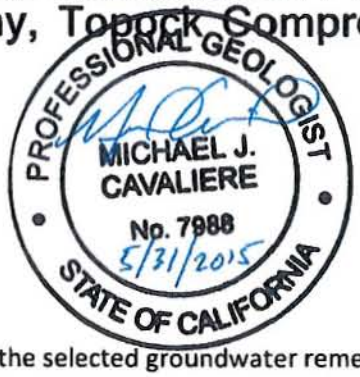
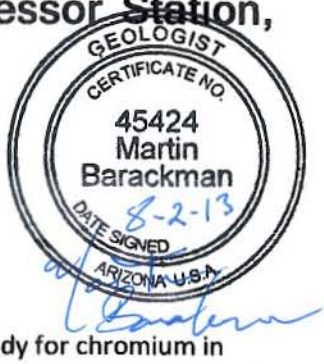
Final Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California





DOCUMENT ID:	PGE20130802A
PREPARED FOR	Pacific Gas and Electric Company
PREPARED BY:	CH2M HILL
DATE:	August 2, 2013

Pacific Gas and Electric Company (PG&E) is implementing the selected groundwater remedy for chromium in groundwater at the PG&E Topock Compressor Station (TCS, or the Compressor Station) in San Bernardino County, California. The existing chromium contamination in groundwater is largely attributable to historical wastewater discharge from TCS operations to Bat Cave Wash, designated as Solid Waste Management Unit (SWMU) 1/Area of Concern (AOC) 1, and within the East Ravine, designated as AOC 10; however, source characterization on the compressor station is ongoing. Remedial activities at the Topock site are being performed in conformance with the requirements of the Resource Conservation and Recovery Act (RCRA) Corrective Action pursuant to a Corrective Action Consent Agreement (CACA) entered into by PG&E and the California Department of Toxic Substances Control (DTSC) in 1996, as well as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) pursuant to the Administrative Consent Agreement entered into between PG&E and the federal agencies (U.S. Department of the Interior [DOI], Bureaus of Land Management [BLM] and Reclamation [Reclamation] and the U.S. Fish and Wildlife Service [USFWS]) in 2005. A Consent Decree between the United States and PG&E under CERCLA was lodged with the United States District Court for the Central District of California on January 10, 2013, and a public comment period on the Consent Decree is currently underway.

As an element of the final groundwater remedy design, freshwater sources including groundwater supply wells and the Colorado River have been considered for use during remedy operation. The average and maximum volume of freshwater required for remedy operation is estimated to be 450 and 900 gallons per minute (gpm), respectively, based on groundwater modeling. In the *Draft Basis of Design Report/Preliminary (30 Percent) Design Submittal for the Final Groundwater Remedy* (CH2M HILL, 2011), PG&E presented a plan to obtain freshwater from a well on the Havasu National Wildlife Refuge (HNWR)—well HNWR-1; however, the California Regional Water Quality Control Board, Colorado River Basin Region (RWQCB) has preliminarily indicated that the HNWR-1 water should be treated to remove naturally occurring arsenic prior to injection. With the RWQCB's consent, PG&E has opened discussions of the need to treat for arsenic with the State Water Resources Control Board (State Board). Because no decision from the State Board has as yet been forthcoming, PG&E continues to evaluate other options for freshwater supply in an effort to find location(s) for new well(s) that could supply an adequate quantity of water and not require treatment prior to use for remedy operation.

This document has been revised from the initial November 20, 2012 submittal (CH2M HILL, 2012a) and the subsequently revised January 28, 2013 submittal (CH2M HILL, 2013) per comments received from the agencies and stakeholders. Comments received on the January 28, 2013 submittal and associated responses were discussed with the agencies and stakeholders during two conference calls conducted on May 14 and May 21, 2013. A summary of comments received and associated responses to those comments for the initial and revised submittals are provided in Attachments A-1 and A-2, respectively.

This technical memorandum presents the plans to evaluate the potential for additional fresh groundwater sources in the Topock Remediation Project area and is organized to include the following key details:

- Section 1.0 Locations for Freshwater Source Evaluation

How is this information related to the Final Remedy or Regulatory Requirements:

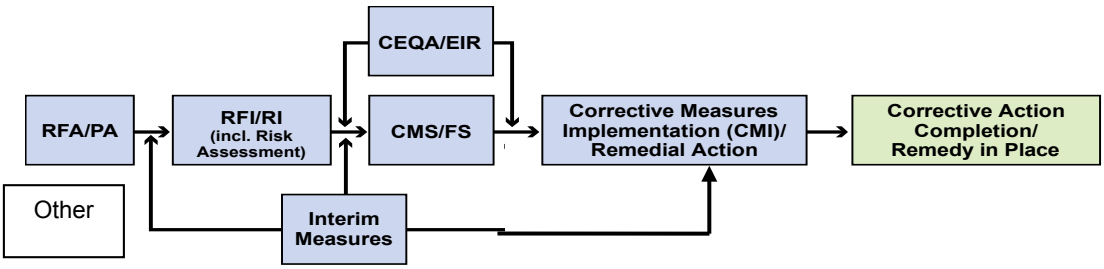
This technical memorandum is required to implementation field activities to find location(s) for new well(s) that could supply an adequate quantity of water and not require treatment prior to use for groundwater remedy operation.

Other requirements of this information?

None.

Related Reports and Documents:

Click any boxes in the Regulatory Road Map (below) to be linked to the Documents Library on the DTSC Topock Web Site (www.dtsc-topock.com).



Legend
RFA/PA – RCRA Facility Assessment/Preliminary Assessment
RFI/RI – RCRA Facility Investigation/CERCLA Remedial Investigation (including Risk Assessment)
CMS/FS – RCRA Corrective Measure Study/CERCLA Feasibility Study

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This technical memorandum presents the plans to evaluate the potential for additional fresh groundwater sources in the Topock Remediation Project area and is organized to include the following key details:

- Section 1.0 Locations for Freshwater Source Evaluation

- Section 2.0 Summary of Geophysical Survey
- Section 3.0 Freshwater Source Evaluation
- Section 4.0 Permitting and Approvals
- Section 5.0 Schedule and Reporting

The following supporting information has been attached to this plan:

- Attachment A – Response to Comments (RTC) Tables
- Attachment B – Compliance Tables
- Attachment C – ADWR Letter Regarding Borehole Decommissioning
- Attachment D – Construction Best Management Practices (BMPs) Plan
- Attachment E – Health and Safety Plan
- Attachment F – Potential Additives for Drilling and Well Development
- Attachment G – Wetland Assessment for Freshwater Well Locations
- Attachment H – Appendix A of the Arizona Pollutant Discharge Elimination System General Permit for De Minimis Discharges to Waters of the U.S.

1. Locations for Freshwater Source Evaluation

In *Geohydrology of the Needles Area, Arizona, California, and Nevada*, Metzger and Loeltz (USGS, 1973a) note that most of the higher-producing wells in the Needles area are completed in river gravels that were deposited since the end of the last ice age, in the geologic epoch known as the Holocene. Generally, these higher-producing wells are located on the Colorado River floodplain. Near the Topock site, the extent of the river floodplain is somewhat limited and there were no potential well locations identified in river gravels located on the river floodplain in areas away from the elevated arsenic concentrations in groundwater near HNWR-1. The channels in the major washes near the river likely were incised during the last ice age and have subsequently been filled with alluvium as the basin has aggraded during the Holocene epoch. The depth of Holocene deposition in the Colorado River channel is estimated to be between 130 and 260 feet in the Parker area (USGS, 1973b). The thickness of fluvial sediments in wells near the Topock site indicate up to 150 feet of Holocene sediment above the older Tertiary alluvium, which is consistent with Metzger's observations near Parker (USGS, 1973b). Therefore, the likely targets for constructing wells capable of producing sufficient water for the final remedy would be Holocene gravel deposits in the wash channels in the range of 150 feet in depth or shallower. Deeper gravel deposits would likely be Tertiary in age and might produce lesser amounts of water and water of lesser quality.

Two general areas—both located within the historic channels of relatively large desert washes—were initially identified where hydrogeologic conditions might be favorable for developing a well capable of 600 gpm or more. One of these locations is in Sacramento Wash, in Arizona, and the other is in an unnamed wash in California about 1.75 miles north of Moabi Regional Park. Within these two general areas, three specific locations (two of which included an additional nearby alternate borehole location) were identified for evaluation (see Figure 1):

- **Former Site A (and A-alt).** This site was located in Arizona on HNWR property approximately 1,800 feet east of Mojave County Highway 10 (Oatman-Topock Highway) within the surface channel of Sacramento Wash (outside of the jurisdictional channel; see Figure 2 and Attachment G). Per the March 26, 2013 letter from DOI to PG&E, DOI has determined that work conducted at Sites A or A-alt would likely result in disturbance of habitat and wildlife on the HNWR and additional impacts on the cultural and archeological resources found in the area. Eliminating Sites A and A-alt from further consideration was determined to be in the best interest of the HNWR for its conservation mission. Therefore, while the results of the surface geophysical survey that was conducted at former Sites A and A-alt are presented in Section 2, discussion about former Sites A and A-alt has been removed from other sections of the Plan related to planned field work for exploratory drilling and groundwater sampling, and supply well installation and aquifer testing.
- **Site B.** This site is located in Arizona on HNWR property adjacent on the west-bound shoulder of Arizona County Highway 10. This site is located just north of the surface expression of the Sacramento Wash, near its confluence with the Colorado River.

- **Former Site C (and C-alt).** This site was located within the surface expression of an unnamed wash in California approximately 1.75 miles northwest of Moabi Regional Park. Per the December 31, 2012 letter from DTSC to PG&E, DTSC has determined that additional exploratory work at or around the vicinity of the area in California (referred to as Site C in the November 20, 2012 submittal of this Plan) will not be approved due in part to the proximity of the site to culturally sensitive areas and a BLM-designated Area of Critical Concern (Beale Slough). Therefore, while the results of surface geophysical survey that was conducted at former Sites C and C-alt are presented in Section 2, discussion about Sites C and C-alt has been removed from other sections of the Plan related to planned field work for exploratory drilling and groundwater sampling, and supply well installation and aquifer testing.

The exclusion of Sites A / A-alt and C / C-alt has resulted in only Site B being available for freshwater supply exploration activities. In order to support contingency planning should Site B site prove unsuitable for a supply well, additional data collection from existing supply well HNWR-1 and from a nearby exploratory borehole is now planned.

- **HNWR-1 Site.** While the existing supply well at this site (HNWR-1) is currently planned to be the source of freshwater for the Topock groundwater remedy, available information regarding the lithology encountered during installation, well construction, and current well performance is very limited. The installation of an exploratory borehole adjacent to the existing HNWR-1 well, in addition to the aquifer test planned for HNWR-1 (see Section 3.2), will provide lithologic, water quality, and hydraulic data necessary for future planning regarding HNWR-1 operation, maintenance, rehabilitation, and/or replacement.

The approximate location of Site B and the HNWR-1 Site (and former Sites A/A-alt and C/C-alt) in relation to existing wells in the region is shown on Figure 1. A conceptual geologic cross section location is shown on Figure 3. The information displayed on this section was obtained from driller's logs available on the Arizona Department of Water Resources website and has not been independently verified by CH2M HILL. The section is annotated to include available data for well yield, static depth to water, and key water quality parameters (arsenic, hexavalent chromium, and total dissolved solids). The available depth to water information shown on the figure was not collected during a contemporaneous event; therefore, it is only to provide for conceptual comparison across the section. The well yield information provides an understanding of the performance of each well, but due to variable screen lengths and unknown well conditions this data may not be particularly useful to compare the yield of the formation across the section. The sand and gravel unit noted at HNWR-1 below a depth of about 83' may be the Holocene gravel that is the target for a new supply well. The two next-nearest wells on this section, Topock-3 and GSRV-1 are not located in the channel of Sacramento Wash so they don't provide any information about the extent of Holocene gravel that is the target of this investigation.

2. Summary of Geophysical Survey

The surface expression of the wash channels in the area of former Sites A and C are between 0.25 and 0.5 mile wide. In order to maximize a well's yield, the well should be located in the thickest sequence and/or coarsest facies of recent alluvial gravel. With a surface channel width greater than 0.25 mile, it is not certain that the deepest portion of the underlying paleochannel, or the portion with the coarsest alluvial sediments, would be beneath the center of the present day channel. Therefore, during the week of October 22, 2012, a geophysical survey (surface resistivity logging) was conducted across the wash channels near former Sites A and C as a means to locate the most favorable portion of the subsurface channel before drilling exploratory borings. Surface resistivity logging was not conducted around Site B because there is not sufficient flexibility in where this exploratory borehole can be drilled to warrant using a geophysical survey. Tribal monitors observed the geophysical survey.

Figure 1 presents the location of the surface resistivity survey lines.Cross-sections providing the color-coded results of the survey are presented on Figure 4. Surface resistivity cannot distinguish between the sediment and groundwater resistivities. Freshwater has much higher resistivity than salty water, and gravel has higher resistivity than clay or silt. As such, the blue areas on the resistivity plots can represent fresher water and/or coarser grained sediments. Dry sediments and most types of bedrock also have high resistivity and would also be expected to show up as blue on the resistivity plot.

The current interpretation, based on the basin's geologic history, suggests that shallow areas of higher resistivity are the best target for exploratory drilling and groundwater sampling. Deeper areas of higher resistivity identified at both former Sites A and C are unlikely to represent Holocene gravels that have been proven to provide the best freshwater sources in this basin. In addition, the quality of the resistivity data in the deeper portions of a surveyed section is lower, making interpreting deeper features less certain than shallower features.

There is evidence from existing wells in both Arizona and California indicating that the salinity increases with depth. The Topock-3 water supply well[1], located approximately 0.75 mile from the southern end of the former Site A survey line, was originally screened to a depth of 250 feet below ground surface (bgs), but it produced saline water. The bottom 100 feet of Topock-3 was subsequently sealed, and water quality improved substantially. Saline water is also present in the deeper part of the aquifer near TCS. Therefore, the current interpretation suggests that the best opportunity of finding freshwater is likely from shallower depths.

The former Site A resistivity results indicate a relatively large interval of higher resistivity (blue) in the target depth range near the southern end of the survey line. This area is in the depth range where Holocene-age sediments are expected and has a shape consistent with a buried stream channel. There is a larger area of higher resistivity identified in the middle of the survey line, however the depth of this area (from 200 to 400 feet bgs) suggests that it is likely Tertiary in age and, therefore, might not produce as much water as the shallower target. Therefore, the shallower area of higher resistivity near the southern end of the line has been identified as the best target for exploration drilling.

Surface resistivity results from the Site C survey line indicate only one area of higher resistivity in the depth range of interest (less than 150 feet), which is located about 500 feet from the northwest end of the survey line. This feature is smaller than the target area identified on the former Site A line, and in general, the resistivity of the entire profile at former Site C is lower than former Site A, potentially indicating lower permeability and/or more saline water. There is a deeper zone of higher resistivity present near the southeast end of the survey line; however, for the same reasons cited above regarding deeper features, this area is not considered an ideal target for exploratory drilling. The primary target for exploratory drilling at former Site C is the shallower area of higher resistivity.

3. Freshwater Source Evaluation

As discussed in Section 1, groundwater conditions will be evaluated at Site B and at the existing HNWR-1 Site. This section details the specific activities and methods planned at each of the two sites, which includes:

- **Exploratory Borehole Drilling and Groundwater Sampling** to assess groundwater quality and qualitatively assess groundwater quantity, and
- **Freshwater Supply Well Installation and Testing** to obtain a true estimate of the quantity of available groundwater, which can only be obtained by testing a properly constructed supply well.

The viability of a freshwater supply well at either Site B or the HNWR-1 Site will not be known until the results from each of these activities are obtained. While there is currently no existing well at Site B, HNWR-1 (an irrigation well that partially penetrates a portion of the unconsolidated aquifer) was previously installed and is available for testing. Therefore, the specific approach to evaluation at each location will be different utilizing the following steps:

1. Install exploratory boreholes at each location to assess groundwater conditions in the upper 400 feet of the unconsolidated portion of the aquifer (or to the top of bedrock, if shallower than 400 feet).
2. Discuss exploratory borehole data with the agencies:

[1] The Topock-2 and Topock-3 wells were evaluated by PG&E as a potential freshwater source; however, the wells do not offer any advantages over HNWR-1 because there are not currently significant differences in the water quality, and there is greater uncertainty about the future water quality as well as the quantity of water available (CH2M HILL, 2012). The casing of Topock-3 is in very poor condition, so the future ability of this well to continue to provide water, especially if the pumping rate were dramatically increased as would be necessary for the remedy, is uncertain. In addition, it is known that poor quality water exists in aquifer below the bottom of Topock 3, so future water quality might decline at increased pumping rates. At HNWR-1, the casing is in good shape so it is not likely to collapse. HNWR-1 is likely in a thicker portion of the aquifer with greater distance to bedrock than Topock 3 and therefore may not be as likely to pull in poor quality water from below.

a. Site B – If water quality data (e.g., key analytes at concentrations below the MCL [see planned analytical list in Section 3.1]) and geologic data (e.g., a significant thickness [tens of feet] of coarse sand and gravel) from Site B is favorable, then a supply well will be installed at Site B.

b. HNWR-1 Site – Water quality and geologic data will be reviewed, but the decision to install a new supply well at this location will be postponed pending further testing/operation of the existing HNWR-1 well.

3. Install new supply well at Site B, if conditions are determined to be appropriate.
4. Conduct aquifer testing activities at HNWR-1 and the new Site B supply well (if installed).
5. Discuss supply well testing data with the agencies. Generally, a supply well will be considered a viable source of freshwater for the groundwater remedy if a sufficient quantity of enhanced quality water relative to HNWR-1 (e.g., arsenic concentration below the MCL), and as required by the remedy, can be sustained. If neither the new well at Site B or the existing HNWR-1 well proves to be a viable source of freshwater for groundwater remedy operation then plans for the installation of new supply well at the HNWR-1 Site will be discussed with the agencies.
6. As determined appropriate, install new supply well at HNWR-1 Site and conduct aquifer testing activities. The design of a new well at the HNWR-1 Site will be based on the data collected from the exploratory borehole. Further, to minimize disturbance to the area, the backfilled exploratory boring at the HNWR-1 Site (installed during Step 1) will be over-drilled for new supply well installation, as practicable. It is assumed that the existing HNWR-1 well will be left in place, and for purposes of groundwater remedy operation, used as an observation well.
7. Discuss supply well testing data with the agencies.

Implementation details specific to conducting the exploratory borehole drilling and testing, installing and testing the freshwater supply wells, and managing all wastes generated during these activities are discussed in the following subsections. All activities will be implemented in accordance with the Best Management Practices (BMP) Plan developed for this project to meet the substantive requirements of the Arizona General Construction Permit (AZ2013-001), and in accordance with the Topock Program Health and Safety Plan, which has been updated for details specific to this project. The BMP Plan and the Health and Safety Plan are included as Attachments D and E, respectively.

3.1 Exploratory Borehole Drilling and Groundwater Sampling

Exploratory boreholes will be drilled using a rotary drilling method with casing advance capabilities using air and potentially freshwater[2] as the drilling fluid (chemical additives are not required when drilling with air or fresh water). This drilling method is commonly used for groundwater exploration and water supply well installation, and it will allow depth-specific lithologic and groundwater samples to be collected. While it is not anticipated, and not preferred, the use of bentonite-based drilling mud may be needed depending on the conditions encountered in the field. If drilling mud is required, then fluid additives including soda ash (for water conditioning), and Baroid Quik Gel®, Quik-Trol®, EZ-Mud®, Penetrol®, and N-Seal® (for control of drilling fluid properties) might be needed (see Attachment F for additional information regarding these additives). If the use of drilling mud or other additives are determined necessary during field work, HNWR and the regulatory agencies will be notified prior to use. The equipment required to conduct the exploratory drilling will include a drilling rig (likely track-mounted but potentially truck-mounted), rig support truck (highway-rated), water truck (highway-rated), forklift and/or backhoe (rubber tire), and crew vehicles (highway-rated). Examples of additional miscellaneous equipment that might be required to conduct the work include, but are not limited to, mobile storage tanks and bins, auxiliary compressors, pumps, and generators. Per the Programmatic Biological Assessment (PBA), up to 1 acre of upland

[2] While fresh water may be used as a drilling fluid, given the shallow depth to water at Sites B and the HNWR Site, it will unlikely be needed. Nonetheless, the potential sources of fresh water for drilling include the Topock Compressor Station supply/ Southwest Water supply wells, or Golden Shores Water Company supply.

habitat may be disturbed during work at each exploratory drilling site; however, the work will be conducted such that the total area disturbed is minimized.

The exploratory boreholes will be drilled to a total depth of up to 400 feet bgs and have a diameter of up to 8 inches (nominal). As discussed in Section 1, the total depth of Holocene deposition is estimated to be between 130 and 260 feet bgs based on review of literature, and not based on site-specific information. If good quality water and permeable aquifer materials exist in older sediments below the Holocene, it would be prudent to extend the well to greater depths in order to maximize the production rate. Conversely, it is important to know if poor quality water exists at depths below the freshwater zone, as was found in the Topock-3 well. If this is the case, it could be prudent to screen the well at shallower depths to avoid drawing in the poor quality water. Therefore, the investigation depth of 400 feet is being used for the exploratory boreholes in order to collect as complete a data set as reasonably possible from which to design the supply well. Bedrock is not a target source of freshwater supply, and therefore the exploratory boreholes would not be drilled into bedrock any deeper than that required to confirm its occurrence.

Borehole lithology will be logged from drill cuttings at the surface; the drill cuttings, which due to the high up-borehole velocity of the compressed air used for drilling, are observed in near real-time with the depth of the drill bit. As requested by the Hualapai Department of Cultural Resources, special handling procedures for drill cuttings generated from clay beds will be used in the field (this does not include clay-containing sediment mixtures, only clay beds). If clay bed(s) are encountered during drilling, then the cutting from those interval(s) will be set aside on 100% cotton muslin (dye free) for future disposition, following discussions with the Tribes. PG&E will notify the agencies and Tribes in the event clay material is encountered and separated for storage.

Once the water table is reached, zone-specific groundwater samples will be collected from the borehole approximately every 50 feet to assess changes in water quality with depth and qualitative changes in borehole capacity. Borehole capacity is a qualitative measurement of aquifer yield (observing drawdown in the borehole for a given extraction rate during drilling or pumping of the open borehole), but cannot be used as a measure of permeability or transmissivity. These samples will be collected by pumping from within the drill casing using an electric submersible pump or equivalent that minimizes disturbance of the purged water and maximizes data quality (air-lift will be the least preferred groundwater purging method for sample collection).Water quality measurements will be monitored at the surface (e.g., specific conductance, pH, oxidation-reduction potential, etc.). All groundwater samples will be analyzed for Title 22 (CAM 17) metals, silica, fluoride, and nitrate. A subset of samples (approximately half of those collected) will be analyzed for the list of water quality parameters that were used to characterize HNWR-1, including CAM 17 metals, perchlorate, petroleum hydrocarbons, pesticides, polyaromatic hydrocarbons, polychlorinated biphenyls, herbicides, chloride, sulfate, nitrate, nitrite, fluoride, bromide, phosphate, general minerals, total organic carbon, pH, gross alpha and beta, and stable isotopes of hydrogen and oxygen.

Based on review of existing hydrogeologic information in the area, the exploratory boreholes are expected to be advanced within an undivided aquifer, and individual aquifers separated by confining units are not expected to be encountered. Therefore, consistent with minimum well construction and abandonment requirements in Arizona Administrative Code R12-15-816 and substantive policy described in the ADWR “Well Abandonment Handbook” (ADWR, 2008), each exploratory borehole will be decommissioned by backfilling from total depth to 22 feet bgs with either bentonite grout or clean granular material (variance option “Alternative 4” of the Well Abandonment Handbook, see Attachment C). The interval from 2 to 22 feet bgs of each borehole will be sealed using cement bentonite grout, reserving the upper most 2 feet for backfill with granular material from the existing site area (e.g., drill cuttings from the borehole). This plan is a slight variance to Alternative 4 in that the 20 foot grout seal will be placed from 2-22 feet bgs and not from 0-20 feet bgs. If this variance is not approved by ADWR, then the interval from 0-20 feet bgs will be sealed. All granular backfilling and sealing materials will be installed using a tremie pipe, which may include the drill casing depending on the drilling method. As determined necessary, an additional tremie pipe installed within the drill casing will be used to install fluid materials used for backfilling and sealing (e.g., grout) so that the material is introduced near the bottom of the borehole and standing water is displaced upward. If multiple aquifers are encountered, then additional intervals of sealing material might be

required to properly decommission the borehole. Using granular materials rather than grout to backfill the exploratory boreholes allows the future option of later reaming the same borehole to construct a supply well, thereby minimizing the number of boreholes drilled.

The approximate location coordinates presented in Northing/Easting format (North American Datum [NAD] 83 CA State Plane, Zone 5 [feet]) for each location where drilling might be conducted are:

Location	Northing	Easting
HNWR Site	2104232.81	7619608.89
Site B	2107502.98	7619598.81

All gated access routes will be maintained closed during working hours for activities implemented as part of this plan. Based on site experience communicated by HNWR during the January 3, 2013 comment resolution meeting, PG&E will plan to have a security detail present at all work sites during non-working hours to manage the potential for unauthorized trespass. Following well installation and testing, installed wellheads will be secured with fencing and/or other additional temporary security measures as determined appropriate and permissible by the HWNR (see Section 3.2).

3.2 Freshwater Supply Well Installation and Aquifer Testing

Based on the data collected during exploratory drilling and groundwater sampling, up to two new groundwater supply wells might be installed. If the Site B exploratory boring encounters a significant thickness (tens of feet) of coarse sand and gravel and shows overall good water quality (e.g., analyte concentrations below the MCL), then it would appear that there is a good chance of getting adequate supply from that location Note that the water quality produced from a long screen well is a flow-weighted average of water quality from many different flow zones zone within the well screen. It is possible to have less than acceptable water quality in a zone that doesn't yield much water and still have a well that produces acceptable water quality. For that reason, there should be more weight given to sample results from the high permeability sections of the exploratory boreholes and less weight given to samples from the low permeability sections.

Ideally, boreholes for supply well construction will be drilled over the backfilled exploratory borehole at a given location to minimize the total number of boreholes installed; however, if the exploratory borehole were to be backfilled with sealing material near the target-screened interval for the supply well, then this approach might not be practicable because the sealing material could interfere with groundwater production from the formation. In this case, a new borehole would be drilled near the exploratory borehole. As described above, up to 1 acre of upland habitat may be disturbed for each exploratory borehole, and this same 1 acre area may be further disturbed by the freshwater supply well installation.

Boreholes for supply well construction will be drilled using drilling methods similar to the exploratory boreholes (i.e., casing advance), but the supply wells will have a larger diameter. Borehole diameter may be up to 42 inches in the uppermost part of the well where surface casing will be set. Borehole diameter in the deeper sections of the supply well would likely be 18 to 24 inches. Therefore, supply well drilling will require a larger drill rig and associated support equipment. Well construction details will be determined based on the lithologic, water quality, and hydraulic data collected from the exploratory borehole. Final design of the wellhead protection and associated instrumentation and control equipment[3], as necessary, will be included in the forthcoming Addendum to the *Basis of Design Report/Intermediate (60 Percent) Design Submittal for the Final Groundwater Remedy* (CH2M HILL, 2013 in progress) (see Section 5); however, temporary wellhead protection measures, which are intended to be similar to those used for the existing HNWR-1 well, must be considered at the time of construction. Newly installed supply wells will be constructed so that they are sealed to prevent surface water inundation or so that the well seal is above the 100-year floodplain level. In addition, the wellhead will be completed with a steel monument casing within a concrete foundation with steel bollards at the foundation perimeter to resist damage and stabilize the well casing, and a temporary perimeter fence will be installed to

[3] The USFWS HNWR will be consulted regarding well head design such that the setup provides for alternative water uses (e.g. Refuge reclamation).

secure the location from unauthorized access until the groundwater remedy design is finalized. Temporary wellhead protection measures and signage requirements will be developed in coordination with USFWS HNWR. All signage used for the temporary and permanent wellhead completion will be for the purpose of compliance, and not to identify or draw unnecessary attention to the infrastructure. Following construction, a combination of bailing, surging, and pumping will be used to remove fluids introduced during drilling and develop the hydraulic connection between the well screen, gravel envelope, and the formation. Dilute chemical additives that might be used during well development to enhance well performance include Baroid Aqua-Clear® (dispersant) and sodium or calcium hypochlorite (disinfection) (see Attachment F for additional information regarding these additives). If the use of other additives is determined necessary during field work, the HNWR and the regulatory agencies will be notified prior to use.

Hydraulic tests—including step-rate and constant-rate extraction tests—will be conducted at each newly installed supply well to collect data about both well and aquifer performance and changes in water quality when pumped over a period of multiple days. If the aquifer contains abundant coarse grained material and observations of pumping water levels during well development indicate abundant well capacity, then it might be possible to confirm well capacity with a short-term step-rate extraction test rather than a longer term constant-rate test. If the aquifer conditions and well capacity appear marginal during drilling and development, then a constant-rate pump test would be prudent to prove the well capacity. A step-rate extraction test likely will require 1 to 2 days, and a constant-rate extraction test likely will require up to 96 hours of continuous pumping; however, the duration of these tests might need to be adjusted shorter or longer depending on the data collected and/or as discharge constraints are identified. Discharge constraints include persistent ponding, runoff towards a jurisdictional channel, the Colorado River, or Mojave County Highway 10, or filling storage vessels (if used). Because water generated during testing will be discharged to the ground surface it is possible that infiltration of discharged water could begin to influence water levels in the aquifer during a long-term pumping test. The purpose of this pumping test is to establish the capacity of the well rather than provide estimates of aquifer properties. The infiltration of discharged water is a relatively slow process that will occur over a relatively large area and likely have only small effects on the production rate of the well during a four day test. It is not likely that the results of the test would be substantially skewed due to infiltration of test water. The only way to eliminate the potential for any interference of test water is to either discharge farther away from the area or to the River, or to truck or pipe the water offsite, and none of these options is practicable. Data collected from these tests will be incorporated into design of the final groundwater remedy.

In addition to the testing for potential new supply wells, a constant-rate extraction test might be conducted at the existing well HNWR-1 (see Figure 2). The test purpose and implementation details would be similar to that mentioned above for the potential new supply wells. Based on the well operation data obtained from HNWR-1 and the samples collected during well sampling events, this test would be conducted by pumping the well near its maximum yield (approximately 800 to 1,000 gpm) for up to 96 continuous hours. Assuming a flow rate of 1,000 gpm, the total estimated discharge is over 5.5 million gallons. The test duration might need to be adjusted shorter or longer depending on the data collected and/or as discharge constraints are identified. Ideally, the test will be conducted using the pump that is currently installed in the well; however, depending on the final design of irrigation pipe layout, a temporary test pump might need to be installed.

Samples will be collected during the constant rate aquifer test to evaluate if water quality is changing over time. For a four day test, the sampling times will be 1 hour, 6 hours, 12 hours, 24 hours, 48 hours, 72 hours and 96 hours after the start of the test. In addition to field parameters, all groundwater samples will be analyzed for Title 22 (CAM 17) metals, silica, fluoride, and nitrate. Samples from the beginning and end of the test (1 hour and 96 hours) will be analyzed for a longer list of analytes, including CAM 17 metals, perchlorate, petroleum hydrocarbons, pesticides, polyaromatic hydrocarbons, polychlorinated biphenyls, herbicides, chloride, sulfate, nitrate, nitrite, fluoride, bromide, phosphate, general minerals, total organic carbon, pH, gross alpha and beta, and stable isotopes of hydrogen and oxygen. If the test ends early, then a sample will be collected near the end of the test and analyzed for the long list of parameters.

DTSC has suggested that if the majority of the arsenic was being contributed from a specific depth zone in HNWR-1, it might be possible to cement or otherwise seal off the high arsenic zone and reduce the arsenic concentration in the HNWR-1 discharge. This technique has been successful in long-screen municipal wells, particularly in wells that penetrate multiple aquifers which are separated by aquitards. It is not clear whether it could work in HNWR-1, with a relatively short (65 foot) screened interval and no aquitards dividing the aquifer into separate zones.

In order to evaluate the possibility for well modifications to exclude arsenic, it would first be necessary to evaluate where the arsenic is entering the well. This is done by collecting depth specific samples while the well is pumping, ideally at a rate close to the design flow rate of 450 gpm. The process involves lowering a profiling tool into the screened interval of the well below the pump. The profiling tool includes a gas-drive pump to lift samples to the surface from specific depths. The tool can also release a small pulse of dye into the well while the well is pumping. By timing the arrival of the dye at the surface from different depths in the well, it is possible to develop a profile of how much water is entering the well at each depth where dye is released. By collecting depth specific samples for arsenic in conjunction with the dye release measurements of flow, a profile of the arsenic concentration with depth can be derived.

The pump currently in HNWR-1 is an 8-inch Grundfos® pump with an outer diameter of 8 5/8 inches. This pump is set in 10-inch diameter steel casing, leaving an annular space of less than ¾ inch around the pump. BESST, Inc provides well profiling services using miniature tools that can often be lowered past a pump. The BESST profiling tool is ¾ inch in diameter. BESST considered it unlikely that the tool could be worked past the existing pump in HNWR-1. It would only fit if the pump happened to be pushed up against one side of the well and if the tool happened to descend on the side of the pump where there was sufficient space for it to pass.

About 25 feet below the pump, the diameter of the HNWR-1 well decreases from 10 inches to 6 inches. The profiling tool would need to be worked into this 6-inch portion of the well. BESST has a miniature camera (also ¾ inches in diameter) that could be used to attempt to position the profiling tool and allow it pass into the 6-inch lower screen, but getting both the camera and the profiling tool past the existing pump in HNWR-1 is considered very unlikely, in part because the camera and profiling tool are not easily maneuvered once down-well.

The approach recommended by BESST is to remove the 8-inch pump from HNWR-1 and install a 6-inch pump along with a 1 ¼ inch access tube extending just past the pump. This access tube would provide a clear path for the profiling tool and the camera to reach the screened section of the well below the pump. The camera would be inserted first, and used to confirm the construction details and condition of well screen. The profiling tool would then be inserted and the camera would be used to help guide the tool into the 6-inch section of well screen. Profiling would be conducted while the well was pumping at approximately the design flow rate for the remedial action of 450 gpm. Samples would be collected on 10 foot intervals throughout the screened interval of the well. Samples would be submitted to a certified laboratory for CAM metals and TDS analysis, at a minimum. Additional constituents specified in Section 3.1 will also be included for analysis provided the available sample volume is adequate. Electrical conductivity and pH would be measured in the field. The profiling would likely require two days to complete.

The potential impact of the hydraulic testing and potential long-term use of the proposed wells on the local and regional aquifer will be addressed by Mitigation Measures Reporting Program (MMRP), specifically mitigation measure WATER-1. Initial assessments using an existing groundwater model indicated that there would be no adverse effect from continuous operation of the HNWR-1 on the nearest pumping wells (Topock 2 and 3), which are located less than 0.2 mile from HNWR-1. During the revegetation pilot project, HNWR-1 was routinely pumped at rates of approximately 1,000 gpm for periods of up to 12 hours per day with no reported adverse effects on any nearby wells. The proposed new well locations are approximately ¾ mile from the Topock 2 and 3 wells so pumping from these locations would have even less effect than pumping from HNWR-1. The Golden Shores wells are approximately 2.5 miles away, well beyond the radius where pumping at the proposed new well locations would be expected to have measureable effects. Further evaluations of the effects of pumping from the new well will be made during the design process, using estimates of hydraulic properties of the aquifer developed through testing of the new well.

3.3 Management of Material Generated During Investigation

Three types of materials will be generated during the activities outlined for the alternative freshwater source evaluation: drill cuttings, purged groundwater, and trash. Drill cuttings and purged groundwater will be managed in accordance with site-specific and regulatory practice for groundwater supply well drilling. Note that, because this freshwater source evaluation is part of a CERCLA response action, implementation plan activities conducted onsite are covered under the permit exemption codified in Section 121(e)(1) of CERCLA. While the permit exemption applies to the administrative or procedural elements (e.g., preparing and submitting permit applications and obtaining permits), the substantive requirements of the applicable laws remain. Groundwater discharge and drill cuttings will be managed in compliance with the substantive requirements of Aquifer Protection General Permit 1.04, as authorized by Arizona Administrative Code Section R18-9-B301(D).

Drill cuttings will comprise a combination of dry and saturated unconsolidated materials. This material will be contained at the ground surface using a cyclone, or equivalent collection device, that is attached to the cuttings return pipe and empties into a hopper. Cuttings, which appear to be clean, will then be spread on the ground near the drilling site (i.e., in an upland area, and not to jurisdictional waterways) in a manner consistent with HNWR approval and applicable requirements. In the chance that fluid additives are required during drilling (e.g., drilling mud or other additive discussed in Sections 3.1) then drill cuttings will be temporarily stored at the wellhead and sampled to determine if it is suitable for discharge to the ground surface. If it is determined that the drill cuttings are not suitable for discharge to the ground surface the material will be transported off site for disposal.

Purged groundwater will be generated during drilling, sampling, well development, and well testing activities. During drilling activities, it is estimated that up to 80,000 gallons of purged groundwater may be generated for each exploratory borehole installed, and up to 5.5 million gallons for each supply well installed. As planned, all purged groundwater will be discharged to the ground surface in a manner consistent with HNWR approval and the Arizona Aquifer Protection General Permit (see Section 4.0). Purged groundwater will be discharged directly to the ground surface in areas that are not jurisdictional waterways using a discharge pipe (for volumes that can be discharged slowly) or sprinkler irrigation system (for volumes requiring faster discharge). If fluid additives are required during drilling or well development (e.g., drilling mud or other additive discussed in Sections 3.1 and 3.2) then groundwater purged during these activities will be temporarily stored at the wellhead and sampled to determine if it is suitable for discharge to the ground surface. If it is determined that purged groundwater is not suitable for discharge to the ground surface then it will be contained and transported off site for disposal.

The approach to discharge of large volumes of water generated at Site B and HNWR-1 was discussed in detail with the agencies based on comments received on the previous submittals of this Implementation Plan. The HNWR-preferred approach to discharge is to utilize existing wash channels such that the potential for an increase in invasive plant species or feral hog usage (in the event of impounded water, which is not planned) is minimized. However, PG&E noted that direct discharge to the channels may not be practicable if infiltration rates are not high enough to prevent runoff from reaching barriers like the Colorado River or Arizona County Highway 10. To manage this potential for runoff, PG&E plans to use sprinkler systems in existing open areas (outside of the wash channels). As a part of this approach, PG&E will conduct reconnaissance of the irrigated area approximately 1-2 months after work (or as directed by HNWR) to determine if the irrigation stimulated unwanted vegetation. If so, PG&E will work with HNWR to determine if mitigation in the form of herbicide application may be required. As discussed with HNWR during the development of this plan, herbicides that may be directed for use include Garlon® (for use in dry areas) or Habitat® (for in areas of standing water). As needed to address specific occurrences of unwanted vegetation, these herbicides would be applied using basal/cut-stump or foliar (i.e. applied to needles or leaves) methods.

The proposed irrigation area and preliminary equipment layout is indicated on Figure 2. It is estimated that five to as many as fifteen, 20,000 gallon mobile water tanks (frac tanks) may be staged in the work area during various phases of work to temporarily store purged groundwater if the generation rate exceeds the irrigation rate. The Site B and HNWR-1 “sprinkled area” was selected because it is located in relatively large, flat, previously disturbed area where discharge activities can be well monitored. In addition, surface topography at this area is favorable for avoiding runoff during discharge. As planned, irrigation will be conducted using a network of high-volume

sprinklers (Nelson® Series 200, or similar) that will be connected by temporary, above grade aluminum irrigation pipes (approximately 4-8 inches in diameter); however, final design and associated details (e.g., pipe diameter, specific sprinkler location and range, etc.) might need to be adjusted based on actual field conditions (e.g., well capacity or location of sensitive biological or cultural resources) at the time of testing. In addition to the indicated discharge area, if requested by HNWR at the time of work, PG&E will include piping and equipment in the irrigation system such that some discharge water can be delivered to the area of the ongoing Sacramento Wash Revegetation Project. PG&E will continue to coordinate with HNWR to determine the specific area outside of the potential work area that should receive irrigation water (see Figure 2). Personnel will remain on site during the duration of discharge activities to monitor for persistent ponding and runoff. Water will be discharged to these areas in a manner that minimizes ponding and limits the potential for runoff. During discharge, if persistent ponding or runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 is observed, corrective action (e.g., modification of sprinkler layout, change in discharge rate, or using hand tools to control disperse ponding/control runoff) will be taken. If it is determined that persistent ponding or runoff cannot be easily corrected, then discharge will be discontinued. If rainfall occurs during discharge to the extent that the runoff of discharged water cannot be effectively monitored, then the discharge will be discontinued. It is impossible to predict the infiltration rate of the discharge areas. Therefore, the degree of infiltration and runoff will be closely monitored at all times during discharge. The discharge will be stopped if it is determined that persistent ponding and runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 cannot be effectively controlled.

To minimize total ground disturbance temporary irrigation pipes will be installed on the ground surface whenever possible. Vehicle traffic will be diverted away from above-ground irrigation piping using signage and delineators. Temporary pipe crossings/ramps will be used when vehicle crossing of above-ground irrigation pipes cannot be avoided. Temporary irrigation pipes will only be recessed in the ground if the pipe diameter is too large to be safely crossed using a temporary pipe crossing/ramp.

Trash associated with normal work operations, which might include well material packaging, plastic sheeting, and food waste, will be removed from the work site daily and transferred to a dumpster located on PG&E property. Dumpster contents will be disposed at an offsite landfill.

4. Anticipated Approvals and Authorizations

Implementing the activities presented in this implementation plan will require prior approval from DTSC and DOI pursuant to their authority under RCRA and CERCLA, respectively. The 2007 PBA was extended on December 27, 2012 until December 31, 2017, and modified to cover this Freshwater evaluation work, in addition to certain other modifications. All proposed activities will be conducted in a manner consistent with the PBA and, therefore, will comply with requirements of the federal Endangered Species Act (ESA). Compliance with Section 106 of the National Historic Preservation Act will involve complying with the requirements and mitigation measures contained in the Programmatic Agreement (BLM, 2010) and the *Cultural and Historic Properties Management Plan* (BLM, 2012) and BLM's consultation with the Tribes, other signatories, and invited signatories to the Programmatic Agreement pursuant to the requirements of the Programmatic Agreement's consultation protocol.

Approval from the DTSC is subject to review pursuant to the California Environmental Quality Act to determine whether the activities presented in this implementation plan present any new or substantially more severe significant impacts compared to the impacts evaluated in the certified Final Environmental Impact Report (EIR) for the remedy. In carrying out the activities presented in this implementation plan, PG&E will comply with applicable mitigation measures set forth in the adopted Mitigation Monitoring and Reporting Program (MMRP) (DTSC, 2011b) for the project.

Applicable or Relevant and Appropriate Requirements (ARARs) and associated compliance actions for this evaluation are summarized in Attachment B (Table B-1). Substantive compliance requirements associated with various other project documents are detailed in Attachment B (Table B-2). PG&E plans to obtain the approval to drill from the Arizona Department of Water Resources prior to starting exploratory drilling and/or well installation activities. Plans for groundwater discharge will be conducted under the Arizona General Aquifer Protection Permit. The general permit is self-implementing and notification to ADEQ is not required. PG&E is not planning to

discharge dredged or fill materials to waters of the United States, and therefore, no additional requirements of Clean Water Act 404/401 apply.

PG&E's understands that authorization to access lands owned by the federal government at Site B and the HNWR-1 Site will be provided in the Department of Interior's approval of this Implementation Plan. In addition, before subject activities are implemented, underground service alert notifications will be made so that utility companies can locate and mark the locations of their underground facilities.

4.1 Biological Evaluation

The original PBA expired in December 2012 and was extended on December 27, 2012 until December 31, 2017. The current PBA includes a modification of the 2007 PBA Action Area[4] along the boundaries for investigative activities and includes up to four test borings and up to two potential additional wells to accommodate freshwater source investigation work prior to final remedy construction. Upland habitat loss threshold of 8 acres would cover the disturbance from the installation of up to two exploratory borings and up to two potential additional wells (of which up to 2 acres of disturbance would be attributable to the exploratory borings and wells), in the current PBA.

The current PBA addresses a variety of PG&E Topock remedial and investigative actions, including those identified in this Implementation Plan, and the modified Action Area encompasses the geographic scope of these activities. The intent of the PBA is to provide programmatic coverage of these actions up to the final remedy and avoid the need for individual project-specific consultations under ESA. The purpose of this biological evaluation is to outline the activities included in this Implementation Plan as they relate to federally listed species in the area and to determine whether the actions are within the context and boundaries of the current PBA. Sections below discuss project timing, project location and habitat sensitivity, habitat loss, conservation measures, listed species determinations, and conclusion, respectively. The federally listed species being considered and evaluated include the southwestern willow flycatcher (*Empidonax traillii extimus*), Yuma clapper rail (*Rallus longirostris yumanensis*), Mojave desert tortoise (*Gopherus agassizii*), bonytail chub (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*) and the candidate species Sororan desert tortoise (*Gopherus morafkai*).

4.1.1 Project Timing

The activities included in this Implementation Plan are anticipated to be conducted between early August and early November 2013. The start date is dependent upon receipt of necessary approvals and authorizations. The anticipated avian nesting season is defined as March 15 to September 30 in the PBA. Should the activities occur within the avian migration or nesting season, the required work windows and buffers outlined in the PBA will be implemented for any federally listed species that may be affected.

4.1.2 Project Location and Habitat Sensitivity

Site B and the HNWR-1 Site are within the 100-year floodplain limits of the Colorado River floodplain and include tamarisk species associated with both riparian and upland areas. These areas consist of either previously disturbed areas or a minor amount of quailbush scrub near the southern portion of the HNWR-1 Site. It is anticipated that only existing roads and access pathways requiring minimal access improvements in select areas will be used during the work proposed in the Plan. Neither the removal or trimming of vegetation is expected to be required to gain access for equipment. Trimming, if required, will be focused on non-native species (e.g., tamarisk) and the trimming of native species (e.g., palo verde and mesquite) will be avoided or minimized to the extent practicable. Prior to mobilization, a biologist will identify acceptable access routes, staging areas, and work zones. In addition, a biologist will be on site during all vegetation trimming activities.

The Sonoran desert tortoise is the only federally listed or candidate species that may occur within the creosote bush scrub or Mojave wash scrub habitats at the proposed freshwater source evaluation sites. The habitat in the area is considered marginal due to limited suitable plants and soils for forage and cover sites, past habitat

[4] The Action Area is the area that has or is being studied for potential biological impacts resulting from activities of the groundwater remediation, including the freshwater source evaluation. Previously this area was identified as the Area of Potential Effect (APE) but to avoid confusion with nomenclature used in the Programmatic Agreement developed under the National Historic Preservation Act the term was changed to Action Area in the Programmatic Biological Assessment Reinitiation in December of 2012.

disturbance and fragmentation, and natural and constructed barriers that deter this species from entering the site.

Other listed species that may potentially occur or are known to occur within the Action Area include the Yuma clapper rail, bonytail chub, and razorback sucker. Project activities will not occur within the Topock Marsh or Colorado River, where these species reside.

4.1.3 Habitat Loss

Loss of habitat will be minimized to the greatest extent possible. The activities included in this Implementation Plan may disturb up to 1 acre per site location and are proposed in upland locations. Up to two locations are currently proposed (Site B and the HWNR-1 Site), which equates to 2 acres of potential disturbance to upland habitat (this is within the approved upland vegetation loss threshold of 8 acres approved per the PBA). All activities at Site B and the HNWR-1 Site will be conducted in previously disturbed areas, thereby reducing the impact to upland habitat vegetation; it is anticipated that actual disturbance to upland habitat will be less than 2 acres. Where it cannot be avoided, vegetation will be trimmed or crushed for equipment to access sites. The trimming or crushing of vegetation is not considered habitat loss as defined in the PBA. While not anticipated, any vegetation removal will be coordinated with the project biologist and in compliance with the PBA and the applicable mitigation measures set forth in the MMRP adopted by DTSC.

4.1.4 Conservation Measures

The conservation measures identified in the PBA for listed species and habitat will be implemented. Any habitat loss is expected to be below the 8-acre upland threshold in the PBA. The project biologist will be on site to perform pre-construction surveys, monitoring during equipment setup, and post-construction surveys to document any habitat loss and to ensure that the sites are clear of desert tortoises and any nesting birds as deemed necessary.

4.1.5 Listed Species Determinations

Annual surveys conducted since 2005 have not identified nesting pairs of the southwestern flycatchers within the Action Area, either in California or Arizona. A single western yellow-billed cuckoo has been observed three years in a row, indicating they may be breeding in the area. In 2012, solitary southwestern flycatchers were identified at the mouth of Bat Cave wash in California, as well as in the Topock Marsh. Yuma clapper rails were detected during surveys conducted in 2012 along the Arizona side in the emergent habitat near the marina.

Southwestern willow flycatcher. This action will have no direct effect upon this species. Southwestern willow flycatcher prefers riparian habitat. Tamarisk (*Tamarix ramosissima*) is a dominate species within the riparian habitats of the Topock Compressor Project. The tamarisk habitats near the areas of Site B and the HNWR-1 Site are dominated by athel (*Tamarix aphylla*) which is an upland species and not preferred by Southwestern willow flycatcher. The project will not occur within or near riparian habitat; therefore, any potential direct and indirect effects to this species will be avoided.

Yuma clapper rail. This action will have no effect upon this species. The project will not occur within or near the emergent marsh habitat; therefore, any potential direct and indirect effects to this species will be avoided.

Sonoran desert tortoise. This action will not likely have a direct effect upon this species based on the implementation of the minimization measures identified in the PBA. Additionally, USFWS protocol surveys were completed in 2013 within the Arizona Action Area and did not identify any evidence of presence for the Sonoran desert tortoise. The habitat within the Action Area is considered marginal, and any loss would be minor and well below the 8-acre upland threshold requested in the PBA. Therefore, this action will have minimal indirect effects upon this species that are covered within the PBA.

Mojave desert tortoise. The Mojave desert tortoise only occurs in California, therefore impacts to this species are no longer being considered in this evaluation.

Razorback sucker. This action will have no effect upon this species. The project will not occur within the Colorado River or affect the bed and bank of the river; therefore, any potential direct and indirect effects to this species will be avoided.

Bonytail chub. This action will have no effect upon this species. The project will not occur within the Colorado River or affect the bed and bank of the river; therefore, any potential direct and indirect effects to this species will be avoided.

4.2 Archeological Surveys and Reviews

Archaeological surveys of the potential work area were conducted from August to November 2012, during which time tribal monitors were invited to observe, and monitors of some tribes were present for portions of the survey. A technical memorandum summarizing the findings of the archaeological surveys was sent to interested tribes by PG&E on January 10, 2013, and subsequently by BLM on January 15, 2013 (Applied Earthworks, 2012). No archaeological or historical sites were located within the potential work area. Work will comply with all applicable archaeological and historical resource mitigation measures included in the *Programmatic Agreement, Cultural and Historic Properties Management Plan and* the adopted *Mitigation Monitoring and Reporting Program* (DTSC, 2011b) for the project. Prior to any ground-disturbing activities, work areas will be reexamined to ensure that no resources are disturbed. Cultural resource-related documents generated during activities associated with this implementation plan will be made available for review by interested Tribes and the agencies. In carrying out the activities presented in this implementation plan, PG&E will comply with applicable mitigation measures set forth in the adopted MMRP for the project (see Table B-2).

The archaeological and historical sites will be protected from work activities and will be monitored during the course of work. The PG&E representative will be responsible for providing cultural sensitivity training to the workers implementing this plan and for ensuring compliance with all applicable archaeological measures during drilling activities. PG&E will invite participation from the Tribes, archaeological monitors, and agency staff, as appropriate, in this training.

Site orientation will stress that all site activities will be conducted in a respectful manner. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered. Specific steps to evaluate and safeguard any previously unidentified potentially significant cultural resources will follow the steps described in the EIR, Programmatic Agreement (PA), and Cultural and Historic Properties Management Plan (CHPMP) (DTSC, 2011a).

In addition, PG&E will invite the Tribes to arrange for tribal monitors to observe the activities in this plan per the monitoring protocol included in Appendix C of the Programmatic Agreement. PG&E will work closely with tribal monitors to ensure that monitoring activity is consistent with security and health and safety considerations.

5. Schedule and Reporting

Figure 5 presents the estimated implementation schedule for the alternative freshwater source evaluation assuming a new supply well is installed and tested at Site B and a replacement well at the HNWR-1 Site is not necessary. As illustrated, the target date for receipt of DOI and DSTC approval is the mid-August 2013. Following approval, field mobilization is estimated to occur within the next three weeks. Exploratory drilling and groundwater sampling is estimated to require 6 field days per location for drilling and sample collection. Groundwater purged as a result of drilling and groundwater sampling will be discharged for lesser period of time throughout the 6 days specified. Laboratory analysis and data validation activities will require approximately 7 days after sample collection. Approximately one week after the receipt of all validated laboratory data collected during the exploratory phase of the investigation a call will be scheduled with the agencies and interested stakeholders to discuss the path forward for supply well installation and aquifer testing. The installation of a supply well at Site B is estimated to require 5 field days for conductor casing installation and an additional 11 field days for well installation and development. Immediately following development an additional 8 field days are estimated for aquifer testing at Site B, followed by an additional 13 days for aquifer testing at the existing HNWR-1 well (including groundwater flow and arsenic profile testing). Approximately one week after the receipt of all validated laboratory data collected during the supply well installation and aquifer testing phase of the investigation a call will be scheduled with the agencies and interested stakeholders to discuss whether the

installation and testing of a second supply well at the HNWR-1 Site is necessary. All field work is estimated to be complete by the end of November 2013 assuming one new supply well is installed at Site B. As with previous well installation programs associated with the Topock Remediation Project, PG&E will provide the agencies and interested stakeholders with periodic schedule updates as mobilization dates are finalized and as work progresses in the field.

The results of all activities conducted as part of this evaluation will be included in a technical memorandum, which will be submitted to the regulatory agencies 60 days after field activities are complete and validated laboratory data have been received.

6. References

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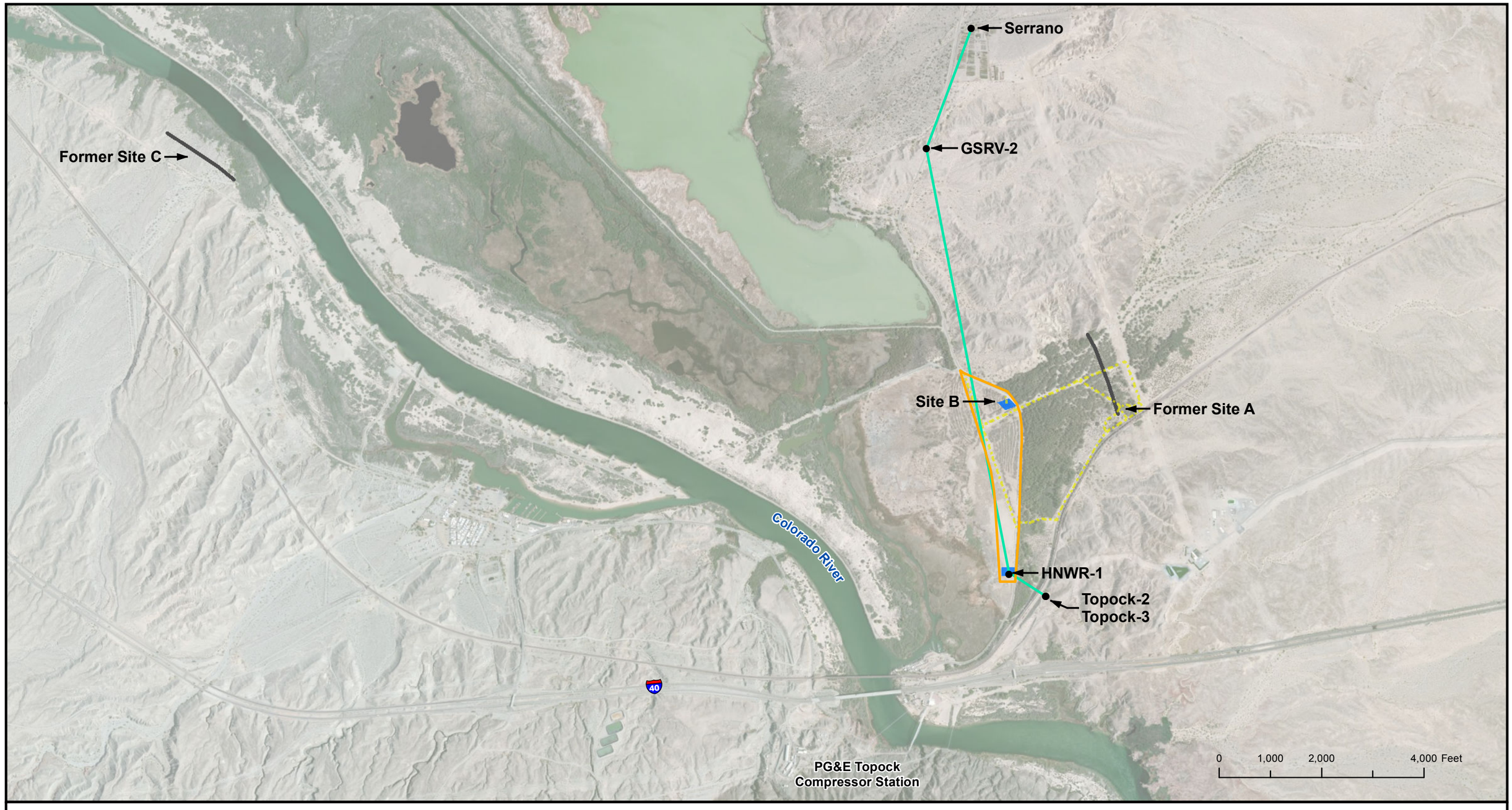
Figures



Approximate 1-acre area

Freshwater Source Evaluation Locations

Existing Wells

Conceptual Geologic Cross Section

Surface Resistivity Survey

Access Routes (exculding paved areas)

Boundary of Potential Work Area

Note
Groundwater source evaluation sites (including contingency site) and access routes are not precisely located, and will be adjusted as necessary to minimze disturbance of biological and cultural resources.

FIGURE 1
SITE MAP

FINAL IMPLEMENTATION PLAN FOR EVALUATION OF ALTERNATIVE FRESHWATER SOURCES IN THE TOPOCK REMEDIATION PROJECT AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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Site B

Irrigation pipe to existing HNWR Revegetation Area. Details to be finalized with HNWR prior to work

Arizona County Highway 10

210-30-008 HNWR

210-30-008 HNWR

HNWR-01

N

0 200 400 800 Feet

- Existing Supply Well Location
- Approximate Exploratory Boring/ Supply Well Location
- Approximate Sprinkler Location
- Approximate Route of Sprinkler Piping
- Existing Unpaved Access Route
- New Unpaved Access Route
- Approximate Sprinkled Area
- Approximate Freshwater Source Evalutation Work Area (1 acre)
- Potential Tank Storage Area
  - Actual area used will be less than area shown, and when combined with area used for drilling, will be within the one acre disturbance limit.
- Approximate Sprinkler Coverage Area
- 210-30-008 Approximate Property Lines
- Outer Boundary of Potential Work Area
- Additional Area Surveyed for Biological and Cultural Resources
- Waters of the State
- USACE Jurisdiction

Note
Groundwater source evaluation sites (including contingency site) and access routes are not precisely located, and will be adjusted as necessary to minimze disturbance of biological and cultural resources.

FIGURE 2
SITE B AND HNWR1 SITE WORK AREAS

FINAL IMPLEMENTATION PLAN FOR EVALUATION OF ALTERNATIVE FRESHWATER SOURCES IN THE TOPOCK REMEDIATION PROJECT AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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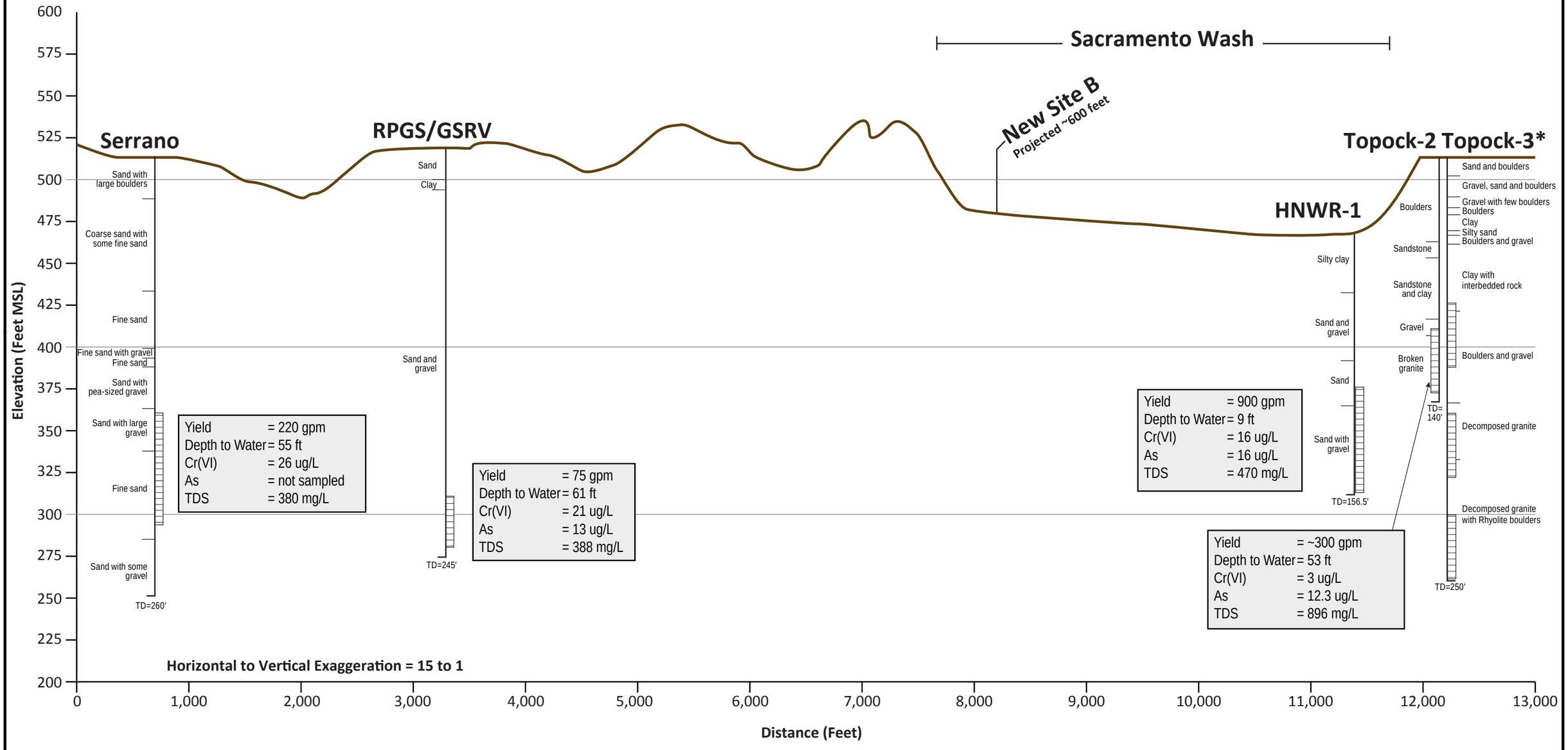

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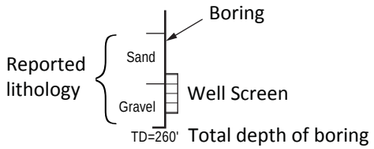

NOTE:
The lithology shown here was obtained from available driller's well logs and has not been independently verified by CH2M HILL.

* In an effort to improve water quality the two deep screens in Topock-3 were isolated after installation. This well currently produces water from the shallow-most screen only.

FIGURE 3
CONCEPTUAL GEOLOGIC CROSS SECTION

FINAL IMPLEMENTATION PLAN FOR EVALUATION OF ALTERNATIVE FRESHWATER SOURCES IN THE TOPOCK REMEDIATION PROJECT AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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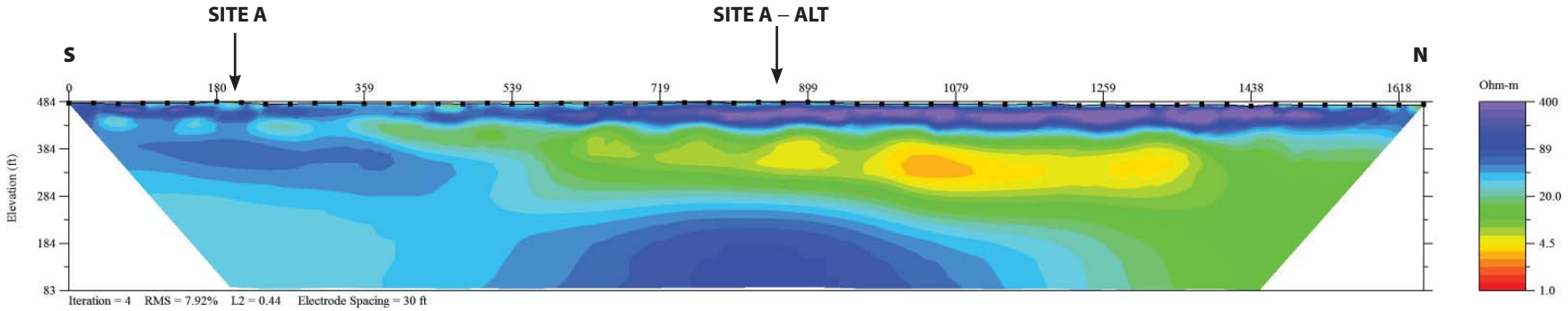
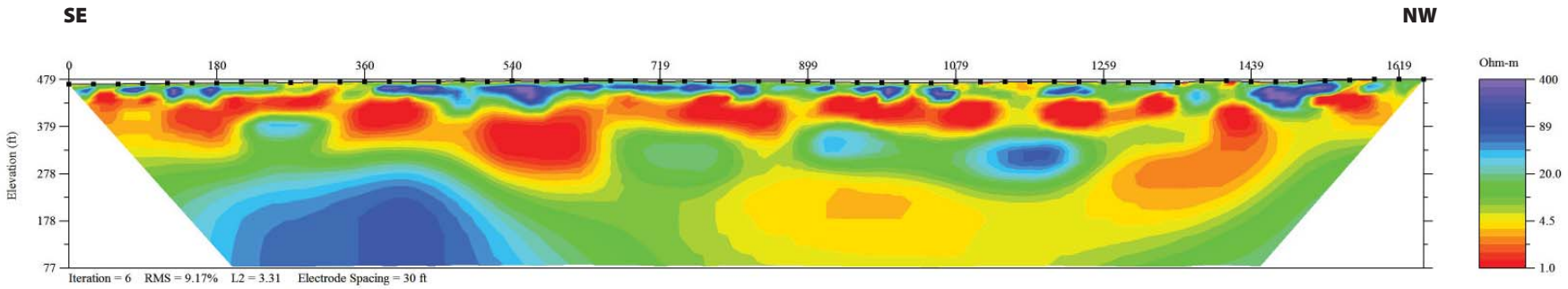
ARIZONA – SITE A AREA



INVERTED RESISTIVITY SECTION

CALIFORNIA – SITE C AREA



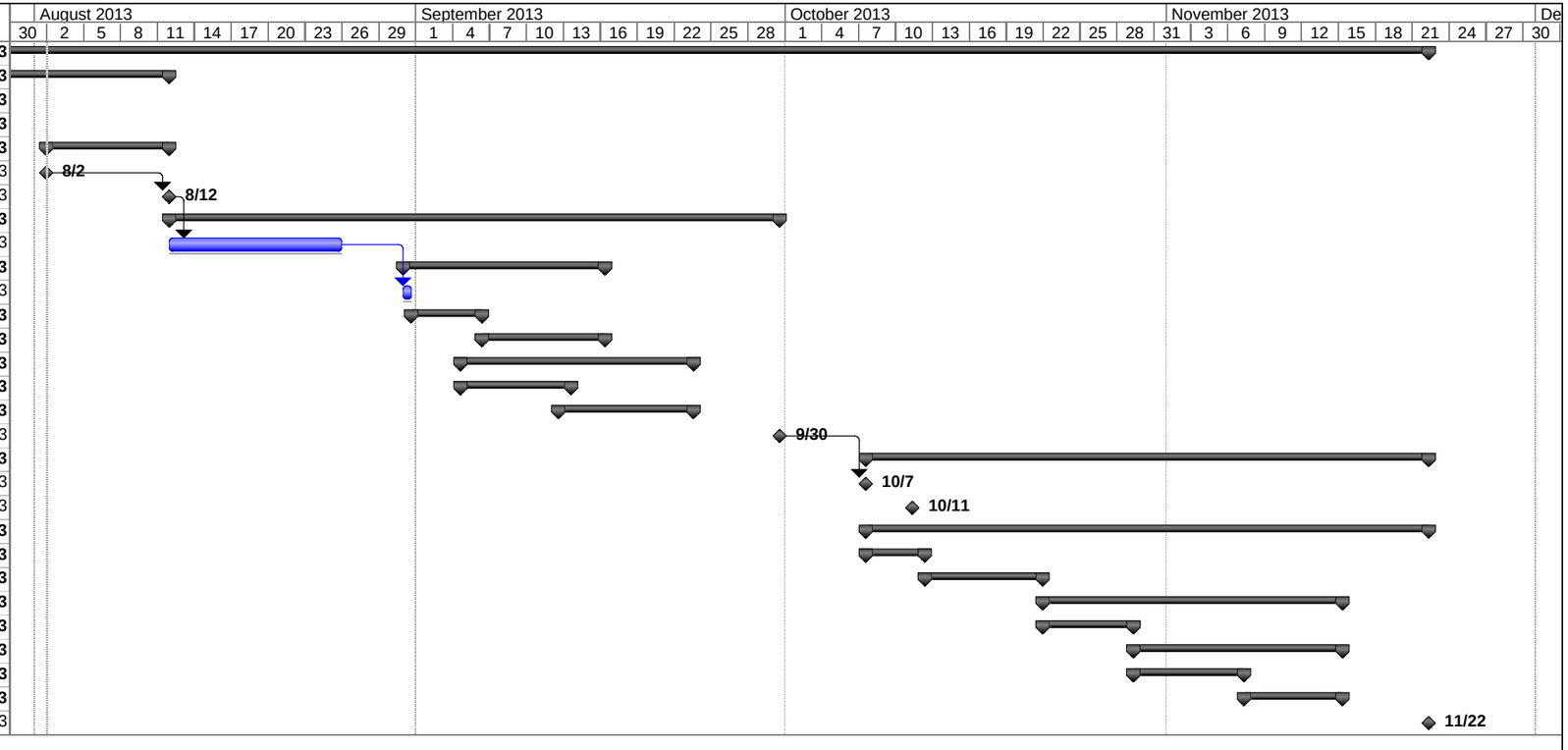
INVERTED RESISTIVITY SECTION

FIGURE 5

Summary of Surface Resistivity Data – Sites A and C

Revised Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area
PG&E Topock Compressor Station, Needles, California

ID	Task Name	Start	Finish
1	**Alternative Freshwater Source Evaluation**	**Tue 11/20/12**	**Fri 11/22/13**
2	**Implementation Plan Development/Approval**	**Tue 11/20/12**	**Mon 8/12/13**
3	**Draft Implmentation Plan**	**Tue 11/20/12**	**Mon 1/28/13**
9	**Revised Implementation Plan with RTCs**	**Mon 1/28/13**	**Tue 5/21/13**
13	**Final Implementation Plan**	**Fri 8/2/13**	**Mon 8/12/13**
14	Submittal to Agencies	Fri 8/2/13	Fri 8/2/13
15	Receive Agency Approval	Mon 8/12/13	Mon 8/12/13
16	**Exploratory Drilling and Testing**	**Mon 8/12/13**	**Mon 9/30/13**
17	Tribal Notification of Planned Work	Mon 8/12/13	Mon 8/26/13
18	**Field Work**	**Sat 8/31/13**	**Mon 9/16/13**
19	Mobilization	Sat 8/31/13	Sat 8/31/13
20	**Site B**	**Sat 8/31/13**	**Fri 9/6/13**
25	**Site HNWR-1**	**Fri 9/6/13**	**Mon 9/16/13**
30	**Laboratory Analysis and Data Validation**	**Wed 9/4/13**	**Mon 9/23/13**
31	**Site B**	**Wed 9/4/13**	**Fri 9/13/13**
34	**HNWR-1**	**Thu 9/12/13**	**Mon 9/23/13**
37	Agency Call - Data Summary/Path Forward Check-In	Mon 9/30/13	Mon 9/30/13
38	**Supply Well Installation and Testing**	**Mon 10/7/13**	**Fri 11/22/13**
39	Mobilization 1 - Conductor Casing Rig	Mon 10/7/13	Mon 10/7/13
40	Mobilization 1 - Well Installation Rig	Fri 10/11/13	Fri 10/11/13
41	**Supply Well 1**	**Mon 10/7/13**	**Fri 11/22/13**
42	**Conductor Casing Installation**	**Mon 10/7/13**	**Sat 10/12/13**
47	**Well Installation/Development**	**Sat 10/12/13**	**Mon 10/21/13**
53	**Well Testing**	**Tue 10/22/13**	**Fri 11/15/13**
54	**Site B**	**Tue 10/22/13**	**Tue 10/29/13**
60	**HNWR-1**	**Tue 10/29/13**	**Fri 11/15/13**
61	**Constant-rate Extraction Test**	**Tue 10/29/13**	**Thu 11/7/13**
66	**Groundwater Flow and Arsenic Profile**	**Thu 11/7/13**	**Fri 11/15/13**
70	Agency Call - Data Summary/Path Forward Check-In	Fri 11/22/13	Fri 11/22/13



Project: Project-Schedule_Freshwater
Date: Fri 8/2/13

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Figure 5 - Forecasted Implementation Schedule
Final Implementation Plan for Evaluation of Alternative Freswater Sources in the Topock Remediation Area
PG&E Topock Compressor Station, Needles, California

Attachment A
Response to Comments (RTC) Tables

Attachment A-1 Comments on Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California (submitted November 20, 2012)

Absolute Comment No.	Comment Source/ Number	Discussion Grouping/Topic	Section	Reference Text	Comment	Response to Comment
1	Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program (VRP)	General Property lines and access agreements			The VRP requests PG&E to further define the property ownership for the sited locations on the Arizona side of the Colorado River discussed in Section 1 and shown on Figure 1. The VRP also requests copies of all applicable access agreements for the parcels in question.	Property ownership information will be added to site maps included in the Implementation Plan (IP). Copies of access agreements will be provided to the VRP prior to mobilization. Authorization to access lands owned by the federal government will be provided in the Department of Interior's approval of the Implementation Plan.
2	ADEQ VRP	General Long-term pumping effects, WATER-1			The VRP requests that PG&E discuss the potential impact of the hydraulic testing and potential long-term use of the proposed wells on the local and regional aquifer. The discussion should also include, at a minimum, impacts to the communities of Topock and Golden Shores, Arizona.	The potential impact of the hydraulic testing and potential long-term use of the proposed wells on the local and regional aquifer will be addressed by Mitigation Measures Reporting Program (MMRP), specifically mitigation measure WATER-1. The following text will be added to the Implementation Plan: "Initial assessments using an existing groundwater model indicated that there would be no adverse effect from continuous operation of the HNWR-1 on the nearest pumping wells (Topock 2 and 3), which are located less than 0.2 mile from HNWR-1. During the revegetation pilot project, HNWR-1 was routinely pumped at rates of approximately 1,000 gpm for periods of up to 12 hours per day with no reported adverse effects on any nearby wells. The proposed new well locations are approximately ¾ mile from the Topock 2 and 3 wells so pumping from these locations would have even less effect than pumping from HNWR-1. The Golden Shores wells are approximately 2.5 miles away, well beyond the radius where pumping at the proposed new well locations would be expected to have measureable effects. Further evaluations of the effects of pumping from the new well will be made during the design process, using estimates of hydraulic properties of the aquifer developed through testing of the new well."
3	ADEQ VRP	General VRP notification / communication			The VRP requests that PG&E copy the VRP project manager on correspondence related to this project regarding environmental matters that are submitted to Arizona agencies, whether they are city, county, or state.	The VRP Project Manager, Danielle Taber, will be copied on all correspondence related to this project regarding environmental matters that are submitted to Arizona agencies, whether they are city, county, or state.
4	ADEQ VRP	General PBA	Section 4.0		Please clarify what happens, or how the process changes, if the Programmatic Biological Assessment of 2007 is not extended.	The Programmatic Biological Assessment (PBA) of 2007 was extended on December 27, 2012 until December 31, 2017. Section 4.0 will be updated to reference this extension.
5	ADEQ VRP	Site A Pipeline owner(s)	Section 4.0, last paragraph		Please clarify who is the "affected pipeline company" mentioned in the last paragraph of Section 4.0.	The text will be revised to state that PG&E will coordinate with Transwestern and Kinder-Morgan pipeline companies, as necessary for Site A access.
6	ADEQ VRP	Permitting / Compliance VRP notification / communication			Please add the permitting requirements and approvals from Arizona agencies.	Anticipated approvals and substantive requirements from Arizona agencies will be added to Section 4.0 and Attachment B, respectively.
7	ADEQ VRP	General	Section 4.2, first paragraph		Within the first paragraph of Section 4.2, please clarify what "variously present" means.	Text will be revised to state that "…tribal monitors were invited to observe, and monitors of some tribes were present for portions of the survey."
8	DOI	General Use of HNWR-1			DOI has a preference of utilizing the existing HNWR-1 well rather than developing new roads on the Havasu National Wildlife Refuge or Bureau of Reclamation (BOR) lands managed by the Bureau of Land Management (BLM). Wells on Federal lands have the potential to impact cultural resources, to result in the loss of habitat, and to increase unwanted traffic into sensitive areas. PG&E should continue to work with the State and Regional Water Quality Control Boards to resolve the issue concerning arsenic and continue the evaluation of treatment options for arsenic. We recognize that a timely decision must be made on the path forward for a freshwater supply and intend to work closely with PG&E, DTSC, Tribes, and stakeholders to resolve this issue.	Comment noted.
9	DOI	Technical Approach			The maps in the current plan should be revised to include further detail on the well locations and potential discharge areas. Additionally, GPS coordinates of	Figures will be updated to indicate approximate well locations, discharge areas, and associated details which have been refined through discussions with the agencies since the initial submittal of the IP. Approximate well location coordinates

Absolute Comment No.	Comment Source/ Number	Discussion Grouping/Topic	Section	Reference Text	Comment	Response to Comment
		Site maps/GPS coordinates			the anticipated well locations should be included.	will be included in the text of the Plan; however, the actual well location may need to be adjusted slightly in the field to minimize disturbance of biological and cultural resources.
10	DOI	Site C Beale Slough ACEC			**California Proposed Well** The proposed well located in California is on land under the jurisdiction of BOR managed by BLM. This well location is within the Beale Slough Area of Critical Environmental Concern (ACEC). ACEC designations highlight areas where special management attention is needed to protect and prevent irreparable damage to important historical, cultural, and scenic values, and other resources. Furthermore, it is recognized that further impacts from associated supply well infrastructure would be realized if the well was located in this area. The Beale Slough ACEC well location is the least preferred location for the fresh water supply well.	Per the December 31, 2012 letter from DTSC to PG&E, DTSC has determined that exploratory work at or around the vicinity of the geophysical survey area Site C will not be approved. Therefore, Site C will be removed from the Plan.
11	DOI	Sites A and B Work sequencing/well locations			**Refuge Area Proposed Wells** Several acres of habitat on the HNWR could potentially be disturbed as a result of the proposed drilling. The discussion of an access road 15 feet in width through the tamarisk and mesquite is a point of concern. The existing HNWR-1 well has good access and would not incur new disturbance. If the existing HNWR-1 well is not used, Site B would be next in preference for wells within the Refuge. It is our expectation that this well would be located as close to the existing road as possible and that new disturbance would be minimized. Of the two sites, Site A is the least preferred location on the Refuge as it has the most potential for wildlife and habitat disturbance.	It is understood that the HWNR prefers the use of existing well HNWR-1 over the installation of new freshwater supply well(s), and if a new well is required, Site B is preferred over Site A. The viability of a freshwater supply well at either Sites A or B will not be known until results from the two phases of work (exploratory drilling and groundwater sampling, and well installation and testing) are obtained. In response to HNWR concerns about disturbance, PG&E analyzed multiple approaches to the sequencing of this work considering schedule impact and level of disturbance, and resources. Based on this analysis, the following revised approach to work sequencing was developed:. 1. Mobilize to conduct exploratory drilling and groundwater sampling at both Sites A and B. Demobilize the exploratory rig when complete. It should be noted that the overall level of disturbance/waste generation is far less for the exploratory work compared to supply well installation and testing (i.e., much less waste is generated during the exploration work, and less equipment is required for access) 2. Discuss exploratory data with the agencies. In general: a. If water quality (e.g., key analytes at concentrations below the MCL [see planned analytical list in Section 3.1]) and geologic data (e.g., a significant thickness [tens of feet] of coarse sand and gravel) from only one of the sites is favorable, then a supply well will be installed at that site, and the other will not be pursued any further. b. If water quality/geologic data from both sites is favorable, then a supply well will be installed at Site B only for subsequent testing. 3. Mobilize to install and test one supply well. Demobilize well installation and testing equipment when complete. 4. Discuss supply well testing data with the agencies. Generally, a supply well will be considered a viable source of freshwater for the groundwater remedy if a sufficient quantity of high quality water as required by the remedy can be sustained. If the well does not prove to be a viable source of freshwater for groundwater remedy operation then a supply well will be installed at the second location (unless it was already disqualified based on the exploratory data). By taking a more phased approach to supply well installation and testing, the overall level of disturbance/waste generation is minimized, and supply well installation can be prioritized for Site B. See response to Comment 13 regarding the actions required to establish work access routes.
12	DOI	Sites A and B Number of wells / level of disturbance			**Refuge Area Proposed Wells (continued)** During a site visit between PG&E and the Refuge Manager on December 5, 2012, the possibility of utilizing more than one well simultaneously was discussed; i.e., production from both the Site A and B wells. However, this option further increases wildlife and habitat disturbance on the Refuge and should not be evaluated further. Alternatively, use of the Site B well along with the HNWR-1 well may be considered. Trimming of tamarisk for well location access is not a significant concern. Preference for trimming of tamarisk over mesquite should be stated in the plan. Trimming or removal of other native trees such as palo verde should also be avoided where possible. For any newly disturbed areas or abandoned well sites located within the HNWR, PG&E shall provide mitigation by planting disturbed areas with native vegetation.	Comment noted. While up to two wells might need to be installed initially to determine the viability of a freshwater supply, only one of the wells would be kept for long term operation of the groundwater remedy (i.e., only one well would be piped to the remediation system). See response to Comment 13 regarding the actions required to establish work access routes, including trimming of vegetation.
13	DOI	Sites A and B			**Refuge Area Proposed Wells (continued)**	Comment noted. It is anticipated that only existing roads and access pathways requiring minimal access improvements in

Attachment A-2 Comments on the Revised Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California (submitted January 28, 2013)

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response Discussed During May 14, and May 21, 2013 Comment Resolution Calls	Action Taken by PG&E Based on Response
1	Department of Interior (DOI) March 26, 2013 Letter DOI-1			As we noted in earlier comments, the addition of wells will likely result in disturbance of habitat and wildlife on the Havasu National Wildlife Refuge (HNWR). This is of particular concern for the proposed Site A and A-alt and we believe that eliminating these two locations from further consideration is in the best interest of the HNWR for its conservation mission. This decision to eliminate these two sites will also reduce additional impacts to the cultural and archeological resources found in the area. Using the HNWR-1 water supply well remains our preferred option for a source of fresh water. We will, however, agree to the investigation and presumed drilling of Site B but remind PG&E that it is our expectation that new disturbance associated with the drilling activities be minimized.	The Final FWIP will be revised to state that Sites A and A-Alt will not be considered for exploratory drilling, well installation, or testing. PG&E will revise the plan in the same manner as when Sites C and C-Alt were removed. Contextual information and surface geophysical results associated with these sites will remain in the document. In addition, discussion specific to Sites A and A-Alt included in Attachment B will remain in the document.	Section 1 of the FWIP has been revised.
2	DOI-2			The Department requests that additional information be provided in support of the PG&E claim that water rights in excess of the amount of water required.	The scope of PG&E's existing water entitlements were described and assessed in Chapter 4.12 of the EIR that was certified by DTSC (and in the Draft EIR that was circulated for review and comment). This analysis included both the amount of water needed for the project and the points of diversion. The EIR concluded, "Any of these points of diversion are permitted" under PG&E's existing Lower Colorado Water Supply Project entitlements. The EIR evaluated water use during construction, during operation, and during decommissioning of the remedy, and in each instance, the EIR concluded that the existing entitlement was more than sufficient to serve the project needs. A copy of this analysis from the EIR is enclosed.	No revisions to the FWIP have been made as a result of this comment.
3	DOI-3			The Tribes are concerned with the process by which surveys are being completed without sufficient notification time to facilitate their participation. Of particular concern was the most recent plant survey where tribes were notified only a few days prior. We request that PG&E notify the Department and Tribes with sufficient lead time to facilitate attendance at the surveys. The Tribal Monitor Protocol included within the Programmatic Agreement specifies a lead time of <u>at least three (3) business days</u> in advance of the initiation of the identified project work, whenever possible. PG&E should provide a one week notification when possible.	Comment noted. Draft MMRP CUL-1a-8j (PROTOCOLS FOR TRIBAL NOTIFICATION IN ADVANCE OF PROJECT-RELATED ACTIVITIES) which has been reviewed and commented on by the Tribes during PG&E's monthly TMU meetings, indicates that every attempt will be made to give two weeks of notification prior to project related activities.	No revisions to the FWIP have been made as a result of this comment.
4	DOI-4			The method for disposition of soil resulting from the FWIP drilling activities was also discussed and it was agreed that soil may be disposed on the ground adjacent to the boring. If, however, a clay bed is discovered during drilling, the cuttings from that bed should be set aside for future disposition, following discussions with the Tribes.	The text will be revised to indicate that if clay bed(s) are encountered during drilling, then the cuttings from those interval(s) will be set aside for future disposition, following discussions with the Tribes. As requested by comments from the Hualapai Department of Cultural Resources (see Comment HDCR-2), drill cuttings generated from clay beds will be separated from the other material and stored aside on cotton material. PG&E will notify DOI in the event clay material is encountered and separated for storage. See Comment HDCR-2.	Section 3.1 of the FWIP has been revised.
5	DOI-5			Additional comments on the FWIP by the Fort Mohave Indian Tribe by Hargis & Associates, consultant to the Fort Mohave Indian Tribe,	All comments received on the FWIP are included in this RTC table, which will be included as Attachment	Aside from including this table in Attachment C, no revisions to the FWIP have been made as a result of

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response Discussed During May 14, and May 21, 2013 Comment Resolution Calls	Action Taken by PG&E Based on Response
				must be included within a Response-to-Comment (RTC) table and included with the final FWIP. DOI expects that a comment resolution meeting will be held prior to finalizing the RTC table and that the FWIP be revised to eliminate Site A and A-alt.	C to the final FWIP. A comment resolution meeting will be held in mid-May 2013. Site A and A-Alt will be removed from the FWIP as discussed in response to Comment DOI-1.	this comment.
6	DOI-6			Based on discussions held with PG&E on March 21, we understand that PG&E is interested in the installation of an exploratory borehole adjacent to the existing HNWR-1 well and acknowledge that the available information regarding the well installation is very limited. An exploratory boring would provide the lithologic and water quality data necessary for planning purposes for HNWR-1 operation, maintenance, and/or future redevelopment utilizing the methods and procedures outlined in the FWIP. This information would help also further refine the conceptual model of the aquifer in the HNWR-1 area as well as provide information on water quality and aquifer conditions at depths below the bottom of the HNWR-1 well, which only partially penetrates the aquifer. The HNWR-1 area is within a previously disturbed portion of the HNWR and the Department agrees that the information gained from an exploratory boring would be valuable for planning purposes. Following discussions with the Tribes and DTSC, the Department is open to including the additional exploratory boring in the revised document for final approval.	Pending the results of DOI discussion with the Tribes and DTSC, the final FWIP will be revised to include an exploratory borehole adjacent to the HNWR-1 location. The field methods and procedures associated with this boring will be the same as those already included in the FWIP and per revisions required in response to comments discussed in this table.	Section 1 of the FWIP has been revised. Per discussion during the May 14 comment resolution call and during a follow-up call with DTSC on May 16, DTSC directed PG&E to include depth-specific flow and water quality data collection during well testing at the HNWR-1 location in the Final FWIP.
7	Department of Toxic Substance Control (DTSC) February 21, 2013 Email DTSC-1	Page 1	Pacific Gas and Electric Company (PG&E) is implementing the selected groundwater remedy for chromium in groundwater at the PG&E Topock Compressor Station (TCS, or the Compressor Station) in San Bernardino County, California. The existing chromium contamination in groundwater is largely attributable to historical wastewater discharge from TCS operations to Bat Cave Wash, designated as Solid Waste Management Unit (SWMU) 1/Area of Concern (AOC) 1, and within the East Ravine, designated as AOC 10. Remedial activities at the Topock site are being performed in conformance with the requirements of the Resource Conservation and Recovery Act (RCRA) Corrective Action pursuant to a Corrective Action Consent Agreement (CACA) entered into by PG&E and the California Department of Toxic Substances Control (DTSC) in 1996, as well as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) pursuant to the Administrative Consent Agreement entered into between PG&E and the federal agencies (U.S. Department of the Interior [DOI], Bureaus of Land Management [BLM] and Reclamation [Reclamation] and the U.S. Fish and Wildlife Service [USFWS]) in 2005. A Consent Decree between the United States and PG&E under CERCLA was lodged with the United States District Court for the Central District of California on January 10, 2013, and a public comment period on the Consent Decree is currently underway.	PG&E should, however, acknowledge that source characterization is not complete on the compressor station.	The text in **bold** will be added to the following statement: The existing chromium contamination in groundwater is largely attributable to historical wastewater discharge from TCS operations to Bat Cave Wash, designated as Solid Waste Management Unit (SWMU) 1/Area of Concern (AOC) 1, and within the East Ravine, designated as AOC 10**; however, source characterization on the compressor station is ongoing**.	The statement in paragraph 1 of the FWIP has been revised as indicated.
8	DTSC-2	Section 1: Locations for Freshwater Source Evaluation	The approximate location of Sites A and B in relation to existing wells in the region is shown on Figure 4 (conceptual geologic cross section location is shown on Figure 1). The information displayed on this section is adapted from the Topock Groundwater Study report prepared for Arizona Department of Environmental Quality (Geotrans, 2006). Well HNWR-1 was added to the section. The sand and gravel unit below a depth of about 83' may be the Holocene gravel that is the target for the new supply wells. The two next-nearest wells on this section, Topock-3 and GSRV-1 are not located in the channel of	Discuss water quality and yield of all wells on x-section to support conceptual model of wash as the right area to prospect. Include anticipated dtw and include on the x-section.	The cross-section will be revised to include available water quality, well yield, and depth to water information. Section 1 will also be revised to include discussion of this data.	Section 1 of the FWIP and Figure 3 (Conceptual Geologic Cross-section) has been revised. As requested during the May 14 comment resolution call, Revised Figure 3 was provided to DTSC for advance review on July 1, 2013.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response Discussed During May 14, and May 21, 2013 Comment Resolution Calls	Action Taken by PG&E Based on Response
			Sacramento Wash so they don't provide any information about the Holocene gravel that is the target of this investigation.			
9	DTSC-3	Section 3: Freshwater Source Evaluation	Mobilize to conduct exploratory drilling and groundwater sampling at both Sites A and B. Demobilize the exploratory rig when complete. It should be noted that the overall level of disturbance/waste generation is far less for the exploratory work compared to supply well installation and aquifer testing (i.e., much less waste is generated during the exploration work, and less equipment is required for access).	Clarify if Site A-alt exploratory boring will be drilled and the rationale for drilling it - assume Site A-alt will be installed if Sites A and B characterization data are substandard or maybe even marginal. Please clarify.	Site A and A-Alt will be removed from the FWIP as discussed in response to comment DOI-1. No additional revisions to the FWIP are required as a result of this comment.	See comment DOI-1.
10	DTSC-4			What if three holes drilled and two sites favorable and one is not? Especially if Site B is not viable.	Site B is the only location where data from an exploratory borehole may result in the construction of a well for subsequent testing. Section 3 will be revised.	The response provided to the left is no longer applicable. The introductory text to Section 3 of the FWIP has been revised to detail the decision making process for new well installation.
11	DTSC-5	Section 3: Freshwater Source Evaluation	Borehole capacity is a qualitative measurement of aquifer yield (observing drawdown in the borehole for a given extraction rate during drilling or pumping of the open borehole), but cannot be used as a measure of permeability or transmissivity. These samples will be collected by pumping from within the drill casing (using either an air-lift or electric submersible pump) and monitoring water quality measurements at the surface (e.g., specific conductance, pH, oxidation-reduction potential, etc.).	Select pump method that will provide the better data.	The text will be revised to indicate that an electric submersible pump, or equivalent, that minimizes disturbance of the purged water and maximizes data quality, will be prioritized. Air-lift will be the least preferred groundwater purging method for sample collection.	Section 3.1 of the FWIP has been revised as indicated.
12	DTSC-6	Section 3.1: Exploratory Borehole Drilling and Groundwater Sampling		Need to mention AZ well abandonment standards and that wells/boreholes will comply with these stds.	The text will be revised to explicitly state that well/borehole abandonment procedures will comply with Arizona standards. Note that Arizona Department of Water Resources communicated that planned procedures were compliant with Arizona standards in a February 28, 2013 letter to Arizona Department of Environmental Quality, which was subsequently sent PG&E, DTSC, and DOI on March 25, 2013.	Section 3.1 of the FWIP has been revised as indicated. Per discussion during the May 14 comment resolution call, the ADWR letter approving the approach to borehole decommissioning has been included in the Final FWIP as Attachment C. In addition, the text in Section 3.1 has been revised to include the option for a variance when installing the required grout seal such that the shallowest two feet of the borehole can be backfilled in accordance with preferences identified by the Tribes (see comment FMIT-8).
13	DTSC-7	Section 3.1: Exploratory Borehole Drilling and Groundwater Sampling	Therefore, each exploratory borehole will be decommissioned by backfilling from total depth to 20 feet bgs with either bentonite grout or clean granular material. The upper 20 feet of each borehole will be sealed using bentonite.	Clean granular material is not AZ std. method of abandonment. Requires variance to Alternative 4 abandonment method to use "clean fine sand' only. Therefore request ADWR review and approval if a variance is pursued.	The application of Alternative 4 to the "Standard Abandonment Method" has been approved by ADWR. See response to Comment DTSC-6.	See comment DSTC-6.
14	DTSC-8	Section 3.1: Exploratory Borehole Drilling and Groundwater Sampling		Insert "high-solids" bentonite grout	The upper 20 feet of the borehole will be backfilled with "cement bentonite grout", as opposed to "high-solids bentonite grout", which is compliant with the Arizona Well Abandonment Handbook. The text will be revised to explicitly state the use of this material.	Section 3.1 of the FWIP has been revised as indicated.
15	DTSC-9	Section 3.1: Exploratory Borehole Drilling and Groundwater Sampling		AZ wells stds indicate a cement plug must be used from 2' bgs to at least 20' bgs. Please revise. PG&E could do a temp backfill provided it is drilled out for final decommissioning.	See response to DTSC-6.	See comments DTSC-6, -7, and -8.

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16	DTSC-10	3.2 Freshwater Supply Well Installation and Aquifer Testing	The only way to eliminate the potential for any interference of test water is to either discharge farther away from the area or to the River, or to truck or pipe the water offsite, and none of these options is practicable. Data collected from these tests will be incorporated into design of the final groundwater remedy.	[Reference text was highlighted, but there was no comment.]	No response required.	No revisions to the FWIP have been made as a result of this comment.
17	DTSC-11	3.2 Freshwater Supply Well Installation and Aquifer Testing	...test would be conducted by pumping the well near its maximum yield (approximately 800 to 1,000 gpm) for up to 96 continuous hours. Assuming a flow rate of 1,000 gpm, the total estimated discharge is over 5.5 million gallons. The test duration might need to be adjusted shorter or longer depending on the data collected and/or as discharge constraints are identified. Ideally, the test will be conducted using the pump that is currently installed in the well; however, depending on the final design of irrigation pipe layout, a temporary test pump might need to be installed.	When will PG&E provide final irrigation pipe layout? Also, PG&E will need to set contingent controls to ensure water does not flow into jurisdictional waters.	As discussed with DTSC during the development of the FWIP and as discussed in the fifth paragraph of Section 3.3, the estimated irrigation pipe layout shown in Figure 3 (only Site B is relevant at this time) is the highest level of detail that can be confidently provided prior to implementation. Exact layout of the pipes will not vary significantly from this estimation. Regarding contingency controls to ensure water does not flow into jurisdictional water, as stated in Section 3.3: *Personnel will remain on site during the duration of discharge activities to monitor for persistent ponding and runoff. Water will be discharged to these areas in a manner that minimizes ponding and limits the potential for runoff. During discharge, if persistent ponding or runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 is observed, corrective action (e.g., modification of sprinkler layout, change in discharge rate, or using hand tools to control disperse ponding/control runoff) will be taken. If it is determined that persistent ponding or runoff cannot be easily corrected, then discharge will be discontinued. If rainfall occurs during discharge to the extent that the runoff of discharged water cannot be effectively monitored, then the discharge will be discontinued. It is impossible to predict the infiltration rate of the discharge areas. Therefore, the degree of infiltration and runoff will be closely monitored at all times during discharge. The discharge will be stopped if it is determined that persistent ponding and runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 cannot be effectively controlled.*	No revisions to the FWIP have been made as a result of this comment.
18	DTSC-12	3.2 Freshwater Supply Well Installation and Aquifer Testing	During the revegetation pilot project, HNWR-1 was routinely pumped at rates of approximately 1,000 gpm for periods of up to 12 hours per day with no reported adverse effects on any nearby wells.	[Reference text was highlighted, but there was no comment.]	No response required.	No revisions to the FWIP have been made as a result of this comment.
19	DTSC-13	3.3 Management of Material Generated During Investigation	Purged groundwater will be generated during drilling, sampling, well development, and well testing activities. As planned, all purged groundwater will be discharged to the ground surface in a manner consistent with land owner approval and the Arizona Aquifer Protection General Permit (see Section 4.0). Purged groundwater will be discharged directly to the ground surface in areas that are not jurisdictional waterways using a discharge pipe (for small volumes that can be discharged slowly) or sprinkler irrigation system (for larger volumes requiring faster discharge).	Specify all drilling additives that may be used during drilling and development and any additional waste management measures/testing that would need to be enacted (consider excluding certain additives).	In lieu of listing all additives that may be required to install/develop a well, the following text will be added to the third paragraph of Section 3.3, which is referenced two columns to the left: “If any additives are used during drilling or well development activities, additional communication with the land owner and water quality characterization will be required prior to discharge to ensure that the water is suitable for land discharge.”	As requested during the May 14 comment resolution call, Sections 3.1 and 3.2 of the FWIP have been revised to indicate the types of additives that might be used during drilling and well development. In addition, the text indicates that while additional additives might be determined necessary, the land owner and the regulatory agencies will be notified prior to use. MSDS and information sheets for each of the specified additives has been included as new Attachment F.

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20	DTSC-14	3.3 Management of Material Generated During Investigation	As a part of this approach, PG&E will conduct reconnaissance of the irrigated area approximately 1-2 months after work (or as directed by HNWR) to determine if the irrigation stimulated unwanted vegetation. If so, PG&E will work with HNWR to determine if mitigation in the form of herbicide application may be required.	Herbicide application can have environmental impacts. ESA will need to evaluate type and application of such use as part of CEQA evaluation.	The following text will be included in this section: "As discussed with HNWR during the development of this plan, herbicides that may be directed for use include Garlon® (for use in dry areas) or Habitat® (for in areas of standing water). As needed to address specific occurrences of unwanted vegetation, these herbicides would be applied to using basal/cut-stump or foliar (i.e. applied to needles or leaves) methods."	Section 3.3 of the FWIP has been revised as indicated.
21	DTSC-15	3.3 Management of Material Generated During Investigation	Personnel will remain on site during the duration of discharge activities to monitor for persistent ponding and runoff. Water will be discharged to these areas in a manner that minimizes ponding and limits the potential for runoff. During discharge, if persistent ponding or runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 is observed, corrective action (e.g., modification of sprinkler layout, change in discharge rate, or using hand tools to control disperse ponding/control runoff) will be taken. If it is determined that persistent ponding or runoff cannot be easily corrected, then discharge will be discontinued. If rainfall occurs during discharge to the extent that the runoff of discharged water cannot be effectively monitored, then the discharge will be discontinued. It is impossible to predict the infiltration rate of the discharge areas. Therefore, the degree of infiltration and runoff will be closely monitored at all times during discharge. The discharge will be stopped if it is determined that persistent ponding and runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 cannot be effectively controlled.	PG&E should consider putting in temporary barriers to ensure water does not run into jurisdictional water ways.	The existing surface topography associated with the Site B and HNWR-1 irrigation areas is expected to sufficiently prevent water from entering jurisdictional water ways, and therefore, the control measures already included in the FWIP should be adequate and temporary barriers beyond those already included in the plan will not be required.	No revisions to the FWIP have been made as a result of this comment.
22	DTSC-16	4. Anticipated Approvals and Authorizations	Approval from the DTSC is subject to review pursuant to the California Environmental Quality Act to determine whether the activities presented in this implementation plan present any new or substantially more severe significant impacts compared to the impacts evaluated in the certified Final Environmental Impact Report (EIR) for the remedy. In carrying out the activities presented in this implementation plan, PG&E will comply with applicable mitigation measures set forth in the adopted Mitigation Monitoring and Reporting Plan (DTSC, 2011b) for the project.	PG&E should cite which of the MMRPs are applicable and how PG&E will comply with them during implementation.	A discussion of each MMRP is presented in Table B-2 of the FWIP.	No revisions to the FWIP have been made as a result of this comment.
23	DTSC-17	4.1.1 Project Timing	Should the activities occur within the avian migration or nesting season, the required work windows and buffers outlined in the PBA will be implemented for any migratory or nesting birds that may be affected.	[Reference text was highlighted, but there was no comment.]	No response required.	No revisions to the FWIP have been made as a result of this comment.

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24	DTSC-18	4.1.1	Other listed species that may potentially occur or are known to occur within the Action Area include the Yuma clapper rail, bonytail chub, and razorback sucker. Project activities will not occur within the Topock Marsh or Colorado River, where these species reside.	Define "Action Area."	The Action Area is the area that has or is being studied for potential biological impacts resulting from activities of the groundwater remediation, including the freshwater source evaluation. Previously this area was identified as the Area of Potential Effect (APE) in the EIR but to avoid confusion with nomenclature used for cultural resource study areas the term was changed to Action Area in the Programmatic Biological Assessment Reinitiation in December of 2012.	The response has been revised to address an error in nomenclature, and now reads as follows: The Action Area is the area that has or is being studied for potential biological impacts resulting from activities of the groundwater remediation, including the freshwater source evaluation. Previously this area was identified as the Area of Potential Effect (APE) but to avoid confusion with nomenclature used in the Programmatic Agreement developed under the National Historic Preservation Act the term was changed to Action Area in the Programmatic Biological Assessment Reinitiation in December of 2012. Section 4.1 has on the FWIP has been revised to include this information.
25	DTSC-19	4.2 Archeological Surveys and Reviews	All archaeological and historical sites will be avoided during plan implementation to the maximum extent practicable, and this work will comply with all applicable cultural resource mitigation measures included in the *Programmatic Agreement, Cultural and Historic Properties Management Plan and* the adopted *Mitigation Monitoring and Reporting Plan* (DTSC, 2011b) for the project. Prior to any ground-disturbing activities, work areas will be reexamined to ensure that no resources are disturbed. Cultural resource-related documents generated during activities associated with this implementation plan will be made available for review by interested Tribes and the agencies.	Should reference Table B-2 on MMRP evaluations.	Table B-2 is referenced in the opening paragraph of Section 4. An additional reference will be added to the end of the referenced paragraph.	Section 4.2 of the FWIP has been revised to include an additional reference to Table B-2.
26	DTSC-20	Figure 3 Site B Work Area		How will PG&E protect this section of pipe from well to sprinkle area? Design not in workplan. What is PG&E's preferred access to the sites? The implementation plan should be clear on this, especially when considering the cultural resources around the implementation area.	The text in Section 3.3 will be revised to clarify that although the channel is identified as an access route, vehicle traffic will not be allowed over the pipe. Signage and delineators will be used as necessary to prevent vehicle entry near the pipe crossing. Access routes are currently shown on Figure 3. All routes shown for Site B drilling and irrigation areas are preferred routes.	Section 3.3 of the FWIP has been revised.
27	DTSC-21	Table B-1: Item No. 21	Federal Lands only. Discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony	Why Federal Lands only? Does NAGPRA not apply to lands owned by PG&E or the Tribes?	Table B-1 is applicable to work activities outlined in the FWIP, which are not taking place on land owned by PG&E or the Tribes. Additionally, NAGPRA applies only on federal and tribal lands. Under NAGPRA "tribal land" is defined as "(A) all lands within the exterior boundaries of any Indian reservation; (B) all dependent Indian communities; (C) any lands administered for the benefit of Native Hawaiians pursuant to the Hawaiian Homes Commission Act, 1920 [42 Stat. 108], and section 4 of Public Law 86-3." There are no such tribal lands involved in the work activities. 25 U.S.C. § 3001(15).	No revisions to the FWIP have been made as a result of this comment.

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28	DTSC-22	Table B-1: Item No. 33	• Plan to prevent and contain spills of fuel and oil from drilling equipment • Appropriate measures to minimize erosion, scour or sedimentation, including, as appropriate, control of the application rate and location of discharged water, rock check dams or velocity dissipaters, fiber rolls, or silt fences. • Training of personnel in spill prevention and response and BMP implementation.	These appropriate measures should be included in the implementation plan.	These items will be incorporated into the body of the final FWIP.	As a result of discussion of this comment and DTSC-42, a BMP Plan has been included as Attachment D to the FWIP. In lieu of including a subset of appropriate BMPs in the body of the FWIP text, a reference to Attachment D (BMP Plan) has been added to the introductory text of Section 3.
29	DTSC-23	Table B-1: Item No. 33	• Monitoring will be performed as specified in Appendix A of the general permit. Discharge limitations specified in Appendix A will not be exceeded.	PG&E should include Appendix A of the general permit. Agencies can not gauge and evaluate PG&E's operations without knowing the limitations.	Appendix A of the general permit will be attached to the final FWIP.	Attachment A of the general permit has been added as Attachment H to the FWIP.
30	DTSC-24	Table B-1: Item No. 45	PG&E will comply with any requirements specified by ADEQ that are based on the location of the proposed wells.	The current decommissioning approach does not meet the Arizona Well Standards.	See response to comment DTSC-6.	See revisions associated with comment DTSC-6.
31	DTSC-25	Table B-1: Item No. 18	... this work will comply with all applicable cultural resource mitigation measures included in the *Programmatic Agreement, Cultural and Historic Properties Management Plan and* the adopted *Mitigation Monitoring and Reporting Plan* (DTSC, 2011b) for the project.	DTSC understands that not all applicable MMRPs can be complied with due to PG&E's proposed timing of mitigation measures development. PG&E must identify those adopted MMRPs that will not be fully complied with and discuss its significance.	All applicable MMRPs will be complied with. See Table B-2 of the FWIP for a discussion of each MMRP.	No revisions to the FWIP have been made as a result of this comment.
32	DTSC-26	Table B-1: Item No. 3	Because these activities will not be performed in the State of California, the California Toxics Rule is not pertinent.	This is in regards to the compliance of Federal Clean Water Act. The applicability is if PG&E will discharge into any water body. Even if action is not in California, are there Arizona regulations to comply with? May be more appropriate to say that discharge to water body will be avoided for this project.	Discharge to a water body will be avoided for this project. Item 3 of Table B-1 will be revised to state this.	Table B-1 of the FWIP has been revised as indicated.
33	DTSC-27	Table B-1	Table	[Reference text was highlighted, but there was no comment.]	No response required.	No revisions to the FWIP have been made as a result of this comment.
34	DTSC-28	Table B-1: Item No. 28	[Blank cell under “Triggering Event”]	Shouldn't there be a triggering event? Maybe identification of project on floodplain or wetland?	This cell will be populated with: “Identification of project activities on floodplain or wetland”. Nonetheless, the action indicated on this table (or lack thereof) remains accurate.	Table B-1, Item 28 of the FWIP has been revised as indicated. In addition, this item has been revised to address the fact that both the Site B and HNWR-1 Site are within the 100-year flood plain of the Colorado River.
35	DTSC-29	Table B-1: Item No. 32	Sites A and B are not located in jurisdictional waters of the United States.	Although Sites A and B are not in jurisdictional waters, discharge from the investigation of Sites A and B may have potential pathways to jurisdictional waters unless proper administrative or engineering controls are in place.	Item 32 will be revised to indicate that the Site B drilling location is separated from the jurisdictional channel located immediately to the south by a large berm created to constrain flow in the channel. This topographic feature will also prevent cuttings deposited on the ground at Site B from entering the jurisdictional channel.	Item 32 has been revised to speak to both Site B and the HNWR Site, include the indicated text, and reference the use of the BMP Plan.
36	DTSC-30	Table B-1: Item No. 34	Activities will not result in soil disturbance, as defined in the construction general permit, of five acres or more at each well location per the Construction General Permit (AZG2008-001).	Seems like PG&E is citing wrong section of Clean Water Act. Should be related to 122.26(b)(15) for a small construction activity which has an automatic designation unless PG&E can demonstrate compliance with 40 CFR 122.26(b)(15)(i)(A) or (B).”		Section 3 of the FWIP has been revised to state that PG&E will comply with the BMP Plan developed to meet the substantive requirements of the 2013 Arizona General Construction Permit (AZ2013-001). AZ2013-001 specifically authorizes stormwater discharges associated with construction activity pursuant to 40 CFR § 122.26(b)(15).

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37	DTSC-31	Table B-2, Item No. 30	Discharging of water is planned for upland areas only. Corrective action included in the work plan will be implemented to prevent runoff to jurisdictional channels.	Should include engineering controls if feasible to ensure water is not discharged to jurisdictional channel.	The following information from Section 3.3 of the FWIP will be included in Action by PG&E for Item 30: "Personnel will remain on site during the duration of discharge activities to monitor for persistent ponding and runoff. Water will be discharged to these areas in a manner that minimizes ponding and limits the potential for runoff. During discharge, if persistent ponding or runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 is observed, corrective action (e.g., modification of sprinkler layout, change in discharge rate, or using hand tools to control disperse ponding/control runoff) will be taken. If it is determined that persistent ponding or runoff cannot be easily corrected, then discharge will be discontinued. If rainfall occurs during discharge to the extent that the runoff of discharged water cannot be effectively monitored, then the discharge will be discontinued. It is impossible to predict the infiltration rate of the discharge areas. Therefore, the degree of infiltration and runoff will be closely monitored at all times during discharge. The discharge will be stopped if it is determined that persistent ponding and runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 cannot be effectively controlled."	Table B-2, Item 30, has been revised as indicated.
38	DTSC-32	Table B-2, Item No. 30	Proposed activities will not impact habitat for the special-status birds SWFL and Yuma clapper rail.	Please explain why?	The Yuma clapper rail occurs in wetland and marsh habitats and all activities currently proposed are 300 feet away from these habitats. The 300-foot buffer is a minimization measure in the Programmatic Biological Assessment (PBA). The South western willow flycatcher (SWFL) breeding habitat occurs in riparian thickets such as cottonwood and tamarisk thickets adjacent to the edge of water. The PBA requires avoidance of this habitat and a 60-foot buffer from the Colorado River. Currently proposed activities are over 200 feet from SWFL breeding habitat.	Table B-2, Item 30, has been revised to include this text.
39	DTSC-33	Table B-2, Item No. 30	Before the initiation of project elements that could result in disturbance of active nests or nesting pairs of other special-status birds, a qualified biologist shall be consulted to identify appropriate measures to minimize adverse impacts during the construction phase of the project. If deemed appropriate for the final project design because of the potential for impacts, minimization measures will include focusing construction activities that must be conducted during the nesting season to less- sensitive periods in the nesting cycle, implementing buffers around active nests of special-status birds to the extent practical and feasible to limit visual and noise disturbance, conducting worker awareness training, and conducting biological monitoring (including noise monitoring to determine if construction noise at the edge of suitable nesting habitat is elevated above 60 dBA Leq or ambient levels). An avoidance and minimization plan for special status bird species, as defined in Table 4.3-3 and those species protected under the	How are the construction measures being met by PG&E? Not described specifically.	A qualified biologist will perform pre-construction surveys to determine if any special-status birds are nesting in or near the work area. If a special-status bird species, including migratory birds, should be found nesting in the work area the required buffers outlined in the PBA will be implemented. Pre-construction surveys will include a 50-foot buffer adjacent to the work areas.	Table B-2, Item 30, has been revised to include this text. As an action from the May 14 comment resolution call, the specific buffers cited were verified to be accurate per the PBA in light of MMRP BIO-2a, which indicates a buffer of 300 feet for special status birds. Pre-construction surveys will include a 50-foot buffer adjacent to the work areas and an expanded 300-foot buffer for inclusion of any identified Yuma clapper rail habitat (i.e., the 300-ft survey buffer is only specified for Yuma clapper rail and not all special-status species), however Yuma clapper rail habitat currently does not exist within 300 feet of the project activity area.

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			federal Migratory Bird Treaty Act, including the Yuma clapper rail, shall be developed and implemented in consultation with USFWS, and agreed upon by DTSC. Avoidance and impact minimization measures, such as prohibiting construction near or in sensitive bird habitat, limiting construction during breeding seasons, and requiring an on-site biological monitor, shall be included in the design plan and implemented to the extent necessary to avoid significant impacts on sensitive bird species.			
40	DTSC-34	Table B-2, Item No. 39	PG&E will work with the landowner prior to work to determine if signage in addition to that already in place is required.	This discussion with landowner should have taken place and resolution be included in the Workplan for approval.	PG&E will coordinate with HNWR regarding signage requirements and include this information in the final FWIP.	Per discussion during the May 14 comment resolution call, the following statement has been added to Table B-2, Item 39, and Section 3.2: "All signage will be for the purpose of compliance, and not to identify or draw unnecessary attention to the infrastructure."
41	DTSC-35	Table B-2, Item No. 39	b. Developing a site security plan as part of the CMI Workplan	PG&E should develop a site security plan as part of this work plan.	Item 39 will be revised to indicate that PG&E has initiated work on an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan, for submittal with the final design. Communication logs with Tribes are submitted to DTSC quarterly, as part of the quarterly EIR mitigation measures compliance reports (see Table 6.1-2). Security measures specific to the FWIP, including gated access and a security detail that will monitor for unauthorized access to work areas during non-working hours are discussed in Section 3.1 of the FWIP and in Table B-2 (Item 39).	Table B-2, Item 39, has been revised as indicated.
42	DTSC-36	Table B-2, Item No. 41	In the event that impacts on the identified plants cannot be avoided and such plants will be displaced, PG&E shall retain a qualified botanist who shall prepare a plant transplantation/monitoring plan which can be included as part of the Cultural Impact Mitigation Program (CIMP) referenced in CUL-1a-8 either by (1) transplanting such indigenous plants to an on-site location, or (2) providing a 2:1 ratio replacement to another location decided upon between PG&E and members of the Interested Tribes. Plans to transplant or replace such plants shall be approved by DTSC.	PG&E needs to address this requirement in event of actual displacement of an indigenous plant.	Item 41 will be revised to exclude Site A, where vegetation was dense and the potential for trimming was identified. Plants located in the Site B work area are extremely sparse due to previous land disturbance and trimming will not be required. Due to the sparse nature of vegetation, work will be conducted without the displacement of an indigenous plant.	Table B-2, Item 41, has been revised to indicate that displacement or trimming of indigenous plants will not be required to gain access for equipment. Per discussion during the May 14 comment resolution call, a statement has been added to Table B-2, Item 41, indicated that if displacement is required, then the MMRP CUL-1a-8 will be followed. Per comment DOI-6x (See Attachment A3 to the Final FWIP), this statement has been deleted as the CIMP has not been finalized. During FWIP activities, indigenous plant species shall be be protected and avoided.
43	DTSC-37	Table B-2, Item No. 42	The notification system for remediation-related alerts and/or phone calls that might be related to new supply wells will be addressed on the remedy design documents.	Since this activity will take place in advance of the remedy design document, please provide specific procedures to be utilized during the implementation of this work plan to comply with the substantive requirement of this MMRP.	Automated alerts/phone calls will not be in place for any aspect of the FWIP activities. All phone calls will be placed manually, as necessary, and will not be routed through PG&Es existing alarm system at the compressor station. Manual phone calls will not result in additional noise to the project area.	Table B-2, Item 42, has been revised to include the indicated text.
44	DTSC-38	Table B-2, Item No. 43	PG&E will plan all nighttime activities closely with HNWR to ensure the light-related impacts are minimize to the extent practicable while maintaining a safe work environment.	This statement does not demonstrate compliance with the necessary MMRP. Deferring the discussion to the future is not appropriate. PG&E should establish the procedures in advance of the work plan approval.	The last sentence of the Action by PG&E for Item 43 will be revised to clearly state that all night work will be conducted in accordance with MM CUL-1a-7.	Table B-2, Item 43, has been revised to include the indicated text. Per discussion during the May 14 comment resolution call, Table B-2, Item 9, has been revised to be consistent with Item 43.

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45	DTSC-39	Table B-2, Item No. 49	PG&E is working collaboratively with Tribes on this measure.	PG&E should also mention the existing cultural sensitivity education program, the kick-off meeting and the content of these existing program absent of future worker cultural sensitivity education program.	The following text will be added to the existing Action by PG&E for Item 49: "The PG&E representative will be responsible for providing cultural sensitivity training to the workers implementing this plan and for ensuring compliance with all applicable archaeological measures during drilling activities. PG&E will invite participation from the Tribes, archaeological monitors, and agency staff, as appropriate, in this training. This training will be initially conducted during a project initiation meeting held specifically for the subject project, prior to any intrusive work being conducted."	Table B-2, Item 49, has been revised as indicated.
46	DTSC-40	Table B-2, Item No. 56	All work areas and access routes associated with the Alternative Freshwater Source Evaluation have been located away from cultural resources identified by archaeological surveys conducted from August to November 2012.	What about the paleontological investigation which is separate from archaeological survey?	Item 56 will be revised to include the results of the Paleontological Report's Sensitivity Analysis, which indicates that the area of the FWIP is "Low Potential." (P31)	Table B-2, Item 56, has been revised as indicated and to also include supporting information provided in the Response to Comments on *Paleontological Resource Management Plan, Topock Groundwater Remediation Project, San Bernardino County, California and Mojave County, Arizona, prepared for Pacific Gas and Electric Company, December 2012* (Arcadis, July 11, 2013).
47	DTSC-41	Table B-2, Item No. 58	ground disturbance is anticipated to be less than an acre	Since PG&E is expecting up to 1 acre of disturbance per site, this would exceed 1 acre in total. See ARAR number 34 Clean Water Act.	Based on the current project schedule, the activities included in the final FWIP will comply with the new Arizona construction general permit (AZG2013-001) that becomes effective June 3, 2013. This new permit lowers the disturbance area defining exemption from less than 5 acres to less than 1 acre. Therefore, the activities defined in the FWIP will be conducted in compliance with the substantive requirements of AZG2013-001. Table B-1, item number 34 (Action by PG&E) and Table B-2, item number 58 (Action by PG&E) will be revised accordingly.	Table B-1, Item 34, and Table B-2, Item 58, have been revised as indicated. Per request during the May 14 comment resolution call, the general construction permit was attached to the BMP Plan, which was submitted to DTSC for advance review on July 1, 2013.
48	DTSC-42		Nonetheless project activities will defer to best management practices that have been developed by PG&E to prevent storm water pollution.	What are these best management practices. Please include with work plan for approval.	Best management practices for the prevention of storm water pollution will be included in the final FWIP.	A BMP Plan developed and included as Attachment D to the Final FWIP. Per request during the May 14 comment resolution call, the BMP Plan was submitted to DTSC for advance review on July 1, 2013.
49	DTSC-43	Table B-2, Item No. 62	This project will utilize the same health and safety plan that DTSC has approved for prior Topock projects with similar activities.	All H&SP should be site and action specific, although DTSC has reviewed other H&SP for other activities, it does not mean that it is appropriate for this proposed work. PG&E must develop a site specific H&SP for this field activity and be available to all site workers.	The Topock Program Health and Safety Plan will be attached to this Implementation Plan as Attachment E.	A Health and Safety Plan has been developed and included as Attachment E to the Final FWIP. Per request during the May 14 comment resolution call, the BMP Plan was submitted to DTSC for advance review on July 1, 2013.
50	DTSC-44	Table B-2, Item No. 63	NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ NPDES No. CAS000002 (General Permit) (SWRCB 2009)	The proposed work is in Arizona, therefore PG&E must comply with substantive requirement of a different NPDES general permit and its standards.	Item 63 will be revised to include best management practices that will be followed to maintain compliance with the substantive requirements of the Arizona General Construction Permit (AZG2013-001, see response to comment DTSC-41).	A reference to the BMP Plan (Attachment D) has been included in Table B-2, Item 63.
51	DTSC-45		...or Arizona County Highway 10 is observed, corrective action (e.g., modification of sprinkler layout, change in discharge rate, or using hand tools to control...	[Reference text was highlighted, but there was no comment.]	No response required.	No revisions to the FWIP have been made as a result of this comment.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response Discussed During May 14, and May 21, 2013 Comment Resolution Calls	Action Taken by PG&E Based on Response
52	Environmental Science Associates (ESA) February 15, 2013 Memo ESA-1	Section 1 – third paragraph		please clarify the last sentence. Is this stating that the decision to drill and test at Alt-A will be made after drilling and testing of Site A is complete? Also, incorrect reference to fourth location and should be third location, correct?	The referenced text no longer applies since there is only one remaining location where a well might be installed (Site B). The text will be revised.	See comment DTSC-4.
53	ESA-2	Section 2		No comments.	No response required.	No revisions to the FWIP have been made as a result of this comment.
54	ESA-3	Section 3		first paragraph states that three locations will drilled and tested, but then item No. 1 states that Sites A and B will be mobilized but does not specifically state that Site A-Alt will be drilled at this time. Please clarify.	The referenced text no longer applies since there is only one remaining location where a well might be installed (Site B). The text will be revised.	See comment DTSC-4.
55	ESA-4	Section 3		Identifies that “much less waste is generated during the exploration work and less equipment is required for access,” but does not quantify these differences. For example, construction equipment is identified for borehole drilling but not well construction.	The referenced waste comparison is no longer necessary since there is only one remaining location (Site B). The text will be revised.	Section 3 of the FWIP has been revised and the text referenced in the comment has been removed. Per discussion with ESA on July 2, 2013, the amount/type of equipment when drilling an exploratory borehole vs. installing a supply well is similar enough that additional detail does not need to be included in the FWIP.
56	ESA-5	Section 3.2		Identifies the volume of water generated while testing well HNWR-1 but not for borehole drilling/sampling and new well installation. We assume it is the volumes identified in the previous submittal of the Freshwater Plan (up to 80,000 gallons per boring/5.5 million gallons per well).	These estimates will be included in the final FWIP.	The volume estimates for purged groundwater referenced in the comment have been added to Section 3.3 of the Final FWIP.
57	ESA-6	Section 3.3		Identifies that purged groundwater will be discharged directly via pipe (for small volumes) or sprinkler system (for larger volumes). If smaller volumes are discharged directly via pipe, will BMPs such as sand bags or water-filled hydraulic barrier tubes also be utilized? Alternately, could the sprinkler system be use for the exploratory boring discharge water?	The text will be revised to include the sprinkler system as an option for the disposal of water during exploratory boring installation. Given the topography of the discharge area for Site B, including specifically that the Site B drilling location is separated from the jurisdictional channel located immediately to the south by a large berm created to constrain flow in the channel, it is unlikely that sand bags or water-filled hydraulic barrier tubes will be needed. These BMPs were more applicable to Sites A/A-alt.	Section 3.3 of the FWIP has been revised to more clearly state that discharge might occur by direct discharge or sprinkler irrigation system. A BMP Plan has been developed for this work and is included as Attachment D to the Final FWIP.
58	ESA-7	Section 3.3		– For the larger volume of water, will storage tanks be used to temporarily store the discharge water so that the discharge water can be released slowly? If so, how large will the storage tank(s) be and how many?	The text will be revised to include an estimated number of 20,000 gallon frac tanks to be used for temporary storage of larger volumes of water.	Per discussion with ESA on July 2, 2013, Section 3.3 of the Final FWIP has been revised to include the estimated number and type of tanks that may be staged on site during work.
59	ESA-8	Section 4.1.3		identifies that up to 3 acres of potential disturbance to upland habitat from the 3 boreholes. The last sentence states that the 8-acre upland vegetation loss threshold identified in the PBA will not be exceeded; however, shouldn’t the limit for this freshwater area be 3 acres?	The eight acre threshold was noted to explain that the overall project is within the current PBA threshold for upland impacts. The limit for the FWIP was three acres, an acre for each of the test locations. Now that the FWIP has been revised and exploratory drilling will only occur at Site B and HNWR-1, potential impacts to upland habitat will be limited to two acres.	Per discussion with ESA on July 2, 2013, to add clarity, reference to the 8-acre upland vegetation loss threshold (last sentence) has been removed from Section 4.1.3 of the Final FWIP, and the second sentence has been revised indicate that the potential disturbance area is below the threshold.

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60	ESA-9	Section 5		identifies that each site exploratory boring would take up to 6 days but it is assumed that the discharge water to be generated from the drilling activities would not be generated across that entire time period. Please identify over how many days water will be discharged.	The text will be revised to state that water would be discharged for lesser periods of time throughout the 6 days specified.	Section 5 of the Final FWIP has been revised as indicated.
61	Fort Mojave Indian Tribe (FMIT) via Hargis and Associates February 16, 2013 Letter FMIT-1			The Tribe appreciates that Site C is being removed from the work plan due to Department of the Interior ("DOI") and tribal concerns regarding the Beale Slough Area of Critical Environmental Concern ("ACEC") and tribal cultural resources. (Page A-2, RTC No. 10).	Comment noted.	No revisions to the FWIP have been made as a result of this comment.
62	FMIT-2			Regarding format, when work plans and other documents are updated, the Tribe would prefer to receive the text in "Track Changes" mode so that it can more efficiently and accurately review the changes made and understand the potential implications for the Tribe.	Comment noted. A "Track Changes" redline will be provided for subsequent revision(s) to the document.	No revisions to the FWIP have been made as a result of this comment.
63	FMIT-3			DOI's February 4, 2013, cover letter references "continuation" of consultation. While this may be true relative to the whole of the groundwater remediation, BLM only just initiated consultation regarding the fresh water source surveys which have been ongoing now for many months. At this stage, a revision to the process is under consideration; therefore the Tribe regards this as a new and separate consultation. Cover letters should be clearer in that regard.	This response provided by DOI: BLM provided the *Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area* (FWIP) to the nine tribes for Section 106 consultation on November 21, 2012 and comments were received from the TRC and FMIT. On December 20, 2012, BLM provided an invitation to a consultation meeting to discuss the freshwater source alternatives currently under consideration for the Topock Project following the CHPMP meeting on January 9, 2013, at the Lake Havasu Field Office. A consultation meeting to discuss the freshwater source alternatives currently under consideration for the Topock Project was held following the CHPMP meeting on January 9, 2013, at the Lake Havasu Field Office. BLM provided the archeological survey and the revised FWIP to the tribes and AZ SHPO on February 4, 2013 for an additional consultation based on concerns from the Tribes expressed during the CWG. A second consultation meeting on the FWIP was held on March 13 with a site visit on March 14th. The reference to the "continuation" of consultation was specific to the FWIP and not the archeological survey.	No revisions to the FWIP have been made as a result of this comment.
64	FMIT-4	Attachment A, Responses To Comments		In the future, can the formatting be changed to allow for a larger font? It is difficult to read this small sized font.	Comment noted.	No revisions to the FWIP have been made as a result of this comment.

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65	FMIT-5	Attachment A, Responses To Comments		Who attended the January 3, 2013, comment resolution meeting? Were the Tribes invited to that session? If not, why not?	This response provided by DOI: The January 3, 2013 comment resolution meeting was attended by DOI, DTSC, and PG&E representatives and contract personnel. The agencies and PG&E have an initial meeting regarding all response to comment tables to identify comments for agency response and to provide direction or clarification to PG&E on the initial responses to some comments. Due to the significant changes to the FWIP based on comments and DTSC direction regarding Site C, a second revision to the plan was provided for comment. This response provided by DTSC: DTSC concurs with DOI response that substantial changes to the initial implementation plan was needed.	No revisions to the FWIP have been made as a result of this comment.
66	FMIT-6	Page 2		The Tribe has learned that there may be yet another alternative freshwater site under consideration along Old Route 66 (Oatman-Topock Highway). At this point, it is not clear at all how many sites have been considered and presently are under consideration for this exploration. At a minimum, all actively considered sites need to be depicted on a map.	Figure(s) will be revised for the final FWIP to depict the current scope of the evaluation. One additional exploratory borehole will be included in the final FWIP adjacent to HNWR-1. A new supply well will not be installed at HNWR-1 during the proposed activities. The purpose of this borehole is to collect additional lithologic and water quality information from this location for fresh water source contingency planning.	Figures have been revised. Actively considered sites are illustrated on Figures 1 and 2. Note – as a result of the May 14 response to comment call, the option for supply well installation at the HNWR Site is included in the Final FWIP (See Section 3).
67	FMIT-7	Page 3	“Site ... C exploratory boreholes”	In the last sentence of the second paragraph it is not clear why empirical data from “Site ... C exploratory boreholes” is mentioned considering that this site has been eliminated. Also, in the fourth paragraph, in locations where more saline water underlies the aquifer intervals across which the production well is screened, is there a potential for eventual upconing of the saline waters from depth as a result of long-term, high volume pumping?	To clarify, the referenced text appears to be in the last sentence of the THRID paragraph. The referenced sentence, and this section of text in general, will be revised to clearly state that Sites A and C will not be considered for field evaluation at this time. That said, the geophysical data collected from these two site provides valuable context to the evaluation, and therefore, have been retained in the document. Without operational data it is very difficult to estimate what effects long-term pumping from the aquifer will have on the water quality from a given pumping well. Determining if more saline groundwater is present and at what depth is a key criteria for determining well design such that the potential for drawing this water into the well is minimized.	See comment DTSC-4 regarding revisions to the sites where work is being proposed. No other revisions to the FWIP have been made as a result of this comment.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response Discussed During May 14, and May 21, 2013 Comment Resolution Calls	Action Taken by PG&E Based on Response
68	FMIT-8	Page 4: Section 3	"Exploratory boreholes will be drilled and tested at up to three locations ..."	Section 3 states that "Exploratory boreholes will be drilled and tested at up to three locations ..." Does this refer to three locations at each site or in total for the entire plan? Additionally, how will these boreholes be abandoned? As you are aware, a sub-committee of the Technical Work Group ("TWG") has been drafting procedures for well decommissioning associated with the Topock Project. To this point, these draft procedures have not addressed the abandonment of exploratory borings in Arizona. The Arizona Department of Water Resources ("ADWR") has published a 2008 Well Abandonment Handbook that specifies alternative abandonment methods for various types of wells and has provisions for variances. With the assistance of the Topock Technical Review Committee ("TRC"), the Tribe has reviewed these ADWR methods and proposes consideration of the abandonment procedure shown on the attached Figures 1-3. A pdf of the ADWR Handbook is also provided as an attachment.	Given the removal of Sites A and A-alt from consideration for drilling, the text will be revised to indicate that one exploratory borehole will be drilled at each Site B and HNWR-1. Regarding the abandonment method for exploratory boreholes, the application of Alternative 4 to the "Standard Abandonment Method" has been approved by ADWR. Also see response to Comment DTSC-6.	See comment DTSC-4 regarding revisions to the sites where work is being proposed. See comment DTSC-6 regarding the abandonment method for exploratory boreholes.
69	FMIT-9	Page 4: Section 3.1		Section 3.1 indicates that fresh water may be used as a drilling fluid. What would be the source of the fresh water?	The text will be revised to state that while fresh water may be used as a drilling fluid, given the shallow depth to water at Sites B and HNWR-1, it will unlikely be needed. Nonetheless, the potential sources of fresh water for drilling (e.g., Topock Compressor Station supply/ Southwest Water supply wells, or Golden Shores public supply) will be cited in the text.	Section 3.1 of the FWIP has been revised as indicated.
70	FMIT-10	Page 6: Section 3.2	"...up to two new groundwater supply wells ... near Sites A (including Site A-Alt) and/or B."	Section 3.2 refers to a proposal to construct "...up to two new groundwater supply wells ... near Sites A (including Site A-Alt) and/or B." What criteria will determine whether one or two wells will be installed? If it is determined that two wells are required, what criteria will determine whether these will be installed at more than one of these alternative sites?	Given the removal of Sites A and A-alt from consideration for drilling, only Site B is being considered for supply well installation at this time.	See comment DTSC-4 regarding revisions to the sites where work is being proposed.
71	FMIT-11	Page 6: Section 3.2	"temporary wellhead protection measures"	In the third paragraph, please describe the "temporary wellhead protection measures" that would be used. Also, the permanent wellhead construction consisting of bollards and a concrete pad seems to be similar (although probably larger) than the completion at monitor well MW-38, which was destroyed by undercutting during a high runoff event. What is different about this construction that would make the production well less vulnerable to such damage?	The text will be revised to clarify that the temporary wellhead protection measures are intended to be similar to those used for the HNWR-1 well. Protection measures would include a concrete pad to stabilize the well casing, and a well head cover and perimeter fence to protect the well casing from unauthorized access. Unlike the MW-38 wells, a new well at the Site B location would not be located in the primary flow channel of a desert wash. The well location is to the north of a large berm that has been constructed to constrain flow, and out of the Sacramento Wash channel. Therefore, a well at Site B would be less vulnerable to damage when Sacramento Wash flows.	Section 3.2 of the FWIP has been revised as indicated.
72	FMIT-12	Page 7		The discussion at the top of the page in regard to the disposition of produced water is confusing. It seems that PG&E is concluding that, while there is a potential for infiltration from the sprinkling of the produced water at the surface, considering the depth to the water table, the duration and rate of pumping during the testing, and the rate of infiltration, it would not be expected to affect the results of the specific capacity testing. In the fourth paragraph, it is said that HNWR-1 was routinely pumped at 1,000 gallons per minute for periods of up to 12 hours	The text states that although there is a potential for the infiltration of test water to influence water levels in the aquifer during testing, given the relatively large area of infiltration and how slow the infiltration process is estimated to be, the magnitude of this influence is expected to be very small. Based on review of a technical memorandum documenting the Sacramento Wash Revegetation	No revisions to the FWIP have been made as a result of this comment.

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				per day. How many days was pumping performed at this rate?	Project the primary periods of irrigation took place from January 28 through April 28, 2011 and May 4 through August 12, 2011. During these periods pumping was conducted for roughly 12 hours at a time during events occurring daily or every few days.	
73	FMIT-13	Pages 7, 9, 11		RTC No. 43: The Implementation Plan repeatedly references the Mitigation Measures Reporting Program ("MMRP") for the Groundwater Remedy Environmental Impact Report ("EIR"). Please explain how the MMRP and EIR apply outside the project boundary for the Final EIR? The measures may or may not be appropriate. How do we know this without additional environmental analysis and findings?	This response provided by DTSC: The freshwater implementation plan references that "in carrying out the activities presented in this implementation plan, PG&E will comply with applicable mitigation measures set forth in the adopted Mitigation Monitoring and Reporting Plan (DTSC, 2011b) for the project." The "applicable mitigation measures" are being proposed by PG&E as part of the freshwater implementation plan. The CEQA evaluation being conducted independently by DTSC will use the mitigation measures provided in the Mitigation Monitoring and Reporting Plan (DTSC, 2011b) as the basis for crafting project-specific measures for the freshwater implementation plan. Through the CEQA evaluation of the freshwater implementation plan, DTSC will determine if those measures are sufficient for protection of resources associated with the freshwater implementation plan. The CEQA evaluation of the freshwater implementation is on-going.	No revisions to the FWIP have been made as a result of this comment.
74	FMIT-14	Page 7		RTC No. 2, Table B-2 Item 31: On a somewhat related point, the Implementation Plan appears to be making determinations regarding both significance of impacts and adverse effect. These determinations are to be made by the lead agencies using their independent judgment, including as part of the California Environmental Quality Act ("CEQA") process, and not by the responsible party or project applicant.	The commenter correctly notes that the lead agency (which is DTSC) will make significance determinations in the CEQA process. This statement in Table B-2 represents PG&E's conclusion regarding effects on the desert tortoise, and does not purport to be a statement or a determination by DTSC, but is intended as a proposal for agencies' review. This response provided by DTSC: The CEQA determinations regarding significance of impacts associated with implementation of the freshwater plan will be identified in the CEQA evaluation conducted by DTSC. Although PG&E can provide their assumptions in the implementation plan, they are not binding conclusions or determinations for the agencies on the significance of impacts and adverse effects. The text in the freshwater implementation plan regarding CEQA analysis and consistency with the Final Groundwater EIR should be qualified as generalized statements made by PG&E and do not necessarily reflect the independent judgment made by DTSC as the lead agency.	No revisions to the FWIP have been made as a result of this comment.

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75	FMIT-15			Figures 2 & 3: The Tribe is concerned about the nature and size of the proposed high-volume sprinkler systems. Please provide more detail about the sprinklers and the area they would water. Will these industrialize the area and create visual and other impacts? The Tribe is concerned about the cumulative impacts of evaporation ponds and sprinkler fields on the area. Please also explain what is meant by "previously disturbed areas" where discharge activities can be well monitored.	The proposed sprinkler system equipment and operation are detailed in Section 3.3 of the FWIP. The proposed area for irrigation is illustrated on Figure 3 of the Revised FWIP (Site B Work Area). The operation of the presence of sprinkler system equipment and its operation will be temporary, and therefore, will minimize visual and industrialization impacts. Please note that evaporation ponds will not be constructed as part of the activities included in the FWIP. In the context cited, “previously disturbed areas” include those where vegetation have been previously removed and/or natural topography has been previously altered, and as a result, provide an open area where discharged water can be easily monitored by on site workers. In the case of the Site B/HNWR-1 irrigation area, which is now the only irrigation area being considered in the FWIP, this area was previously disturbed by the land owner to remove unwanted vegetation.	Note that the Figure 3 referenced is now Figure 2 based on revisions to the Final FWIP. No revisions to the FWIP have been made as a result of this comment. Per discussion during the May 21 comment resolution call, DTSC noted that temporary impacts are being assessed as part of the CEQA process.
76	FMIT-16	Page 8		The Tribe is also concerned about the extent of potential herbicide application mentioned in the last sentence of the third full paragraph.	Additional detail regarding the specific pesticides and application methods will be included in Section 3.3 in response to Comment DTSC-14 and this comment. See response to Comment DTSC-14.	See comment DTSC-14.
77	FMIT-17	Page 9		This section references Attachment B-1, an Applicable or Relevant and Appropriate Requirements (“ARAR”) compliance table. This is the first time the Tribe has seen this table. What is its genesis (who drafted it and for what purpose)? Please explain the significance of the division between ARARs and non-ARARs? Who drafted the details of the actions required for compliance? How are the lead agencies overseeing this table? Is this just a draft? Are the agencies exercising their independent judgment and making revisions? If so, please provide those to the Tribe.	This response provided by DOI: The ARARs compliance table was initially developed by DOI in 2007 in our preliminary determination of potential ARARs for the Topock site. (Email correspondence to CWG from DOI dated 12/11/2007, Preliminary ARARs for Topock Site). Similar tables have been used throughout the groundwater remedy evaluation and selection. These tables, including the table in Attachment B-1, are used as an administrative tool by which actions proposed by PG&E to attain ARARs are identified for review and evaluation by DOI and DTSC. DOI and DTSC review these tables in draft documents to evaluate whether proposed actions will comply with ARARs and, based on our comments, are revised as necessary to obtain DOI and DTSC approval. PG&E is required to comply with all DOI and DTSC direction with respect to all activities performed by PG&E, and obtain DOI and DTSC approval of all documents prepared by PG&E, under enforceable orders issued by both DOI and DTSC.	No revisions to the FWIP have been made as a result of this comment.
78	FMIT-18	Page 11		RTC No. 7, Table B-2 Item 44: The description of Tribal participation in these archaeological surveys is misleading. The Tribes were not apprised of at least one of the surveys. Perhaps there were additional ones that the Tribes are still not aware of. Please describe in greater detail tribal participation on the surveys including how long surveys were conducted without tribes being invited, on which survey segments tribes were present, etc.	Tribal monitors from the Chemehuevi, CRIT, and FMIT were variously involved August 10 to 11, 2012, October 2 to 4, 2012, October 10, 2013, and December 12 to 13, 2012. During the course of AE’s ongoing field work activity, one short field session was conducted without specific PG&E Tribal notification. PG&E has taken action to insure timely Tribal notification in the future.	The text has been revised for Table B-2, Item 44 to include this detail.

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79	FMIT-19	Page 11	"with DTSC approval"	Please explain what "with DTSC approval" means relative to the retention of Applied Earthworks (“AE”). Please know that tribes may be concerned about the use of this firm given the controversy over cultural resource management (“CRM”) at the Genesis project where AE was the CRM consultant.	This response provided by DTSC: DTSC’s approval of Applied Earthworks is based on project history and credentials presented by PG&E. DTSC’s evaluation of Applied Earthworks as the Qualified Cultural Resource Consultant is based on the criteria set under Cul-1a-3 of the Mitigation Monitoring and Reporting Program established for the certified programmatic EIR for the groundwater remedy. DTSC welcomes any tribal concerns regarding the performance of the selected consultant. Please note that DTSC must make our decision based on substantive facts on the firms’ performance and not exclusively based on past controversy associated with Tribes.	Per discussion during the May 21 comment resolution call, the response provided by DTSC has been revised as follows: DTSC’s approval of Applied Earthworks is based on project history and credentials presented by PG&E. DTSC’s evaluation of Applied Earthworks as the Qualified Cultural Resource Consultant is based on the criteria set under Cul-1a-3 of the Mitigation Monitoring and Reporting Program established for the certified programmatic EIR for the groundwater remedy. DTSC welcomes any tribal concerns regarding the performance of the selected consultant. Please note that DTSC must make our decision based on substantive facts on the firms’ performance. No revisions to the FWIP have been made as a result of this comment.
80	FMIT-20	Page 11	“...temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered,”	Also, in regard to AE’s authority to “...temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered,” a provision for AE to consult and act on the advice of Tribal Monitors should also be made.	Tribal participation in discoveries of previously unidentified cultural and/or historic resource are addressed in Section IX of the Programmatic Agreement and the PA’s Monitoring Protocol (Appendix C), and in the CHPMP’s Discovery Plan (Appendix C of the CHPMP) and Plan of Action (Appendix D of the CHPMP addressing discoveries of human remains).	Per discussion during the May 21 comment resolution call, the monitoring protocol included in the Programmatic Agreement (Appendix C) has been cited at the end of Section 4.2.
81	FMIT-21	Attachment A, Responses to Comments		RTC No. 13: What are the details regarding potentially necessary security measures such as temporary and permanent fences (i.e., materials, height, total perimeter, etc.). Will these industrialize the area and create visual and other impacts? The Tribe is concerned about the cumulative impacts of evaporation ponds, sprinkler fields, fences and security on the area.	Temporary security measures are anticipated to be similar to those already in place at the HNWR-1 well. As stated in the FWIP, final measures will be presented in subsequent groundwater remedy design document(s). The cumulative the impacts of the freshwater source are evaluated in the EIR.	Per discussion during the May 21 comment resolution call, the response has been revised as follows [changed portions are underlined]: <u>Additional</u> temporary security measures <u>will</u> be similar to those already in place at the HNWR-1 well. As stated in the FWIP, final measures will be presented in subsequent groundwater remedy design document(s). The cumulative impacts of the freshwater source are evaluated in the EIR. The end of Section 3.1 has also been revised per discussion on May 21.
82	FMIT-22	Attachment A, Responses to Comments	"PG&E does not consider areas north of Site C viable due to logistical constraints and cost."	RTC No. 25: What does the statement mean: "PG&E does not consider areas north of Site C viable due to logistical constraints and cost." Isn't feasibility of alternatives something that the lead agencies should be determining, in part through a CEQA or other public process?	Site C is no longer eligible for evaluation as part of the FWIP. If a well was installed to the north of Site C, then infrastructure (e.g., pipelines) would need to pass through Site C en route to the Topock Site, which would not be acceptable.	No revisions to the FWIP have been made as a result of this comment.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response Discussed During May 14, and May 21, 2013 Comment Resolution Calls	Action Taken by PG&E Based on Response
83	FMIT-23	Attachment A, Responses to Comments		RTC No. 43: References a Mitigation Compliance Table. What is the genesis of this table? This is the first time the Tribe has seen this table. Who drafted it and for what purpose? Who drafted the details of the actions required for compliance? How are the lead agencies overseeing this table? Is this just a draft? Are the agencies exercising their independent judgment and making revisions?	The table referenced by the commenter is Table B-2. This table was drafted by PG&E for the purpose of documenting compliance with requirements of the Programmatic Biological Agreement (PBA), the EIR MMRP, the PA, and the CHPMP (see column titled "Action by PG&E"). Text in the column titled "Compliance Item, Relevant Excerpt or Section from Document" is lifted verbatim from the source document (PBA, EIR MMRP, PA, or CHPMP). Text describing "Action by PG&E" is PG&E's own evaluation and is intended as a proposal for agencies' review. Portions of this table related to compliance with the EIR MMRP has been included in previous documents such as the CMI/RD Work Plan, the preliminary (30%) design report, and the quarterly EIR mitigation measures compliance reports.	Per discussion during the May 21 comment resolution call, a footnote has been added to the "Action by PG&E" column header indicating that text describing "Action by PG&E" is PG&E's own evaluation and is intended for agencies' review and approval.
84	FMIT-24	Attachment A, Responses to Comments		RTC No. 48: How can PG&E rely on the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") permit exemption for activities that are outside the contaminated area and the project boundary area? See also Table B-2 Item 58 which states that "All work is being conducted outside areas of concern associated with the Topock Remediation Project." Both statements cannot be true?	CERCLA's permit exemption included in Section 121(e)(1) states that "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with this section." 42 U.S.C. § 9621(e)(1). On-site is defined as "the areal extent of the contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action." 40 CFR § 300.400(e)(1). Therefore, CERCLA's permit exemption does not apply only to the contaminated area. In this case, the work encompassed by the FWIP is conducted in "all suitable areas in very close proximity to the contamination necessary for implementation of the response action."	Per discussion during the May 21 comment resolution call, Table B-2, Item 58, has been revised to replace "areas of concern" with "SWMUs/AOCs".
85	FMIT-25	Attachment A, Responses to Comments		RTC No. 51: Having a biologist "on call" is not the same as having a biologist "on site." Please revise.	PG&E will not have a biologist onsite during the entire fieldwork phase of the FWIP. A biologist will survey the work area immediately before the field mobilization and will designate and mark the acceptable work zone that avoids impact to sensitive vegetation and habitat. The biologist will also train and authorize biological resources Field Contact Representatives (FCRs) who will be responsible for ensuring compliance with all biological-related requirements and best practices, which is consistent with all other PG&E field work within the HNWR. At least one FCR will be onsite whenever active fieldwork is being conducted at the work site. A knowledgeable biologist will be on-call at all times during field work.	No revisions to the FWIP have been made as a result of this comment.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response Discussed During May 14, and May 21, 2013 Comment Resolution Calls	Action Taken by PG&E Based on Response
86	FMIT-26	Attachment A, Responses to Comments		RTC No. 54: States that a determination of whether an amendment to the Area of Potential Effects ("APE") will be necessary will be conducted during the 60 % design. How does this relate to the timing of the freshwater source evaluation and CEQA evaluation by DTSC? Shouldn't these be coordinated actions?	This response provided by DOI: As noted in the March 3, 2013 FWIP consultation meeting with the Tribes, BLM has proposed that the appropriate timing for the expansion of the APE would be during the 90% design review. This response provided by DTSC: CEQA project area is distinct and separate from the federal definition of the APE. CEQA Guidelines Section 15124 requires that the precise location and boundaries of the proposed project shall be identified. CEQA does not require development of an "Area of Potential Effects ("APE")." The boundary of the proposed project site has been identified in the freshwater implementation plan and the CEQA evaluation. Although ideally DTSC's project area would be the same as the Federal APE, there is no legal requirement that they are defined together, at the same time, or having the same boundaries.	No revisions to the FWIP have been made as a result of this comment.
87	FMIT-27	Attachment B-1, ARAR Compliance Table		Item No. 5: This item references BLM taking action to prevent unnecessary or undue degradation. Has BLM been making these project findings throughout the life of the remediation, and if so, where have these been made? Please provide this information to the Tribe.	This response provided by DOI: DOI and BLM review draft documents to ensure that the proposed actions comply with ARARs and our review is reflected in our comments, as necessary.	Per discussion during the May 21 comment resolution call, the response provided by DOI has been revised as follows [added text is underlined]: <u>Yes, in consultation with Tribes and agencies,</u> DOI and BLM review draft documents to ensure that the proposed actions comply with ARARs and our review is reflected in our comments, as necessary.
88	FMIT-28	Attachment B-1, ARAR Compliance Table	"This activity does not substantially burden a person's exercise of religion."	Item No. 39: States that "This activity does not substantially burden a person's exercise of religion." Whose opinion is this? Is this the opinion of DTSC or BLM or a recommendation by PG&E? The Tribe has not been consulted on this conclusion.	This response provided by DOI: The DOI Solicitor's Office determined in the process of identifying ARARs during the Feasibility Study for the Topock groundwater remedy, based on an analysis of controlling case law, that activities performed to implement the groundwater remedy at the Topock site do not establish a "substantial burden" on the exercise of religion as that term is used in the Religious Freedom Restoration Act.	Per discussion during the May 21 comment resolution call, the following response was provided by DOI in an email on June 3, 2013: The table of Applicable or Relevant and Appropriate Requirements is found in the Groundwater Corrective Measures Study/Feasibility Study (CMS/FS) Appendix B. The discussion found for ARAR 39 provides the judicial test as to what constitutes a "substantial burden" (in the context of the Religious Freedom Restoration Act). "To constitute a 'substantial burden' on the exercise of religion, a government action must (1) force individuals to choose between following the tenets of their religion and receiving a governmental benefit or (2) coerce individuals to act contrary to their religious beliefs by the threat of civil or criminal sanctions." Based on an this information, activities performed to implement the groundwater remedy at the Topock site do not establish a "substantial burden" on the exercise of religion as that term is used in the Religious Freedom Restoration Act. No revisions to the FWIP have been made as a result of this comment.
89	FMIT-29	Attachment B-2, Non-ARAR Compliance Table	"barren areas"	Item No. 6: What does "barren areas" mean as used here?	The text will be revised to state that these areas are largely devoid of vegetation.	Table B-2, Item 6, has been revised as indicated.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response Discussed During May 14, and May 21, 2013 Comment Resolution Calls	Action Taken by PG&E Based on Response
90	FMIT-30	Attachment B-2, Non-ARAR Compliance Table		Item No. 14: Who determines "to the extent practicable" relative to avoidance of sensitive plants?	The PG&E biologist makes the first determination regarding “the extent practicable” and the agencies provide review and comment on this determination. Please note that the work areas identified for Site B or HNWR-1 occur on previously disturbed areas however there are two areas that contain sensitive plant species that will be avoided. These species were identified during the spring botanical surveys in 2013. In the northern part of the study area several ethnobotanical seedlings occur and then along Sacramento Wash there are several blue palo verde trees. Both areas that contain sensitive plants are outside the designated sprinkle area and the proposed exploratory well work areas and will be avoided.	Table B-2, Item 14, has been revised to include the additional detail provided in the response.
91	FMIT-31	Attachment B-2, Non-ARAR Compliance Table		Item No. 26: All historical sites will not be protected from work activities. There has been no study of the project's potential impacts on Traditional Cultural Properties (“TCPs”) or Traditional Cultural Landscapes (“TCLs”) relative to this new study area. Moreover, the tribes should be added to the notification list should any cultural resources be encountered during work.	BLM’s previous determination that there is a TCP that is National Register eligible is limited to the current APE (i.e., BLM’s determination regarding the TCP does not extend to Site B or HNWR-1). However, all archaeological and historical sites will be avoided and protected from work activities, to the extent practicable, whether they are inside or outside of the current APE, in accordance with applicable regulations. The Tribes will be added to the notification list should any cultural resources be encountered during work.	Per discussion during the May 21 comment resolution call, the response has been revised as follows [added text is underlined]: BLM’s previous determination that there is a TCP that is National Register eligible is limited to the current APE (i.e., BLM’s determination regarding the TCP does not extend to Site B or HNWR-1). However, all archaeological and historical sites will be avoided and protected from work activities, to the extent practicable, whether they are inside or outside of the current APE, in accordance with applicable regulations. <u>The Tribes will be added to the notification list should any cultural resources be encountered during work. Modification of the APE will be considered throughout the course of the project</u>.
92	FMIT-32	Attachment B-2, Non-ARAR Compliance Table		Item No. 27: The Tribe needs additional project detail, as outlined elsewhere in this letter, before it can fully understand the impacts of the project from the Maze. The conclusions stated by PG&E are without substantiation.	Based on review of other comments, PG&E gathers the additional project detail referred to in this comment is related to irrigation equipment and infrastructure associated with a well head at Site B and associated security infrastructure (e.g., fencing). Please see response to Comment FMIT-15 regarding the temporary nature of the irrigation equipment and activities. In the event a well is installed at Site B it is unlikely the well head or associated infrastructure will be visible from the Maze due to the large berm that is present on the line of sight between the Maze and Site B. The berm is approximately 10-15 feet in height and a Site B well head will be approximately 100 feet north of the berm. The location of the Maze is greater than one mile from Site B. It is anticipated that well head infrastructure would be obscured by the berm. This response provided by DTSC: The CEQA evaluation conducted by DTSC will consider direct and indirect impacts to the Maze. DTSC has participated in a site walk with the Tribes, as well as solicited additional comments and feedback from the Tribes related to impacts to the maze as well as other cultural resources.	No revisions to the FWIP have been made as a result of this comment.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response Discussed During May 14, and May 21, 2013 Comment Resolution Calls	Action Taken by PG&E Based on Response
93	FMIT-33	Attachment B-2, Non-ARAR Compliance Table		Item No. 28: The Tribe needs additional project detail, as outlined elsewhere in this letter, before it can fully understand the impacts of the project from the River. The conclusions stated by PG&E are without substantiation.	See response to Comment FMIT-32. In addition, the ground elevation of Site B is very close to that of the River, and because of this, vegetation between the River and Site B would prevent the visibility of Site B infrastructure.	No revisions to the FWIP have been made as a result of this comment.
94	FMIT-34	Attachment B-2, Non-ARAR Compliance Table		Item No. 29: This item references a survey conducted to delineate/map jurisdictional areas. The Tribe does not recall receiving a copy of this survey and map. Please provide. In the future, the Tribe requests to be timely provided all such surveys and maps.	Jurisdictional areas are shown on site figures included in the FWIP. In addition, the jurisdictional area survey will be included as an attachment to the final FWIP.	Information collected during the jurisdictional area survey has been included in the Final FWIP as Attachment G.
95	FMIT-35	Attachment B-2, Non-ARAR Compliance Table		Item No. 39: Please provide more detail on the potential security detail, the rationale behind it, and specific duties and authorizations.	The Site B and HWNR-1 work areas are readily visible from a busy highway. The purpose of the security detail is to monitor the work sites during non-working hours to prevent unauthorized access though the notification of law enforcement, as necessary.	Table B-2, Item 39, has been revised to include the detail included in the response.
96	FMIT-36	Attachment B-2, Non-ARAR Compliance Table	"cultural resources" "archaeological resources" "The potential work area has been established to exclude all known resources"	Item Nos. 44, 51, 55, & 56: These sections incorrectly state that the areas were surveyed for "cultural resources." This misstatement must be corrected to reference that they were surveys for "archaeological resources." To our understanding, no effort has been made to survey or make assessments regarding religious or ceremonial proprieties, TCPs or TCLs, or other aspects of cultural resources of concern to the Tribes. Likewise, it cannot be concluded at this time here and at Item No. 93 that "The potential work area has been established to exclude all known resources." This conclusion is unsubstantiated.	The term “cultural resources” is used in the same sense as in the certified EIR for the groundwater remedy, and the cultural resources analysis in chapter 4.4 of the EIR was based on surveys for archeological and historic resources, as well as consultations with interested tribes. Likewise, the areas here were surveyed for archeological and historical resources. Tribal consultation was conducted by the BLM in addition to DTSC’s Tribal coordination. The conclusions will be revised to state that “The potential work area has been established to exclude all resources identified during the surveys.”	The conclusions for Table B-2, Items 44, 51, 55, 56, and 93, have been revised as indicated.
97	FMIT-37	Attachment B-2, Non-ARAR Compliance Table		Item Nos. 44 & 63: These items state that soil or drill cuttings would be left on the ground where they are generated. Such project aspects must be discussed with the Tribe. To date, no consultation on this topic for this project has occurred.	PG&E understands that Comment DOI-4 is a direct result of discussion with the Tribe regarding management of drill cuttings for this project. Please also see response to Comment DOI-4 and FMIT-3.	See comments DOI-4 and FMIT-3.
98	FMIT-38	Attachment B-2, Non-ARAR Compliance Table		Item No. 57: Should also reference that all applicable federal authority will be followed including the Native American Graves Protection and Repatriation Act (“NAGPRA”) and the American Indian Religious Freedom Act (“AIRFA”).	This EIR MMRP relates specifically to discoveries during ground-disturbing activities. As Table B-2 already notes, “all ground disturbing activities will occur on federal land and thus the Native American Graves Protection and Repatriation Act will be followed.” The American Indian Religious Freedom Act (“AIRFA”) is also an ARAR that will be followed and as laid out in Table B-1, Item No. 22, “The United States must ‘protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise [their] traditional religions…’”.	No revisions to the FWIP have been made as a result of this comment.

Absolute Comment No.	Comment Source/Number	Section	Reference Text	Comment	Response Discussed During May 14, and May 21, 2013 Comment Resolution Calls	Action Taken by PG&E Based on Response
99	FMIT-39	Attachment B-2, Non-ARAR Compliance Table		Item No. 63: States that purged groundwater will be discharged to the ground. Please provide additional detail on volumes, manner and locations of such discharges.	The estimated volumes of water discharge will be added to the text per response to Comment ESA-5 (up to 80,000 gallons per boring/5.5 million gallons per well). The locations of discharge are illustrated on the Site B Figure, which was previously Figure 3 of the Revised FWIP. The manner of discharge is detailed in Section 3.3 of the FWIP.	No revisions to the FWIP have been made as a result of this comment.
100	FMIT-40	Attachment B-2, Non-ARAR Compliance Table		Item No. 66: The Tribe needs additional project detail, as outlined elsewhere in this letter, before it can fully understand the impacts to vibration-sensitive receptors. The conclusions stated by PG&E are without substantiation.	As already detailed in the Action by PG&E column for this Item on Table B-2, planned activities are a minimum of 275 feet of vibration-sensitive land uses located in Arizona.	No revisions to the FWIP have been made as a result of this comment.
101	Hualapai Department of Cultural Resources (HDCR) April 24, 2013 Letter HDCR-1			On behalf of the Hualapai Tribe, we feel that it is very important to have minimal disturbance in an area that has been under constant environmental change due to the operations of the Topock Compressor Station. We feel that HNWR1 on the Arizona side is the best choice, and we prefer that there be no treatment for either arsenic or fluoride as this process will create an entirely new set of parameters for the Topock Remediation project that would cause further disturbances to the entire area. The HNWR 1 well would be, in our estimation, the least intrusive and create the least amount of disturbance.	PG&E thanks the Hualapai for their comment and will continue to work towards minimizing disturbance during implementation of the remedy.	No revisions to the FWIP have been made as a result of this comment.
102	HDCR-2			In the process of re-drilling this well if necessary, Hualapai prefer that any clay-type soils be set aside in a location safe from disturbances. The clays could be placed on cotton materials and deposited safely aside so that in the future these clay materials can be placed back into the well-casing at a time when the HNWR 1 well could be decommissioned.	See response to Comment DOI-4 regarding the management of drill cuttings from clay beds.	See comment DOI-4 (Section 3.1 of the FWIP has been revised).

Attachment A-3 Comments on the Final (Redline) Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California (submitted July 19, 2013)

Absolute Comment No.	Comment Source/Number	Section/Item	Reference Text	Comment	Response	Action Taken
1	DOI-1x	Attachment B-1		ARAR 28 (40CFR 6.302) found in the ARAR table should be removed, referencing only Executive Orders 11988 and 11990 as TBCs to address the floodplain and wetland issue. DOI directed PG&E to remove this ARAR from subsequent design documents in October 2011. This ARAR deals procedures for coordination of the specified environmental reviews under NEPA and is not applicable to this project.	Comment noted.	ARAR 28 has been deleted.
2	DOI-2x	Section 4.1, 1st Paragraph, Second Sentence		Refers to an 8-acre upland threshold. In accordance with the Section 7 reinitiation, the revised allowable acreage disturbance in the upland is 7.0 acres (3 from original PBA plus 4 additional acres from the reinitiation).	In the January 9, 2013 letter from USFWS to BLM regarding the extension and the modification of the PBA, it states that the total allowable upland acreage disturbance is up to 8.0 acres (3 from original PBA plus 5 additional acres). The total additional acreage in the PBA reinitiation for upland was 1.0 for soil sampling and 4.0 for test wells. The FWIP is referencing the total upland threshold from the PBA not just the 4.0 acres for test wells. The updated version of Section 4.1 also states that 2.0 acres of disturbance would be attributable to the exploratory borings and wells.	No revisions to the FWIP have been made as a result of this comment.
3	DOI-3x	4.1.2 Project Location and Habitat Sensitivity		The habitat description found in the PBA which provides the distinction between upland and floodplain is "sparse creosote bush scrub community, whereas the floodplains on the California and Arizona shorelines are composed of sandy soils with tamarisk". From this definition and input from FWS, HNWR-1 and site B likely fall within the floodplain. Please provide clarification regarding designating the area surrounding HNWR-1 and Stie B as "uplands" or reference appropriate floodplain maps. If HNWR-1 and Site B are in the floodplain, please modify the text throughout the document to show this designation.	HNWR-1 and Site B fall within the 100-year floodplain limits. There was an attempt to differentiate species of tamarisk found at the site (Tamarix ramosissima and Tamarix aphylla). T. ramosissima was identified as riparian specific and T. aphylla was identified as an upland species. We agree that T. aphylla can be found in floodplains and should adjust the text accordingly to reflect that it's not entirely confined to uplands.	Section 4.1.2 of the Final FWIP has been revised.
4	DOI-4x	text in Section 4.1.4 Conservation Measures		States that "The conservation measures identified in the PBA for listed species and habitat will be implemented. Any habitat loss is expected to be below the 8-acre upland threshold an in the PBA." The 8-acre upland threshold is incorrect. In accordance with the Section 7 reinitiation, the revised allowable acreage disturbance in the upland is 7.0 acres.	See response to comment DOI-2x.	See response to comment DOI-2x.
5	DOI-5x	Section 4.1.5, in the 4th paragraph		The above comment also applies to Section 4.1.5, in the 4th paragraph. Additionally, "upload" should be changed to "upland" in this paragraph.	See response to comment DOI-2x.	Typo has been corrected.
6	DOI-6x	Table B-2, Item 41, Action by PG&E		The sentence reads as follows: "Should displacement of indigenous **plans** of traditional cultural significance be required, the MMRP for CUL-1a-8 will be followed." Correct word should be "plants". Also, this plan will be implemented prior to the CIMP finalization. CUL-1a-8 is referenced in the response but does not seem applicable to the situation. Please clarify.	Concur.	Typo has been corrected and the sentence "Should displacement of indigenous plants of traditional cultural significance be required, the MMRP for CUL-1a-8 will be followed" had been deleted Note that the "Action Taken By PG&E Based on Response" as indicated in Attachment A2 (comment DTSC-36) has been modified, and as a result, "Action Taken By PG&E" as indicated on Attachment B2 (Item 41) has been modified.
7	ADEQ-1x	Attachment D – BMP Plan		The BMP Plan is in general compliance with the following sections of the Arizona Pollutant Discharge Elimination System (AZPDES) General Permit for Stormwater Discharges associated with	PG&E has added a table detailing compliance with the substantive portions of Section 6.0 of the permit as Attachment F to the BMP Plan.	Attachment F has been added to the BMP Plan.

Absolute Comment No.	Comment Source/Number	Section/Item	Reference Text	Comment	Response	Action Taken
				Construction Activity to Waters of the United States (AZG2013-001): 3.0, 4.0, and 5.0. However, the BMP Plan is missing several elements contained with Section 6.0: Stormwater Pollution Prevention Plan (SWPPP) Preparation. Since this project falls under the CERCLA process and PG&E is only required to comply with the substantive portions of the permit, I will defer to the Department of the Interior to determine if Section 6.0 is of importance to the project.		
8	ADEQ-2x	Attachment D – BMP Plan		Suggestion: PG&E could explain the CERCLA exemption in the first paragraph of page 1.	The following text, which is already included in Section 3.3 of the FWIP text, will be added included in Attachment D (BMP Plan) text: Note that, because this freshwater source evaluation is part of a CERCLA response action, implementation plan activities conducted onsite are covered under the permit exemption codified in Section 121(e)(1) of CERCLA. While the permit exemption applies to the administrative or procedural elements (e.g., preparing and submitting permit applications and obtaining permits), the substantive requirements of the applicable laws remain.	Text has been added as indicated.
9	ADEQ-3x	Attachment D – BMP Plan		Suggestion: PG&E should change the permit title to what is provided in the paragraph above.	Concur.	Text has been revised as indicated.
10	ADEQ-4x	Attachment D – BMP Plan		Suggestion: PG&E could utilize Arizona's rainfall erosivity factor calculator as provided in Section 1.6 of the permit.	The Arizona rainfall erosivity factor calculator is populated per the EPA Calculator, which was used in the BMP Plan.	No revisions to the FWIP have been made as a result of this comment.
11	ADEQ-5x	Attachment D – BMP Plan		Suggestion: PG&E should include the final executed permit in their BMP Plan as opposed to the draft final.	Concur.	The final permit has been added as Attachment A to the BMP Plan.
12	ADEQ-6x	Attachment D – BMP Plan		Suggestion: PG&E should include the 2013 permit documents in Attachment A.1, A.2, A.6, and A.7.	The specified permit documents are included in Attachment B of the BMP Plan.	No revisions to the FWIP have been made as a result of this comment.
13	ADEQ-7x	Attachment E – Health and Safety Plan		As for PG&E's HASP, my position does not provide me the ability to approve or not approve safety documents. I can say that the HASP appears to be very thorough and cover a large variety of safety concerns that could be present.	Comment noted.	No revisions to the FWIP have been made as a result of this comment.
14	DTSC-1x	Section 2	Empirical data that will be collected from the former Site A and C exploratory boreholes might lead to an alternative interpretation of the resistivity results, thereby requiring that one of these deeper intervals be evaluated.	Delete the highlighted text as it no longer applies	Concur.	The text has been revised as indicated.

Absolute Comment No.	Comment Source/Number	Section/Item	Reference Text	Comment	Response	Action Taken
15	DTSC-2x	Section 3, Page 5, Item 5	High quality water…	Define "high quality". DTSC would recommend the installation of supply well if exploratory borehole suggests "enhanced" quality from HNWR-1. In other words, likely to be with lower concentration of constituents that are above current or future MCL (i.e., Ar and Cr6).	Concur. The statement will be revised to read: Generally, a supply well will be considered a viable source of freshwater for the groundwater remedy if a sufficient quantity of enhanced quality water relative to HNWR-1 (e.g. arsenic concentrations below the MCL), and as required by the remedy, can be sustained.	The text has been revised as indicated.
16	DTSC-3x	Section 3, Page 5, Item 5	will be will be	Delete duplication	Concur.	The typo has been corrected.
17	DTSC-4x	Section 3.1, 1st paragraph	and not preferred, the use of bentonite-based drilling mud…	DTSC concurs with the desire to not use additives. No revision necessary.	Comment noted.	No revisions to the FWIP have been made as a result of this comment.
18	DTSC-5x	Section 3.1, 1st paragraph	EZ-Mud	DTSC discourages use of the polyacrylamide mixtures due to the potential for toxic acrylamide monomers to be present. If use is necessary, the well shall be properly developed to remove the additives from the formation. No revision necessary.	Comment noted.	No revisions to the FWIP have been made as a result of this comment.
19	DTSC-6x	Section 3.2, Page 9	Baroid Aqua-Clear	Will waste management be different if these additives are utilized? Revise Section 3.3 to address this question.	The following statement has been added to Section 3.3 (a similar statement has been also been added for drill cuttings): If fluid additives are required during drilling or well development (e.g., drilling mud or other additive discussed in Sections 3.1 and 3.2) then groundwater purged during these activities will be temporarily stored at the wellhead and sampled to determine if it is suitable for discharge to the ground surface.	The text has been revised as indicated.
20	DTSC-7x	Section 3.2, Page 10, 4th paragraph	for arsenic analysis	DTSC recommends laboratory analysis for additional constituents specified in Section 3.1. At a minimum, PG&E should conduct laboratory analysis for CAM metals and TDS.	Section 3.2 has been revised to include the following text: Samples would be collected on 10 foot intervals throughout the screened interval of the well. Samples would be submitted to a certified laboratory for CAM metals and TDS analysis, at a minimum. Additional constituents specified in Section 3.1 will also be included for analysis provided the available sample volume is adequate.	The text has been revised as indicated.
21	DTSC-8x	Section 3.3, Page 10	Drill cuttings, purge groundwater, and trash.	Please revise to indicate how drilling muds, if used, would be disposed. It is assumed that they would be taken to an appropriate landfill as per the MSDS sheets.	The following statement has been added to Section 3.3 (a similar statement has been also been added for drill cuttings): If it is determined that purged groundwater is not suitable for discharge to the ground surface then it will be contained and transported off site for disposal.	The text has been revised as indicated.
22	DTSC-9x	Section 5, Page 16	Per the December 31, 2012 letter from DTSC to PG&E the results of all activities conducted as part of this evaluation will be included in intermediate design addendum.	Instead of "intermediate design addendum," PG&E may want to state that a technical memorandum will be prepared after implementation.	The last sentence of Section 5 has been revised to read: The results of all activities conducted as part of this evaluation will be included in a technical memorandum, which will be submitted to the regulatory agencies 60 days after field activities are complete and validated laboratory data have been received.	The text has been revised as indicated.

Absolute Comment No.	Comment Source/Number	Section/Item	Reference Text	Comment	Response	Action Taken
23	DTSC-10x	Attachment A2, Comment 10, DTSC-4	Site B is the only location where data from an exploratory borehole may result in the construction of a well for subsequent testing. Section 3 will be revised.	What about as a result of borehole near HNWR-1 suggests possible high yield with lower Arsenic? Wouldn't PG&E construct well?	To clarify, the "Action Taken by PG&E Based on Response" field for this comment has been revised to state: The response provided to the left is no longer applicable. The introductory text to Section 3 of the FWIP has been revised to detail the decision making process for new well installation.	The text has been revised as indicated.
24	DTSC-11x	Attachment A2, Comment 29, DTSC-23	For ARAR#3, we state that "Discharges to waters of the U.S. will be avoided during FWIP activities.	Is this meant to change the response? Should PG&E revise the referenced text in Table B-1 to "Does not apply, no discharge to waters of the US?"	The referenced text was incorrectly included in the "Action Taken by PG&E Based on Response" field of Attachment A2. This text has been replaced with "Appendix A of the general permit has been included as an Attachment to the FWIP."	The general permit, including Attachment A, has been added as Attachment H to the FWIP.
25	DTSC-12x	Attachment B2, Number 27	It with will be too small to be visible from the maze.	Delete "with"	Concur.	The word has been removed.
26	DTSC-13x	Attachment B2, Number 44, Action by PG&E, o)	The result of the cultural surveys for the potential work area were submitted to interested tribes on January 10, 2013.	This does not address the issue of reporting discoveries (per MMRP). Address discovery procedure requirements of PA and CHPMP.	The "Action by PG&E" field for this item has been revised to include the following statement: "Section 8 of the BLM CHPMP discusses the protocol for addressing and reporting new discoveries."	The table has been revised as indicated.
27	DTSC-14x	Attachment B2, Number 47, Action by PG&E	who is looking to refill their Project Manager position	Since Edgar is in place, please delete this statement to be current.	Concur.	The statement has been deleted.
28	DTSC-15x	Attachment B2, Number 52, Action by PG&E	Preparation of the final design has not yet begun.	Since this project is being implemented ahead of the final design and out of phase with the appropriate timing of this mitigation measure, PG&E should consider and meet the intent of the mitigation measure. Describe that a survey has been conducted, and activities will be conducted outside of known historical archaeological resource. Also that a geoarchaeological investigation and draft report has been prepared and provided to the Tribes.	The "Action by PG&E" field for this item has been revised as follows: A survey has been completed and activities will be conducted outside of areas known to include historical and archeological resources. In addition, a geoarchaeological investigation has been completed and a draft report has been prepared and provided to the Tribes. The study has concluded that there is a low potential for buried archeological deposits.	The table has been revised as indicated.
29	DTSC-16x	Attachment B2, Number 53, Action by PG&E	See CUL-1b/c-2	PG&E should explain that since survey was conducted and project areas are outside of known resources, there should not be impact.	The response for this item references the previous item, which has been revised per comment DTSC-15x.	No revisions to the FWIP have been made as a result of this comment.
30	DTSC-17x	Attachment B2, Number 54, Compliance Item	"if a discovery occurs…"	PG&E should provide description of action to be taken if discoveries occur.	The "Action by PG&E" field for this item has been revised to include the following statement: "Section 8 of the BLM CHPMP discusses the protocol for addressing and reporting new discoveries."	The table has been revised as indicated.
31	DTSC-18x	Figure 5 - Schedule		Schedule should be updated to match latest CWG rainbow schedule. Specifically to be in-line with EIR Addendum.	Line 15 (Agency Approval of FWIP) of the schedule included as Figure 5 will be revised to indicate a finish date of August 12, 2013, which is consistent with the finish date for line 1480 of the Rainbow Schedule (DTSC review/approve Final Implementation Plan).	Figure 5 has been revised as indicated.
32	DTSC-19x	Attachment E – Health and Safety Plan		All general comments provided by DTSC are not included in this table, but noted.	Comments noted.	No revisions to the FWIP have been made as a result of this comment.

Absolute Comment No.	Comment Source/Number	Section/Item	Reference Text	Comment	Response	Action Taken
33	DTSC-20x	Attachment E – Health and Safety Plan	Page 10-5, Section 10.3.1 (Thermal Stress Monitoring)	Please include the reference for the monitoring of heat related illnesses and the determination of work/res cycle cited [such as work/rest cycles based on recommendation from the TLVs and BEIs published by the American Conference of Governmental Industrial Hygienists (ACGIH)].	A table summarizing screening criteria for TLV and action limits for heat stress exposure published by the American Conference of Governmental Industrial Hygienists (ACGIH) has been added to Section 10.3.1.	Table added as indicated.
34	DTSC-21x	Attachment E – Health and Safety Plan	Page 13-1, Section 13.1 (Direct Reading Monitoring Specifications)	Please provide rationale for action level of 10 mg/m^3 for Dust Monitor, based on lead level indicated in AOC4, on page 12-2, Section 12.0, Contaminants of Concern.	The action level for dust at this specific location has been revised to correspond with the maximum concentration of lead levels that have been detected. As a result the action level for dust at this specific location has been reduced to 2.5 mg/m^3.	Table in Section 13.1 has been revised as indicated.
35	DTSC-22x	Attachment E – Health and Safety Plan		Where operations occur outside of federal boundaries, it is assumed that the California (or prevailing) analogue of the federal regulations cited throughout the HASP, including permissible exposure levels, will apply.	Comment noted.	No revisions to the FWIP have been made as a result of this comment.
36	DTSC-23x	Attachment E – Health and Safety Plan		Please note that air monitoring, permissible exposure levels and action levels reviewed in this health and safety plan are limited to the occupational exposures only. Exposure levels, action levels and risk assessments applicable for the public and the community in Arizona should be determined and reviewed by an appropriate professional of that State.	Comment noted.	No revisions to the FWIP have been made as a result of this comment.
37	DTSC-24x	Attachment E – Health and Safety Plan		While procedures for addressing hazards included in this HASP have been reviewed, the procedures have been reviewed from the perspective that all activities will be conducted in compliance with all applicable federal, state and local health and safety regulations as indicated on page 201, Section 2.0, Applicability, fourth paragraph. Methods to control hazards may be at the discretion of the employer(s) submitting (or covered in) this HASP provided that the methods are in compliance with all applicable regulations. This includes and is not limited to asbestos, hexavalent chromium, lead, training, air monitoring, machine guarding, confined spaces, lockout/blockout, work near overhead power lines, electrical work/connections, operating heavy machinery, excavations, etc. and for procedures which may rely on an action level or on objective and/or historical data where applicable.	Comment noted.	No revisions to the FWIP have been made as a result of this comment.
38	DTSC-25x			The HASP is adequate for the work activities for this site. Although no further review by HSB is required, the items from the specific comments addressed in this document shall be reflected in (work) practice as well as in the final revision of [Attachment E – HSP].	Comment noted.	No revisions to the FWIP have been made as a result of this comment.
39	DTSC-25x			In addition, any deviation, future changes and revision to the final version other than as indicated in this document shall be clearly identified and resubmitted for review by this department and the appropriate Arizona State agency.	Comment noted. See comment ADEQ-7.	No revisions to the FWIP have been made as a result of this comment.

Attachment B
Compliance Tables

Table B-1
Summary of Compliance Approach for ARARs Established for the Topock Groundwater Remedy That Are Pertinent to the Alternative Freshwater Source Evaluation
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Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

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2	Federal Chemical-Specific	Federal Safe Drinking Water Act - 42 USC § 300g-1; 40 CFR 141 -- Subpart G – National Primary Drinking Water Regulations (MCLs)	ARAR Relevant and Appropriate	These MCLs are relevant and appropriate standards, which establish the maximum permissible level of contaminants (e.g., Chromium) in sources (or potential sources) of drinking water. MCLs may be applicable where water at a CERCLA site is delivered through a public water supply system.	Yes	Remedy Implementation	PG&E	The purpose of the freshwater evaluation is to identify a fresh water source that meets MCLs
52	California Chemical-Specific	California Safe Drinking Water Act - Title 22, CCR, Div 4, Ch 15, §64431, §64444	ARAR Applicable	Maximum Contaminant Levels (MCLs) which shall not be exceeded in the water supplied to the public. California state MCLs for drinking water standards are more stringent than primary federal standards.	Yes	Remedy Implementation	PG&E	The purpose of the freshwater evaluation is to identify a fresh water source that meets MCLs
53	California Chemical-Specific	Secondary MCLs list for drinking water - Title 22, CCR, Div 4, Ch 15, §64449	ARAR Relevant and Appropriate	State secondary MCLs for drinking water standards are more stringent than federal standards. These secondary MCLs are relevant and appropriate standards, which establish the maximum permissible level of contaminants in sources (or potential sources) of drinking water. These secondary MCLs would be applicable if water at the site was used as drinking water and delivered through a community water supply system.	Yes	Remedy Implementation	PG&E	The purpose of the freshwater evaluation is to identify a fresh water source that meets MCLs
55	California Chemical-Specific	Groundwater and vadose zone protection standards - Title 22, CCR, Div 4.5, Ch 15, Article 6, §66265.94	ARAR Applicable	RCRA hazardous waste Interim Status TSD facilities shall comply and ensure that hazardous constituents entering the groundwater, surface water, and soil from a regulated unit do not exceed the concentration limit from contaminants of concern in the uppermost aquifer underlying the waste management area beyond the point of compliance.	Yes	Remedy Implementation	PG&E	Providing a fresh water source that meets MCLs will conform with this requirement.

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5	Federal Location-Specific	Federal Land Policy and Management Act - (FLPMA); 43 USC § 1701, et seq.; 43 CFR 2800	ARAR Applicable	In managing public lands, BLM is directed to take any action necessary to prevent unnecessary or undue degradation of the lands. Actions taken on the public land (i.e. BLM-managed land) portions of the Topock site should provide the "optimal balance between authorized resource use and the protection and long-term sustainability of sensitive resources."	Yes	Activities on public lands	BLM	The *Final Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California* was submitted to DOI for review and comment. PG&E understands that DOI will coordinate its review of these submittals with BLM.
7	Federal Location-Specific	National Wildlife Refuge System Administration Act, as amended - 16 USC §§ 668dd-ee; 50 CFR Part 27	ARAR Applicable	This Act governs the use and management of National Wildlife Refuges. The Act requires that FWS evaluate ongoing and proposed activities and uses to ensure that such activities are appropriate and compatible with both the mission of the overall National Wildlife Refuge System, as well as the specific purposes for which the Havasu National Wildlife Refuge was established. The Topock site includes portions of the Havasu National Wildlife Refuge. Prior to selection of a remedial action by DOI/FWS, that remedial action must be found by the Refuge Manager to be both an appropriate use of the Refuge and compatible with the mission of the Refuge and the Refuge System as a whole. Any remedial action proposed to be implemented on the Refuge that was not selected by DOI/FWS would be subject to the formal appropriate use/compatibility determination process.	Yes	Activities on the HNWR	USFWS/DOI	The *Final Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California* was submitted to DOI for review and comment. PG&E understands that DOI will coordinate its review of these submittals with USFWS.
14	Federal Location-Specific	National Historic Preservation Act - 16 USC § 470, et seq.; 40 CFR 6.301(b); 36 CFR 800.1, et seq.	ARAR Applicable	This statute and the implementing regulations direct federal agencies to consider the effects of their undertakings on historic properties included in or eligible for inclusion in the National Register of Historic Places and to consult with certain parties before moving forward with the undertaking. The agency must determine, based on consultation, if an undertaking's effects would be adverse and consider feasible and prudent alternatives that could avoid, mitigate, or minimize such adverse effects on a National Register or eligible property. The agency must then specify how adverse effects will be avoided or mitigated or acknowledge that such effects cannot be avoided or mitigated. The Topock site includes historic properties in or eligible for inclusion in the National Register and remedial action selected for the Topock site qualifies as an undertaking pursuant to the NHPA. Measures to avoid or mitigate adverse effects of any selected remedial action that are adopted by the agency through consultation must be implemented by the remedial action to comply with the NHPA.	Yes	The remedial investigations and groundwater and soil removal and response actions at the Topock site qualify as an undertaking under NHPA	BLM, Advisory Council on Historic Preservation, California and Arizona State Historic Preservation Offices, USFWS, the Hualapai Tribe, and PG&E are parties to the PA	Compliance will involve complying with the requirements and mitigation measures contained in the Programmatic Agreement (BLM, 2010) and the *Cultural and Historic Properties Management Plan* (BLM, 2012).

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17	Federal Location-Specific	National Archaeological and Historic Preservation Act - 16 USC § 469, et seq.; 36 CFR 65; 40 CFR 6.301[c]	ARAR Applicable	This statute requires the evaluation and preservation of historical and archaeological data which might otherwise be irreparably lost or destroyed through any alteration of terrain as a result of federal construction projects or a federally-licensed activity. The Topock site includes historical and archaeological data. Any remedial action selected for the Topock site must include measures for the evaluation and preservation of historical and archaeological data that might be lost or destroyed as a result of the remedial action.	Yes	Alteration of terrain that threatens significant scientific, historical or archaeological data.	Federal Agencies, PG&E	Archaeological surveys were conducted for the potential work area from August to November 2012, during which time tribal monitors were invited to observe, and monitors of some tribes were present for portions of the survey. Three archaeological and historical sites were located within these areas. All archaeological and historical sites will be avoided during plan implementation to the maximum extent practicable, and this work will comply with all applicable cultural resource mitigation measures included in the *Programmatic Agreement, Cultural and Historic Properties Management Plan and* the adopted *Mitigation Monitoring and Reporting Plan* (DTSC, 2011b) for the project. Prior to any ground-disturbing activities, work areas will be reexamined to ensure that no resources are disturbed. Cultural resource-related documents generated during activities associated with this implementation plan will be made available for review by interested Tribes and the agencies. See discussion in Section 4.2.
21	Federal Location-Specific	Native American Graves Protection and Repatriation Act (NAGPRA) - 25 USC § 3001, et seq.; 43 CFR 10.1, et seq.	ARAR Applicable	NAGPRA establishes requirements regulating the removal and trafficking of human remains and cultural items, including funerary and sacred objects. The Topock site may contain human remains. If remediation activities result in the discovery of Indian human remains or related objects, NAGPRA requirements must be met.	Yes	Federal Lands only - Discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony	PG&E	Requirements of the PA and the CHPMP (led by BLM), which include compliance with NAGPRA, will be adhered to during the implementation of this activity.
22	Federal Location-Specific	American Indian Religious Freedom Act - 42 USC § 1996, et seq.	ARAR Relevant and Appropriate	The United States must "protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise [their] traditional religions..." Any remedial action selected for the Topock site must satisfy this requirement.	Yes	Remedy selection	Federal Agencies (BLM Lead), PG&E	BLM led the preparation of the Tribal Access Plan, and the Plan was completed on November 26, 2011.
33	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC § 1342; 40 CFR 122; 40 CFR 125	ARAR Applicable	These National Pollutant Discharge Elimination System (NPDES) requirements regulate discharges of pollutants from any point source into waters of the United States.	Yes	Point source discharges to waters of the US.	PG&E	If water from well purging, development, or testing is discharged to waters of the United States, the substantive requirements of Arizona general NPDES permit AZG2010-001, Arizona Pollutant Discharge Elimination System General Permit for De Minimis Discharges to Waters of the U.S. will be met. Discharges authorized under this permit include those from well development and maintenance and/or aquifer testing. Best management practices (BMPs) will be implemented as defined in the BMP Plan for this project to achieve compliance with the substantive provisions of the general permit, including the following: • Plan to prevent and contain spills of fuel and oil from drilling equipment • Appropriate measures to minimize erosion, scour or sedimentation, including, as appropriate, control of the application rate and location of discharged water, rock check dams or velocity dissipaters, fiber rolls, or silt fences.

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								• Training of personnel in spill prevention and response and BMP implementation. Monitoring will be performed as specified in Appendix A of the general permit. Discharge limitations specified in Appendix A will not be exceeded.
40	Federal Action-Specific	Endangered Species Act of 1973 - 16 USC §§ 1531-1544; 50 CFR 402	ARAR Applicable	The ESA makes it unlawful to remove or "take" threatened and endangered plants and animals and protects their habitats by prohibiting certain activities. Examples of such species in or around the Topock site may include, but are not limited to, southwestern willow flycatcher, Mojave Desert tortoise, Yuma clapper rail, Colorado pike minnow, razorback sucker, and bonytail chub. Any remedial action selected for the Topock site will not result in the take of, or adverse impacts to, threatened and endangered species or their habitats, as determined based on consultation with the Fish and Wildlife Service under section 7 of the ESA.	Yes	Extension of existing Programmatic Biological Assessment (PBA) through December 31, 2017 and modification to encompass freshwater investigation activities	DOI/USFWS/ PG&E	All activities will be conducted in a manner consistent with the PBA, which has been extended until December 31, 2017 and modified to include the freshwater evaluation activities, and, therefore, will comply with requirements of the federal Endangered Species Act (ESA). See discussion in Section 4.1, and see Table B-2.
41	Federal Action-Specific	Migratory Bird Treaty Act - 16 USC 703-712	ARAR Applicable	This Act makes it unlawful to "take, capture, kill," or otherwise impact a migratory bird or any nest or egg of a migratory bird. The Havasu National Wildlife Refuge, which is part of the Topock site, was created as a refuge and breeding ground for migratory birds and other wildlife, therefore, there is potential for contact with migratory birds during proposed remediation activities. Any remedial action selected for the Topock site will be designed and implemented so as to not take, capture, kill, or otherwise impact a migratory bird, nest, or egg.	Yes	Remedial action for Topock site	PG&E	The project biologist will perform pre-activity surveys to verify that federally protected migratory birds or their nests are not present. See discussion in Section 4.1
45	Arizona Action-Specific	Arizona Well Standards - A.A.C. R-12-15-850	ARAR	These requirements on the placement of wells will apply if the selected remedy includes placement of wells in Arizona.	Yes	During project design and before construction	PG&E	PG&E will comply with any requirements specified by ADEQ that are based on the location of the proposed wells.
47	Arizona Action-Specific	Requirements for wells, groundwater withdrawal, treatment, and reinjection - A.R.S. §45-454.01	ARAR	This statute exempts new well construction, withdrawal, treatment, and reinjection into a groundwater aquifer as a part of a CERCLA Remedial Action from the requirements of the Arizona Groundwater Code, except that they must comply with the substantive requirements of A.R.S. 45-594, 45-595, 45-596, and 45-600. If groundwater that is withdrawn is not reinjected into the aquifer, the groundwater shall be put to reasonable and beneficial use.	Yes	Construction of wells in Arizona	PG&E	Construction of wells will occur as part of a CERCLA remedial action. Compliance with A.R.S. 45-594, 45-595, 45-596, and 45-600 is addressed below.
48	Arizona Action-Specific	Well construction standards - A.R.S. §45-594 and 595	ARAR	These provisions identify the well construction standards and requirements for new well construction in the State of Arizona. These requirements will apply if the selected remedy involves the construction of wells in Arizona.	Yes	Construction of wells in Arizona	PG&E	Wells will be constructed in conformance with the minimum well construction standards specified in A.A.C. R12-15-811. Wells will be installed by an Arizona-licensed well driller.

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49	Arizona Action-Specific	Notice of intention to drill - A.R.S. §45-596	ARAR	Substantive requirements will apply if the selected remedy involves the construction of wells in Arizona.	Yes	Construction of wells in Arizona	PG&E	A notice of intention to drill will be submitted prior to the start of work.
50	Arizona Action-Specific	Report by driller - A.R.S. §45-600	ARAR	Substantive requirements will apply if the selected remedy involves the construction of wells in Arizona.	Yes	Construction of wells in Arizona	PG&E	A well driller report and a completion report will be filed upon completion of work.
18	Federal Location-Specific	Archaeological Resources Protection Act - 16 USC § 470aa-ii, et seq.; 43 CFR 7.1, et seq.	ARAR Applicable	This statute provides for the protection of archeological resources located on public and tribal lands. The Act establishes criteria which must be met for the land manager's approval of any excavation or removal of archaeological resources if a proposed activity involves soil disturbances. The Topock site includes archaeological resources on public land. Any remedial action selected for the Topock site must satisfy the criteria applicable to excavation or removal of archaeological resources that might be affected as a result of the remedial action.	Yes	Disturbance of archaeological and historical sites	Federal Agencies, PG&E	Archaeological surveys were conducted for the potential work area from August to November 2012, during which time tribal monitors were invited to observe, and monitors of some tribes were present for portions of the survey. Three archaeological and historical sites were located within these areas. All archaeological and historical sites will be avoided during plan implementation to the maximum extent practicable, and this work will comply with all applicable cultural resource mitigation measures included in the *Programmatic Agreement, Cultural and Historic Properties Management Plan and* the adopted *Mitigation Monitoring and Reporting Plan* (DTSC, 2011b) for the project. Prior to any ground-disturbing activities, work areas will be reexamined to ensure that no resources are disturbed. Cultural resource-related documents generated during activities associated with this implementation plan will be made available for review by interested Tribes and the agencies. See discussion in Section 4.2.
1	Federal Chemical-Specific	Federal Safe Drinking Water Act - 42 USC § 300f, et seq.; 40 CFR 141 -- Subpart F– Maximum Contaminant Level Goals (MCLGs)	ARAR Relevant and Appropriate	MCLGs are not federally enforceable drinking water standards, but CERCLA § 121(d) identifies MCLGs as relevant and appropriate requirements.	No	Remedy Implementation	PG&E	The purpose of the freshwater evaluation is to identify a fresh water source that meets MCLs. Because MCLGs are not identified as water quality objectives for the aquifer into which the fresh water will be injected, they are not pertinent to this activity.
3	Federal Chemical-Specific	Federal Water Pollution Control Act (Clean Water Act) - 33 USC §§ 1251-1387; 40 CFR 131.38	ARAR Applicable	These are federally promulgated Water Quality Standards for surface waters. Such water quality standards include specific criteria for water bodies in California, including standards for Hexavalent Chromium.	No	Remedy Implementation	PG&E	Because these activities will not be performed in the State of California, the California Toxics Rule is not pertinent. In addition, discharge to a water body will be avoided for this project.

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13	Federal Location-Specific	Fish and Wildlife Coordination Act - 16 USC §§ 661-667e; 40 CFR 6.302(g)	ARAR Applicable	This Act requires that any federally-funded or authorized modification of a stream or other water body must provide adequate provisions for conservation, maintenance, and management of wildlife resources and their habitat. Necessary measures should be taken to mitigate, prevent, and compensate for project-related losses of wildlife resources. Any remedial action selected for the Topock site that includes any modification of a water body will be subject to these requirements.	No	Any modification of a water body	PG&E	This activity will not result in a modification of a stream or other water body.
19	Federal Location-Specific	Historic Sites Act - 16 USC 461-467; 40 CFR 6.301(a)	ARAR Applicable	Pursuant to this Act, federal agencies are to consider the existence and location of historic sites, buildings, and objects of national significance using information provided by the National Park Service to avoid undesirable impacts upon such landmarks. There are no designated historic landmarks within the APE, although 16 USC 461, through Public Law 106-45, provides for a cooperative program "for the preservation of the Route 66 corridor" through grants and other measures. Undesirable impacts on this site that might result from any remedial action selected for the Topock site will be evaluated and mitigated to the maximum extent practicable.	No	Existence of a historic landmark	Federal Agencies	No action unless directed by federal agencies.
27	Federal Location-Specific	Resource Conservation and Recovery Act - 42 USC § 6901, et.seq.; 40 CFR 264.18	ARAR Applicable	These regulations promulgated under RCRA establish Seismic and Floodplain considerations which must be followed for treatment, storage, or disposal facilities constructed, operated, or maintained within certain distances of fault lines and floodplains. Portions of the Topock site are located on or near a 100-year floodplain.	No	Infrastructure in 100-year floodplain/ regulatory floodway	PG&E	These activities do not comprise construction of hazardous waste treatment, storage, or disposal facilities that are subject to this requirement.
43	Arizona Location-Specific	Archeological Discoveries - A.R.S. § 41-841 through 847	ARAR	This Act prohibits any person from knowingly excavating on Arizona State or State agency owned land which is a historic or prehistoric ruin, burial ground, archaeological or paleontological site. These requirements will apply if the selected remedy involves excavation in Arizona.	No	Only if activities in Arizona on lands owned or controlled by Arizona or an agency of Arizona - Discovery of any archaeological, paleontological or historical site or object (including human remains) that is at least fifty years old	PG&E	No further action is required because work will be conducted on federal lands.

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44	Arizona Location-Specific	Historic Preservation - A.R.S. § 41-865	ARAR	This Act restricts any person from disturbing human remains or funerary objects on lands other than lands[1] owned or controlled by the State. These requirements will apply if the selected remedy involves excavation in Arizona.	No	Only if activities in Arizona on private lands - Discovery of human remains/funerary objects	PG&E	No further action is required because work will be conducted on federal lands.
31	Federal Action-Specific	Federal Safe Drinking Water Act - 42 USC §300f, et seq. Part C – Protection of Underground Sources of Drinking Water; 40 CFR 144-148	ARAR Applicable	These Underground Injection Control Regulations assure that any underground injection performed on-site will not endanger drinking water sources. Substantive requirements include, but are not limited to, regulation of well construction and well operation. These requirements will be applicable if underground injection is proposed as a part of a site remedy.	No	Underground injection activities	PG&E	This activity will not involve underground injection.
32	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) - **33** USC § 1344 ; 40 CFR 230.10	ARAR Applicable	This section of the Clean Water Act prohibits certain activities with respect to on-site wetlands and waterways. No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed activity which would have less adverse impact to the aquatic ecosystem.	No	Activities that occur in the Colorado River or in jurisdictional waters of the United States that result in discharge of dredged or fill material.	PG&E	This activity will not involve discharge of dredged or fill material to jurisdictional waters of the United States. Site B and the HNWR Site are not located in jurisdictional waters of the United States. The Site B drilling location is separated from the jurisdictional channel located immediately to the south by a large berm created to constrain flow in the channel. This topographic feature will also prevent cuttings deposited on the ground at Site B from entering the jurisdictional channel. Drill cuttings will be spread on the ground near the drilling site (not in jurisdictional waters of the United States). The BMP Plan will be followed during work to minimize the potential for discharges to jurisdictional channels during work.
34	Federal Action-Specific	Federal Water Pollution Control Act (Clean Water Act) - 40 CFR 122.26	ARAR Applicable	These regulations define the necessary requirements with respect to the discharge of storm water under the NPDES program. These regulations will apply if proposed remedial actions result in storm water runoff which comes in contact with any construction activity from the site remediation.	Yes	Ground disturbance as a result of construction is equal to or greater than 1 acre	PG&E	Activities might result in soil disturbance, as defined in the construction general permit, of one or more acres of land per the Construction General Permit (AZG2013-001). All activities will be conducted in accordance with the BMP Plan, which has been developed by PG&E to comply with the substantive requirements of the Arizona General Construction Permit (AZG2013-001).

[1] As corrected by the Department of the Interior.

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Item No.	Category	Citation	Determination	Description in DOI's ARARs Table	Pertinent to Freshwater Source Evaluation	Triggering Event	Compliance Responsibility	Action by PG&E (Alternative Freshwater Source Evaluation)
35	Federal Action-Specific	River and Harbor Act of 1899 - 33 USC §§ 401 and 403	ARAR Applicable	This Act prohibits the creation of any obstruction in navigable waters, in addition to banning activities such as depositing refuse, excavating, filling, or in any manner altering the course, condition, or capacity of navigable waters. These requirements will apply if proposed activities at the Topock site have the potential of affecting any navigable waters on the site.	No	Activities with the potential to affect any navigable waters on the site	PG&E	These activities will not create an obstruction in or alter the course, condition, or capacity of navigable waters.
38	Federal Action-Specific	Clean Air Act - USC §§ 7401, et seq. (National Emission Standards for Hazardous Air Pollutants (NESHAP)); 40 CFR 61; 40 CFR 63	ARAR Applicable	NESHAPs are regulations which establish emissions standards for certain hazardous air pollutants (HAPs) identified in the regulations. NESHAPs will apply if remediation activities on the site produce identified HAP emissions.	No	Activities produce identified HAP emissions	PG&E	These activities will not generate emissions of hazardous air pollutants that are regulated by NESHAPS.
39	Federal Action-Specific	Religious Freedom Restoration Act - 42 USC § 2000bb	ARAR Applicable	Pursuant to this Act, the government shall not substantially burden a person's exercise of religion, unless the application of the burden is in furtherance of a compelling government interest, and it is the least restrictive means of furthering that interest. To constitute a "substantial burden" on the exercise of religion, a government action must (1) force individuals to choose between following the tenets of their religion and receiving a governmental benefit or (2) coerce individuals to act contrary to their religious beliefs by the threat of civil or criminal sanctions. If any remedial action selected imposes a substantial burden on a person's exercise of religion, it must be in furtherance of a compelling government interest and be the least restrictive means of achieving that interest.	No	Activities with the potential to impose a substantial burden on a person's exercise of religion.	DOI/BLM	This activity does not substantially burden a person's exercise of religion.
46	Arizona Action-Specific	Design criteria for treatment units - A.A.C. R18-5-(501-502)	ARAR	These minimum design criteria will apply if the selected remedy includes construction of a groundwater treatment plant.	No	Construction of treatment plant in Arizona	PG&E	These activities will not involve construction of a groundwater treatment plant.
51	Arizona Action-Specific	Arizona Remedial Action Requirements - A.R.S. §49-282.06(A)(2)	ARAR	Any treatment of groundwater must be conducted in a manner to provide for the maximum beneficial use of the waters of the state.	No	Treatment of groundwater in Arizona	PG&E	These activities do not involve treatment of groundwater.

Table B-2
Summary of Compliance Approach for Requirements Not Identified as ARARs for the Topock Groundwater Remedy That Are Pertinent to the Alternative Freshwater Source Evaluation
Final Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area,
Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

No.	Source Document	Compliance Item, Relevant Excerpt or Section from Document	Action by PG&E (Alternative Freshwater Source Evaluation)[1]
1	Programmatic Biological Assessment (PBA)	1. Project activities will be conducted in a manner that avoids take of a federally listed species. "Take" (under the federal ESA, Section 3) is defined to include "harm" , including significant habitat modification or degradation where it actually kills or injures listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Take" also includes "harassment", which means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns, including breeding, feeding, or sheltering. Should a listed species enter the project work area or become harmed, harassed or killed by project activities, the activity will be stopped and the USFWS, BLM, and/or California Department of Fish and Game (CDFG) will be consulted. Impacts to habitat will also be minimized to the maximum possible extent.	Immediately prior to mobilization, as part of the preconstruction biological survey, a biologist will identify all acceptable access routes, staging areas, and work zones that limit impacts to habitat. In addition, a biologist will be on site during all vegetation trimming activities, if determined necessary. Upon mobilization and prior to work, a biologist will brief the field team on the content of the PBA and PG&E's threatened and endangered species education program. This briefing will cover measures required to avoid a "take", and stop work action/communication procedures required in the event of listed species entering the work area or a "take". In addition, avoidance and minimization measures referenced in this table from the Programmatic Biological Assessment (PBA) will be implemented to avoid take to listed species.
2	PBA	2. PG&E will designate a field contact representative who will be responsible for overseeing compliance with the mitigation measures. The representative must be onsite during project activities. The representative will have authority to halt activities that are in violation of the mitigation measures and/or pose a danger to listed species prior to a potential "take". The representative will have a copy of the mitigation measures when work is being conducted on the site. The representative may be a project manager, PG&E representative, or a biologist.	PG&E will designate a field contact representative responsible for overseeing compliance with the mitigation measures prior to commencement of work.
3	PBA	3. PG&E will have a qualified biologist responsible for assisting crews in compliance with the mitigation measures, performing surveys in front of the crew as needed to locate and avoid listed species, and monitoring compliance. Preconstruction surveys by a biologist will be implemented for special-status wildlife species in impact areas immediately prior to initiation of ground-disturbing activities. The inspection will provide 100 percent coverage of the area within the project limits. Any desert tortoise burrows and pallets outside of, but near, the project footprint will be flagged at that time so that they may be avoided during work activities. At conclusion of work activities, all flagging will be removed.	Immediately prior to mobilization, as part of the preconstruction biological survey, a biologist will identify all acceptable access routes, staging areas, and work zones that limit impacts to habitat.
4	PBA	4. Listed species, including the desert tortoise, will not be handled or harassed. Encounters with a listed species will be reported to the project biologist and BLM Lake Havasu biologists. These biologists will maintain records of all listed species encountered during project activities. This information will include for each individual: the locations (narrative, vegetation type, and maps) and dates of observations; general conditions and health; any apparent injuries and state of healing; and diagnostic markings.	Field crews will be instructed not to handle listed species. All encounters with wildlife shall be reported to the project biologist, who will be responsible for notifying PG&E and the appropriate agencies.
5	PBA	5. PG&E employees and the contractors involved with the proposed project will be required to attend PG&E's threatened and endangered species education program prior to initiation of activities. New employees will receive training prior to working onsite.	See action for Item 1.
6	PBA	6. To the maximum extent possible, facilities (treatment facility, pipelines, injection wells, and access routes) will be sited within an existing right–of-way and previously disturbed or barren areas to limit new surface disturbance.	Site facilities will be sited within an existing right–of-way and previously disturbed or barren areas, which are largely devoid of vegetation, to the maximum extent possible. This review will include feedback from the project biologist.
7	PBA	7. Existing routes of travel to and from the proposed project site will be used. Cross country vehicle and equipment use will be prohibited.	It is anticipated that only existing roads and access pathways requiring minimal access improvements in select areas will be used during the work proposed in the Plan. The removal of vegetation is not planned to gain access for equipment; however, while unlikely, the trimming of vegetation may be required. Trimming, if required, will be focused on non-native species (e.g., tamarisk) and the trimming of native species (e.g., palo verde and mesquite) will be avoided or minimized to the extent practicable. Prior to mobilization, a biologist will identify all acceptable access routes, staging areas, and work zones. In addition, a biologist will be on site during all vegetation trimming activities.
8	PBA	8. Trash and food items will be contained in closed containers and removed daily to reduce attractiveness to opportunistic predators such as common ravens (Corvus corax), coyotes (Canis latrans), and feral dogs.	Trash will be stored in closed containers and removed from the site daily.
9	PBA	9. To minimize effects, lights shall be angled toward the ground, reduced in intensity to levels compatible with safety concerns, and limited in duration of usage. The hue of lighting shall be that which is most compatible with and least disturbing to wildlife.	This minimization measure will be implemented during all night work requiring lighting.
10	PBA	10. Employees will not bring pets to the project site.	Pets will be prohibited from the project site.
11	PBA	11. Firearms will be prohibited from the project site, except as required for security employees.	Firearms will be prohibited from the project site with the potential exception of site

[1] Text describing "Action by PG&E" is PG&E's own evaluation and is intended for agencies' review and approval.

Table B-2
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Final Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area,
Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

No.	Source Document	Compliance Item, Relevant Excerpt or Section from Document	Action by PG&E (Alternative Freshwater Source Evaluation)[1]
			security personnel. Site security personnel will not be permitted to have firearms on site without approval from USFWS HNWR.
12	PBA	12. If a desert tortoise or other wildlife is encountered under vehicles or equipment, the vehicle will not be moved until the animal has voluntarily moved to another location or to a safe distance from the parked vehicle.	Field crews will be instructed (and reminded daily) to check under vehicles for wildlife before driving. Vehicles shall not be moved until it has been confirmed they are clear of wildlife. Field crews will be instructed to not disturb or engage wildlife if encountered.
13	PBA	13. Upon project completion, all unused material and equipment will be removed from the site. This condition does not apply to fenced sites.	All equipment and materials will be removed from the project site following work unless within fenced areas, as coordinated with HNWR.
14	PBA	14. Palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species are considered sensitive by the BLM. To the extent practicable, these species will be avoided. If avoidance is not possible, these species will be transplanted when practical. Should any of the aforementioned plants be destroyed, they will be replaced.	Sensitive plant species including palo verde, ocotillo, mesquite, cat-claw, smoke tree, and cacti species will be avoided to the extent practicable. Please note that the work areas identified for Site B or HNWR-1 occur on previously disturbed areas however there are two areas that contain sensitive plant species that will be avoided. These species were identified during the spring botanical surveys in 2013. In the northern part of the study area several ethnobotanical seedlings occur and then along Sacramento Wash there are several blue palo verde trees. Both areas that contain sensitive plants are outside the designated sprinkle area and the proposed exploratory well work areas and will be avoided.
15	PBA	15. The area of disturbance will be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, nesting sites or dens, public health and safety, and other limiting factors. As needed, work area boundaries will be delineated with flagging or other marking to minimize surface disturbance associated with vehicle straying.	Ensure that area of disturbance will be confined to the smallest practical area. Work areas will be demarcated immediately prior to mobilization by the project biologist.
16	PBA	16. Activities will be restricted to a predetermined area. If unforeseen circumstances require project expansion, the potential expanded work areas shall be surveyed for listed species prior to use of the area. All appropriate mitigation measures shall be implemented within the expanded work areas based on the judgment of the agencies and the project biologist. Work outside of the original predetermined area will proceed only after receiving written approval from the BLM, USFWS, and/or CDFG describing the exact location of the expansion.	Site maps, aerial photographs and other project data will be reviewed prior to and during work to ensure that only existing routes of travel are used to access work areas. Field crews will be notified that “cross-country” travel, or the creation of new access routes, is prohibited. Preconstruction biological surveys will be conducted prior to working in new areas.
17	PBA	17. Construction vehicles and equipment will be periodically checked to ensure proper working condition and to ensure that there is no potential for fugitive emissions of oil, hydraulic fluid, or other hazardous products. The BLM will be informed of any hazardous spills.	All equipment will be inspected prior to use on the site and periodically during operation to ensure that it is in good working condition and free of leaking fluids. Any incidents involving releases of oils, petroleum, hydraulic fluids or any hazardous substance shall be immediately reported.
18	PBA	18. Workers will exercise caution when traveling to and from the Action Areas. To minimize the likelihood for vehicle strikes of listed species, speed limits when commuting to project areas on right–of-way roads will not exceed 20 miles per hour.	Discussion of speed limitations will be included in daily safety briefings. Any vehicular incident involving a wildlife strike shall be reported to the PM and project biologist.
19	PBA	19. Intentional killing or collection of either plant or wildlife at construction sites and surrounding areas will be prohibited. The BLM will be notified of any such occurrences.	All field team members will be required to participate in PG&E field sensitivity training. All staff shall also be informed that intentional killing of plant or wildlife is prohibited. The BLM will be notified of any intentional killing or collection of either plant or wildlife.
20	PBA	20. For emergency situations involving a pipeline leak or spill or any other immediate safety hazard, PG&E will notify the BLM within 48 hours. As a part of this emergency response, the BLM may require specific measures to protect listed species. During cleanup and repair, the agencies may also require measures to recover damaged habitats.	Field staff will report pipeline leaks or spills or any other immediate safety hazards to the BLM within 48 hours.
21	PBA	21. Within 60 days of completion of construction activities, the FCR and biologist shall prepare a brief report for the BLM documenting the effectiveness and practicality of the mitigation measure and making recommendations for modifying the measures to enhance species protection. The report will also provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.	A report documenting the effectiveness and practicality of the mitigation measures, along with a summary of survey results and monitoring activities will be submitted to BLM within 60 days of the completion of construction activities.
22	PBA	22. Any future construction during the nesting season for migratory birds, generally February to September for most birds, will require preconstruction surveys for nesting pairs, nests and eggs. These preconstruction surveys shall occur in areas proposed for any vegetation removal and active nesting areas flagged. If nesting birds are detected, vegetation removal will be avoided during the nesting season. All construction activity within 200 feet of active nesting areas will be prohibited until the nesting pair/young have vacated the nests.	Should the activities occur within the nesting season, the required work windows and buffers outlined in the PBA will be implemented for any migratory or nesting birds that may be affected.
23	PBA	23. All areas within the proposed action areas, subject to operations and maintenance activities, and within the potential impact of the action, shall be monitored annually during the active period for tortoise by a biologist knowledgeable of desert tortoise ecology. Surveys shall be completed throughout the duration of the action to verify the presence or absence of desert tortoise and reports shall be provided to the biologists in the BLM Lake Havasu Field Office annually.	USFWS protocol surveys were performed from 2004 through 2009 that resulted in no recent evidence of species presence within the California Action Area. USFWS then determined that future protocol surveys were not warranted. Preconstruction surveys and other minimization measures included in the PBA and listed in this table will be

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			incorporated to avoid and minimize impacts the Sonoran desert tortoise or its habitat.
24	PBA	24. Riparian areas surrounding the proposed action site and subject to influence of operations and maintenance activities shall be surveyed for South western willow flycatcher (SWFL) according to the protocol established by the USFWS. These surveys will be completed each year by a biologist permitted by the USFWS to carry out flycatcher surveys until the action has been completed and all facilities have been removed. Reports will be provided to the biologists in the BLM Lake Havasu Field Office annually.	Based on additional consultation with USFWS and BLM, protocol surveys for SWFL occur once every two years at the Topock Compressor project. The last survey was completed in 2012. Proposed work in this evaluation will not impact SWFL or its riparian habitat.
25	PBA	25. Upon locating an individual of a dead or injured listed species, PG&E will make initial notification to the BLM Havasu Office and USFWS Phoenix Office within 3 working days of its finding. The notification must be made by telephone and writing to the Lake Havasu BLM Office (2610 Sweetwater Avenue, Lake Havasu City, Arizona 86406, 928 505-1200) and the Phoenix Fish and Wildlife Office (2321 West Royal Palm Road, Suite 103, Phoenix, AZ 85021, 602-242-0210). The report will include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Animals injured through PG&E activities will be transported to a qualified (authorized or permitted) veterinarian for treatment at the expense of PG&E. If an injured animal recovers, the USFWS and the BLM will be contacted for final disposition of the animal.	BLM Havasu Office and USFWS Phoenix Office will be notified within 3 working days of finding a dead or injured listed species.
26	PBA	26. PG&E will immediately notify the BLM Lake Havasu Field Manager (or his designated representative) of any cultural resources (prehistoric/historic sites or objects) and/or paleontological resources (fossils) encountered during permitted operations and will maintain the integrity of such resources pending subsequent investigation. All operations in the immediate area of the discovery must be suspended until written authorization from BLM to proceed is issued. An evaluation of the discovery will be made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically important paleontological values.	The archaeological and historical sites will be protected from work activities and will be monitored during the course of work. The PG&E representative will be responsible for providing cultural sensitivity training to the workers implementing this plan and for ensuring compliance with all applicable archaeological measures during drilling activities. PG&E will invite participation from the Tribes, archaeological monitors, and agency staff, as appropriate, in this training. If any cultural resources and/or paleontological resources are encountered during work, operations in the immediate area of the discovery will be suspended, and BLM will be notified.
27	Environmental Impact Report (EIR) Mitigation Monitoring and Reporting Program (MMRP) for the Topock Compressor Station Groundwater Remediation Project	**AES-1.** Impacts on Views from Topock Maze Locus B, a Scenic Vista (Key View 5) The proposed project shall be designed and implemented to adhere to the design criteria presented below. a) Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases consistent with CUL1a-5. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation. b) Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed and shall be implemented consistent with CUL1a-5. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist. c) Plant material shall be consistent with surrounding native vegetation. d) The color of the wells, pipelines, reagent storage tanks, control structures, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete. e) The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.	The field work portion of the project, the only aspect of the project that might be visible from the maze, is short-term and temporary. If a supply well is installed, it will be too small to be visible from the maze.
28	EIR MMRP	**AES-2.** Impacts on Views from Colorado River, a Scenic Resources Corridor (Key View 11) The proposed project shall be designed and implemented to adhere to the design criteria presented below. a) A minimum setback requirement of 20 feet from the water (ordinary high water mark) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the riverbank. b) Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases. The identification of plant specimens that are determined to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist or biologist and integrated into the final design and project implementation consistent with CUL1a-5. c) Revegetation of disturbed areas within the riparian vegetation along the Colorado River shall occur concurrently with construction operations. Plans and specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed. The revegetation plan shall include specification of maintenance and monitoring requirements, which shall be implemented for a period of 5 years after project construction or after the vegetation has successfully established, as determined by a qualified plant ecologist or biologist. d) Plant material shall be consistent with surrounding native vegetation.	The field work portion of the project is short-term and temporary, and generally not visible from the river. From the river, Site B and the HNWR-1 Site will be obscured from view by existing vegetation.

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		e) The color of the wells, pipelines, and utilities shall consist of muted, earth-tone colors that are consistent with the surrounding natural color palette. Matte finishes shall be used to prevent reflectivity along the view corridor. Integral color concrete should be used in place of standard gray concrete. f) The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California to ensure that the design objectives and criteria are being met. Planting associated with biological mitigation may contribute to, but may not fully satisfy, visual mitigation.	
27	EIR MMRP	**AES-3.** Impacts on Visual Quality and Character along the Colorado River (Key View 11). Mitigation Measure AES-1 shall be implemented. Implementation of Mitigation Measures AES-1 would reduce the overall change to the visual character of the view corridor along the Colorado River. Although the proposed project would still be visible, incorporating a facilities design that is aesthetically sensitive and preserving the vegetation would blend the proposed project into their visual setting within the floodplain and would reduce the overall contrast of the proposed project.	See AES-1 and AES-2.
28	EIR MMRP	**AIR-1. Short-Term Construction-Related Emissions of Criteria Air Pollutants and Precursors** PG&E shall implement the fugitive dust control measures below for any construction and/or demolition activities: a) Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions during dust episodes. Use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes shall be considered sufficient; b) Cover loaded haul vehicles while operating on publicly maintained paved surfaces; c) Stabilize (using soil binders or establish vegetative cover) graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions; d) Cleanup project-related track out or spills on publicly maintained paved surfaces within twenty-four hours; and e) Curtail nonessential earth-moving activity under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance.	Dust generation attributable to site activities and disturbances will be monitored during work, especially along unpaved access pathways, and dust suppression will be conducted as necessary. Hauling of drill cuttings is not anticipated. However, if required, materials will be covered or completely contained to manage fugitive dust. Grading will not be conducted as part of the planned activities. Minor stabilization improvements along existing access pathways at Site B and the HNWR-1 Site are anticipated. The access pathway for both sites will be established along a disturbed, flat area. Based on the pre-construction state, this area will require stabilization as opposed to grading for use as an access route. See item a. Track-out onto Arizona County Highway 10, which is the only publicly maintained paved surface in the project area will be monitored and cleaned daily (as required). Earth-moving activities will not be conducted.
29	EIR MMRP	**BIO-1. Potential Fill of Wetlands and Other Waters of the United States and Disturbance or Removal of Riparian Habitat.** Areas of sensitive habitat in the project area have been identified during project surveys. These areas include floodplain and riparian areas, wetlands, and waters of the United States. Habitats designated by DFG as sensitive, including desert washes and desert riparian, are also included. To the extent feasible, elements of the project shall be designed to avoid direct effects on these sensitive areas. During the design process and before ground disturbing activities within such areas (not including East Ravine), a qualified biologist shall coordinate with PG&E to ensure that the footprints of construction zones, drill pads, staging areas, and access routes are designed to avoid disturbance of sensitive habitats to the extent feasible. DTSC shall be responsible for enforcing compliance with design and all preconstruction measures. If during the design process it is shown that complete avoidance of habitats under USACE jurisdiction is not feasible, the Section 404 permitting process shall be completed, or the substantive equivalent per CERCLA Section 121(e)(1). In either event, the acreage of affected jurisdictional habitat shall be replaced and/or rehabilitated to ensure “no-net-loss.” Before any ground-disturbing project activities begin in areas that contain potentially jurisdictional wetlands, the wetland delineation findings shall be documented in a detailed report and submitted to USACE for verification as part of the formal Section 404 wetland delineation process and to DTSC. For all jurisdictional areas that cannot be avoided as described above, authorization for fill of wetlands and alteration of waters of the United States shall be secured from USACE through the Section 404 permitting process before project implementation. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods agreeable to USACE and consistent with applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented. Alternately, if USACE declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the substantive equivalent of the Section 404 permitting process shall be complied with by ensuring that the acreage of jurisdictional wetland affected is be replaced on a “no-net-loss” basis in accordance with the substantive provisions of USACE regulations. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by feasible methods consistent with USACE methods, and consistent with the purpose and intent of applicable county and agency policies and codes. Minimization and compensation measures adopted through any applicable permitting processes shall be implemented. In any event, a report shall be submitted to DTSC to document compliance with these mandates. If during the design process it is shown that complete avoidance of habitats under DFG jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, a Section 1602 streambed alteration agreement shall be obtained from DFG and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a no-net-loss basis in accordance with DFG regulations and, if applicable, as specified in the streambed alteration agreement, if needed. Habitat restoration,	A survey was conducted to delineate/map jurisdictional areas within the project area so that planned activities could avoid State and Federal jurisdictional waters. The planned activities are not expected to result in a fill or discharge within jurisdictional waterways. Immediately prior to mobilization, as part of the preconstruction biological survey, a biologist will identify all acceptable access routes, staging areas, and work zones to ensure that jurisdictional waterways are avoided by construction activities. Discharging of water is planned for upland areas only. Corrective action included in the work plan will be implemented to prevent runoff to jurisdictional channels.

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		rehabilitation, and/or replacement shall be at a location and by methods agreeable to DFG and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan submitted to DFG, BLM, and USFWS that is agreeable to these agencies, or, alternately, through the implementation of a habitat restoration plan consistent with the substantive policies of DFG, BLM, and USFWS. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan. Alternately, if DFG declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, and during the design process it is shown that complete avoidance of habitats under DFG jurisdiction (such as changes to the natural flow and/or bed and bank of a waterway) is infeasible, the substantive mandates of a streambed alteration agreement shall be implemented, and affected habitats shall be replaced and/or rehabilitated. If complete avoidance of identified riparian habitat is not feasible, the acreage of riparian habitat that would be removed shall be replaced or rehabilitated on a "no-net-loss" basis in accordance with DFG regulations and, if applicable. Habitat restoration, rehabilitation, and/or replacement shall be at a location and by methods agreeable to DFG and consistent with the purpose and intent of applicable county policies and codes, as well as those policies outlined under the respective federal agency guidance documents. Minimization and compensation measures adopted through the permitting process shall also be implemented. Restoration of any disturbed areas shall include measures to achieve "no-net-loss" of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan developed consistent with the substantive policies of DFG, BLM and USFWS. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.	
30	EIR MMRP	**BIO-2a Disturbance of Special-Status Birds and Loss of Habitat.** To the extent feasible, the project implementation plans shall be designed to minimize removal of habitat for special-status birds. During the design process and before ground disturbing activities (except within the East Ravine as described in the Revised Addendum and unless otherwise required as noted below), a qualified biologist shall coordinate with PG&E to ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on habitat and nesting habitat for other special-status species, to the extent feasible. DTSC will ensure compliance with all preconstruction and construction phase avoidance measures identified during this process and included in any design plans. Vegetation removal and other activities shall be timed to avoid the nesting season for special-status bird species that may be present. The nesting cycle for most birds in this region spans March 15 through September 30. ***Preconstruction Measures*** Preconstruction breeding season surveys shall be conducted during the general nesting period, which encompasses the period from March 15 through September 30, if the final design of the project (including East Ravine investigation Sites I, K and L) could result in disturbance or loss of active nests of special-status bird species. If vegetation removal or other disturbance related to project implementation is required during the nesting season, focused surveys for active nests of special-status birds shall be conducted before such activities begin. A qualified biologist shall conduct preconstruction surveys to identify active nests that could be affected. The appropriate area to be surveyed and the timing of the survey may vary depending on the activity and species that could be affected. For the Yuma clapper rail, the preconstruction surveys shall specifically identify habitat within 300 feet of construction areas, in accordance with substantive policies of USFWS including those set out in USFWS protocols. ***Construction Measures*** Before the initiation of project elements that could result in disturbance of active nests or nesting pairs of other special-status birds, a qualified biologist shall be consulted to identify appropriate measures to minimize adverse impacts during the construction phase of the project. If deemed appropriate for the final project design because of the potential for impacts, minimization measures will include focusing construction activities that must be conducted during the nesting season to less- sensitive periods in the nesting cycle, implementing buffers around active nests of special-status birds to the extent practical and feasible to limit visual and noise disturbance, conducting worker awareness training, and conducting biological monitoring (including noise monitoring to determine if construction noise at the edge of suitable nesting habitat is elevated above 60 dBA $_{Leq}$ or ambient levels). An avoidance and minimization plan for special status bird species, as defined in Table 4.3-3 and those species protected under the federal Migratory Bird Treaty Act, including the Yuma clapper rail, shall be developed and implemented in consultation with USFWS, and agreed upon by DTSC. Avoidance and impact minimization measures, such as prohibiting construction near or in sensitive bird habitat, limiting construction during breeding seasons, and requiring an on-site biological monitor, shall be included in the design plan and implemented to the extent necessary to avoid significant impacts on sensitive bird species.	Proposed activities will not impact habitat for the special-status birds SWFL and Yuma clapper rail. The Yuma clapper rail occurs in wetland and marsh habitats and all activities currently proposed are 300 feet away from these habitats. The 300-foot buffer is a minimization measure in the Programmatic Biological Assessment (PBA). The South western willow flycatcher (SWFL) breeding habitat occurs in riparian thickets such as cottonwood and tamarisk thickets adjacent to the edge of water. The PBA requires avoidance of this habitat and a 60-foot buffer from the Colorado River. Currently proposed activities are over 200 feet from SWFL breeding habitat. Pre-construction surveys will be completed by a qualified biologist to avoid impacting nesting birds protected under MBTA (i.e., the survey will determine if special-status birds are nesting in or near the work area). If a special-status bird species, including migratory birds, should be found nesting in the work area the required buffers outlined in the PBA will be implemented. Pre-construction surveys will include a 50-foot buffer adjacent to the work areas. Trimming of vegetation will only occur after a biologist has confirmed that MBTA nesting birds are absent. Trimming activities at Site B and the HNWR Site (including the irrigation area) are not required for equipment access. Personnel will remain on site during the duration of discharge activities to monitor for persistent ponding and runoff. Water will be discharged to these areas in a manner that minimizes ponding and limits the potential for runoff. During discharge, if persistent ponding or runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 is observed, corrective action (e.g., modification of sprinkler layout, change in discharge rate, or using hand tools to control disperse ponding/control runoff) will be taken. If it is determined that persistent ponding or runoff cannot be easily corrected, then discharge will be discontinued. If rainfall occurs during discharge to the extent that the runoff of discharged water cannot be effectively monitored, then the discharge will be discontinued. It is impossible to predict the infiltration rate of the discharge areas. Therefore, the degree of infiltration and runoff will be closely monitored at all times during discharge. The discharge will be stopped if it is determined that persistent ponding and runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 cannot be effectively controlled.
31	EIR MMRP	**BIO-2b Disturbance of Desert Tortoise and Loss of Habitat.**	This action will not likely have a direct effect upon the Sonoran desert tortoise based on

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		Preconstruction Measures In areas where impacts to potential desert tortoise habitat are unavoidable, measures outlined in the Programmatic Biological Agreement (PBA) and in the USFWS letter concurring with the PBA, shall be implemented, as described below. To the extent feasible, project construction shall be designed to minimize removal of habitat for the desert tortoise. Before any ground-disturbing project activities begin, and (except within the East Ravine for which potential effects to the tortoise have been considered per the PBA), a USFWS-authorized desert tortoise biologist shall identify potential desert tortoise habitat in areas that could be affected by the final project design. Through coordination with the authorized biologist, PG&E shall ensure that the footprints of project elements and construction zones, staging areas, and access routes are designed to avoid direct or indirect effects on potential desert tortoise habitat to the extent feasible. These measures include the presence of a USFWS-authorized desert tortoise biologist on-site who will examine work areas and vehicles for the presence of desert tortoises, and who will conduct preconstruction desert tortoise surveys in areas where unavoidable impacts to tortoise habitat would occur. If feasible, the preconstruction desert tortoise surveys would coincide with one of the two peak periods of desert tortoise activity (i.e., if feasible, the surveys should be conducted in either the period from April through May, or from September through October). The preconstruction surveys shall be in full accordance with the substantive requirements of USFWS protocols. ***Construction Measures*** Before the initiation of project elements that could result in disturbance of desert tortoises or desert tortoise habitat, a USFWS-authorized desert tortoise biologist shall be consulted to identify appropriate measures to minimize adverse impacts. Minimization measures are likely to include micro-siting structures, pipelines, and access roads in previously disturbed areas or in areas with sparse scrub vegetation, conducting worker awareness	the implementation of the minimization measures identified in the PBA and in this table, including pre-construction surveys by a biologist. Additionally, USFWS protocol surveys were performed from 2004 through 2009 that resulted in no recent evidence of species presence within the Action Area including Arizona. The habitat within the Action Area is considered marginal, and any loss would be minor and well below the 8-acre upload threshold requested in the PBA. Therefore, this action will have minimal indirect effects upon this species that are covered within the PBA.
32	EIR MMRP	**BIO-2c Disturbance of Special-Status Species and Loss of Habitat Caused by Decommissioning.** To avoid impacts on special-status species that may occur within the project area as a result of decommissioning activities, an avoidance and minimization plan shall be developed and implemented through consultation with DFG, BLM, and USFWS. These measures shall be based on surveys conducted prior to decommissioning, and during the breeding season (as previously defined in this EIR for each species or suite of species). Restoration of any disturbed areas shall include measures to achieve no net loss of habitat functions and values existing before project implementation. These measures shall be achieved by developing and implementing a habitat restoration plan submitted to DFG, BLM, and USFWS that is agreeable to these agencies. The plan shall include a revegetation seed mix or plantings design, a site grading concept plan, success criteria for restoration, a monitoring plan for achieving no net loss of habitat values and functions, and an adaptive management plan.	Any proposed freshwater source well decommissioning activities would avoid impacts to special-status species including the Sonoran desert tortoise and nesting birds protected under the MBTA. An avoidance and minimization plan to protect special-status species along with a restoration plan would be developed and implemented through consultation with BLM, USFWS, and HNWR.
33	EIR MMRP	**BIO-3a Potential Impacts to Aquatic Habitat Related to Turbidity, Erosion, Sedimentation, and Overall Water Quality during Construction of the Intake Structure.** Hydrology & Water Quality Mitigation Measure HYDRO-1 shall be implemented in order to reduce water quality impacts related to erosion and pollutant runoff through implementation of BMPs. In addition, installing the cofferdam and dewatering a portion of the proposed intake structure site during fish screen construction may result in fish stranding. PG&E and its contractor shall coordinate with a qualified fisheries biologist to develop and implement a fish rescue plan. The fish rescue effort would be implemented during the dewatering of the area behind the cofferdam and would involve capturing those fish and returning them to suitable habitat within the river. The fish rescue plan shall identify and describe the following items: collection permits needed, fish capture zones, staffing, staging areas, fish collection and transport methods, species prioritization, resource agency contacts, fish handling protocols, fish relocation zones, site layout and progression of dewatering and fish rescue, and records and data. To ensure compliance, a fisheries biologist shall be present on-site during initial pumping (dewatering) activities and to oversee the fish rescue operation.	An intake structure will not be constructed as part of the planned activities.
34	EIR MMRP	**BIO-3b Potential Loss or Degradation of Aquatic Habitat.** To restore, replace, or rehabilitate habitat impacted by the intake structure, PG&E shall implement the measures described below. Unless as provided below, PG&E shall confer with DFG regarding potential disturbance to fish habitat and shall obtain a streambed alteration agreement, pursuant to Section 1602 of the California Fish and Game Code, for construction work associated with intake structure construction; PG&E shall also confer with DFG pursuant to the CESA regarding potential impacts related to the loss of habitat or other operational impacts on state-listed fish species, respectively. PG&E shall comply with all requirements of the streambed alteration agreement and any CESA permits to protect fish or fish habitat or to restore, replace, or rehabilitate any important habitat on a “no-net-loss” basis. Alternatively, if DFG declines to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, the project proponent shall consult with DFG regarding potential disturbance to fish habitat and shall meet the substantive policies of a streambed alteration agreement and of the CESA for construction work associated with intake structure construction and operations. PG&E shall comply with all substantive requirements of the streambed alteration agreement and CESA to protect fish and fish habitat or to restore, replace, or rehabilitate any important habitat on a “no-net-loss” basis and to operate the facility in accordance with CESA to ensure no net loss of habitat function. Additionally, PG&E shall consult with USACE regarding the need to obtain permits under section 404 of the CWA and section 10 of the Rivers and Harbors Act. In conjunction with these permitting activities, the USACE must initiate consultation with USFWS under Section 7 of the Federal ESA regarding potential impacts of the proposed project on federally listed fish species due to the loss of habitat on federally listed fish species. PG&E shall implement any additional measures	An intake structure will not be constructed as part of the planned activities.

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Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

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		developed through the ESA Section 7 processes, or its equivalent, to ensure "no-netloss" of habitat function. Alternatively, if USACE and/or USFWS decline to assert jurisdiction because it determines that CERCLA Section 121(e)(1) applies, PG&E shall confer with USFWS regarding potential disturbance to federally listed fish species and federally listed fish species habitat and shall meet the substantive mandates under Section 7 of the Federal ESA regarding potential impacts to fish or to habitat of federally listed fish species. PG&E shall implement any additional measures developed through that processes, including compliance with the substantive requirements of all of what would be permit conditions if not exempt pursuant to CERCLA, and to ensure "no-net-loss" of habitat function. Because the type and extent of habitat potentially affected is unknown, PG&E shall have an instream habitat typing survey conducted in the area potentially affected by the intake construction. Further, cooperation with USFWS and other fisheries biologists shall determine suitable and acceptable location(s) for the intake structure(s) to avoid the spawning habitat of special-status fish species. PG&E shall avoid habitat modifications, especially to habitat that is preferred by native fishes for spawning or rearing including side channels, cobble or gravel bars, and shallow backwaters. If these habitat types cannot be avoided, any disturbed habitat will be restored or replaced to achieve "no-net-loss" of habitat types and values as described above.	
35	EIR MMRP	**BIO-3c Potential Fish Entrainment and Impingement during Operation of the Intake Structure.** Both screened and unscreened diversions can entrain larval life stages of fish. For example, adverse effects to early life stages of fish could occur if diversions coincide with planktonic larval life stages that occur during summer months, a period of high entrainment vulnerability. Prior to operation of the intake structure, PG&E shall consult with USFWS and DFG to determine the most vulnerable time of the year for entrainment or impingement of razorback sucker and bonytail chub eggs or larvae. PG&E shall install a state-of-the-art positive-barrier fish screen that would minimize fish entrainment and impingement at the intake structure. The fish screen shall be designed in accordance with DFG and the National Marine Fisheries Service criteria, with specific consideration given to minimizing harm to fish eggs and other early life stages. To ensure that the fish screen operates as intended and reduce the risk of impacts, long-term monitoring of the operations and maintenance of the positive-barrier screen shall be conducted. Monitoring at the onset of diversions through the intake shall include approach velocity measurements immediately after the positive-barrier screen operations begin, with fine-tuning of velocity control baffles or other modifications as necessary, to achieve uniform velocities in conformance with the screen criteria established by regulatory agencies.	An intake structure will not be constructed as part of the planned activities.
36	EIR MMRP	**CUL-1a During Design, Construction, O&M, and Decommissioning Implement Measures to Avoid, Minimize, or Mitigate Impacts on Cultural Resources.** Establishment of a cultural impact mitigation program and a Corrective Measures Implementation Workplan (CMI Workplan), with specific activities stipulated for each phase of the project, will reduce the potential for impacts on historical resources within the project area, and will help preserve the values of and access to the Topock Cultural Area for local tribal users. As detailed below, measures will be implemented to avoid known resources, re-use existing disturbed areas to the extent feasible, allow for tribal input to the final design and maintain access for tribal users during design, construction, operation, and decommissioning activities, as appropriate. During construction, a Worker Education Program and regular archaeological and tribal monitoring will be implemented, and measures intended to reduce the potential for incursion by outside parties will be strengthened. This measure does not apply to the activities included as part of the East Ravine Revised Addendum, Groundwater Investigation (dated December 31, 2010).	Prior to work, the approved work areas will be defined in the field by the PG&E cultural resources monitor and workers will be instructed to not conduct work outside of the defined area. The work area boundary was established to avoid resources identified during previous cultural resource surveys. Prior to work, all field workers will participate in PG&E's Site Sensitivity Training program, which will inform them of the cultural significance of the project area, and define the rules of working within the project area.
37	EIR MMRP	**CUL-1a-1:** During development of the final design and the construction, operation, and decommissioning phases of the project, PG&E shall carry out and require all subcontractors to carry out all investigative, testing, and remediation activities, including all supporting operations and maintenance activities, in ways that avoid, minimize, and mitigate significant adverse effects to historically significant cultural and historic resources, consistent with the CEQA Guidelines, and including the Topock Cultural Area, to the maximum extent feasible as determined by DTSC. [1]"Interested Tribes" means, for purposes of this EIR and the mitigation measures contained herein, the six tribes that have substantially participated in the various administrative processes surrounding remediation of the site with DTSC, PG&E, and DOI, including throughout development of the final remedy. Interested tribes include the Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Fort Yuma-Quechan Indian Tribe, and Hualapai Indian Tribe.	See CUL-1a.
38	EIR MMRP	**CUL-1a-2:** As part of the CMI Workplan, PG&E shall develop a written access plan to preserve tribal members' access to, and use of, the project area for religious, spiritual, or other cultural purposes. This plan will allow access to the extent PG&E has the authority to facilitate such access, and be consistent with existing laws, regulations, and agreements governing property within the project area. The access plan may place restrictions on access into certain areas, such as the Compressor Station and the existing evaporation ponds, subject to DTSC review with regard to health and safety concerns and to ensure noninterference with approved remediation activities. This access plan may be developed in coordination with the federal agencies with land management responsibilities in the project area (e.g., BLM and USFWS) in accordance with the related stipulation (General Principle I.C) contained in the Programmatic Agreement (Appendix PA). PG&E shall demonstrate a good faith effort to coordinate with Interested Tribes 1 by including communication logs as part of the CMI Workplan.	As with previous well installation programs associated with the Topock Remediation Project, PG&E will provide the agencies and interested stakeholders with periodic schedule updates as mobilization dates are finalized and as work progresses such that the tribal monitors can plan to oversee the work. Tribal members will be provided contact information for Curt Russell, Chris Smith, and the PG&E cultural resources monitor to coordinate site access, as necessary.
39	EIR MMRP	**CUL-1a-3:** PG&E shall enhance existing measures to prevent and reduce incursions from recreational and/or other outside users from affecting unique archeological and historically significant resources, including resources within the Topock Cultural Area, by:	This measure applies to the remedy project, and will be implemented in connection with the remedy project.

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		a. Retaining a Qualified Cultural Resource Consultant to implement the Mitigation Monitoring and Reporting Program (MMRP) and conducting yearly inspections (or less frequently upon approval by DTSC) of identified historical resources, including inspections of the Topock Cultural Area, to determine if substantial adverse changes have occurred relative to the condition of the historical resources during the past year or prior to the implementation of the proposed project. PG&E shall offer to retain a tribal monitor at historic rates of compensation or tribal representatives designated by the Tribal Council or chairperson, if so requested, to accompany the Qualified Cultural Resources Consultant during the inspections. The Qualified Cultural Resource Consultant shall be a person who is acceptable to DTSC and who is also a qualified archaeologist with a graduate degree in archaeology, anthropology or closely related field, plus at least 3 years of full-time professional experience in general North American archaeological research and fieldwork, with expertise/experience in the Southwest preferred. b. Developing a site security plan as part of the CMI Workplan. The site security plan shall include, but not be limited to, instructions for PG&E personnel to inspect the project site routinely during construction and report any human-caused disturbance to project facilities and the surrounding environment to DTSC and the appropriate landowner, such as BLM, USFWS, or FMIT, as appropriate, depending on the ownership of the property involved in the incursion. Notification shall be within a specified period, as established in the site security plan for the event, and shall also be summarized as part of the periodic implementation status report, as approved by DTSC for remedy implementation. This measure does not impose any obligation on PG&E to perform law-enforcement duties on federal or private lands, but is intended to provide increased observation of potential intrusions into the project area during construction and operation of the final remedy that may impact significant cultural resources. PG&E staff, or assigned agents, should be instructed to report any outside disturbance to the environment personally observed over the course of the working day. Information shall be reported within a specific period, as established in the site security plan, to DTSC and the appropriate landowners, such as BLM, USFWS, or FMIT, depending on the ownership of the property intruded upon. The site security plan may also include the use of PG&E security cameras at major ingress/egress gates into the project site. Finally, if requested by the FMIT the plan may include the use of private security personnel to patrol the FMIT-owned parcel within the project area to prevent outside incursions. c. Coordinating with BLM and San Bernardino County to facilitate an outreach effort to the staff at Moabi Regional Park, requesting that they communicate to visitors the parts of the project area that are off limits to off-road vehicle usage because of health and safety concerns, public lands management plans, or landowner requests. PG&E shall make a good faith effort to involve the surrounding tribes in this outreach effort, providing Interested Tribes with the opportunity to comment on outreach materials or provide a tribal cultural resources specialist the opportunity to participate in the outreach activities. As part of this outreach effort, PG&E shall work with Park Moabi and offer to design, develop, and fund the installation of an informational kiosk within Park Moabi that informs visitors of the work being done at the project site. PG&E shall involve the tribes to the maximum extent feasible, as determined by DTSC, in the design and development of the informational kiosk. d. Posting signage to indicate those parts of the project area that are off limits to off-road vehicle usage due to possible health and safety concerns and to reduce potential damage to environmental resources. If agreed to by land owners and/or local, state, or federal management entities within the project area, PG&E shall work with the relevant land owner or land management entity to develop, design, and fund the installation of easily visible and clear signage. This may include coordination with BLM to install signage noting the designation of the area as an Area of Critical Environmental Concern owing to its biological and cultural resources, while ensuring that signs are placed in a way that does not draw unwanted attention to specific resources.	All gated access routes will be maintained closed during working hours. Based on site experience communicated by HNWR during the January 3, 2013 comment resolution meeting, PG&E will plan to have a security detail present at all work sites during non-working hours to manage the potential for unauthorized trespass through the notification of law enforcement, as necessary. If unauthorized trespass is detected, PG&E will notify the landowner as soon as possible. Moabi Regional Park is outside the project area for this work. PG&E will work with the landowner prior to work to determine if signage in addition to that already in place is required. All signage will be for the purpose of compliance, and not to identify or draw unnecessary attention to the infrastructure. PG&E has initiated work on an Access Plan for the lands not under federal management, taking into consideration the information in the BLM Access Plan, for submittal with the final design. Communication logs with Tribes are submitted to DTSC quarterly, as part of the quarterly EIR mitigation measures compliance reports (see Table 6.1-2). Security measures specific to the FWIP, including gated access and a security detail that will monitor for unauthorized access to work areas during non-working hours are discussed in Section 3.1 of the FWIP
40	EIR MMRP	**CUL-1a-4:** PG&E shall work with representative members of the Interested Tribes to convene and retain a multidisciplinary panel of independent scientific and engineering experts as part of a Technical Review Committee (TRC). The TRC shall be made up of not more than five multidisciplinary experts who will be on call to review project-related documents, participate in project-related meetings, and advise interested tribal members on technical matters relating to the final design and remedy. The TRC shall include only persons with technical expertise, including but not limited to geology, hydrology, water quality, engineering, paleontology, toxicology, chemistry, biology, or botany. Before July 1, 2011, PG&E shall post an open grant or Request for Qualifications (RFQ) and retain members of the TRC at rates comparable to those paid historically to tribal experts by PG&E for the remediation project. TRC members shall be selected by majority vote of one representative from each participating Interested Tribe. PG&E shall provide Interested Tribes at least 30-days notice of the meeting to select TRC members and to review TRC candidate qualifications. For the purposes of contracting, the grant may be awarded to one tribal government to manage or, alternatively, PG&E may reimburse the tribe or TRC members directly. The entirety of the monies shall be used to fund the scientific and engineering team exclusively, and shall not be used to fund other tribal government expenses or used to support legal counsel. A stipulation of the open grant shall be that the scientific and engineering team shall provide all deliverables and results to all involved tribes, despite a possible contract agreement with only one tribe or with PG&E. Upon conclusion of the construction phase of the project, the necessity and dollar value of the TRC shall be assessed by PG&E and, with the approval of DTSC, shall either be extended, reduced, or terminated under the operations and maintenance phase.	Topock Final Remedy TRC is in place. As with previous well installation programs associated with the Topock Remediation Project, PG&E will provide the agencies and interested stakeholders (including the TRC) with periodic schedule updates as mobilization dates are finalized and as work progresses such that the tribal monitors can plan to oversee the work.
41	EIR MMRP	**CUL-1a-5:** Should any indigenous plants of traditional cultural significance and listed in Appendix PLA of this FEIR be identified within the project area, PG&E shall avoid, protect, and encourage the natural regeneration of the identified plants when developing the remediation design, final restoration plan, and IM-3 decommission plan. In the event that impacts on the identified plants cannot be avoided and such plants will be displaced, PG&E shall retain a qualified botanist who shall prepare a plant transplantation/monitoring plan which can be included as part of the Cultural Impact Mitigation Program (CIMP) referenced in CUL-1a-8 either by (1) transplanting such indigenous plants to an on-site location, or (2) providing a 2:1 ratio replacement to another location decided upon between PG&E and members of the Interested Tribes. Plans to transplant or replace such plants shall be approved by DTSC. In coordination with the qualified botanist, PG&E shall monitor all replanted and replacement plants for at least 3 5 years, and shall ensure at least a 75 percent survivorship during that time. This mitigation measure is	It is anticipated that only existing roads and access pathways requiring minimal access improvements in select areas will be used during the work proposed in the Plan. The removal or trimming of vegetation is not expected to be required to gain access for equipment.Prior to mobilization, a qualified biologist will identify acceptable access routes, staging areas, and work zones. In addition, a qualified biologist will be on site during all vegetation trimming activities.

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		not meant to replace or subsume any actions required by state or federal entities with regard to the protection of species listed as rare, threatened, or endangered.	
42	EIR MMRP	**CUL-1a-6:** All additional phone calls and alarms associated with remediation activities or facilities shall not be routed through PG&E's existing alarm system utilized at the compressor station. The notification system for remediation-related alerts and/or phone calls shall not introduce additional noise to the project area, to the maximum extent feasible, provided there is ongoing compliance with applicable safety regulations or standards of the Federal Energy Regulatory Commission, Occupational Safety and Health Administration, and other agencies. (See Mitigation Measure NOISE-3 for additional mitigation related to the Topock Cultural Area).	Automated alerts/phone calls will not be in place for any aspect of the FWIP activities. All phone calls will be placed manually, as necessary, and will not be routed through PG&Es existing alarm system at the compressor station. Manual phone calls will not result in additional noise to the project area.
43	EIR MMRP	**CUL-1a-7:** Nighttime construction-related activities shall be limited to work that cannot be disrupted or suspended until the following day, such as, but not limited to, well drilling and development or decommissioning activities. Lighting considerations, including the potential use of solar power for some lighting, shall be included as part of the remedial design plan to be developed with involvement of Interested Tribes and the U.S. Department of the Interior. To minimize construction and operations-related lighting impacts, the lighting in the remedial design plan shall include, at a minimum: (1) shrouding/shielding for portable lights needed during construction and operational activities; (2) installation of portable lights at the lowest allowable height and in the smallest number feasible to maintain adequate night lighting for safety; (3) shielding and orientation of lights such that off-site visibility of light sources, glare, and light from construction activities is minimized to the extent feasible. No additional permanent poles shall be installed for lighting. This mitigation measure is not meant to replace or subsume any actions required by the County or state or federal entities with regard to lighting required for minimum security and safety purposes.	It is anticipated that drilling activities will be conducted during daylight hours only. However, in the case of multiple day aquifer testing, well pumping and groundwater discharge activities may need to be conducted during nighttime hours. In this case, or as exceptional field conditions are encountered during drilling, PG&E will plan all nighttime activities closely with HNWR to ensure the light-related impacts are minimize to the extent practicable while maintaining a safe work environment, and that all night work is conducted in accordance with MMRP CUL-1a-7.
44	EIR MMRP	**CUL-1a-8:** Prior to commencement of construction, PG&E shall submit as part of the final Remedial Design, a CIMP developed in coordination with Interested Tribes for DTSC's review and approval. The CIMP may be developed in coordination with the federal agencies with land management responsibilities in the project area (e.g., BLM and USFWS) in accordance with the Programmatic Agreement (Appendix PA). The CIMP shall include, at a minimum and to DTSC's satisfaction, the following: a. Protocols for continued communication. Consistent with past practice and the communication processes previously entered into by PG&E with Interested Tribes, the company shall continue to communicate with Interested Tribes during the design, construction, operation, and decommissioning of the project. Prior to implementation of construction, PG&E shall communicate with Interested Tribes that place cultural significance on the Topock Cultural Area. Outreach efforts between the Tribes and PG&E shall be communicated by PG&E to DTSC quarterly during the design and construction phase for review and input, and annually during project operations. b. Protocols for the appropriate treatment of archaeological materials that may be disturbed or discovered during implementation of the final remedy, including protocols for the repatriation of significant items of cultural patrimony that may be recovered during the project, and protocols for the curation of cultural materials recovered during the project. Treatment of archaeological sites may include data recovery or capping. If data recovery is proposed, a Research Design following California Office of Historic Preservation guidelines or federal guidelines, as applicable, shall be prepared and reviewed and approved by DTSC. c. Protocols for the review of cultural resource-related documents throughout the design, construction, and operational phases. d. Protocols for the review of project design documents before the beginning of construction, including reviews of project design documents throughout the design process (e.g., Preliminary [approximately 30% completed], Intermediate [approximately 60% completed] and Pre-final design). e. Protocols for the appropriate methods to be used to restore the environment to its preconstruction condition upon decommissioning of individual groundwater remedy facilities. f. A plan for the decommissioning and removal of the IM-3 Facility and proposed restoration of the site (to be an appendix to the CIMP). g. Protocols for the repatriation of clean soil cuttings generated during construction activities and during drilling associated with repair/replacement activities during operations and maintenance phases. The soil cuttings shall be managed in compliance with applicable laws and regulations on site. h. Protocols for the appropriate methods, consistent with Mitigation Measure NOISE-3, to reduce auditory impacts. i. Protocols for the appropriate methods, consistent with Mitigation Measures AES-1 and AES-2, to reduce visual intrusions. j. Protocols for tribal notification in advance of project-related activities that the Interested Tribes may feel have the potential to cause adverse impacts to sensitive cultural resources. k. Protocols to be followed by project personnel to accommodate, if feasible as determined by DTSC, key tribal ceremonies that involve the Topock Cultural Area. l. Provisions affording sufficient tribal monitors to observe ground-disturbing activities and/or other scientific surveying (e.g., biological surveys) that may occur in preparation for construction activities. Ground-disturbing activities include trenching, excavation, grading, well excavation/drilling, decommissioning of the IM-3 Facility and subsurface pipeline, or other construction-related activities. m. Provisions of reasonable compensation for tribal monitors consistent with historic rates. n. Locations requiring specific protective devices, such as temporary fencing, flagging, or other type of demarcation during construction. o. Protocols for the reporting of discoveries of cultural importance consistent with existing statutes and regulations.	Work on the CIMP is ongoing. PG&E has and will continue to discuss with and solicit input from Interested Tribes on various mitigation measures under the CIMP. A draft CIMP will be provided to Interested Tribes for review prior to submittal to DTSC for review and approval. This measure was discussed with Interested Tribes at the monthly meetings on October 25, 2012, November 9, 2012, December 4, 2012, and December 18, 2012. Regardless, the following measures will be taken during the implementation of the Alternative Freshwater Evaluation: a) As with previous well installation programs associated with the Topock Remediation Project, PG&E will provide the agencies and interested stakeholders with periodic schedule updates as mobilization dates are finalized and as work progresses. b) Potential well sites have been surveyed for cultural resources. The potential work area has been established to exclude all resources identified during the surveys.. As stated in the Implementation Plan, Applied Earthworks will observe all ground disturbing activities, including aquifer testing, and will have the authority to halt work in the event additional cultural resources are discovered. Also as described in Section 4 of the plan, specific steps to value and safeguard discovered resources will be followed. c) The results of the archaeological and historical site surveys for the potential work area were submitted to interested tribes on January 10, 2013. Tribal monitors from the Chemehuevi, CRIT, and FMIT were variously involved with the survey on August 10 to 11, 2012, October 2 to 4, 2012, October 10, 2012, and December 12 to 13, 2012. Section 8 of the BLM CHPMP discusses the protocol for addressing and reporting new discoveries. d) This process is ongoing. Interested tribes have reviewed and commented on the initial submittal of this Implementation Plan . e) The development of these protocols is ongoing. f) The development of this plan is ongoing. g) Discussion of these protocols is ongoing, and subject to information provided in individual work plans. For this work, it is proposed that the soil cuttings be left on the ground where they were generated. h) See Noise-3. i) See AES-1 and AES-2. j) Interested tribes have the opportunity to comment on the Implementation

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		Protocols for the inspection of remediation facilities and/or staging areas throughout the construction phase.	Plan. k) As with previous field activities associated with the Topock Remediation Project, PG&E will regularly communicate the project schedule, in part, to accommodate key tribal ceremonies should they be requested. l) As with previous field activities associated with the Topock Remediation Project, PG&E will regularly communicate the project schedule, in part, to coordinate tribal monitor participation.. m) As with other activities associated with the Topock Remediation Project, and in accordance with memoranda of understanding, tribal monitors will be invited to monitor work activities. Tribal monitors were present during the cultural resource surveys. n) Prior to work, the approved work areas will be defined in the field by the PG&E cultural resources monitor and the PG&E biologist. Workers will be instructed to not conduct work outside of the defined area. The work area boundary was established to avoid resources identified during previous cultural and biological resource surveys. o) The results of the cultural surveys for the potential work area were submitted to interested tribes on January 10, 2013.
45	EIR MMRP	**CUL-1a-9:** During selection of the design and specific locations for physical remediation facilities, PG&E shall, in communication with the Interested Tribes (and subject to their review), and to the maximum extent feasible, as determined by DTSC, give: (1) priority to previously disturbed areas for the placement of new physical improvements; and (2) priority to re-use of existing physical improvements, such as but not limited to wells and pipelines, but not including IM-3 facilities. "Disturbed" areas in this context means those areas outside of documented archaeological site boundaries that have experienced ground disturbance in the last 50 years. PG&E shall produce an aerial map of these disturbed areas to guide project design, and PG&E shall make a good faith effort to provide tribes with an opportunity to review and comment on the information displayed on the map in determining "disturbed" areas.	The potential supply wells are the only physical remediation facilities associated with the Alternative Freshwater Source Evaluation and installation work will be focused in areas that have been previously disturbed.
46	EIR MMRP	**CUL-1a-10:** PG&E shall consider the location of Loci A, B, and C of the Topock Maze during the design and approval of the physical facilities necessary for the final remedy and is prohibited from creating any direct physical impact on the Topock Maze, as it is manifested archaeologically. Through the design, PG&E shall prevent all indirect (e.g. noise, aesthetics) impacts on the Topock Maze, to the maximum extent feasible as determined by DTSC.	Work associated with the Alternative Freshwater Source Evaluation is not anticipated to interfere with the areas mentioned, which are on the California side of the Colorado River.
47	EIR MMRP	**CUL-1a-11:** PG&E shall provide an open grant for two part-time cultural resource specialist/project manager positions during the design and construction phases of the remediation project. The positions shall be filled by qualified members of an Interested Tribe as nominated by a majority vote of their Tribal Council(s) and appointed by DTSC's project manager if more than two members are nominated. The award of the grants is for continued involvement in review of project documents and participation in project-related meetings, including TRC meetings, at rates of historic compensation. Additionally, in light of FMIT's ownership of land in the project area and historical involvement in the environmental process, additional funding is guaranteed for one full-time FMIT position upon submission of an application by a qualified FMIT member who shall be appointed by the FMIT council, provided such funding is not duplicative of the services and funding provided by PG&E pursuant to the Settlement Agreement between PG&E and the FMIT in Fort Mojave Indian *Tribe v. Dept. of Toxic Substances Control, et al.*, Case No. 05CS00437 for a position with the FMIT's AhaMakav Culture Society. The payment of grant monies shall be timed to the awarded tribes' fiscal cycles so that the tribes are not forced to front funds for long periods of time. These positions shall act as cultural resources contacts and project managers for interactions between the tribes, PG&E, and DTSC to ensure coordination for review and comment of subsequent project and/or environmental documents related to the design and implementation of the groundwater remediation project to avoid, reduce, or otherwise mitigate impacts on historical resources, as defined by CEQA. This funding is separate from provisions for tribal monitor positions and shall not be used for routine tribal business or legal counsel. For review and approval, PG&E shall provide DTSC with the names of the selected grant recipients and an annual report that summarizes activities associated with the grant program. Upon the conclusion of the construction phase of the project, the necessity and dollar value of the grant program shall be assessed by PG&E and, with the approval of DTSC, shall either be extended or terminated under the operations and maintenance phase.	The first funded position was filled by the Chemehuevi Tribe; the second funded project manager position was filled by the Cocopah Indian Tribe.
48	EIR MMRP	**CUL-1a-12:** PG&E shall provide sufficient opportunity, as determined by DTSC, for Interested Tribes to provide a traditional healing/cleansing ceremony (or ceremonies) before and after ground disturbing construction activities occur.	Please see CUL-1a-8(k).
49	EIR MMRP	**CUL-1a-13:** PG&E shall, in communication with Interested Tribes, develop as part of the CMI Workplan, a worker cultural sensitivity education program. The program shall be implemented before commencement of construction and throughout construction and operations as personnel are added. This program may include information provided directly by tribal entities either in written form or on video, in a manner consistent with Appendix C in the existing BLM Programmatic Agreement. The worker cultural sensitivity education program shall ensure that every person working on the project as an employee or contractor, before participating in design or outdoor activities at the project site, is informed regarding:	PG&E is working collaboratively with Tribes on this measure. The PG&E representative will be responsible for providing cultural sensitivity training to the workers implementing this plan and for ensuring compliance with all applicable archaeological measures during drilling activities. PG&E will invite participation from the Tribes, archaeological monitors, and agency staff, as appropriate, in this training. This training will be initially conducted during a project initiation meeting held

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		• the cultural significance of the Topock Cultural Area, • appropriate behavior to use within the Topock Cultural Area, • activities that are to be avoided in the Topock Cultural Area, and • consequences in the event of noncompliance.	specifically for the subject project, prior to any intrusive work being conducted.
50	EIR MMRP	**CUL-1b and 1c During Design, Construction, O&M, and Decommissioning Consider the Location of Historical Resources and Implement Measures to Avoid Resources to the Extent Feasible** The following actions will reduce the potential for impacts on identified historically significant resources (other than the Topock Cultural Area, which is separately addressed in CUL-1a) within the project area. As detailed below, these actions include consideration of the location of historical resources, preparation of a cultural resources study, and preparation of a treatment plan. Monitoring of ground-disturbing activities during project construction will further protect historically significant resources. Protective actions are also described pertaining to the discovery of any previously unidentified potentially significant cultural resources.	See sub-measures.
51	EIR MMRP	**CUL-1b/c-1:** PG&E shall consider the locations of the identified historic resources described above (Table 4.4-3) during the design of the physical improvements necessary for the proposed project and avoid, minimize, or mitigate impacts on historical and archaeological resources to the maximum extent feasible, as determined by DTSC. The final design plans for the project will be submitted to DTSC for review and approval.	The potential work area has been established to exclude all resources identified during the archaeological surveys conducted from August to November 2012. identified by.
52	EIR MMRP	**CUL-1b/c-2:** During preparation of the final design, and consistent with CUL-1 a-3, PG&E shall retain a Qualified Cultural Resources Consultant to prepare a cultural resources study that assesses the potential for the construction, operations, or decommissioning of specific proposed improvements to result in significant impacts on identified historically significant resources described in Impacts CUL-1b and CUL-1c. This may include a geoarchaeological investigation and/or non-destructive remote-sensing surveys of potentially disturbed areas to determine if a potential exists for buried historical and archaeological resources. “Significant impacts” as used here means the potential for construction to demolish or materially alter in an adverse manner those physical characteristics of a resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the CRHR. The study will be submitted to DTSC During the design phase for review and evaluation to determine if existing mitigation measures are appropriate.	A survey has been completed and activities will be conducted outside of areas known to include historical and archeological resources. In addition, a geoarchaeological investigation has been completed and a draft report has been prepared and provided to the Tribes. The study has concluded that there is a low potential for buried archeological deposits.
53	EIR MMRP	**CUL-1b/c-3:** If the cultural resources study determines that the construction of physical improvements would result in significant impacts on identified historically significant resources described in Impacts CUL-1b and CUL-1c, and avoidance of the resource is not feasible, PG&E shall prepare a treatment plan that identifies measures to reduce these impacts (see above description of the CIMP) for DTSC’s review and approval. The treatment plan shall identify which criteria for listing on the CRHR contribute to the affected resource’s significance and which aspects of significance would be materially altered by construction, operations, or decommissioning and shall provide for reasonable efforts to be made to permit the resource to be preserved in place or left in an undisturbed state. Methods of accomplishing this may include capping or covering the resource with a layer of soil. To the extent that a resource cannot feasibly be preserved in place or left in an undisturbed state, excavation as mitigation shall be restricted to those parts of the resource that would be damaged or destroyed by the project. Excavation as mitigation shall not be required for a historically significant resource if the treatment plan determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource. The plan shall require communication with all Interested Tribes with regard to their perspectives and wishes for the treatment of the resources.	See CUL-1b/c-2.
54	EIR MMRP	**CUL-1b/c-4:** Consistent with CUL-1a-3a above, PG&E shall retain a Qualified Cultural Resources Consultant to observe ground-disturbing activities and shall be required to request the participation of tribal monitors during those activities, including steps necessary during operations and decommissioning activities to ensure that historically significant resources are avoided to the maximum extent feasible, as determined by DTSC, during actual construction (see the description of the CMI Workplan, above). The Qualified Cultural Resources Consultant shall provide training to construction personnel on the locations of identified resources, values associated with the identified resources, responsibility for reporting suspected historic resources, and procedures for suspension of work in the immediate vicinity of the discovery, and shall use exclusionary fencing, flagging, or other appropriate physical barriers to mark the boundaries of identified resources. The Qualified Cultural Resources Consultant shall invite participation from Interested Tribal members to participate in the training. In the event that previously unidentified potentially significant cultural resources are discovered during ground-disturbing activities, the Qualified Cultural Resources Consultant shall have the authority to divert or temporarily halt ground-disturbing activities in the area of discovery to allow evaluation of the potentially significant cultural resources. If such discoveries occur on land managed by a federal agency, Stipulation IX (Discoveries) of the Programmatic Agreement shall apply and are deemed adequate by DTSC. If a discovery occurs on other lands within the project area, the Qualified Cultural Resources Consultant shall contact the PG&E and DTSC project managers at the time of discovery and, in consultation with DTSC and tribal monitors, shall evaluate the resource before construction activities will be allowed to resume in the affected area. For significant cultural resources, and before construction activities are allowed to resume in the affected area, the resource(s) shall be recovered with coordination of the tribal monitors and DTSC. Recovery may include a Research Design and/or Data Recovery Program submitted to DTSC for review and approval. The Qualified Cultural Resources Consultant (and tribal monitors) shall determine the amount of material to be recovered for an adequate sample for analysis or data recovery. Any concerns or recommendations regarding the ground-disturbing activities or the handling of cultural resources shall be directed to the Qualified Cultural Resources Consultant or PG&E’s site supervisor.	As stated in the plan, Applied Earthworks has been retained by PG&E with DTSC approval, and will observe all ground-disturbing activities and planned well testing activities. Section 8 of the BLM CHPMP discusses the protocol for addressing and reporting new discoveries.
55	EIR MMRP	**CUL-2 During Project Design Consider the Location of Unique Archaeological Resources and Avoid Resources to the Maximum extent Feasible.** Cultural resources that qualify as unique archaeological sites in the project area would probably also meet one or more of the criteria for historical resources and	The potential work area has been established to exclude all resources identified during the archaeological surveys conducted from August to November 2012.

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		would be subject to Mitigation Measures CUL-1b/c-2 and CUL-1b/c-3. The mitigation measures under this identified impact are the same as listed for Impact CUL-1b and CUL-1c. These mitigation measures would reduce the potential for impacts on unique archaeological resources.	
56	EIR MMRP	**CUL-3 Conduct Survey and Construction Monitoring.** A paleontological investigation, including a detailed survey of the project area by a qualified paleontologist, shall be conducted to refine the potential impacts on unique paleontological resources within the final design area and determine whether preconstruction recovery of sensitive resources and/or construction monitoring would be warranted. If construction monitoring is determined to be warranted, ground-altering activity would be monitored by a qualified paleontologist to assess, document, and recover unique fossils. Monitoring shall include the inspection of exposed surfaces and microscopic examination of matrix in potential fossil bearing formations. In the event microfossils are discovered, the monitor shall collect matrix for processing. In the event paleontological resources are encountered during earthmoving activities, recovered specimens shall be prepared by the paleontologist to a point of identification and permanent preservation. PG&E shall retain a Qualified Paleontologist to observe ground-disturbing activities where determined necessary based on the results of the paleontological investigation and shall be required to request the participation of tribal monitors during those activities, including steps necessary during operations and decommissioning activities to ensure that historically significant resources are avoided to the maximum extent feasible, as determined by DTSC, during actual construction (see above description of the CMI Workplan). Paleontological resources of scientific value shall be identified and curated into an established, accredited, professional museum repository in the region with permanent retrievable paleontological storage. This measure does not apply to the activities included as part of the East Ravine Revised Addendum, Groundwater Investigation.	The potential work area has been established to exclude all resources identified during the archaeological surveys conducted from August to November 2012.. The sensitivity analysis conducted for the FWIP activities indicated that the area of the FWIP is "low potential" for impact to paleontological resources. Based on information in the in the Response to Comments on *Paleontological Resource Management Plan, Topock Groundwater Remediation Project, San Bernardino County, California and Mojave County, Arizona, prepared for Pacific Gas and Electric Company, December 2012* (Arcadis, July 11, 2013), drilling activities regardless of diameter or depth have a low potential to produce fossils meeting significance criteria since they will not have information on formation, depth, or context.
57	EIR MMRP	**CUL-4 With Discovery of Human Remains or Burials Suspend Work, Protect Remains, and Comply with Local, State, and Federal Laws Regarding Discoveries During Ground-Disturbing Activities.** Ground-disturbing activities may disturb as-yet undiscovered human remains or Native American burials and associated grave goods. PG&E shall retain a Qualified Cultural Resource Consultant and request designated tribal monitor(s) to train construction personnel in the identification of human remains so that they may aid in the identification of such resources (see above description of the CIMP). A Qualified Cultural Resource Consultant and tribal monitor(s) shall be in place to adequately oversee all ground-disturbing activities. In the event human remains are uncovered over the course of project construction, operation and maintenance, and/or decommissioning activities, the following procedures shall be followed to ensure compliance with all applicable local, state, and federal laws. f) The construction contractor shall immediately suspend work within the vicinity of the discovery and determine if the remains discovered are human or nonhuman. This determination shall be made by the Qualified Cultural Resources Consultant, a qualified archaeologist and/or physical anthropologist with expert skill in the identification of human osteological (bone) remains. g) The Qualified Cultural Resources Consultant (and tribal monitor), or construction contractor, shall protect discovered human remains and/or burial goods remaining in the ground from additional disturbance. h) The Qualified Cultural Resources Consultant, archaeologist, or construction site supervisor shall contact the San Bernardino County Coroner, and the PG&E and DTSC project managers immediately. In California, all subsequent action shall conform to the protocols established in the Health and Safety Code and regulations. In Arizona, the Qualified Cultural Resources Consultant or PG&E construction site supervisor will follow Arizona laws and the implementing regulations. Human remains found on federal land would require the notification of the BLM Havasu City field office and compliance with applicable federal laws and regulations, including the Native American Graves Protection and Repatriation Act if the remains are determined to be of Native American origin. The Qualified Cultural Resources Consultant shall coordinate the interaction between Interested Tribes, PG&E, the County, and DTSC to determine proper treatment and disposition of any remains. i) The San Bernardino County Coroner will determine if the remains are of recent origin and if an investigation of the cause of death is required (California Health and Safety Code Section 7050.5). If the coroner determines that the human remains are not Native American and not evidence of a crime, project personnel shall coordinate with the Qualified Cultural Resources Consultant (s) to develop an appropriate treatment plan. This may include contacting the next-of kin to solicit input on subsequent disposition of the remains. If there is no next-of-kin, or recommendations by the next-of-kin are considered unacceptable by the landowner, the landowner will reinter the remains with appropriate dignity in a location outside the project area and where they would be unlikely to be disturbed in the future. j) In the event that the San Bernardino County Coroner determines that the human remains are Native American and not evidence of a crime, project personnel shall contact the NAHC so that a most likely descendent (MLD) can be identified as required under California Public Resources Code Section 5097.98. k) The MLD (s) shall inspect the area in which the human remains were found and provide treatment recommendations to the landowner and PG&E site manager in accordance with the provisions of PRC Section 5097.98. The treatment may include reburial, scientific removal of the discovered human remains and relinquishment to the MLD(s), nondestructive analysis of human remains and/or other culturally appropriate treatment. If the MLD(s) so requests, the landowner would reinter the remains with the appropriate dignity in a location outside the area of disturbance in a location unlikely to be disturbed in the future. l) To the maximum extent feasible, Mitigation Measure CUL-4 shall be implemented in a manner that is consistent with mitigation required by local, state, and	The onsite cultural resource monitor will observe all ground-disturbing activities. In the event human remains are uncovered, the procedures identified in the MM will be followed as appropriate for work conducted in Arizona. Specifically, all ground-disturbing activities will occur on federal land and thus the Native American Graves Protection and Repatriation Act will be followed.

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		federal requirements.	
58	EIR MMRP	**GEO-1a Construction, Operation and Maintenance, and Decommissioning Impacts Related to Erosion of Soils.** a) A DTSC-approved grading and erosion control plan, prepared by a California Registered Civil Engineer, shall be completed prior to implementation of any grading in areas of the site where there is a potential for substantial erosion or loss of top soils. The plan shall outline specific procedures for controlling erosion or loss of topsoil during construction, operation and maintenance, and decommissioning. b) To ensure soils do not directly or indirectly discharge sediments into surface waters as a result of construction, operation and maintenance, or decommission activities, PG&E shall develop a SWPPP as discussed in mitigation measure HYDRO-1 of the "Hydrology and Water Quality" section of this EIR. The SWPPP shall identify best management practices (BMPs) that would be used to protect stormwater runoff and minimize erosion during construction. PG&E shall prepare plans to control erosion and sediment, prepare preliminary and final grading plans, and shall prepare plans to control urban runoff from the project site during construction, consistent with the substantive requirements of the San Bernardino County Building and Land Use Services Department for erosion control. c) During road preparation activities, loose sediment shall be uniformly compacted consistent with the substantive San Bernardino County Building and Land Use Services Department requirements to aid in reducing wind erosion. Ongoing road maintenance including visual inspection to identify areas of erosion and performing localized road repair and regrading, installation and maintenance of erosion control features such as berms, silt fences, or straw wattles, and grading for road smoothness shall be performed as needed to reduce potential for erosion. d) Regarding the potential for contaminated soils to be eroded and contribute contamination into receiving waters, Mitigation Measures GEO-2 and HAZ-2 shall be implemented. Mitigation Measure GEO-2 provides the provisions for mitigating erosion through BMPs which shall be implemented. Mitigation Measure HAZ-2 provides the provisions for safe work practices and handling of contaminated soils as investigation derived wastes.	Grading will not be conducted as part of the planned activities. Minor stabilization improvements along existing access pathways at Site B and the HNWR Site are anticipated. The access pathway for both sites will be established along a previously disturbed, flat area. Based on the pre-construction state, this area will require stabilization (e.g. with gravel) as opposed to grading for use as an access route. Project activities will be conducted in accordance with the BMP Plan that has been developed by PG&E to comply with the substantive requirements of the Arizona General Construction Permit (AZG2013-001) . See item a. It is presumed that soils are not contaminated in the planned action area. All work is being conducted outside SWMUs/AOCs associated with the Topock Remediation Project.
59	EIR MMRP	**GEO-1b Construction, Operation and Maintenance, and Decommissioning Impacts Related to Differential Compaction of Soils.** a) BMPs shall be implemented during construction, operation and maintenance, and decommissioning activities to minimize impacts on the affected areas. Such BMPs could include, but would not be limited to, the following: uniform compaction of roadways created for accessing the project area as per San Bernardino County Building and Land Use Services Department requirements, returning areas adversely affected by differential compaction to preexisting conditions when these areas are no longer needed, and continuing maintenance of access roads, wellhead areas, and the treatment facility areas. b) Work area footprints shall be minimized to the greatest extent feasible to limit the areas exposed to differential compaction. Where possible, existing unpaved access roads and staging/working areas shall be reused and maintained for different stages of the construction. New graded areas for staging or for access roads shall be compacted to a uniform specification, typically on the order of 90 to 95% compaction and consistent with substantive San Bernardino County Building and Land Use Services Department requirements to reduce differential compaction and subsequent erosion of site soils. c) After the completion of the operation and maintenance phase, the disturbed areas which result in increased potential for compaction shall be returned to their respective preexisting condition by regarding consistent with the preconstruction slopes as documented through surveys that may include topographic surveys or photo surveys. The areas will be returned to the surrounding natural surface topography and compacted consistent with unaltered areas near the access roads or staging areas in question. The habitat restoration plan outlined in mitigation measure BIO-1 shall include restoration of native vegetation or other erosion control measures where revegetation would be infeasible or inadequate, for purposes of soil stabilization and erosion control of the project area.	The following BMPs will be used to minimize impacts of differential compaction: Existing access routes will be utilized for all access unless an existing route is not available. If a new routes are required, it will be established in a previously disturbed area. Access routes and work area dimensions will be minimized to only what is required to complete the planned activities. Vehicle traffic will be limited to only those vehicles critical to complete the planned activities. The number of trips along access pathways will be minimized to the extent practicable. See item a. New areas will not be graded. The access pathways for Site B and the HWNR-1 Site will be established along a previously disturbed, flat area. Based on the pre-construction state, this area will require stabilization (e.g., with gravel) as opposed to grading for use as an access route. After the completion of the planned activities disturbed areas resulting in increased potential for compaction will be evaluated with the land owner (BLM) and returned to the respective preexisting condition as determined necessary.
60	EIR MMRP	**HAZ-1a Spills or Releases of Contaminants during Operation and Maintenance Activities.** a) PG&E shall store, handle, and transport hazardous material in compliance with applicable local, state, and federal laws. b) All chemical storage and loading areas shall be equipped with proper containment and spill response equipment. BMPs to be implemented may include, but are not limited to, use of secondary containment in mixing and storage areas; availability of spill kits and spill containment booms, and appropriate storage containers for containment of the materials generated during the spill response. c) A project-specific HMBP, chemical standard operating procedure (SOP) protocols and contingency plans shall be developed to ensure that proper response procedures would be implemented in the event of spills or releases. Specifically, the HMBP and SOPs shall describe the procedures for properly storing and handling fuel on-site, the required equipment and procedures for spill containment, required personal protective equipment, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. BMPs to be implemented may include, but are not limited to, use of secondary containment in mixing and storage areas; availability of spill kits and spill containment booms, and appropriate storage containers for containment of the materials generated during the spill response. The field manager in charge of operations and maintenance activities shall be responsible for ensuring that these procedures are followed at all times.	Applies. Action required: a) Hazardous material (e.g. fuel) will be stored and transported in compliance with applicable local, state, and federal laws. b) Chemicals will not be stored/loaded as part of the planned activities. c) Standard site protocols included in the Topock Compressor Station HMBP will be followed. Standards protocols require the placement of spill kits, splash containment, and berms around stored hazards liquids, such as fuels, (when present). The SOP for remote vehicle/equipment fueling will be followed.
61	EIR MMRP	**HAZ-1b Spill or Release of Contaminants during Construction and Decommissioning Activities.** a) Fueling areas and maintenance areas would be supplied with proper secondary containment and spill response equipment. b) PG&E shall develop fueling SOP protocols and a contingency plan that would be implemented at all fueling areas on-site. The SOPs shall describe the procedures	While most fueling will be conducted off-site, the SOP for remote fueling (attachment to the BMP Plan) will be followed when fueling on-site (see bullet b). Equipment will only be fueled on-site if it cannot be moved due to ongoing operation. Equipment will

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		for properly storing and handling fuel on-site, the required equipment and procedures for spill containment, required PPE, and the measures to be used to reduce the likelihood of releases or spills during fueling or vehicle maintenance activities. Potential measures include but are not limited to, fuel storage in bermed areas, performing vehicle maintenance in paved and bermed areas, and availability of spill kits for containment and cleanup of petroleum releases. The field manager in charge of construction and decommissioning activities shall be responsible for ensuring that these procedures are followed at all times. c) PG&E shall comply with local, state, and federal regulations related to the bulk storage and management of fuels.	not be fueled while in active operation. All remote fueling activities will comply with the SOP including spill preparation and response (attachment to the BMP Plan). Fuels will not be stored in bulk as part of the planned activities.
62	EIR MMRP	**HAZ-2 Reasonably Foreseeable Releases of Chemicals from Excavated or Disturbed Soil.** Before initiating ground-disturbing operations, a health and safety plan shall be developed and implemented by qualified environmental professionals to ensure health and safety precautions are being met. It is not possible to prepare the health and safety plan at this stage of the planning process because final construction plans and other design documents have not been finalized in sufficient detail. However, at a minimum, the health and safety plan shall include procedures to mitigate potential hazards, and such procedures shall include the use of PPE, measures that provide protection from physical hazards, measures that provide protection from chemical hazards that may be present at the site, decontamination procedures, and worker and health and safety monitoring criteria to be implemented during construction. The worker health and safety plan shall include protective measures and PPE that are specific to the conditions of concern and meet the requirements of the U.S. Occupational Safety and Health Administration's (OSHA's) construction safety requirements and Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). In accordance with OSHA requirements, appropriate training and recordkeeping shall also be a part of the health and safety program. The worker health and safety plan shall be certified by a Certified Industrial Hygienist in accordance with OSHA regulations. The worker health and safety plan shall be explained to the construction workers and all workers shall be required to sign the plan, which will be kept on the construction site at all times. Worker safety training shall occur prior to initiation of ground disturbing activities. Training shall include the review of all health and safety measures and procedures. All workers and engineering inspectors at the site shall provide written acknowledgement that the soils management plan (discussed below), worker health and safety plan, and community health and safety plan were reviewed and training was received prior to commencement of construction activities. d. In the event that drilling sites must be located within areas of suspected soil contamination, the appropriate PPE shall be worn by all personnel working in these areas and methods specified in the health and safety plan used to control the generation of dust. When working in these areas. The following are specific elements and directives that shall be included in the health and safety plan and implemented by PG&E during construction, operation and maintenance, and decommissioning of this project: a. Vehicles traveling on unpaved roadways or surfaces would be directed to avoid traveling in areas where contaminated soils are known to be present; vehicle speeds shall be controlled (e.g., limited to 15 mph or slower) to limit generation of dust; measures, such as wetting of surfaces, will be employed to prevent dust generation by vehicular traffic or other dust-generating work activities. b. Pre-mobilization planning shall occur during which the likelihood of encountering contaminated soils shall be reviewed along with the HMBP, site-specific health and safety plan, and SOPs so that the procedures are followed and the contingencies for handling contaminated soils are in-place prior to implementing the field operations. c. Should evidence of contaminated soil be identified during ground disturbing activities (e.g., noxious odors, discolored soil), work in this area will immediately cease until soil samples can be collected and analyzed for the presence of contaminants by the site supervisor or the site safety officer. Contaminated soil shall be managed and disposed of in accordance with a project-specific health and safety plan and soil management plan. The health and safety plan and soil management plan shall be approved by DTSC before beginning any ground disturbing activities. While the project is exempt from the requirements of the San Bernardino County Division of Environmental Health, the health and safety plan and soil management plan shall be prepared in general accordance with the substantive requirements of this agency. d. In the event that drilling sites must be located within areas of suspected soil contamination, the appropriate PPE shall be worn by all personnel shall be required to follow all guidance presented in the site-specific health and safety plan and soil management plan. The site-specific health and safety plan shall include provisions for site control such as, but not limited to, delineation of the exclusion, contaminant reduction and support zones for each work area, decontamination procedures, and procedures for the handling of contaminated soils and other investigation derived wastes. Soil that is excavated shall be loaded directly into containers such as roll-off bins; dust suppression methods shall be used prior to and during loading of soils into the bins. Suspected contaminated soils shall be segregated from suspected uncontaminated soils. e. Personnel working at the site shall be trained in Hazardous Waste Operations. f. All soil excavated and placed in roll-off bins or trucks for transportation off-site shall be covered with a tarp or rigid closure before transporting, and personnel working in the area shall be positioned upwind of the loading location.	This project will utilize the an updated version of the health and safety plan that DTSC has approved for prior Topock projects with similar activities (Attachment E to the Implementation Plan). Upon mobilization for ground disturbing activities, the field crew will review/be trained regarding all aspects of the HSP and provide written acknowledgement of the training by signing the HSP signature sheet. Drilling sites are not in areas of suspected soil contamination. Nonetheless, appropriate PPE will be donned at all times in accordance with the HSP. a) There are no in the project area where contaminated soils are known to be present. b) See bullet a. c) Should evidence of contaminated soil be identified during ground disturbing activities (e.g., noxious odors, discolored soil), work will be immediately halted in this area until soil samples can be collected and analyzed for the presence of contaminants. d) Work areas are not in areas of suspected soil contamination. e) Training in hazardous waste operations is not required by OSHA for the planned activities. This work is being conducted outside of the boundaries of any known contamination associated with the Topock Remediation Project, and therefore, there is no reasonable expectation for exposure to hazardous waste. f) Soil excavation or transport off site is not part of the planned activities.
63	EIR MMRP	**HYDRO-1 Exceedance of Water Quality Standards.** The project shall implement BMPs to meet the substantive criteria of NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ NPDES No. CAS000002 (General Permit) (SWRCB 2009) as well as all other applicable federal, state, and local permit and regulatory requirements, even if a permit is not required pursuant to CERCLA, for purposes of ensuring the protection of receiving water quality. As such, a BMP plan shall be prepared and implemented for the project prior to construction and decommissioning phase activities.	Activities associated with the planned activities will be conducted without creating an exceedance of water quality standards. Drill cuttings and purged groundwater will be discharged in accordance with the Arizona General Aquifer Protection Permit. All work will be conducted in accordance with the BMP Plan (Attachment D). Implementation of the BMP Plan will result in the following specific actions::

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		Impacts on water quality from pollutants, including soils from erosion, shall be controlled through use of the following types of BMPs, which shall be incorporated into the appropriate project-specific BMP plan. The General Permit requirements include specific BMPs as well as numeric effluent levels (NELs) and numeric action levels (NALs) to achieve the water quality standards (SWRCB 2009:3). Types of BMPs cited in the General Permit (SWRCB 2009:Attachment A:7) include: a) Scheduling of Activities; b) Prohibitions of Practices; c) Maintenance Procedures; d) Other Management Practices to Prevent or Reduce Discharge of Pollutants to Waters of the United States; e) Treatment Requirements; and f) Operating Procedures and Practice to Control Site Runoff, Spillage or Leaks, Sludge or Waste Disposal, or Drainage from Raw Materials Storage. Visual inspections and monitoring and sampling are required under the General Permit to evaluate the effectiveness of the BMPs and to determine whether modifying BMPs or implementing additional BMPs is required. The BMP designations cited below are based on those used by the *California Stormwater Quality Association Construction BMP Handbook* (California Stormwater Quality Association 2003) and are consistent with the types of BMPs referenced in the General Permit: g) Scheduling (SS-1): Proper scheduling assists in identifying ways to minimize disturbed areas, which allows for a reduction in the active project area requiring protection and also minimizes the length of time disturbed soils are exposed to erosive processes. h) Preservation of Existing Vegetation (SS-2): Preserving existing vegetation to the maximum extent practicable facilitates protection of surfaces from erosion and can also help to control sediments. Sensitive areas should also be clearly identified and protected. i) Hydraulic Mulch (S S-3), Straw Mulch (S S-6), and Wood Mulching (SS- 8): Using various mulches is a method for temporarily stabilizing soil and can be used on surfaces with little or no slope. j) Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats (S S-7): These erosion control methods can be used on flat or, usually, sloped surfaces, channels, and stockpiles. k) Stabilized Construction Entrance/Exit (TC-1): A graveled area or pad located at points where vehicles enter and leave a construction site can be built. This BMP provides a buffer area where vehicles can drop their mud and sediment to avoid transporting it onto public roads, to control erosion from surface runoff, and to help control dust. l) Runoff Control Measures (SS-9, SS-10, and SC-10): These include graded surfaces to redirect sheet flow, diversion dikes or berms that force sheet flow around a protected area, and stormwater conveyances (swales, channels, gutters, drains, sewers) that intercept, collect, and redirect runoff. Diversions can be either temporary or permanent. Temporary diversions include excavation of a channel along with placement of the spoil in a dike on the downgradient side of the channel, and placement of gravel in a ridge below an excavated swale. Permanent diversions are used to divide a site into specific drainage areas, should be sized to capture and carry a specific magnitude of storm event, and should be constructed of more permanent materials. A water bar is a specific kind of runoff diversion that is constructed diagonally at intervals across a linear sloping surface such as a road or right- of-way that is subject to erosion. Water bars are meant to interrupt accumulation of erosive volumes of water through their periodic placement down the slope, and divert the resulting segments of flow into adjacent undisturbed areas for dissipation. m) Silt Fence (SC-1): A temporary sediment barrier consisting of fabric is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows. n) Gravel Bag Berm (SC-6) and Sand/Gravel Bag Barrier (SC-8): A temporary sediment barrier consisting of gravel-filled fabric bags is designed to retain sediment from small disturbed areas by reducing the velocity of sheet flows. o) Desilting Basin (SC-2) and Sediment Trap (SC-3): Constructing temporary detention structures facilitates the removal of sediment from waters. The devices provide time for sediment particles to settle out of the water before runoff is discharged. Secondary concerns include potential pollutants from inappropriate material storage and handling procedures and nonstormwater discharges. These will be addressed through the following types of BMPs, which shall be incorporated into the stormwater BMP plan: p) Material Delivery and Storage (WM-1): Provide covered storage for materials, especially toxic or hazardous materials, to prevent exposure to stormwater. Store and transfer toxic or hazardous materials on impervious surfaces that will provide secondary containment for spills. Park vehicles and equipment used for material delivery and storage, as well as contractor vehicles, in designated areas. q) Spill Prevention and Control (WM-4): Ensure that spills and releases of materials are cleaned up immediately and thoroughly. Ensure that appropriate spill response equipment, preferably spill kits preloaded with absorbents in an overpack drum, is provided at convenient locations throughout the site. Spent absorbent material must be managed and disposed of in accordance with applicable regulations. In particular, absorbents used to clean up spills of hazardous materials or waste must be managed as hazardous waste unless characterized as nonhazardous. r) Solid Waste Management (WM-5): Provide a sufficient number of conveniently located trash and scrap receptacles to promote proper disposal of solid wastes. Ensure that the receptacles are provided with lids or covers to prevent windblown litter.	• Drill cuttings will be deposited on the ground in the immediate work areas, which are located outside of jurisdictional waterways. • Purged groundwater will be discharged to the ground outside of jurisdictional waterways, and will not be allowed to runoff to jurisdictional waterways. Personnel will remain on site during the duration of discharge activities to monitor for persistent ponding and runoff. Water will be discharged to these areas in a manner that minimizes ponding and limits the potential for runoff. During discharge, if persistent ponding or runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 is observed, corrective action (e.g., modification of sprinkler layout, change in discharge rate, or using hand tools to control disperse ponding/control runoff) will be taken. If it is determined that persistent ponding or runoff cannot be easily corrected, then discharge will be discontinued. If rainfall occurs during discharge to the extent that the runoff of discharged water cannot be effectively monitored, then the discharge will be discontinued. It is impossible to predict the infiltration rate of the discharge areas. Therefore, the degree of infiltration and runoff will be closely monitored at all times during discharge. The discharge will be stopped if it is determined that persistent ponding and runoff towards a jurisdictional channel, the Colorado River, or Arizona County Highway 10 cannot be effectively controlled.

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		s) Hazardous Waste Management (WM-6): Provide a sufficient number of proper receptacles to promote proper disposal of hazardous wastes. t) Concrete Waste Management (WM-8): Dispose of excess concrete in specific concrete washout facilities. u) Sanitary/Septic Waste Management (WM-9): Locate sanitary and septic waste facilities away from drainage courses and traffic areas. Maintain the facilities regularly. v) Vehicle and Equipment Cleaning (NS-8): Clean vehicles and equipment that regularly enter and leave the construction site. w) Vehicle and Equipment Fueling (NS-9): Fuel vehicles and equipment off- site whenever possible. If off-site fueling is not practical, establish a designated on-site fueling area with proper containment and spill cleanup materials. x) Vehicle and Equipment Maintenance (NS-10): Use off-site maintenance facilities whenever possible. Any on-site maintenance areas must be protected from stormwater runoff and on-site flooding. In addition to BMPs implemented to avoid or reduce impacts from the construction and decommissioning phases, BMPs shall also be implemented to avoid or reduce impacts from the operations and maintenance phases. To address potential violation of water quality standards caused by insufficient treatment, system failure at concentrations in excess of water quality standards, proper design shall include contingency measures such as safeguards to shut down the extraction wells in case of pipeline failure or malfunction. In addition, operation of the proposed project will be governed by and follow an operations and maintenance plan. PG&E will comply with all applicable water quality standards, the General Permit, and any SWRCB or RWQCB resolutions identified as ARAR, as well as a corrective action monitoring program. Under the corrective action monitoring program, data will be collected to measure performance of the remedy, compliance with standards, and progress of the remedial action as a part of the project description. In addition, the project will be operated to continually assess performance issues and to modify the type, method, and configuration of the treatment delivery systems to enhance performance of the remedy to attain the cleanup goals and to respond to site conditions and performance issues as described in the project description. A SWPPP will also be prepared for the proposed project, which will contain BMPs related to industrial activities (industrial SWPPP). The BMPs are designed to reduce pollutants in discharges that may affect receiving water quality during operations and maintenance of the proposed project. As noted above, BMP designations are based on those used by the *California Stormwater Quality Association Construction BMP Handbook* (California Stormwater Quality Association 2003) and those referenced in the General Permit The SWPPP will incorporate BMPs such as the following: y)Good Housekeeping: Maintain facility in a clean manner and train facility personnel to contribute to a safe, clean, and orderly environment by properly disposing of trash in designated containers, storing materials in appropriate locations, and keeping equipment clean and in good working condition. z)Preventative Maintenance: Prevent or minimize release of pollutants. Develop Standard Operating Procedures for operation and maintenance of facility components and train employees to follow the procedures. aa) Non-Stormwater Discharges (SC-10): Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Conduct regular inspections of high priority areas. bb) Spill Prevention, Control, and Cleanup (SC-1 1): Store materials properly to prevent spills from entering the storm drain system or surface waters. Ensure that spill cleanup materials are located on-site and are easily accessible. Clean up leaks and spills immediately using proper absorbent materials. Absorbents used to clean up hazardous materials must be disposed of as hazardous waste. Educate employees about spill prevention and cleanup. cc) Vehicle and Equipment Fueling (SC-20): Maintain clean fuel-dispensing areas using dry cleanup methods, such as sweeping or using rags and absorbents for leaks and spills. Cover the fueling area to prevent contact with stormwater. Train personnel in pollution prevention, focusing on containment of spills and leaks. dd) Outdoor Loading/Unloading (SC-30): Load and unload chemicals during dry weather, if possible, and load and unload in designated areas. Check equipment regularly for leaks. ee) Outdoor Liquid Container Storage (SC-3 1): Cover the storage area with a roof and provide secondary containment. Inspect storage areas regularly for leaks or spills. ff) Outdoor Equipment Operations (SC-32): Perform activities during dry weather, cover the work area with a roof, and use secondary containment. Train employees in proper techniques for spill containment and cleanup. gg) Waste Handling and Disposal (SC-34): Cover storage containers with leak-proof lids, check for leaks weekly, and clean storage areas regularly. Ensure that wastes are disposed of properly. hh) Tank Design System: Ensure that tank systems have sufficient strength to avoid collapse, rupture, or failure and that they are protected against physical damage and excessive stress. Provide adequate secondary containment. In conformance with the substantive requirements of General Permit (Order No. 2009-0009-DWQ, a monitoring and reporting program will be implemented to assess the effectiveness of BMPs and to modify BMPs and revise the SWPPP, if necessary, to continue to reduce pollutants and impacts on receiving waters. The monitoring program shall include the following minimum elements as per the General Permit: ii) quarterly, nonstormwater visual inspections, jj) storm-related visual inspections within 2 business days of a qualifying	

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		rain event (producing precipitation of one-half inch or more of discharge), kk) visual inspection after a storm event, ll) monitoring of nonvisual pollutants based on the calculated risk level for the project, with Risk Level 2 and 3 requiring a minimum of three samples per day during qualifying rain events (SWRCB 2009:Tables 5 and 6, 22–27), and mm) monitoring and reporting for linear projects as per Attachment A of the General Permit Results of this monitoring shall be reported annually to DTSC and to the Storm Water Multi-Application Reporting and Tracking System (SMARTS). The annual report shall include a summary and evaluation of all sampling and analysis results, original laboratory reports, and chain of custody forms; a summary of all corrective actions taken during the compliance year; and identification of any compliance activities or corrective actions that were not implemented. NEL Violation Reports and/or NAL Violation Reports are required for Risk Level 3 and linear underground/overhead project (LUP) Type 3 Discharges. Should the project meet these criteria, the respective reports shall be submitted within 5 days of the end of the storm event, as per General Permit requirements, and provide the required information identified (SWRCB 2009:26–27 and Attachment A). The implementation of stormwater plans shall include an education component to train workers on water quality concerns and proper BMP implementation, maintenance, and repair, in addition to stormwater management program training on the construction BMP plan and industrial SWPPP.	
64	EIR MMRP	**HYDRO-2 Exceedance of Water Quality Standards and/or Waste Discharge Requirements.** Implement Mitigation Measure HYDRO-1. Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling erosion and siltation. Consequently, any impacts associated with erosion and siltation resulting from alterations of drainage and hydrology and water quality during construction, operation and maintenance, and decommissioning.	See HYDRO-1.
65	EIR MMRP	**HYDRO-3 Exceedance of Water Quality Standards and/or Waste Discharge Requirements.** Implement Mitigation Measure HYDRO-1. Mitigation Measure HYDRO- 1 shall be implemented. Implementation of appropriate BMPs defined in Mitigation Measure HYDRO-1 would minimize impacts on water quality by controlling potential pollutants, including sediment, and runoff discharges from the project area. Consequently, any impacts associated with pollutants resulting from alterations of drainage and water quality during construction, operation and maintenance, and decommissioning.	See HYDRO-1.
66	EIR MMRP	**Noise-1 Short-Term Groundborne Noise and Vibration Levels Caused by Construction Activities near Sensitive Receptors.** a) Construct new wells a minimum of 45 feet from vibration-sensitive receptors. Avoid constructing wells within 30 feet of vibration- sensitive land uses located in California and 275 feet of vibration- sensitive land uses located in Arizona; b) A disturbance coordinator will be designated by the project applicant, which will post contact information in a conspicuous location near the entrance so that it is clearly visible to nearby receivers most likely to be disturbed. The coordinator will manage complaints resulting from the construction vibration. Reoccurring disturbances will be evaluated by a qualified acoustical consultant retained by the project applicant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby vibration-sensitive receptors, advising them of the construction schedule.	Planned activities are a minimum of 45 feet from vibration-sensitive receptors, 30 feet of vibration- sensitive land uses located in California, and 275 feet of vibration- sensitive land uses located in Arizona. A disturbance coordinator will be designated for the planned activities, and contact information and a construction schedule will be posted at a location to be determined based on discussion with the land owner.
67	EIR MMRP	**Noise-2 Project-Generated Construction-Related Noise Levels.** a) Construction equipment shall be properly maintained per manufacturer specifications and fitted with the best available noise suppression devices (e.g., mufflers, silencers, wraps). All impact tools shall be shrouded or shielded, and all intake and exhaust ports on power equipment shall be muffled or shielded. b) Construction equipment shall not idle for extended periods of time (more than 15 minutes) when not being utilized during construction activities. c) Construction activities shall include the use of berms, stockpiles, dumpsters, and or bins to shield the nearest noise-sensitive receptor adjacent to construction activities to within acceptable non-transportation noise level standards. When construction activities are conducted within the distances outlined above (i.e., 1,850 feet and 5,830 feet from California receptors and 330 feet and 735 feet from Arizona receptors for daytime and nighttime noise, respectively) relative to noise-sensitive uses in the project area, noise measurements shall be conducted by a qualified acoustical consultant at the nearest noise-sensitive land use relative to the construction activities with a sound level meter that meets the standards of the American National Standards Institute (ANSI Section S14 1979, Type 1 of Type 2) to ensure that construction noise associated with the project component complies with applicable daytime and nighttime noise standards. If noise levels are still determined to exceed noise standards, temporary barriers shall be erected as close to the construction activities as feasible, breaking the line of sight between the source and receptor where noise levels exceed applicable standards. All acoustical barriers shall be constructed with material having a minimum surface weight of 2 pounds per square foot or greater and a demonstrated Sound Transmission Class (STC) rating of 25 or greater as defined by the American Society for Testing and Materials' Test Method E90. Placement, orientation, size, and density of acoustical barriers shall be specified by a qualified acoustical consultant. d) A disturbance coordinator will be designated by the project applicant, which will post contact information in a conspicuous location near construction areas so that it is clearly visible to nearby receivers most likely to be disturbed. In addition, mailing of the same information will be sent to nearby receptors and all tribes. The coordinator will manage complaints resulting from the construction noise. Reoccurring disturbances will be evaluated by a qualified acoustical consultant retained by the project applicant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby noise- sensitive receptors, advising them of the construction schedule.	Equipment will be inspected upon mobilization confirm that it is properly maintained and fitted with noise suppression devices. Equipment will not be allowed to idle for more than 15 minutes when not being utilized is prohibited. Work is not planned within 330 feet and 735 feet from Arizona receptors for daytime and nighttime noise, respectively See Noise-1(b).

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68	EIR MMRP	**NOISE-3 Land Use Compatibility of Future Project Noise Levels with Places of Worship and the Topock Cultural Area.** Provided that the proposed project would be required to achieve the normally acceptable exterior noise level standard for places of worship, the following mitigation measure shall be incorporated in the project design: a) Implement all of the mitigation measures outlined for Impact NOISE-1 and Impact NOISE-2; b) Upon completion of detailed project design, the determination of remediation activities and the schedule established to achieve these activities shall be communicated to Native American tribes. PG&E shall maintain a liaison with requesting Tribes to alert them to project activities that would generate new noise in the Topock Cultural Area on at least an annual basis.	Implement mitigation measures in NOISE-1 and NOISE-2 (see above). The project schedule will be communicated to Native American tribes and periodic schedule updates will be provided in accordance with existing communication protocols associated with the project.
69	EIR MMRP	**WATER-1 Depletion of Groundwater.** To mitigate potentially significant effects on local groundwater levels associated with the freshwater extraction wells, in the event that freshwater is to be supplied from wells rather than from a surface intake, a hydrologic analysis shall be conducted during the design phase of the project to evaluate the proposed pumping rates for extraction, the potential cone of depression, and the extraction effect on any existing wells in proximity. Proximity shall be defined by the cone of depression boundary of any well to be used in the extraction process. Extraction well location and/or extraction rates shall be adjusted during project design based on this analysis to ensure that extraction does not substantially adversely affect the production rates of existing nearby wells (e.g., adversely affect well production such that existing land uses would not be supported). It shall be demonstrated using computer simulations or other appropriate hydrologic analysis that production rates of existing nearby wells will not be substantially affected before the installation of any new freshwater extraction wells.	Initial assessments using an existing groundwater model indicated that there would be no adverse effect from continuous operation of the HNWR-1 on the nearest pumping wells (Topock 2 and 3), which are located less than 0.2 mile from HNWR-1. During the revegetation pilot project, HNWR-1 was routinely pumped at rates of approximately 1,000 gpm for periods of up to 12 hours per day with no reported adverse effects on any nearby wells. The proposed new well locations are approximately ¾ mile from the Topock 2 and 3 wells so pumping from these locations would have even less effect than pumping from HNWR-1. The Golden Shores wells are approximately 2.5 miles away, well beyond the radius where pumping at the proposed new well locations would be expected to have measureable effects. Further evaluations of the effects of pumping from the new well will be made during the design process, using estimates of hydraulic properties of the aquifer developed through testing of the new well.
70	Programmatic Agreement (PA)	Stipulation I(A) The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to select and implement, or cause to be implemented, an alternative or combination of alternatives to remediate the groundwater and soil contamination in a manner that fulfills the requirements of CERCLA and the CERCLA Records of Decision (RODs) and protects the Colorado River, human populations, and the natural environment to the maximum extent practicable.	PG&E is implementing the groundwater remedy selected by DOI and DTSC. This Fresh Water Implementation Plan (FWIP) is part of Fresh Water Supply which is a component of the groundwater remedy.
71	PA	Stipulation I(B) The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to Subject to I(A) above, carry out, and require others under their jurisdiction to carry out, all investigative, testing and remediation activities, including all supporting operations and maintenance activities, in ways that avoid, minimize, or mitigate adverse effects to cultural and historic properties within the APE, to the maximum extent practicable.	Archaeological surveys of the potential work area were conducted from August to November 2012, during which tribal monitors were invited to observe, and monitors of some tribes were present for portions of the survey. Three archaeological and historical sites were located within these two areas. All archaeological and historical sites will be avoided during plan implementation to the maximum extent practicable. Tribal and Archaeological Monitors will be invited to monitor all ground disturbing field activities. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered. In addition, the FWIP includes avoidance and minimization measures and emphasizes use of existing facilities to protect cultural and historic properties, to the maximum extent practicable. For example, it is anticipated that only existing roads and access pathways requiring minimal access improvements in select areas will be used during the work proposed in the FWIP. Further, in execution of the field work, granular materials will be used rather than grout to backfill the majority of the exploratory boreholes, which allows the future option of later reaming the same borehole to construct a supply well, thereby minimizing the number of boreholes drilled.
72	PA	Stipulation I(C) The BLM, USFWS, USBR and PG&E shall consult with the Tribes that attach cultural significance to the TCP within the APE to develop a plan to ensure Tribal access to areas within the APE for religious, cultural, or spiritual purposes. Access shall be consistent with applicable laws, regulations and agreements governing property within the APE and may not impede the Topock Remediation Project, may not create health and safety concerns, and shall exclude the Topock Compressor Station and related facilities.	The Tribal Access Plan authored by BLM was finalized and published in November 2011.
73	PA	Stipulation I(D) The Federal Agencies, in consultation with the Tribes, SHPOs, ACHP, PG&E, and other interested parties, agree to ensure that PG&E shall to the extent practicable restore the areas affected by the Topock Remediation Project within the APE, including, but not limited to, the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities, to the conditions existing prior to the construction of the PG&E investigation and	A habitat restoration plan for areas potentially affected by the groundwater remedy will be prepared and submitted for review/comment and consultation outside of the scope of this FWIP. PG&E is collaborating with Tribes on a similar measure related to restoration under the CIMP (CUL 1a-8e); initial discussion regarding this plan occurred

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		remediation related appurtenances and facilities.	at the monthly Topock update meeting on January 15, 2013.
74	PA	Stipulation III(B)(1), III(B)(2)(a) - Remediation of GW contamination Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, existing monitoring wells and related facilities shall be used to the maximum extent practicable.	See Response to Item No. 71.
75	PA	Stipulation III(B)(2)(b) - Remediation of GW contamination Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, the need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the guidelines in Appendix B.	The FWIP presents PG&E's rationale for continuing its work to search for alternative fresh water sources that is of adequate quantity and that does not require treatment, and its plan for evaluation of these alternative sources which include exploratory drilling and potential installation of new water supply wells. BLM has consulted and is continuing to consult with the Tribes regarding the FWIP under the PA's Consultation Protocol.
76	PA	Stipulation III(B)(2)(c) Remediation of GW contamination Should Alt E be selected, the Federal Agencies will ensure that, consistent with the general principals in Stipulation I, that new facilities or activities be placed in areas already disturbed by previous grading or other mechanized activities to the maximum extent practicable, consistent with protecting human health and the environment and achieving cleanup in a timely manner.	The potential work area subject to activities described in the FWIP are located within previously disturbed areas. See Response to Item No. 71.
77	PA	Stipulation III(B)(2)(e) - Remediation of GW contamination The performance of all field activities in support of the remedy shall be executed in such a way as to avoid and/or minimize adverse effects to cultural and historic properties to the maximum extent practicable.	See Response to Item No. 71.
78	PA	Stipulation III(B)(3)(b) - Remediation of GW contamination – Final Design Every effort should be made to avoid and minimize adverse effects in accordance with the general principles set forth in Stipulation I.	See Response to Item No. 71.
79	PA	Stipulation III(B)(3)(c) - Remediation of GW contamination Whatever the selected alternative, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the design, implementation, and monitoring activities to determine how best to restore the areas affected by the Topock Remediation Project. These areas will include, but not be limited to, the site of the existing treatment plant and related facilities but will exclude the Topock Compressor Station and related facilities. The Federal Agencies will ensure that environmental restoration to the conditions existing prior to the construction of the Project, is planned and conducted to the extent practicable.	A habitat restoration plan for areas potentially affected by the groundwater remedy will be prepared and submitted for review/comment and consultation outside of the scope of this FWIP. PG&E is collaborating with Tribes on a similar measure related to habitat restoration under the CIMP (CUL 1a-8e); initial discussion regarding this plan occurred at the monthly Topock update meeting on January 15, 2013.
80	PA	Stipulation V(A) All facilities and appurtenances related to the Topock Remediation Project are to be removed as soon as practicable upon attainment of cleanup standards and a determination by DOI that removal of such facilities is protective of human health and the environment. All such removal will be planned in consultation with the Signatories, Tribes, and Invited Signatories, following the guidelines in Appendix B [Consultation Protocol).	This stipulation will adhered to in planning for the decommissioning of remedy facilities. A decommissioning plan for the groundwater remedy will be prepared and submitted for review/comment and consultation outside of the scope of this FWIP.
81	PA	Stipulation V(C) The removal of such facilities shall take place along existing graded roads to the maximum extent practicable.	This stipulation will adhered to in planning for the decommissioning of the ground remedy facilities. A decommissioning plan for the groundwater remedy will be prepared and submitted for review/comment and consultation outside of the scope of this FWIP.
82	PA	Stipulation V(D) Prior to decommissioning of any remediation facility, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the development of the closure plan to determine how to best restore the areas affected by the Topock Remediation Project, including but not limited to, the site of the existing treatment plant and related facilities, but excluding the Topock Compressor Station and related facilities, to ensure that environmental restoration of conditions existing prior to the construction of the Project, is achieved to the extent practicable.	The exploratory boreholes installed as part of this FWIP will be decommissioned in accordance with Arizona state regulations (see Attachment C to the Implementation Plan). Any supply well installed as part of this FWIP will be decommissioned when it is no longer in use, as part the groundwater remedy. A decommissioning plan for the groundwater remedy and a habitat restoration plan for areas potentially affected by the groundwater remedy will be prepared and submitted for review/comment and consultation outside of the scope of this FWIP.
83	PA	Stipulation IX(A)-(D) If the Undertaking affects a previously unidentified cultural and/or historic resource, including human remains and/or associated funerary objects or graves, or affect such resources in a way not previously anticipated, or have greater adverse effect than previously anticipated, all work in the vicinity of the discovery shall cease. No further action will be taken until the BLM, in consultation with Tribal and Archaeological Monitors and PG&E in the field, has determined the nature of the discovery and delineated an area not to exceed 50 meters from the approximate center point of the discovery (or a smaller or larger areas if warranted by specific circumstances) in which no further work is to take place until treatment of the discovery is resolved. At such point BLM will notify all Signatories, Tribes, and Invited Signatories of the nature and general location of the discovery. The BLM will implement appropriate measures, including stabilization or covering, to protect any discovery (human remains, funerary objects, sacred objects, or objects of cultural patrimony) from further disturbance in accordance with the principles set forth in Stipulation I. Ongoing work not within 50 meters (or a smaller area if determined appropriate by parties in the field) of the discovery may continue. If human remains and/or associated funerary objects compose all or part of the discovery, then BLM shall ensure the stipulations of the POA included in	This stipulation will be adhered to during the field implementation of the FWIP. Tribal monitors will be invited to monitor all ground disturbing activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.

No.	Source Document	Compliance Item, Relevant Excerpt or Section from Document	Action by PG&E (Alternative Freshwater Source Evaluation)[1]
		the CHPMP, as described in Stipulation VII (H) hereof, will be completed. Also, if human remains and/or funerary objects are encountered, all activities shall follow the procedures and direction provided in NAGPRA and California Public Resources Code sections 5097.98 and 5097.991. For Arizona, such activities shall follow the procedures and direction provided in NAGPRA and applicable state laws, including the Arizona Antiquities Act of 1927 (ARS § 41-841 to 41-846), Burial Protection Law of 1990 (ARS §41-865), and ARS §41-844 of 1990. If the Tribes, PG&E, and BLM can resolve treatment of the discovery in a manner that does not cause adverse effects to significant cultural and historic properties, BLM shall document the resolution, the activities within the work area may proceed and the AZ SHPO and the CA SHPO shall be notified of the discovery and resolution. The Tribes, PG&E, and BLM will use their best efforts to resolve treatment as quickly as possible. If there is failure to resolve treatment of the discovery in consultation with the Tribes and PG&E, BLM shall then consult with the AZ SHPO or the CA SHPO to develop a treatment plan that takes into account the effects of the Undertaking on the discovery. Within fifteen (15) days of notification of discovery, BLM shall provide the consulted SHPO(s), via email, a recommendation for resolving the discovery situation that takes into account the potential effects of the Undertaking on the discovery. D. If the CA SHPO or AZ SHPO (as appropriate, depending on the location of the discovery) does not object to BLM‟s recommendation(s) within fifteen (15) days, BLM will implement the recommendation(s). If the consulted SHPO objects to the recommendation, BLM will utilize the dispute resolution process in Stipulation XV of this PA to resolve any objection.	
84	PA	Appendix C Monitoring Protocol Cultural sensitivity training will be required of all staff, workers and contractors engaged in activities in the Topock Remediation Project APE to familiarize them with the sacred nature of the areas so that they will perform their job in a respectful manner. This training will also be given to new personnel before they are allowed to do fieldwork within the APE. This training will be conducted by PG&E with participation by Tribes and Tribal Monitors, Archaeological Monitors, Federal Agency staff, and PG&E supervising staff, as appropriate. Consistent with PG&E's stated policy, PG&E will not tolerate any disrespectful behavior in the field and will remove any staff, workers or contractors who do not comply with this section.	Site orientation and the training on cultural/historical resources sensitivity will be provided at the project initiation meeting, to be held at the Topock Compressor Station. Site orientation will stress that all site activities will be conducted in a respectful manner. Sensitivity training will be provided by PG&E Site Operations Manager, PG&E Remediation Resources Specialist, and PG&E will invite participation from the Tribes, archaeological monitors, and agency staff, as appropriate.
85	PA	Appendix C Monitoring Protocol Prior to execution of the PA for the Undertaking, PG&E sometimes invited the Tribes to be present on site during construction to monitor and observe non-maintenance grading, trenching, or other excavation for any facilities, new roads, or other project components related to the Undertaking which may have had the potential to adversely impact cultural and historic resources. The Tribal and Archaeological Monitors shall both be invited to monitor such field work.	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor all ground disturbing activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project
86	PA	Appendix C Monitoring Protocol This Protocol specifies ways in which the Tribes, BLM, and PG&E may ensure that: 1. Tribes, BLM, and PG&E, each are kept well informed of Undertaking activities and outcomes; 2. Tribal and Archaeological Monitors have the opportunity to alert PG&E's site supervisor (or designee) to potentially sensitive areas or issues that Monitors may be aware of or may become aware of while fieldwork is in progress; 3. PG&E's site supervisor (or designee) notifies BLM of potentially complicated situations. These situations may include discovery of a new cultural or historical resource, damage to a previously recorded cultural or historical resource, or unanticipated effects identified; 4. Tribal concerns regarding work activities are addressed while fieldwork is in progress.	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor all ground disturbing activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.
87	PA	Appendix C Monitoring Protocol (Work Schedule) Tribal and Archaeological Monitors will be provided with anticipated schedules for Topock Remediation Project work that requires monitoring as early as possible but at least three (3) business days in advance of the initiation of the identified project work, whenever possible. Recognizing that changes to the work schedule may be inevitable, any change in the work schedule will be provided to the Tribal and Archaeological Monitors as soon as possible after the change becomes part of the work schedule. If there is a question regarding need for a monitor, the questioning party shall consult the BLM Project or Field Manager who will make the final determination of need.	This stipulation will be adhered to during field implementation. The PG&E Site Operations Manager or his designee will provide the work schedule and inform the monitors of schedule changes as soon as practicable.
88	PA	Appendix C Monitoring Protocol (Discoveries) If the Undertaking will affect previously unidentified resources, or affect a previously recorded cultural or historical resource in a way not previously anticipated, or have greater or different effects than previously anticipated, all work having potential for adverse affect shall cease within a fifty (50)-meter radius (or a smaller or larger area if determined appropriate by the BLM, the Monitors, and PG&E in the field) of the point of discovery. The Archaeological and Tribal Monitors will work with BLM and PG&E to ensure that the PA requirements of Stipulation VII (CHPMP) and Stipulation IX (Discoveries) are met.	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor all ground disturbing activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.
89	PA	Appendix C Monitoring Protocol (Human Remains) If the Undertaking affects previously unidentified human remains and/or associated funerary objects or graves, or affects such resources in a way not previously anticipated, or has greater adverse effect than previously anticipated, all work in the vicinity of the discovery shall cease. No further action will be taken until the	This stipulation will be adhered to during field implementation. Tribal monitors will be invited to monitor all ground disturbing activities. Archaeological monitoring will also be conducted during ground disturbing portions of the project. Applied Earthworks, a

No.	Source Document	Compliance Item, Relevant Excerpt or Section from Document	Action by PG&E (Alternative Freshwater Source Evaluation)[1]
		BLM, in consultation with Tribal and Archeological Monitors and PG&E in the field, has determined the nature of the discovery and delineated an area not to exceed 50 meters from the approximate center point of the discovery (or a smaller or larger area if warranted) in which no further work is to take place until treatment of the discovery is resolved.	professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.
90	PA	Appendix C Monitoring Protocol (Safety) Tribal and Archeological Monitors will be required to meet with PG&E's site supervisor prior to initiating monitoring activity and will be required to obtain any applicable training required under 29 CFR 1910.120 and 40 CFR 300.150. The PG&E site supervisor will identify the safety and logistical guidelines that are appropriate for the monitoring activity. Tribal and Archaeological Monitors are invited to attend the safety meetings at the start of each workday or new work task. If the Monitors do not attend this meeting, they will be instructed about the safety concerns of the day by a PG&E representative. Tribal and Archaeological Monitors will be expected to wear all personal protective equipment specified by PG&E's site supervisor and required of other similarly situated field workers. Tribal and Archaeological Monitors will be expected to actively participate to enhance the safety of themselves and the other workers onsite by communicating with PG&E's site supervisor if any safety concerns are identified. Due to safety considerations at the Project site, Tribal and Archaeological Monitors will also be prohibited from conducting any monitoring within designated construction exclusion zones, unless otherwise authorized by PG&E. Such zones are to be clearly delineated to the Tribal and Archaeological Monitors by PG&E's site supervisor. In these situations, other efforts to provide alternative methods for accommodating Monitors including, but not limited to, high-powered binoculars, spotting scopes, or other vision enhancement tools or alternative viewing platforms will occur.	During the project initiation meeting or at similar venues (as appropriate), the PG&E Site Operations Manager or his designee will identify the safety and logistical guidelines that are appropriate for the monitoring activity. Tribal and Archaeological Monitors will be invited to attend the safety meetings at the start of each work day or new work task. If they do not attend, they will be instructed of the safety concerns of the day by PG&E.
91	Cultural and Historic Properties Management Plan (CHPMP)	Section 6.2 Measures and principles to avoid, minimize, or resolve adverse effects include the following: • Existing monitoring wells and related facilities shall be used to the maximum extent practicable. • The need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the Guidelines in Appendix B. • New facilities or activities will be placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable, consistent with human health and the environment and achieving cleanup in a timely manner. • The performance of all field activities in support of the remedy shall be executed in such a way as to avoid and/or minimize adverse effects to cultural and historic properties to the maximum extent practicable.	See responses to PA Stipulations I(B), III(B)(1), III(B)(2)(a)-(c) and (e).
92	CHPMP	Section 6.3 "Environmental Restoration" refers to the restoration obligations in the Programmatic Agreement and the Consent Decree, including that PG&E draft a plan for decommissioning, removal, and restoration of the IM-3 facility and a Remedy Decommissioning Plan that will address post-remedy restoration of the site.	See responses to PA Stipulations I(D), III(B)(3)(c), and V(D).
93	CHPMP	Section 6.6.3 "Avoidance Measures/Management Thresholds" provides that: "The primary means for achieving avoidance will be through careful planning and placement of project facilities and installation of temporary barrier fences around significant cultural and historic properties. Metal fence posts and orange mesh all-weather fabric will be used, unless other appropriate materials are identified as preferable, for temporary fencing and will be regularly inspected and maintained. Permanent post-and double cable fencing may be required in high traffic areas. An archaeologist and/or Tribal representative(s) will clearly delineate the sensitive areas to be avoided by construction and supervise fence installation. Project personnel will be notified that fenced locations are to be completely avoided."	See EIR MMRP CUL-1a-8(n). In addition, the "Outer Limit of Potential Work Area" indicated on Figure 2 was developed based on the results of the cultural resource surveys for the potential work area conducted from August to November 2012, during which tribal monitors were invited to observe, and monitors of some tribes were present for portions of the survey. The potential work area has been established to exclude all resources identified during the surveys. Tribal and Archaeological Monitors will be invited to monitor all ground disturbing field activities. Applied Earthworks, a professional cultural resources consulting firm, was retained by PG&E with DTSC approval. Applied Earthworks will observe ground-disturbing activities and will have the authority to temporarily divert or halt any activities in the event that previously unidentified potentially significant cultural resources are discovered.
94	CHPMP	Section 6.6.4 Construction Monitoring. Monitoring of all earth-disturbing Project activities will be in accordance with Appendix C of the PA (Tribal and Archaeological Monitoring Protocol). Qualified archaeological and Tribal monitors will be notified in advance and invited to be on site during earth-disturbing construction activities (grading, trenching, boring, drilling, or other excavation) for new injection, extraction or monitoring wells, new pipelines, new treatment facilities, new access roads, new staging areas, other new transportation facilities, or other new Project components. Due to safety considerations at the Project site, Tribal and archaeological monitors will comply with all safety requirements.	See responses to PA Appendix C, Monitoring Protocol. See also EIR MMRP CUL-1a-8(l).

Table B-2
Summary of Compliance Approach for Requirements Not Identified as ARARs for the Topock Groundwater Remedy That Are Pertinent to the Alternative Freshwater Source Evaluation
Final Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area,
Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

No.	Source Document	Compliance Item, Relevant Excerpt or Section from Document	Action by PG&E (Alternative Freshwater Source Evaluation)[1]
95	CHPMP	Section 6.6.5 Periodic Site Monitoring. Sound management of the archaeological and historical properties requires that any progressive degradation of sites be identified. Additionally, it is recognized that a mechanism is needed to identify any accidental damage that may occur. To accomplish these goals, PG&E will develop a proposal describing a program of periodic site monitoring and condition assessment. BLM, following consultation with the Tribes and other appropriate parties, will approve any monitoring program before implementation by PG&E. The program will include all historic properties within the APE. Any previously unknown properties that may be encountered during the Project also will be included in the monitoring program unless such properties are evaluated as ineligible. During its initial phase, periodic monitoring and condition assessment will consist of annual field visits to monitor site conditions and disturbances	As part of the 2004 (Applied Earthworks) Cultural Resources Management Plan, Applied Earthworks conducted quarterly monitoring the first year and since then (2005 – 2012) annual monitoring and condition assessment.
96	CHPMP	Section 6.8 "Protocols for Tribal and Archaeological Monitoring" states that monitoring for the Project will be performed in accordance with the PA's Appendix C (Tribal and Archaeological Monitoring Protocol).	See responses to PA Appendix C, Monitoring Protocol. See also EIR MMRP CUL-1a-8(l).
97	CHPMP	Section 7.1 2. To the maximum extent practicable, PG&E will avoid all archaeological sites within the APE and protect all historic properties regardless of their NRHP status. The primary means for accomplishing avoidance will be through careful planning and placement of proposed access routes and drilling sites and by the installation of barrier fences around significant historic properties. A pre-project archaeological survey field verification will be conducted prior to any ground-disturbing activities. Consistent with other phases of work conducted at the Topock Remediation Project site, agency representatives and other stakeholders (including representatives of Native American Indian tribes involved with the Project) will be invited to the site for a project initiation meeting to discuss various cultural sensitivities associated with the Project. 3. Ensure that PG&E shall, to the extent practicable, restore the areas affected by the Topock Remediation Project within the APE, including but not limited to the site of the existing treatment plant and related facilities but excluding the Topock Compressor Station and related facilities, to the conditions existing prior to the construction of the PG&E investigation and remediation related appurtenances and facilities per PA Stipulation I.D. 4. Remediation activities that propose the removal or introduction of vegetation on public lands shall be undertaken after coordination with Tribes to assess if culturally significant native plant species are being impacted and if there could be potential visual impacts to the Topock TCP. 5. Existing monitoring wells and related facilities shall be used to the extent practicable per PA Stipulation III.B.2(a). 6. The need for and placement of any new facilities or activities will be determined in consultation with the Tribes and the Consulting Parties following the Guidelines in Appendix B and per PA Stipulation III.B.2(b). 7. New facilities or activities will be placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable, consistent with human health and the environment and achieving cleanup in a timely manner per PA Stipulation III.B.2(c). 8. Clay deposits are an important resource identified by the Hualapai in their creation, and may be important as well to other Tribes. Accordingly, BLM, PG&E, and those Tribes that ascribe importance to clay deposits shall meet to identify the clay deposits that are considered a resource and develop a protocol to be followed if such clay deposits are encountered.	See responses to PA Stipulations I(B), I(D), III(B)(1), III(B)(2)(a)-(c) and (e), III(B)(3)(c), and V(D). See also EIR MMRPs CUL-1a-8(i), AES-1, and AES-2. Regarding Item 4, PG&E does not plan to remove or introduce vegetation on public lands in connection with this plan; instead, only some trimming of vegetation may be required which will be focused on non-native species (e.g., tamarisk). The trimming of native species (e.g., palo verde and mesquite) will be avoided or minimized to the extent practicable. Regarding Item 8, BLM met with the Hualapai Tribe and PG&E in late 2012 and discussed the Clay Monitoring Protocol. The Hualapai representative indicated that the Hualapai would make the initial draft of this protocol and then send it out for BLM and PG&E to review.
98	CHPMP	Section 7.3 Treatment of other cultural, historical, and archaeological properties within the APE "The only properties identified within the APE that are not contributing properties to the Topock TCP are the properties from the historic period (i.e., Route 66, the AT&SF Railroad Grade, and National Old Trails Road). None of these properties has been impacted, to date, by this Undertaking. These properties shall be avoided, to the extent practicable, in the implementation of the Undertaking. These properties are periodically monitored for condition assessment to assure that they are being protected."	See responses to PA Stipulations I(B), III(B)(1), III(B)(2)(a)-(c) and (e).
99	CHPMP	Section 8.1 Discoveries - Steps to be taken if previously unrecorded properties are found	PG&E will follow the procedures specified in Appendix C of the CHPMP (Discovery Plan). See also response to PA Stipulation IX(A)-(D), EIR MMRP CUL-1a-8(b) and -8(o).
100	CHPMP	Section 8.2 Discoveries - Treatment of any human remains, funerary objections, ceremonial objects and items of cultural patrimony	PG&E will follow the procedures specified in Appendix D of the CHPMP (Plan of Action). See also response to PA Stipulation IX(A)-(D), EIR MMRP CUL-1a-8(b) and -8(o).

Table B-2
Summary of Compliance Approach for Requirements Not Identified as ARARs for the Topock Groundwater Remedy That Are Pertinent to the Alternative Freshwater Source Evaluation
Final Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area,
Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

No.	Source Document	Compliance Item, Relevant Excerpt or Section from Document	Action by PG&E (Alternative Freshwater Source Evaluation)[1]
101	CHPMP	Section 8.3 Consultation Procedures Related to Unanticipated Discoveries The BLM will notify all Signatories of the PA, Tribes and Invited Signatories of the nature and general location of any discovery. If the Tribes, PG&E and BLM can resolve treatment of the discovery in a manner that does not cause adverse effects to significant cultural and historic properties, BLM shall document the resolution, the activities within the work area may proceed and the AZ SHPO and the CA SHPO shall be notified of the discovery and resolution. The Tribes, PG&E and BLM will use their best efforts to resolve treatment as quickly as possible. If there is failure to resolve treatment of the discovery in consultation with the Tribes and PG&E, BLM shall then consult with the AZ SHPO or the CA SHPO to develop a treatment plan that takes into account the effects of the Undertaking on the discovery. Within fifteen (15) days of notification of discovery, BLM shall provide the consulted SHPO(s), via email, a recommendation for resolving the discovery situation that takes into account the potential effects of the Undertaking on the discovery. If the CA SHPO or AZ SHPO (as appropriate, depending on the location of the discovery) does not object to BLM's recommendation(s) within fifteen (15) days, BLM will implement the recommendation(s). If the consulted SHPO objects to the recommendation, BLM will utilize the dispute resolution process in Stipulation XV of the PA to resolve any objection.	See response to PA Stipulation IX(A)-(D). See also EIR MMRP CUL-1a-8(b) and -8(o).
102	General Aquifer Protection Permit A.A.C. R18-9-B301(D)	This general aquifer protection permit allows any discharge from a facility that, for water quality sampling, hydrologic parameter testing, well development, redevelopment, or potable water system maintenance and repair purposes, receives water, drilling fluids, or drill cuttings from a well if the discharge is to the same aquifer in approximately the same location from which the water supply was originally withdrawn, or the discharge is under an AZPDES permit.	The general permit is self-implementing and notification to ADEQ is not required. If discharged water flows to a water of the United States, PG&E will comply with the substantive requirements of Arizona general NPDES permit AZG2010-001. However, PG&E anticipates that the discharged water from the freshwater investigation will not flow to waters of the United States.

Attachment C
ADWR Letter Regarding Borehole Decommissioning

ARIZONA DEPARTMENT
OF
ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov

Janice K. Brewer
Governor

Henry R. Darwin
Director

March 25, 2013

VRP 13:175

Ms. Yvonne Meeks
Pacific Gas and Electric Company - Topock Project Manager
4325 South Hiquera, San Luis
Obispo, California 93401

Mr. Aaron Yue
Project Manager, Geological Services Branch
California Department of Toxic Substances Control
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Cypress, California 90630

Ms. Pamela Innis
Topock Remedial Project Manager
Office of Environmental Policy and Compliance – Denver Region
U.S. Department of Interior
P.O. Box 25007 (D-108)
Denver, Colorado 80225-0007

Re: Agency comments on *Standard Operating Procedure for Well and Borehole Decommissioning* and *Proposed Abandonment Methods for Arizona Exploratory Borings*
Topock Groundwater Site
Needles, California; VRP Site Code: 506252-01

Dear Topock Compressor Station Project Managers,

The Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program (VRP) requested that the Arizona Department of Water Resources (ADWR) conduct a review of the *Standard Operating Procedure for Well and Borehole Decommissioning* and *Proposed Abandonment Methods for Arizona Exploratory Borings*.

ADWR's comments are attached to this letter.

If you have any questions, please contact me by electronic mail at dt3@azdeq.gov or by telephone at (602) 771-4414, or feel free to contact ADWR directly.

Respectfully,

Danielle Taber
Project Manager
Voluntary Remediation Program

Enc: ADWR letter dated February 28, 2013

cc: David Christiana, R.G. – Arizona Department of Water Resources

JANICE K. BREWER
Governor

SANDRA A. FABRITZ-WHITNEY
Director

ARIZONA DEPARTMENT OF WATER RESOURCES

3550 North Central Avenue, Second Floor
PHOENIX, ARIZONA 85012-2105

(602) 771-8500

February 28, 2013

Danielle Taber
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, AZ 85007

Subject: Review of "Standard Operating Procedure for Well and Borehole Decommissioning" and "Proposed Abandonment Methods for Arizona Exploratory Borings"

Dear Ms. Taber:

The Arizona Department of Water Resources (ADWR) has reviewed two documents referenced above pertaining to the Pacific Gas and Electric (PG&E) Topock Compressor Station remediation in Needles, California. ADWR has the following comments:

- The text in the Standard Operation Procedure (SOP), section 1.2 states that all required forms can be obtained from the Phoenix ADWR offices. All forms are available online at: http://www.azwater.gov/azdwr/WaterManagement/NOI/documents/PermitsFormsApplicationsNOI.htm

- The SOP document describes requirements for abandoning (decommissioning) wells in Arizona and California and technical specifications and procedures for abandoning wells at the Topock Compressor Station remediation site. The proposed methods are thorough, protective of the aquifer, and consistent with minimum well construction and abandonment requirements in Arizona Administrative Code (A.A.C.) R12-15-816 and substantive policy described in the ADWR "Well Abandonment Handbook" (2008).

- The proposed methods suggested for abandoning exploratory boreholes in Arizona utilizing "granulated material" are satisfactory. The methods are consistent with the

variance option of Alternative 4 in the "Well Abandonment Handbook". Notices of Intent to Abandon a Well must be accompanied with a written request for a variance from the provisions of the minimum well construction and abandonment standards and in accordance with A.A.C. R12-15-820.

Thank you for the opportunity to review these documents and provide these comments. If you need additional information, please feel free to contact me by telephone at (602) 771-8548 or by electronic mail at dgchristiana@azwater.gov.

Sincerely,

David Christiana, R.G.
Hydrologist IV
Permitting and Adjudication Support Unit

Printed on recycled paper. Each ton of recycled paper saves 7,000 gallons of water.

Attachment D
Construction Best Management Practices (BMPs) Plan

Contents

Appendix D

Attachments

ATTACHMENT D

Construction Best Management Practices (BMPs) Plan

In compliance with EIR mitigation measure HYDRO-1, Topock Groundwater Remediation Project activities associated with the *Implementation Plan for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California* (FWIP) will implement BMPs to meet the substantive criteria of the Arizona Pollutant Discharge Elimination System (AZPDES) program for General Permit for Stormwater Discharges associated with Construction Activity to Waters of the United States (General Permit) (AZG2013-001) as well as applicable Federal, state, and local permit and regulatory requirements. Because the freshwater source evaluation is part of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response action, implementation plan activities conducted onsite are covered under the permit exemption codified in Section 121(e)(1) of CERCLA. While the permit exemption applies to the administrative or procedural elements (e.g., preparing and submitting permit applications and obtaining permits), the substantive requirements of the applicable laws remain (a table tracking compliance with the substantive requirements of Section 6 of this permit is included as Attachment F). Although the PG&E Project activities are not required to obtain a General Permit, a copy of the General Permit is presented in Attachment A of this BMP plan as a reference. The Arizona Department of Transportation (ADOT) Erosion and Pollution Control Manual (Manual) was used to identify BMPs for use on this Project. The BMPs excerpted from the Manual for application onsite will be inspected, implemented and maintained by PG&E. The Manual is included in Attachment B.

This BMP plan has been prepared by a Qualified SWPPP Developer (QSD) and will be implemented in accordance with good engineering practices prior to Project activities under the direction of a Qualified SWPPP Practitioner (QSP).

A summary of key BMPs identified for this project is presented in Section 1 and a risk determination for the project is presented in Section 2. Visual inspections and monitoring are required to evaluate the effectiveness of the BMPs and to determine whether modifying or implementing additional BMPs is required during work. An inspection program is outlined in Section 3 and Inspection and Corrective action Report Forms (Forms) are introduced in Section 4. A sample Form is included in Attachment C.

The PG&E Project Manager (or appointed Field Team Leader) will maintain an erosion control field book that includes maps, figures, and inspection and corrective action report forms. The PG&E Project Manager will retain the field book, with all attachments, forms, and field notes until Project completion. The PG&E Project Manager and the Field Team Leader will have operational control over construction plans and specifications. The Field Team Leader will have control over day-to-day activities, and will implement this BMP plan under the direction of a QSP.

In addition to waters of the United States located in the immediate vicinity of the project area (see Figure D1), the following waters of the United States are located within one mile of the project area: the Colorado River, Topock Bay, and Lost Lake.

1.0 Project BMPs

This section provides a summary of relevant and applicable BMPs for this project as included in the ADOT Manual. Specific details included in Section 5 of the Manual for each BMP will be used for guidance in the field, as applicable based on field actual conditions. In addition, specific EIR mitigation measures other than HYDRO-1 or project-specific standard operating procedures (SOPs) (included in Attachment E) are referenced for each BMP category where appropriate. See Figure D1 for site topography and inferred surface water flow directions for each work area.

1.1.1 Soil Stabilization BMPs

Soil stabilization BMPs will be used where soils are disturbed as a result of construction activities to minimize erosion and transport during work.

- **Scheduling**: The development of a schedule for every project that includes sequencing of construction activities in conjunction with the implementation of construction site BMPs in order to reduce the amount and duration of soil exposed by construction activities. The purpose is to minimize erosion of disturbed soils by wind, rain, runoff, and vehicle tracking.
- **Geotextiles, Plastic Covers, Erosion Control Blankets/Mats**: A natural (excelsior, straw, coconut, etc.) or synthetic (usually polyethylene) material installed to reduce soil erosion by wind or water, as determined necessary. The purpose is to reduce rainfall impact, provide a microclimate to promote seedling establishment protect exposed soil from wind and rain, and reduce erosiveness of concentrated flows.

1.1.2 Sediment Control BMPs

Sediment control BMPs will be used at the perimeter of areas where soil disturbance occurs as a result of construction.

- **Sediment Wattles**: Aspen wood excelsior, straw, flax or other similar materials that are rolled and bound into tight tubular rolls and placed on the face of slopes at regular intervals depending on the steepness of the slope. The purpose is the intercept runoff, reduce flow velocities, and promote infiltration, release runoff as sheet flow, and reduce sediment from runoff.
- **Sand Bag Barrier**: A sandbag barrier is a temporary linear sediment barrier consisting of stacked sandbags, designated to intercept and slow the flow of sediment-laden sheet flow runoff. The purpose is to allow sediment to settle from runoff before water leaves the construction site/ Sandbags can also be used where flows are moderately concentrated, such as ditches, swales, and storm drain inlets to divert and/or detain flows.

1.1.3 Wind Erosion Control BMPs

Wind erosion BMPs will be used to prevent or alleviate dust nuisance and minimize the movement of sediment disturbed during project activities.

- **Wind Erosion Control**: The application of water as necessary to prevent or alleviate dust nuisance. The purpose is to prevent the movement of soil particles by the wind causing air pollution and eventual sediment release into the waters of the U.S.
- EIR mitigation measure AIR-1a: Use periodic watering for short-term stabilization of surface area disturbed by project activities to minimize visible fugitive dust emissions during dust episodes. Use of a water truck or equivalent to maintain moist disturbed surfaces and actively spread water during visible dusting episodes will be considered sufficient.
- EIR mitigation measure AIR-1b: Cover loaded haul vehicles while operating on publicly maintained paved surfaces.
- EIR mitigation measure AIR-1c: Stabilize (using soil binders or establish vegetative cover) graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such delay is caused by precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions. Implementation of this BMP will be coordinated with the Havasu National Wildlife Refuge (HWNR).
- EIR mitigation measure AIR-1e: Curtail non-essential earth-moving activity, if conducted, under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance.

1.1.4 Tracking Control BMPs

Tracking control BMPs will be used to limit Project-related track out or spills.

- **Stabilized Construction Entrance/Exit**: A temporary stabilized vehicular entrance, located where traffic will enter and exit a construction site. The purpose is to reduce or eliminate the tracking of sediment onto public right-of-way, streets, sidewalk, or parking areas where it can potentially be washed into local storm drains or become airborne pollution.
- **Stabilized Construction Roadway**: A stabilized construction roadway is a temporary access road connecting existing public roads to a remote construction area. The purpose is to designate for the control of dust and erosion created by vehicle tracking.
- EIR mitigation measure AIR-1d: Cleanup Project-related track out or spills on publicly maintained paved surfaces within twenty-four hours.

1.1.5 Non-Storm Water BMPs

BMPs will be used to prevent the release of non-storm water associated with Project activities.

- **Water Conservation Practices**: Procedures and practices that minimize the harmful effects to water and water quality during the construction of a project. The purpose is to conserve and protect a critical resource.
- **Vehicle and Equipment Cleaning**: As determined necessary, the preferred location for vehicle cleaning is on the concrete pad located at the Topock Compressor Station, which was designed for this purpose. Should cleaning be determined necessary at the work site, procedures and practices used to clean vehicles and equipment will be followed to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drain or to watercourses, and to reduce or eliminate spread of noxious weeds and invasive plant species from the project site.
- **Vehicle and Equipment Fueling**: Vehicle and equipment fueling will take place off site whenever possible. Should remote fueling be required during work the Remedy-SOP-02 for remote fueling (Attachment E), which was developed in response to EIR mitigation measure HAZ-1b will be followed. This procedure includes practices to minimize or eliminate fuel spills and leaks during fueling. The purpose is to prevent the pollution of soils, storm drain systems or watercourses from fuel spills and leaks.
- **Vehicle and Equipment Maintenance**: Vehicle and equipment maintenance will take place off site whenever possible. Should maintenance be determined necessary at the work site, procedures and practices used during maintenance will be followed to prevent the contamination of on-site soils and storm water and to ensure the proper disposal of equipment fluids, and other vehicle maintenance debris.
- **Liquid Waste Management**: Procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

1.1.6 Good Housekeeping BMPs

The following good housekeeping measures should be implemented onsite for the duration of project activities:

- Cover and berm loose stockpiled construction materials (e.g., drill cuttings) that are not actively being used.
- Store chemicals in water tight containers (with appropriate secondary containment) to prevent any spillage and leakage in a completely enclosed storage cabinet, trailer, or sealed drums.
- Minimize exposure of construction materials to precipitation.
- Prevent the tracking of loose construction and landscape materials offsite.
- Prevent the disposal of rinse or wash waters or materials on impervious site surfaces.
- Ensure the containment of sanitary facilities to prevent discharges of pollutants to the stormwater drainage system or receiving water. Regularly inspect sanitation facilities and clean or replace them as needed.

- Cover waste disposal containers at the end of every business day and during rain events. Prevent discharges from waste disposal containers to the stormwater drainage system or receiving water.
- Contain and securely protect stockpiled waste materials from wind and rain at all times unless actively being used.
- Contain all equipment cleaning areas so that there is no discharge into the underlying soil and onto the surrounding areas.
- Prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters. Immediately clean up all leaked material and dispose of properly.
- Limit washing vehicles onsite to emergency situations only. Prevent non-stormwater discharges from vehicle washing from reaching drainage courses.
- Provide soil cover for areas of work that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
- Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to control erosion and sediment discharges from the site.
- Conduct regular stormwater tailgate meetings with the workforce when the Project is staffed and work is underway.
- Construction vehicles and equipment should be placed on mats, plastic sheeting, or equivalent to prevent leaks from impacting soils or entering water bodies.

1.1.7 Waste Management and Materials Pollution Control BMPs

BMPs will be used to stabilize stock piles (i.e. drill cuttings) staged during work activities.

- **Stockpile Management**: Procedures and practices to reduce or eliminate storm water contact with construction site stockpiles of soil. The purpose is to reduce or eliminate pollution of storm water from stockpiles.
- **Spill Prevention and Control**: The SOP-A13 for spill prevention and control established for the Topock site (Attachment E) will be followed during all work activities (adapted as necessary for tasks specific to this project). This procedure includes practices implemented to prevent and control spills in a matter that minimizes discharges of spilled materials to the soil, drainage system, or watercourse.

2.0 Risk Determination

A Risk Type 1 has been calculated per the General Permit for the Project activities. The sediment risk was determined from a combination of the Rainfall Erosivity Factor (R value), the Soil Erodibility Factor (K value), and the hill slope length-to-gradient factor (LS value) to account for the effect of topography on erosion. These three values are multiplied to obtain a watershed erosion estimate, which then directly corresponds to a certain level of sediment risk.

The R value of 10.00 was calculated using the estimated annual R values and Erosivity Index Tables developed by the United States Department of Agriculture. The methodology is outlined by the EPA Fact Sheet 3.1 and is dependent on construction schedule and location. The K value of 0.10 was obtained from Web Soil Survey. The LS factor of 1.32 was calculated using a table provided by the SEA, USDA, Agricultural Handbook Number 537, December 1978. With these values, the combined watershed erosion estimate was found to be 0.43 tons per acre. Because it was calculated to be less than 15 tons per acre per the CGP this project is considered a Low Sediment Risk.

Stormwater runoff is expected to infiltrate or follow natural drainage courses to the receiving water body. The Project drains to the Colorado River. This portion of the Colorado River is not a 303d-listed impaired water body for sediment or siltation and is not deemed to have a beneficial reuse pertaining to COLD, SPAWN, and

MIGRATORY. As a result, it is classified as a Low Receiving Water Risk. As classified by the Attachment A of the General Permit, the Risk Type determination for the Project is Type 1. Risk determination calculations are shown in Attachment D to this appendix.

Prior to implementation of the project activities, the R value calculation will be updated using the actual construction dates. However, the revised R value is not anticipated to change enough to alter the risk type determination.

3.0 Inspection Program and Recordkeeping

In conformance with the substantive requirements of General Permit (Order No. AZG2013-001), a site inspection in accordance with one of the schedules listed below will be implemented to assess the effectiveness of BMPs and to modify BMPs, if necessary, to continue to reduce pollutants and impacts on receiving waters and will include:

- **Routine inspection schedule**: The QSP shall ensure inspections are performed at the site as indicated below to ensure control measures are functional and that the BMP plan is being properly implemented. To determine the amount of rainfall from a storm event that occurs on the site (in accordance with options a., b., or c.), the QSP shall obtain rainfall information (in accordance with Part 4.4(3)) of the AGP2013-001, from either a properly maintained rain gauge on the site, or a weather station that is representative of the site's location. For any day of rainfall during normal business hours that measure 0.25 inch or greater, the total rainfall measured for that day shall be recorded in accordance with Par 4.4(3).
    - The site will be inspected a minimum of once every 7 calendar days, or
    - The site will be inspected a minimum of once every 14 calendar days, and also within 24 hours of the end of each storm event of 0.5 inch or greater in 24 hours; or
    - The site will be inspected a minimum of once per month, but not within 14 calendar days of the previous inspection and within 24 hours of the occurrence of a storm event of 0.25 inch or greater.
    - **Reduced inspection schedule**: The QSP may reduce inspection if the entire site has been temporarily stabilized, discharges are unlikely based on seasonal rainfall patters, or runoff is unlikely due to winter conditions (e.g., site is covered with snow, ice, or frozen ground exists). With a reduced inspection schedule, the site shall be inspected at least once per month (but not within 14 calendar days of the previous inspection) and before an anticipated storm event and within 24 hours of the end of each storm event of 0.5 inch or greater in 24 hours.

Inspections are only required during the Project's normal working hours. If an inspection day (except those required relative to a rainfall event) falls on a Saturday or holiday, the inspection may be conducted on the preceding workday. If the inspection day falls on a Sunday, the inspection may be conducted on the following Monday.

Inspections are not required under adverse conditions. The QSP is not required to inspect areas that, at the time of inspection, are considered unsafe for inspection personnel. Inspections may be postponed when conditions such as local flooding, high winds, or electrical storms, or situations that otherwise make inspections unsafe. The inspection must resume as soon as conditions are safe.

To meet the substantive criteria of the AZPDES program, General Permit AZG2013-001, pertinent records will be stored in the HNWR-1 well shed. Pertinent records include:

- AZPDES General Permit
- BMP plan
- A copy of agreement received from ADEQ
- Copies of any other agreements (such as a CWA section 404 permit, local grading permit, etc.) with any state, local, or federal agencies that would affect the provisions or implementation of the SWPPP, if applicable

- Descriptions and dates of any incidences of significant spills, leaks, or other releases that resulted in discharges of pollutants in stormwater to a regulated MS4 or to waters of the U.S., the circumstances leading to the release and actions taken in response to the release and measures taken to prevent the recurrence of such releases
- Documentation of maintenance, including repairs of structural control measures, including the date(s) of discovery of areas in need of repair/replacement, date(s) that the structural control measure(s) returned to full function, and the justification for any extended repair schedules. The maintenance records shall include the date(s) of regular maintenance
- All inspection reports
- Description of any corrective action taken at the site, including triggering event and dates when problems were discovered and modifications occurred

This BMP Plan shall be revised as necessary to reflect current conditions and to maintain accuracy. This BMP Plan shall be revised as necessary in the event the document does not meet one or more requirements of the AZPDES General Permit.

4.0 Inspection and Corrective Action Report Form

PG&E will maintain an Inspection and Corrective Action Report Form (Attachment C) for this Project. This form will record precipitation events within the project area that produces more than one inch of precipitation within a 24-hour period. The form will record the following details about qualifying precipitation events:

- Date of the precipitation event
- Approximate duration of the event
- Amount of precipitation
- Identification of all sources of non-stormwater discharge occurring at the site and the associated control measures in place
- Description of adverse or unsafe conditions for inspection
- Condition and effectiveness of all on-site control measures and stabilization and pollution prevention practices
- Corrective action report form

5.0 BMPs Project Team

The BMPs Project Team members include:

- PG&E Project Manager, Curt Russell
- PG&E Environmental Inspector, Chris Smith
- Project Manager, Mike Cavaliere (CH2M HILL) – operational control over construction plans and specifications.
- QSD and QSP, Gino Nguyen (CH2M Hill) – operational control over construction plans and specifications.
- Site Contact, Barry Colom (CH2M Hill), telephone (541) 740-3250, PG&E Topock Compressor Station
- Field Team Leader, to be appointed – responsible for day-to-day activities.
- Field Operators, to be appointed – responsible for day-to-day activities

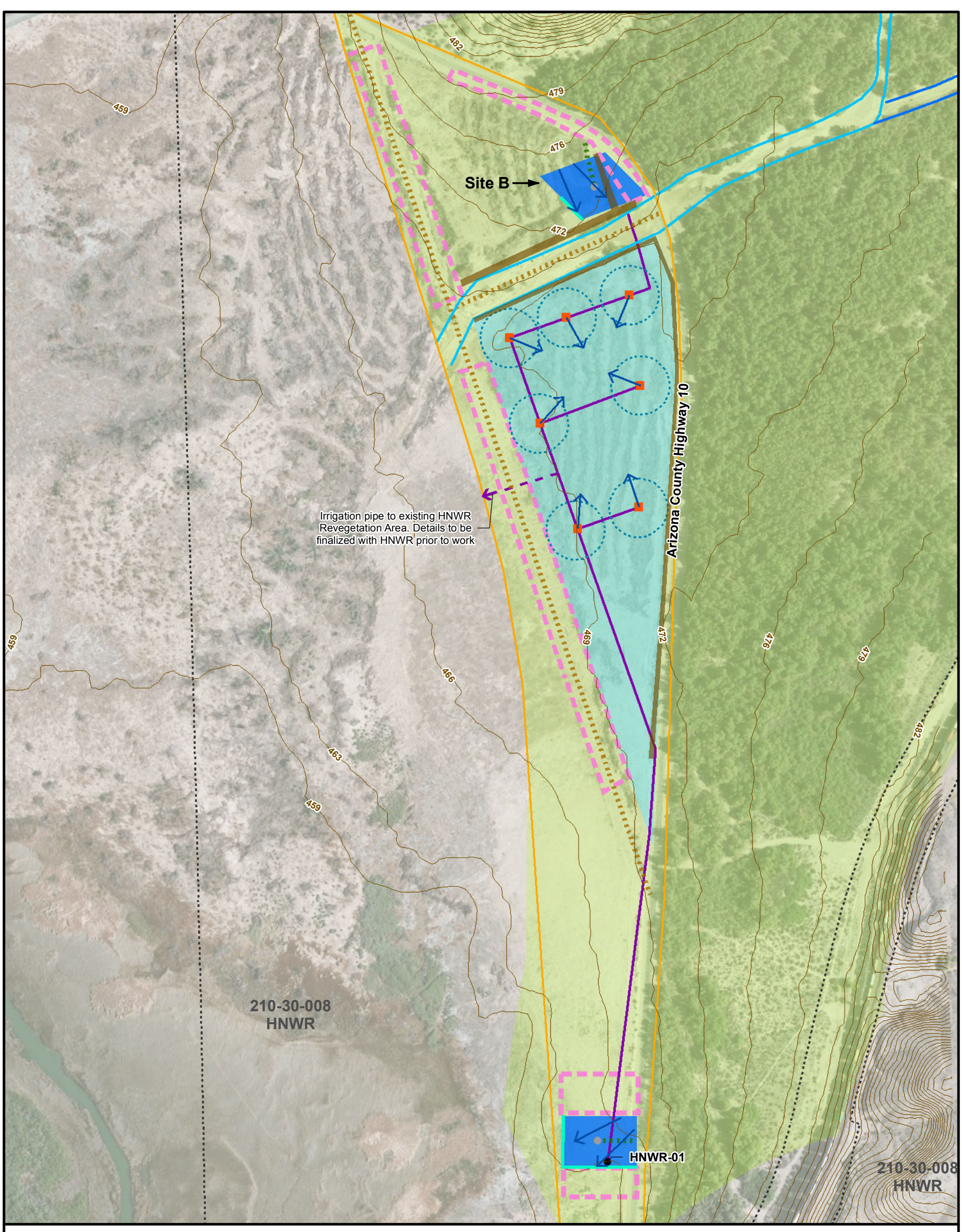

FIGURE D-1
BMP: SITE B AND HNWR1 SITE WORK AREAS

FINAL IMPLEMENTATION PLAN FOR EVALUATION OF ALTERNATIVE FRESHWATER SOURCES IN THE TOPOCK REMEDIATION PROJECT AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Document Path: D:\Projects\Topock\MapFiles\2013\CMS\FreshwaterSource\SiteBWorkArea.mxd

Attachment A
Arizona Pollutant Discharge Elimination System General Permit for Stormwater Discharges Associated with Construction Activity to Waters of the United States

Permit No. AZG2013-001

ADEQ Arizona Department of Environmental Quality

STATE OF ARIZONA
DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY DIVISION
PHOENIX, ARIZONA 85007

ARIZONA POLLUTANT DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY TO WATERS OF THE UNITED STATES

This permit provides authorization to discharge under the Arizona Pollutant Discharge Elimination System (AZPDES) program, in compliance with the provisions of the Arizona Revised Statutes, Title 49, Chapter 2, Article 3.1, the Arizona Administrative Code (A.C.C.), Title 18, Chapter 9, Articles 9 and Chapter 11, Article 1, and the Clean Water Act as amended (33 U.S.C. 1251 et seq.).

This general permit specifically authorizes stormwater discharges associated with construction activity, pursuant to 40 CFR § 122.26(b)(14)(x) and 40 CFR § 122.26(b)(15) in Arizona. All discharges authorized by this general permit shall be consistent with the terms and conditions of this general permit. Permit coverage is required from the "commencement of construction activities" until "final stabilization", as these terms are defined in this permit.

This general permit becomes effective on June 3, 2013.

This general permit and the authorization to discharge expire at midnight, June 2, 2018.

Signed this 29th day of May, 2013.

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Michael A Fulton, Director
Water Quality Division

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1.0 COVERAGE UNDER THIS GENERAL PERMIT

1.1 Permit Area.

This general permit covers the state of Arizona. This permit is not authorized for use by operators with stormwater discharges associated with construction activities on any Indian Country lands in Arizona. USEPA Region 9 is the permitting authority for Indian lands in Arizona.

1.2 Eligibility.

This general permit authorizes stormwater discharges associated with "construction activities", as defined in Appendix A that will disturb one or more acres of land, or will disturb less than one acre, but is part of a common plan of development or sale that will ultimately disturb one acre or more. This general permit is also applicable to stormwater discharges associated with support activities from temporary plants or operations set up to produce concrete, asphalt, or other materials exclusively for the permitted construction project. See 40 CFR 122.26(b)(14)(x) and (15).

Operators of small construction sites (less than five (5) acres – see 40 CFR 122.26(b)(15) and Appendix A) may, if eligible, choose a waiver from coverage under this permit, provided that site remains in compliance with the applicable requirements of Part 1.5 during construction.

Coverage under this permit may be required for any discharge that ADEQ determines is needed in accordance with A.A.C. R18-9-A902(B)(8)(d).

Any discharges that are not consistent with the eligibility conditions of this permit are not authorized by this permit. A person shall either apply for a separate Arizona Pollutant Discharge Elimination System (AZPDES) permit to cover such ineligible discharge(s), cease the discharge(s), or take necessary steps to make the discharge(s) eligible for coverage under this permit.

Individual Permit Requirements. An operator who desires to obtain an individual stormwater permit (in accordance with the requirements of A.A.C. R18-9-C902(B), or is required by ADEQ to obtain an individual stormwater permit (in accordance with A.A.C. R18-9-C902(A)), shall comply with the requirements of Appendix B, Subsections 17 and 18(a)(i).

1.3 Authorized Discharges.

1. Allowable Stormwater Discharges. An operator may discharge pollutants in:
    a. Stormwater runoff associated with construction activities provided the discharge is conducted in compliance with this permit;
    b. Discharges requiring a stormwater permit under 40 CFR 122.26(a)(1)(v); 40 CFR 122.26(b)(15)(ii); or under 40 CFR 122.26(a)(9);
    c. Stormwater discharges from construction support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided:
        i. The support activity is directly related to a construction site that is required to have AZPDES permit coverage for discharges of stormwater associated with construction activity;
        ii. The support activity is not a commercial operation (serving multiple unrelated construction projects by different operators) and does not operate beyond the completion of the construction activity for which the support activity is directly associated.
        iii. The support activity is not otherwise covered by a separate AZPDES permit; and
        iv. Appropriate control measures for the discharges from the support activity areas are identified in the Stormwater Pollution Prevention Plan (SWPPP) and implemented.

2. Allowable Non-Stormwater Discharges.

a. The following are the only non-stormwater discharges allowed under this permit. These discharges are allowed provided they are reduced or eliminated to the extent practicable. When allowable non-stormwater discharges can not be practicably eliminated, the operator shall install appropriate control measures to reduce or eliminate pollutants in the discharge to assure compliance with Part 3 of this permit:

i. Discharges from emergency fire-fighting activities;

ii. Water used to control dust, provided reclaimed water or other process wastewaters are not used;

iii. Routine external building wash down where detergents are not used;

iv. Water used to rinse vehicles and equipment, provided that reclaimed water or other wastewater is not used and no soaps, solvents, detergents, oils, grease or fuels are present in the rinsate;

v. Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used;

vi. Uncontaminated air conditioning or compressor condensate;

vii. Uncontaminated groundwater or spring water;

viii. Foundation or footing drains where flows are not contaminated with process materials such as solvents;

ix. Water from fire fighting system testing and maintenance, including hydrant flushings;

x. Discharges related to installation and maintenance of potable water supply systems, including disinfection and flushing activities, discharges resulting from pressure releases or overflows, and discharges from wells approved by ADEQ for drinking water use;

xi. Hydrostatic testing of new pipes, tanks or vessels using potable water, surface water, or uncontaminated groundwater;

xii. Water used for compacting soil, provided reclaimed water or other wastewaters are not used;

xiii. Water used for drilling and coring such as for evaluation of foundation materials, where flows are not contaminated with additives; and

xiv. Uncontaminated waters obtained from dewatering operations/ foundations in preparation for and during excavation and construction provided the discharge are managed as specified in Part 3.1.4 of this permit.

Note: This permit does not prohibit the use of reclaimed or other process wastewaters on-site for dust control, soil compaction or for landscape irrigation. However, such activities shall be managed in a way that they are not discharged off site or applied during rain events consistent with A.A.C. R18-9-704(G)(3)(c) of the reclaimed water rules. Therefore, they are not permissible 'discharges'.

b. If the site is within 1/4 mile of an outstanding Arizona water (OAW), the operator shall not discharge any non-stormwater under this permit, except for emergency fire-fighting activities, unless specifically authorized by the Department.

1.4 Prohibited Discharges.

The operator shall not allow any non-stormwater discharges from the site except as provided in Part 1.3(2). All other non-stormwater discharges (not listed above) shall be eliminated or authorized under a separate AZPDES permit, as those discharges are not authorized under this permit. Stormwater discharges that are mixed with non-stormwater, other than the allowable non-stormwater discharges

listed in Part 1.3(2) are not eligible for coverage under this permit. The following discharges are prohibited:

1. Wastewater from washout of concrete, unless managed by an appropriate control as described in Part 3.1.3.1(1);
2. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials, unless managed by an appropriate control as described in Part 3.1.3.1(3);
3. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;
4. Soaps or solvents used in vehicle and equipment washing; and
5. Toxic or hazardous substances from a spill or other release.

1.5 Limitations of Coverage.

1. Post-Construction Discharges. This general permit does not authorize stormwater discharges that originate from the site after construction activities have been completed and the site, including any temporary support activity site, has achieved final stabilization and a Notice of Termination (NOT) has been submitted to ADEQ. Post-construction stormwater discharges from industrial sites may need to be covered by a separate AZPDES permit.
2. Discharges Covered by Another AZPDES Permit. This general permit does not authorize stormwater discharges associated with construction activity that are covered under an individual permit or another applicable general permit.
3. Impaired Waters. The following conditions and requirements apply if any portion of the construction site is located within 1/4 mile of a receiving water listed as impaired under section 303(d) of the Clean Water Act:
    a. The operator must submit a copy of the SWPPP and associated review fee with the NOI to ADEQ;
    b. The SWPPP must include a sampling and analysis plan (see Part 7.3(5)) for analytical monitoring if there is potential for discharges from the site to include the pollutant(s) for which the receiving water is impaired. However, if the operator can demonstrate there is no reasonable potential that construction activities could be an additional source of the identified pollutant(s), analytical monitoring is not required. As part of this demonstration, the operator must consider all on-site activities, including the potential for the pollutants (metals, nutrients, etc.) to be present in site soils. The demonstration must be included in the SWPPP submitted for ADEQ's review;
    c. If a discharge contains pollutants for which an approved Total Maximum Daily Load (TMDL) has been established, the SWPPP shall specifically identify control measures necessary to ensure the discharges will be consistent with the provisions of the TMDL:
4. Outstanding Arizona waters (OAW). The following conditions and requirements apply if any portion of the construction site is located within 1/4 mile of a receiving water listed as an OAW in A.A.C. R18-11-112(G):
    a. The operator must submit a copy of the SWPPP and associated review fee with the NOI to ADEQ;
    b. The SWPPP must include a sampling and analysis plan for analytical monitoring (see Part 7.3(5)) of pollutants expected to discharge from the site, including sediment;

1.6 Erosivity Waivers for Small Construction Activities.

A person performing construction activity which disturbs between one and five acres may be exempt from obtaining coverage under this permit for the duration of the project based on a low potential for soil erosion for the duration of the project (i.e., the Erosivity Waiver).

Note: Construction activities that disturb five acres or greater, or less than five acres but are part of a common plan of development or sale, are not eligible for any of this waiver.

1. Calculating the Erosivity Waiver. Low potential for erosion is defined as a rainfall erosivity (R) factor of less than five as calculated using ADEQ's Smart NOI Web site.

   The small construction project's rainfall erosivity factor calculation shall be less than five during the **entire** period of construction activity. The period of construction activity begins at initial earth disturbance (commencement of construction activities) and ends with final site stabilization.

   The applicant shall certify to ADEQ that construction activity will occur only when the rainfall erosivity factor is less than five.

   If any portion of the construction site is located within 1/4 mile of an impaired water or OAW, the site is not eligible for the erosivity waiver. The erosivity waiver is predicated on the above criteria being met and proper application procedures being followed.

   Projects Which Extend Past Certified Period. If the small construction project continues beyond the calculated "end date" as shown on the Permit Waiver Certification, the operator is in violation of this permit. If this occurs, the operator shall prepare a SWPPP and submit an NOI as required under Parts 2.3 and 6.0 before the end of the certified waiver period.

2. Permit Waiver Certification. The operator shall obtain an AZPDES Permit Waiver Certification before commencing construction activities. All waiver certifications require an AZPDES fee in accordance with A.A.C. R18-14-109, Table 6. ADEQ will not issue a waiver until the proper fee is paid.

   An operator of a construction activity that is eligible for one of the above waivers shall provide the following information:

   a. The name, address, and telephone number of the construction site operator(s);
   b. The name (or other identifier), address, county, and parcel or lot number as recorded by the county, of the construction project or site;
   c. An accurate (within 15 seconds) latitude and longitude (in degrees/ minutes/ seconds format) of the construction project or site at the point of discharge nearest to the receiving water;
   d. The project start and completion (final stabilization) dates;
   e. The total project acreage and the acreage to be disturbed by the operator submitting the NOI, to the nearest 0.5 acre;
   f. If there is potential for discharge to a municipal separate storm sewer system (including municipal streets and other improvements that can convey stormwater), the name of the municipal operator of the storm sewer;
   g. The name of the waterbody(s) that would be receiving stormwater discharges from the construction project;
   h. For the erosivity waiver, verification that the rainfall erosivity factor calculation that applies to the active construction phase at the project site is less than five calculated using ADEQ's Smart NOI Web site; and
   i. The waiver certification form shall be signed using the electronic signature feature on the Smart NOI Web site and in accordance with the signatory requirements of Appendix B, Subsection 9.

2.0 AUTHORIZATION UNDER THIS GENERAL PERMIT

The operator shall review all the conditions and requirements of this permit before submitting any of the forms described in Part 2.

2.1 Responsibilities of Operators.

2.1.1 All operators. All operators are required to obtain coverage for stormwater discharges associated with construction activity under this permit or an alternative AZPDES permit. For the purposes of this permit, an "operator" is any person associated with a construction project that meets either of the following two criteria:

1. The person has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
2. The person has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the permit).

Subcontractors generally are not considered operators for the purposes of this permit.

2.1.2 Multiple Operators. Where there are multiple operators associated with the same project, all operators are required to obtain permit coverage. The following applies in these situations:

1. If one operator has control over plans and specifications and a different operator has control over activities at the project site, they may divide responsibility for compliance with the terms of this permit as long as they jointly develop a common SWPPP (see Part 6.1(1)), which documents which operator has responsibility for each requirement of the permit.
2. If an operator only has operational control over a portion of a larger project (e.g., one of four homebuilders in a subdivision), the operator is responsible for compliance with applicable effluent limits (see Part 3), terms, and conditions of this permit as it relates to their activities on their portion of the construction site and implementation of control measures described in the SWPPP in the areas under their control.
3. Operators must ensure either directly or through coordination with other operators, that their activities do not render another person's pollutant discharge controls ineffective.
4. If the operator of a construction support activity (see Part 1.3(1)(c)) is different than the operator of the main construction site, that operator is also required to obtain permit coverage.

2.2 Prerequisites for Submitting a Notice of Intent (NOI).

A person may be authorized to discharge under this permit only if the stormwater discharge is associated with construction activities from the project site. Prior to submission of an NOI, an applicant seeking authorization to discharge under this general permit shall:

1. Meet the eligibility requirements under Part 1.2; and
2. Develop a SWPPP that meets the requirements of Part 6 of this permit and that covers either the entire site or all portions of the site for which the person is an operator.
   a. The SWPPP shall be prepared prior to submission of the NOI and shall be implemented prior to the start of construction.
   b. The SWPPP is not required to be submitted to ADEQ (unless the project is within 1/4 mile of an impaired water or OAW as described in Parts 1.5(3) and 1.5(4)) but shall be retained and made available in accordance with Part 6.7.

Note: Emergency-related construction activities (see Part 2.4) are automatically authorized to discharge under this permit (see Appendix A).

2.3 Submitting an NOI.

1. Application Required.

   a. The operator shall submit separate, accurate and complete NOIs to ADEQ for each project that disturbs one or more acres of land. The operator of a common plan of development or sale that will ultimately disturb one or more acres must submit completed NOIs to ADEQ at the address specified in Part 8.2.

   b. Submission of the NOI demonstrates the operator's intent to be covered by this permit; it is not a determination by ADEQ that the operator has met the eligibility requirements for the permit. Discharges are not authorized if ADEQ notifies the operator that further evaluation is necessary, or the discharges are not eligible for coverage under this permit.

   c. Whenever the operator changes or another is added during the construction project, the new operator shall also submit an NOI to be authorized under this permit before taking over operational control or commencing construction activities at the site.

2. NOI Requirements. Construction site operators seeking authorization for stormwater discharges under this general permit shall submit a complete and accurate AZPDES NOI form to ADEQ. Submit to the Department a complete and accurate NOI form electronically via the Smart NOI Web site at: https://az.gov/app/smartnoi/ or submit a paper copy with original signature in accordance with A.A.C. R18-9-C901(D) to the address listed in Part 8.2.

   The NOI form is available at http://www.azdeq.gov/environ/water/permits/cgp.html

   The NOI form requires, at a minimum, the following information:

   a. The name, address, and telephone number of the construction site operator;

   b. The type of project (e.g., school, commercial, subdivision, roadway, etc.) shall be specifically identified on the NOI;

   c. Whether the project is part of a greater plan of development;

   d. Estimates of the total project acreage and the acreage to be disturbed by the operator submitting the NOI;

   e. The printed name (or other identifier), address, county, lot number or parcel or lot number as recorded by the county, of the construction project or site;

   f. An accurate (within 15 seconds) latitude and longitude (in degrees/ minutes/ seconds format) of the construction site at the point nearest the closest receiving water. If the site is located within 1/4 mile of an impaired water or OAW, the operator shall provide the latitude and longitude of the property that is closest to the impaired water or OAW. If the site is part of a larger common plan of development, the operator shall provide the latitude and longitude of the discharge point for the portion of the site covered by that NOI;

   g. Whether any part of the site is located on Indian Country;

   h. Confirmation that a SWPPP meeting the requirements in Part 6 of this permit has been developed and will be implemented prior to commencement of construction activities. If the NOI is a late application, the operator shall certify that a SWPPP has been developed and implemented prior to submittal of the NOI;

   i. The onsite location where the SWPPP may be viewed and the name and telephone number of a contact person;

   j. Provide the name of the closest receiving water, which may include an unnamed wash;

   k. The name(s) of the MS4 into which there is a potential to discharge, if applicable;

l. The project's estimated start and completion dates;

m. Whether the project has or will need any other water quality permits or approvals, including, but not limited to, subdivision approvals, a Clean Water Act (CWA) section 404 permit, and the permit number(s), if applicable;

n. Whether any portion is within 1/4 mile of an impaired or OAW; and

o. All Notice of Intent forms must be signed in accordance with the signatory requirements of Appendix B, Subsection 9.

p. An NOI is not complete unless the appropriate fee is paid.

3. Effective Date of Permit Coverage.

a. Incomplete NOI Submitted. If ADEQ notifies the operator that an NOI is incomplete or incorrect, the operator shall submit an amended NOI if the operator still intends to obtain coverage under this permit.

b. Discharges to Impaired or outstanding Arizona waters. Applicants seeking coverage for a construction site that is located within 1/4 mile of an impaired or outstanding Arizona water are not authorized under this permit for a minimum of 30 calendar days following receipt of the signed NOI, SWPPP and initial application fee. ADEQ may notify operators within this time-frame that there is cause for a SWPPP amendment or denial of coverage as specified in Parts 1.5(3) and 1.5(4) of this permit. If notification is not received in the 30 calendar day time period, the operator may assume coverage under this permit; the operator must verify with the Department that the Surface Water Section received the NOI and SWPPP prior to commencement of construction activities.

c. NOIs Requiring Additional Evaluation. ADEQ may notify an operator that authorization to discharge shall not occur for up to 30 calendar days in the event that review of the NOI identifies information requiring further evaluation, including that the SWPPP be submitted to ADEQ. This notification may be made either in writing, email, by fax or phone contact. Operators receiving notice of a delay in coverage may discharge 30 calendar days after the date the signed NOI is received unless further notice is received from the Department during this time period. Such further notice may confirm authorization to discharge or deny permit coverage and require an application for an individual permit.

If the operator receives notification from ADEQ that the SWPPP is incomplete or otherwise deficient, the operator shall submit a revised SWPPP to ADEQ that addresses the Department's comments if the operator still intends to obtain permit coverage. If review of the revised SWPPP reveals that a discharge of pollutants may cause or contribute to an exceedance of an applicable water quality standard, monitoring may be required, in accordance with Part 7. The revised SWPPP must include the applicable re-review fee. Permit coverage is suspended until the Department issues the permit authorization certificate.

d. Routine Coverage. Except as provided in Parts 2.3(3)(a) through (c), an eligible operator is authorized to discharge stormwater from a construction project 7 calendar days after a complete and accurate NOI is received by ADEQ's Surface Water Section or when an authorization certificate is issued, whichever is earlier. However, in order to rely on the 7 calendar day "default" provision, the operator must submit the NOI in a manner that documents the date of ADEQ's receipt (i.e., certified mail, hand delivery, etc.).

Alternatively, applicants that submit a SMART NOI using the electronic signature feature will typically obtain immediate authorization unless any portion of the site is located within 1/4 mile of an impaired water or OAW.

e. Ongoing Construction Projects. For operators of construction projects ongoing as of the effective date of this permit that received authorization to discharge for these projects

under the expired Construction General Permit (AZG2008-001), coverage will automatically transfer to CGP 2013 and remain in effect until the operator submits an NOT (in accordance with Part 2.5). An operator that has had authorization automatically transferred and re-issued shall comply with the terms of this permit, as described in i., ii. and iii. below. Parts 2.3(3)(b), (c) and (d) do not apply to operators of on-going construction projects that were authorized to discharge under AZG2008-001.

i. Within the first 120 days from the effective date of this permit, the operator shall update the SWPPP as necessary to comply with the requirements of Part 6 of this permit.

ii. The operator may continue to comply with the terms and conditions of the expired AZG2008-001 until the SWPPP is updated, within the first 120 days from the effective date of this permit.

iii. An operator may submit an NOT within the first 120 days from the effective date of this permit, if the operator is eligible to submit an NOT (e.g., construction is finished and final stabilization has been achieved).

f. Change in Operators. For construction projects where the operator changes, including instances where an operator is added after an NOI has been submitted, the new operator shall submit an NOI and receive an authorization certificate before assuming operational control or commencing work on-site (see Appendix B, Subsection 19).

g. Certificate of Authorization. The operator will receive an authorization certificate (by mail, or electronically via the Smart NOI system for electronic submittals with e-signatures) assigning an authorization number and approval date.

Note: The Certificate of Authorization is not the permit. The authorization certificate acknowledges that the Department received the NOI and that the operator is authorized to discharge subject to the terms and conditions of this permit. Correspondence with ADEQ concerning any construction activity covered by this permit shall reference the authorization number.

4. Late Applications. The operator is only permitted for discharges that occur after a complete and accurate NOI is received by ADEQ and authorization is granted. ADEQ reserves the right to take enforcement action for any un-permitted discharges or permit noncompliance that occur between the time construction commenced and either permit authorization is granted, denied, or a complete and accurate Permit Waiver Certification form is submitted and the wavier is approved.

5. Discharges to a regulated MS4. Construction sites located within a regulated MS4 shall submit a copy of the Department's Authorization to Discharge to the MS4 operator. A list of regulated MS4s is found at http://www.azdeq.gov/environ/water/permits/stormwater.html#ms4s.

6. Revised NOI. If personnel contact information or the operator address on the NOI filed for permit coverage changes during permit coverage, the operator shall submit a revised NOI to ADEQ indicating the updated information. If information other than personnel contact or the operator's address changes, a new NOI shall be submitted to the address specified in Part 8.2. No fee is assessed for submitting a revised NOI.

2.4 Authorization of Emergency-Related Construction Activities

Emergency-related construction activities are automatically authorized provided that:

1. The project is being performed in order to avoid imminent endangerment to human health or the environment or in response to a emergency and the activity requires immediate authorization;

2. If the activity continues past 30 calendar days of commencing construction activities (see Part 2.2), the operator shall prepare a SWPPP and submit a complete and accurate NOI;
3. The operator provides documentation in the SWPPP to substantiate the occurrence of the public emergency; and
4. The operator complies with all other applicable requirements in the permit regarding discharges associated with the construction activities.

Note: Operators of emergency-related construction activities are considered provisionally covered under the terms and conditions of this permit immediately, unless ADEQ notifies the operator that the authorization has been delayed or denied.

2.5 Terminating Coverage.

1. Notice Required. To terminate permit coverage, the operator shall submit a complete and accurate Notice of Termination (NOT) form to the address listed in Part 8.2. Other NOT options (i.e., electronic submission) may also be used if ADEQ makes the information available on the Internet of or by public notice. The operator is responsible for meeting the terms and conditions of this permit until the construction site's authorization is terminated.

   All NOT forms must be signed in accordance with the signatory requirements of Appendix B, Subsection 9.

   The operator may submit a complete and accurate NOT form to ADEQ after any of the following conditions have been met:

   a. The operator has established final stabilization on all portions of the site for which the operator is responsible, in accordance with Part 3.1.2.2.
   b. Another operator who has a valid authorization number under this general permit or an individual AZPDES permit has assumed control over all areas of the site that have not been finally stabilized (see Appendix B, Subsection 19);
   c. For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner (or a homeowner's association) in accordance with Part 3.1.2.2(2)(b);
   d. The planned construction activity identified on the original NOI was never initiated (i.e., no grading or earthwork was ever started) and plans for construction have been permanently abandoned or indefinitely postponed;
   e. The operator has obtained coverage for the site under another AZPDES permit;
   f. The operator qualifies for one of the stabilization alternatives in Part 3.1.2.3. If qualifying for either alternative, the operator shall submit the required documentation with the NOT demonstrating compliance with Part 3.1.2.3.

   Note: NOTs can only be submitted to ADEQ for those sites which obtained timely permit authorization by submitting a complete and accurate NOI. Sites which did not receive permit authorization have no permit coverage to terminate.

2. NOT Requirements. The operator shall submit to ADEQ a complete and accurate NOT form electronically via the Smart NOI Web site at: https://az.gov/app/smartnoi/ or submit a paper copy (photocopy/ fax/ e-mail/ electronic) to the address listed in Part 8.2. All NOT forms must be signed in accordance with the signatory requirements of Appendix B, Subsection 9.

   Note: The operator shall receive an acknowledgement letter upon ADEQ's receipt of the operator's completed NOT form.

3. Notification to Municipal Separate Storm Sewer Systems. If the construction site was located within a regulated MS4, the operator shall send a copy of the NOT acknowledgement letter to the MS4 operator. A list of regulated MS4s is found at http://www.azdeq.gov/environ/water/permits/stormwater.html#ms4s.

4. Effective Date of Permit Termination. Authorization to discharge terminates under this permit at midnight on the date the complete NOT is received by the Department.

2.6 Change of Operator Request due to Foreclosure or Bankruptcy.

If a lending institution or another person takes operational control of the permitted construction site due to foreclosure or bankruptcy then that person is responsible for discharges from the construction site and shall submit an application for permit coverage within 14 days prior to taking control of the site if the construction site has not achieved final stabilization as defined in Part 3.1.2.2.

In the event the person taking control of the construction site fails to submit an application for the construction site, the permittee may submit a petition to the department to terminate permit coverage by submitting a Change of Operator Request (COR) form (available at http://www.azdeq.gov/environ/water/permits/cgp.html). In making this request, the permittee must no longer have access to the property and shall submit the following information:

1. The date of the loss of control of the construction site;
2. identifies the person that has control of the construction site;
3. Identifies the reasons for being unable to submit a NOT that complies with the requirements of Part 2.5;
4. Submits a copy of the SWPPP and associated review fee with the COR;
5. The permittee shall provide an update in the SWPPP documenting conditions at the time of loss of control. The permittee shall indicate areas of exposed soils and material stockpiles; the location, type and quantity of chemicals storage; the existing BMPs left in place and their condition; and areas that have been stabilized. The permittee shall indicate if there is public access to the site (e.g., perimeter fence, gate, etc). The Permittee shall also identify any conditions which may be dangerous or hazardous, or may pose a significant environmental threat.
6. Documentation that the permittee informed the person taking control of the construction site of the requirements of this permit; and
7. If the construction site has the potential to discharge to a regulated MS4, documentation that the permittee notified the MS4 of the change in control and the identity and contact information for the person that has control.

ADEQ will review the COR and related information to determine appropriate actions, including (but not limited to) terminating permit coverage for the original permittee. As part of this assessment, the department may conduct a site inspection. Submitting a COR does not suspend ongoing enforcement actions and does not preclude the department from taking enforcement actions for violations of this permit.

3.0 EFFLUENT LIMITATIONS AND WATER QUALITY STANDARDS APPLICABLE TO ALL DISCHARGES FROM CONSTRUCTION SITES

The control requirements in this Part implement the technology-based effluent limitations to meet water quality standards that, where applicable, apply to all stormwater and allowable non- stormwater discharges from construction sites eligible for coverage under this permit. These requirements apply the national effluent limitations guidelines and new source performance standards found at 40 CFR Part 450. The operator shall comply with the control measures requirements included in Part 3 through site planning and designing, installing, and maintaining these controls.

Exception for ongoing construction projects

Note: If a project is an "ongoing construction project" (see Part 2.3(3)(e)), and it is infeasible for the operator to comply with a specific requirement in Part 3.1 because (1) the requirement was not part of the permit the project was previously covered under (i.e., AZG2008-001) and (2) the operator is prevented from compliance due to the nature or location of earth disturbances at the site or the operator is unable to comply with the requirement due to the manner in which control measures have already been installed or were already designed prior to October 1, 2013, the operator does not have to comply with that requirement provided that this fact is documented in the SWPPP. This exception only applies to those portions of a project that have already commenced earth-disturbing activities or where control measures implemented in compliance with the previous permit have already been installed.

3.1. Non-numeric Effluent Limitations and Associated Control Measures

Whenever applicable, the operator shall design, install and maintain the following control measures at construction sites:

- Erosion and sediment control (Part 3.1.1)
- Site stabilization (Part 3.1.2)
- Pollution prevention (Part 3.1.3)
- Controls for Allowable Non-Stormwater Discharges and Dewatering Activities (Part 3.1.4)

General Maintenance Requirements.

1. Ensure that all control measures required in this Part remain in effective operating condition during permit coverage and are protected from activities that would reduce their effectiveness.
2. Inspect all control measures in accordance with the inspection requirements in Part 4. The operator shall document the findings in accordance with Part 4.5. When controls need to be replaced, repaired, or maintained, make the necessary repairs or modifications. Routine maintenance does not constitute a corrective action (see Part 5.1). The operator shall comply with the following schedule:
    a. Initiate work to fix the problem immediately after discovery, and complete such work by the close of the next work day, if feasible and the problem does not require significant maintenance, repair or replacement, or if the problem can be corrected through routine maintenance. SWPPP recordkeeping is not required for actions taken under this paragraph.
    b. When installation of a new control that is not in response to a corrective action in Part 5.1, or a significant repair of existing controls is needed, install the new or modified control and make it operational, or complete the repair, by no later than 7 calendar days from the time of discovery, or before the next storm event (whichever is sooner) where feasible. If it is infeasible to complete the installation or repair within 7 calendar days or before the next storm event, SWPPP records must document why it is infeasible. The SWPPP must also document the schedule for installing the control(s) and making it operational as soon as practicable after the 7-day timeframe. Where these actions result in changes to any of the controls or

procedures documented in the SWPPP, modify the SWPPP accordingly within 7 calendar days of completing this work.

3.1.1 Erosion and Sediment Control Requirements.

Design, install and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. The operator shall minimize the amount of soil exposed during construction activities. The operator is also subject to the deadlines for temporarily and/or permanently stabilizing exposed portions of the site in accordance with Part 3.1.2.

The following general requirements are applicable to all construction sites that implement the erosion and sediment controls in Part 3.1.1.

A. Design Requirements.

1. The operator shall account for the following factors in designing control measures:

   a. The expected amount, frequency, intensity, and duration of precipitation;

   b. The nature of stormwater runoff and run-on at the site, including factors such as expected flow from impervious surfaces, slopes, and site drainage features. If any stormwater flow will be channelized at the site, control measures must be designed to control both peak flowrates and total stormwater volume to minimize erosion at outlets and to minimize downstream channel and streambank erosion; and

   c. The range of soil particle sizes expected to be present on the site.

2. The operator shall direct discharges to vegetated areas of the site to increase sediment removal and maximize stormwater infiltration, including any natural buffers established under Part 3.1.1.6(1), unless infeasible. Use velocity dissipation devices if necessary to prevent erosion when directing stormwater to vegetated areas.

B. Installation Requirements.

1. Complete the installation of control measures by the time each phase of earth-disturbance has begun. In the event it is infeasible to install one or more control measures prior to construction activity, the operator shall ensure that those controls are installed as soon as possible. SWPPP records must document why it is infeasible.

   Following the installation of these initial control measures, all other controls planned for this portion of the site and described in the SWPPP must be installed and made operational as soon as conditions on the site allow. The requirement to install control measures prior to earth-disturbance for each phase of the project does not apply to the earth disturbance associated with the actual installation of these controls.

2. Use good engineering practices and follow manufacturer's specifications. The operator shall install all control measures in accordance with good engineering practices, including applicable design specifications. Design specifications may be found in manufacturer specifications and/or in applicable erosion and sediment control manuals or local ordinances. Any departures from such specifications must reflect good engineering practice and must be explained in the SWPPP.

3.1.1.1 Control stormwater volume and velocity within the site to minimize soil erosion;

1. Run-on Management. If off site areas direct flow onto the construction site, divert run-on flows, or otherwise provide other appropriate control measures to account for off site contributions of stormwater and non-stormwater flow.

   If stormwater conveyance channels are used at the site, the operator shall design and construct them to avoid unstabilized areas and to reduce erosion, unless infeasible. Minimize erosion of channels and their embankments, outlets, adjacent streambanks, slopes, and downstream waters during discharge conditions through the use of erosion controls and

velocity dissipation devices within and along the length of any constructed stormwater conveyance channel, and at any outlet to provide a non-erosive flow velocity.

2. Sediment Basins and Traps. If necessary, the operator shall install and maintain sediment basin(s) and / or traps to manage run-on, runoff, and sediment discharge from the construction site.

   a. Design requirements. The SWPPP shall provide sizing and calculation requirements for sediment basin(s) and shall indicate whether the basin(s) will be temporary or permanent.

      i. When discharging from the sediment basin, utilize outlet structures that minimize pollutants;

      ii. Prevent erosion of (1) the sediment basin using stabilization controls (e.g., erosion control blankets), and (2) the inlet and outlet using erosion controls and velocity dissipation devices; and

      iii. Sediment basins must be situated outside of surface waters and any natural buffers established under Part 3.1.1.5, unless approved under a CWA section 404 permit.

   b. Maintenance requirements. The operator shall maintain sediment basins, ponds, and traps, and remove accumulated sediment when design capacity has been reduced by 50%.

   c. An operator that uses polymers, flocculants, or other cationic treatment chemicals in a sediment basin shall select and use these chemicals in accordance with manufacturers' instructions so as to provide for adequate settling time and minimize or eliminate these chemicals in the discharge. Furthermore, the operator shall comply with the requirements in Part 6.3(10).

3.1.1.2 Control stormwater discharges, including both peak flowrates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and streambank erosion;

1. Culvert Stabilization. If culverts are present on the site, the SWPPP shall include measures to sufficiently minimize the threat of erosion at culvert locations to prevent the formation of rills and gullies during construction; and

2. Velocity Dissipation Devices. The operator shall place velocity dissipation devices along the length of any outfall channel on-site, and at locations where discharges leave the construction site as necessary to provide a non-erosive flow velocity.

3.1.1.3 Minimize the amount of soil exposed and the disturbance of steep slopes during construction activity;

1. Preserving Natural Vegetation. Where practicable, existing vegetation should be preserved. If natural vegetation can be preserved, the operator shall clearly mark vegetation before clearing activities begin. Locations of trees and boundaries of environmentally sensitive areas and buffer zones to be preserved shall be identified on the SWPPP site map;

2. Phase or sequence construction activities. Where practicable, minimize the area of disturbance at any one time.

3. Steep slopes. Where practicable, implement standard erosion and sediment control practices, such as phasing disturbances to these areas and using stabilization practices designed to be used on steep grades.

3.1.1.4 Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site;

1. Perimeter Control. The operator shall use appropriate control measures (e.g., fiber rolls, berms, silt fences, vegetative buffer strips, sediment traps, or equivalent sediment controls) at all times for all down slope boundaries (and for those side slope boundaries deemed appropriate as dictated by individual site conditions) of the construction site.

   For sites where stormwater from disturbed areas, exclusive of rights-of-way, is conveyed to one or more retention basins that are designed to retain stormwater runoff from a local 100 yr/ 2 hr storm event, the operator is not required to utilize perimeter controls.

   For linear projects (see Appendix A) with rights-of-way that restrict or prevent the use of such perimeter controls, the operator shall maximize the use of these controls where practicable and document in the SWPPP why it is impracticable in other areas of the project.

2. Control discharges from stockpiles of sediment or soil. As necessary, implement the following measures for any stockpiled or land clearing debris composed, in whole or in part, of sediment or soil:

   a. Place stockpiles outside of washes or other surface waters, or stormwater conveyances, such as curb and gutter systems, or streets leading to such conveyances. If infeasible, install appropriate sediment controls and document the reasons in the SWPPP.

   b. Locate the piles outside of any buffers established consistent with Part 3.1.1.5;

   c. Protect from contact with stormwater (including run-on) using a temporary perimeter sediment barrier;

   d. Avoid rinsing sediment, debris, or other pollutants accumulated on pavement or other impervious surfaces after the stockpile has been removed into any stormwater conveyance (unless connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface water;

   e. To the extent practicable, implement control measures to prevent the generation of wind blown sediment and debris; and

   f. Use silt fences or other effective sediment control measures around soil stockpiles except when they are being actively worked.

3. Storm Drain Inlet Protection. The operator shall assess the need for and install inlet protection measures as necessary that remove sediment from the site's discharge. If the site discharges to any storm drain inlet that carries stormwater flow directly to a surface water (and it is not first directed to a sediment basin, sediment trap, or similarly effective control and the operator has authority to access the storm drain inlet), then inlet protection is required.

   Note: Inlet protection measures can be removed in the event of flood conditions that may endanger the safety of the public. Such actions are allowable only under extreme conditions and shall be documented on the SWPPP. The operator shall evaluate alternatives to be used in the future to prevent a recurrence of this problem.

4. If existing control measures need to be repaired or modified or if additional control measures are necessary, implementation shall be completed within 7 calendar days or before the next storm event (whichever is sooner), unless otherwise prescribed in a. through d. below. If implementation before the next storm event is impracticable, the reason(s) for delay shall be documented in the SWPPP and alternative control measures shall be implemented as soon as possible. Additionally, the following maintenance activities shall be implemented as follows:

   a. Remove accumulated sediment when it reaches a maximum of one-third the height of the silt fence or one-half the height of a fiber roll.

   b. Sediment shall be removed from temporary and permanent sedimentation basins, ponds and traps when the depth of sediment collected in the basin reaches 50% of the storage capacity.

c. Construction site egress location(s) shall be inspected for evidence of off-site tracking of sediment, debris, and other pollutants onto paved surfaces. Removal of sediment, debris, and other pollutants from all off-site paved areas shall be completed as soon as practicable.

d. Accumulations of sediment, debris, and other pollutants observed in off-site surface waters, drainage ways, catch basins, and other drainage features shall be removed in a manner and at a frequency sufficient to minimize impacts and to ensure no adverse effects on water quality.

3.1.1.5 Maintain natural buffers adjacent to perennial waters and direct stormwater to vegetated areas to increase sediment removal, unless infeasible.

1. Provide Natural Buffers or Equivalent Sediment Controls. This requirement only applies when a perennial water (including lakes, unless infeasible) is located within 50 feet of the project's earth disturbances.

   Areas not owned or that are otherwise outside the operational control of the operator may be considered areas of undisturbed natural buffer for purposes of compliance with this part.

   The operator shall ensure that any discharges to perennial waters through the area between the disturbed portions of the property and any perennial waters located within 50 feet of the site are treated by an area of undisturbed natural buffer and/or additional erosion and sediment controls in order to achieve a reduction in sediment load equivalent to that achieved by a 50-foot natural buffer. Refer to Part 3.1.1.5(3) for exceptions to this requirement.

2. Alternatives. In areas where it is infeasible to maintain the 50 foot buffer, the operator shall:

   a. Document in the SWPPP the reasons why the 50 foot buffer cannot be maintained, and identify the additional erosion and sediment controls selected;

   b. Preserve as much buffer as possible and design, implement and maintain additional erosion and sediment controls (such as berms, diversion dikes, sediment basins, etc.);

   c. Ensure that all discharges from the area of earth disturbance to the natural buffer are first treated by the site's erosion and sediment controls, and use velocity dissipation devices if necessary to prevent erosion caused by stormwater within the buffer;

   d. Document in the SWPPP the natural buffer width retained on the property, and show the buffer boundary on the site plan;

   e. Delineate, and clearly mark off, with flags, tape, or other similar marking device all natural buffer areas; and

   f. Follow the additional stabilization requirements described in Part 3.1.2.1.

Note: The operator is not required to enhance the quality of the vegetation that already exists in the buffer, or provide vegetation if none exists.

3. Exceptions.

   a. If there is no discharge of stormwater to perennial waters through the area between the site and any perennial waters located within 50 feet of the site, the operator is not required to comply with the requirements in this Part. This includes situations where control measures, such as a berm or other barrier that will prevent such discharges, have been implemented.

   b. Where no natural buffer exists due to preexisting development disturbances (e.g., structures, impervious surfaces) that occurred prior to the initiation of planning for the current development of the site, operators are not required to comply with the requirements in this Part, unless portions of the preexisting development are removed.

Where some natural buffer exists but portions of the area within 50 feet of the perennial water are occupied by preexisting development disturbances, operators are required to comply with the requirements in this Part. For the purposes of calculating the sediment load reduction, an operator is not expected to compensate for the reduction in buffer function from the area covered by these preexisting disturbances.

If, during the life of the project, any portion of these preexisting disturbances will be disturbed, the area disturbed will be deducted from the area treated as natural buffer.

c. Linear projects are not required to comply with the requirements in this Part if site constraints (e.g., limited right-of-way) prevent the operator from meeting any of the compliance alternatives in Part 3.1.1.5(2), provided that, to the extent practicable, disturbances are limited to within 50 feet of the perennial water and/or the operator provides supplemental erosion and sediment controls to treat stormwater discharges from earth disturbances within 50 feet of the perennial water. The operator shall document in the rationale for why it is infeasible to comply with the requirements in Part 3.1.1.5(2) in the SWPPP, and describe any buffer width retained and/or supplemental erosion and sediment controls installed.

d. "Small residential lot" construction (see Appendix A) is exempt from buffer requirements, provided that the operator minimizes the discharge of pollutants by complying with the requirements of Parts 3.1.1.1 through 3.1.1.4.

e. The following disturbances within 50 feet of a perennial water are exempt from the requirements in this Part:

- Construction approved under a CWA section 404 permit; or
- Construction of a water-dependent structure or water access area (e.g., pier, boat ramp, trail).

Any of the above disturbances that may occur within the buffer area shall be documented in the SWPPP.

3.1.1.6 The operator shall minimize soil compaction and, unless infeasible, preserve topsoil (for later revegetation).

Minimize soil compaction in areas of the site where final vegetative stabilization will occur or where infiltration practices will be installed.

3.1.2 Site Stabilization Requirements, Schedules and Deadlines.

The operator shall comply with the stabilization requirements in this Part to minimize the discharge of pollutants.

3.1.2.1 Temporary Stabilization.

The operator must provide temporary stabilization, or initiate permanent stabilization, of disturbed areas within 14 calendar days of the most recent land disturbance in areas where construction or support activities have been temporarily suspended or have permanently ceased, except as follows:

1. Where stabilization by the 14th day is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable;
2. When the site is using vegetative stabilization and is located in an area of the state experiencing drought conditions (see Appendix A), vegetative stabilization measures shall be initiated as soon as practicable, when growing conditions are best for planting or seeding;
3. Stabilization shall be initiated within 7 calendar days, for areas within 50 feet of an impaired water or OAW.

4. Where disturbed areas are awaiting vegetative stabilization for periods greater than 14 calendar days after the most recent disturbance, non-vegetative methods of stabilization shall be employed. These methods shall be described in the SWPPP.

5. Seeding/ Vegetation. If revegetation plans include seeding, the SWPPP shall include seed mix and application specifications that will be used for vegetative stabilization. If the operator uses fertilizers or tackifiers on-site to establish vegetation, control measures shall be established to minimize the presence of these chemicals in the discharge.

Note: The operator is not expected to apply temporary or permanent stabilization measures to areas that are intended to remain unvegetated or unstabilized following construction (e.g., dirt access roads, utility pole pads, areas being used for storage of vehicles, equipment, or materials).

3.1.2.2 Final Stabilization.

Final stabilization means that one of the following conditions (1, 2, or 3) is met:

1. All soil disturbing activities at the site have been completed; all construction materials, waste, and temporary erosion and sediment control measures (including any sediment that was being retained by the temporary erosion and sediment control measures) have been removed and properly disposed; and either a. and/ or b. below is met:

   a. A uniform (i.e., evenly distributed, without large bare areas) vegetative cover with a density of 70% of the native background vegetative cover for the area is in place on all unpaved areas and areas not covered by permanent structures.

      When preconstruction native background vegetation covered less than 100% of the ground (e.g., arid areas, beaches), the 70% coverage criteria is adjusted as follows: if the native vegetation covered 50% of the ground, 70% of 50% (.70 X .50 = .35) or 35% cover density would be required, or

   b. Equivalent permanent stabilization measures (such as the use of riprap, gabions, gravel, or geotextiles) have been employed.

2. For individual lots in residential construction, final stabilization means that the homebuilder:

   a. Has completed final stabilization as specified in Part 3.1.2.2(1)(a) above, or

   b. Has established temporary stabilization, including perimeter controls, for an individual lot prior to occupation of the home by the homeowner and has informed the homeowner of the need for, and benefits of, final stabilization.

3. For construction projects on land used for agricultural purposes (e.g., pipelines across crop or range land), final stabilization may be accomplished by returning the disturbed land to its preconstruction agricultural use. Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately adjacent to water of the U.S., and areas that are not being returned to their preconstruction agricultural use shall meet the final stabilization criteria above.

Any non-vegetative stabilization methods must achieve the same levels of stabilization as specified in Part 3.1.2.2(1).

3.1.2.3 Site Stabilization Alternatives.

An operator with an eligible site may choose either of the following alternatives instead of implementing the stabilization requirements in Parts 3.1.2.1 or 3.1.2.2:

1. *Sites with additional retention capacity (see A.R.S. § 49 – 255.01(L))*. Stabilization deadline requirements in this permit do not apply to sites with retention capacity that meets or exceeds the 100 year/ 2 hour storm event as calculated by an Arizona registered professional engineer, geologist or landscape architect (A.R.S. § 32-144) and that meet the following conditions:

a. The nearest receiving water is ephemeral and not within 2.5 miles of a perennial or intermittent water body;
b. All stormwater generated by disturbed areas of the site, exclusive of public rights-of-way, is directed to one or more retention basins;
c. The operator complies with good housekeeping measures;
d. The operator maintains capacity of retention basin(s); and
e. The operator determines temporary and final stabilization requirements for the site to reduce or minimize the discharge of sediment and other pollutants to meet the requirements of Part 3.2.

Note: for the purposes of this permit, retention and detention are equivalent terms and mean that stormwater is held in a basin on-site up to the design capacity of the basin. However, local ordinances may have specific requirements for on-site stormwater detention/ retention.

2. *Sites returned to pre-construction discharge conditions*. Construction operators may qualify for this exemption by demonstrating that stormwater discharge from the site's pre- and post-construction activities is equal or less than in volume and pollutant load from disturbed areas as calculated by an Arizona registered professional engineer, geologist or landscape architect and where the site is not located within 2.5 miles of an impaired water or OAW.

The above demonstrations must be documented and retained with the SWPPP and submitted with the NOT, in accordance with Part 2.5(1)(f).

3.1.3 Pollution Prevention Requirements.

The operator shall design, install, implement, and maintain effective pollution prevention measures to minimize the discharge of pollutants. To meet this requirement, the operator shall comply with the following:

- Eliminate certain pollutant discharges from the site (see Part 1.4, Prohibited Discharges);
- Properly maintain all pollution prevention controls (see Part 3.1, General Maintenance Requirements); and
- Comply with pollution prevention standards for pollutant-generating activities that occur at the site (see Parts 3.1.3.1 through 3.1.3.3).

The operator shall comply with the pollution prevention standards in this Part if any of the following activities are conducted at the site or at any construction support activity areas covered by this permit (see Part 1.3(1)(c)).

3.1.3.1 Minimize the Discharge of Pollutants – from equipment and vehicle washing, wheel wash water, and other wash waters.

1. Concrete Washout. To comply with the prohibition in Part 1.4(1) for discharges of wastewater from washout of concrete:
   a. Where possible, concrete suppliers should conduct washout activities at their own plants or dispatch facilities.
   b. If conducted at the construction site, the operator shall employ measures to contain and manage on-site concrete washout to prevent discharge (see Part 6.3).
   c. Specify locations of concrete washout activities that will occur at the construction site.
2. Washing of equipment and vehicles. Any operator that washes equipment or vehicles on site shall implement the following control measures:
   a. Provide an effective means of minimizing the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of washing; and

b. To comply with the prohibition in Part 1.4(4), for storage of soaps, detergents, or solvents, the operator shall provide either (1) cover (e.g., plastic sheeting or temporary roofs) to prevent these detergents from coming into contact with rainwater, or (2) a similarly effective means designed to prevent the discharge of pollutants from these areas.

3. Washing of Applicators and Containers used for Paint or Other Materials. To comply with the prohibition in Part 1.4(2), the operator shall provide an effective means of eliminating the discharge of water from the washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials. To comply with this requirement, the operator shall:

   a. Direct all washwater into a leak-proof container or leak-proof pit. The container or pit must be designed so that no overflows can occur due to inadequate sizing or precipitation;

   b. Locate any washout or cleanout activities as far away as possible from surface waters and stormwater inlets or conveyances, and, to the extent practicable, designate areas to be used for these activities and conduct such activities only in these areas; and

   c. Handle washout or cleanout wastes as follows:

      i. Do not dump liquid wastes in storm sewers;

      ii. Dispose of liquid wastes in accordance with applicable requirements in Part 3.1.3.3;

4. Fueling and Maintenance of Equipment or Vehicles. Any operator that conducts fueling and/or maintenance of equipment or vehicles at the site shall provide an effective means of eliminating the discharge of spilled or leaked chemicals, including fuel, from the area where these activities will take place.

   To comply with the prohibition in Part 1.4(3), operators shall:

   a. If applicable, comply with the Spill Prevention Control and Countermeasures (SPCC) requirements in 40 CFR 112 and Section 311 of the CWA;

   b. Ensure adequate supplies are available at all times to handle spills, leaks, and disposal of used liquids;

   c. Use drip pans and absorbents under or around leaky vehicles;

   d. Dispose of or recycle oil and oily wastes in accordance with other federal, state, tribal, or local requirements;

   e. Clean up spills or contaminated surfaces immediately, using dry clean up measures where possible, and eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge; and

   f. Do not clean surfaces by hosing the area down.

3.1.3.2 Construction Site Egress. The operator shall implement effective control measures to minimize tracking of sediments, debris and other pollutants from vehicles and equipment leaving the site (e.g., stone pads, concrete or steel wash racks, or equivalent systems).

If site conditions make it infeasible to install structural controls to prevent track-out (e.g., a linear operator conducting earth disturbing activities within a paved right-of-way or immediately adjacent and parallel to a paved right-of-way), the operator shall explain in the SWPPP why such controls cannot be installed; what alternative measures will be used to prevent sediment from being tracked-out or accumulated on paved areas; and what procedures will be used to ensure track-out is discovered and removed as soon as practicable.

The reasons for any departure from the use of standard ingress/ egress control measures to control track-out shall be documented in the SWPPP:

1. Explain why structural control measures cannot be installed;
2. Describe what alternative measures will be used to prevent sediment from being tracked-out or accumulated on paved areas; and
3. Describe what procedures will be used to ensure track-out is discovered and removed as soon as practicable.

Note: Some fine grains may remain visible on the surfaces of paved roads even after implementing sediment removal practices. Such "staining" is not a violation of Part 3.1.3.2.

3.1.3.3 The operator shall minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on the site to precipitation and to stormwater.

1. Good Housekeeping Measures. The operator shall implement good housekeeping procedures to prevent litter, construction debris, and construction chemicals exposed to stormwater from becoming a pollutant source for stormwater discharges. These procedures shall include storage practices to minimize exposure of the materials to stormwater, and spill prevention and response practices.
2. Storage, Handling, and Disposal of Construction Products, Materials, and Wastes. The operator shall minimize the exposure to stormwater of any of the products, materials, or wastes specified below that are present at the site by complying with the requirements in this Part.

   Note: These requirements do not apply to those products, materials, or wastes that are not a source of stormwater contamination or that are designed to be exposed to stormwater.

   The operator shall consider and implement the following control measures, as appropriate:

   a. For building products: In storage areas, provide either (1) cover (e.g., plastic sheeting or temporary roofs) to prevent these products from coming into contact with rainwater, or (2) a similarly effective means designed to prevent the discharge of pollutants from these areas.
   b. For pesticides, herbicides, insecticides, fertilizers, and landscape materials:
      i. In storage areas, provide either (1) cover (e.g., plastic sheeting or temporary roofs) to prevent these chemicals from coming into contact with rainwater, or (2) a similarly effective means designed to prevent the discharge of pollutants from these areas; and
      ii. Comply with all application and disposal requirements included on the registered pesticide, herbicide, insecticide, and fertilizer label.
   c. For diesel fuel, oil, hydraulic fluids, other petroleum products, and other chemicals:
      i. To comply with the prohibition in Part 1.4(3), store chemicals in water-tight containers, and provide either (1) cover (e.g., plastic sheeting or temporary roofs) to prevent these containers from coming into contact with rainwater, or (2) a similarly effective means designed to prevent the discharge of pollutants from these areas (e.g., spill kits), or provide secondary containment (e.g., spill berms, decks, spill containment pallets); and
      ii. Clean up spills immediately, using dry clean-up methods where possible, and dispose of used materials properly. Do not clean surfaces or spills by hosing the area down. Eliminate the source of the spill to prevent a discharge or a continuation of an ongoing discharge.
   d. For hazardous or toxic waste:

i. Separate hazardous or toxic waste from construction and domestic waste;

ii. Store in sealed containers, which are constructed of suitable materials to prevent leakage and corrosion, and which are labeled in accordance with applicable Resource Conservation and Recovery Act (RCRA) requirements and all other applicable federal, state, tribal, or local requirements;

iii. Store all containers that will be stored outside within appropriately-sized secondary containment (e.g., spill berms, decks, spill containment pallets) to prevent spills from being discharged, or provide a similarly effective means designed to prevent the discharge of pollutants from these areas (e.g., storing chemicals in covered area or having a spill kit available on site);

iv. Dispose of hazardous or toxic waste in accordance with the manufacturer's recommended method of disposal and in compliance with federal, state, tribal, and local requirements; and

v. Clean up spills immediately, using dry clean-up methods where possible, and dispose of used materials properly. Do not clean surfaces or spills by hosing the area down. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge.

e. For construction and domestic waste: Provide waste containers (e.g., dumpster or trash receptacle with covers/ lids) of sufficient size and number to contain construction and domestic wastes. In addition:

i. On work days, clean up and dispose of waste in designated waste containers; and

ii. Clean up immediately if containers overflow.

f. For sanitary waste: Position portable toilets outside of areas of stormwater flow and ensure that they are secure and will not be tipped over.

3.1.3.4 Spill Prevention and Response Procedures. Operators are prohibited from discharging toxic or hazardous substances from a spill or other release, consistent with Part 1.4. The operator shall minimize the potential for leaks, spills and other releases that may be exposed to stormwater and develop plans for timely and effective clean-up of spills if or when they occur by implementing measures such as:

- Procedures for plainly labeling containers (e.g., "Used Oil," "Spent Solvents," "Fertilizers and Pesticides," etc.) that could be susceptible to spillage or leakage to encourage proper handling and facilitate rapid response if spills or leaks occur;
- Preventative measures such as barriers between material storage and traffic areas, secondary containment provisions, and procedures for material storage and handling;
- Procedures for expeditiously stopping, containing, and cleaning up leaks, spills, and other releases. Employees who may cause or detect a spill or leak should be knowledgeable in the proper reporting procedures established by their facility. Employees who are responsible for spill response and/or cleanup, must be properly trained and have necessary spill response equipment available; and
- Procedures for notification of appropriate facility personnel and emergency response. Where a leak, spill, or other release occurs that contains a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, the operator shall notify ADEQ Emergency Response Duty Office at (602) 771-2330 or, toll free, at (800) 234-5677. Contact information must be in locations that are readily accessible and available. Within 7 calendar days of knowledge of the release, operators shall provide a description in the SWPPP of: the release; the circumstances leading to the release; and the date of the release. Local requirements may necessitate additional reporting of spills or discharges to local emergency response, public health, or drinking water supply agencies.

3.1.3.5 Fertilizer Discharge Restrictions.

Operators are required to minimize discharges of fertilizers containing nitrogen or phosphorus by applying these products consistent with manufacturer's specifications.

3.1.4 Controls for Allowable Non-Stormwater Discharges and Dewatering Activities.

Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls. Appropriate controls include, but may not be limited to: sediment basins or traps; dewatering tanks; tube settlers; weir tanks; or filtration systems (e.g., bag or sand filters) that are designed to remove sediment.

The operator shall ensure all water from dewatering or basin draining activities is discharged in a manner that does not cause nuisance conditions, including erosion in receiving channels or on surrounding properties.

The operator shall retain superchlorinated wastewaters (i.e., containing chlorine above residual levels acceptable in drinking water systems) on-site until the chlorine dissipates, or shall otherwise effectively dechlorinate the water prior to discharge.

Note: As with any non-stormwater, if acceptable to the local sanitary sewer authority, this wastewater may be discharged to the sanitary sewer. In this case, dechlorination is not required by this permit.

3.2 Water Quality Standards

3.2.1 Water Quality Standards

The operator shall control discharges from the site as necessary to not cause or contribute to an exceedance of an applicable water quality standard.

ADEQ expects that compliance with other conditions in this permit will control discharges as necessary to not cause or contribute to an exceedance of an applicable water quality standard (A.A.C.R18-11, Article 1). However, if at any time the operator becomes aware, or ADEQ determines, that the facility's discharge causes or contributes to an exceedance of an applicable water quality standard, the operator shall take corrective action as required in Part 5.1, document the corrective actions as required in Parts 5.3 and 6.4, and report the corrective actions to ADEQ as required in Part 8.2(3).

Additionally, ADEQ may impose additional water quality-based requirements on a site-specific basis, or require the operator to obtain coverage under an individual permit in accordance with Part 1.2, if information in the NOI, required reports, or from other sources indicates that additional controls are necessary to not cause or contribute to an exceedance of an applicable water quality standard.

3.2.2 Discharge Limitations for Impaired Waters and OAWs.

Operators of construction sites that are located within 1/4 mile of an impaired water or OAW are required to comply with the following requirements, which supplement the requirements applicable to the site in other corresponding parts of this permit:

1. Frequency of Site Inspections. The operator shall conduct inspections at the frequency specified in Part 4.2(3).
2. Deadline to Complete Stabilization. The operator shall comply with the deadlines for completing site stabilization as specified in Part 3.1.2.

If the discharge is to an impaired water, ADEQ may inform the operator that additional limits or controls are necessary to meet water quality standards or any applicable wasteload allocation (WLA), or to prevent the site from contributing to the impairment, or if coverage under an individual permit is necessary in accordance with Appendix B, Subsection 17.

If during coverage under a previous permit, the operator was required to install and maintain control measures specifically to meet the assumptions and requirements of an USEPA-approved or established TMDL (for any parameter) or to otherwise control a discharge to meet water quality standards, the operator shall continue to implement such controls as part of this permit.

4.0 INSPECTIONS

4.1 Inspector Qualifications.

The operator shall provide qualified personnel (as defined in Appendix A) to perform inspections according to the selected inspection schedule identified in the SWPPP. The operator shall conduct inspections of the site in accordance with Parts 4.2 through 4.5 of this permit.

4.2 Inspection Schedule.

At a minimum, operator shall conduct a site inspection in accordance with one of the schedules listed below. The operator shall document in the SWPPP which schedule is being used and, when necessary, the location of the rain gauge or weather station used to obtain rainfall information. The Department encourages adding inspections **before** and/ or **during** predicted storm events and "spot" inspections to ensure control measures will be effective in managing stormwater runoff and associated pollutants.

1. Routine Inspection Schedule. The operator shall ensure inspections are performed at the site as indicated below to ensure control measures are functional and that the SWPPP is being properly implemented. To determine the amount of rainfall from a storm event that occurs on the site (in accordance with options b. or c.), the operator shall obtain rainfall information (in accordance with Part 4.4(3)) from either a properly maintained rain gauge on the site, or a weather station that is representative of the site's location. For any day of rainfall during normal business hours that measures 0.25 inch or greater, the total rainfall measured for that day shall be recorded in accordance with Part 4.4(3).

    a. The site will be inspected a minimum of once every 7 calendar days, or

    b. The site will be inspected a minimum of once every 14 calendar days, and also within 24 hours of each storm event of 0.5 inch or greater in 24 hours; or

    c. The site will be inspected a minimum of once per month, but not within 14 calendar days of the previous inspection and within 24 hours of the occurrence of a storm event of 0.25 inch or greater.

2. Reduced Inspection Schedule. The operator may reduce inspection if the entire site has been temporarily stabilized, discharges are unlikely based on seasonal rainfall patterns, or runoff is unlikely due to winter conditions (e.g., site is covered with snow, ice, or frozen ground exists).With a reduced inspection schedule, the site shall be inspected at least once per month (but not within 14 calendar days of the previous inspection) and before an anticipated storm event and within 24 hours of each storm event of 0.5 inch or greater in 24 hours.

3. Inspection Schedule for Sites within 1/4 mile of Impaired Waters or OAWs. If any portion of the construction site is within 1/4 mile of an impaired water or OAW, the operator shall inspect the site at least once every 7 calendar days. The operator may reduce inspections to the schedule specified in Part 4.2(2) for those areas of the construction site that have undergone temporary or final stabilization.

4. Inspection Schedule for Inactive and Unstaffed Sites. A site is inactive and unstaffed that will have an anticipated period of no construction activity for at least six consecutive months. *Inactive and unstaffed sites within 1/4 mile of an impaired water or OAW are not eligible for this reduced inspection frequency unless they have undergone temporary stabilization*.

    Operator's responsibilities include:

    a. Immediately before becoming inactive and unstaffed, the operator shall perform an inspection in accordance with Part 4.4. All control measures must be in operational condition in accordance with Part 3.1 prior to becoming inactive and unstaffed;

    b. During the time the site is inactive and unstaffed, the operator shall perform an inspection at least once every six months and within 24 hours of each storm event of 0.5 inch or greater in 24 hours;

c. Non-storm event inspections must be at least three months apart;

d. All control measures must be maintained in operational condition;

e. The site shall be secured, such as limited access, blocking or fencing;

f. Maintain a statement in the SWPPP as required in Part 6.4(11) indicating that the construction site is inactive and unstaffed. The statement must be signed and certified in accordance with Appendix B, Subsection 9; and

g. If circumstances change and the site becomes active and/or staffed, this exception no longer applies and the operator shall immediately resume the routine inspection schedule.

ADEQ retains the authority to revoke this exception from routine inspections where it is determined that the discharge causes, has a reasonable potential to cause, or contribute to an exceedance of an applicable water quality standard, including designated uses.

5. Inspections are only required during the project's normal working hours. If an inspection day (except those required relative to a rainfall event) falls on a Saturday or holiday, the inspection may be conducted on the preceding workday. If the inspection day falls on a Sunday, the inspection may be conducted on the following Monday. If rainfall events occur on the weekend or holiday, an inspection relative to that event may be conducted the following workday.

6. Inspections are not required under Adverse Conditions. The operator is not required to inspect areas that, at the time of the inspection, are considered unsafe for inspection personnel. Inspections may be postponed when conditions such as local flooding, high winds, or electrical storms, or situations that otherwise make inspections unsafe. The inspection must resume as soon as conditions are safe.

4.3 Scope of Inspections.

At a minimum, the inspector shall examine each of the following during each inspection:

1. All structural controls identified in the SWPPP to ensure they are in place and functioning as intended. Repair, replace, or maintain any controls as necessary in accordance with Part 3.1;
2. The effectiveness of non-structural controls and practices (such as good housekeeping practices and pollution prevention measures);
3. All areas of the site used for storage of materials that are exposed to precipitation;
4. All locations where new or modified control measures are necessary to meet the requirements of Part 3;
5. Locations where vehicles and equipment enter or exit the site for evidence of tracking sediment, debris, and other pollutants onto and off the site;
6. Site conditions for evidence of, or the potential for, pollutants entering the municipal separate storm sewer;
7. The presence of conditions that could lead to spills, leaks, or other accumulations of pollutants on the site;
8. Accessible discharge locations or discharge points to ascertain whether erosion and sediment control measures are effective in preventing significant impacts to receiving waters;
9. Where discharge locations are inaccessible, nearby downstream locations to the extent that the inspections are practicable;
10. All locations where temporary stabilization measures have been implemented; and
11. When a discharge is occurring during an inspection, observe and note the physical characteristics (color, odor, clarity, floating, settled, or suspended solids, foam, oil sheen, and other obvious indicators of stormwater pollutants). In addition, when there is no discharge, examine each discharge location for evidence of erosion, sedimentation and other pollutants, and the presence of current (and indications of prior) discharges and their sources.

4.4 Inspection Report Form.

For each inspection, the operator shall complete an inspection report either on a form provided by the Department online at http://www.azdeq.gov/environ/water/permits/cgp.html or an alternative form developed by the operator that documents all of the information required by this permit. The operator may supplement the inspection report form as necessary with additional information, forms or drawings. Within 7 calendar days of completing the inspection, the corresponding inspection report shall be placed with previous reports (in chronological order) and kept with the SWPPP. At a minimum, the report shall include:

1. The inspection date;
2. Name(s) and title(s) of qualified person(s) making the inspection;
3. Weather information for the period since the last inspection (or since commencement of construction activity for the first inspection) including:
    a. Best estimate of the beginning of each storm event;
    b. Duration of each event;
    c. Time elapsed since last storm event; and
    d. Approximate amount of rainfall for each event (in inches).
4. Identification of discharges of sediment or other pollutants from the site. Identify the discharge location(s) and associated control measures on the site map(s), in accordance with Part 6.3(6);
5. For inspections occurring during or after a storm event:
    a. A description of the physical characteristics of the stormwater discharge (Part 4.3(11)) from the site, when present;
    b. Document the evidence of erosion, sedimentation and other pollutants; and
    c. Document the presence of control measures in all areas inspected and whether such controls are operating effectively.
6. Identification of control measures that need to be maintained, failed to operate as designed, or proved inadequate. Until removed from the site, identify the location(s) of these control measures on the site map(s), in accordance with Part 6.3(6);
7. Identification of what additional control measures are needed, if any, that did not exist at the time of the inspection. Identify the location(s) of these control measures on the site map(s), in accordance with Part 6.3(6);
8. Identification of all sources of non-stormwater discharges occurring at the site and associated control measures in place;
9. Identification of material storage areas and, evidence of or potential for, pollutant discharge from such areas;
10. Corrective actions required (in accordance with Part 5.3), including any necessary changes to the SWPPP, and implementation dates (of corrective actions and SWPPP changes); and
11. Identification of any other instances of non-compliance with the conditions of this permit that are not associated with Part 4.4(10), or where the inspector does not identify any incidents of non-compliance, the inspection report shall contain a certification that the construction project or site is being operated in compliance with the SWPPP and this permit.
12. Document Adverse Conditions. If the operator determines that certain area(s) of the site are unsafe to inspect, the Inspection Report shall document the unsafe condition(s) and specify the locations where the unsafe condition(s) exists.

4.5 Inspection Follow-up.

1. Control Measure Assessment. Based on the findings and observations of the inspection, the operator shall implement the changes necessary to comply with the conditions in Part 3 and revise the SWPPP as needed in accordance with Part 6.5. The changes shall be implemented in accordance with the schedule described in "General Maintenance Requirements" in Part 3.1.
2. Corrective Actions. Based on the scope of inspection conducted in accordance with Part 4.3, the operator shall determine and implement appropriate corrective actions, and meet the applicable deadlines pursuant to Part 5.

5.0 CORRECTIVE ACTIONS.

5.1 Corrective Action Triggers.

Corrective actions are actions the operator takes in compliance with this Part to modify, or replace any control measure that failed to meet the conditions of Part 3. ADEQ does not consider routine maintenance or repairs as corrective actions. If any of the following conditions at the construction site occur resulting in or from a failure of a control measure, the operator shall implement new or modified control(s):

1. A necessary control measure was never installed, was installed incorrectly, or not in accordance with the requirements in Parts 3.1 and/ or 3.2; or
2. One of the prohibited discharges in Part 1.4 is occurring or has occurred; or
3. ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

On the same day a condition requiring corrective action is discovered, the operator shall take all reasonable steps to minimize or prevent the discharge of pollutants until a permanent solution is installed and made operational. However, if the problem is identified when it is too late in the work day to initiate a corrective action, the corrective action shall be initiated on the following work day, unless the condition poses imminent endangerment to human health or the environment, in which case the operator shall take immediate action.

5.2 Corrective Action Deadlines.

Any control measures or repairs required must be made operational, or completed, by no later than 7 calendar days from the time of discovery. If the operator cannot complete the necessary repairs or installation of controls within 7 calendar days, the SWPPP shall include the following:

1. The reason it is infeasible to complete the installation or repair within the 7 calendar day timeframe; and
2. The schedule for installing and making the control measure(s) operational as soon as practicable after the 7-day timeframe.

Any corrective actions that result in changes to any of the control measures or procedures shall be documented in the SWPPP within 7 calendar days of completing the corrective action work.

The operator shall complete all corrective actions in accordance with the deadlines specified in this Part.

5.3 Corrective Action Report.

For each corrective action taken in accordance with this Part, the operator shall document the details of the corrective action in the inspection report required by Part 4.4. These reports shall be signed in accordance with the signatory requirements in Appendix B, Subsection 9 and maintained with the SWPPP in accordance with the record keeping requirements in Appendix B, Subsection 11.

1. Construction Sites Located within 1/4 Mile of an Impaired Water or OAW. When any condition listed in Part 5.1 occurs, the operator of a construction site that discharges to an impaired water or OAW (in accordance with Parts 1.5(3) or (4)) shall submit this documentation in accordance with Part 8.2(2). . The operator shall retain a copy of the inspection report documenting the corrective action(s) onsite with the SWPPP as required in Part 6.4.
2. Report Schedule. Within 7 calendar days of discovery of any condition listed in Part 5.1, the operator shall document and maintain with the SWPPP the following information:
   a. Summary of corrective action taken or to be taken;
   b. Whether SWPPP modifications are required as a result of this discovery or corrective action;
   c. Date corrective action initiated or will be initiated; and
   d. Date corrective action completed or expected to be completed.

6.0 STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARATION

6.1 General Information.

1. The operator shall develop a stormwater pollution prevention plan (SWPPP) before submitting the NOI for permit coverage and prior to conducting any construction activity. Any SWPPP prepared for coverage under a previous version of this AZPDES construction general permit must be reviewed and updated by the operator to comply with this permit's requirements prior to submitting the NOI in accordance with Part 2.3(3)(e).

   Note: For projects that did not prepare a SWPPP and submit an NOI before commencement of construction activity, see Part 2.3(2)(h) (late NOI submittal).

   At least one SWPPP must be developed for each construction project or site covered by this permit. A "joint" or "common" SWPPP may be developed and implemented as a cooperative effort where there is more than one operator at a site. All operators shall either implement their portion of a common SWPPP or develop and implement their own SWPPP.

2. The SWPPP shall be prepared and implemented in accordance with good engineering practices and shall:

   a. Identify all potential sources of pollution that may reasonably be expected to affect the quality of stormwater discharges from the construction site;
   b. Identify, describe, and ensure implementation of control measures that will be used to reduce pollutants in stormwater discharges from the construction site;
   c. Assure compliance with the terms and conditions of this permit; and
   d. Identify the responsible person for on-site SWPPP implementation.

3. All operator(s) shall sign and certify the SWPPP in accordance with the signatory requirements of Appendix B, Subsection 9.

4. The operator shall implement the SWPPP from initial commencement of construction activity until an NOT is submitted to ADEQ in accordance with Parts 2.5(1) or 2.6.

5. SWPPPs that do not meet all provisions of this permit are considered incomplete. Operating under an incomplete or inadequate SWPPP is a violation of the permit.

6. Emergency-Related Projects. Operators conducting construction activities in response to an emergency (see Part 2.4), shall document the cause of the emergency (e.g., natural disaster, extreme flooding conditions, etc.), information substantiating its occurrence (e.g., state disaster declaration or similar state or local declaration), and describe the construction necessary to reestablish effected public services.

6.2 Types of Operators

1. Operator Requirements. Either Part 6.1(2)(a) or (b), or both, will apply depending on the type of operational control a person exerts over the site. Part 6.1(2)(c) applies to all operators who have control over only a portion of a construction site.

   a. Operators with Operational Control over Construction Plans and Specifications shall ensure that:

      i. The SWPPP indicates the areas of the project where the operator has operational control over project specifications, including the ability to make modifications in specifications;
      ii. All other operators implementing portions of the SWPPP impacted by any changes made to the SWPPP are notified of such modifications in a timely manner; and
      iii. The SWPPP indicates the name(s) of the person(s) with day-to-day operational

control of those activities necessary to ensure compliance with the SWPPP or other permit conditions.

b. Operators with Control over Day-to-Day Activities shall ensure that:

i. The SWPPP identifies the persons responsible for implementation of control measures identified in the SWPPP;

ii. The SWPPP indicates areas of the project where each operator has operational control over day-to-day activities; and

iii. The SWPPP indicates the name(s) of the person(s) with operational control over project specifications (including the ability to make modifications in specifications).

c. Operators with Control over Only a Portion of a Larger Project are responsible for compliance with the terms and conditions of this permit as it relates to the activities on the operator's portion of the construction site (including implementation of control measures required by the SWPPP). Operators shall ensure either directly or through coordination with other operators, that activities do not render another person's control measure(s) ineffective.

6.3 SWPPP Contents

1. Stormwater Team.

Each operator, or group of operators, must assemble a "stormwater team," which is responsible for overseeing the development of the SWPPP, any later modifications to it, and for compliance with the requirements in this permit.

The SWPPP must identify the name, title and a description of the qualifications and a copy of any training certificates of team members, including inspector(s), as well as their individual responsibilities. Each member of the stormwater team must have ready access to an electronic or paper copy of applicable portions of this permit, the most updated copy of the SWPPP, and other relevant documents or information that must be kept with the SWPPP.

The team may include members who are not employed by the operator (such as third party consultants).

2. Identification of Operators.

The SWPPP shall identify all operators, including contact information, for the project site and the areas and phases over which each operator has control.

3. Nature of Construction Activities.

The SWPPP must describe the nature of construction activities, including the size of the property (in acres) and the total area expected to be disturbed by the construction activities (in acres), construction support activity areas covered by this permit (see Part 1.3(1)(c)), and the maximum area expected to be disturbed at any one time.

4. Sequence and Estimated Dates of Construction Activities.

The SWPPP must include a description of the intended sequence of construction activities, including a schedule of the estimated start dates and the duration of the activity, for the following activities:

a. Installation of control measures, and when they will be made operational, including an explanation of the sequence and schedule for installation of the control measures;

b. Commencement and duration of construction activities, including clearing and grubbing, grading, site preparation (i.e., excavating, cutting and filling), underground utility installation, infrastructure installation, final grading, and creation of soil and vegetation stockpiles requiring stabilization;

c. Cessation, temporarily or permanently, of construction activities on the site, or in designated portions of the site including the beginning and ending dates of inactive/ unstaffed status, when applicable;

d. Final or temporary stabilization of areas of exposed soil. The dates for stabilization must reflect the applicable deadlines to which the operator is subject in Part 3.1.2; and

e. Removal of temporary stormwater conveyances/ channels and other control measures, removal of construction equipment and vehicles, and cessation of any pollutant-generating activities.

Note: If plans change due to unforeseen circumstances or for other reasons, the requirement to describe the sequence and estimated dates of construction activities is not meant to "lock in" the operator to meeting these projections. When departures from initial projections are necessary, this should be documented in the SWPPP itself or in associated records, as appropriate.

5. Site Description. The SWPPP shall describe the construction site, including:

   a. A description of the site and its intended use after the NOT is submitted to ADEQ (e.g. low density residential, shopping mall, highway, etc.);

   b. The total area of the site, and an estimate of the total area of the site expected to be disturbed by construction activities including off-site supporting activities, borrow and fill areas, staging and equipment storage areas;

   c. The percentage of the site that is impervious (e.g., paved, roofed, etc.) before and after construction;

   d. A description of the site's soils including potential for erosion;

   e. Areas where it is infeasible to maintain a 50 foot buffer in accordance with Part 3.1.1.5(1), describe which alternative was selected for the site, and comply with any additional requirements to provide documentation (Part 3.1.1.5(2));

   f. On-site and Offsite Material Storage. The operator shall identify and describe all material storage areas (including overburden and stockpiles of dirt, borrow areas, etc.) used for the permitted project in the SWPPP unless those areas are covered by another AZPDES permit; and

   g. A general location map (e.g., USGS quadrangle map, a portion of a city or county map, or other map) – with enough detail to identify:

      i. The location of the construction site and one mile radius; and

      ii. The waters of the U.S. including tributaries within one mile radius of the site.

6. Site Map(s). The SWPPP shall contain legible site map or series of maps completed to scale, showing the entire site that identifies:

   Note: If a marked-up site map is too full to be easily read, the operator should date and fold it, put it in the SWPPP for documentation, and start a new one.

   a. Topography of the site, existing types of cover (e.g., forest, pasture, pavement, structures)**,** and drainage pattern(s) of flow onto, over, and from the site property before and after major grading activities;

   b. Drainage divides and direction of stormwater flow for all drainage areas located within the project limits (i.e., use arrows to show which way stormwater will flow);

   c. Areas of soil disturbance and areas that will not be disturbed. Boundaries of the property and of the locations where construction activities will occur, including:

      i. Locations where construction activities will occur, noting any phasing of construction activities;

      ii. Locations where sediment or soil will be stockpiled;

iii. Locations of any crossings of surface waters;

iv. Designated points on the site where vehicles will exit onto paved roads; and

v. Locations of construction support activity areas covered by this permit (see Part 1.3(1)(c)).

d. Locations of temporary and permanent control measures identified in the SWPPP;

e. Locations where stabilization control measures are expected to occur;

f. Areas protected by buffers (i.e., either the 50-foot buffer or other buffer areas retained on site when within 50 feet of a perennial water) consistent with Part 3.1.1.5. The site map must show the boundary line of all such buffers;

g. Locations of on-site material, waste, borrow areas, or equipment storage areas, and other supporting activities (per Part 1.3(1)(c));

h. Locations of all potential pollutant-generating activities identified in Part 6.3(9). Examples include, but are not limited to: the pollutant-generating activities listed in Part 3.1.3.1 (fueling and maintenance operations; concrete, paint, and stucco washout); waste disposal; solid waste storage and disposal (Part 3.1.3.3); and dewatering operations (Part 3.1.4);

i. Locations of all surface waters and any impaired waters or OAWs within 1/4 mile of the facility. If none exist on site, the SWPPP shall indicate so;

j. Stormwater discharge location(s), using arrows to indicate discharge direction. Include the following:

i. Location(s) where stormwater and/or allowable non-stormwater discharges are discharged to waters of the U.S. (in accordance with Part 1.3); and

ii. Location(s) of any discharges to municipal separate storm sewer systems (MS4s) from the construction site.

Note: Where surface waters and/or MS4s receiving stormwater will not fit on the plan sheet, they shall be identified with an arrow indicating the direction and distance to the surface water and/or MS4;

k. Locations and registration numbers of all on-site drywells and drywells on adjacent properties that have the potential to receive stormwater from the site (If none exist the SWPPP shall indicate so);

l. Areas where final stabilization has been accomplished and no further construction permit requirements apply (if none, the SWPPP shall indicate so); and

m. Location and boundaries of environmentally sensitive areas and buffer zones to be preserved.

7. Receiving Waters. The SWPPP shall identify the nearest receiving water(s), including ephemeral and intermittent streams, dry washes, and arroyos. If applicable, the SWPPP shall also identify the areal extent and describe any wetlands near the site that could be disturbed or that could potentially receive discharges from disturbed areas of the project.

   Indicate if the receiving water is listed as impaired, or an OAW.

   Note: Operators may determine whether their sites are located within 1/4 mile of any impaired waters or OAWs by using ADEQ's Smart NOI system or by obtaining a list of impaired waters at http://www.azdeq.gov/environ/water/assessment/assess.html . OAWs are listed in A.A.C. R18-11-112(G).

8. Control Measures to be used During Construction Activity. The SWPPP shall describe all control measures as required in Part 3.1 and that will be implemented and maintained as part of the construction project to control pollutants in discharges. For each control measure, the SWPPP shall contain:

   a. For each major activity identified at Part 6.3 in the project sequence of activities

description, a description of:

i. The appropriate control measures, including controls to minimize or eliminate non-stormwater discharges;

ii. The general sequence during the construction process or schedule that the control measures will be implemented; and

iii. Which operator is responsible for the implementation of control measures.

b. Standard detail drawings and/or specifications for the structural control measures, including design or installation details, used on the project;

c. What specific sediment controls will be installed and made operational prior to conducting earth-disturbing activities in any given portion of the site to meet the requirement of Part 3.1.1;

d. For site egress points, document the control measures that are intended to minimize tracking of pollutants from vehicles leaving the site consistent with Part 3.1.3.2.

9. Summary of Potential Pollutant Sources. The SWPPP shall identify the location and describe any pollutant sources, including any non-stormwater discharges expected to be associated with the project, from areas other than construction (i.e., support activities including stormwater discharges from dedicated asphalt or concrete plants and any other non-construction pollutant sources such as fueling and maintenance operations, materials stored on-site, waste piles, equipment staging yards, etc.). The operator shall implement control measures in these areas to minimize pollutant discharges and shall detail these controls in the SWPPP.

   If any portion of the construction site is within 1/4 mile of an impaired water, the SWPPP shall identify sources of the pollutants of concern listed on the 303(d) list that may potentially be discharged from the construction site and describe additional or enhanced control measures to minimize discharges of these pollutants.

10. Use of Treatment Chemicals. If polymers, flocculants, or other cationic treatment chemicals will be used at the site, the SWPPP shall include:

    a. A justification for the need for such chemicals and an assessment of potential water quality impacts;

    b. A description of the training specific personnel have or will receive on the use and storage of any cationic treatment chemicals and/or chemical treatment systems at the construction site;

    c. A listing of all treatment chemicals to be used at the site, a description of how the chemicals will be stored, and why the selection of these chemicals is suited to the soil characteristics of the site;

    d. The dosage of all treatment chemicals that will be used at the site or the methodology that will be used to determine dosage;

    e. A copy of any applicable Material Safety Data Sheets (MSDS);

    f. Schematic drawings of any chemically-enhanced controls or chemical treatment systems to be used for application of the treatment chemicals;

    g. Copies of applicable manufacturer's specifications regarding the use of specific treatment chemicals and/or chemical treatment systems and references to state or local requirements affecting the use of these chemicals.

11. Pollution Prevention Procedures.

    a. Spill Prevention and Response Procedures. The SWPPP must describe procedures to prevent and respond to spills, leaks, and other releases consistent with Part 3.1.3, including:

i. Procedures for plainly labeling containers (e.g., “Used Oil,” “Spent Solvents,” “Fertilizers and Pesticides,” etc.) that could be susceptible to spillage or leakage to encourage proper handling and facilitate rapid response if spills or leaks occur;

ii. Preventative measures such as barriers between material storage and traffic areas, secondary containment provisions, and procedures for material storage and handling;

iii. Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or position of the employee(s) responsible for detection and response of spills or leaks; and

iv. Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 3.1.3.4 and established under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, occurs during a 24-hour period. Contact information must be in locations that are readily accessible and available.

The operator may reference the existence of other plans, such as the Spill Prevention Control and Countermeasure (SPCC) plans developed for the construction activity under Part 311 of the CWA, or spill control programs otherwise required by an AZPDES permit for the construction activity, provided that a copy of that other plan is kept with the SWPPP onsite. If an SPCC or other spill prevention plan already exists, the operator may use such plans and incorporate them by reference in the SWPPP.

b. Waste Management Procedures. The SWPPP must describe procedures for handling and disposing all wastes generated at the site, including, but not limited to, clearing and demolition debris, sediment removed from the site, construction and domestic waste, hazardous or toxic waste, and sanitary waste.

6.4 Documentation Requirements including Permit Related Records

The operator shall keep the following inspection, monitoring, and certification records complete and up-to-date. Retaining these records with the SWPPP (unless otherwise specified below) is necessary to demonstrate compliance with the conditions of this permit.

1. A copy of this permit (an electronic copy easily available to SWPPP personnel is also acceptable);

2. A copy of the NOI submitted to ADEQ, including any correspondence exchanged between the operator and ADEQ specific to coverage under this permit;

3. A copy of the authorization certificate received from ADEQ;

4. Identification of any municipality that received a copy of the authorization certificate;

5. Copies of any other agreements (such as a CWA section 404 permit, local grading permit, etc.) with any state, local, or federal agencies that would affect the provisions or implementation of the SWPPP, if applicable;

6. Descriptions and dates of any incidences of significant spills, leaks, or other releases that resulted in discharges of pollutants in stormwater to a regulated MS4 or to waters of the U.S., the circumstances leading to the release and actions taken in response to the release and measures taken to prevent the recurrence of such releases (see Part 3.1.3.4);

7. Documentation of repairs of structural control measures, including the date(s) of discovery of areas in need of repair/replacement, date(s) that the structural control measure(s) returned to full function, and the justification for any extended repair schedules (see Part 3.1). The maintenance records shall include the date(s) of regular maintenance;

8. All inspection reports (see Part 4.4);

9. Description of any corrective action taken at the site, including triggering event and dates when problems were discovered and modifications occurred;

10. Buffer Documentation. If the construction site's earth disturbances are located within 50 feet of a perennial water, the operator shall describe which alternative was selected for the site, and comply with any additional documentation requirements in Part 3.1.1.5.

11. Documentation to support the operator's claim that the facility has changed its status from active to inactive and unstaffed with respect to the requirements to conduct inspections (see Part 4.2(4));

12. Post-Construction Stormwater Management.

    a. The SWPPP shall include a description of post-construction stormwater management control measures that will be installed during the construction process to control pollutants in stormwater discharges after construction has been completed.

    b. If 'temporary' sediment basins are to be used as/converted to retention or detention basins in the post-construction phase, the operator shall remove and properly dispose of all sediments accumulated in the basin during construction activities prior to filing an NOT.

    c. New discharge connections or permanent stormwater outfalls directly to OAWs are prohibited under this permit.

    Note: The installation of these devices may also require a separate permit under section 404 of the Clean Water Act.

    Note: This permit only authorizes and requires the operator to install and maintain stormwater management measures up to and including final stabilization of the site, and does not require continued maintenance after stormwater discharges associated with the construction activity have been eliminated from the site and an NOT has been submitted to ADEQ. However, post-construction control measures that discharge pollutants from point sources once construction is complete may require authorization under a separate AZPDES permit.

6.5 SWPPP Updates and Modification Requirements

6.5.1 Maintaining an Updated SWPPP.

The SWPPP shall be revised as necessary during permit coverage to reflect current conditions and to maintain accuracy. The operator shall make any required amendments to the SWPPP within 7 calendar days whenever:

1. There is a change in design, construction, operation, or maintenance at the construction site that may have a significant effect on the discharge of pollutants to the waters of the U.S. that has not been previously addressed in the SWPPP; or

2. During inspections, monitoring if required, or investigations by the operator or by ADEQ or USEPA, it is determined the discharges are causing or contributing to water quality exceedances or the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the construction site; or

3. There is a change to the stormwater team.

6.5.2 Conditions Requiring SWPPP Modification.

The operator shall complete required revisions to the SWPPP within 7 calendar days following the occurrence of any of the conditions listed below. The operator shall modify the SWPPP, including the site map(s), in response to any of the following conditions:

1. New operators become active in construction activities at the site, construction plans are changed (that will affect the quality of the discharge), control measures, pollution prevention measures, or other activities at the site are no longer accurately reflected in the SWPPP. This includes changes made in response to corrective actions triggered

under Part 5.1. Operators do not need to modify their SWPPPs if the estimated dates in Part 6.3(6) change during the course of construction;

2. Areas on the site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;
3. If inspections or investigations by site staff, or by local, state, or federal officials determine that SWPPP modifications are necessary for compliance with this permit;
4. ADEQ determines it is necessary to impose additional requirements on the discharge (in accordance with Part 6.5.1), the following must be included in the SWPPP:
   a. A copy of any correspondence describing such requirements; and
   b. A description of the control measures that will be used to meet such requirements.
5. To reflect any revisions to applicable federal, state, tribal, or local requirements that affect the control measures implemented at the site; and
6. If applicable, if a change in chemical treatment systems or chemically-enhanced control is made, including use of a different treatment chemical, different dosage rate, or different area of application.
7. SWPPP Modification Records. Operators are required to maintain records showing the dates of all SWPPP modifications. The records must include the name of the person authorizing each change (see Part 6.1(3)) and a brief summary of all changes.

6.5.3 Certification Requirements.

All modifications made to the SWPPP consistent with Part 6.5.2 must be authorized by a person identified in Appendix B, Subsection 9.

6.5.4 Required Notice to Other Operators.

When the operator determines that a modification to the SWPPP is required and there are multiple operators covered under a common SWPPP, any operators who may be impacted by the change to the SWPPP shall be notified at the address of record in the SWPPP.

6.6 Deficiencies in the SWPPP

ADEQ may notify the operator at any time that the SWPPP does not meet one or more of the requirements of this permit. The notification shall identify the parts of this permit that are not being met and parts of the SWPPP that require modification to comply with permit. Within 15 calendar days of receipt of the notification from ADEQ (or as otherwise provided by ADEQ), the operator shall make the required changes to the SWPPP and submit to ADEQ a written certification that the changes have been made. ADEQ may require re-submittal of the SWPPP to confirm all deficiencies have been adequately addressed.

In accordance with Appendix B, Subsection 1, ADEQ also is not precluded from taking enforcement action for any period of time the operator was operating under a SWPPP that did not meet the minimum requirements of this permit.

6.7 Posting, SWPPP Review and Making SWPPPs Available

1. The operator must post the authorization number(s) in a conspicuous location near the main entrance of the construction site and retain a copy of the authorization certificate in the SWPPP. For linear projects, the authorization number(s) must be posted near the entrance where most of the construction activity is occurring.
2. A copy of the site specific SWPPP shall be on-site whenever construction or support activities are actively underway, and shall be available to the Department or any other federal, state or local authority having jurisdiction over the project at any reasonable time (generally Monday through Friday, 8:00 a.m. to 5:00 p.m.).

3. The SWPPP shall be made available to the Department or any other federal, state, tribal, or local authority having jurisdiction over stormwater discharges from the project at the time of an on-site inspection.

4. Any person, including, tribal authority, state, federal or local agency may make a written request to ADEQ for access to a copy of the SWPPP. ADEQ may request, and within 7 calendar days the operator shall provide, a copy for ADEQ to make available for public review;

5. *Inactive and Unstaffed Sites:* Operators with sites that meet the requirements for inactive and unstaffed are not required to maintain the SWPPP on-site. However, the SWPPP must be locally available (i.e., in Arizona) and must be on-site when conducting the inspections required by Part 4. For the purpose of a regulatory inspection, the SWPPP shall be made available to ADEQ, USEPA, or other Federal, State or local authority having stormwater program authority, within 48 hours of request. If otherwise requested by ADEQ, the operator shall submit copies of these documents within 14 calendar days of request.

6.8 Procedures for Inspection, Maintenance, and Corrective Action

The SWPPP must describe the procedures operators will follow for maintaining their control measures, conducting site inspections, and, where necessary, taking corrective actions, in accordance with Part 3.1, Part 4, and Part 5 of the permit. The following information must also be included in the SWPPP:

1 Personnel responsible for conducting inspections;

2 The inspection schedule that will be followed based on whether the site is subject to Part 4.2(1) or 4.2(3), and whether the site qualifies for any of the reduced inspection frequencies in Part 4.2(2) or 4.2(4). If conducting inspections in accordance with the inspection schedule in Part 4.2(1) or 4.2(3), document the weather information required in the inspection report (see Part 4.5);

3 If reducing the inspection frequency in accordance with Part 4.2(2) or 4.2(4), the beginning and ending dates of the reduced inspection period; and

4 Any inspection or maintenance checklists or other forms that will be used.

5. The operator shall ensure that all qualified personnel (see Appendix A) review the requirements of this permit. Qualified personnel are responsible for:

   - The design, installation, maintenance, and/ or repair of control measures (including pollution prevention measures);
   - The application and storage of treatment chemicals (if applicable);
   - Conducting inspections as required in Part 4.1; and
   - Taking corrective actions as required in Part 5.

7.0 STORMWATER MONITORING

The provisions of Part 7 apply only to operators with construction projects located within 1/4 mile of an impaired or outstanding Arizona water (OAW), or as otherwise specified by ADEQ. Any portion of the project area that extends within this distance is subject to the requirements of this Part, unless the operator provides a justification for not monitoring, consistent with Part 7.1. The monitoring plan, or justification, must be a part of the SWPPP and submitted along with it to ADEQ for approval.

The Department may notify the permittee, in writing, of additional discharge monitoring required to ensure protection of receiving water quality if it is determined that the pollutant may be causing or contributing to an exceedance of a water quality standard.

7.1 Monitoring Program.

Operators of projects that are located within 1/4 mile of impaired or outstanding Arizona waters (OAW) shall prepare and implement a monitoring program that meets the requirements of this Part. Sites can be exempted from monitoring if the operator provides a demonstration acceptable to ADEQ that there is no potential for the discharge to reach the OAW or impaired receiving water.

For any portion of a construction site that is located within 1/4 mile of an impaired water, if the operator can demonstrate that there is no reasonable potential that construction activities will be an additional source of the specific pollutant for which the water is impaired, analytical monitoring for that parameter is not required. As part of this demonstration, the operator must consider all on-site activities and sources, as well as the potential for any pollutants (metals, nutrients, etc.) to be present in the on-site soils that will be disturbed.

7.2 General Requirements.

The operator shall develop a written site-specific monitoring program for analytical monitoring of stormwater unless an acceptable rationale demonstrates that stormwater monitoring is not necessary, in accordance with Part 7.1. . The monitoring program shall be a part of the SWPPP as either an appendix or separate SWPPP section. The monitoring program shall include:

1. Locations of monitoring sites;
2. The name(s) and title of the person(s) who will perform the monitoring;
3. A map showing the segments or portions of the receiving water that are most likely to be impacted by the discharge of pollutant(s);
4. Water quality parameters/ pollutants to be sampled;
5. The citation and description of the sampling protocols to be used; and
6. Identification of the analytical methods and related method detection limits (if applicable) for each parameter required. Method detection limits shall be below applicable surface water quality standards when possible.
7. Additionally, for construction sites within 1/4 mile of an impaired water, the monitoring program shall include:
    a. An identification of the pollutant(s) of concern based on the most recent 305(b) / 303(d) listing or other information available; and
    b. A description of potential source(s) of this pollutant(s) from the project, if any.

7.3 Analytical Monitoring Requirements.

1. Analytical Monitoring Schedule. The operator shall conduct analytical monitoring a minimum of two times per wet season throughout the duration of permit coverage. Analytical monitoring is only required when stormwater or snowmelt exits the construction site by way of a discharge point in sufficient quantity to allow for sample collection and analysis.

    Wet seasons, for the purposes of analytical monitoring, are defined as follows:

- Summer wet season: June 1 – October 31
- Winter wet season: November 1 – May 31

2. Adverse Conditions. The operator is not required to collect samples under adverse conditions, in accordance with Part 4.2(6). Information about any adverse conditions that prevented sampling shall be documented in the SWPPP.

3. Analytical Monitoring Locations. The operator shall conduct discharge sampling at locations observed or suspected to contain the greatest pollutant load resulting from the construction activities. If any portion of the construction site is located within 1/4 mile of an impaired water or OAW, the operator shall use Table 7-1 to determine the minimum number of samples to collect for purposes of analytical monitoring.

Table 7-1. Minimum number of samples to collect

Number of Discharge Points	Number of Samples
1 to 4	1
5 to 19	2
20 or more	10% of total

   a. Where the construction site is adjacent to or otherwise discharges directly to an OAW, the operator shall sample for turbidity both immediately upstream and downstream of each discharge point. If there are two or more discharge locations from the site to the same OAW, the operator may sample at one upstream and one downstream location in the stream

   b. If the impaired water or OAW is a lake, a site-specific proposal for sampling the impact area shall be submitted.

4. Analytical Monitoring Parameters.

   a. All operators with construction sites that are located within 1/4 mile of an OAW shall monitor for turbidity. The operator shall compare turbidity values from the sample locations referenced in Part 7.3(3)(a). If there is a 25% or more increase at the downstream monitoring location, or for lakes, in the area of impact, the operator shall evaluate and replace, maintain, or install additional control measures as necessary to reduce sediment transport.

   b. For sites with discharges to OAWs, the operator shall also sample for any pollutants known to be present at the site or that have the potential to be discharged from the site.

   c. All operators with construction sites that are located within 1/4 mile of an impaired water shall monitor for the pollutant(s) for which the water is impaired.

5. Sampling and Analysis Plan (SAP). The operator shall establish written procedures for sample collection, preservation, tracking, handling, and analyses. The approved SAP (in accordance with Parts 1.5(3) and 1.5(4)) shall be a part of the SWPPP, either as an appendix or a separate SWPPP section. The SAP shall include the following:

   a. Sample Collection, Preservation, Tracking, Handling and Analyses.

      - Designate and train personnel to collect, maintain, and handle samples in accordance with the appropriate sample protocols.
      - Identify water quality parameters/pollutants to be sampled including any pollutant(s) of concern in accordance with this Part;
      - Identify the required sample analyses and associated analytical methods (analytical laboratory and field analyses).

- Written procedures for:
  - Sample collection (equipment and containers, calibration procedures, document site conditions during sampling, field notes and conditions under which the sample was taken),
  - Preservation (sample preparation to meet holding times),
  - Tracking (including chain-of-custody procedures), and
  - Handling (packing, transporting and shipping procedures to maximize sample integrity).

b. Calibration and Maintenance of Equipment and Monitoring Methods.

All monitoring instruments and equipment (including operators' own field instruments for measuring pH and turbidity) shall be calibrated and maintained in accordance with manufacturers' recommendations. All laboratory analyses shall be conducted according to test procedures specified in 40 CFR Part 136, unless other test procedures have been specified in this general permit.

All samples collected for analytical monitoring shall be analyzed by a laboratory that is licensed by the Arizona Department of Health Service (ADHS) Office of Laboratory Licensure and Certification. This requirement does not apply to parameters that require analysis at the time of sample collection as long as the testing methods used are approved by ADHS or ADEQ. These parameters may include flow, dissolved oxygen, pH, temperature, and total residual chlorine. The operator may conduct field analysis of turbidity if the operator has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to properly perform the field analysis.

8.0 FEES, REPORTING AND RECORDKEEPING

8.1 Fee Requirements.

In accordance with A.A.C R18-14-109, the operator shall pay the initial AZPDES water quality protection services fee for coverage under this permit at the time the NOI is submitted. In addition, the operator shall pay the applicable annual fee when billed, unless a notice of termination has been submitted to ADEQ. The annual fee is due on the anniversary of the date the authorization certificate (see Part 2.3(3)(d)). Both fees are based on the amount of acreage identified in the NOI, in accordance with A.A.C. R18-14-109, Table 6.

8.2 Records.

1. Address for Submittal of All Forms and Reports. All documents required by this permit (signed copies of NOIs, NOTs, DMRs and paper copies of any reports required in Parts 4, 5, 6, 7 and 8) and any other written correspondence concerning discharges covered under this permit shall be signed and dated in accordance with Appendix B, Subsection 9 of this permit and submitted to ADEQ at the address below. Other options (i.e., electronic submittal) may also be used if ADEQ makes the information available on the Internet or by public notice.

   Arizona Department of Environmental Quality
   Surface Water Section, Stormwater Permits Unit—CGP Monitoring
   1110 W. Washington Street, Mail Code 5415 A-1
   Phoenix, AZ 85007

   Reports of non-compliance shall be reported to:

   Arizona Department of Environmental Quality
   Water Quality Compliance Section
   1110 W. Washington Street, Mail Code 5515 B-1
   Phoenix, AZ 85007
   Office: 602/ 771 – 4497; Fax 602/ 771 – 4505

2. Record Submittal. Operators of construction sites that are required to monitor, in accordance with Part 7, shall submit analytical monitoring results annually. Monitoring records for the period between January 1 and December 31 shall be submitted to ADEQ by January 31 of each year or at the time of final stabilization and NOT submittal, whichever is sooner.

   Monitoring results must be reported on a Discharge Monitoring Report (DMR) form available at http://www.azdeq.gov/environ/water/permits/cgp.html or other format specified by the Director, and submitted to:

   Arizona Department of Environmental Quality
   Surface Water Section
   Stormwater and General Permits Unit/NOI (5415A-1)
   1110 W. Washington Street
   Phoenix, Arizona 85007

3. Record Retention. The operator shall retain records of all stormwater monitoring information, corrective actions, inspection and other reports with the SWPPP for a period of at least three years from the date the NOT was submitted to ADEQ.

APPENDIX A. DEFINITIONS and ACRONYMS (for the purposes of this permit).

A – 1. DEFINITIONS

"24 hour period" – any consecutive 24-hour period.

"Anticipated storm event" – any storm event with at least a 30% chance of precipitation as predicted by the National Weather Service for the area local to the construction site.

"Approved Total Maximum Daily Loads (TMDLs)" – Approved TMDLs are those that are developed by the Arizona Department of Environmental Quality and approved by USEPA. See also, Total Maximum Daily Load.

"Arid areas" – the parts of Arizona that receive an annual rainfall of less than 20 inches.

"Best management practices" (BMPs) – those methods, measures or practices to prevent or reduce discharges and includes structural and nonstructural BMPs and operation and maintenance procedures. Best management practices may be applied before, during and after discharges to reduce or eliminate the introduction of pollutants into receiving waters. In addition, the term shall include erosion and sediment control BMPs, stormwater conveyance, stormwater diversion, and treatment structures, and any procedure or facility used to minimize the exposure of pollutants to stormwater or to remove pollutants from stormwater.

"Borrow Areas" – the areas where materials are dug for use as fill, either onsite or off-site.

"Calendar day" – a calendar day or any 24-hour period that reasonably represents the calendar day.

"Cationic Treatment Chemical" – polymers, flocculants, or other chemicals that contain an overall positive charge. Among other things, they are used to reduce turbidity in stormwater discharges by chemically bonding to the overall negative charge of suspended silts and other soil materials and causing them to bind together and settle out. Common examples of cationic treatment chemicals are chitosan and cationic PAM.

"Commencement of construction activities" – the initial disturbance of soils (or 'breaking ground') associated with clearing, grading, excavating, or stockpiling of fill material activities or other construction-related activities (such as the placement of fertilizers, pesticides, herbicides, detergents, fuels, oils, or other chemicals, or the occurrence of authorized non-stormwater washout activities, or dewatering activities have begun on the site).

"Common plan of development" – a contiguous area where multiple separate and distinct land disturbing activities may be taking place at different times, on different schedules, but under one plan. A 'plan' is broadly defined to include design, permit application, advertisement or physical demarcation indicating that land-disturbing activities may occur.

"Construction activity" – earth-disturbing activities such as, clearing, grading, excavating, stockpiling of fill material and other similar activities. This definition encompasses both large construction activities defined in 40 CFR 122.26 (b)(14)(x) and small construction activities in 40 CFR 122.26 (b)(15)(i) and includes construction support activities.

"Construction and Development Effluent Limitations and New Source Performance Standards" (C&D Rule) – as published in 40 CFR § 450 is the regulation requiring effluent limitations guidelines (ELGs) and new source performance standards (NSPS) for controlling the discharge of pollutants from construction sites.

"Construction site" or **"site"** – the land or water area where construction activities will occur, including construction support activities, and where control measures will be installed and maintained. The construction support activities may be located at a different part of the property from where the primary construction activity will take place, or on a different piece of property altogether. The construction site is often a smaller subset of the lot or parcel within which the project is taking place.

"Construction support activity" – a construction-related activity that exclusively supports the construction activity and involves earth disturbance or pollutant-generating activities of its own, and can include activities associated with concrete or asphalt batch plants, equipment staging yards, materials storage areas, excavated material disposal areas, and borrow areas. When the term "support activities" is used without clarification, it means "construction support activities".

"Construction waste" – discarded material (such as packaging materials, scrap construction materials, masonry products, timber, steel, pipe, and electrical cuttings, plastics, and Styrofoam).

"Control measure" – refers to any BMP or other method (including effluent limitations) used to prevent or reduce the discharge of pollutants to waters of the United States.

"Conveyance channel" – a temporary or permanent waterway designed and installed to safely convey stormwater flow within and out of a construction site.

"Corrective action" – any action taken to (1) modify, or replace any ineffective control measure used at the site; (2) mitigate any conditions that resulted in a discharge of pollutants above surface water quality standards; or (3) remedy a permit violation.

"Department" – the Arizona Department of Environmental Quality.

"Discharge" – any addition of any pollutant to waters of the United States or to a MS4 from any point source.

"Discharge of a pollutant" – any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source," or any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. This includes additions of pollutants into waters of the United States from surface runoff which is collected or channeled by man. See 40 CFR 122.2.

"Discharge point" – the location where stormwater flows exit the construction site.

"Domestic waste" – typical household trash, garbage or rubbish items generated by construction activities.

"Drought" – weather conditions considered "severely" or "extremely" dry (i.e., has a value of -1.50 or less) as evaluated by the 3-month Standardized Precipitation Index (SPI) which compares current cumulative precipitation to average conditions.

"Effective operating condition" – a control measure is kept in effective operating condition if it has been implemented and maintained in such a manner that it is working as designed to minimize pollutant discharges.

"Effluent limitations" – any of the Part 1.4 or Part 3 requirements.

"Effluent Limitations Guideline" (ELG) – defined in 40 CFR § 122.2 as a regulation published by the Administrator under section 304(b) of CWA to adopt or revise effluent limitations.

"Emergency-related construction activity" – an activity initiated in response to a emergency (e.g., natural disaster, disruption in essential public services), for which the related work requires immediate authorization to avoid imminent endangerment to human health or the environment, or to reestablish essential public services.

"Ephemeral water" – a surface water that has a channel that is at all times above the water table, and that flows only in direct response to precipitation. [A.A.C. R18-11-101(22)]

"Erosion control" – temporary or permanent measures to prevent soil particles from detaching and being transported in stormwater.

"Hazardous materials" or **"Hazardous substances"** or **"Hazardous or toxic waste"** – any liquid, solid, or contained gas that contain properties that are dangerous or potentially harmful to human health or the environment. See also 40 CFR §261.2.

"Impaired water" – waters that have been assessed by ADEQ, under the Clean Water Act, as not attaining a water quality standard for at least one designated use, and are listed in Arizona's current 303(d) List or on the 305(b) Category 4 list.

"Intermittent water" or **"Intermittent stream"** – a stream or reach that flows continuously only at certain times of the year, as when it receives water from a spring or from another surface source, such as melting snow. [A.A.C. R18-11-101(25)]

"Linear project" – includes the construction of roads, bridges, conduits, substructures, pipelines, sewer lines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities in a long, narrow area.

"Minimize" – to reduce and/or eliminate to the extent achievable using control measures that are technologically available and economically practicable and achievable in light of best industry practices.

"Municipal separate storm sewer" – a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

i. Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or a designated and approved management agency under section 208 of the Clean Water Act (33 U.S.C. 1288) that discharges to waters of the United States;

ii. Designed or used for collecting or conveying stormwater;

iii. Which is not a combined sewer; and

iv. Which is not part of a Publicly Owned Treatment Works.

"Municipal separate storm sewer system" (MS4) – all separate storm sewers defined as "large," "medium," or "small" municipal separate storm sewer systems or any municipal separate storm sewers on a system-wide or jurisdiction-wide basis as determined by the Director under A.A.C. R18-9-C902(A)(1)(g)(i) through (iv). [A.A.C. R18-9-A901(23)]. This also includes similar systems owned or operated by separate storm sewer municipal jurisdictions not required to obtain stormwater discharge authorization.

"Notice of Intent" (NOI) – the application to operate under this general permit.

"Notice of Termination" (NOT) – the application to terminate coverage under this general permit.

"Outstanding Arizona Water" – a surface water that has been designated by ADEQ as an outstanding state resource under A.A.C. R18-11-112.

"Perennial water" – a surface water that flows continuously throughout the year (A.A.C. R18-11-101(30)).

"Person" – an individual, employee, officer, managing body, trust, firm, joint stock company, consortium, public or private corporation, including a government corporation, partnership, association or state, a political subdivision of this state, a commission, the United States government or any federal facility, interstate body or other entity. [A.R.S. § 49-201(27)]

"Point(s) of discharge" – see "Discharge Point."

"Point source" – any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be

discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

"Pollutant" – sediment, fluids, contaminants, toxic wastes, toxic pollutants, dredged spoil, solid waste, substances and chemicals, pesticides, herbicides, fertilizers and other agricultural chemicals, incinerator residue, sewage, garbage, sewage sludge, munitions, petroleum products, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt (e.g., overburden material), and mining, industrial, municipal and agricultural wastes or any other liquid, solid, gaseous or hazardous substances. [A.R.S. § 49-201(29)]

"Pollutant-generating activities" – at construction sites, those activities that lead to or could lead to the discharge of pollutants, either as a result of construction activity or construction support activity. Types of pollutants that are typically associated with construction sites include, but are not limited to:

- Sediment;
- Nutrients;
- Heavy metals;
- Pesticides and herbicides;
- Oil and grease;
- Bacteria and viruses;
- Trash, debris, and solids;
- Treatment polymers; and
- Any other toxic chemicals.

"Pollution prevention measures" – control measures designed to reduce or eliminate the addition of pollutants to construction site discharges through analysis of pollutant sources, implementation of proper handling/ disposal practices, employee education, and other actions.

"Polymers" – coagulants and flocculants used to control erosion on soil or to enhance the sediment removal capabilities of sediment traps or basins. Common construction site polymers include polyacrylamide (PAM), chitosan, alum, polyaluminum chloride, and gypsum.

"Prohibited discharges" – discharges that are not allowed under this permit, including:

1. Wastewater from washout of concrete;
2. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
3. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;
4. Soaps or solvents used in vehicle and equipment washing; and
5. Toxic or hazardous substances from a spill or other release.

"Provisionally covered under this permit" – ADEQ provides temporary coverage under this permit for emergency-related projects prior to receipt of a complete and accurate NOI. Discharges from earth-disturbing activities associated with the emergency-related projects are subject to the terms and conditions of the permit during the period of temporary coverage.

"Qualified person" or **"Qualified personnel"** – Qualified personnel are those (either the operator's employees or outside personnel) who are knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possess the skills to assess conditions at the construction site that could impact stormwater quality, and the skills to assess the effectiveness of any control measures selected to control the quality of stormwater discharges from the construction activity.

"Received" – for the purposes of this permit and in reference to NOIs or NOTs or Permit Waiver Certificate forms means:

1. The day the information was signed electronically via the Smart NOI system and submitted to ADEQ,
2. The date of hand-delivery of the signed form to ADEQ, or
3. The date ADEQ signs for certified mail containing the signed form.

"Receiving water" – a "Water of the United States" as defined in 40 CFR §122.2 into which the regulated stormwater discharges.

"Reclaimed water" – water that has been treated or processed by a wastewater treatment plant or an on-site wastewater treatment facility. A.R.S. § 49-201(31).

"**Run-on**" – stormwater that drains from land located upslope or upstream from the regulated site in question.

"Sediment control" – measures designed to intercept and settle out soil particles that have become detached and transported by water. Sediment control measures complement soil stabilization measures (erosion control).

"Site" – see "construction site".

"Small construction activity" – defined at 40 CFR §122.26(b)(15) and incorporated here by reference. A small construction activity includes clearing, grading, and excavating resulting in a land disturbance that will disturb equal to or greater than one (1) acre and less than five (5) acres of land or will disturb less than one (1) acre of total land area but is part of a larger common plan of development or sale that will ultimately disturb equal to or greater than one (1) acre and less than five (5) acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site.

"Spill" – the release of a hazardous or toxic substance from its container or containment (see Part 3.1.3.5).

"Stabilization" – covering or maintaining an existing cover over soil that reduces and minimizes erosion. The use of vegetative and/or non-vegetative cover to prevent erosion and sediment loss in areas exposed through the construction process.

"Storm event" – a precipitation event that results in a measurable amount of precipitation.

"Stormwater" – stormwater runoff, snow melt runoff, and surface runoff and drainage. See 40 CFR 122.26(b)(13).

"Stormwater discharges associated with construction activity" – a discharge of pollutants in stormwater runoff from areas where soil disturbing activities (e.g., clearing, grading, or excavating), construction materials, or equipment storage or maintenance (e.g., fill piles, borrow areas, concrete truck washout, fueling), or other industrial stormwater directly related to the construction process (e.g., concrete or asphalt batch plants) are located. See 40 CFR 122.26(b)(14)(x) and 40 CFR 122.26(b)(15).

"Stormwater Pollution Prevention Plan" (SWPPP) – a site-specific, written document that, among other things: (1) identifies potential sources of stormwater pollution at the construction site; (2) describes control measures to reduce or eliminate pollutants in stormwater discharges from the construction site; and (3) identifies procedures the operator will implement to comply with the terms and conditions of this general permit.

"Stormwater team" – an individual or group of individuals responsible for oversight of the development and modifications of the SWPPP, and oversight of compliance with the permit requirements. The individual(s) on the "Stormwater Team" must be identified in the SWPPP.

"Surface Water" – a "Water of the United States" as defined in 40 CFR §122.2.

"Temporary stabilization" – a condition where exposed soils or disturbed areas are provided a temporary vegetative and/or non-vegetative protective cover to prevent erosion and sediment loss. Temporary stabilization may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either final stabilization can be achieved or until further construction activities take place to re-disturb this area.

"Total Maximum Daily Load" (TMDL) – an estimation of the total amount of a pollutant from all sources that may be added to a water while still allowing the water to achieve and maintain applicable surface water quality standards. Each total maximum daily load shall include allocations for sources that contribute the pollutant to the water, as required by section 303(d) of the clean water act (33 United States Code, Section 1313(d)) and regulations implementing that statute to achieve applicable surface water quality standards. [A.R.S. § 49-231(4)]

"Toxic waste" – see "Hazardous Materials"

"Turbidity" – a condition of water quality characterized by the presence of suspended solids and/or organic material; expressed as nephelometric turbidity units (NTU).

"Waters of the United States" (U.S.) – defined in 40 CFR 122.2.

"Waste Load Allocation" – The maximum load of pollutants each discharger of waste is allowed to release into a particular waterway. Discharge limits are usually required for each specific water quality criterion being, or expected to be, violated. WLAs constitute a type of water quality-based effluent limitation. (See 40 C.F.R. § 130.2(h))

"Water Quality Standards" – A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States and USEPA adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (See CWA sections 101(a)2 and 303(c)). Water quality standards also include an antidegradation policy. See P.U.D. o. 1 of Jefferson County et al v. Wash Dept of Ecology et al, 511 US 701, 705 (1994).

"Wetland" – an area that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. A wetland includes a swamp, marsh, bog, cienega, tinaja, and similar areas. [A.A.C. R18-11-101(49)]

"Work day" – a calendar day on which construction activities will take place.

A – 2. ACRONYMS

AAC	Arizona Administrative Code	NOI	Notice of Intent
ADEQ	Arizona Department of Environmental Quality	NOT	Notice of Termination
ARS	Arizona Revised Statute	NPDES	National Pollutant Discharge Elimination System
AZPDES	Arizona Pollutant Discharge Elimination System	SWPPP	Stormwater Pollution Prevention Plan
CFR	Code of Federal Regulations	TMDL	Total Maximum Daily Load
CWA	Clean Water Act	USEPA	United States Environmental Protection Agency
MS4	Municipal Separate Storm Sewer System	USGS	United States Geological Survey

APPENDIX B. STANDARD PERMIT CONDITIONS.

Standard permit conditions in Appendix B are consistent with the general permit provisions required under 40 CFR 122.41 and A.A.C. R-18-9-A905(A)(3).

1. **Duty to Comply.** [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(a)(1) and A.R.S. §§ 49-261, 262, 263.01, and 263.02.]

   a. The operator shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act; A.R.S. Title 49, Chapter 2, Article 3.1; and A.A.C. Title 18, Chapter 9, Article 9, and is grounds for enforcement action, permit termination, revocation and reissuance, or modification, or denial of a permit renewal application.
   b. The issuance of this permit does not waive any federal, state, county, or local regulations or permit requirements with which a person discharging under this permit is required to comply.
   c. The operator shall comply with any effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

2. **Duty to Reapply / Continuation of the Expired General Permit.** [A.A.C. R18-9-A905, which incorporates 40 CFR 122.41(b) and A.A.C. R18-9-C903]

   a. Upon reissuance of the general permit, the permittee shall file an NOI, within the timeframe specified in the new general permit, and shall obtain new written authorization to discharge from the Director.

   b. If the Director does not reissue the general permit before the expiration date, the current general permit will be administratively continued and remain in force and effect until the general permit is reissued.

   c. Any operator granted authorization to discharge under the general permit before the expiration date automatically remains covered by the continued general permit until the earlier of:

      i. Reissuance or replacement of the general permit, at which time the operator shall comply with the NOI conditions of the new general permit to maintain authorization to discharge; or
      ii. The date the operator has submitted a Notice of Termination; or
      iii. The date the Director has issued an individual permit for the discharge; or
      iv. The date the Director has issued a formal permit decision not to reissue the general permit, at which time the operator shall seek coverage under an alternative general permit or an individual permit, or cease discharge.

3. **Need To Halt or Reduce Activity Not a Defense.** [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(c)]

   It shall not be a defense for an operator in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. **Duty to Mitigate.** [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(d)]

   The operator shall take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment per A.R.S. § 49-255.01(E)(1)(d).

5. **Proper Operation and Maintenance.** [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(e)]

   The operator shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the operator to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures.

6. **Permit Actions.** [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(f)]

   This permit may be modified, revoked and reissued, or terminated for cause. Filing a request by the operator for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

7. **Property Rights.** [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(g)]

   This permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or invasion of personal rights, nor any infringement of federal, state, Indian tribe, or local laws or regulations.

8. **Duty to Provide Information.** [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(h)]

   The operator shall furnish to ADEQ, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The operator shall also furnish to ADEQ upon request, copies of records required to be kept by this permit.

9. **Signatory Requirements.** [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(k) and (l); A.A.C. R18-9-A905(A)(1)(c), which incorporates 40 CFR 122.22]

   All Notices of Intent (NOI) and Notices of Termination (NOT) must be signed as follows:

   a. NOIs:

      i. For a corporation*:* By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

      ii. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

      iii. For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a federal (or state) agency includes: (1) The chief executive officer (or director) of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.

   b. All NOTs, reports, including SWPPPs, inspection reports, monitoring reports, and other information required by this permit must be signed by a person described in Appendix B, Subsection 9(a) above or by a duly authorized representative of that person. A person is a

duly authorized representative only if:

i. The authorization is made in writing by a person described in Subsection 9(a) above;

ii. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of manager, operator, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may be either a named individual or any individual occupying a named position); and

iii. The signed and dated written authorization is included in the SWPPP. A copy must be submitted to ADEQ, upon request.

c. Certification. Any person signing documents under the terms of this permit shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

10. Inspection and Entry. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(i)]

The operator shall allow the Director or an authorized representative upon the presentation of credentials and such other documents as may be required by law to:

a. Enter upon the operator's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

b. Have access to and copy at reasonable times, any records that must be kept under the conditions of this general permit;

c. Inspect at reasonable times any facility or equipment (including monitoring and control equipment), practices or operations regulated or required under this permit;

d. Sample or monitor at reasonable times any substances or parameters at any location, for the purposes of assuring permit compliance or as otherwise authorized by A.R.S. Title 49, Chapter 2, Article 3.1, and 18 A.A.C. 9, Articles 9.

11. Monitoring and Records. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(j)]

a. Representative Samples/Measurements. Samples and measurements taken for the purpose of monitoring must be representative of the volume and nature of the monitored activity.

b. Retention of Records. The operator shall retain records of all monitoring information, including all calibration and maintenance records, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date permit coverage ends. Operators shall submit any such records to the Director upon request. The operator shall retain the SWPPP developed in accordance with Part 6 of this permit, for at least three (3) years after the last modification or amendment is made to the plan. The Director may extend this retention period upon request by notifying the operator in writing at any time prior to the end of the standard three year retention period.

c. Records Contents. Records of monitoring information must include:

i. The date, exact place, and time of sampling or measurements;

ii. The initials or name(s) of the individual(s) who performed the sampling or measurements;

iii. The date(s) analyses were performed;

iv. The time(s) analyses were initiated;
v. The initials or name(s) of the individual(s) who performed the analyses;
vi. References and written procedures, when available, for the analytical techniques or methods used;
vii. The analytical techniques or methods used; and
viii. The results of such analyses.

d. Any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained in this permit is subject to the enforcement actions established under A.R.S. Title 49, Chapter 2, Article 4, which includes the possibility of fines and/or imprisonment.

12. Reporting Requirements. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(l)]

a. Planned changes. The operator shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

i. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b) (incorporated by reference at A.A.C. R18-9-A905(A)(1)(e)); or
ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1) (incorporated by reference at A.A.C. R18-9-A905(A)(3)(b)).

b. Monitoring reports. Monitoring results must be reported at the intervals specified elsewhere in this permit.

i. Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms (paper or electronic) provided or specified by ADEQ. Pursuant to Part 8.2(2), all monitoring data collected pursuant to Part 7 must be submitted to the Department using the Discharge Monitoring Report (DMR) form, available at http://www.azdeq.gov/environ/water/permits/cgp.html .
ii. If the operator monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.
iii. Calculations for all limitations which require averaging of measurements must use an arithmetic mean and non-detected results must be incorporated in calculations as the limit of quantitation for the analysis.

c. Anticipated noncompliance. The operator shall give advance notice to the Director of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

d. Twenty-four hour reporting.

i. The operator shall report to ADEQ any noncompliance with this permit which may endanger human health or the environment. The operator shall orally notify the office listed below within 24 hours:

Arizona Department of Environmental Quality – Water Quality Compliance
1110 W. Washington Street, Mail Code 5515 B-1
Phoenix, AZ 85007
Office: 602-771 – 2330; Fax 602-771 – 4505

ii. A written submission shall also be provided to the office identified above within five (5) days of the time the operator becomes aware of the circumstances. The written

submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

iii. The following shall be included as information which must be reported within 24 hours under this paragraph.

1) Any upset which exceeds any effluent limitation in the permit.

2) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within 24 hours. (See 40 CFR 122.44(g) which is incorporated by reference at A.A.C. R18-9-A905(A)(3)(d)).

iv. ADEQ may waive the written report on a case-by-case basis for reports under this subsection if the oral report has been received within 24 hours.

e. Other noncompliance. The operator shall report all instances of noncompliance not otherwise required to be reported under this subsection, at the time monitoring reports are submitted. The reports shall contain the information listed in subsection 12(d).

f. Other information. When the operator becomes aware that it failed to submit any relevant facts or submitted incorrect information in the Notice of Intent or in any other report to the Department, the operator shall promptly submit the facts or information to ADEQ at the address listed in Part 8.2.

13. Reopener Clause. [A.A.C. R18-9-A905(A)(3)(d), which incorporates 40 CFR 122.44(c)]

The Department may elect to modify the permit prior to its expiration (rather than waiting for the new permit cycle) to comply with any new statutory or regulatory requirements, such as for effluent limitation guidelines, which may be promulgated in the course of the current permit cycle.

14. Other Environmental Laws.

No condition of this general permit releases the operator from any responsibility or requirements under other environmental statutes or regulations. For example, this permit does not authorize the "taking" of endangered or threatened species as prohibited by Section 9 of the Endangered Species Act, 16 U.S.C. 1538. Information regarding the location of endangered and threatened species and guidance on what activities constitute a "taking" are available from the U.S. Fish and Wildlife Service. The operator shall also comply with applicable State and Federal laws, including Spill Prevention Control and Countermeasures (SPCC).

15. State or Tribal Law. [Pursuant to A.A.C. R18-9-A904(C)]

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the operator from any responsibilities, liabilities, or penalties established pursuant to any applicable State or Tribal law or regulation under authority preserved by Section 510 of the Clean Water Act.

16. Severability.

The provisions of this general permit are severable, and if any provision of this general permit, or the application of any provision of this general permit to any circumstance, is held invalid, the application of the provision to other circumstances, and the remainder of this general permit shall not be affected.

17. Requiring Coverage under an Individual Permit or an Alternative General Permit. [Pursuant to A.A.C. R18-9-C902 and R18-9-A909]

a. The Director may require a person authorized by this permit to apply for and/or obtain either an individual AZPDES permit or an alternative AZPDES general permit. Any interested person may petition the Department to take action under this section. The Department may

require an operator authorized to discharge under this permit to apply for an individual permit in any of the following cases:

i. A change occurs in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the point source;

ii. Effluent limitation guidelines are promulgated for point sources covered by the general permit;

iii. An Arizona Water Quality Management Plan containing requirements applicable to the point sources is approved;

iv. Circumstances change after the time of the request to be covered so that the discharger is no longer appropriately controlled under the general permit, or either a temporary or permanent reduction or elimination of the authorized discharge is necessary;

v. If the Director determines that the discharge is a significant contributor of pollutants. When making this determination, the Director shall consider:

1) The location of the discharge with respect to waters of the United States,

2) The size of the discharge,

3) The quantity and nature of the pollutants discharged to waters of the U.S., and

4) Any other relevant factor.

b. If an individual permit is required, the Director shall notify the discharger in writing of the decision. The notice shall include:

i. A brief statement of the reasons for the decision;

ii. An application form;

iii. A statement setting a deadline to file the application;

iv. A statement that on the effective date of issuance or denial of the individual permit, coverage under the general permit will automatically terminate;

v. The applicant's right to appeal the individual permit requirement with the Water Quality Appeals Board under A.R.S. § 49-323, the number of days the applicant has to file a protest challenging the individual permit requirement, and the name and telephone number of the Department contact person who can answer questions regarding the appeals process; and

vi. The applicant's right to request an informal settlement conference under A.R.S. 41-1092.03(A) and 41-1092.06.

c. The discharger shall apply for an individual permit within 90 days of receipt of the notice, unless the Director grants a later date. In no case shall the deadline be more than 180 days after the date of the notice.

d. If the discharger fails to submit the individual permit application within the time period established in Appendix B, Subsection 17(c) the applicability of the general permit to the discharger is automatically terminated at the end of the day specified by the Director for application submittal.

e. Coverage under the general permit shall continue until an individual permit is issued or denied unless the general permit coverage is terminated under Appendix B, Subsection 17(d).

18. Request for an Individual Permit. [Pursuant to A.A.C. R18-9-C902]

a. An operator may request an exclusion from coverage of a general permit by applying for an individual permit.

i. The operator shall submit an individual permit application under R18-9-B901(B) and include the reasons supporting the request no later than 90 days after publication of the general permit.

ii. The Director shall grant the request if the reasons cited by the operator are adequate to

support the request.

b. If an individual permit is issued to a person otherwise subject to a general permit, the applicability of the general permit to the discharge is automatically terminated on the effective date of the individual permit.

19. Change of Operator. [A.A.C. R18-9-C904]

If a change of ownership or operator occurs for a facility operating under a general permit:

a. Permitted owner or operator. The operator shall provide the Department with a Notice of Termination by certified mail within 30 days after the new owner or operator assumes responsibility for the facility.

i. The Notice of Termination shall include all requirements for termination specified in the general permit for which the Notice of Termination is submitted.

ii. An operator shall comply with the permit conditions specified in the general permit for which the Notice of Termination is submitted until the Notice of Termination is received by the Department.

b. New owner or operator.

i. The new owner or operator shall complete and file a Notice of Intent with the Department within the time period specified in the general permit before taking over operational control of, or initiation of activities at, the facility.

ii. If the previous operator was required to implement a stormwater pollution prevention plan, the new owner shall develop a new stormwater pollution prevention plan, or may modify, certify, and implement the old stormwater pollution prevention plan if the old stormwater pollution prevention plan complies with the requirements of the current general permit.

iii. The operator shall provide the Department with a Notice of Termination if a permitted facility ceases operation, ceases to discharge, or changes operator status. In the case of a construction site, the operator shall submit a Notice of Termination to the Department when:

1) The facility ceases construction operations and the discharge is no longer associated with construction or construction-related activities,

2) The construction is complete and final site stabilization is achieved, or

3) The operator's status changes.

20. Bypass. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(m)]

a. Definitions.

i. Bypass means the intentional diversion of waste streams from any portion of a treatment facility

ii. Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations. The operator may allow any bypass to occur that does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions Appendix B, Subsections 20(c) and 20(d).

c. Notice.

i. Anticipated bypass. If the operator knows in advance of the need for a bypass, if possible

prior notice shall be submitted at least ten days before the date of the bypass.

ii. Unanticipated bypass. The operator shall submit notice of an unanticipated bypass as required in Appendix B, Subsection 12(d).

d. Prohibition of bypass.

i. Bypass is prohibited, and ADEQ may take enforcement action against the operator for bypass, unless:

1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

3) The operator submitted notices as required under Appendix B, Subsection 20(c).

ii. ADEQ may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three conditions listed above in this Appendix B, Subsection 20(d).

21. Upset. [A.R.S. §§ 49-255(8) and 255.01(E), A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(n)]

a. Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the operator. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Appendix B, Subsection 21(c) are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. An operator who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i. An upset occurred and that the operator can identify the cause(s) of the upset;

ii. The permitted facility was at the time being properly operated;

iii. The operator submitted notice of the upset as required in Appendix B, Subsection 12(d)(iii); and

iv. The operator complied with any remedial measures required under Appendix B, Subsection 4.

d. Burden of proof. In any enforcement proceeding, the operator, who is seeking to establish the occurrence of an upset, has the burden of proof.

22. Penalties for Violations of Permit Conditions.

Any permit noncompliance constitutes a violation and is grounds for an enforcement action, permit termination, revocation and reissuance, modification, or denial of a permit renewal application.

a. Civil Penalties. A.R.S. § 49-262 provides that any person who violates any provision of A.R.S. Title 49, Chapter 2, Article 2, 3 or 3.1 or a rule, permit, discharge limitation or order issued or adopted under A.R.S. Title 49, Chapter 2, Article 3.1 is subject to a civil penalty not

to exceed $25,000 per day per violation.

b. Criminal Penalties. Any person who violates a condition of this general permit, or violates a provision under A.R.S. Title 49, Chapter 2, Article 3.1, or A.A.C. Title 18, Chapter 2, Article 9 is subject to the enforcement actions established under A.R.S. Title 49, Chapter 2, Article 4, which may include the possibility of fines and/or imprisonment.

ii. The Director shall grant the request if the reasons cited by the operator are adequate to support the request.

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DRAFT

Attachment B
ADOT Erosion and Pollution Control Manual

ADOT EROSION AND POLLUTION CONTROL MANUAL

For Highway Design and Construction

Arizona Department of Transportation

Intermodal Transportation Division

ADOT EROSION AND POLLUTION CONTROL MANUAL

Written and Edited by
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February 2005

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5 TEMPORARY BEST MANAGEMENT PRACTICES

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INTRODUCTION

Highway construction has been identified as a primary source of soil erosion and sediment loss. Construction of highways typically disturbs large areas of natural vegetative cover that can result in an accelerated rate of soil erosion. In contrast to highways of the past where the roadways were narrow and profiles followed the contour of the land, contemporary highways have wider cross sections and flatter profiles, which results in large areas of land disturbance, high fills and deep cuts (Figures 1.1 and 1.2). Consequently, highway design and construction requires careful consideration for erosion and sediment control.

Erosion and sedimentation from construction sites can have environmental and economic impacts. Environmentally, some of the more common impacts of excessive erosion include:

- Turbidity, which reduces in-stream photosynthesis and increased water temperatures, leading to reduced food supply and aquatic habitat;
- Introduction of soil nutrients into waters that cause algal blooms, which reduces water clarity and depletes oxygen;
- Sedimentation of stream bottoms that blankets fauna and destroys spawning areas; and
- Removal of top soil that leaves hard, rocky and infertile soil, which is difficult to revegetate.

Figure 1.1 Today's highways have wide cross sections that result in large areas of land disturbance

These environmental impacts result in damage to aquatic habitat that is difficult to quantify in terms of costs. However, the economic impacts go beyond the cost of damage to natural resources. For example: excessive accumulation of sediment in streams and reservoirs can require dredging at very high costs; replacement and repair of eroded soil can be very expensive; and sediment removal from roadways, channels and culverts can produce additional maintenance costs and cause flood damage (Figure 1.3).

Excessive sedimentation can also disturb the physical stability of ephemeral channels, resulting in accelerated rates of erosion and sediment deposition within the channels. Increased erosion and deposition can result in damage to native vegetation and subsequently to local wildlife populations for which ephemeral stream channels are important habitats and movement corridors. Increased channel erosion and sedimentation can also lead to accelerated delivery of sediment downstream to intermittent and perennial stream channels, thereby damaging those environments as well.

The Arizona Department of Transportation (ADOT) has adopted this manual to assist in developing erosion and pollution control during both design and construction of roadways.

Figure 1.2 (Above) Rill erosion on cut slope

Figure 1.3 (Below) Sedimentation at storm drain

There are three main goals:

- Reduce erosion potential.
- Reduce off-site sedimentation.
- Prevent contamination by construction materials.

These goals are achieved by means of both permanent and temporary storm water Best Management Practices (BMPs).

Figure 1.4 When properly designed, today's highways carefully fit into the physical and visual landscape

1.1 PURPOSE OF MANUAL

The overall purpose of this manual is three-fold:

- To outline ADOT's procedures for complying with water quality regulations and permits.
- To provide a "tool box" of available BMP's.
- To provide guidance for the selection of BMPs on ADOT construction projects.

1.2 WATER QUALITY REGULATIONS AND PERMITS

All ADOT construction projects must comply with federal, state and local water quality regulation and permit requirements. Attention must be given to these regulations and permit requirements through-out the planning, design and construction of a project to insure that the quality of the waters of the U.S. is not compromised. The following is a general overview of the pertinent regulations and permitting requirements.

1.2.1 Arizona Department of Environmental Quality's (ADEQ's) Arizona Pollution Discharge Elimination System (AZPDES) Storm Water Permit Requirements.

On Dec. 5, 2002, Arizona became one of 45 states with authorization from Environmental Protection Agency (EPA) to operate the National Pollutant Discharge Elimination System (NPDES) Permit Program (Section 402 of the Clean Water Act) (CWA) at the state level. Under the AZPDES Permit Program, all facilities that discharge pollutants from any point source into waters of the U.S. are required to seek coverage under an AZPDES permit. Pollutants can enter waters of the U.S. from various sources including agricultural, domestic, and industrial. For regulatory purposes, these sources are generally categorized as either point source or non-point sources.

For similar types of construction activities, the ADEQ has issued a Construction General Permit (CGP), Arizona Construction General Permit (AZCGP) No. AZG2003-001, which is available to provide storm water permit coverage to all construction projects in the State of Arizona (except on Tribal Trust Lands where the construction general permit is issued by the EPA, termed the Federal Construction General Permit or FCGP in this document). In order to comply with the conditions of either the AZCGP or the FCGP, the operator is required to file a Notice of Intent (NOI) with ADEQ or EPA if construction and construction-related activities, including all clearing, grading, excavation, and stockpiling activities, will result in the disturbance of equal to or greater than one acre. ADEQ or EPA approves the specific project use of the general permit for storm water discharges by accepting and approving the NOI. If ADEQ or EPA denies NOI approval, the operator may have to pursue an individual storm water discharge permit for the project.

The AZCGP specifies allowable storm water discharges (Part I.C) from construction sites and requires the operator to meet water quality standards through implementation of temporary and permanent BMPs and other measures. Compliance with the requirements of the AZCGP constitutes compliance with the National Pollution Discharge Elimination System permit. In order to obtain coverage, construction contractors under contract to ADOT and ADOT representatives shall:

- Comply with all terms and conditions of the AZCGP or FCGP.
- Prepare and implement a site specific Storm Water Pollution Prevention Plan (SWPPP) which meets the minimum requirements of Part IV of the AZCGP.
- Submit an NOI to ADEQ after the contract has been awarded and before any construction activity begins (the NOI is submitted to the EPA if the project is located on Tribal Trust Lands). These requirements are described under Part II.B and Part III of the AZCGP.

- Submit a Notice of Termination (NOT) to ADEQ when construction is complete, all permanent erosion and sedimentation controls are in place, and final stabilization has been achieved to meet the requirements described in Part II.C of the AZCGP. The NOI is submitted to the EPA if the project is located on Tribal Trust Lands.

Chapters 3 and 4 of this manual provide instructions for preparing a SWPPP and completing the NOI and NOT forms for ADOT projects.

1.2.2 Federal Highway Administration Erosion Control Guidelines

Section 1057 of the Intermodel Transportation Efficiency Act of 1991 (ISTEA) requires the Federal Highway Administration (FHWA) to develop erosion and sediment control guidelines for States to follow when building highways using Federal funds. FHWA has formally adopted the American Association of State Highway and Transportation Officials (AASHTO) Highway Drainage Guidelines, Volume III (see Reference 1, Appendix c), for this purpose. Each State highway agency is required to comply with the AASHTO Guidelines or to develop and apply their own more stringent guidelines.

1.2.3 Section 404 of the Clean Water Act

Section 404 of the CWA regulates the discharge of dredged or fill material within the waters of the U.S. and establishes a program to issue permits. In Arizona, the U.S. Army Corps of Engineers (Corps) administers this program. In addition, the U.S. Fish & Wildlife, the National Marine Fisheries Service and State resources agencies (e.g., ADEQ, Game and Fish Department, Water Resources) have important advisory roles. The phrase "discharge of dredged or fill material" includes all earthwork activities such as clearing, grading, filling, and excavating.

The 404 program has considerable impact on the design, construction and maintenance of Arizona's highways. Essentially, any proposed work in washes, rivers, streams, lakes and wetlands requires ADOT's Environmental and Enhancement Group (EEG) to obtain a permit from the Corps. During construction, the Corps evaluates adherence to permit conditions. Typical projects that are affected include the construction and maintenance of culverts, bridges, and stream bank erosion protection.

There are two types of 404 permits: nationwide permits and individual permits. Nationwide permits are general permits designed for allowing minor, noncontroversial projects that are similar in nature, and which create minimal impact on the environment. Individual permits are required for projects that do not meet the terms and conditions for a nationwide permit. They require greater scrutiny by the Corps, other regulatory agencies and the public.

Requirements for nationwide permits in Arizona are found in the Corps Special Public Notice dated April 19, 2002. Some projects may require an individual permit. The Corps should be contacted for determination of permit requirements.

U.S. Army Corps of Engineers
Regulatory Branch
3636 N. Central Avenue, Suite 900
Phoenix, AZ 85012-1939
(602) 640-5385
FAX (602) 640-2020

The federal Section 404 permit program can be easily confused with the ADEQ, Section 402, AZPDES program. It is important to remember, however, that they are two separate and distinct regulatory programs. The distinction is that a Section 404 permit provides permission to add fill material to the waters of the U.S., whereas an AZPDES permit provides permission to discharge treated storm waters to the waters of the U.S. in compliance with permit limitations, conditions and BMPs.

1.2.4 Section 401 of the Clean Water Act

Section 401 of the CWA enables the States to provide certification that the draft 404 permit is in compliance with State law. ADOT Environmental Planning Group obtains 401 Certification during the design process. The purpose of Section 401 is to ensure that the proposed activity meets the State's water quality standards and any other pertinent state-required criteria. In Arizona, ADEQ performs the State Water Quality Certification Review for all areas of the State with the exception of Indian Reservations. For projects within the White Mountain Apache Reservation, the Tribal Environmental Planning Office performs certification reviews. For projects within all other Indian Reservations in Arizona, EPA performs certification reviews.

Section 401 certification requirements apply to all activities regulated under Section 404 of the CWA. The certification review evaluates proposed projects for compliance with state water quality standards and consistency with approved water quality planning and management programs. ADEQ may approve or deny certification for any Section 404 Permit based on the anticipated effect on water quality. A Letter of Certification will be issued by ADEQ if the applicant is in compliance with these standards and conditions.

In order to obtain a letter of certification from ADEQ, construction contractors under contract to ADOT and ADOT representatives shall contact ADEQ Water Permits Division.

1.2.5 Additional Federal Land Requirements

There are several agencies within the U.S. government that manage public lands and may have their own erosion and pollution control requirements. These agencies include the BLM, the BIA, the U.S. Forest Service, the National Parks Service and the U.S. Fish and Wildlife Service. Each affected agency shall be included in the planning and design process when roadway plans are prepared within their jurisdictions. Doing so will ensure that their requirements are incorporated into the plans.

Contact Information:

Bureau of Land Management – http://www.blm.gov/nhp/

Bureau of Indian Affairs - www.doi.gov/bureau-indian-affairs.html

The U.S. Department of Agriculture Forest Service – www.fs.fed.us/

Southwestern Region
USDA Forest Service
333Broadway SE
Albuquerque, NM 87102
(505) 842-3192

The National Parks Service – www.nps.gov/

Pacific West Region, Regional Director
National Park Service
One Jackson Center
1111 Jackson Street
Suite 700
Oakland, CA 94607
(510) 817-1300

U.S. Fish and Wildlife Service – www.fws.gov/

Southwest Region 2
500 Gold Ave. SW
Albuquerque, NM 87102
(505) 248-6635

1.2.6 State and Local Government and Agency Requirements

The Arizona State Land Department does not have a specific policy on erosion control for construction projects but rather reviews projects on a case-by-case basis. For projects that are located on State Trust Land contact:

Arizona State Land Department
Right-of-Way Section
1616 W. Adams St.
Phoenix, AZ 85007
(602) 542-4098

Other environmental issues such as archaeological and/or historic sites may be identified during project planning and design that affect design and construction activities. These issues may affect the contractor's proposed activities outside of the approved right-of-way.

Projects may also be located within the jurisdictions of local governments. These may include Municipal Separate Storm Sewer Systems (MS4) and County Flood Control Districts. Each affected agency shall be included in the planning and design process when roadway plans are prepared within their jurisdictions. This will ensure that their requirements are incorporated into the plans.

Contact Information:

Local Government Units

Phone Listings in Government Pages
Arizona Council of Governments Website
http://www.mag.maricopa.gov/archive/AZ-COGs/index.html

Municipal Separate Storm Sewer Systems

Arizona Department of Environmental Quality Listings
http://www.adeq.state.az.us/environ/water/permits/stormwater.html

EPA Region 9: Water Programs Website
http://www.epa.gov/region09/water/npdes/stormwater.html

County Flood Control Districts

Phone Listings County Government Pages
Arizona Association of Counties Website
http://www.azcounties.org/home/index.cfm

1.3 BEST MANAGEMENT PRACTICE (BMP) SELECTION AND DESIGN

As used in this document, the term BMP refers to operational (non-structural) activities or physical controls (structural) that prevent or reduce the discharge of pollutants and minimize potential impacts upon receiving waters.

Proper BMP design, selection and installation are essential to achieve the goals of this manual. BMP selection begins during the design phase but must be continued by the contractor and ADOT throughout the life of the project. The most effective way to reduce erosion and offsite sedimentation and to prevent the contamination of storm water is to select and install BMPs that best fit the specific conditions encountered.

This manual provides the following:

Chapter 2:
Design guidance for incorporating storm water quality controls in projects during the planning and design phases.

Chapter 3:
Instructions to the contractor for obtaining a Construction General Permit.

Chapter 4:
Instructions to the contractor for preparing a SWPPP, a necessary requirement of the General Permit.

Chapter 5:
Descriptions of both temporary and permanent BMPs for consideration by ADOT and the contractor during design and construction of ADOT projects.

2

PROJECT PLANNING AND DESIGN GUIDE

2.1 OVERVIEW

As used in this document, the term BMP refers to operational activities or physical controls that reduce the discharge of pollutants and minimize potential impacts upon receiving waters. There are two categories of BMPs within ADOT: Permanent Pollution Prevention BMPs and Temporary Pollution Prevention BMPs.

Permanent Pollution Prevention BMPs are permanent measures to improve storm water quality both during and after construction of the project. They include:

1. The minimization of impermeable surfaces;
2. The re-establishment of vegetation to disturbed soils (Figure 2.1);
3. The evaluation of increased runoff flows;
4. The preservation of existing vegetation;
5. The design of concentrated flow structures; and
6. The design of measures to protect disturbed slopes.

Figure 2.1 Revegetated cut slope

Figure 2.2 Installation of erosion control blanket

Temporary Pollution Prevention BMPs are temporary measures to improve storm water quality during the construction process. They include:

1. Temporary soil stabilization and sediment control (Figure 2.2);
2. Non-storm water management; and
3. Waste management.

The objective of this chapter is to provide guidelines for the consideration of permanent pollution prevention BMPs during the ADOT planning and design processes.

2.2 PROJECT PLANNING AND DESIGN

During the design process, the Landscape Architect and Engineer must endeavor to minimize the impacts to water quality that may be caused by the project. In order to maintain water quality affected by a project, ADOT has established the following objectives:

1. Maximize vegetated surfaces;
2. Stabilize disturbed soils;
3. Prevent downstream erosion.

The designer should consider the BMPs described in this chapter in order to achieve these objectives.

2.2.1. Evaluate Increased Runoff Flows

The project design may increase the amount of impermeable surface area within the project area, resulting in increased runoff quantities from the project site. The project design may also increase the velocities of existing offsite runoff flows by concentrating those flows into smaller drainage structures. Consequently, large storm events may result in greater peak runoff discharges into existing drainages than those drainages may have historically received.

To address these concerns, the designer shall consider the following:

- Drainage design: Bridges typically affect offsite runoff less significantly than do culverts and may be less visually intrusive;
- Bio-engineered designs such as live fascines and/ or pole plantings;
- Modifications to receiving drainages: the drainage may need to be protected by means of vegetation, geotextile mats, rock or riprap;
- Energy dissipation devices at culvert outlets;
- Reducing the turbulence and scour at culvert inlets and outlets by smoothing the transition between culvert inlets and outlets and drainages;
- Incorporating detention facilities into project design in order to reduce peak discharges; and
- Spread runoff flows across channel outlet structures in order to mimic natural drainage channels.

Figure 2.3 Preserving vegetation and limiting land disturbance are major factors in highway erosion prevention

2.2.2 Preservation of Existing Vegetation

Existing vegetation provides natural protection against soil erosion and should be preserved wherever possible (Figure 2.3). Mature plants have extensive root structures that help hold soil in place and reduce erosion. Vegetative foliage also helps reduce erosion by absorbing the impact of raindrops that would otherwise fall directly to the ground and erode the soil. Disturbed soils typically erode at much greater rates than do undisturbed soils.

Therefore, the designer should seek to minimize land disturbance by the following general guidelines:

- Minimize land disturbance through appropriate design to balance cut and fill and to reduce the length and steepness of the highway slopes and the extent of grading (typically, vegetation will not successfully colonize slopes greater than 2:1, H: V);
- Areas to be preserved should be delineated prior to the start of soil-disturbing activities. Vegetation that lies within transition areas of cuts or fills and outside of clear zones should be preserved in place;
- For larger projects, existing vegetation should be preserved for as long as possible where activity will occur later in the construction process;
- Temporary roads should be located to avoid stands of significant vegetation and to follow existing contours to reduce cutting and filling; and
- Temporary roads should be located within limits of area to be disturbed by permanent road construction.

Figure 2.4 and Figure 2.5 Swale with check dams

2.2.3 Concentrated Flow Structures

2.2.3.1 Ditches and Dikes

These are permanent devices used to intercept and direct surface runoff into a drain and/or into an existing drainage. Because they concentrate storm water runoff, they are highly susceptible to erosion. Therefore, the designer should consider the following:

- The drainage design should include calculations of peak flows and velocities for all drainage structures and should provide erosion control measures where erodable velocities occur (Table 2.1);
- To prevent downcutting, riprap should be considered for all ditches and dikes that exceed five percent slope; and
- Rock check dams reduce runoff velocity and capture sediment (Figures 2.4 and Figure 2.5).

Figure 2.6 Cut fill transition

	Maximum	Permissible	Velocities For:
Soil Type or Lining (earth: no vegetation)	Clear Water	Water Carrying Fine Silts	Water Carrying Sand and Gravel
	F.P.S.	F.P.S.	F.P.S.
Fine sand (noncolloidal)	1.5	2.5	1.5
Sandy loam (noncolloidal)	1.7	2.5	2.0
Silt loam (noncolloidal)	2.0	3.0	2.0
Ordinary firm loam	2.5	3.5	2.2
Fine gravel	2.5	5.0	3.7
Stiff clay (very Colloidal)	3.7	5.0	3.0
Graded, loam to cobbles (noncolloidal)	3.7	5.0	5.0
Graded, silt to cobbles (colloidal)	4.0	5.5	5.0
Alluvial silts (noncolloidal)	2.0	3.5	2.0
Alluvial silts (colloidal)	3.7	5.0	3.0
Coarse gravel (noncolloidal)	4.0	6.0	6.5
Cobbles and shingles	5.0	5.5	6.5
Shales and hard pans	6.0	6.0	5.0

Table 2.1. Permissible Velocities for Channels with Erodible Linings, Based on Uniform Flow in Continuously Wet, Aged Channels[1]

[1]As recommended by Special Committee on Irrigation research, American Society of Civil Engineers, 1926.
From: FHWA - Hydraulic velocity by: 0.95 for slightly sinuous; 0.90 for moderately sinuous; and 0.80 for highly sinuous.

Figure 2.7 (left) Spillway (with failed temporary embankment curb)
Figure 2.8 (right) Culvert protection

Ditches and dikes also act as devices to prevent erosion. During the design process, the designer should consider the following:

- Crown ditches installed at the tops of slopes to divert runoff from adjacent cut slopes. Construction should take place prior to excavation of the slope. The designer should give careful consideration to crown ditch outlets to avoid downstream erosion and minimize ditch maintenance. In addition, since crown ditches can be highly visible to motorists, consideration should be given to ditch layout and existing vegetation. Finally, the designer should keep in mind that all ditches required maintenance; therefore, crown ditch access should be a consideration;
- Slope ditches: Installed at bottom and mid-slope locations to intercept sheet flow and convey concentrated flows;
- Embankment curbs: Installed on fill slopes at the edge of the roadway to intercept sheet flow from paved surfaces. Embankment curbs are of special consideration where the roadway is super-elevated, thereby directing all sheet flow to one side of the pavement; and

- Cut-to-fill slope transition protection: Installed at the intersection of cut and fill slopes. Cut ditches that discharge at cut-to-fill slope transitions will normally require erosion protection until runoff flows reach an existing stable drainage (Figure 2.6).

Figure 2.9 Rock rip rap at culvert

2.2.3.2 Overside Drains

Overside drains are pipes, downdrains and spillways used to protect slopes against erosion by collecting surface runoff and conveying it down the slope to a stabilized drainage. The designer should consider their use as follows:

- Cut slope spillway: Installed where offsite runoff will intercept a cut slope. Because cut slopes typically are highly visible to motorists, consideration should be given to the aesthetic design of these structures; and
- Fill slopes: Where embankment curbs are installed, openings in the curb are constructed that drain into a spillway or downdrain. Generally, downdrains are used for aesthetic reasons where slopes will be visible from a main roadway (Figure 2.7).

2.2.3.3 Culvert and Channel Outlets

Culvert and structural channel outlets are typically areas of high concern for erosion. The designer should consider the following:

- Careful review of inlet invert elevation: When lower than the existing natural channel, the channel backslope must be protected to avoid headcutting of that slope by runoff;

- Flared end section: These are typically installed at the inlets and outlets of pipes and channels to improve the hydraulic operation, retain the embankment near pipe conveyances and help prevent scour (Figure 2.8);
- Outlet protection/ velocity dissipation devices: In order to prevent scour at the outlet and to reduce runoff flow velocity, rock riprap or some other measure is typically installed. These devices should be constructed during or immediately after construction of the culvert; and
- Protection at the soil/ drainage structure interface: The interface between fill slope soils and concrete or metal structures is typically prone to erosion. While this interface frequently occurs at drainage structure outlets, it is also possible at the edges of spillways and bridge abutments. The designer should consider the use of rock or other protective measure to prevent erosion in this area (Figure 2.9).

2.2.4 Slope Protection

Surface protection consists of permanent design measures that are used alone or in combination to minimize erosion from disturbed surfaces. Vegetated surfaces may offer several advantages to paved surfaces including lower runoff volumes, slower runoff velocities, increased times of concentration and lower cost. However, where site-specific conditions would prevent adequate establishment and maintenance of a vegetative cover, hard surfacing should be considered.

2.2.4.1 Vegetated Surfaces

A vegetated surface is a permanent vegetative cover on areas that have been disturbed. The purpose of the vegetated surface is to prevent erosion and remove pollutants (including sediment) in storm water runoff. Vegetated surfaces should be established on areas of disturbed soil after construction related activities in that area are completed and after the slope has been prepared. Vegetated surfaces should only be considered for areas that can support the selected vegetation long-term. Typically, responsibility for treatment of vegetated slopes rests with the project Landscape Architect as follows:

- Project site shall be evaluated for soil types and conditions; topography; local climate and season; existing native vegetation types and species;
- Surfaces to be vegetated shall be designed to maximize rainfall infiltration and minimize concentrated flow volumes and speeds. Slopes shall be considered for roughening, terracing, and rounding; and
- Existing project site topsoil and vegetation shall be considered for salvage during clearing and grubbing operations. Use salvaged materials as part of surface preparation prior to seeding.

2.2.4.2 Hard Surfaces

Hard surfaces consist of placing concrete, rock or rock and mortar. Typically, these measures are considered where vegetation will not provide adequate erosion control and/or where vegetation will be difficult to maintain. The designer should to consider the downstream effects of increased runoff volumes and velocities from hard surfaces. Typical applications include bank protection and bridge abutments.

2.2.4.3 Erosion and Sediment Control Plans and Details.

As part of the project design process, the designer should develop plans and details which direct the contractor to the proper locations, installation and maintenance of BMPs. The intent of these plans is to provide general direction and specific BMP expectations to the contractor. They will not be considered a complete SWPPP and shall not replace the contractor's SWPPP, since the project plans and details are prepared assuming standard construction practices and may not reflect the contractor's actual methods of construction, access requirements or project phasing. The contractor shall use the project plans as a guide in developing his own SWPPP.

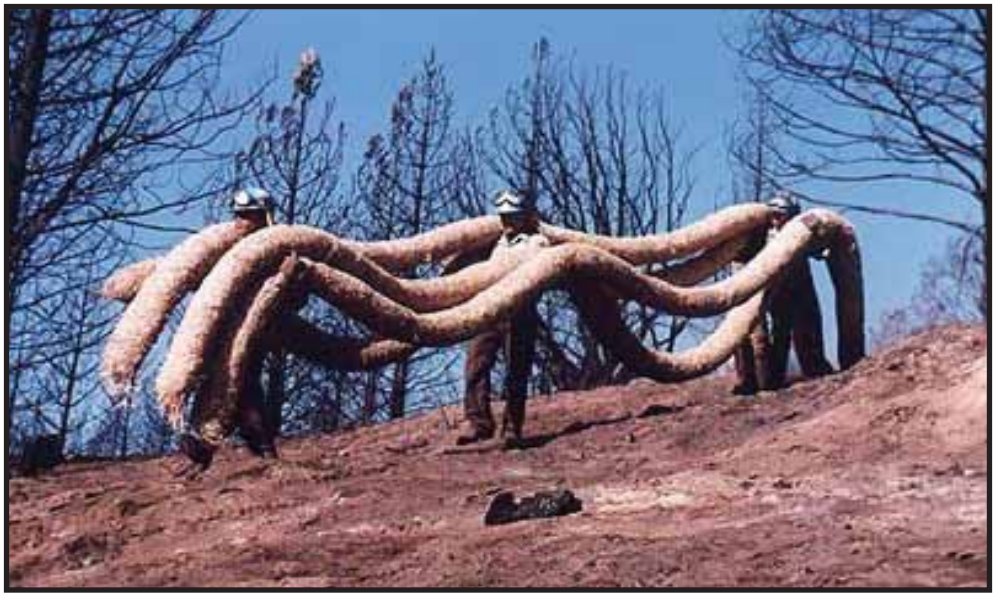


Figure 2.10 Installation of sediment wattles

INSTRUCTIONS FOR OBTAINING ARIZONA OR FEDERAL CONSTRUCTION GENERAL PERMIT AUTHORIZATION FOR ADOT CONSTRUCTION PROJECTS

The following sections describe the steps that ADOT and the general contractor will follow to comply with the ADEQ's AZCGP requirements (federal CGP instructions are described at the end of this chapter). Within each section a short summary of responsibilities for the individuals involved in the construction process is explained. It is ADOT's intent to share responsibilities on the job site with the contractor. It shall not be the general contractor's nor ADOT's sole responsibility to comply with AZCGP requirements. Instead, it is a shared obligation between ADOT and the general contractor and subcontractors to protect the environment.

Step	Action	AZCGP Reference	Information & forms
Step 1	Prepare a Storm Water Pollution Prevention Plan (SWPPP).	Part IV	Chapter 4 Appendix A, Contract Documents ADOT Stored Specification 104SWDEQ
Step 2	Certify the SWPPP	Part IV.C.1, Part IV.J.1, Part VII.K	ADOT Standard Sheet-Appendix A "AZPDES SWPPP Index"
Step 3	Submit a Notice of Intent (NOI)	Part III	Appendix A www.adeq.state.az.us Project Specifications
Step 4	Retain the NOI and SWPPP at the job site	Part IV.J.	Project Specifications
Step 5	Implement the SWPPP	Part IV.D	Maintenance, record keeping and site-monitoring forms - Appendix A Project Specifications
Step 6	Inspect the BMP's regularly and after each storm event	Part IV.H,	ADOT Inspection Form Appendix A Project Specifications
Step 7	Adjust the SWPPP to fit site conditions	Part IV.H.7	Project Specifications
Step 8	Maintain an Updated SWPPP	Part IV.I	Project Specifications
Step 9	Maintain the BMPs	Part IV.E.1 -3	BMP descriptions-Appendices A & B
Step 10	Evaluate job site to determine if Final Stabilization is achieved	Part IX - definition of final stabilization	Final Stabilization Methods Appendix A Project Specifications
Step 11	Submit Notice of Termination (NOT)	Part II.C	Appendix A www.adeq.state.az.us Project Specifications
Step 12	Retain Records after project is complete for 3 years.	Part VI	Project Specifications

Table 3.1 Steps for obtaining Arizona Construction General Permit Authorization

3.1 STEP 1: PREPARE A STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

A complete SWPPP shall be developed by an Erosion Control Coordinator who is designated by the contractor in accordance with the project specifications. Instructions for completing a SWPPP are included in Chapter 4. Two copies of the draft SWPPP shall be submitted to the Engineer at the preconstruction conference if possible, but not later than 14 calendar days from the Department's approval of the contractor's Erosion Control Coordinator.

Responsibilities:

ADOT: Provide supporting documents required to complete the SWPPP. Review the credentials of the Erosion Control Coordinator selected by the contractor. Review the draft SWPPP submitted by the contractor.

The Contractor: Designate an Erosion Control Coordinator. The Erosion Control Coordinator shall prepare the SWPPP.

3.1.1 Project Document BMPs

As described in Section 2.2.4.3, during the project design process ADOT will prepare storm water pollution prevention plans (entitled "Erosion and Sediment Control Plans"), details (entitled "Erosion and Sediment Control Details") and specifications (in Section 810 of the Special Provisions) using BMPs from this manual and BMPs developed for unique conditions particular to individual projects. The project documents will provide direction and specific expectations to the contractor regarding storm water pollution prevention. However, these documents shall not be considered a complete SWPPP and shall not replace the contractor's SWPPP, since the project documents are prepared assuming standard construction practices and may not reflect the contractor's actual methods of construction, access requirements or project phasing. Instead, the contractor shall use the project documents as a guide in developing his own SWPPP.

3.2 STEP 2: CERTIFY THE SWPPP

ADOT, the contractor and any subcontractors that are responsible for constructing the pollution controls must certify the SWPPP. In the case of ADOT local government projects involving federal aide, the appropriate municipality shall also certify the SWPPP. Refer to the AZCGP Part IV.C.1, Part IV.J.1, and Part VII.K for specific instructions. The certifications shall occur after award of the contract and before construction begins.

As described earlier, it is the obligation of all personnel involved in the construction process to protect the environment. The certification requirement shall reinforce the fact that it takes a team effort to properly control storm water pollution and that the responsibility is equally shared between ADOT and its contractors and subcontractors.

The following certification is required by ADEQ and is included on ADOT's "AZPDES SWPPP Index" Sheet (Appendix A).

Responsibilities:

ADOT: The Engineer will certify the SWPPP.

> *I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

The Contractor: The Contractor, the Erosion Control Coordinator and any Subcontractors who are involved in implementing measures identified in the SWPPP must sign the certification.

3.3 STEP 3: SUBMIT NOTICE OF INTENT (NOI)

A complete and accurate NOI form must be prepared and signed by the operator(s) to receive coverage under the AZCGP. The NOI form serves as a promise that the operator(s) will comply with the AZCGP conditions. An operator(s) is any person associated with the project that has control over the construction plans or specifications (the ADOT Engineer) or day-to-day operational control of the site (the Contractor, the Erosion Control Coordinator, and any Subcontractor directly associated with installation or maintenance of BMPs). Refer to Part IX of the AZCGP for a complete definition of operator.

The NOI must be mailed to ADEQ at least 2 business days before any construction activities occur at the site (AZCGP Part III.C.1). If the project is located within or has the potential to discharge to an MS4, a copy of the NOI must also be submitted to the MS4 (AZCGP Part III.F). A list of MS4 municipalities in Arizona is located on the ADEQ website (www.adeq.state.az.us). Also, contractors operating under an approved local sediment and erosion control plan, grading plan, or storm water management plan shall submit a signed copy of the NOI to the local authority upon their request. If the project site is

located within 1/4 mile of unique or impaired waters, the NOI must be submitted at least 32 business days before any construction activities occur at the site (AZCGP Part II.B.1).

A SWPPP that satisfies the conditions of the AZCGP must be completed and certified prior to submitting the NOI to ADEQ. It is not necessary for the SWPPP to be included with the NOI, but the SWPPP must always be available for ADEQ review. The SWPPP must be submitted to ADEQ with the NOI if the construction site is located within 1/4 mile of a unique or impaired water (AZCGP Part II.B.1).

The NOI form and detailed instructions for completing the form are available at the ADEQ website (www.adeq.state.az.us) or by calling either 602-771-4665 or 602-771-4449.

Submit NOI form by certified mail or hand delivery to:

Arizona Department of Environmental Quality
Water Permits Section/Storm Water NOI (5415B-3)
1110 W. Washington Street
Phoenix, AZ 85007

Forms can be faxed to 602-771-4674.

The agency now offers a Web-based service to assist individuals in applying for construction storm water discharge permits (Smart NOI). Access the website as described above.

Responsibilities:

ADOT: Because of its control over the project specifications, ADOT is required to submit the NOI. Following approval by ADOT and completion of the Contractor-prepared SWPPP, the Engineer shall prepare, sign, and mail the NOI for ADOT.

The Contractor: Because he has day-to-day control over the job site, the Contractor also is required to submit the NOI. The Contractor shall prepare the NOI after certification of the SWPPP and mail the signed forms at least 48 hours before any construction begins.

3.4 STEP 4: RETAIN DOCUMENTS AT THE JOB SITE

The following documents must be kept with the SWPPP and retained on the job site, or a location easily accessible during normal business hours, throughout the construction process:

Document	AZCGP Reference	Source
Copy of the AZPDES AZCGP (AZG2003-001)		www.adeq.state.az.us
NOI (as completed by the contractor and ADOT)	Part IV.J	www.adeq.state.az.us
AZPDES authorization number for the project.	Part IV.J.2	Provided by ADEQ after NOI is approved.
Other agreements with any state, local or federal agencies that affect the provisions or implementation of the SWPPP.	Part IV.J.3	ADOT environmental clearance documents

Responsibilities:

ADOT: The Engineer shall keep copies of the above-mentioned documents at the construction office.

The Contractor: The contractor shall post a sign or other notice near the main entrance of the construction site with specific information requested in Part IV.J.2 of the AZCGP. If the contractor maintains a construction office at or near the site, the SWPPP with all the above-mentioned attachments shall be kept at the office. If there is no construction office, the contractor's superintendent and ADOT's inspector shall keep copies in their vehicles.

3.5 STEP 5: IMPLEMENT THE SWPPP

After the NOI is accepted and an authorization number received, construction may begin that will require implementation of the SWPPP (Quick Start projects require special coordination with the Engineer). The pollution controls (i.e., the BMPs) shall be constructed in accordance with the SWPPP.

The SWPPP is intended to be a dynamic plan that shall be revised as a result of unanticipated or changing conditions during construction. Making changes to the plan where it is not effective is a requirement of the AZCGP. Any changes to the plan shall be noted and dated on the plan.

Responsibilities:

In order to effectively implement the SWPPP, ADOT and the contractor shall monitor and record weekly-extended weather forecasts. The contractor and the Engineer shall discuss these forecasts at regularly scheduled weekly progress meetings. In the event that extended forecasts report a high probability for precipitation in the project area, the contractor shall ensure that all BMPs in the SWPPP have been properly installed and maintained. He shall also install additional measures in areas determined to be susceptible to erosion as directed by the Engineer.

Stabilization measures shall be installed within 14 calendar days in portions of the site where construction activities have temporarily or permanently ceased. Exceptions can be found in the AZCGP Part IV.D.4.

The Engineer and the contractor are jointly responsible for implementing the SWPPP and maintaining dated records of :

- Major grading activities.
- Areas where construction activities have temporarily or permanently stopped.
- Installation of stabilization measures (BMPs).
- Delays and reasons for delays of installation of stabilization measures.

These records shall be included in the SWPPP. A sample form for record keeping is included in Appendix A.

3.6 STEP 6: INSPECT THE BMPS REGULARLY

Regular site inspections are required as part of the AZCGP (Part IV.H) to ensure that BMPs are functional and that the SWPPP is properly maintained.

The AZCGP requires regular inspections. In areas of the state that receive greater than 20 inches mean annual rainfall, the inspection requirement is every 7 calendar days or once every 14 calendar days and within 24 hours after a rainfall event of 1/2 inch or greater. In areas of the state that receive less than 20 inches mean annual rainfall and construction occurs during the seasonal dry period, inspections are required monthly, anytime rain is predicted and within 24 hours following a rainfall event of 1/2 inch or greater. Refer to the following map (Figure 3.1) to determine the locations in Arizona where the mean annual rainfall is less than or greater than 20 inches. The reduced inspection frequency requirement also applies to sites where runoff is unlikely due to winter conditions.

Inspections must be preformed by qualified personnel as described in Part IV.H.3 of the AZCGP and as specified in the project specifications.

Inspections must include all areas of the site disturbed by construction activity, staging areas and areas used for storage of materials that are exposed to precipitation. Refer to AZCGP Part IV.H.4 for a complete scope of inspections. ADOT has developed an AZPDES inspection checklist to be used on ADOT construction projects (Appendix A). The completed ADOT checklist and any additional sheets necessary to record the results of the inspection shall serve as the Compliance Evaluation Report (Part IV.H.5). The Report and the record of any follow-up actions taken shall be retained as part of the SWPPP.

Responsibilities:

ADOT: Responsible for inspections of BMPs and approval of any follow-up actions deemed necessary following the inspections.

The Contractor: Responsible for inspections, inspection reports and installation and maintenance of all BMPs. Responsible for required follow-up actions within time limits described in project specifications.

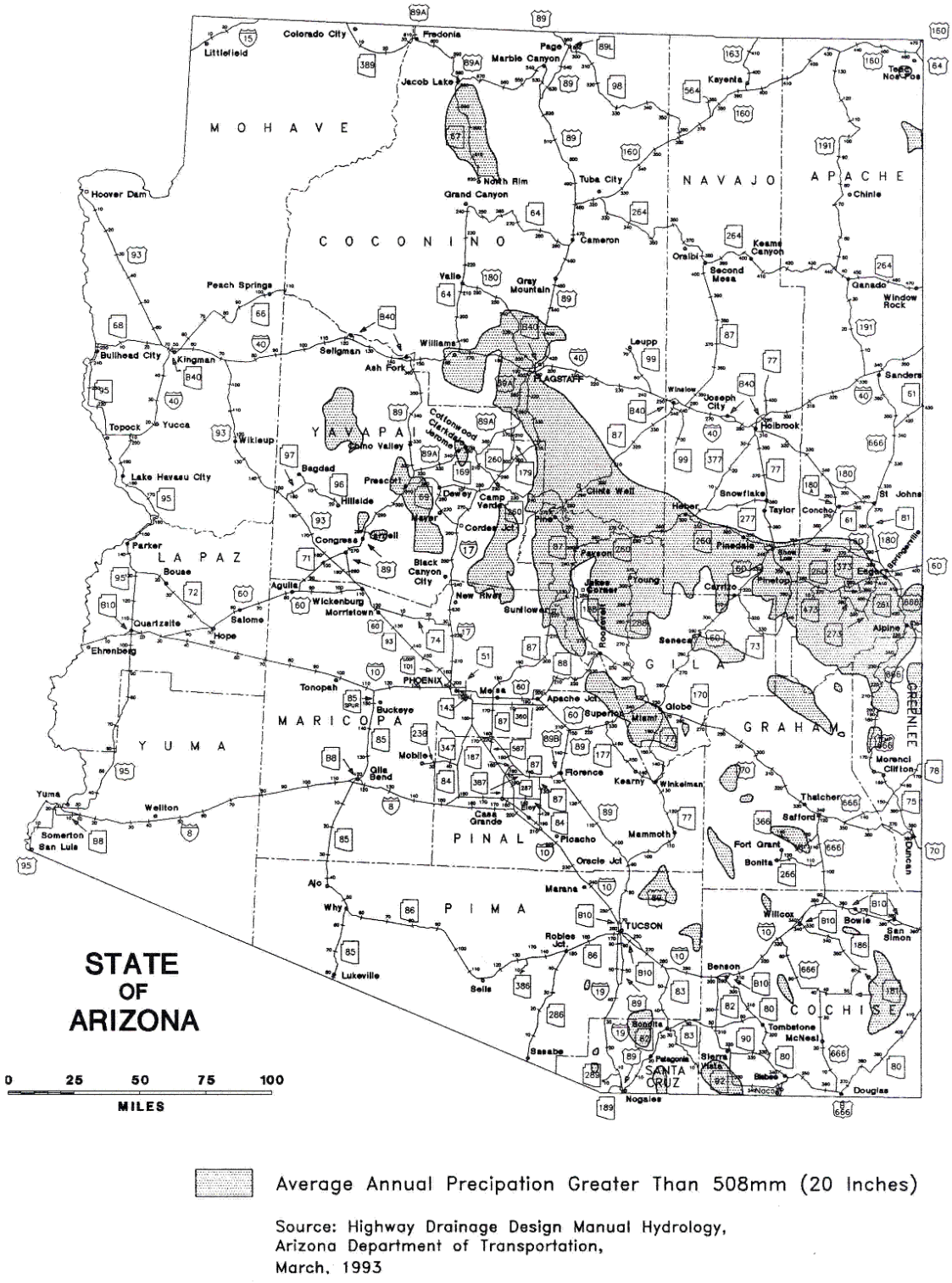


Figure 3.2 Arizona Climate Map

3.7 STEP 7: ADJUST THE SWPPP TO FIT SITE CONDITIONS

The operator shall implement follow-up actions based on results of the inspection process within seven calendar days following the inspection, or as required by the project specifications. Where adjustments to the SWPPP are deemed necessary, implementation must be completed before the next anticipated storm event or as soon as practical (AZCGP Part IV.H.7).

Responsibilities:

ADOT: Responsible for the approval of any changes or additions to the SWPPP based on specific site conditions.

The Contractor: Responsible for the installation and adjustment of BMPs to fit specific site conditions deemed necessary as a result of inspections. The contractor is also responsible for recording these actions on the SWPPP.

3.8 STEP 8: MAINTAIN AN UPDATED SWPPP

It is imperative that the SWPPP remain current with the changes and adjustments made in the field. Failure to update the SWPPP is considered a violation of AZCGP conditions and grounds for issuance of a failure notice.

The SWPPP shall be updated within 15 calendar days if changes in design, scheduling or maintenance activities have a significant effect on the discharge of pollutants or it is determined that discharges from the construction site are causing or contributing to water quality exceedances (Refer to AZCGP Part IV.I).

Responsibilities:

ADOT: The Engineer must retain copies of updated SWPPP in his vehicle.

The Contractor: Must maintain an updated SWPPP.

3.9 STEP 9: MAINTAIN THE BMPS

All erosion and sediment control measures and other protective measures identified in the SWPPP must be maintained in effective operational condition (Refer to AZCGP Part IV.E.1-3).

Responsibilities:

ADOT: Responsible for inspections and approval of maintenance activities.

The Contractor: Responsible for the maintenance of all erosion and sediment control measures.

3.10 STEP 10: EVALUATE JOB SITE TO DETERMINE FINAL STABILIZATION

Final Stabilization shall be defined as the completion of all soil-disturbing activities and the two following criteria have been met:

- A uniform (i.e., evenly distributed, without large bare areas) perennial vegetative cover with a density equivalent to 70% of the native background vegetative cover has been established on all unpaved areas and areas not covered by permanent structures. Where perennial vegetation is not yet fully established, temporary erosion control devices are properly installed and fully operational.
- Permanent erosion control measures (e.g., riprap, gabions, or geotextiles) have been employed and are fully operational.

Refer to Appendix A for methods for determining final stabilization for native seeded/unpaved areas.

Responsibilities:

ADOT: Determine final acceptance in accordance with the project specifications.

The Contractor: Initiate inspections to determine if final stabilization has been achieved.

3.11 STEP 11: SUBMIT NOTICE OF TERMINATION (NOT)

A complete and accurate NOT must be submitted to ADEQ after it has been determined that the project has met the submittal criteria as described in 3.10 above.

The NOT form is available at the ADEQ website www.adeq.az.us or by calling 602-771-4665 or 4449.

Submit form by certified mail or hand delivery to:

Arizona Department of Environmental Quality
Storm Water Program - Water Permits Section/NOT (5415B-3)
1110 W. Washington Street,
Phoenix, AZ 85007

Responsibilities:

ADOT: The Engineer is responsible for filling out, signing and submitting the NOT form for ADOT.

The Contractor: The Contractor is responsible for submitting his own NOT form to ADEQ and providing one copy to the Engineer. In the case of an urban highway project where the landscape contract lags behind the paving project, the following rules apply for submitting the NOT:

- If the bare ground is temporarily seeded and mulched as part of the paving project, ADOT and the contractor shall submit NOTs when the contract is complete. At the start of the subsequent landscape contract, both ADOT and the landscape contractor shall submit NOIs to obtain a new permit to cover the landscaping activities.
- If temporary seeding and mulching are not part of the paving project, ADOT cannot submit a NOT until after the completion of the landscaping project. Therefore, ADOT shall maintain temporary erosion and sediment controls in the area. ADOT shall also perform regular inspections (in accordance with the AZCGP) during the interim period after the paving project is complete and before the landscape contract begins. It should be noted that in this latter case, the paving contractor will submit a NOT at the end of the paving contract and the landscape contractor will submit a NOI before beginning subsequent work. In the interim, ADOT will have sole responsibility for the project.

3.12 STEP 12: RETENTION OF RECORDS

ADOT and the Contractor shall retain copies of SWPPPs and all documentation required by this permit, including records of all data used to complete the NOI to be covered by this permit, for at least three years from the date of final stabilization of the site (AZCGP Part VI).

3.13 SPECIAL CONDITIONS, REQUIREMENTS AND EXCEPTIONS

Condition, Requirement or Exception	Action	Location of forms and further information
Permit Requirements for Tribal Trust Lands	Permit must be obtained through the EPA	EPA website: www.epa.gov http://cfpub.epa.gov/npdes/index.cfm ADOT Stored Specification 104SWEPA
Permit Requirements for discharge to unique or impaired waters	Follow instructions outlined in AZCGP and submit NOI, SWPPP and Monitoring Program 32 business days before construction activity will begin	AZCGP Part II.B.1 www.adeq.state.az.us This chapter - for AZCGP instructions Chapter 4 - for SWPPP preparation
Permit Requirements for Batch Plants, Borrow Pits and Material Pits located outside the right-of-way.	Obtain permit coverage under Multi-Sector General permit for construction activities not directly related to a construction site.	www.adeq.state.az.us AZCGP Part I.C.1.c for definition of allowable discharges.
Waivers for Small Construction Activities	Determine if project equal to or greater than 1 acre but less than 5 acres is exempt from permit requirements	AZCGP Part I.E and Part III.B

Table 3.3 Special Conditions, Requirements and Exceptions

3.13.1 Permit Requirements on Tribal Trust Lands

If the project is located entirely on Tribal Trust Lands, permit coverage shall be obtained through the EPA (http://cfpub.epa.gov/npdes/index.cfm). Follow these steps (described in detail on the EPA website) and refer to the ADOT Stored Specification 104SWEPA to obtain coverage:

Step 1: Read the FCGP and fact sheet.
Step 2: Determine if project is eligible for coverage under the FCGP.
Step 3: Develop and implement SWPPP (follow instructions in Chapter 4).
Step 4: Complete and submit a NOI.

Forms can be submitted by mail to:

Storm Water Notice Processing Center
Mail Code 4203M
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Electronic NOI forms are available from the following website:
http://cfpub.epa.gov/npdes/stormwater/enoi.cfm

If the project site is located on the White Mountain Apache Reservation, the NOI shall be sent to:

Tribal Environmental Planning Office
P.O. Box 2109
Whiteriver, AZ 85941

3.13.2 Permit requirements for projects located within 1/4 mile of Impaired or Unique Waters.
If the project site is located within ¼ mile of unique (R18-11-112) or impaired (Section 303(d) of the CWA) waters, the NOI and the SWPPP must be submitted to ADEQ at least 32 business days before any construction activities occur at the site (AZCGP Part II.B.1). This extra time allows ADEQ to review the SWPPP to determine whether selected BMPs are sufficiently protective of water quality.

The SWPPP must include a proposal for monitoring to determine if BMPs and controls are effective (AZCGP Part I.D.5.a).

3.13.3 Permit requirements for Batch Plants, Borrow Pits and Material Pits
Discharges from support activities such as concrete or asphalt batch plants, equipment staging yards, material storage areas, screening and crushing plants, excavated material disposal areas and borrow areas are covered under the AZCGP if the conditions of the permit are followed (AZCGP Part I.C.1). The contractor must obtain coverage under a separate Multi-Sector General Permit (MSGP) for activities that do not fall under the allowable discharges for an AZCGP.

3.13.4 Waivers for Small Construction Activities
Small Construction Activities, equal to or greater than 1 acre and less than 5 acres may be exempt from Arizona or Federal Construction General Permits if:

- The project's rainfall erosivity factor calculation is less than 5 during the entire period of construction activity (AZCGP Part I.E.1) or,
- When an EPA-approved "total maximum daily load" indicates that receiving waters will not be impacted by discharges from the project (AZCGP Part I.E.2).

4

STORM WATER POLLUTION PREVENTION PLANS (SWPPP)

Storm Water Pollution Prevention Plans (SWPPPs) are developed to describe operational activities and physical controls (BMPs) that will be used to prevent the discharge of pollutants into the waters of the United States. SWPPPs are site specific and, for ADOT construction projects, the contractor develops them as a first step in obtaining a CGP. A useful construction SWPPP checklist can be downloaded from the ADEQ website (www.adeq.state.az.us) and is included in Appendix A. The follow steps have been developed to provide direction and resources to facilitate the completion of the SWPPP.

Step	Action	AZCGP Reference	Information & forms
Step 1	Identify all operators for the Project	Part IV.C	
Step 2	Describe the Site and Prepare a Schedule of Construction Activities	Part IV.C	ADOT Standard Sheet Project Specifications
Step 3	Select Controls to Reduce Pollutants	Part IV.D	Chapters 2 & 5
Step 4	Prepare a Plan for Maintenance of BMPs	Part IV.E	Appendix A
Step 5	Collect Permit Related Documents	Part IV.F	
Step 6	Comply with Applicable Federal, State and Local Programs	Part IV.G	Chapter 1Design Documents
Step 7	Develop a Site Specific Inspection Plan	Part IV.H	ADOT AZPDES Inspection Checklist

4.1 STEP 1: IDENTIFY ALL OPERATORS FOR THE PROJECT

An operator(s) is any person associated with the project who has control over the construction plans or specifications (ADOT) or day-to-day operational control of the site (the Contractor, the Erosion Control Coordinator, and any Subcontractor directly associated with installation or maintenance of BMPs).

Operators certify the SWPPP (Chapter 3, Step 2) and are identified on the Standard “AZPDES SWPPP Index” Sheet in the erosion and sediment control plans developed by ADOT.

4.2 STEP 2: DESCRIBE THE SITE AND PREPARE A SCHEDULE OF CONSTRUCTION ACTIVITIES

Much of the information needed to complete this portion of the SWPPP is included in the contract documents or in reports that are generated as part of the design process. These reports include the soils/geotechnical report, the project drainage report, and the environmental clearance documents and are available from ADOT.

For larger projects, the project site may be divided into sub-areas based on the maximum allowable exposed area as specified in the project specifications. A schedule of construction activity shall be developed for each sub-area.

4.3 STEP 3: SELECT BMPS TO REDUCE POLLUTANTS

To comply with Part IV.D of the AZCGP, the SWPPP must describe all BMPs that will be implemented as part of the construction project to control pollutants in storm water discharges. The SWPPP must clearly describe appropriate control measures to be used in each sub-area. Refer to the BMP descriptions in Chapter 5 when selecting appropriate permanent and temporary controls.

As discussed in Section 3.1.1, ADOT will prepare Erosion and Sediment Control plans and details as part of the construction documents. These will provide direction and specific BMP expectations to the contractor. However, the project documents shall not be considered a complete SWPPP and shall not replace the contractor's SWPPP, since the project plans and details are prepared assuming standard construction practices and may not reflect the contractor's actual methods of construction, access requirements or project phasing. The contractor shall use the project plans as a guide in developing his own SWPPP.

The SWPPP must also describe the "Good Housekeeping" procedures and practices as specified in the project specifications. These include:

- An inventory of chemicals and materials needed for construction.
- A spill prevention and clean-up plan;
- A description of storage, use and disposal of chemical and construction materials;
- A hazardous waste management plan;
- A solid waste management plan; and
- Sanitary/septic waste storage and disposal procedures.

4.4 STEP 4: PREPARE A PLAN FOR MAINTENANCE OF BMPS

Proper maintenance of BMPs is an integral part of the effort to prevent storm water pollution. BMPs must be cleaned or replaced where design capacity is reduced by 50%. Procedures and activities for this purpose must be included in the SWPPP. Maintenance criteria are included in the BMP descriptions in Chapter 5.

4.5 STEP 5: COLLECT PERMIT-RELATED DOCUMENTS

The following documents must be included in the SWPPP:

Document	AZCGP Reference	Source
AZPDES permit (AZG2003-001)		www.adeq.state.az.us
NOI (as completed by the contractor)	Part IV.J	www.adeq.state.az.us
NPDES or AZPDES authorization number for the project.	Part IV.J.2	Provided by ADEQ after NOI is approved.
Other agreements with any state, local or federal agencies that affect the provisions or implementation of the SWPPP.	Part IV.J.3	ADOT environmental clearance documents.

In addition, a site specific inspection plan must be developed as part of the SWPPP. A standard ADOT inspection checklist is included in Appendix A. Identify and document the credentials of qualified inspectors. The credentials of a qualified inspector are described in the project specifications.

4.6 STEP 6: COMPY WITH APPLICABLE FEDERAL, STATE AND LOCAL PROGRAMS

Chapter one described the federal, state and local soil and erosion control programs that must be followed to prevent pollution to the waters of the U.S.

4.7 STEP 7: DEVELOP A STE SPECIFIC INSPECTION PLAN

An inspection plan must be developed as part of the SWPPP. A standard ADOT inspection checklist is included in Appendix A. Identify and show the credentials of qualified inspectors, as described in project specifications and in the SWPPP to simplify the completion of inspection reports in the field.

5

BEST MANAGEMENT PRACTICES

5.0 INTRODUCTION

ADOT requires contractors to prepare and implement a SSWPPP to control water pollution effectively during the construction process of all ADOT projects. As described in Chapter 4 of this manual, in order to complete the SWPPP for ADOT approval, the contractor is required to select those BMPs which will best control storm water pollution. This chapter provides instructions for the selection and implementation of BMPs. The BMPs described in this Chapter include both temporary and permanent erosion and sediment control practices. Each project presents unique conditions. These BMPs are provided as a "toolbox" to allow ADOT and the Contractor options to best address the requirements of the Arizona Construction General Permit.

Disturbed Soil Area Management
Limiting the amount of disturbed soil is a critical component in conducting an effective storm water management program. Section 104.09 of the Special Provisions states

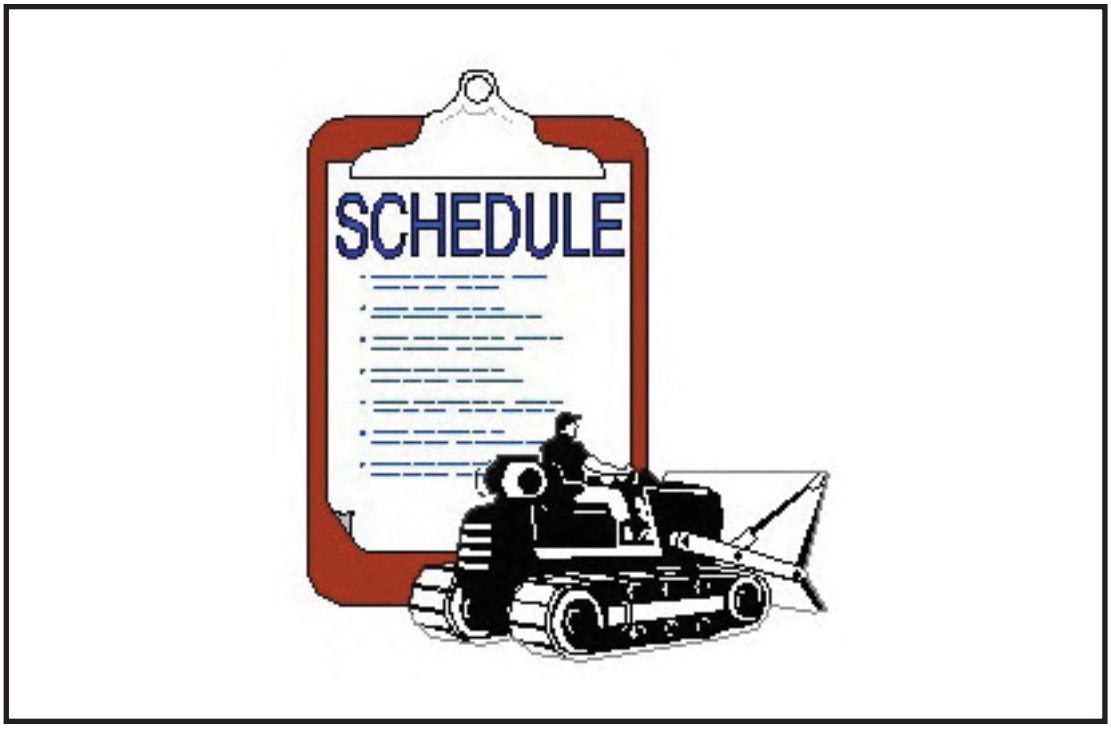
"*Unless otherwise approved in writing, the contractor shall not expose an area greater than 750,000 square feet in any one location within the project limits until the erosion control devices proposed for that portion of the project have been installed and accepted by the Engineer…. In addition, unless otherwise approved by the Engineer, erosion control measures for each slope that is not scheduled to be re-disturbed within 21 days shall be placed not later than 14 days after construction activity has temporarily or permanently ceased for that portion of the work.*"

The Engineer may elect to further restrict the size of the project's total disturbed area during the rainy season.

5.1 SOIL STABILIZATION BEST MANAGEMENT PRACTICES

Soil stabilization consists of preparing the soil surface and applying one of the following BMPs, or a combination thereof, to disturbed soils areas.

Scheduling



5.1.1 Scheduling

Definition

The development of a schedule for every project that includes sequencing of construction activities in conjunction with the implementation of construction site BMPs in order to reduce the amount and duration of soil exposed by construction activities. The purpose is to minimize erosion of disturbed soils by wind, rain, runoff, and vehicle tracking.

Purpose

- To reduce the amount and duration of soil exposed to erosion.
- To ensure that BMPs are implemented in a timely manner as construction proceeds.

Appropriate Applications

- Construction activities shall be planned to minimize the amount of disturbed land exposed to erosive conditions.
- Stabilization measures shall be installed and maintained as work progresses, not just at the completion of construction.

Planning Considerations

- Schedule the installation of temporary and permanent controls as specified in the Construction General Permit.
- The schedule of construction activities and concurrent application of temporary and permanent BMPs is developed as part of the SWPPP.
- Schedule clearing and grubbing activity to allow existing vegetation to remain in place as long as possible.
- For larger projects, the contractor shall not expose more than 750,000 square feet in any location until temporary or permanent BMPs have been installed.
- Schedule shall include dates for significant long-term operations or activities that may have planned non-storm water discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.
- Schedule shall include dates for installation of permanent drainage systems and runoff diversion devices. These devices should be installed as early as possible in the construction process.
- The schedule shall include non-storm water BMPs, waste management and materials pollution control BMPs.
- Stabilize non-active areas as specified in the CGP.
- Monitor weather forecast and adjust construction schedule to allow for the implementation of soil stabilization and sediment controls on all disturbed areas prior to the onset of rain.

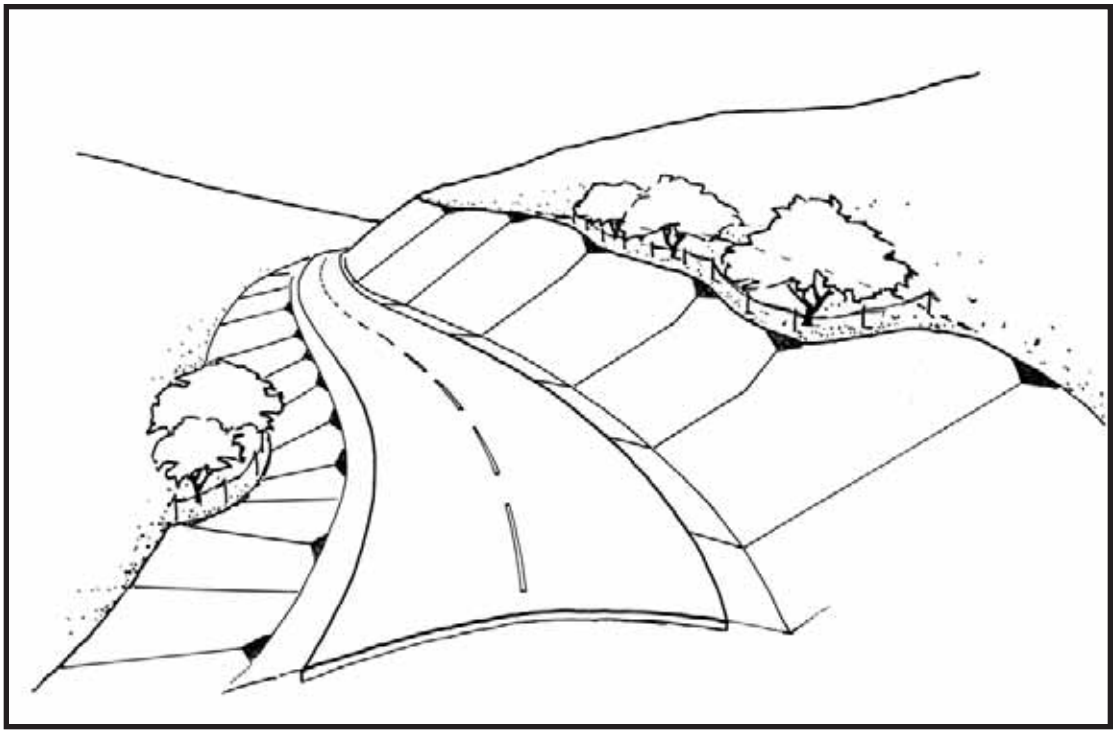
Inspections

- Verify that work is progressing in accordance with the schedule.

Maintenance

- The schedule must be updated when changes are warranted or when directed by the Engineer.

Preserve Existing Vegetation



5.1.2 Preserve Existing Vegetation

Definition

The carefully planned protection of trees and natural vegetated areas within the construction site or right-of-way in order to minimize the amount of bare soil exposed to erosive forces and provide vegetated areas to filter storm water runoff.

Purpose

- Reduce soil erosion, sediment transport, and tracking.
- Reduce maintenance.

Appropriate Application

- Protect trees and natural areas not in direct conflict with construction activities.

Limitations

- Difficult on sites with restricted access.
- Requires planning and may limit area available for construction activity.

Standards and Specifications

Timing

- Evaluate existing vegetation early in the planning process to adjust grading limits around high quality natural areas.
- Areas to be preserved in place shall be clearly marked at the site and identified on the project plans.
- Preservation of existing vegetation shall conform to scheduling requirements set forth in the special provisions.
- Clearing and grubbing and other soil-disturbing construction activities shall not be permitted prior to preservation of existing vegetation.

Design and Layout

- Areas to be preserved shall be marked with highly visible, non-metallic, temporary fencing as described in the project specifications.
- Temporary fencing shall be placed beyond the "dripline" of a tree by a distance that is 1½ times the length of the "dripline" radius.
- Temporary roads shall be constructed to minimize disturbance to existing vegetation and remain within limits of disturbance of permanent road.
- Construction materials, equipment storage, and parking areas shall be located where they will not cause root compaction.
- Waste materials including vegetation to be removed shall not be stored within the preserved area.

Construction Activities

- Where tree roots are disturbed, they shall be covered with soil as soon as possible.
- Damaged roots and limbs shall be cut cleanly.
- Seriously damaged trees shall be examined a trained arborist.
- Remove and replace trees if they are damaged seriously enough to affect their survival.
- Aerate soil where compaction occurs from construction activity.
- Immediately repair damage to irrigation systems.

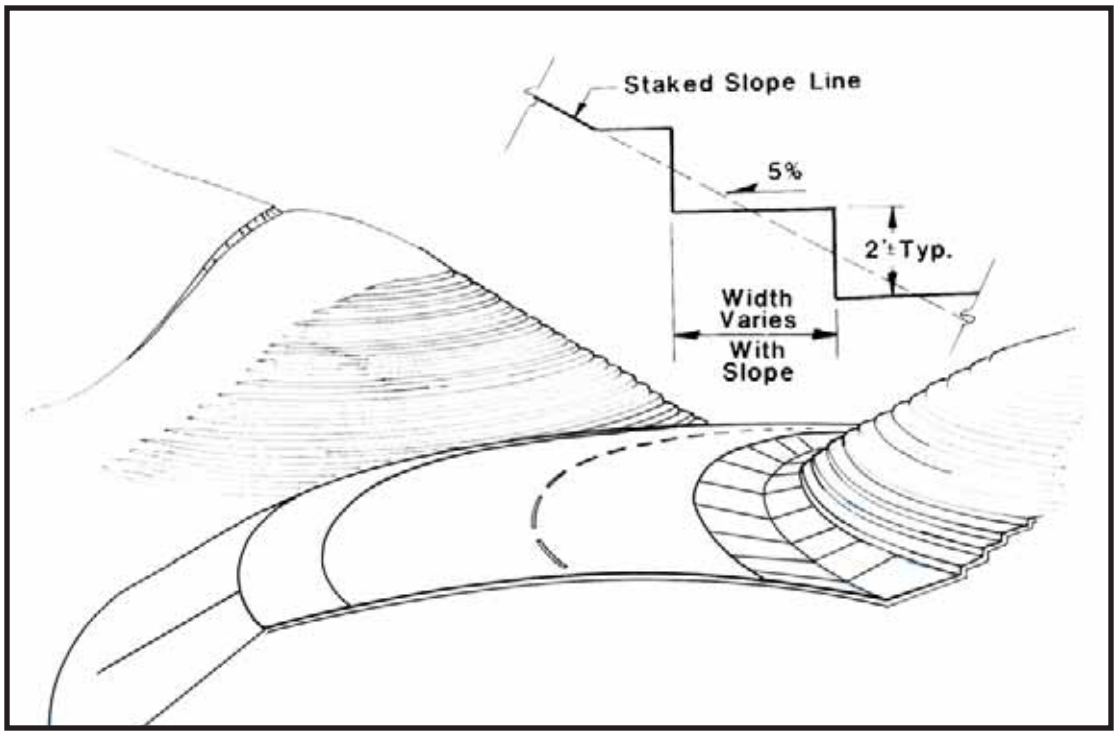
Inspections

- Follow inspection schedule required in CGP Part IV.H.
- Inspect the preservation fencing to ensure that it is intact and that there has been no encroachment into the preservation area.
- Evaluate preserv-in-place vegetation for signs of stress.

Maintenance

- Maintain preservation fencing as needed.
- After all other work is complete, fencing and barriers shall be removed last.
- Address unhealthy and declining vegetation as described in project specifications.

Minibenches/Slope Roughening



5.1.3 Minibenches/Slope Roughening

Definition

Terracing and roughening are techniques for creating furrows, terraces, serrations, stair-steps or track-marks on the soil surface.

Purpose

- To improve water infiltration.
- To increase the effectiveness of temporary and permanent soil stabilization practices.

Appropriate Applications

- Large engineered slopes, primarily cuts in rural settings.
- Soils prone to erosion.
- Prior to application of permanent seeding.

Limitations

- Not appropriate on rock slopes.
- Must be constructed as slope is cut.

Standards and Specifications

Planning Considerations

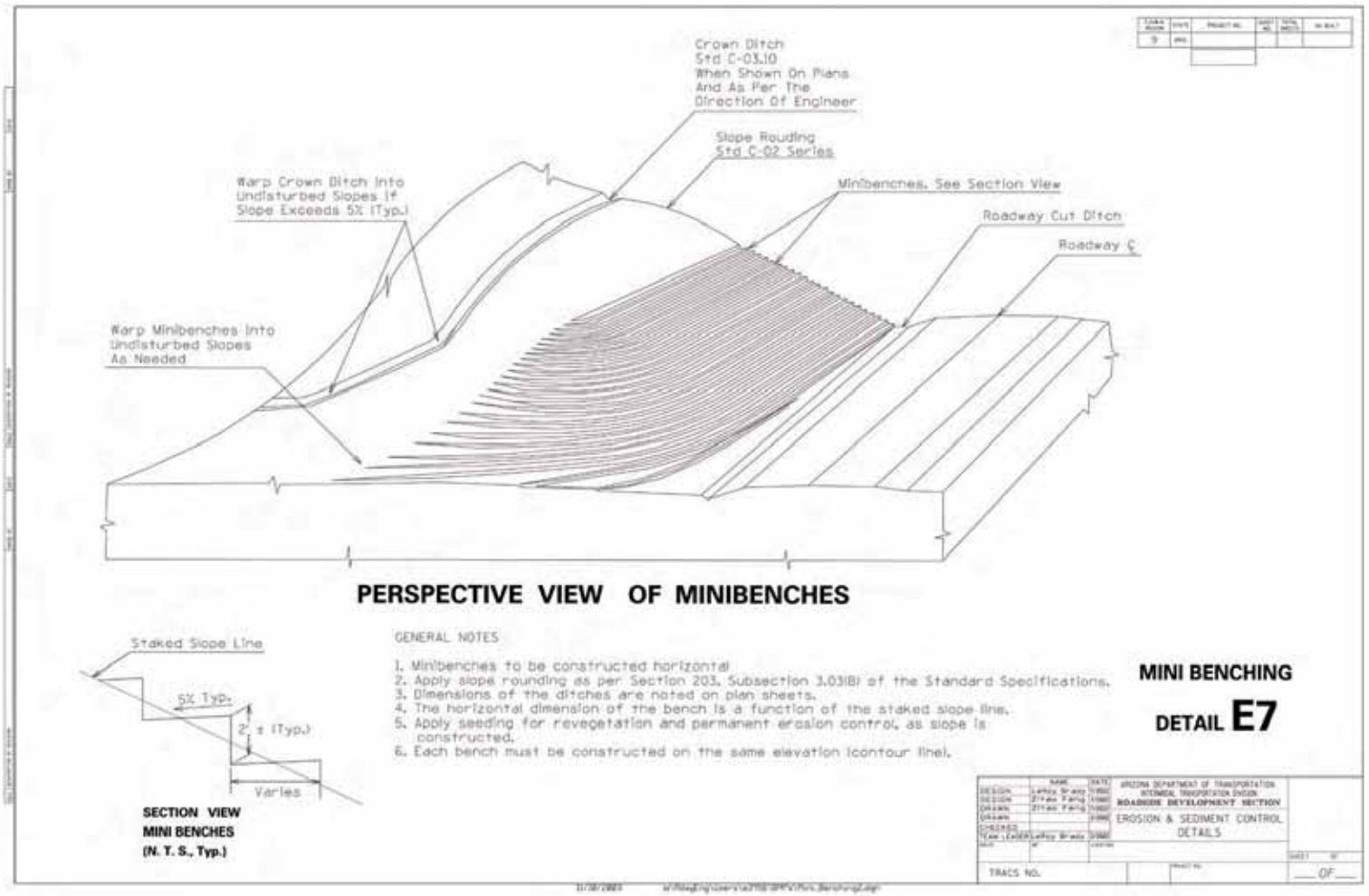
- Minibenching and slope roughening shall be constructed from the top of a cut slope down.

Design

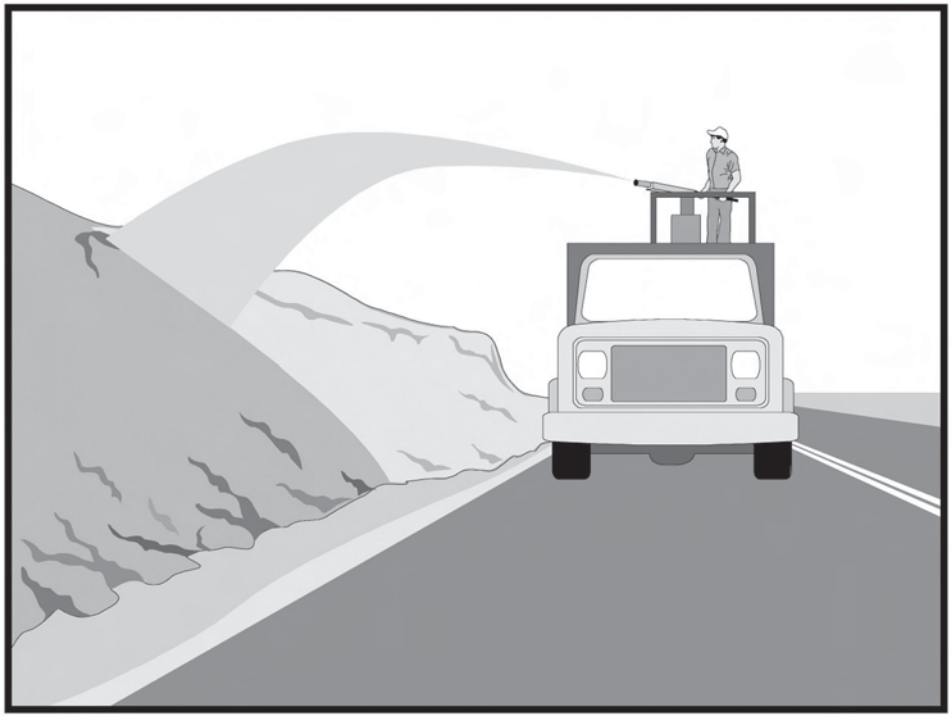
- Minibenches, terraces, furrows, and other horizontal roughening techniques shall follow the contour.

Inspections and Maintenance

- Follow inspection schedule required in the CGP Part IV.H.
- Where horizontal roughening falls away from the contour, additional BMPs may be required to protect the slope.


Crown Ditch
Std C-03.10
When Shown On Plans
And As Per The
Direction Of Engineer
Slope Rouding
Std C-02 Series
Warp Crown Ditch Into
Undisturbed Slopes If
Slope Exceeds 5% (Typ.)
Minibenches, See Section View
Roadway Cut Ditch
Roadway ℄
Warp Minibenches Into
Undisturbed Slopes
As Needed
PERSPECTIVE VIEW OF MINIBENCHES
Staked Slope Line
5% Typ.
2' ± (Typ.)
Varies
SECTION VIEW
MINI BENCHES
(N. T. S., Typ.)
GENERAL NOTES
1. Minibenches to be constructed horizontal
2. Apply slope rounding as per Section 203, Subsection 3.03(B) of the Standard Specifications.
3. Dimensions of the ditches are noted on plan sheets.
4. The horizontal dimension of the bench is a function of the staked slope line.
5. Apply seeding for revegetation and permanent erosion control, as slope is constructed.
6. Each bench must be constructed on the same elevation (contour line).
MINI BENCHING
DETAIL E7
ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADSIDE DEVELOPMENT SECTION
EROSION & SEDIMENT CONTROL
DETAILS
TRACS NO.

Hydraulic Mulch



5.1.4 Hydraulic Mulch

Definition

Hydraulic mulch consists of applying a mixture of shredded wood fiber or a hydraulic matrix (e.g., bonded fiber matrix), and a stabilizing emulsion or tackifier with hydro-mulching equipment. This will protect exposed soil from erosion by raindrop impact or wind. This is one of five temporary soil stabilization alternatives to consider.

Purpose

- Reduce soil erosion through temporary stabilization.

Appropriate Applications

- Temporary protection of disturbed areas until permanent measures (such as vegetation) are installed.
- Temporary protection of disturbed areas that must be re-disturbed following an extended period of inactivity.
- Hydraulic matrices typically are effective for longer periods of time.

Limitations

- Wood fiber hydraulic mulches are typically short-lived (less than a growing season).
- Hydraulic tackifiers typically require 24 hours to cure to be effective. Therefore,

should not be applied immediately prior to a storm event.

Standards and Specifications

- Apply as specified in project documents or by manufacturer.
- Soil surface must be loose at time of application.
- Area to be mulched shall be completely covered.
- Avoid overspray onto existing pavements, structures and vegetation.
- Selection of hydraulic mulches by the contractor must be approved by the Engineer prior to use.

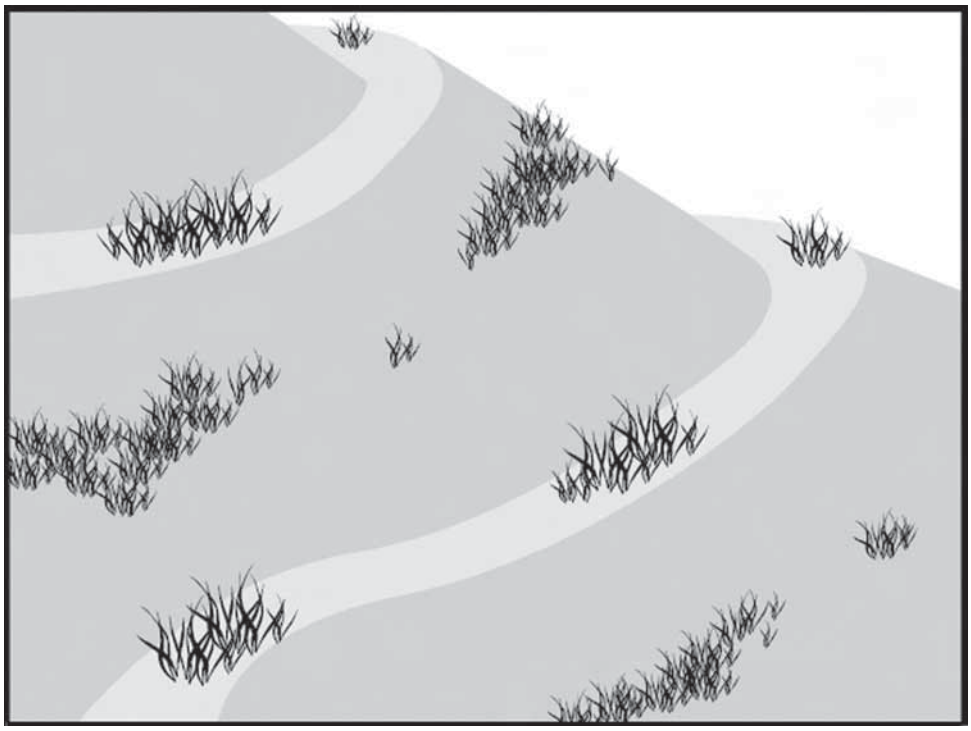
Inspections

- Follow inspection schedule required in the CGP Part IV.H.
- Inspect after all rainfall events.

Maintenance

- Maintain an unbroken ground cover throughout the period of construction the soils are not being reworked.

Hydroseeding



5.1.5 Hydroseeding

Definition

Hydroseeding typically consists of applying a mixture of fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, which protects exposed soils from erosion by water and wind. This is one of five temporary soil stabilization alternatives to consider.

Purpose

Reduce soil erosion through temporary soil stabilization.

Appropriate Applications

- Application of seed for permanent revegetation and stabilization of disturbed soils.
- Temporary protection of disturbed areas until permanent measures (e.g., vegetation) are installed.
- Temporary protection of disturbed areas that must be re-disturbed following an extended period of inactivity.

Limitations

- Straw mulching may be necessary in addition to hydroseeding in order to promote establishment of vegetation.

- Steep slopes are difficult to protect with temporary seeding.
- Dry or cold weather will affect vegetative establishment.

Standards and Specifications

- Site conditions must be evaluated prior to determining suitable species selection and application rates. Attributes such as soil types, topography, local climate and season, maintenance requirements, proximity of sensitive areas (e.g., live streams), and existing native vegetation types.
- Prior to use, ADOT shall approve application rates for mulches, tackifier, soil amendments and seed mixtures as per specifications prior to application.
- All seed shall be in conformance with requirements of the project specifications.
- Areas to be seeded shall be filled as described in project specifications. Soil shall be loose and friable.

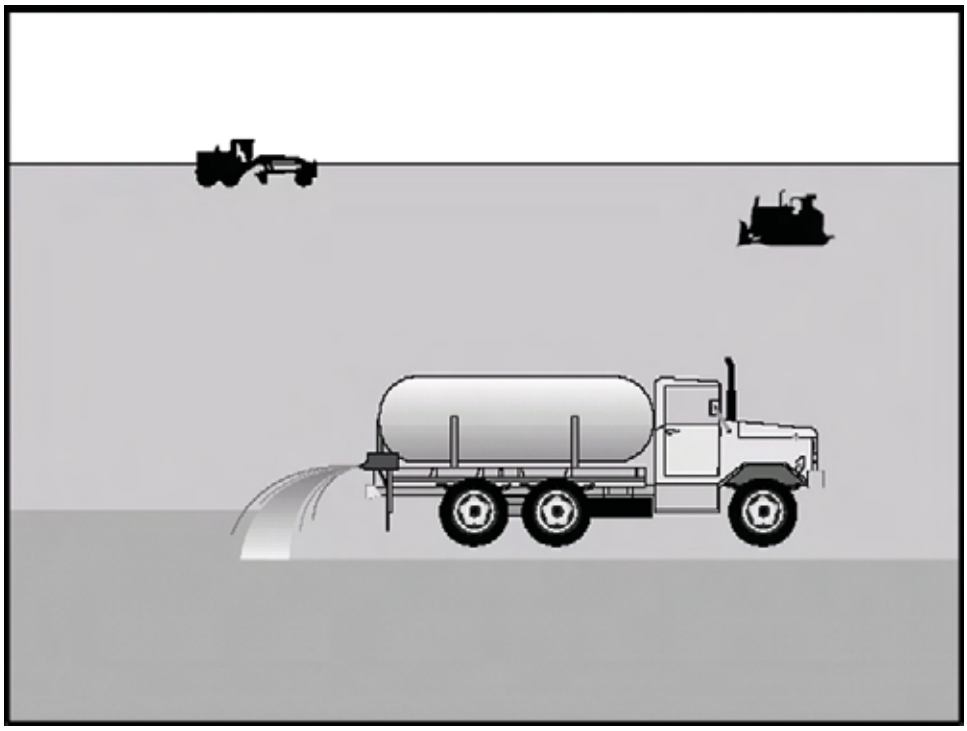
Inspections

- Follow inspection schedule required in the CGP Part IV.H and project specifications.

Maintenance

- Any temporary revegetation efforts that do not provide adequate cover must be revegetated as required by the Engineer.

Soil Binders



5.1.6 Soil Binders

Definition

Soil binders consist of applying and maintaining polymeric or lignin sulfonate soil stabilizers or emulsions. Soil binders are materials applied to the soil surface to temporarily prevent water-induced erosion of exposed soils on construction sites. Soil binders typically also provide dust, wind, and soil stabilization (erosion control) benefits. This is one of five temporary soil stabilization alternatives to consider.

Purpose

- Reduce soil erosion through temporary soil stabilization.

Appropriate Applications

- Temporary protection of disturbed areas until permanent measures (e.g., vegetation) are installed.
- Temporary protection of disturbed areas that must be re-disturbed following a period of inactivity. Because they can be often incorporated back into the work, they may be a good choice where grading activities will soon resume.

Limitations

- Soil binders are temporary in nature and may require reapplication, especially after heavy or prolonged rainfall.
- Typically require a cure time of approximately 24 hours.
- Easily disturbed by vehicular or pedestrian traffic.
- Do not adhere well to compacted or dense (clay) soils.
- May not perform well under conditions of low relative humidity or low temperatures.
- May be slippery if oversprayed onto vehicular travelways.

Standards and Specifications

General Considerations

- Site conditions (soil type, temperature and humidity) must be evaluated prior to determining appropriate soil binder type.
- Regional soil types will dictate appropriate soil binders to be used.
- Must be environmentally benign (non-toxic to existing plants and wildlife).

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 5.1.6. In consultation with the Engineer, use Table 5.1.6 to select an appropriate soil binder.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation – Consider where the soil binder will be applied: if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders. The soil binders in Table 5.1.6 may also be used for dust control using the provided dust control application rates. The dust control application rates will not be adequate to provide protection from water-induced erosion.
- Soil types and surface materials – Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application – The frequency of application can be affected by subgrade conditions, surface type, traffic volumes, climate, and maintenance schedule.

Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean-up.

After considering the above factors, the soil binders in Table 5.1.6 will be generally appropriate as follows:

Copolymer: Appropriate for long term soil stabilization in areas where cross-traffic might occur, or where stabilization needs to be achieved in conjunction with preserving existing vegetation. Longevity can be up to 2 years, it has a high resistance to abrasion, and is compatible with existing vegetation. However, it is also relatively costly which makes it less desirable for short-term or frequent applications.

Lignin sulfonate: Appropriate for short- or medium-term soil stabilization applications in low traffic areas. The moderate relative cost makes it less desirable to reapply frequently, though it typically lasts longer than psyllium or guar. With only moderate penetration and a low resistance to abrasion, it would be more suited to areas which will not be disturbed frequently by construction activities.

Psyllium/Guar: Appropriate for typical soil stabilizing situations or short-term applications. Because of the relatively low cost, they can be applied more frequently. Their high penetration provides good stabilization but their moderate resistance to abrasion limits their longevity. They are not very compatible with vegetation.

Applying Soil Binders

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps shall be followed:

- Follow manufacturer's recommendations for application rates, pre-wetting of application area and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas. Track walking shall only be used where rolling is impractical.
- Soil binders shall not be applied during or immediately before rainfall.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Do not apply soil binders to frozen soil, areas with standing water, under freezing or rainy conditions, or when temperature is below 4 º (40ºF).

- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure times.

For liquid agents:

- Crown or slope ground to avoid ponding.
- Uniformly pre-wet ground at 0.14 to 1.4 l/m² (0.03 to 0.3 gal/yd²) or according to manufacturer's recommendations.
- Apply solution under pressure. Overlap solution 150 to 300 mm (6 to 12 inches).
- Allow treated area to cure for the time recommended by the manufacturer, typically, at least 12 hours.
- Apply second treatment before the first treatment becomes ineffective, using 50% application rate.
- In low humidities, reactivate chemicals by re-wetting with water at 0.5 to 0.9 l/m² (0.1 to 0.2 gal/yd²).

Maintenance and Inspection

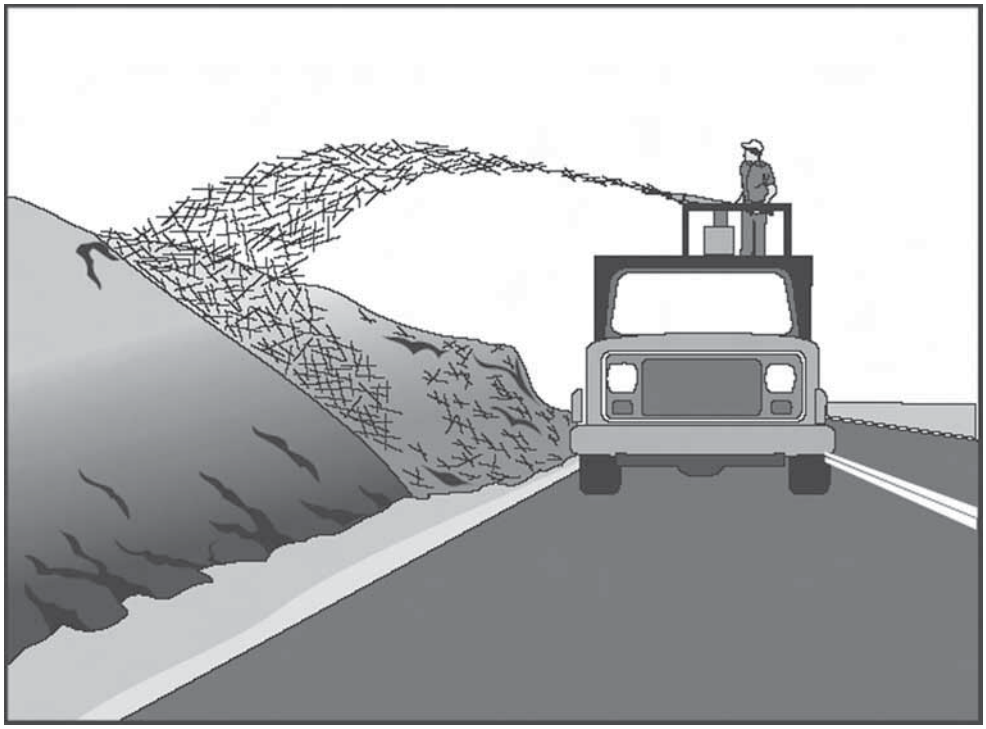
- Reapplying the selected soil binder may be needed for proper maintenance. High traffic areas shall be inspected on a daily basis, and lower traffic areas should be inspected on a weekly basis.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Properties of Soil Binders for Erosion Control

Chemicals	Copolymer	Lignin Sulfonate	Psyllium	Guar
Comments	- Forms semi-permeable transparent crust. - Resists ultraviolet radiation and moisture induced breakdown	- Paper industry waste produce - Acts as dispersing agent- Best in dry climates- Can be slippery	- Effective on dry, hard soils - Forms a crust	- Effective on dry, hard soils - Forms a crust
Relative Cost	High	Moderate	Low	Low
Environmental Hazard	Low	Low	Low	Low
Penetration	Moderate	Moderate	High	High
Evaporation	Moderate	Moderate	Moderate	Moderate
Resistance to Leaching	Low	High	High	High
Resistance to Abrasion	High	Low	Moderate	Moderate
Longevity	1 to 2 years	6 months to 1 year	3 to 6 months	3 to 6 months
Minimum Curing Time before Rain	24 hours	24 hours	24 hours	24 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Chemically Degradable	Biologically/Physicall-y/Chemically Degradable	Biologically Degradable	Biologically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Yes	Yes	Yes	Yes
Liquid/Powder	Liquid	Powder	Powder	Powder
Surface Crusting	Yes	Yes, but dissolves on rewetting	Yes, but dissolves on rewetting	Yes, but dissolves on rewetting
Clean-Up	Solvents	Solvents	Water	Water
Erosion Control Application Rate	Apply 800-1,000l/ha (85-110 gal/ac).	Apply 5,600-6,500 l/ha (600-700 gal/ac).	Apply 170 kg/ha (150 lb./ac) with 560-2,200 kg/ha (500-2,000 lbs./ac) fiber mulch.	Apply 110-220 kg/ha (100-200 lbs./ac) with 560-2,200 kg/ha (500-2,000 lbs./ac) fiber mulch.
Dust Control Application Rate	Apply 280-520 L/ha (30-55 gal/ac).	Loosen surface 25-50mm (1-2 in). Need 4-8% fines. Apply 470-1,900 l/ha (50-200 gal/ac).	Apply 170 K/ha (150 lbs./ac).	Apply at 45-70 K/ha (40-60 lbs./ac).

Table 5.1.6

Straw Mulch



5.1.7 Straw Mulch

Definition

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil by mechanical means (e.g., a drill or studded roller) or anchoring it with tackifier. This is one of five temporary soil stabilization alternatives to consider.

Purpose

- Reduce soil erosion through temporary soil stabilization.

Appropriate Applications

- Straw mulch is used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for final stabilization.
- Typically used in combination with temporary and/or permanent seeding applications to enhance plant establishment.

Limitations

- Where mechanical straw blowers are used, application areas are typically limited to within approximately 150 feet of equipment. Therefore, for large slopes frequent mobilizations and applications are necessary.
- Application of straw mulch by hand is typically expensive.

- Potential for accidental introduction of undesirable weed species.
- Blown straw is potentially a nuisance when applied in urban areas.

Standards and Specifications

- Materials shall conform to and shall be applied at rates specified in special provisions.
- Straw shall be certified to be free of weeds and invasive species.
- When applied by blower, avoid overspray onto existing pavements, structures and vegetation.
- On slopes less steep than 2 (horizontal): 1 (vertical) and where mechanical action will not contribute to soil compaction, straw can be "punched" into the soil using a knife-blade roller or a straight bladed coulter ("crimper").
- For small areas, straw can be anchored by hand tools.

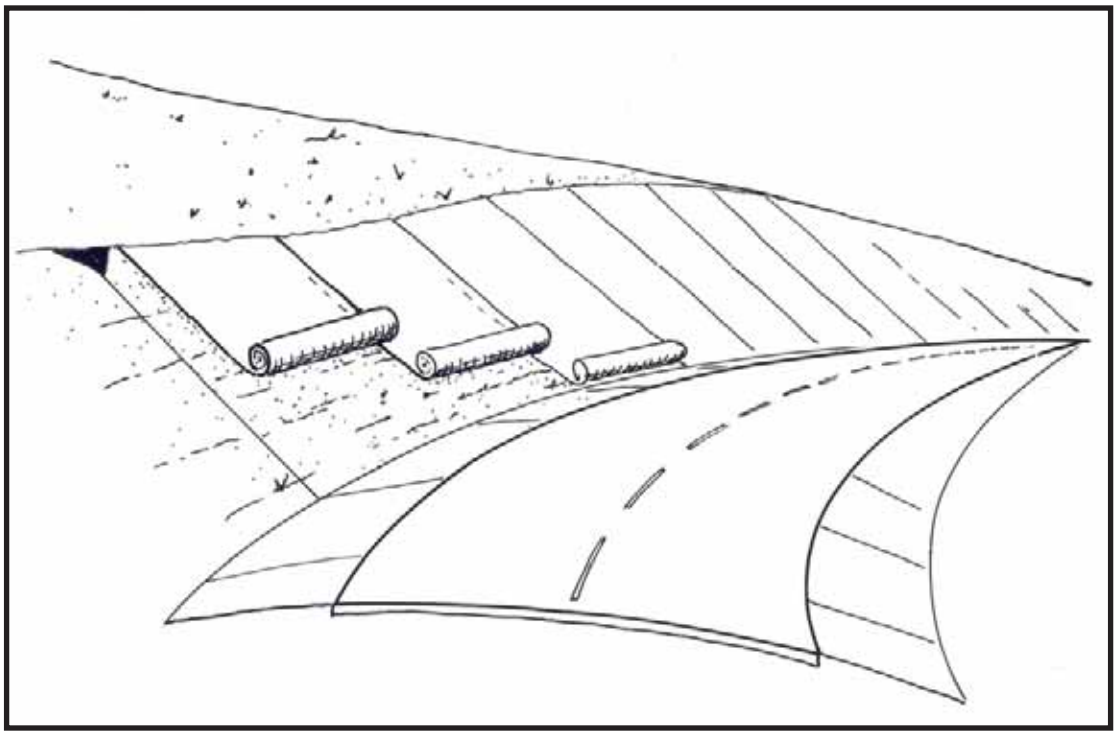
Inspections

- Follow inspection schedule required in the CGP Part IV.H.

Maintenance

- Reapply mulch when more than 20% bare ground is exposed in application area.

Geotextiles, Plastic Covers, Erosion Control Blankets/Mats



5.1.8 Geotextiles, Plastic Covers and Erosion Control Blankets/Mats

Definition

A natural (excelsior, straw, coconut, etc.) or synthetic (usually polyethelene) material installed to reduce soil erosion by wind or water. This is one of five soil stabilization alternatives to consider.

Purpose

- Reduce rainfall impact.
- Provide a microclimate to promote seedling establishment.
- Protect exposed soil from wind and rain.
- Reduce erosiveness of concentrated flows.

Appropriate Applications

- Steep slopes (typically greater than 3 horizontal: 1 vertical).
- Slopes with highly erosive soils or where the erosion hazard is high.
- Slopes adjacent to bodies of water.
- Concentrated flow areas such as ditches and channels with flows exceeding 3.3 ft/sec. (refer to ADOT Hydraulic Manual for channel lining criteria).
- In areas where plant establishment is likely to be slow.
- Areas inaccessible to hydraulic equipment.

- Stockpiles.

Limitations

- Costly.
- Not suitable for excessively rocky sites or rough slopes.
- Not suitable for areas where vegetation will be mowed.
- Plastic sheeting is easily disturbed and must be removed and disposed of prior to
- Application of permanent soil stabilization measures. Plastic also results in increased runoff rates.
- May trap wildlife.

Standards and Specifications

Material Selection

There are a wide variety of types and materials from which to choose. Selection shall be based on needs for the specific project. Factors to consider include:

- Cost: materials, site preparation, installation.
- Effectiveness: reduction of erosion, flow velocity, and runoff.
- Acceptability: environmental compatibility, regulatory, and aesthetic concerns.
- Vegetation enhancement: moisture retention, temperature modification.
- Installation: durability, longevity, ease of installation, safety.
- Maintenance.

Geotextiles:

Material shall be woven polypropylene fabric with minimum thickness of 0.5 inches, minimum width of 12 feet and shall have minimum tensile strength of 50 lbs/ ft (0.67 kN) (warp) 25 lbs/ ft. (0.36 kN) (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric shall be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric shall have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets shall be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under

Geotextiles may be reused if, in the opinion of the RE, they are suitable for the use intended.

Geotextiles, Plastic Covers, Erosion Control Blankets/Mats

Plastic Covers:
Material shall be polyethylene sheeting and shall have a minimum thickness of 6 mm. Plastic covers shall be anchored by sandbags placed no more than 10 feet apart and by keying into the tops of slopes to prevent infiltration of surface waters under the plastic. All seams shall be taped or weighted down their entire length, and there shall be at least 12 inches to 24 inches overlap of all seams.

Plastic covers may be reused if, in the opinion of the engineer, they are suitable for the use intended.

Erosion Control Blankets/Mats:
Blankets and Mats are available in materials with a wide variety of susceptibility to biological and photo-degradation. The most common materials in order of least to most durable are:

- Agricultural straw.
- Jute fiber.
- Wood fiber (Excelsior).
- Coconut fiber (coir).

Site Preparation

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil. Contractor shall cut material to fit around large boulders.
- If areas is to be seeded, prepare soil as directed in the project specifications before applying covering.

Seeding

Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Anchoring

- U-shaped wire staples, metal pins or wooden stakes can be used to anchor mats and blankets to the ground surface.
- Staples shall be made of .12 inch steel wire and shall be U-shaped with 8-inch legs and 2-inch crown. Wire staples shall be minimum of 11 gauge.

- Metal stake pins shall be 0.188-inch diameter steel with a 1.5 inch steel washer at the head of the pin.
- Wire staples and metal stakes shall be driven flush to the soil surface.
- All anchors shall have sufficient ground penetration to resist pullout by wind. Longer anchors may be required for loose soils.

Installation on Slopes

Always consult the manufacturer's recommendations for installation. In general, these will be as follows:

1. Begin at the top of the slope and anchor the blanket in a 12-inch deep trench. Backfill trench, tamp earth firmly and staple every 12 inches.
2. Unroll blanket downslope in the direction of water flow.
3. Overlap the edges of adjacent parallel rolls 4 inches and staple every 12 inches.
4. When blankets must be spliced, place blanket ends in common trench as described above with 6-inch overlap. Staple through overlapped area, approximately 6 inches apart.
5. Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
6. Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges.
7. On steep slopes, 1:1 (V:H) to 1:2 (V:H), require a minimum of 2 staples/yd^2. Moderate slopes, 1:2 (V:H) to 1:3 (V:H), require a minimum of 1 ½ staples/yd^2, placing 1 staple/yd on centers. Gentle slopes require a minimum of 1 staple/yd^2.

Installation in Channels

Always consult the manufacturer's recommendations for installation. In general, these will be as follows:

1. Dig initial anchor trench 12 inches deep and 6 inches wide across the channel at the lower end of the project area.
2. Excavate intermittent check slots, 6 inches deep and 6 inches wide across the channel at 25- to 30 foot-intervals along the channels.
3. Cut longitudinal channel anchor slots 4 inches deep and 4 inches wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 inches to 3 inches above the crest of the channel side slopes.
4. Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 inches intervals. Note: matting will initially be upside down in anchor trench.
5. In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 inches.

6. Secure these initial ends of mats with anchors at 12-inch intervals, backfill and compact soil.Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3-inch overlap.
7. Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12-inch intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.

Alternate method for non-critical installations:

1. Place two rows of anchors on 6-inch centers at 25- to 30-foot intervals in lieu of excavated check slots.
2. Shingle-lap spliced ends by a minimum of 12 inches apart on 12-inch intervals.
3. Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.
4. Anchor, fill and compact upstream end of mat in a 12 inches by 6 inches terminal trench.
5. Secure mat top ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
6. Seed and fill turf reinforcement matting with soil, if specified.

Soil filling (if specified for turf reinforcement)

- Always consult the manufacturer's recommendations for installation.
- Do not drive tacked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes or brooms for fine grading and touch up. Smooth out soil filling; just exposing top netting of mat.

Removal

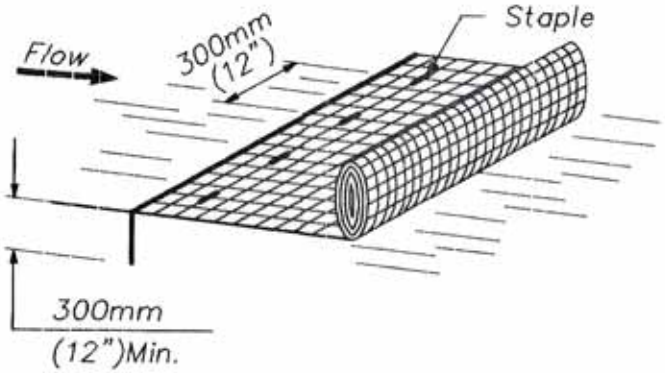
When no longer required for the work, coverings shall become the property of the Contractor and shall be disposed of outside the highway right of way in conformance with the special provisions.

Inspections

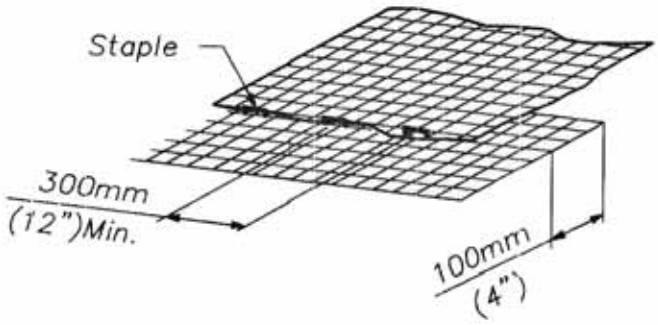
- Follow inspection schedule required in CGP Part IV.H.
- Erosion may occur under blankets in areas were contact with soil has been compromised. This damage may be difficult to detect and repair.

Maintenance

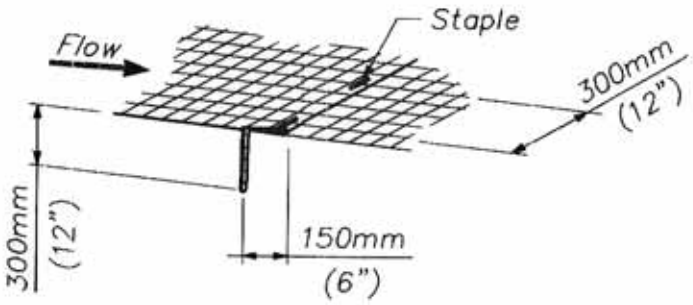
- Re-anchor loosened matting and replace lost matting and staples as required.
- Repair slope or channel damage before re-installing matting if washout or breakage occurs.



ANCHOR SLOT: Bury the up-slope end of the net in a 300mm (12") deep trench. Tamp the soil firmly. Staple at 300mm (12") intervals across the net.



OVERLAP: Overlap longitudinal edges of adjoining mattings at least 100mm (4"). Staple every 300mm(12") down the edge of the overlapping net.



JOINING MATS: Insert the roll in a trench; as with the anchor slot. Overlap the up-slope end of the roll a min. of 150mm (6"). Staple at 150mm (6") intervals along the end of the up-scale net.

INSTALLATION OF MATTING

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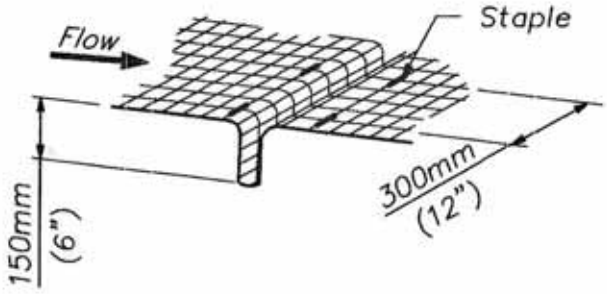
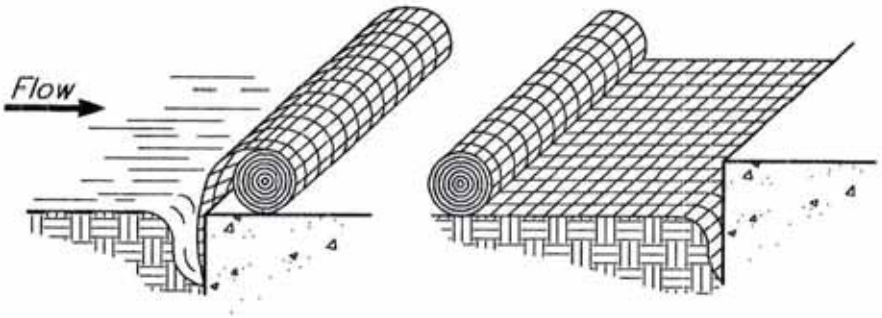


CHECK SLOTS: On erodible soils or steep slopes, check slots should be placed every 4.5m (15'). Insert a fold of the mat into a 150mm (6") trench and tamp firmly, staple at 300mm (12") intervals across the mat on each side of the check slot. Lay the mat smoothly on the surface of the soil – Do Not stretch the mat and Do Not allow wrinkles.



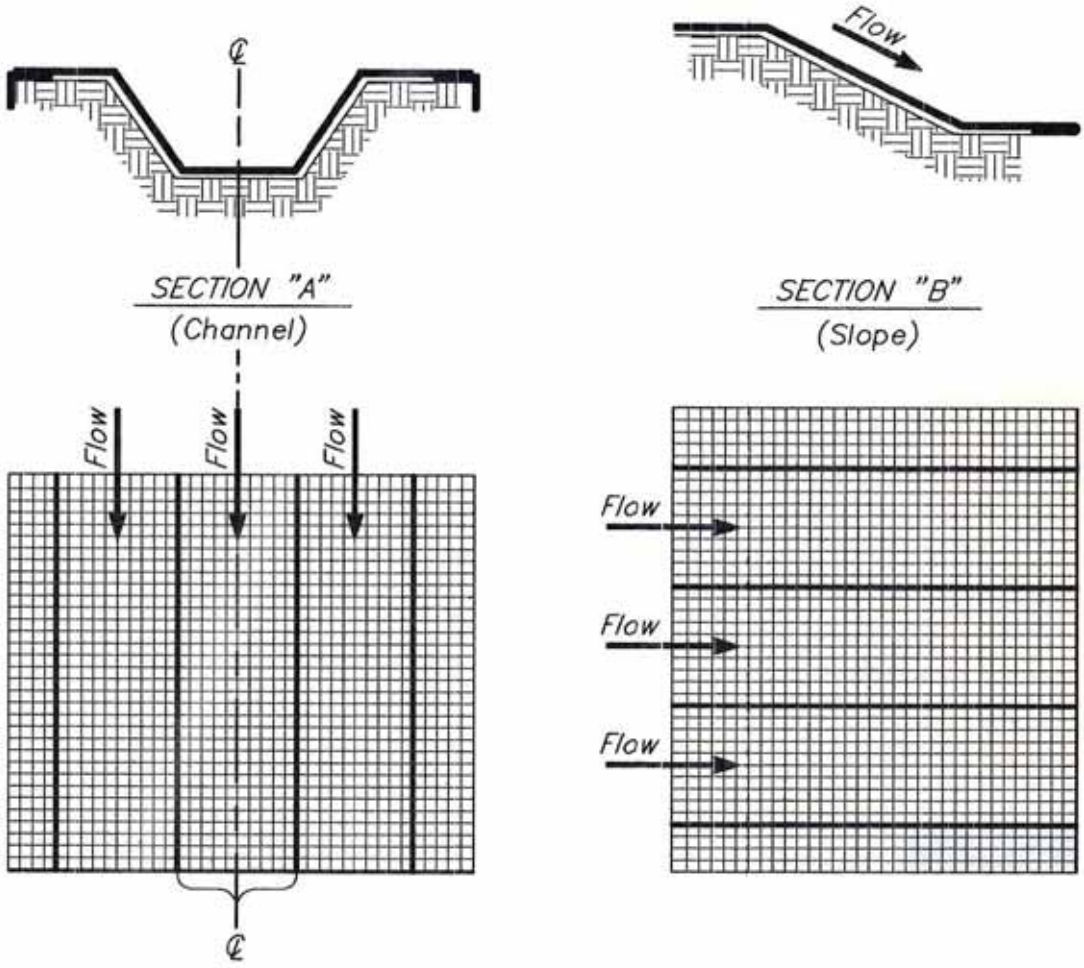
ANCHORING ENDS AT STRUCTURE: Place the end of the mat in a 300mm (12") slot on the up–channel side of the structure. Fill the trench and tamp firmly. Roll the net up the channel. Place staples at 300mm (12") intervals along the anchor end of the net.

INSTALLATION OF MATTING

not to scale

Apply matting parallel to the direction of flow. Use check slots every 4.5 Meters (15 feet). Center first strip in the center of channel.

Apply matting parallel to the direction of the flow on slopes of 25% or greater.



MATTING ORIENTATION

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Compost/Wood Mulching

5.1.9 Compost/Wood Mulching

Definition

Compost or wood mulching consists of applying a mixture of compost, shredded wood mulch or bark.

Purpose

- To temporarily protect exposed soil from wind, raindrop impact, increase infiltration and reduce runoff.
- To provide a suitable microclimate to promote seed germination.
- To prevent surface compaction or crusting.

Appropriate Applications

- Temporary soil stabilization.
- Shredded bark mulch may be applied to smaller drainage channels to reduce runoff velocities and soil erosion.
- Sensitive areas may be mulched at the end of a day's operations if rain is predicted.
- In conjunction with seed to encourage seed germination and establishment.

Mulches that are susceptible to erosion by wind or water are anchored to the soil using a variety of techniques.

- Crimping, tracking, disking or punching.
- Hydraulic bonding using a variety of organic or acrylic tackifiers.
- Covering with netting and stapled

Limitations

- Susceptible to wind disturbance.
- Potential for accidental introduction of undesirable weed species.
- Areas where hydraulically bonded mulches are to be applied must be accessible to equipment used in the process.
- Hydraulically bonded mulches require 24 hours to dry before rainfall occurs to be effective.
- Shredded wood mulch will not withstand significant concentrated flows and is prone to sheet erosion.

Standards and Specifications

Mulch Selection

There are many different types of mulches. Selection on type shall be based on type of application and site conditions. Prior to use, choice of mulch shall be approved by the Landscape Architect.

- Shredded wood and wood chips)–may be available from existing suitable vegetation to be cleared from site.
- Compost – typically applied as a component of seeding applications; shall be tested as described in the special provisions for biotic and abiotic factors.

Installation

- May be applied by hand or by mechanical or hydraulic methods.

Inspections

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for exposed areas of soil or where covering is broken.

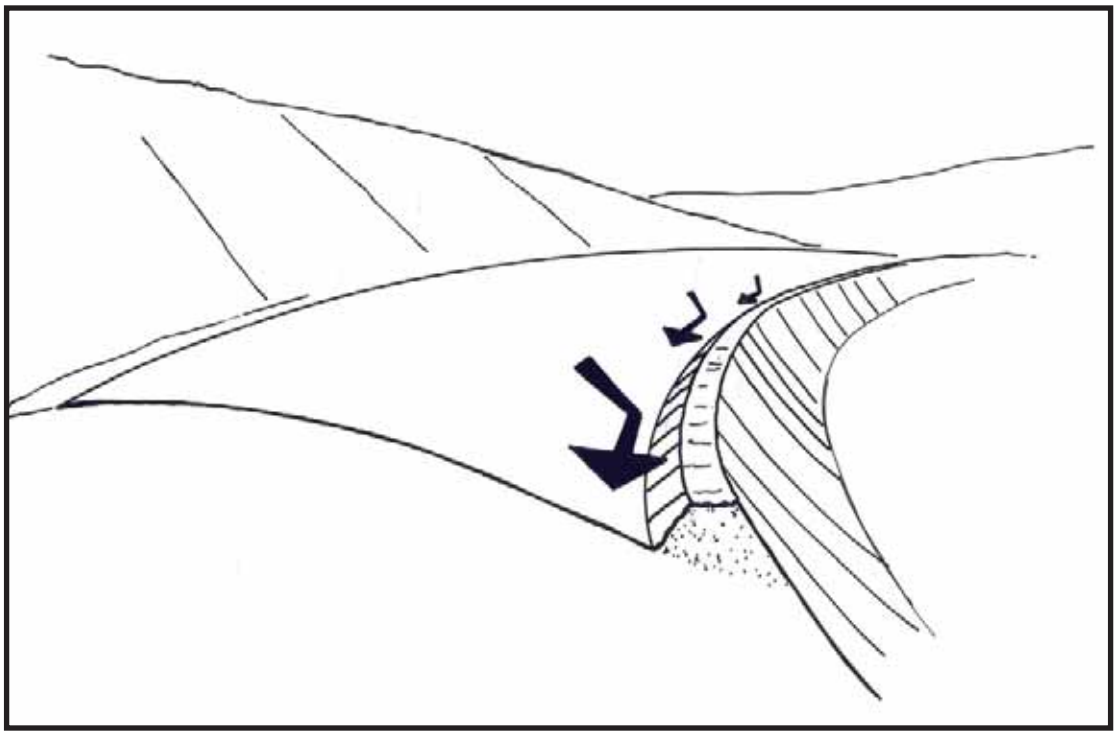
Maintenance

- Reapply mulch when more than 20% bare ground is exposed in application area.

5.2 CONCENTRATED FLOW CONVEYANCE CONTROLS

Temporary concentrated flow conveyance controls consist of a system of installations or BMPs that are used alone or in combination to intercept, divert, convey, and discharge concentrated flows with a minimum of soil erosion, both on-site and downstream (offsite). Temporary concentrated flow conveyance controls may be required to direct run-on around or through the project in a non-erodible fashion. Temporary concentrated flow conveyance systems include the following BMPs:

Earth Dikes/Drainage Swales



5.2.1 Earth Dikes/Drainage Swales

Definition

Structures that intercept, divert, and convey surface runoff (generally sheet flow) to a desired location.

Purpose

- To divert runoff away from erodible surfaces.
- To divert runoff toward sediment trapping devices.

Appropriate Applications

- At the base of fill slopes where runoff begins to concentrate.
- At the top of slopes to control rill and gully erosion.
- At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.
- To divert runoff toward a stabilized watercourse or drainage structure.
- To divert sediment laden water to sediment trapping device.
- To divert storm water around construction staging areas.

Limitations

- Runoff must be diverted into existing or stabilized drainages or sediment basins.
- High runoff velocities may scour and erode dikes and swales. May be necessary to combine with other BMPs such as check dams, blankets, and sediment logs or riprap.
- Does not control erosion or remove sediment.

Standards and Specifications

- Must be sized correctly for expected flows.
- Swales shall be lined where high runoff velocities are expected.
- Dikes shall be stabilized by compaction or other means such as erosion control blankets or riprap.
- Provide stabilized outlets. Where runoff will carry sediment, divert flow into sediment traps.
- Where installed at construction traffic crossings, the top width may be wider and side slopes may be flatter.
- When possible, dikes and swales shall be installed early in the construction process.
- Shall not adversely impact adjacent properties and must conform to local floodplain management regulations.

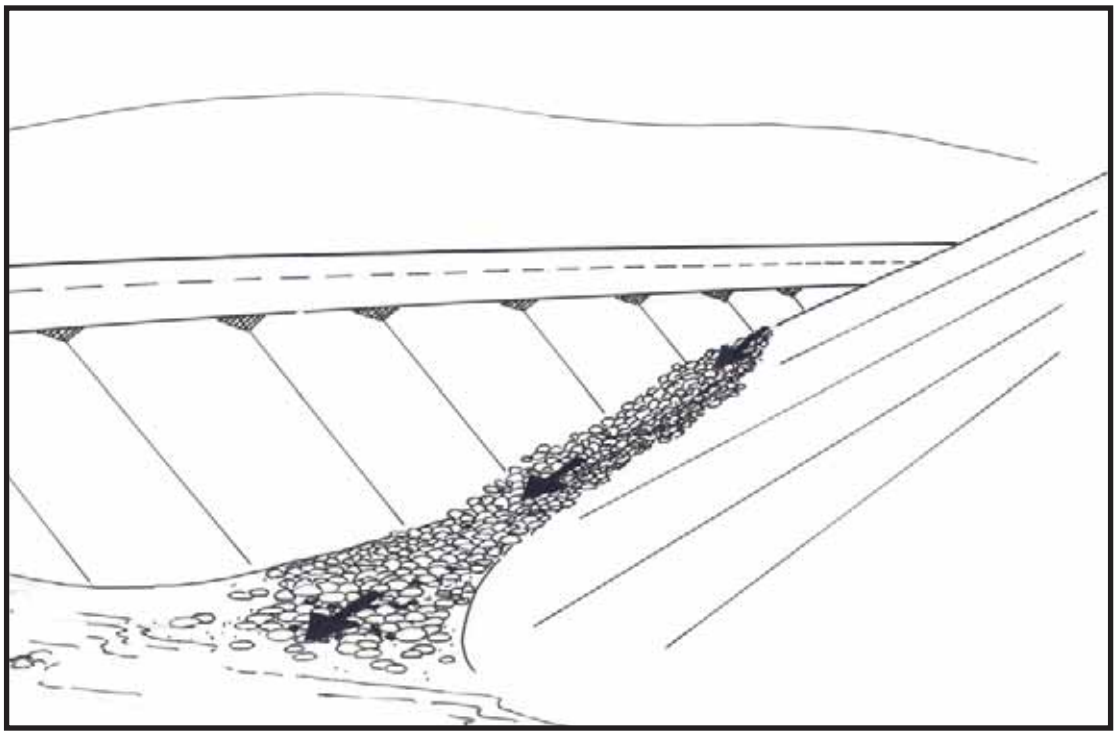
Inspections

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for washouts and failure of associated BMPs.
- Check outlet stabilization for signs of erosion.

Maintenance

- Repair as needed.
- Repair where damaged by construction equipment.
- If material is added to repair the dike it must be properly recompacted.
- Where flows are directed into sediment traps, maintain as described in Sediment Trap BMP.

Cut to Fill Slope Transitions



5.2.2 Cut to Fill Slope Transitions

Definition

Rock riprap placed in cut-to-fill slope transitions.

Purpose

- To reduce erosion at cut-to fill transitions.

Appropriate Applications

- Where concentrated surface flows must be conveyed from a cut ditch, down to the toe of the adjoining downstream fill slope.

Limitations

- Rock riprap transitions reduce erosion only when they have been sized and built properly.

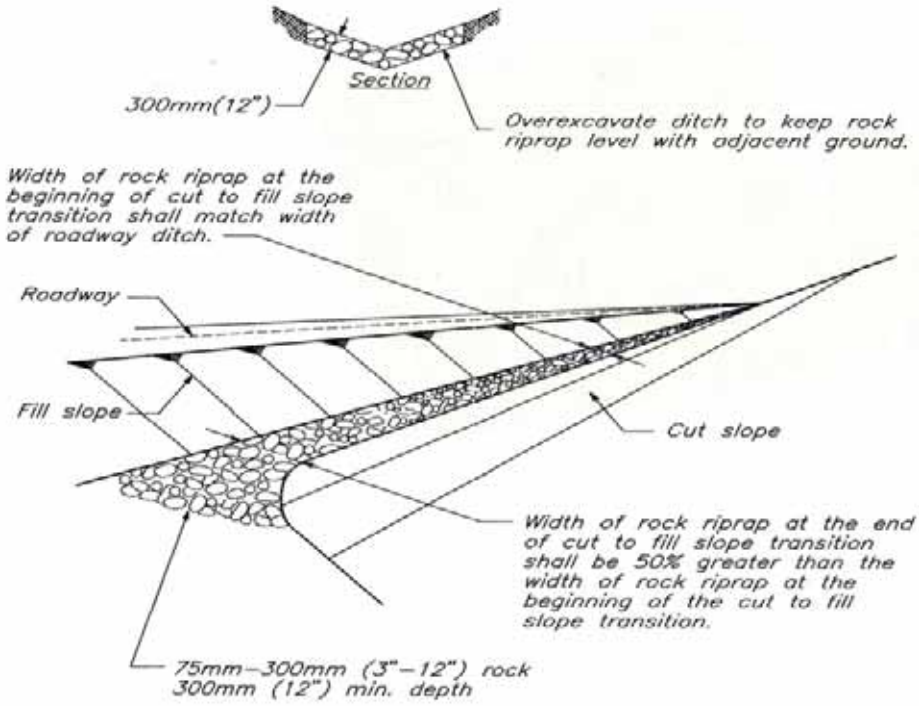
Standards and Specifications

- Width of riprap application at beginning of the cut-to-fill transition shall match width of roadside ditch.
- Width of rock riprap at end of cut-to-fill transition shall be 50% greater than the width of rock riprap at the beginning of the cut-to-fill transition.

- Cut-to-fill transition shall terminate at a planned or existing stabilized drainage.
- Rock shall be placed by hand or mechanical means to achieve complete coverage at the transition. Dumping of riprap may be necessary.
- Riprap shall be embedded into slopes.
- Riprap shall be placed to ensure that the center of the transition is lower than the edges and avoid runoff flow over unprotected soil.
- Size of rock used must be large enough to withstand expected design flow through the transition. Riprap greater than 6 inches shall be wire-tied if required by traffic recovery area.

Inspections and Maintenance

- Follow inspection schedule required in the CGP Part IV.H.
- Inspect for signs of slope erosion under and around the rock protection, check for erosion and displacement of rock at the outlet. Replace rock and repair as needed.



CUT TO FILL SLOPE TRANSITION
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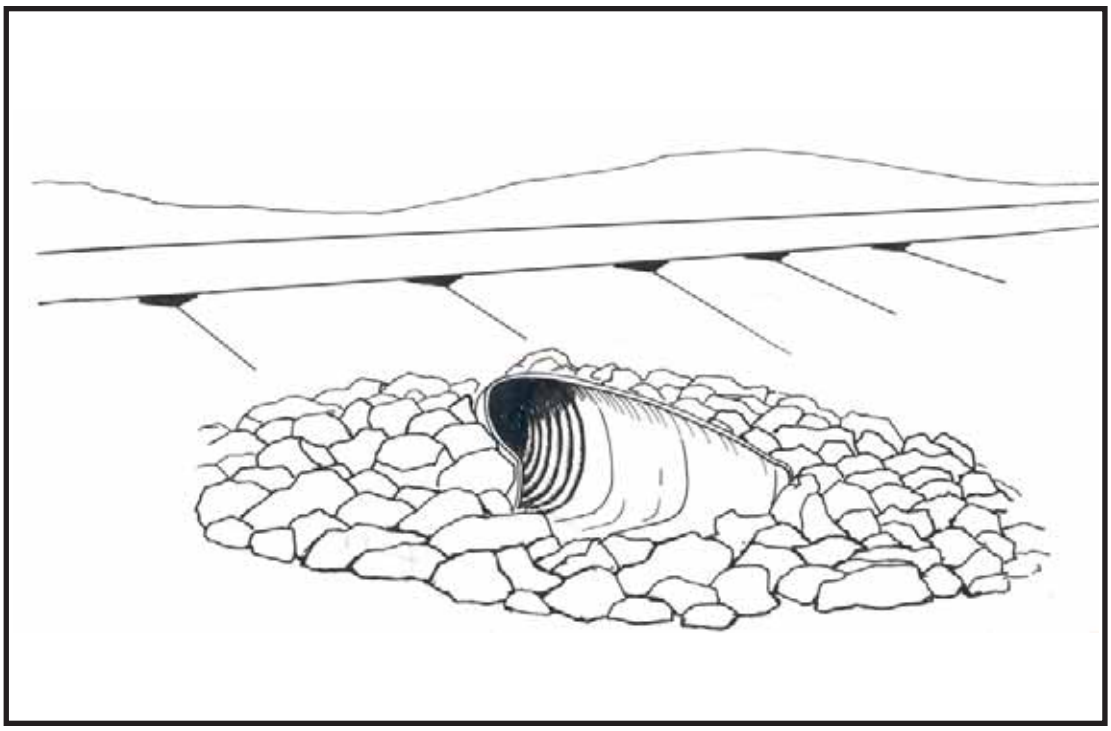
Erosion Protection at Structures



5.2.3 Erosion Protection at Structures

Definition

Rock riprap place along soil interface of concrete and metal structures

Purpose

- To reduce or eliminate the potential for undercutting at structures.

Appropriate Applications

- Place at any structure that abuts a soil surface and where concentration and/or velocity of storm water is great enough to cause erosive flows.

Limitations

- None

Planning Considerations

- Rock interface protection is effective when the rock is sized and placed properly.

Standards and Specifications

- Design and size as specified in the contract documents or as directed by the Engineer.

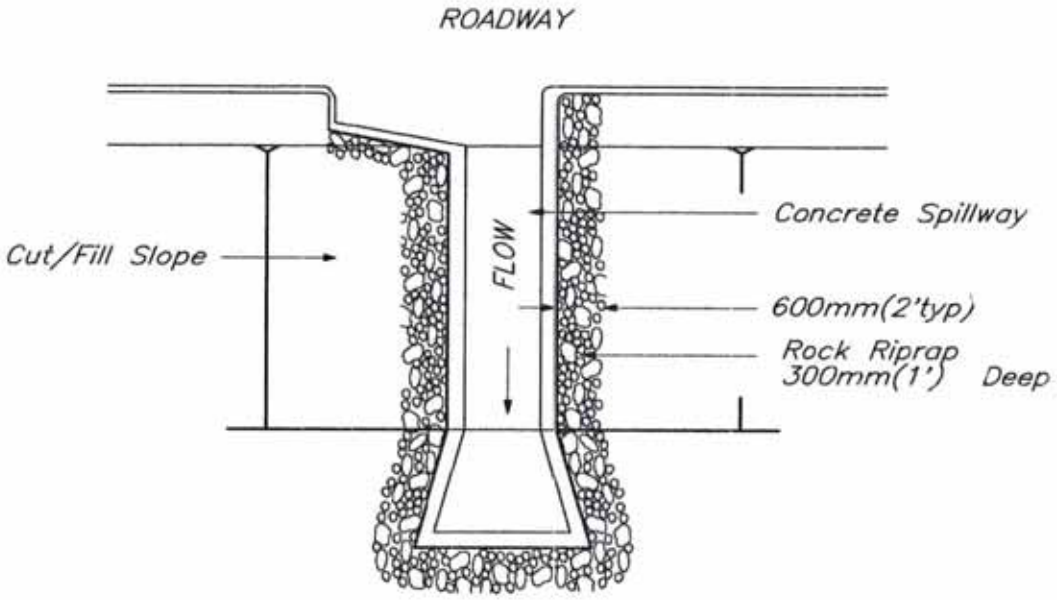
- Use sound, durable, and angular rock for best results.

Inspections

- Follow inspection schedule required in the CGP Part IV.H.
- Inspect for signs of erosion and undercutting around the structure.

Maintenance

- Replace rock and repair erosion damage as needed.



SPILLWAY EROSION PROTECTION

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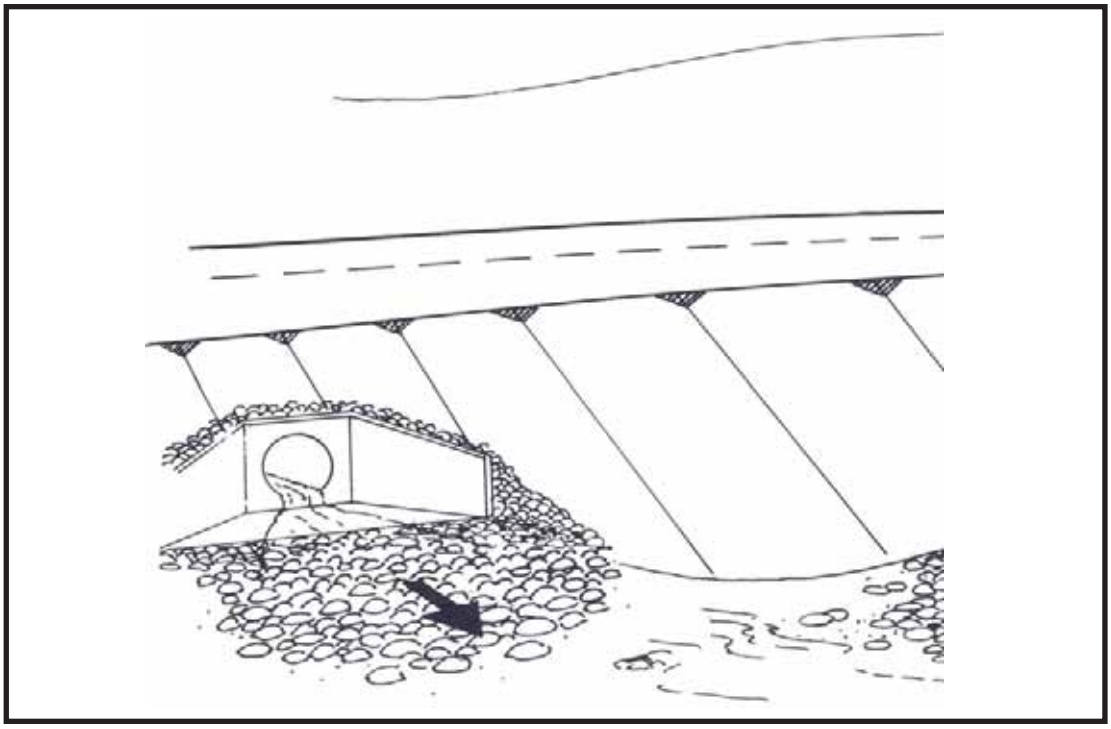
Rock Outlet Protection



5.2.4 Rock Outlet Protection

Definition

Rock riprap or grouted riprap placed at outlets ends of culverts, conduits, or channels.

Purpose

- To prevent scour and reduce velocity of exiting storm water flows.

Appropriate Applications

- Where discharge velocities and energies at the outlets of culverts, pipes or channels are sufficient to erode the downstream channel.
- At discharge outlets that carry continuous flows of water.
- At points where lined conveyances discharge to unlined conveyances.

Limitations

- Loose rock may be washed away during high flows.
- Freeze/thaw cycles may break up grouted riprap.

Standards and Specifications

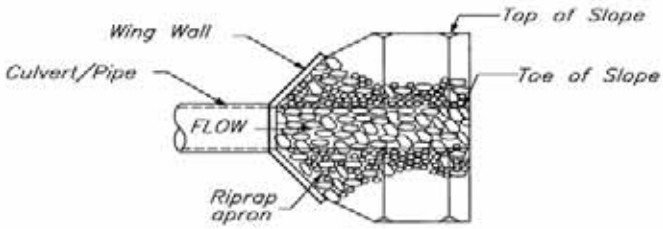
- Grouted or wire-tied rock riprap can minimize maintenance requirements.
- Rock must be sized and placed properly to be effective. Refer to ADOT Drainage Manual.
- A sediment trap below the outlet is recommended if runoff is sediment-laden.
- Use sound, durable and angular rock for best results.

Inspections

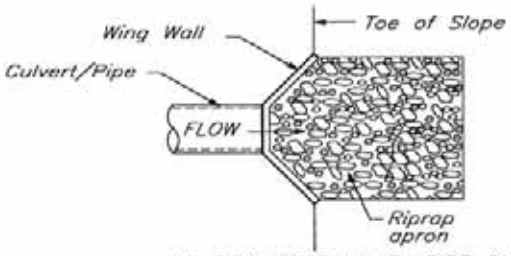
- Follow inspection schedule required in the CGP Part IV.H.
- Inspect for displacement of riprap or damage to underlying fabric, and signs of scour beneath the riprap or around the outlet.

Maintenance

- Replace rock and repair apron and slopes as needed.



WELL DEFINED CHANNEL PIPE OUTLET



UN-DEFINED CHANNEL PIPE OUTLET

NOTES:

1. Area, depth, and size of riprap are based on culvert or pipe size and hydraulic flow calculations.
2. Pipes and culverts should also include erosion protection around the inlet and outlet structures (see BMP No. 6A Erosion Protection at Structures.

ROCK OUTLET PROTECTION

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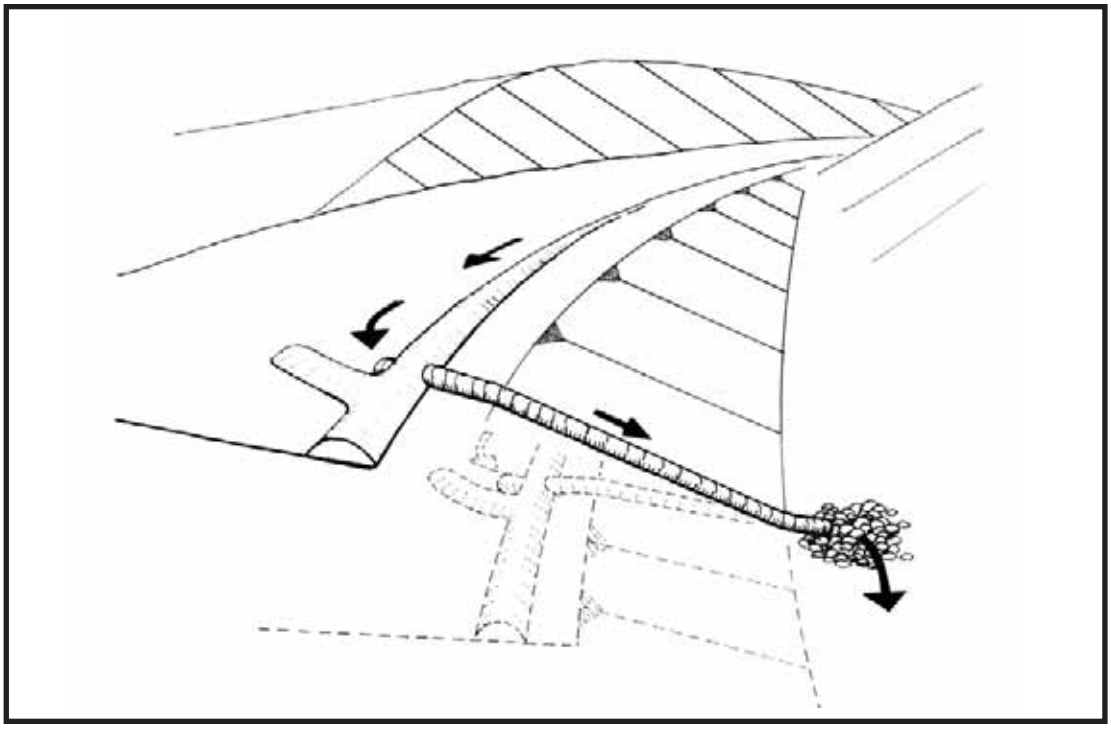
Slope Drains



5.2.5 Slope Drains

Definition

A temporary drain used to intercept and convey runoff into a stabilized drainage.

Purpose

- To prevent soil erosion.

Appropriate Applications

- Installed where slopes may be eroded by surface runoff.
- Typically used in conjunction with top of slope diversion berms, dikes or swales or temporary embankment curbs.
- Where final road grades are completed but remain unpaved.
- May be used as emergency spillway for sediment basin.

Limitations

- Volume of runoff to be conveyed must not exceed capacity of structure.
- Larger areas require a paved spillway, rock lined channel or additional pipes.
- May become clogged or overcharged during large storms forcing water around pipe.
- Failure causes extreme slope erosion.

Standards and Specifications

Design and Layout

- Size of area to be drained must be taken into consideration. Typically, no more than 5 acres shall be drained by one pipe. For larger areas, use a rock-lined channel or a series of pipes.
- Direct runoff into stabilized drainages.
- Inlet installation is critical because it is a common point of failure. Consider use of erosion control blanket at inlets.
- Outfall must be protected by riprap. For that reason, installation is typically limited to maximum grades of 2:1(v:h). Installation on steeper slopes is difficult.
- Consider flared end section for high volume discharges.
- Slope drains can be placed on the surface of slopes or installed below grade.
- Recommended materials for pipes are PVC, ABS or comparable.
- If a pipe slope drain is conveying sediment-laden water all flows shall be directed into a sediment-trapping device.

Installation

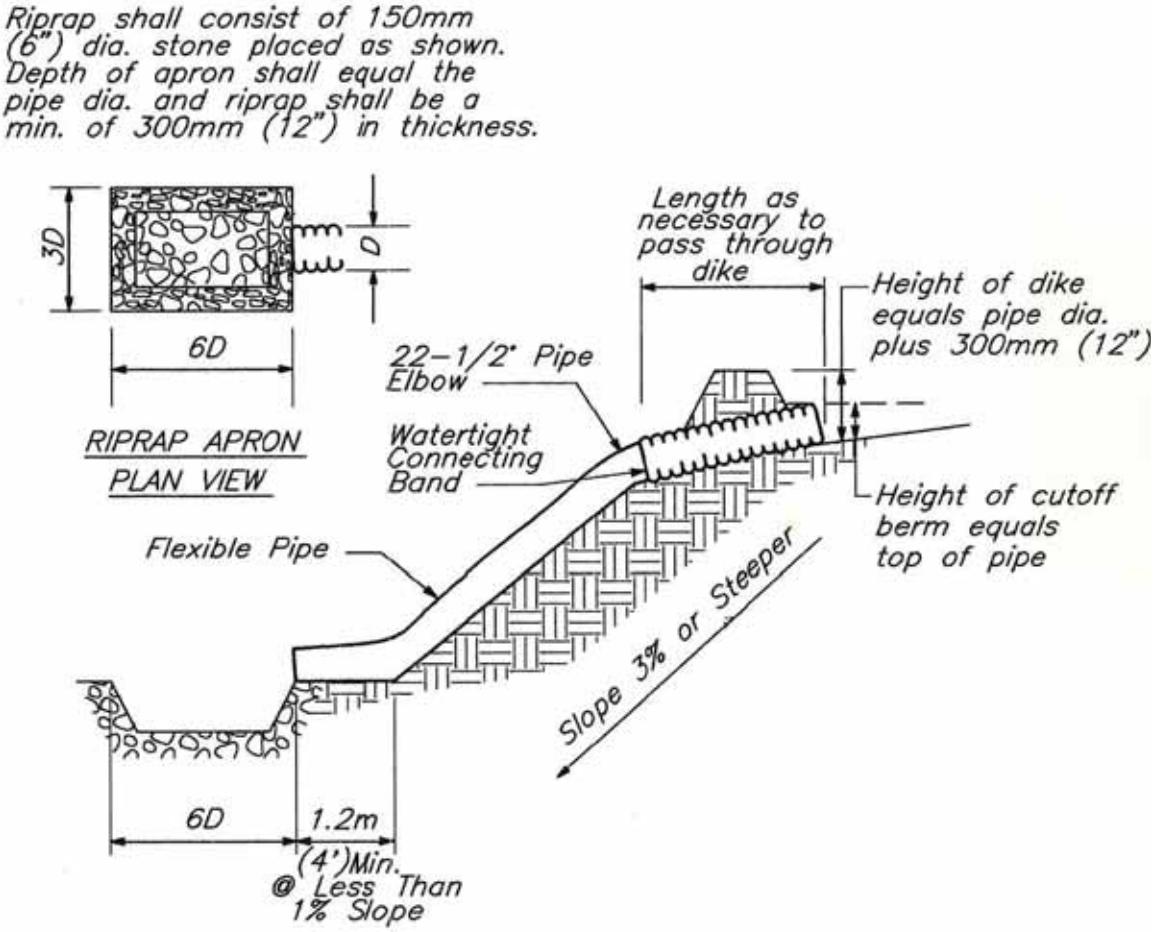
- Install as directed in contract documents. Drains shall be perpendicular to slope contours.
- All slope drain pipe sections shall be securely fastened together with a watertight seal and shall be securely anchored into the soil.
- Follow requirements for diversion dikes/swales to construct diversions used to direct runoff into a slope drain. Compact soil around and under inlet, outlet, and along length of pipe.
- The area below the outlet must be stabilized with a riprap apron. Refer to Erosion Protection and Structures Detail E-2.

Inspections

- Follow inspection schedule required in Construction General Permit Part IV.H.
- Inspect for structural integrity, blockage, and stability at the inlet and outlet.
- Inspect for downstream scour; remedy as required.

Maintenance

- Reinforce inlet with compacted soil or sandbags if problems occur.
- If outlet flow is directed to a sediment-trapping device, sediment should removed as specified in for that device.



FLEXIBLE PIPE SLOPE DRAIN

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5.3 SEDIMENT CONTROL BEST MANAGEMENT PRACTICES

Temporary sediment control practices include those measures that intercept and slow or detain the flow of storm water to allow sediment to settle and be trapped and include the following BMPs:

Sediment Control Berm

5.3.1 Sediment Control Berm

Definition

A temporary sediment barrier consisting of salvaged topsoil, surface soils and/or compacted vegetation pushed into a small berm at midslope locations or at the top or toe of fill slopes.

Purpose

- Intercept sediment-laden sheet flow runoff, allowing runoff to infiltrate and sediment to drop out of suspension.
- Stockpiling of topsoil for future plating on slopes.

Appropriate Applications

- Below the toe of exposed and erodible slopes and soil stockpiles.
- May be utilized in place of silt fence.
- May be constructed in conjunction with topsoil salvage operations. Soil may be reincorporated into adjacent slopes upon completion of final slope geometry.

Limitations

- May require additional BMPs where concentrated flows are involved.
- Can create a temporary sedimentation pond on the upstream side of the berm.
- Must be graded out prior to application of BMPs and seed to final slopes.
- Additional BMPs are required where profile slopes exceed 3%.

Standards and Specifications

General

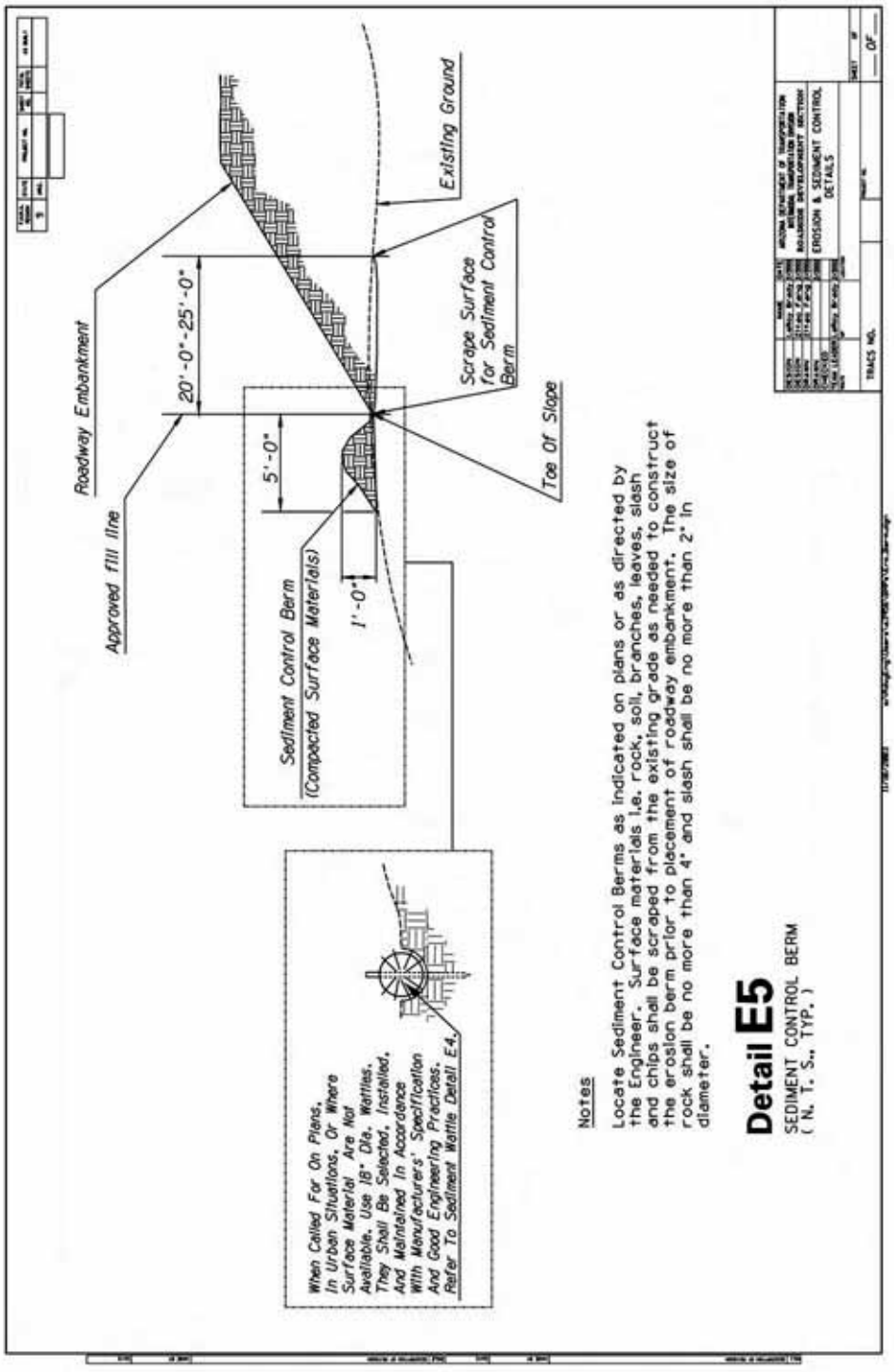
- Berm soil shall be stabilized to prevent erosion.

Installation

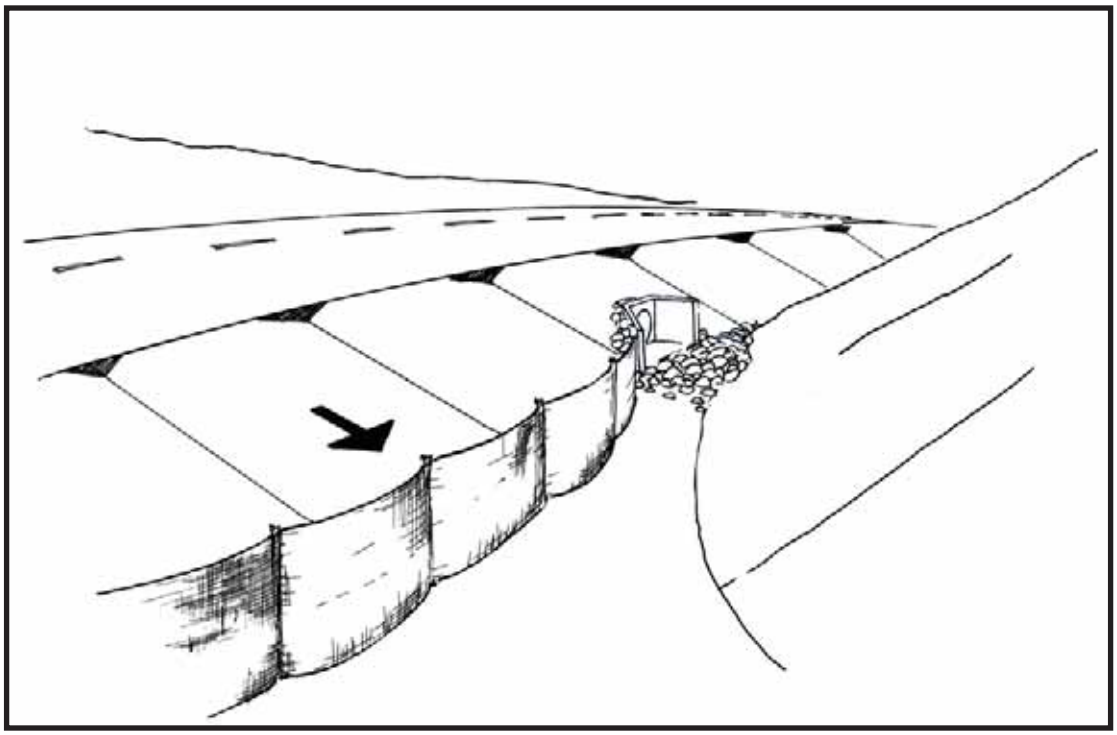
- Salvage topsoil as directed in the project plans or by the Engineer.
- Create a stabilized weir where runoff will pond and overtop berm.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for breaks and erosion in berms.
- Repair as necessary.
- Remove berm when up-slope area has been permanently stabilized. Grade area to blend in with adjacent ground.


Roadway Embankment
Approved Fill line
20'-0"-25'-0"
5'-0"
1'-0"
Sediment Control Berm
(Compacted Surface Materials)
Existing Ground
Scrape Surface for Sediment Control Berm
Toe Of Slope
When Called For On Plans, In Urban Situations, Or Where Surface Material Are Not Available. Use 18" Dia. Wattles, They Shall Be Selected, Installed, And Maintained In Accordance With Manufacturers' Specification And Good Engineering Practices. Refer To Sediment Wattle Detail E4.
Notes
Locate Sediment Control Berms as Indicated on plans or as directed by the Engineer. Surface materials i.e. rock, soil, branches, leaves, slash and chips shall be scraped from the existing grade as needed to construct the erosion berm prior to placement of roadway embankment. The size of rock shall be no more than 4" and slash shall be no more than 2" in diameter.
Detail E5
SEDIMENT CONTROL BERM
(N. T. S., TYP.)
EROSION & SEDIMENT CONTROL DETAILS
TRACS NO.

Silt Fence



5.3.2 Silt Fence

Definition

A temporary sediment barrier consisting of a filter fabric that is entrenched into the soil and attached to posts and wire fence for support.

Purpose

- Intercept and slow sediment-laden sheet flow runoff, allowing sediment to drop out of suspension.

Appropriate Applications

- At downstream perimeter of disturbed site.
- Below the toe of exposed and erodible slopes and soil stockpiles.
- Above active riparian areas as a last line of defense.
- As check dams in swales and ditches with flow velocities of less than 1.0 ft^3/s.
- Around area drains or inlets located in a sump.

Limitations

- Not practical where large flows are involved.
- Will not halt slope creep or slumping.
- Can create a temporary sedimentation pond on the upstream side of the fence and cause temporary flooding.

- Must be removed following final approved stabilization of disturbed area.
- Typical fabric lifespan is between five and eight months.

Standards and Specifications

General

- Filter fabric must be trenched in to be effective.
- Upstream drainage area is limited to 1 acre/100 feet of silt fence.
- Use caution when installing in highly erodible soils: sediment-laden sheetflow may collapse fence.

Design and Sizing Criteria

Maximum Allowable Slope Length

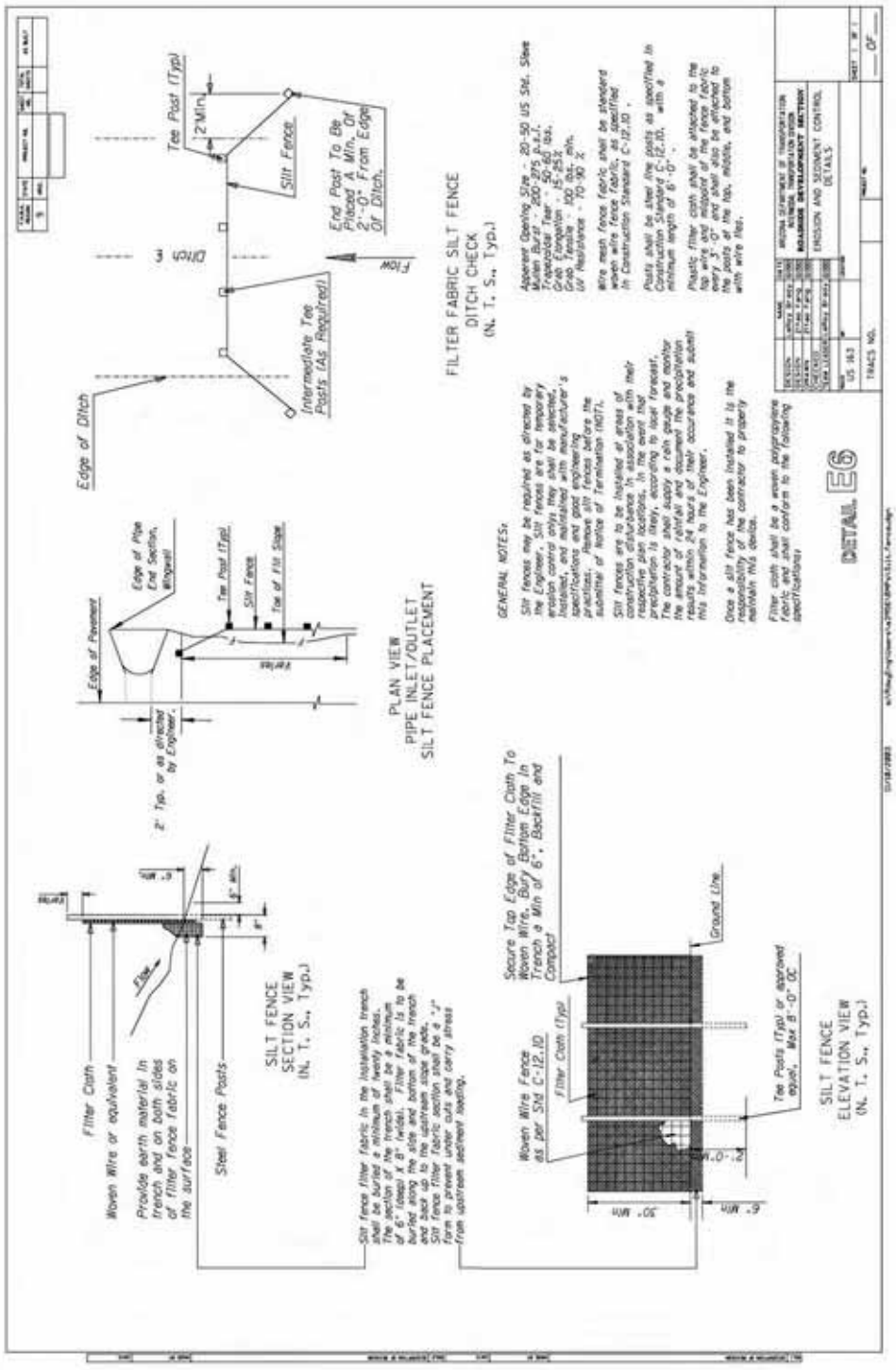
- Select filter fabric based on soil conditions at the project site. Refer to manufacturer's specifications.
- Wire mesh backing and posts shall be sized as specified in the contract documents.

Installation

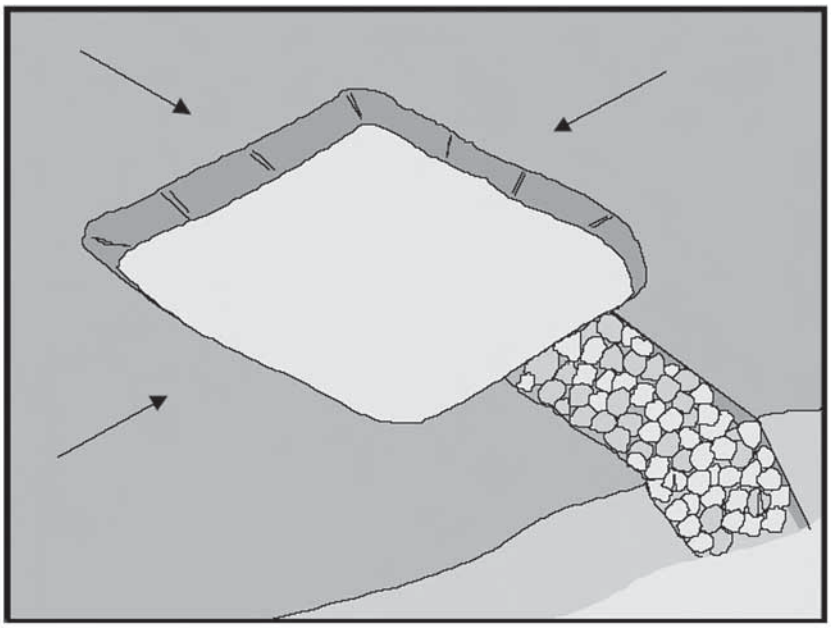
- Compact backfill for tight seal at base.
- Install fence along contour of slopes.
- Overlap seams between sections.
- Finish with ends up-slope to prevent runoff around fence.
- Consider installing fence a minimum 5 feet away from toe of slope to allow space for ponding.
- Provide sufficient room for sediment removal equipment between the silt fence and the toe of slope, or other obstructions.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for depth of sediment, splits or tears in fabric, undercutting, fabric attachment to the fence posts and to confirm that the posts are firmly in the ground.
- Repair as necessary.
- Remove sediment when it reaches one-third the height of the fence. Removed sediment shall be incorporated into the project at locations approved by the Engineer or removed from the right-of-way.
- Remove fence when up-slope area has been permanently stabilized. Fill and compact post holes and fabric trench, remove accumulated sediment and grade area to blend in with adjacent ground.


FILTER FABRIC SILT FENCE
DITCH CHECK
(N. T. S., Typ.)
Tee Post (Typ)
2' Min.
Silt Fence
End Post To Be Placed A Min. Of 2'-0" From Edge Of Ditch.
Ditch
Flow
Intermediate Tee Posts (As Required)
Edge of Ditch
PLAN VIEW
PIPE INLET/OUTLET
SILT FENCE PLACEMENT
Edge of Pavement
Edge of Pipe End Section, Wingwall
Tee Post (Typ)
Silt Fence
Toe of Fill Slope
Varies
2' Typ. or as directed by Engineer.
GENERAL NOTES:
Silt fences may be required as directed by the Engineer. Silt fences are for temporary erosion control only, they shall be selected, installed, and maintained with manufacturer's specifications and good engineering practices. Remove silt fences before the submittal of Notice of Termination (NOT).
Silt fences are to be installed at areas of construction disturbance in association with their respective plan locations, in the event that precipitation is likely, according to local forecast. The contractor shall supply a rain gauge and monitor the amount of rainfall and document the precipitation results within 24 hours of their occurrence and submit this information to the Engineer.
Once a silt fence has been installed it is the responsibility of the contractor to properly maintain this device.
Filter cloth shall be a woven polypropylene fabric and shall conform to the following specifications:
Apparent Opening Size - 20-50 US Std. Sieve
Mullen Burst - 200-275 p.s.i.
Trapezoidal Tear - 50-60 lbs.
Grab Elongation - 15-25%
Grab Tensile - 100-150 lbs.
UV Resistance - 70-90 %
Wire mesh fence fabric shall be standard woven wire fence fabric, as specified in Construction Standard C-12.10 .
Posts shall be steel line posts as specified in Construction Standard C-12.10, with a minimum length of 6'-0" .
Plastic filter cloth shall be attached to the top wire and midpoint of the fence fabric every 3'-0" and shall also be attached to the posts at the top, middle, and bottom with wire ties.
SILT FENCE
SECTION VIEW
(N. T. S., Typ.)
Filter Cloth
Woven Wire or equivalent
Provide earth material in trench and on both sides of filter fence fabric on the surface
Steel Fence Posts
Silt fence filter fabric in the installation trench shall be buried a minimum of twenty inches. The section of the trench shall be a minimum of 6" (deep) x 8" (wide). Filter fabric is to be buried along the side and bottom of the trench and back up to the upstream slope grade. Silt fence filter fabric shall be in a "J" form to prevent undermining and carry stress from upstream sediment loading.
Secure Top Edge of Filter Cloth To Woven Wire, Bury Bottom Edge In Trench a Min of 6", Backfill and Compact
Ground Line
Woven Wire Fence as per Std C-12.10
Filter Cloth (Typ)
Tee Posts (Typ) or approved equal, Max 8'-0" OC
SILT FENCE
ELEVATION VIEW
(N. T. S., Typ.)
DETAIL E6
EROSION AND SEDIMENT CONTROL DETAILS
US 163
TRACS NO.
SHEET 1 OF 1
OF

Desilting Basin/Sediment Trap



5.3.3 Desilting Basin/Sediment Trap

Definition

A temporary basin formed by excavation and/or constructing an embankment so that sediment-laden runoff is temporarily detained.

Purpose

- To slow the velocity of runoff and allow sediment to settle out before the water is discharged.

Appropriate Applications

- Projects under construction during the rainy season.
- Where sediment-laden water may enter the drainage system or watercourses.
- At outlets of disturbed soil areas measuring between 5 and 10 acres.

Limitations

- Alternative BMPs should be considered before selecting temporary basins.
- Require large surface areas to permit settling of sediment.
- Not appropriate for drainage areas greater than 75 acres.
- Not appropriate in live streams.
- If safety is a concern, basins may require protective fencing.
- Size may be limited by availability of right-of-way.

Standards and Specifications

For common drainage locations that serve an area with 10 or more acres disturbed at one time, a temporary (or permanent) sediment basin that provides storage for a calculated volume of runoff from a 2-year, 24-hour storm from each disturbed area drained must be provided where attainable until final stabilization of the site. Where no calculation has been performed, a temporary (or permanent) sediment basin, providing 3,600 cubic feet of storage per acre drained, shall be provided where attainable until final stabilization of the site (*APDES General Permit*).

- Limit the contributing area to the basin to only runoff from disturbed soil areas. Where possible, use temporary dikes and swales to divert runoff from undisturbed areas away from the basin.
- Basin length shall be more than two times basin width; the length shall be measured by measuring the distance between the inlet and outlet.
- Basin depth must be 3 feet minimum and 5 feet maximum.
- A professional Civil Engineer registered with the state of Arizona shall design basins with an impounding levee greater than 5 feet tall, measured from the lowest point of the impounding area to the highest point of the levee, and basins capable of impounding more than 35,000 cubic feet. The design must be submitted to the Engineer for approval at least 7 days prior to the basin construction. The design shall include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures.
- Design and locate basins so that they can be maintained. Construct basins prior to the rainy season and construction activities.
- Basins, regardless of size and storage volume, shall include features to accommodate overflow or bypass flows that exceed the design storm event. The calculated basin volume and proposed location shall be submitted to the Engineer for approval at least 3 days prior to the basin construction.
- Basins shall be designed to drain within 72 hours following storm events.
- The outflow from the basin shall be provided with outlet protection to prevent erosion and scouring of the embankment and channel.
- Basin shall be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where post-construction (permanent) detention basins will be constructed, (3) where failure would not cause loss of life or property damage, and (4) where the basins can be maintained on a year-round basins to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area, and to maintain the basin to provide required capacity.
- Areas under embankments, structural works, and basin must be cleared, stripped of vegetation in accordance with Standard Specifications.

- Basin inlets shall be located to maximize travel distance to the basin outlet.
- Rock or vegetation shall be used to protect the basin inlet and slopes against erosion.
- A forebay, constructed upstream of the basin may be provided to remove debris and larger particles.
- Principal outlet shall consist of a corrugated metal, high density polyethylene (HDPE), or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure shall be designed to accommodate the inflow design storm.
- Structure shall be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.
- Attach riser pipe (watertight connection) to a horizontal pipe (barrel) that extends through the embankment to toe of fill. Provide anti-seep collars on the barrel.
- Cleanout level shall be clearly marked on the riser pipe.
- Avoid dewatering of groundwater to the basin during the rainy season. Insignificant quantities of accumulated precipitation may be dewatered to the basin unless precipitation is forecasted within 24 hours.
- Chain link fencing shall be provided around each basin to prevent unauthorized entry to the basin or if safety is concern. Fencing shall be in accordance with Standard Specifications.
- One of the dewatering configurations shown below for the principal outlet may be used. The contractor shall verify that the outlet is properly designed to handle the design and peak flows.

Installation

Outlet #1

- Perforate the top one-third of the riser with 0.5-inch diameter holes spaced 8 inches vertically and 10 to12 inches horizontally.
- Wrap with well-secured filter fabric.
- Place ¾-inch gravel over perforated holes to approximately 2-inch minimum thickness to assist in prevention of clogging of dewatering holes. Gravel will naturally settle into a cone surrounding the riser pipe.

Outlet #2

- Perforate the lower one-half of the riser pipe with 0.5-inch diameter holes spaced approximately 3 inches apart, in each outside valley (corrugated metal pipe).
- Place ¾-inch gravel over perforated holes to approximately 2-inch minimum thickness to assist in prevention of clogging of dewatering holes. Gravel will

naturally settle into a cone surrounding the riser pipe.

Outlet #3

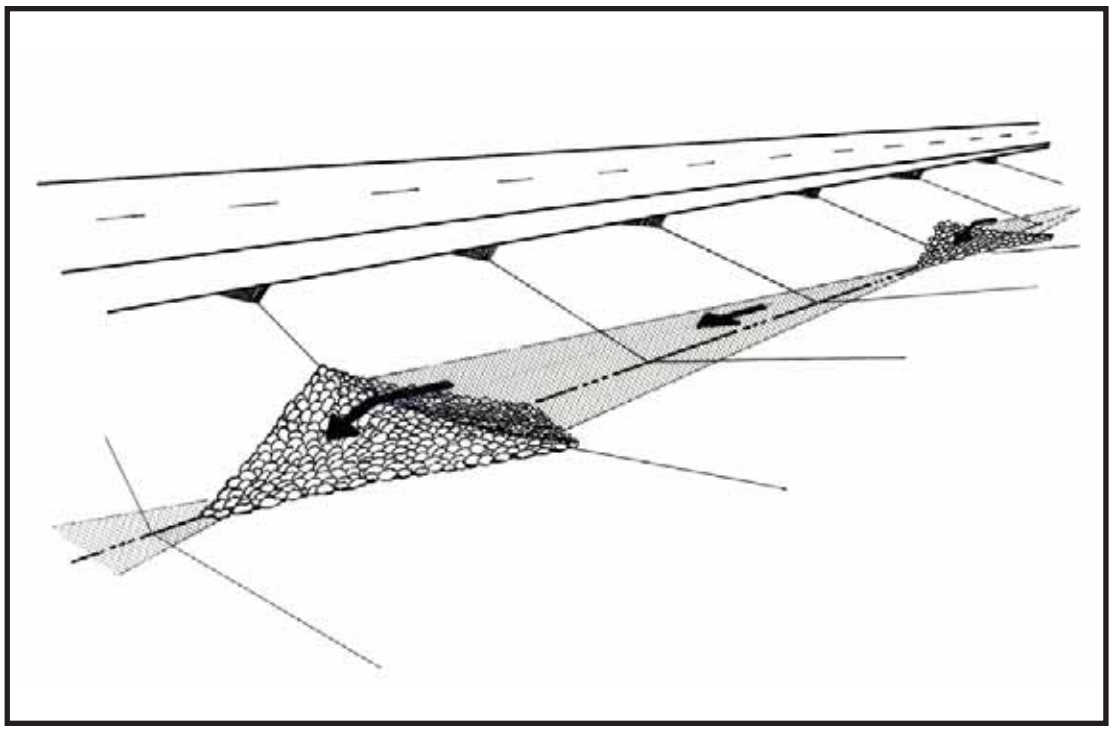
- Provide two 1-inch diameter holes above the sediment storage volume on opposites sides of the non-perforated riser pipe. This will typically provide sufficient detention time for basins to drain approximately 10 acres.
- Construct an emergency spillway to accommodate flows not carried by the principal spillway. Spillway shall consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible riprap.
- Spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, shall be a minimum of 20 feet in length.
- Use outlet protection at the pipe outlet.

Inspections and Maintenance

Follow inspection Schedule required in Construction General Permit Part IV.H.

- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage, obstructions or erosion.
- Repair damage, remove obstructions and stabilize if required or if directed by the Engineer.
- Remove sediment when storage zone is one-third full.
- Check barrier fencing and repair if needed or directed by the Engineer.
- Inspect temporary basins before and after rainfall events and weekly during the rest of the rainy season. During extended rainfall events, inspect at least every 24 hours.
- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed, or as directed by the Engineer.
- Check inlet and outlet area for erosion and stabilize if required, or if directed by the Engineer.
- Remove sediments when storage zone is one-third full.
- Check fencing for damage and repair as needed or as directed by the Engineer.

Check Dams



5.3.4 Check Dams

Definition

A small temporary or permanent dam constructed in a swale or channel.

Purpose

- Reduce the velocity of concentrated water flows.
- Reduce channel erosion.
- Allows sediment to settle.

Appropriate Applications

- Small channels which drain 10 acres or less.
- Channels constructed in erosive soils.
- Channels constructed with steep profile grades (greater than 5%).
- In temporary ditches or swales that, because of their short length of service, will not receive permanent protection.
- In permanent ditches or swales that will not receive permanent non-erodible linings.
- In ditches or swales that need protection during the establishment of grass linings.

Limitations

- Not to be used in live streams.
- Do not use in channels that have already been lined or vegetated unless erosion is expected.
- Promotes sediment trapping, which can be re-suspended during subsequent storms or removal of check dam.
- Installation may be affected if installed within Recovery Zone.

Standards and Specifications

General

Specific design criteria apply if check dam is located within the clear zone.

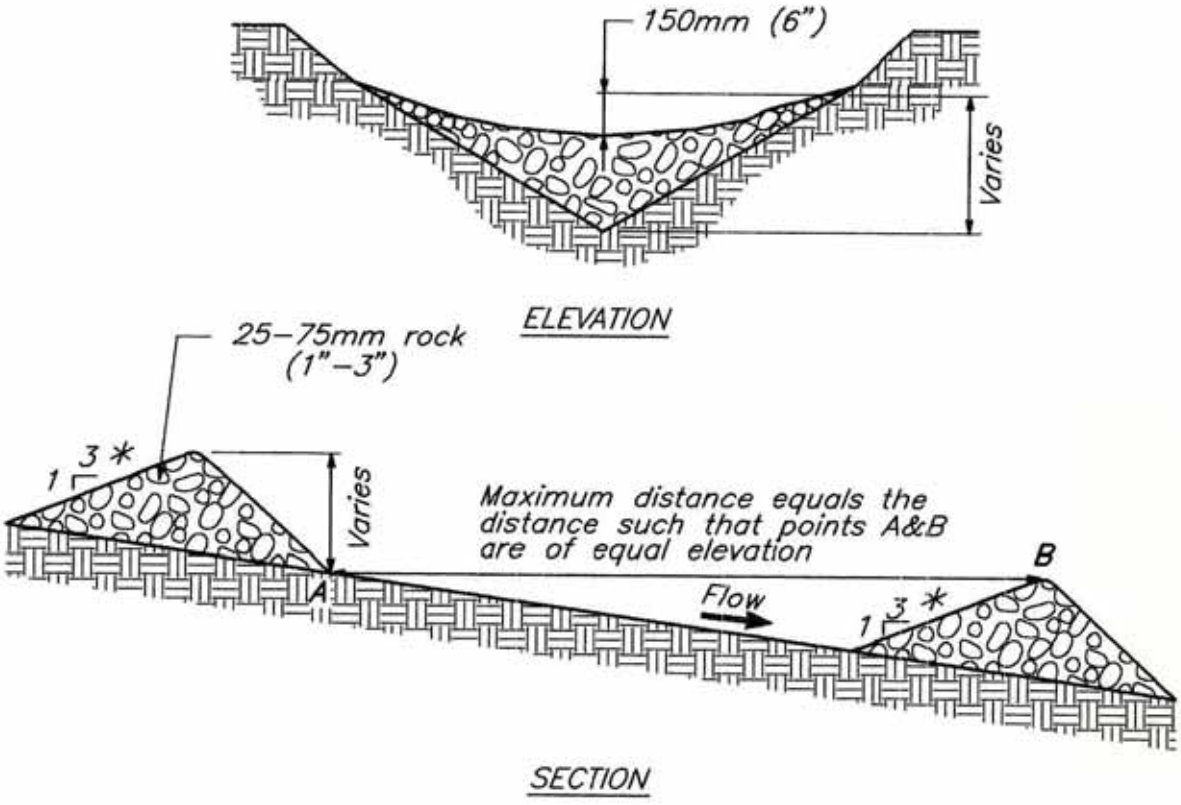
- Must be designed and constructed with adequate spillways, dissipater aprons and tie-ins to the channel banks and/or bed to protect the channel and structure during times of peak flow.
- In locating the check dam, consideration shall be given to the effects and the reach of the impounded water and sediment.
- If installation is to be permanent, the final depth of the silted ditch must be considered in the original design of the ditch.
- Check dams shall be constructed of rock.
- Rock shall be sized as specified in the contract documents or as stated in the ADOT Hydraulics Manual.
- Rock shall be large enough to stay in place given the expected design flow through the channel.

Installation

- Rock shall be placed to achieve complete coverage of the channel or swale.
- The center of the dam shall be lower than the edges.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Remove sediments when depth reaches one-third of check dam height. Removed sediment shall be incorporated into the project at locations approved by the Engineer or removed from the right-of-way.
- Erosion caused by high flows around the edges of the dam should be corrected immediately.



* Slope shall be 1V:6H if check dam is within the clear zone.

ROCK CHECK DAM

not to scale

Sediment Wattles

5.3.5 Sediment Wattles

Definition

Aspen wood excelsior, straw, flax or other similar materials that are rolled and bound into tight tubular rolls and placed on the face of slopes at regular intervals depending on the steepness of the slope.

Purpose

- Intercept runoff, reduce flow velocities, and promote infiltration.
- Release runoff as sheet flow.
- Reduce sediment from runoff.

Appropriate Applications

- At the top, face and at grade breaks of exposed and erodible slopes.
- As check dams for small runoff volumes.

Limitations

- Offer a potential for accidental introduction of undesirable weed species if filled with straw.
- Not to be used in place of linear sediment barrier such as silt fence.

Standards and Specifications

- Materials shall be certified to be weed-free.
- Can be prefabricated or rolled tubes of erosion control blanket.
- Consideration shall be given to predation of wattles by herbivores. Some materials are more palatable to wildlife and cattle than others.
- Consideration shall be given to required lifespan of wattles. Excelsior wattles wrapped in polyethylene, jute or shredded coconut may extend lifespan up to 3 years.
- Typically left in place following final approval of soil stabilization.

Installation

- Wattles shall be installed as indicated on the plans, or as directed by the Engineer and in accordance with manufacturer's specifications.
- Typical installations are as follows:

Steeper than 2 (H): 1 (V) slopes	10-foot spacing
2:1 to 3:1 slopes	20-foot
Greater than 3:1 slopes	30-foot

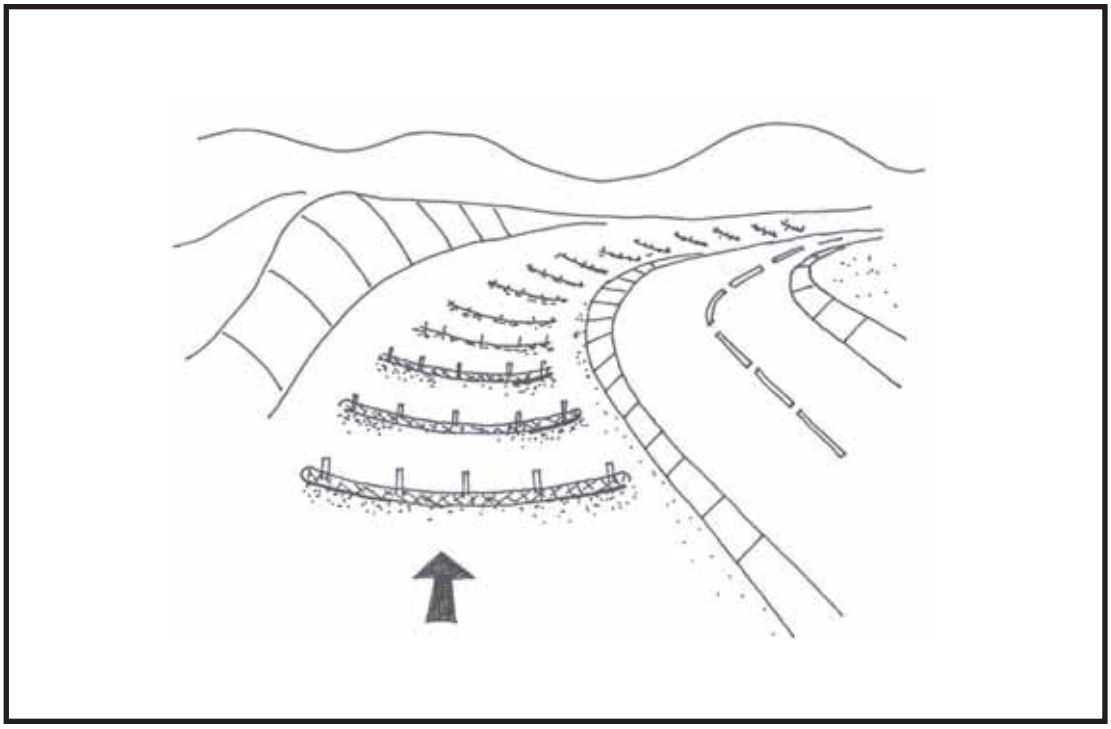
- The important consideration is to prevent undercutting of wattle. Therefore, subgrade preparation as directed is essential.
- Wattles may be staked with hardwood or pine stakes.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for tears, split or unraveling rolls and the evidence of erosion due to the failure of the device to reduce runoff velocity. Repair or replace as required.
- Repair any rills or gullies promptly.
- Where used as check dams, dispose of sediment when it reaches one-third the height of the wattle. Removed sediment shall be incorporated into the project at locations approved by the Engineer or removed from the right-of-way.

DETAIL E4
SEDIMENT WATTLE
NOTES
Sediment Wattles To Be Installed As Slopes Are Constructed To Grade Or As Directed By The Engineer. They Shall Be Selected, Installed, And Maintained With Manufacturers' Specifications And Good Engineering Practices.
Trenches To Be Constructed Along Contour, Parallel To The Horizon. Trench Depth To Be 1/3 The Thickness Of The Sediment Wattle. Place Excavated Material On Downhill Side Of Trench.
Locate Sediment Wattles As Indicated On Plans Or As Directed By The Engineer. Space Trenches According To The Following Schedule:
Slope Ratio Spacing Intervals
1:1 15'-0"
2:1 20'-0"
3:1 35'-0"
4:1 45'-0"
5:1 55'-0"
6:1 65'-0"
Sediment Wattles To Be In Continuous Contact With Trench Bottom And Sides.
Stakes To Penetrate Undisturbed Soil Of Trench Bottom 12" Minimum. Stake To Be Exposed 3" Maximum Above Top Of Wattle.
Space Stakes 5'-0" O.C. Max., 1'-0" Max. At Wattle Ends, Typical.
18" Dia. Wattles Require Two Excelsior Or Two Straw Blankets Rolled.
Repair Any Rills Or Gullies Promptly.
SECTION
SEDIMENT WATTLE
(N. T. S., Typ.)
SEDIMENT WATTLE LAYOUT
(N. T. S., Typ.)
SEDIMENT WATTLE CONNECTION
(N. T. S., Typ.)
Slope
Abut Wattle Ends Tight, No Gaps
Install Sediment Wattles Along Contour
Bind With Baling Wire 10'-0" O.C., 2'-0" From Wattle Ends, Typical
1" X 1" Stake
Sediment Wattle 9"-18" Dia.
Cut Or Fill Slope
Shoulder Buildup Area
Toe Of Shoulder Buildup
Excavated Material To Be Tamped Against Downstream Side Of Sediment Log To Prevent Undermining
Spacing Depends on Slope Ratio-- See General Notes
Fill Or Cut Slope
Toe Of Slope
Bottom Three Wattles To Be 18" Dia. When Slope Length Exceeds 100' Top To Bottom
1'-0" Max. Typical
Abut Wattle Ends Tight, No Gaps
STAGE
EROSION & SEDIMENT CONTROL
SEDIMENT WATTLE
TRACS NO.

Sediment Logs



5.3.6 Sediment Logs

Definition

Aspen wood excelsior, straw, flax, compost, or other material that has been bound into a tight tubular roll.

Purpose

- Intercept runoff and reduce flow velocities.
- Reduce sediment from runoff.

Appropriate Applications

- As check dams in roadway ditches and channels downstream of disturbed soils.
- Around storm drain inlets associated with disturbed areas.
- Outfalls of small drainage channels or structures.

Limitations

- Not practicable where large flows are involved.
- Offer a potential for accidental introduction of undesirable weed species if filled with straw.
- Not suitable for rock subgrades where stakes cannot be securely installed.

Standards and Specifications

- Install as located on the plans or as directed by the Engineer. Typical installations are as follows:

Ditch grades greater than 3%	50-foot spacing
Ditch grades less than 3%	100-foot

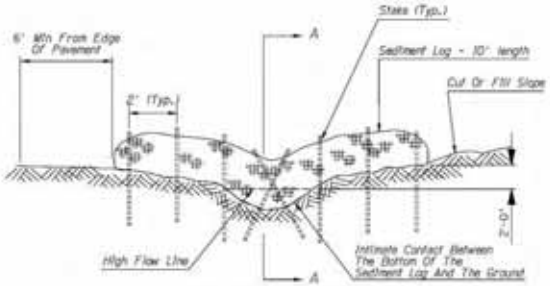
- Materials shall be certified to be weed-free.
- Consideration shall be given to predation of wattles by herbivores. Some materials (e.g., straw) are more palatable to wildlife and cattle than others (e.g., excelsior).
- Consideration shall be given to required lifespan of logs. Excelsior logs wrapped in polyethylene, jute or shredded coconut may extend lifespan up to 3 years.

Installation

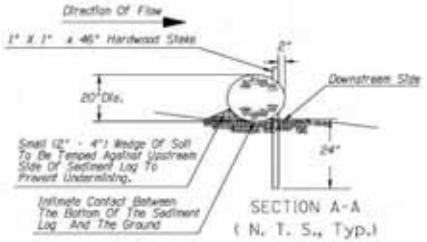
- Install as shown on the plans, or as directed by the Engineer in accordance with the manufacturer's instructions.
- Prepare subgrade to prevent undercutting.
- Sediment logs shall be staked with hardwood or pine stakes. Tops of stakes shall be sunk to top of logs.
- Overlap ends of sediment logs a minimum 24 inches when using more than one length.

Inspections and Maintenance

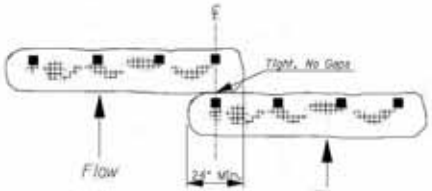
- Follow inspection schedule required in CGP Part IV.H.
- Inspect for split, torn or unraveling of logs and evidence of erosion due to failure of the installation to reduce flow velocities.
- Dispose of sediment when it reaches one-third the height of the log. Removed sediment shall be incorporated into the project at locations approved by the Engineer or removed from the right-of-way.



SEDIMENT LOG AND
DITCH / CHANNEL
SECTIONAL ELEVATION
(N. T. S., Typ.)



SECTION A-A
(N. T. S., Typ.)



TYPICAL OVERLAP
(N. T. S., Typ.)

Typical Overlap applies to the situation where ditch /channel is wider than the length of one Sediment Log.

NOTES

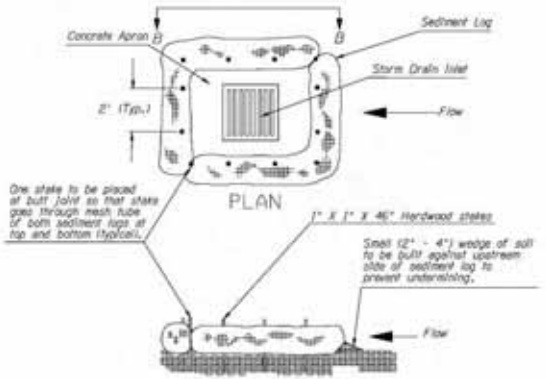
Sediment logs shall be located as indicated in plans or as directed by the Engineer. They shall be selected, installed, and maintained with manufacturers' specifications and good engineering practices.

Lay sediment log across prepared channel. Trenching or burial of Sediment Logs is not required. The intimate contact between the bottom of the log and the ground is mandatory. The logs shall be installed in the swale or channel bottom and shall continue up the side slopes 2'-0" above the high flow line, all perpendicular to the flow of water.

Stake with 1" X 1" x 46" min. hardwood stakes on 2 feet centers. The stake shall be placed through the downstream side only 2" into the log. It is only necessary for the stakes to grab one or two inches of the netting. Do not drive the stakes through the center of the log. The stakes must be driven into the ground 24". Center stakes shall be placed in an 'X' pattern.

Make sure no gaps exist between the soil and the sediment logs. Repair any rills or gullies promptly. In rock conditions the Engineer will evaluate the placement of sediment logs.

Slopes steeper than 4:1 shall apply rock riprap for channel/ditch lining or check dams when suitable.



During Construction

SEDIMENT LOG STORM DRAIN PROTECTION
SECTIONAL VIEW B-B (N. T. S., Typ.)

Detail E1

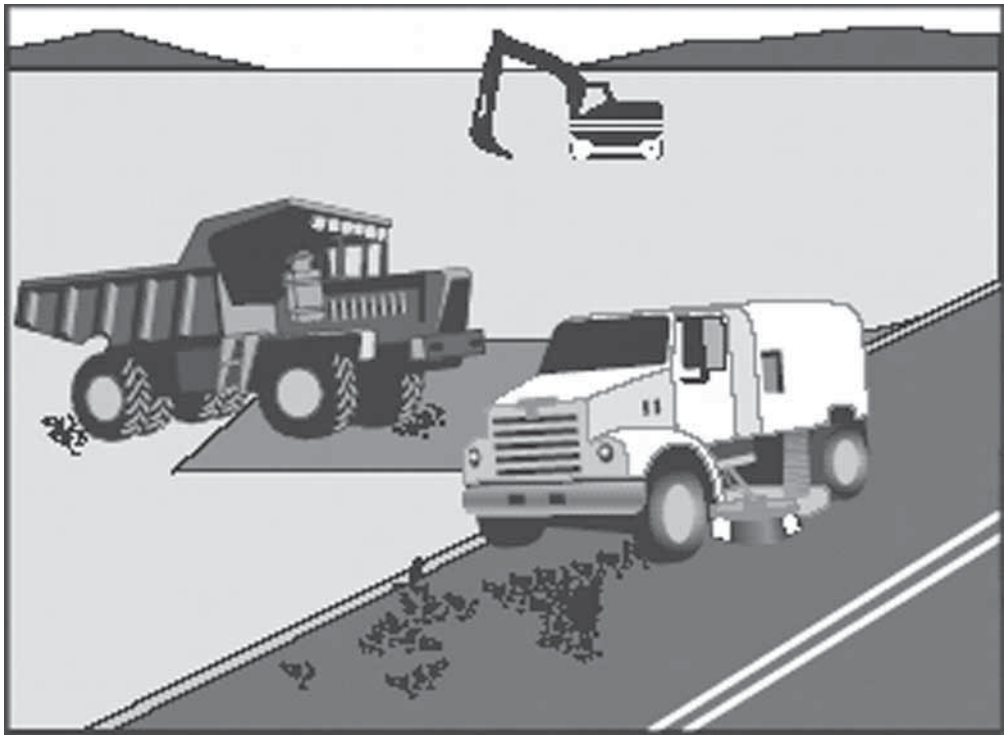
NOTES

Sediment log and stakes to be removed once construction activities are complete. Contractor to dispose of sediment logs and dispose of trapped sediment material and to fill shallow trench created by sediment log.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADSIDE DEVELOPMENT SECTION
EROSION & SEDIMENT CONTROL DETAILS

TRACS NO.

Street Sweeping and Vacuuming



5.3.7 Street Sweeping and Vacuuming

Definition

Practices to remove sediment tracked from the projects site onto public or private paved roads.

Purpose

- To keep sediment from entering a storm drain or watercourse.

Appropriate Applications

- Use where sediment is tracked from a project site onto paved public or private roads.

Limitations

- May be ineffective if soil is wet or sticky.

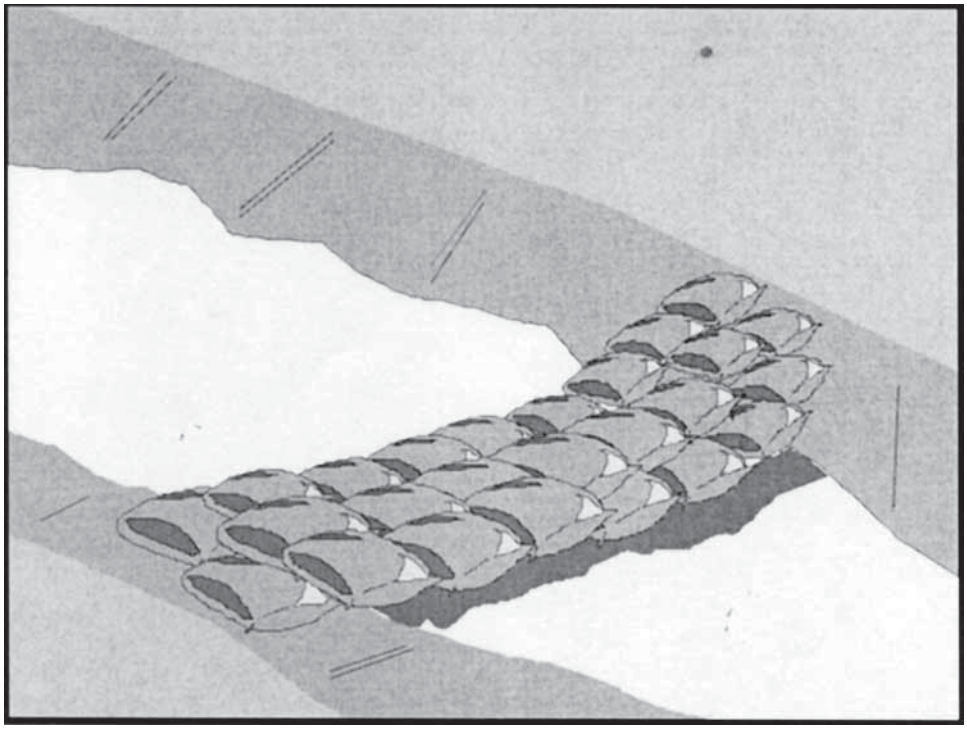
Standards and Specifications

- If not mixed with debris or trash, consider incorporating removed sediment back into project.

Inspections and Maintenance

- Inspect daily construction ingress and egress and other paved areas of sediment accumulation; sweep as necessary or as required by the Engineer.
- Dispose of sweeper waste at an approved dumpsite.

Sand Bag Barrier



5.3.8 Sand Bag Barrier

Definition

A sandbag barrier is a temporary linear sediment barrier consisting of stacked sandbags, designated to intercept and slow the flow of sediment-laden sheet flow runoff.

Purpose

- Sandbag barriers allow sediment to settle from runoff before water leaves the construction site. Sandbags can also be used where flows are moderately concentrated, such as ditches, swales, and storm drain inlets to divert and/or detain flows.

Appropriate Applications

- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.

- Parallel to a roadway to keep sediment off paved areas.
- At the top of slopes to divert roadway runoff away from disturbed slopes.
- To divert or direct flow or create a temporary sediment basin.
- During construction activities in stream beds when the contributing drainage area is less than 5 acres.
- When extended construction period limits the use of either silt fences or straw bale barriers.
- Along the perimeter of vehicle and equipment fueling and maintenance areas or chemical storage areas.
- To capture and detain non-storm water flows until proper cleaning operations occur.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- To temporarily close or continue broken, damaged or incomplete curbs.
- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Engineer.

Limitations

- Limit the drainage area upstream of the barrier to 5 acres.
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Limited durability for long term projects.
- When used to detain concentrated flows, maintenance requirements increase.

Standards and Specifications

Materials

- *Sandbag Material:* Sandbag shall be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight 135 g/m² (four ounces per square yard), mullen burst strength exceeding 2,070 kPa (300 psi) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70 percent in conformance with the requirements in ASTM designation D4355. Use of burlap is not acceptable.
- *Sandbag Size:* Each sand-filled bag shall have a length of 450 mm (18 in), width of 300 mm (12 in), thickness of 75 mm (3 in), and a mass of approximately 15 kg (33 lb.). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the Engineer for approval prior to deployment.

- *Fill Material:* All sandbag fill material shall be non-cohesive, Class 1 or Class 2 permeable material free from clay and deleterious material, conforming to the provisions in Section 68-1.025 "Permeable Material", of the Standard Specifications. The requirements for the Durability Index and Sand Equivalent do not apply. Fill material is subject to approval by the Engineer.

Installation

When used as a linear control for sediment removal:

- Install along a level contour.
- Turn ends of sandbag row up slope to prevent flow around ends.
- Generally, sandbag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective control.

When used for concentrated flows:

- Stack sandbags to required height using a pyramid approach.
- Upper rows of sandbags shall overlap joints in lower rows.
- Construct sandbag barriers with a setback of at least 3 feet from the toe of a slope.
- Where it is determined to be not practicable due to specific site conditions, the sandbag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.

Maintenance and Inspection

- Inspect sandbag barriers before and after each rainfall event, and weekly throughout the rainy season.
- Reshape or replace sandbags as needed, or as directed by the Engineer.
- Repair washouts or other damages as needed, or as directed by the Engineer.
- Inspect sandbag barriers for sediment accumulations and remove sediments when accumulation reaches one-third the barrier height. Removed sediment shall be incorporated in the project at locations designated by the Engineer or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- Remove sandbags when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

Storm Drain Inlet Protection

5.3.9 Storm Drain Inlet Protection

Definition

A sediment filter or a temporary or permanent detention area around a storm drain drop inlet.

Purpose

- Prevent sediment from entering storm drain system.

Appropriate Applications

- Use where storm drains are operational prior to permanent stabilization of disturbed drainage area.

Limitations

- Ponding can occur at the inlet with possible short term flooding.
- Can typically handle limited volumes of runoff and sediment. Therefore, requires frequent maintenance. If larger volumes of runoff are anticipated, direct runoff into Desilting Basins or Sediment Traps.

Standards and Specifications

Planning Considerations

- Identify existing and/ or proposed storm drain inlets that must be protected during storm events.
- Inlet protection is only appropriate for drainage areas of less than 1 acre. Route storm water to other sediment trapping devices for areas larger than 1 acre.
- Ensure that ponding will not encroach into highway traffic.

Materials:

Gravel or stone filters

- Gravel or stone filters may be held in place by wire mesh, concrete block or contained in bags.
- Gravel or stone shall be washed to remove sand and sediment that could wash into the storm drain system.

Filter Fabric

- Filter Fabric may be secured over the top of a drainage inlet with rocks or placed around the inlet and installed using silt fence specifications.
- Do not place fabric under the grate as the collected sediment may fall into the drain when the fabric is retrieved.
- Fabric placed on inlets surrounded by concrete or asphalt shall be anchored sufficiently to prevent runoff from pulling fabric away from inlet.
- Commercially available filter fabric inlet protection shall be installed according to manufacturer's specifications.

Sediment logs

- Sediment logs may be wrapped around storm drain inlets because of their flexible nature.
- Secure with stakes if inlet apron is not paved.

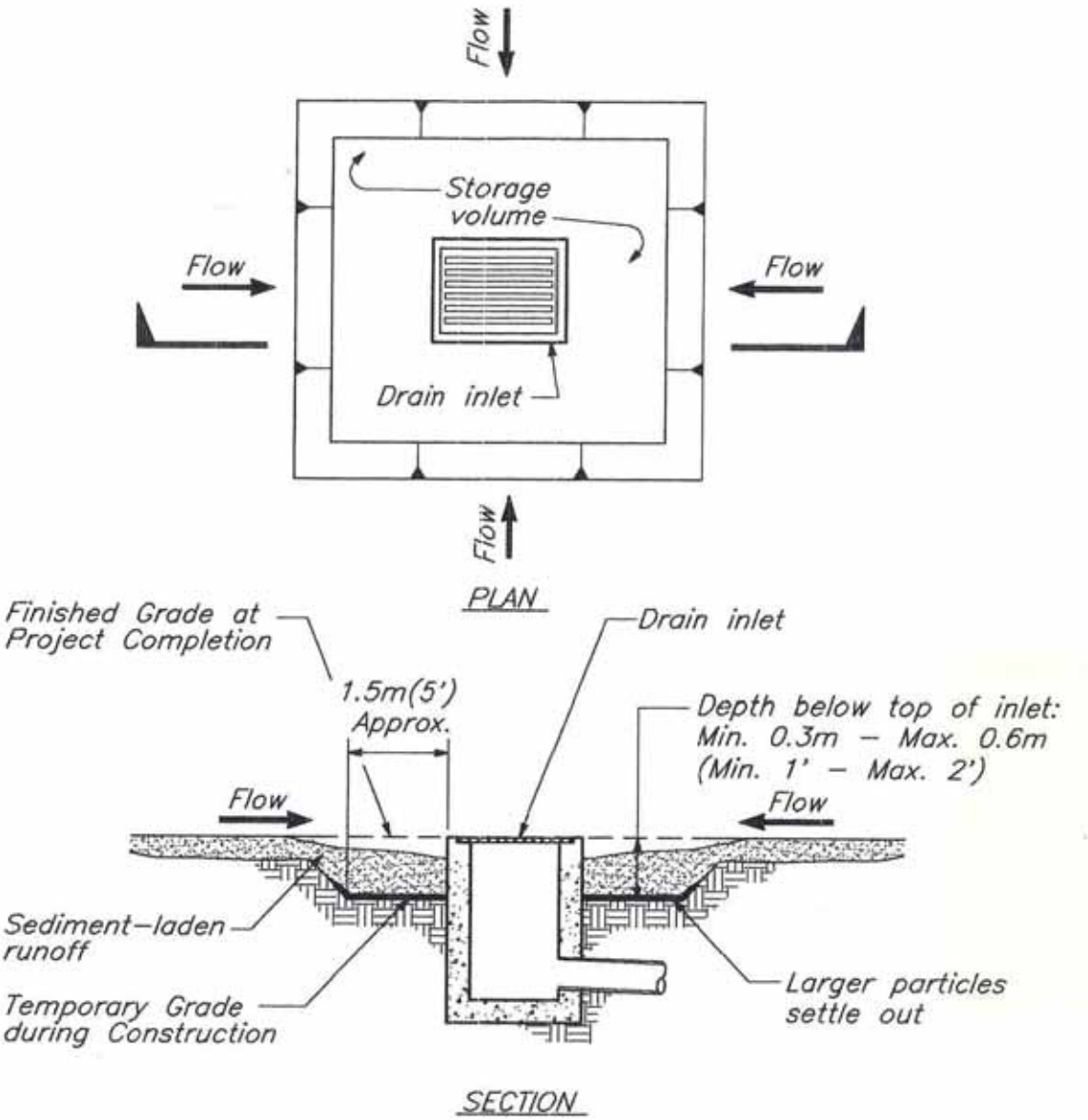
Excavated drop inlet sediment traps

- Excavated drop inlet sediment traps are appropriate when inlet is not surrounded by concrete or asphalt and drainage area is not greater than 1 acre.
- Inlet sediment traps should include sediment sumps of 1-2 feet in depth with side slopes a maximum of 1:2(v:h).

Storm Drain Inlet Protection

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for damage, failure to filter sediment, accumulation of sediment that should be removed, and damage from temporary flooding that may have occurred during a storm event. Repair as necessary.
- Replace filter fabric if it becomes clogged.
- Remove sediment after each rainfall event and as specified in the contract documents or as directed by the Engineer.
- Remove all inlet protection devices within 30 days after site is stabilized or when inlet protection is no longer needed. Regrade and stabilize disturbed areas as necessary.



This method of inlet protection is applicable where heavy flows are expected and where an overflow capability and ease of maintenance are desirable.

STORM DRAIN INLET PROTECTION

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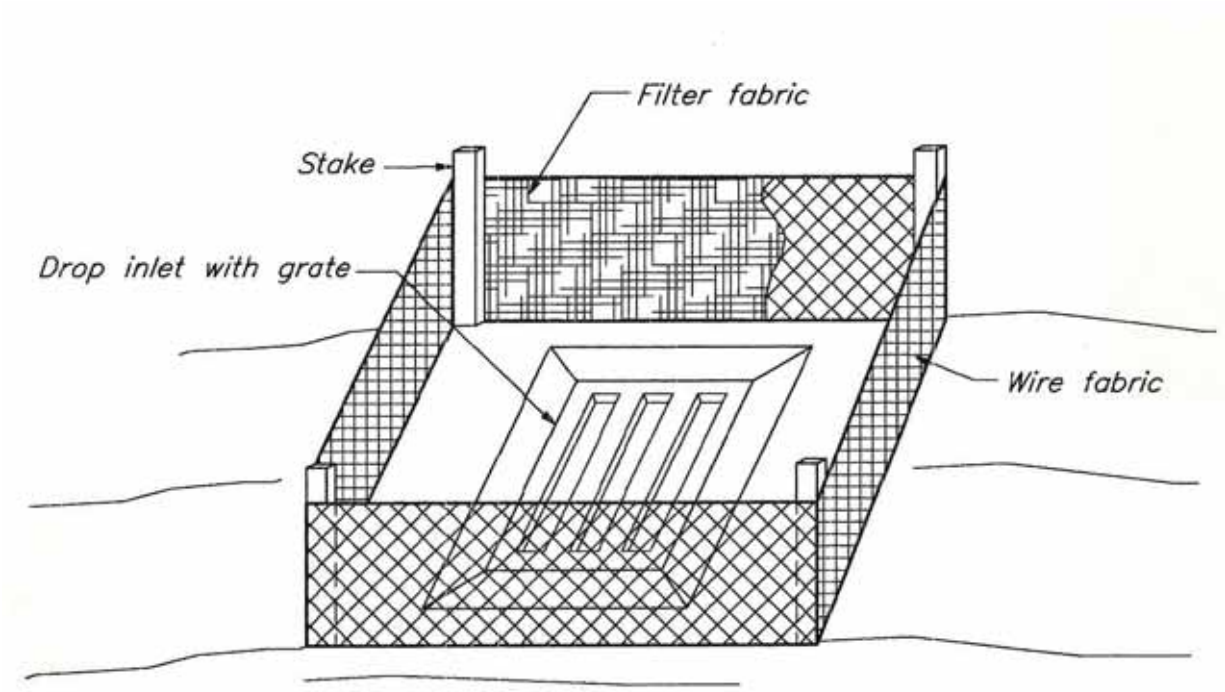

PERSPECTIVE

STORM DRAIN INLET PROTECTION

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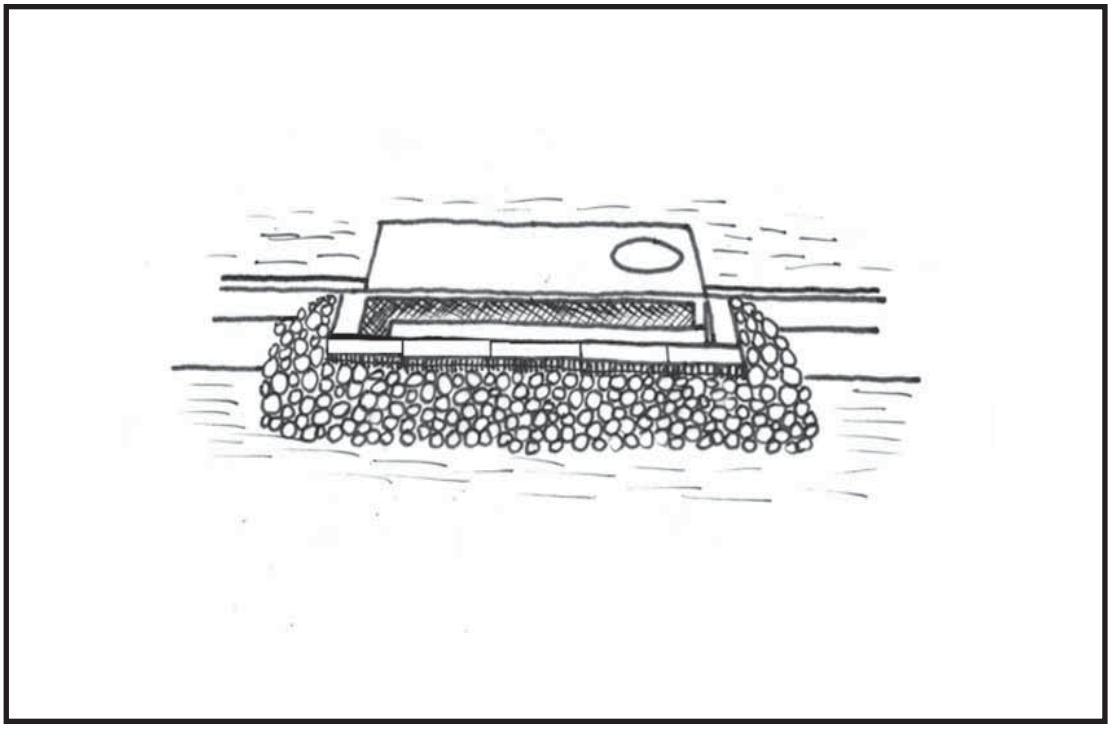
Curb Inlet Protection



5.3.10 Curb Inlet Protection

Definition

A temporary filtering device placed around completed curb inlets before final stabilization has been achieved.

Purpose

- To prevent sediment from entering the storm water system.

Appropriate Applications

- Where completed curb inlets are exposed to sediment-laden runoff from adjacent areas that have not been permanently stabilized.

Limitations

- Requires constant maintenance to keep accumulated sediment out of vehicular travel lanes and storm sewer system.
- Are easily damaged on roads open to the public.
- Can cause ponding in travel lanes during storm events.
- Typically ineffective on slopes steeper than 5%: runoff bypasses the inlet and continues downhill.

Standards and Specifications

Materials

- Gravel or stone held in place by wire mesh, concrete block or contained in bags is the traditional method of protecting curb inlets from sediment. Gravel or stone should be washed to remove sand and sediment that could wash into the storm drain system.
- The erosion control industry has developed two types of products for this purpose: (1) filtering devices that remain at street level and are installed across the curb inlet; (2) filtering devices that are placed within the catch basin. Follow manufacturer's specifications when installing specific curb inlet protection products.

Inspections and Maintenance

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for damage, failure to filter sediment, accumulation of sediment that should be removed, and damage from temporary flooding that may have occurred during a storm event.
- Repair as necessary.

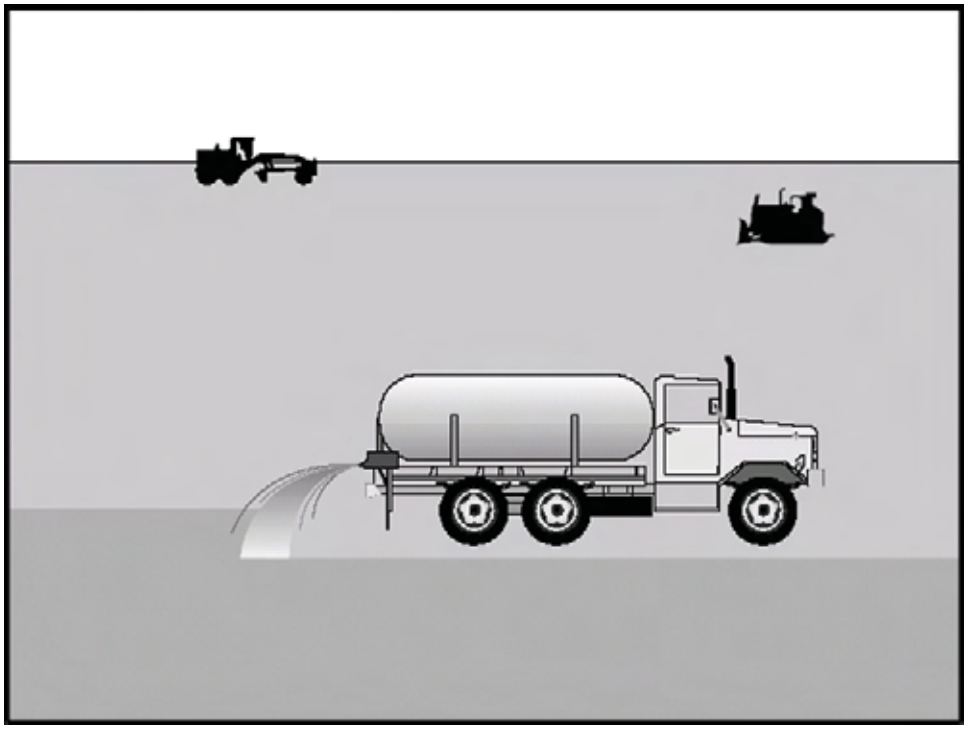
5

TEMPORARY BEST MANAGEMENT PRACTICES

5.4 WIND EROSION CONTROL BEST MANAGEMENT PRACTICES

Wind erosion control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance. Temporary Soil Stabilization BMPs described earlier in this chapter may also be appropriate.

Wind Erosion Control



5.4.1 Wind Erosion Control

Definition

The application of water or chemical dust palliatives as necessary to prevent or alleviate dust nuisance.

Purpose

- To prevent the movement of soil particles by the wind causing air pollution and eventual sediment release into the waters of the U.S.

Appropriate Applications

- Implement on all soil surfaces exposed to wind including stockpiles.

Limitations

- Effectiveness depends on soil, temperature, humidity, and wind velocity.
- May cause surface to become slippery.

Standards and Specifications

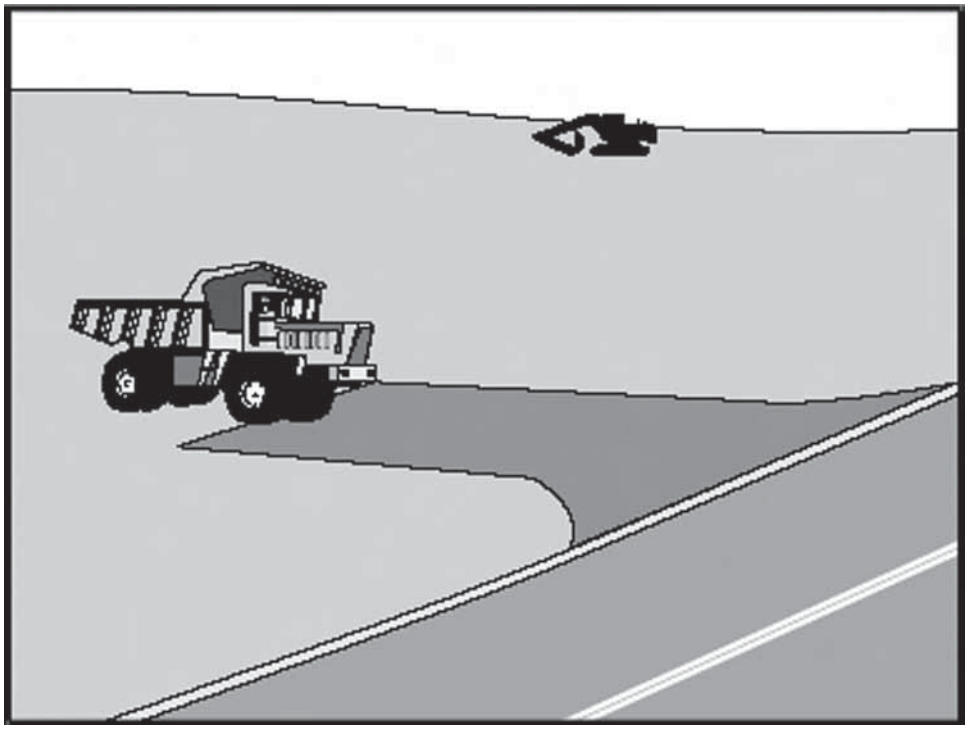
- Follow federal, state, and local air quality regulations and guidelines.
- Contact ADOT Transportation Planning Division, Air Quality Policy Section for the most up to date information about air quality control on construction projects.

- Use dust control treatments that conserve water whenever feasible.
- Materials applied as temporary soil stabilizers and soil binders, such as erosion control blankets or mulches, will also provide wind erosion benefits.
- Follow ADOT standard Specifications for Road and Bridge Construction.

5.5 TRACKING CONTROL BEST MANAGEMENT PRACTICES

Tracking control consists of preventing or reducing vehicle tracking from entering a storm drain or watercourse and includes the following:

Stabilized Construction Entrance/Exit



5.5.1 Stabilized Construction Entrance/Exit

Definition

A temporary stabilized vehicular entrance, located where traffic will enter and exit a construction site.

Purpose

- To reduce or eliminate the tracking of sediment onto public right-of-way, streets, sidewalk, or parking areas where it can potentially be washed into local storm drains or become airborne pollution.

Appropriate Applications

- Whenever traffic will be leaving a construction site and moving directly onto a public road or paved area.
- Entrances should be constructed on level ground.
- Site specific, conditions will dictate need.

Limitations

- Entrances must be planned and reviewed as part of the project traffic control plan.

- Increases construction cost
- Not very effective at removing sediment from equipment leaving the construction site.

Planning Considerations

- Entrances are more effective if designed in conjunction with tire wash area.
- Water source for tire wash must be provided.

Design and Sizing Criteria

- Entrances must be properly graded to prevent runoff from leaving the construction site.
- Entrances should drain to a sediment trap or sediment basin
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.
- Place aggregate over geotextile fabric to prevent sediment from the base material from migrating into the aggregate.
- Aggregate should be angular, fractured rock.
- Aggregate should be 12 inches deep, 3 to 6 inches in size and 50 feet long.

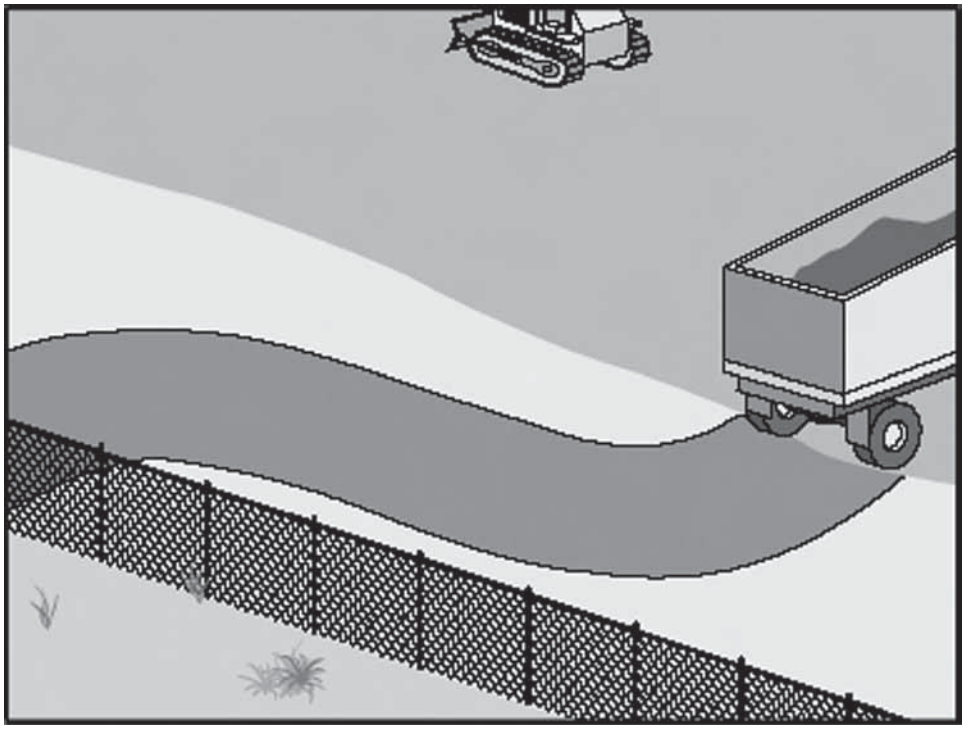
Inspections

- Follow inspection schedule required in CGP Part IV.H.
- Inspect for amount of sediment being tracked unto the road and verify that the gravel is clean and not filled with sediment.

Maintenance

- Gravel mat shall be replaced by top dressing with additional stone when surface voids are no longer visible.
- All sediment deposited on paved roadways must be removed within 24 hours (Refer to Street Sweeping and Vacuuming BMP).
- Sediment shall be removed from sediment traps as specified in maintenance standards for the specific BMP used.
- The gravel and filter fabric will be removed upon completion of the construction and disturbed soil areas resulting from removal shall be permanently stabilized.

Stabilized Construction Roadway



5.5.2 Stabilized Construction Roadway

Definition

A stabilized construction roadway is a temporary access road connecting existing public roads to a remote construction area.

Purpose

- It is designed for the control of dust and erosion created by vehicular tracking.

Appropriate Applications

Construction roadways and short-term detour roads:

- Where mud tracking is a problem during wet weather
- Where dust is a problem during dry weather
- Adjacent to water bodies
- Where poor soils are encountered

This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Engineer.

Limitations

- Materials will likely need to be removed prior to final project grading and stabilization.
- Site conditions will dictate design and need.
- May not be applicable to very short duration projects.
- Limit speed of vehicles to control dust.

Standards and Specifications

- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support heaviest vehicles and equipment that will use it.
- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) millings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 inches depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 inches, but smaller than 6 inches shall be used.

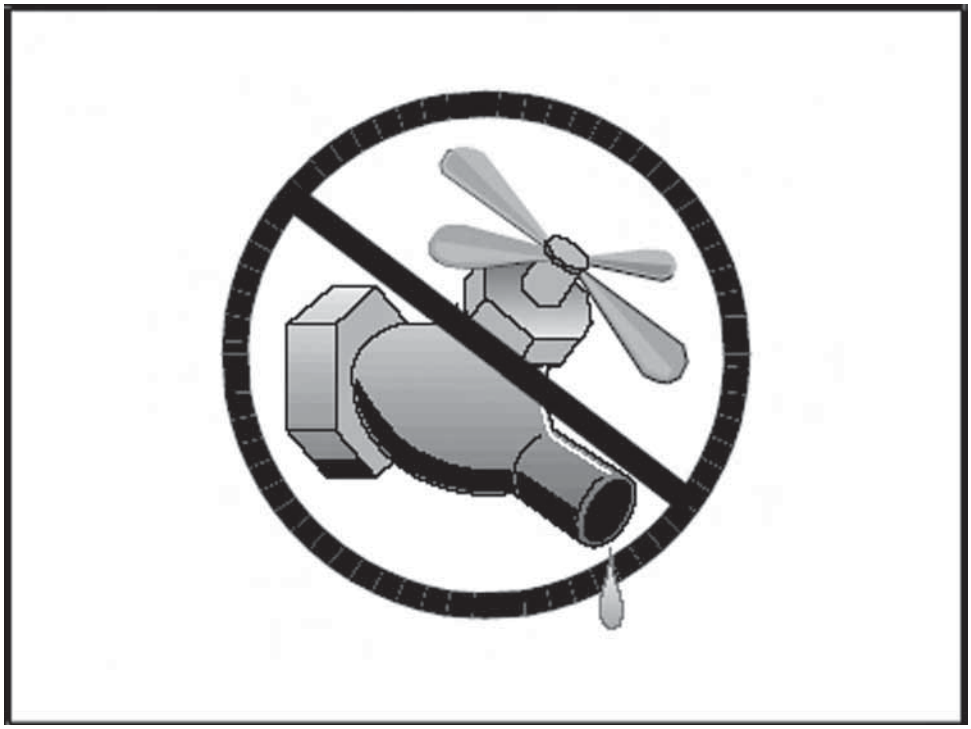
Maintenance and Inspection

- Inspect routinely for damage and repair as needed, or as directed by the Engineer.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.

5.6 NON-STORM WATER BEST MANAGEMENT PRACTICES

Non-storm water management Best Management Practices are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their sources before they come in contract with storm water. These practices involve day-to-day operations of the construction site and are usually under the control of the contractor. These BMPs are also referred to as “good housekeeping practices”, which involve keeping a clean, orderly construction site and include the following:

Water Conservation Practices



5.6.1 Water Conservation Practices

Definition

Procedures nd practices that minimize the harmful affects to water and water quality during the construction of a project.

Purpose

- To conserve and protect a critical resource.

Appropriate Applications

Project Design

- Limit as much as possible changes to the natural patterns of water movement.
- Limit as much as possible the amount of impervious surfaces added to the site.
- Consider the use of multiple small water management practices that can be implemented as close to the point where water comes in contact with newly cleared land as possible.

Project Construction

- Direct construction water runoff to areas where it can soak into the ground.
- Manage runoff as close to the source as possible.
- Look for ways to conserve wherever water is used on a project.

Standards and Specifications

- Use alternative methods for dust control and cleaning of construction areas to avoid the use of water.
- Avoid using water to clean construction areas.
- Use water harvesting techniques to water areas that are being revegetated.

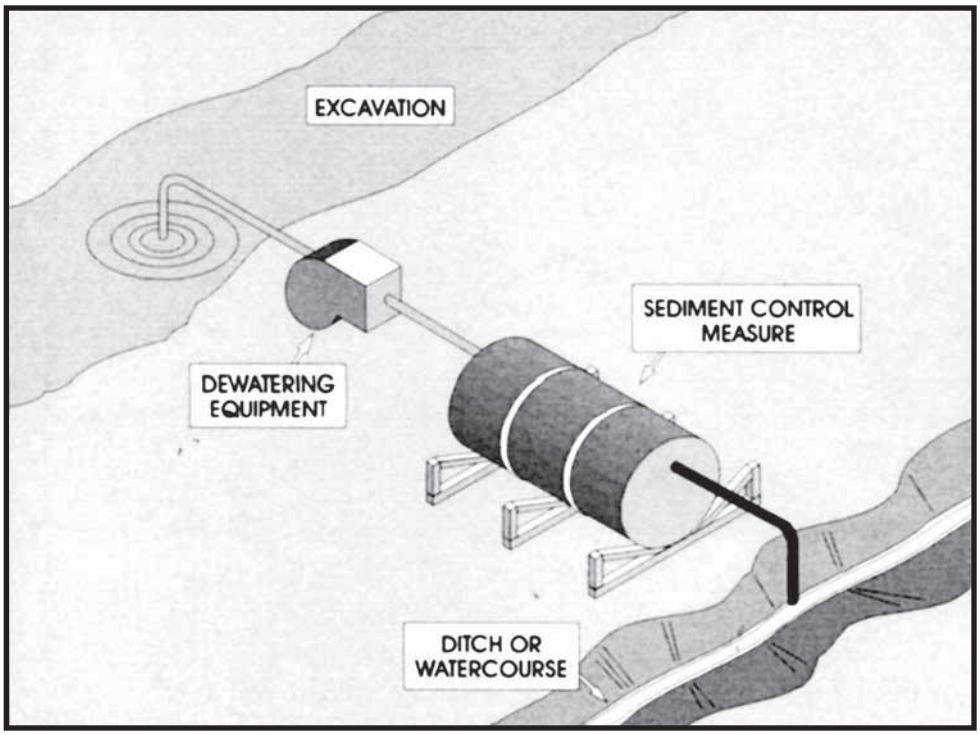
Inspections

- Inspect water equipment for leaks at least weekly.

Maintenance

- Keep water equipment in good working condition.
- Repair leaks promptly.

Dewatering Operations



5.6.2 Dewatering Operations

Definition and Purpose

Dewatering operations are practices that manage the discharge of pollutants from groundwater and accumulated precipitation dewatering operations.

Appropriate Applications

These practices are implemented where groundwater or accumulated precipitation will be discharged from a construction site. Controlling sediment from dewatering operations is required on all projects that pump sediment-laden water from work areas and plan to discharge the pumped water into a conveyance system or water body. Dewatering discharges include but are not limited to:

- Removal of uncontaminated groundwater.
- Removal of accumulated rainwater from work areas.
- Removing water from cofferdams or diversions.

Limitations

- Site conditions will dictate design and use of dewatering operations.
- The controls discussed in this BMP address sediment only. If the presence of polluted water is identified in the contract, the contractor shall implement dewatering pollution controls as required by the contract documents. If the quality

of water to be removed by dewatering is not identified as polluted in the contract documents, but is later determined by observation or testing to be polluted, the contractor shall notify the Engineer and comply with Standards Specifications, "Differing Site Conditions."

- The controls detailed in this BMP only allow for minimal settling time for sediment particles. Use only when site conditions restrict the use of the other control methods.
- Dewatering operations will require and must comply with applicable local permits.
- Avoid dewatering discharges where possible by using the water for dust control, by infiltration, etc.

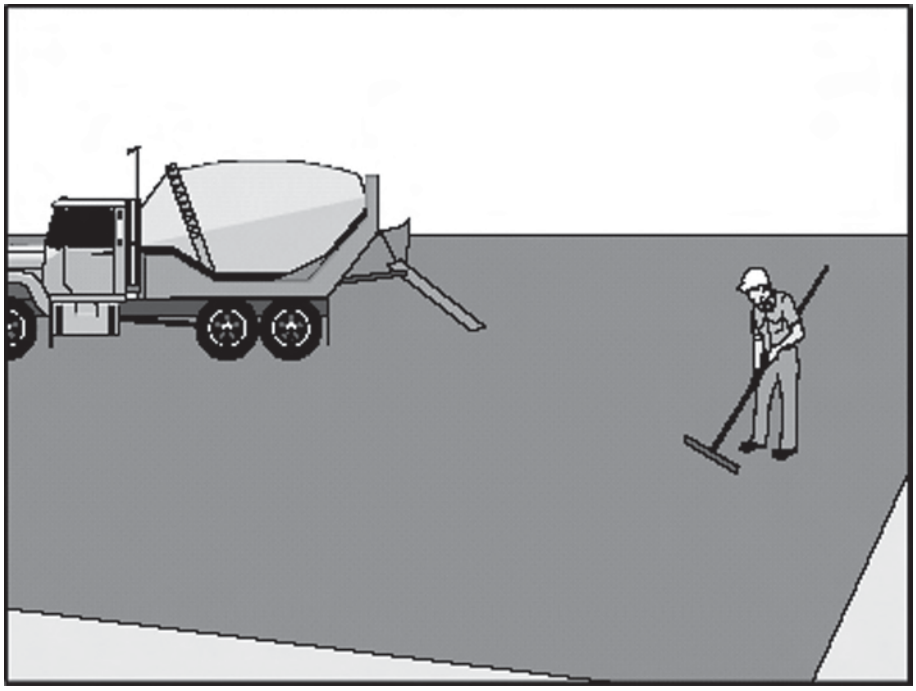
Standards and Specifications

- Contractor shall notify the Engineer of planned discharges.
- The Engineer will coordinate monitoring and permit compliance.
- Discharges must comply with regional and watershed-specific discharge requirements.
- Ensure that dewatering discharges do not cause erosion at the discharge point.
- Sediment Control Treatment: Dewatering effluent (groundwater and accumulated precipitation) that is laden with suspended solids shall be treated by a device designed to remove soil particles down to 0.02 mm in size. Desilting basins (see BMP) are an example of a temporary treatment device.
- A filtration devise may be substituted for a desilting basin if the contractor can demonstrate to the Engineer's satisfaction that the filtration devices provides equivalent or greater removal of suspended solids than the basin.
- Filter bags may be used for small-scale dewatering operations.

Inspection and Maintenance

- Inspect filtering device frequently and repair or replace once the sediment build-up prevents the structure from functioning as designed.
- Accumulated suspended solids removed from a dewatering device shall be spread on the project site and stabilized at locations designated by the Engineer or shall be properly disposed of outside the highway right of way in conformance with the Standard Specifications.

Paving and Milling Operations



5.6.3 Paving and Milling Operations

Definition

Procedures implemented during paving surfacing, resurfacing, or sawcutting to reduce or eliminate pollution of storm water.

Purpose

- Water use during paving and milling operations can contain pollutants and must not be allowed to enter storm water systems or drainage ways.

Appropriate Applications

- These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute storm water runoff or discharge to the storm drain system or watercourses.

Limitations

- Finer solids are not effectively removed by filtration systems.
- Paving opportunities may be limited during wet weather.

Standards and Specifications

- Substances used to coat asphalt transport trucks and asphalt trucks and asphalt

spreading equipment shall not contain soap and shall be non-foaming and non-toxic.

- Place drip pans or absorbent materials under paving equipment while not in use, to catch and/or contain drips and leaks.
- When paving involves asphaltic concrete (AC), the following steps shall be implemented to prevent the discharge of milling residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
- Minimize the washing of sand or gravel from new asphalt into storm drains, streets, and creeks by sweeping where practical.
- Old or spilled asphalt must be disposed as approved by the Engineer.
- AC millings, pieces, or chunks used in embankments or shoulder backing must not be allowed to enter any storm drains or watercourses. Apply temporary BMP perimeter controls until structure is stabilized or permanent controls are in place.
- Collect and remove all broken asphalt and recycle when practical; otherwise, dispose in accordance with special provisions or as directed by the Engineer.
- Any AC chunks and pieces used in embankments must be placed above the water table and covered by at least 1 foot of material.
- Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.
- Drainage inlet structures and manholes shall be covered with filter fabric during application of seal coat, tack coat, slurry seal, and/or fog seal.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall is predicted to occur during the application or curing period.
- Clean asphalt coated equipment off-site whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in BMP "Solid Waste Management". Any cleaning on site shall follow BMP "Vehicle and Equipment Cleaning".
- Do not wash sweepings from exposed aggregate concrete into storm drain system. Collect and return aggregate base stockpile, or dispose of properly.
- Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in BMP "Concrete Waste Management" or pump the water to the sanitary sewer if allowed by the local wastewater authority.
- Do not allow saw-cut Portland Concrete Cement (PCC) slurry to enter storm drains or watercourses. Residue from milling operations shall not be allowed to flow across the pavement, and shall not be left on the surface of the pavement. See also BMP "Concrete Waste Management" and BMP "Liquid Waste Management".

- When approved by the Engineer, stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses.
- Disposal of PCC and AC waste shall be in conformance with the Standard Specifications. See also BMP "Concrete Waste Management".

Thermoplastic Striping

- All thermoplastic striper and pre-heater equipment shutoff valves shall be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the storm water drainage system, or watercourses.
- The pre-heater shall be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave 6 inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move when the vehicle is deadheaded.
- Contractor shall not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible recycle thermoplastic material. Thermoplastic waste shall be disposed of in accordance with project specifications.

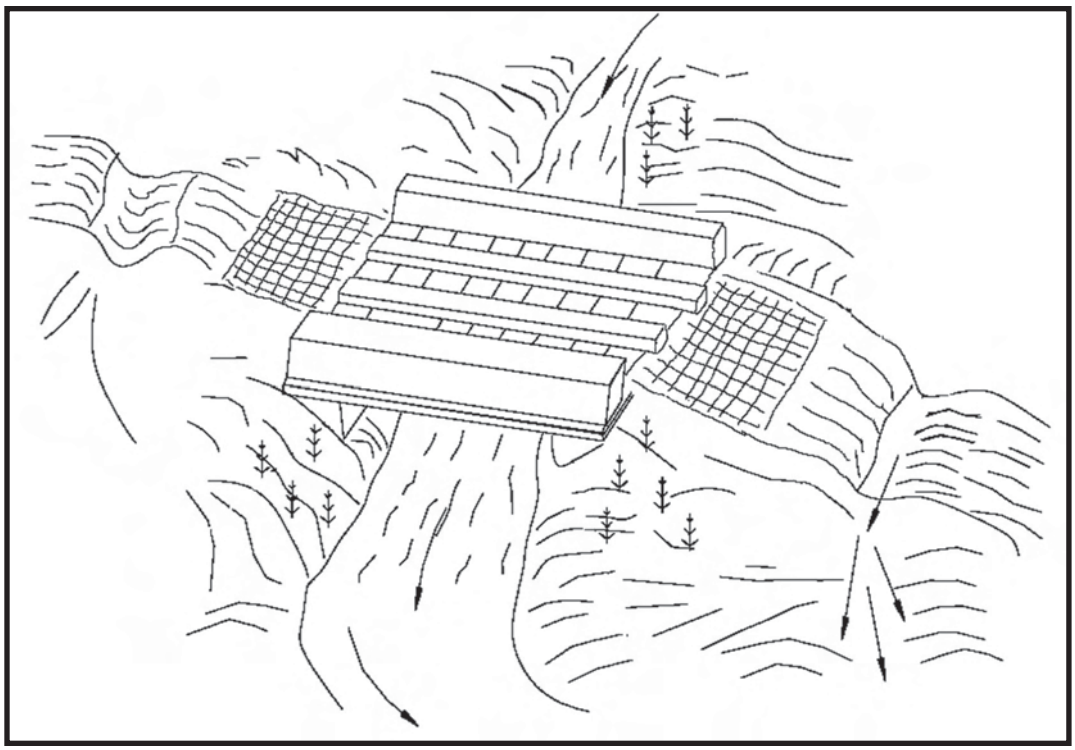
Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the storm water drainage system or watercourses.
- Melting tanks shall be loaded with care and not filled to beyond six inches from the top to leave room for splashing when vehicle is deadheaded.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.
- Waste shall be disposed of in accordance with Standard Specification.

Maintenance and Inspection

- Inspect and maintain machinery regularly to minimize leaks and drips.
- Ensure that employees and subcontractors are implementing appropriate measures during paving operations.
- Maintain machinery regularly to minimize leaks and drips.

Temporary Stream Crossings



5.6.4 Temporary Stream Crossing

Definition

A structure that is placed across a waterway that allows vehicles to cross the waterway during construction.

Purpose

- To eliminate erosion and downstream sedimentation caused by vehicles moving through the streambed.

Appropriate Applications

- In all cases where construction equipment or vehicles need to frequently cross a waterway or as specified in ADOT Stored Specification 104SWDEQ or 104SWEPA.
- When alternative access routes are not feasible.
- When crossing perennial streams or waterways causes significant erosion.

Limitations

- Installation and removal will disturb the waterway.
- May require additional permitting such as U.S. Army Corps of Engineers 404 permit and environmental clearance.

- Installation may require dewatering or temporary diversion of the stream. See BMP "Dewatering Operations".
- May become a constriction in the waterway, which can obstruct flood flow and cause flow backups or washouts. If improperly designed, flow backups can increase the pollutant load through washouts and scouring.

Standards and Specifications

General Considerations

Location of the temporary stream crossing shall address:

- Site selection where erosion potential is low.
- Areas where the side slopes from highway runoff will not spill into the side slopes of the crossing.

The following types of temporary stream crossings shall be considered:

- Culverts – Used on perennial and intermittent streams.
- Fords – Appropriate during the dry season in arid areas. Used on dry washes and ephemeral streams. Avoid use on perennial streams.
- Bridges – Appropriate for streams with high flow velocities, steep gradients and/or where temporary restrictions in the channel are not allowed.
- Must allow for storm event-generated runoff.

Design and installation requires knowledge of stream flows and soil strength. Designs shall be prepared under direction of, and approved by, a registered civil and/or structural engineer. Both hydraulic and construction loading requirements shall be considered with the following:

- Comply with the requirements for culvert and bridge crossings, as contained in the ADOT Highway Design Manual, particularly if the temporary stream crossing will remain through the rainy season.
- Provide stability in the crossing and adjacent areas to withstand the design flow. The design flow and safety factor shall be selected based on careful evaluation of the risks due to over topping, flow backups, or washout.
- Install sediment traps immediately downstream of crossings outside of the drainage in order to capture sediments. See BMP "Sediment Trap".
- Avoid oil or other potentially hazardous waste materials for surface treatment.

Temporary Stream Crossings

Construction Considerations

- Stabilize construction roadways, adjacent work area and stream bottom against erosion.
- Construct during dry periods to minimize stream disturbance and reduce costs.
- Construct at or near the natural elevation of the streambed to prevent potential flooding upstream of the crossing.
- Vehicles and equipment shall not be driven, operated, fueled, cleaned, maintained, or stored in the wet or dry portions of a water body where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as authorized by the Engineer as necessary to complete the work.
- Temporary water body crossings and encroachments shall be constructed to minimize scour. Cobbles used for temporary water body crossings or encroachments shall be clean, rounded river cobble.
- The exterior of vehicles and equipment that will encroach on the water body within the project shall be maintained free of grease, oil, fuel, and residues.
- Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. Precautions shall be taken to avoid damage to vegetation by people or equipment.
- Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble shall be removed upon completion of project activities.
- Any temporary artificial obstruction placed within flowing water shall only be built from material, such as clean gravel or sandbags, which will cause little or no siltation.

Specific Considerations

- Culverts are relatively easy to construct and able to support heavy equipment loads.
- Fords are the least expensive of the crossings, with maximum load limits.
- Temporary fords are not appropriate if construction will continue through rainy season, if thunderstorms are likely, or if the stream is perennial.
- Bridges are generally more expensive to design and construct but provides the least disturbance of the stream bed and constriction of the waterway flows.
- Refer to Stored Specification 104SWDEQ or 104SWEPA for design and sizing criteria.

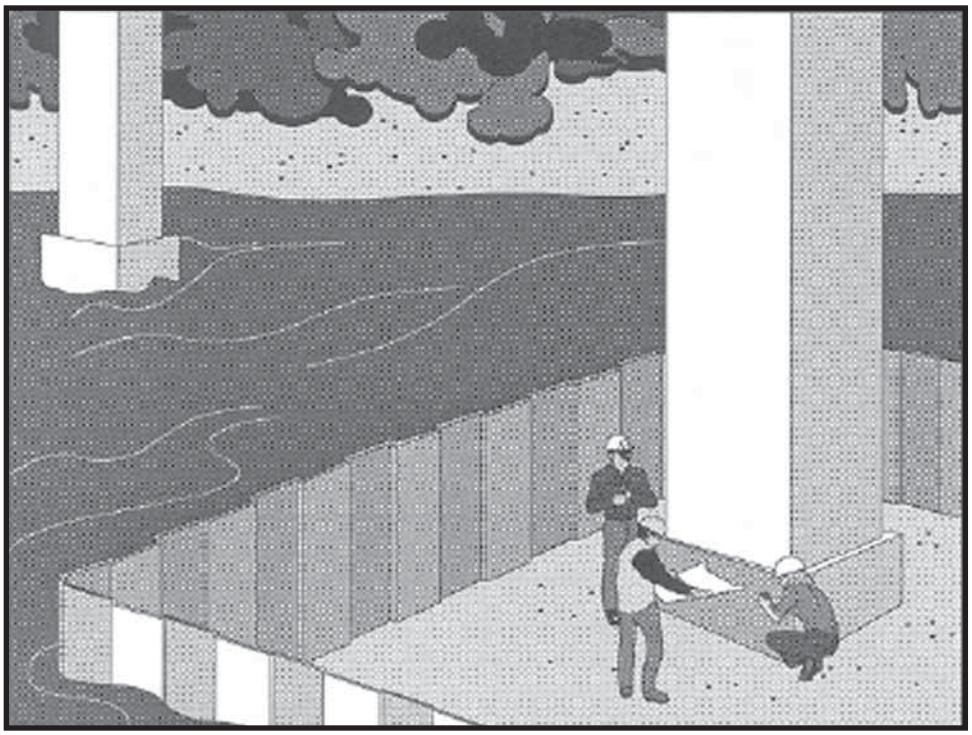
Inspections

- Inspect periodically to ensure that the bridge, streambed, and banks are maintained and not damaged.

Maintenance

- Maintenance shall be performed, as needed to ensure that the structure, streambed and banks are stable.

Clear Water Diversion



5.6.5 Clear Water Diversion

Definition and Purpose

- Clear water diversion consists of a system of structures and measures that intercept clear surface water runoff upstream of a project site, transport it around the site, and discharge it downstream with minimal water quality degradation for either the project construction operations or the construction of the diversion. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, drainage, and interceptor swales.

Appropriate Applications

- Implemented where appropriate permits have been secured and work must be performed in a running stream or water body.

Limitations

- Diversion/encroachment activities will usually disturb the waterway during installation and removal of diversion structures.
- Specific permit requirements or mitigation measures, such as Corps, Arizona Department of Game & Fish, Federal Emergency Management Agency (FEMA), etc. may be included in contract documents because of clear water diversion/ encroachment activities.

- Diversion/encroachment activities may constrict the waterway, which can obstruct flood flows and cause flooding or washouts.

Standards and Specifications

General

- Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams shall be constructed and maintained between working areas and streams. During construction of the barriers, muddying of streams shall be held to a minimum.
- Diversion structures must be adequately designed to accommodate fluctuations in water depth or flow volume due to storms, flash floods, etc.
- Heavy equipment driven in wet portions of a water body to accomplish work shall be completely clean of petroleum residue, and water levels are below the gear boxes of the equipment in use, or lubricants and fuels are sealed such that inundation by water shall not result in leaks.
- Mechanical equipment operated in the water shall not be submerged to a point above any axle of said mechanical equipment.
- Excavation equipment buckets may reach out into the water for the purpose of removing or placing fill materials. Only the bucket of an excavator/backhoe may operate in a water body. The main body of the crane/excavator/backhoe shall not enter water-covered portions of a water body, except as necessary to cross the stream to access the work site.
- Stationary equipment such as motors and pumps, located within or adjacent to a water body, shall be positioned over drip pans.
- When any artificial obstruction is being constructed, maintained, or placed in operation, sufficient water shall, at all times, be allowed to pass downstream to maintain aquatic life downstream.
- The exterior of vehicles and equipment that will encroach on a water body within the project shall be maintained free of grease, oil, fuel, and residues.
- Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. Precautions shall be taken to avoid damage to vegetation by people or equipment.
- Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure.

The cobble shall be removed upon completion of project activities. Drip pans shall be placed under all vehicles and equipment placed on structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.

- Where possible, avoid or minimize diversion/encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. See also the project special provisions for scheduling requirements.
- Scheduling shall also consider seasonal releases of water from dams, seasonal riparian wildlife, and water demands due to crop irrigation.
- Construct diversion structures with materials free of potential pollutants such as soil, silt, sand, clay, grease, or oil. If sandbags are used, they shall be filled with clean materials free of silt, clay, and organic substances.

Temporary Diversions/Encroachments

- Construct diversion channels in accordance with BMP "Earth Dikes/Drainage Swales".
- In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with BMP "Geotextiles, Plastic Covers and Erosion Control Blankets/ Mats", or, use rock slope protection, as described in the Standard Specifications Section.
- Where appropriate, use natural streambed materials such as large cobbles and boulders for temporary embankment/slope protection, or other temporary soil stabilization methods.
- Provide for velocity dissipation at transitions in the diversion, such as the point where the stream is diverted to the channel and the point where the diverted stream is returned to its natural channel. See also BMP "Rock Outlet Protection".

Temporary Dry Construction Areas

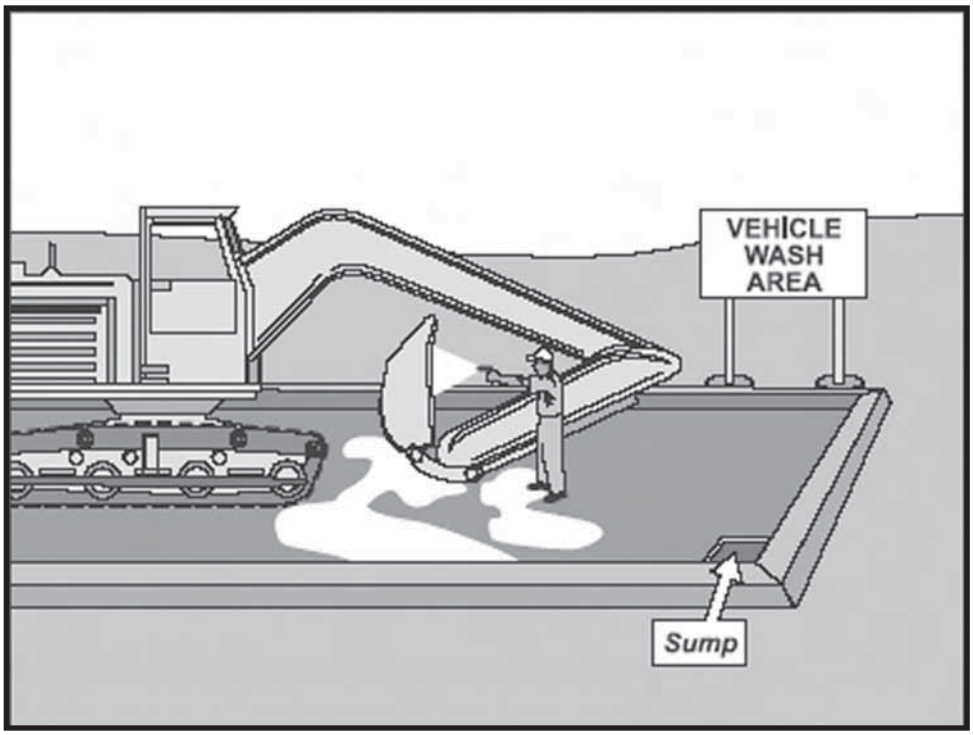
- When dewatering behind temporary structures to create a temporary dry construction area, such as coffer dams, pass pumped water through a sediment settling device, such as a portable tank or settling basin, before returning water to the water body. See also BMP "Dewatering Operations".
- If the presence of polluted water or sediment is identified in the contract, the contractor shall implement dewatering pollution controls as required by the contract documents. If the quality of water or sediment to be removed while dewatering is not identified as polluted in the contract documents, but is later determined by observation or testing to be polluted, the contractor shall notify the Engineer and comply with the Standard Specifications.

- Any substance used to assemble or maintain diversion structures, such as form oil, shall be non-toxic and non-hazardous.
- Any material used to minimize seepage underneath diversion structures, such as grout, shall be non-toxic, non-hazardous, and as close to a neutral pH as possible.

Maintenance and Inspection

- Inspect diversion/encroachment structures before and after significant storms, and at least once per week while in service.

Vehicle and Equipment Cleaning



5.6.6 Vehicle and Equipment Cleaning

Definition

Procedures and practices used to clean vehicles and equipment prior to or during use on project site.

Purpose

- Minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drain or to watercourses.
- Reduce or eliminate spread of noxious weeds and invasive plant species from project site.

Appropriate Applications

- These procedures are applied on all construction sites where vehicle and equipment cleaning is performed.

Standards and Specifications

- On-site vehicle and equipment washing is discouraged, but may be necessary to eliminate spread of invasive species to areas outside of project site.
- Cleaning of vehicles and equipment with soap, solvents or steam shall not occur on the project unless the Engineer has been notified in advance and the resulting

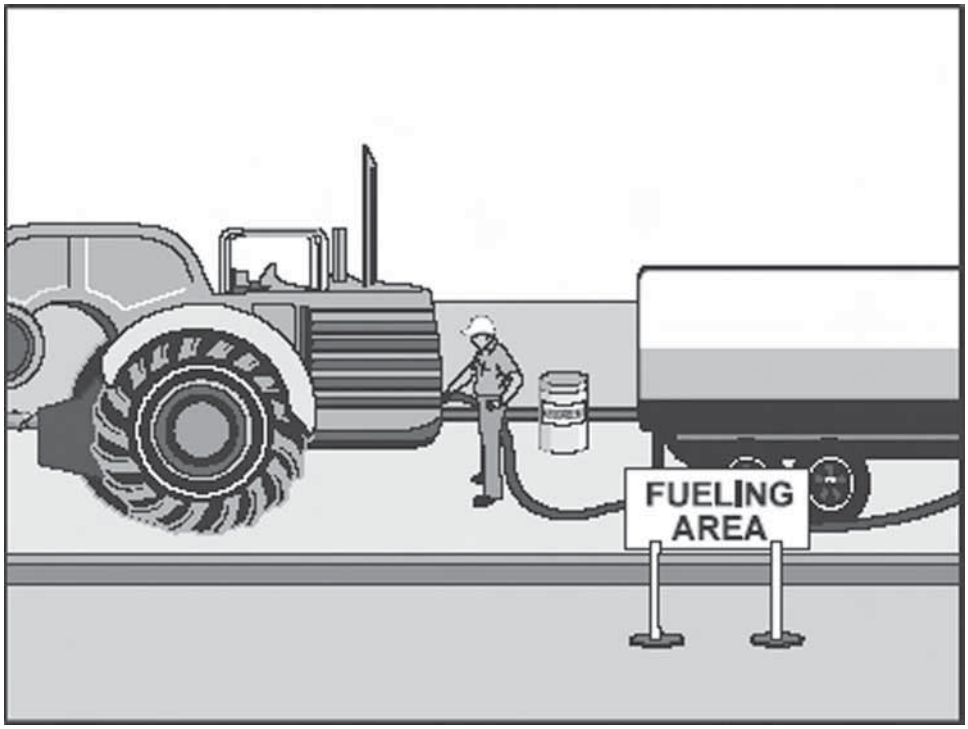
wastes are fully contained and disposed of outside of the highway right-of-way in conformance with the Standard Specifications. Resulting wastes shall not be discharged or buried within the highway right-of-way.

- When equipment/vehicle washing/cleaning must occur on-site and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning shall have the following characteristics and shall be arranged with the Erosion Control Coordinator:
  - A washout area shall be an excavated pit, which will later be backfilled or where the concrete wash can harden and be properly disposed of.
  - Locate wash out areas close to the active construction site on the project.
  - Locate wash out pits away from storm drains, open ditches, or receiving waters.
  - Use only when necessary.
  - When cleaning vehicles/equipment with water:
  - Use as little water as possible. Consider using high pressure sprayers, which require less water.

Maintenance

- Inspect sump regularly and remove liquids and sediment as required or as directed by the Engineer.

Vehicle and Equipment Fueling



5.6.7 Vehicle and Equipment Fueling

Definition

Procedures and practices to minimize or eliminate fuel spills and leaks during fueling.

Purpose

- To prevent the pollution of storm drain systems or watercourses from fuel spills and leaks.

Appropriate Applications

- These procedures are applied on all construction sites where vehicle and equipment fueling takes place.

Limitations

- Only use on-site vehicle and equipment fueling when it is impractical to send vehicles and equipment off-site to be refueled.

Standards and Specifications

- When fueling must occur on-site, the contractor shall select and designate an area to be used, subject to approval by the Engineer.

- Federal, state and local requirements shall be observed for any stationary aboveground storage tanks.
- Mobile fueling of construction equipment throughout the site shall be minimized. Whenever practical, equipment shall be transported to the designated fueling area.
- Spill prevention, containment and countermeasures shall be included in the SWPPP if the volume of projectsite fuel in a single container exceeds 660 gallons, or if the total fuel storage volume at any one site exceeds 1,320 gallons.
- Designated fueling areas shall be protected from storm water runoff and shall be located at least 50 feet from downstream drainage facilities or watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and/or dikes to prevent runon, runoff and to contain spills.
- Absorbent spill clean-up materials and spell kits shall be available in fueling areas and on fueling trucks and shall be disposed of properly after use.
- Drip pans or absorbent pads shall be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to control drips. Fueling operations shall not be left unattended. Fuel tanks shall not be "topped off."

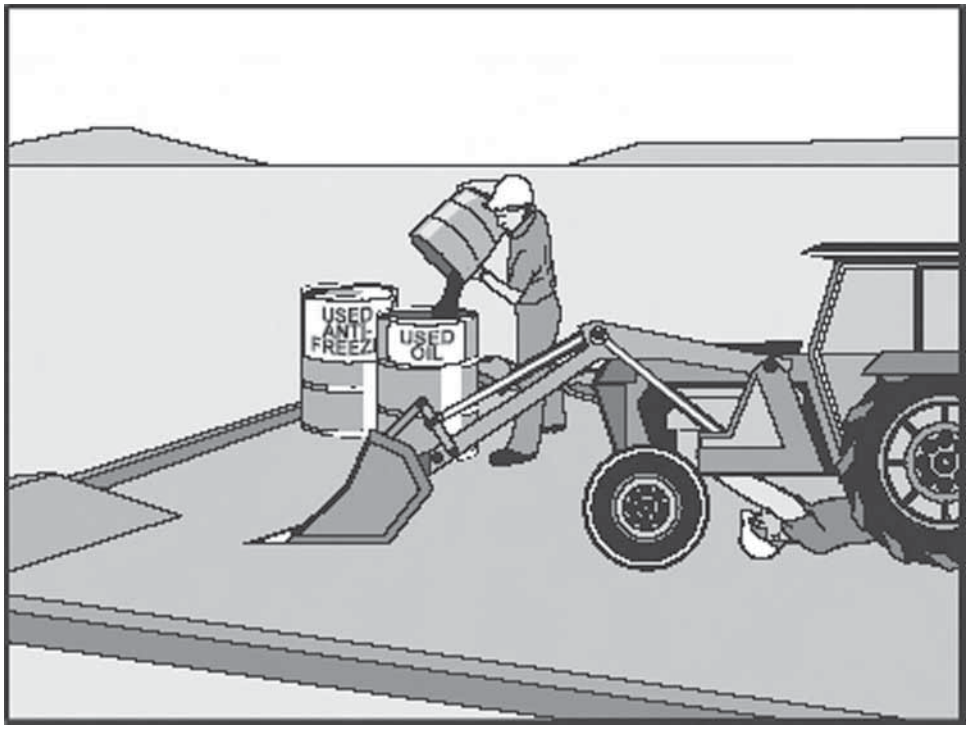
Inspections

- Vehicles and equipment shall be inspected daily for leaks. Leaks shall be repaired immediately or problem vehicles or equipment shall be removed from the project site.
- Fueling areas and storage tanks shall be inspected on a regular basis.

Maintenance

- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.
- Keep an ample supply of spill cleanup material on the site.

Vehicle and Equipment Maintenance



5.6.8 Vehicle and Equipment Maintenance

Definition

A program of equipment maintenance procedures and practices for the construction site.

Purpose

- To prevent the contamination of on-site soils and storm water.
- To insure the proper disposal of equipment fluids, and other vehicle maintenance debris.

Appropriate Applications

- On any construction site where heavy equipment and truck storage and maintenance yards are located on-site.

Limitations

- Comply with local codes and ordinances regarding the disposal of fluids and consumables, and the on-site maintenance of equipment.

Standards and Specifications

- Plan for the proper recycling or disposal of used oils, hydraulic fluids, gear lubricants, batteries, and tires.

- Use appropriate, leak-proof containers for fuels, oils and lubricants to provide for proper disposal.
- Use steam or high-pressure water instead of thinners and solvents to wash down equipment. Wash water and detergents can be disposed of in the sanitary sewer system after grit is removed, after checking with local authorities.
- Use drip pans or absorbent pads under equipment during maintenance that involves fluids.
- Equipment maintenance and wash-out areas should be located at least 50 feet away from drainages.
- Provide spill containment areas around stored oil and chemical drums.
- Provide a contained wash-out area to wash down heavy equipment (Refer to BMP "Designated Wash-out Area").

Inspections

- Inspect equipment for damaged hoses and leaky gaskets, and repair or replace as needed.
- Inspect equipment maintenance areas and wash-out areas regularly.
- Inspect fluid containers for leaks.

Maintenance

- Repair leaky fluid containers immediately.

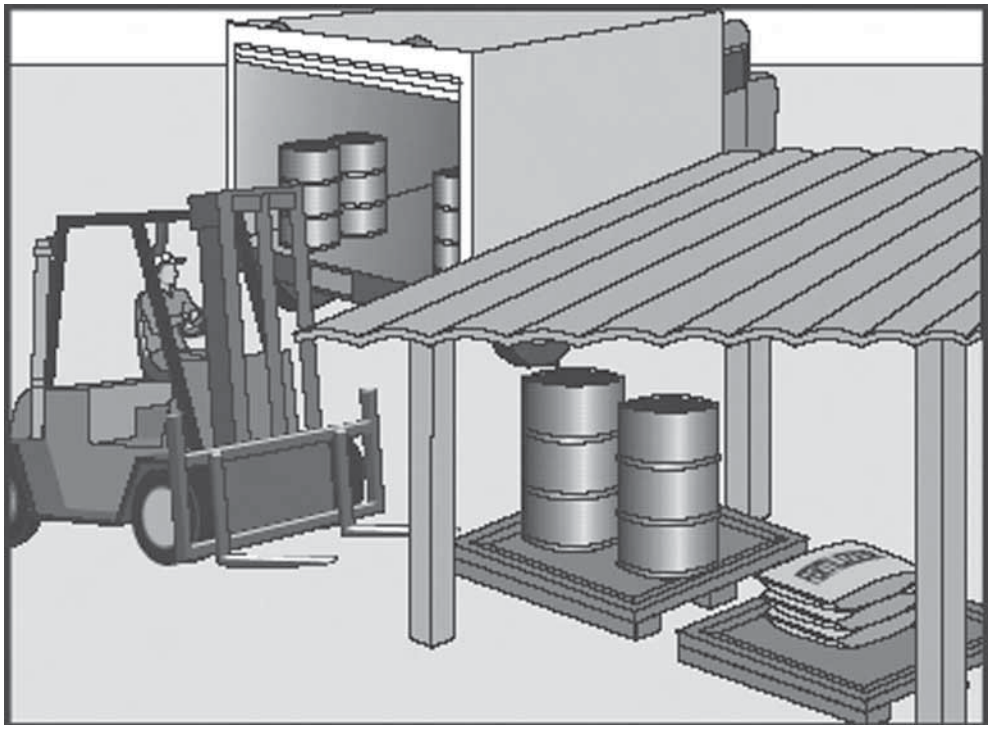
5.7 WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BEST MANAGEMENT PRACTICES

Waste management and materials pollution control BMPs, like non-storm water management BMPs, are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contract with storm water. These BMPs also involve day-to-day operations of the construction site and are under the control of the contractor, and are additional "good housekeeping practices", which involve keeping a clean, orderly construction site and include the following:

Materials pollution (also called materials handling) consists of implementing procedural and structural BMPs for handling, storing and using construction materials to prevent the release of those materials into storm water discharges. The objective is to reduce the opportunity for rainfall to come in contact with these materials. These controls shall be implemented for all applicable activities, material usage and site conditions. Materials handling practices include the following BMPs:

- Material Delivery, Storage;
- Material Use; and
- Stockpile Management.

Material Delivery and Storage



5.7.1 Material Delivery and Storage

Definition

Procedures and practices for the proper handling, delivery, and storage of construction materials at the construction site.

Purpose

- To minimize the risk of discharge from leaks and spills of construction site materials into storm drain system or watercourses.

Appropriate Applications

Following materials that are stored on construction site:

- Soil
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil and grease
- Asphalt and bitumens
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds

- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds must meet building and fire code requirements.

Standards and Specifications

General

- Train employees and subcontractors on the proper material delivery and storage practices.
- Temporary storage area shall be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) shall be supplied to the Engineer for all materials stored.

Material Storage Areas and Practices

Liquids and petroleum products shall be handled in conformance with the following provisions.

- Storage, preparation, and mixing shall be accomplished in temporary containment facilities. Each temporary containment facility shall provide a spill containment volume equal to 1.5 times the volume of all containers therein and shall be impervious to the materials contained therein for a minimum contact time of 72 hours.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- To provide protection from wind and rain, temporary containment facilities shall be covered during non-working days and prior to rain events.
- Temporary containment facilities shall be maintained free of accumulated rainwater and spills.
- Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.
- Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground.
- Stockpiles shall be protected in accordance with BMP “Stockpile Management.”

- Minimize the material inventory stored on site by maintaining only a few days supply.
- Store material indoors when available.
- Post proper storage instructions in conspicuous locations near storage areas.
- Do not store hazardous drums, boxes, or bagged materials directly on the ground. Place these items on pallets and, when possible, under cover in a secondary containment.
- Maintain ample supply of appropriate spill clean up material near storage areas.
- Use proper devices to transfer chemicals from one container to another.
- Follow manufacturer's instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.

Material Delivery Practices

- Employees trained in emergency spill clean-up procedures shall be present when dangerous materials or liquid chemicals are unloaded.
- Keep an accurate, up-to-date inventory of material delivered and stored on-site.
- Chemical and material storage areas shall be located away from low areas, drainages and stream banks, and outside the 100-year flood level.

Spill Clean-up

- Contain and clean up any spill immediately.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose any hazardous material or contaminated soil.

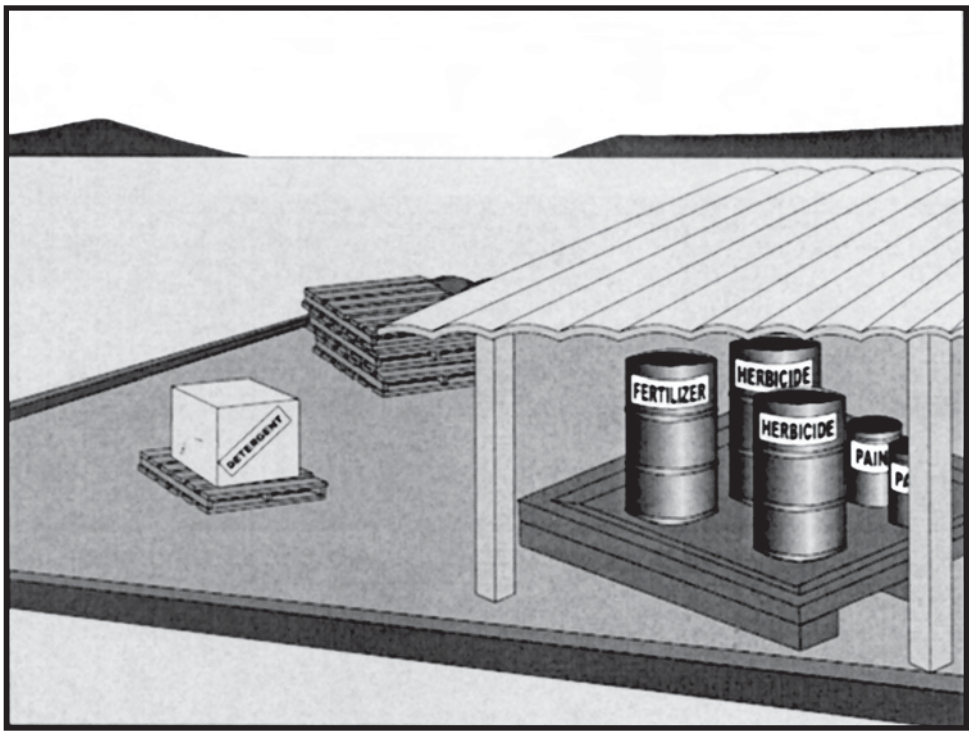
Inspections

- Containers and storage areas shall be inspected weekly for spills and damage.
- Inspect before and after rainfall events.

Maintenance

- Storage areas shall be maintained to prevent rainfall and runoff from coming in contact with chemicals or materials.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Clean areas where materials have been removed to insure that no dust or spillage remains to be washed into storm water.

Material Use



5.7.2 Material Use

Definition and Purpose

- These are procedures and practices for use of construction material in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or watercourse.

Appropriate Applications

This BMP applies to all construction projects. These procedures apply when the following materials are used or prepared on site:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Hazardous chemical such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Safer alternative building and construction products may not be available or suitable in every instance.

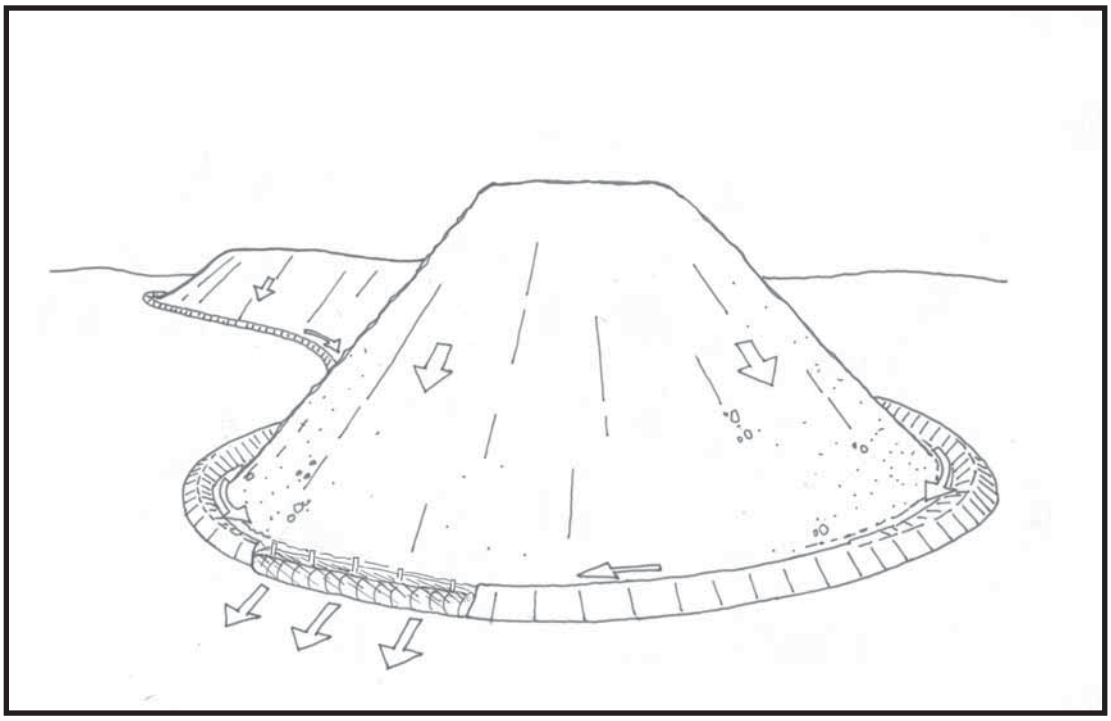
Standards and Specifications

- Material Safety Data Sheets (MSDS) shall be supplied to the Engineer for all materials.
- Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, may be disposed of with other construction debris.
- Do not remove the original product label, it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors, or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain or watercourse. Dispose of any paint thinners, residue and sludge(s), that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practical, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit or temporary sediment trap. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials on-site when practical.
- Do not over-apply fertilizers and pesticides. Prepare only the amount needed. Strictly follow the recommended usage instructions. Apply surface dressings in smaller applications, as opposed to large applications, to allow time for it to work in and to avoid excess materials being carried off-site by runoff.
- Application of herbicides and pesticides shall be performed by a licensed applicator.
- Contractors are required to complete the “Report of Chemical Spray Forms” when spraying herbicides and pesticides.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Comply with all pertinent Federal Regulations.

Maintenance and Inspections

- Spot check employees and subcontractors monthly throughout the job to ensure appropriate practices are being employed.

Stockpile Management



5.7.3 Stockpile Management

Definition

Procedures and practices to reduce or eliminate storm water contact with construction site stockpiles of soil and paving materials such as concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate subbase or premixed aggregate, and asphalt minder ("cold mix" asphalt).

Purpose

- To reduce or eliminate pollution of storm water from stockpiles

Appropriate Applications

- Implement on all projects that stockpile soil and paving materials

Standards and Specifications

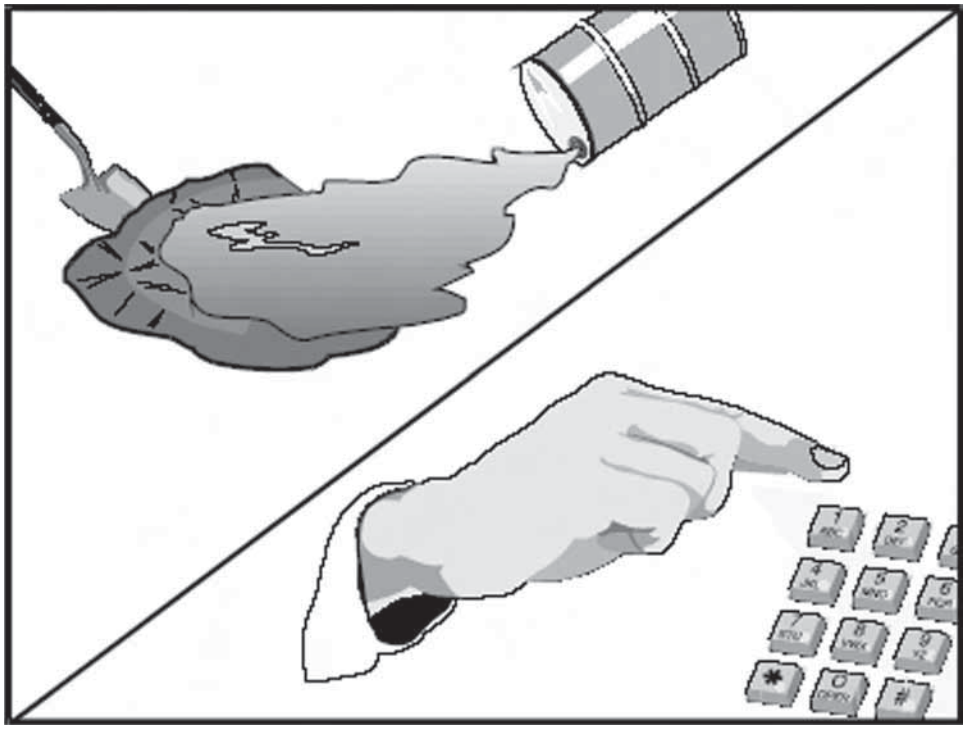
- Locate stockpiles away from concentrated flows of storm water, drainage courses, and inlets.
- Protect all stockpiles from storm water run-on using a temporary perimeter sediment barrier such as berms, dikes, silt fences, or sandbag barriers.
- Cover or protect with soil stabilization measures if rain is predicted.
- Implement wind erosion practices as appropriate.

- "Cold mix" stockpiles shall be placed on and covered with plastic or comparable material at all times.

Maintenance

- Repair and/or replace perimeter controls and covers as needed or as directed by the Engineer.

Spill Prevention and Control



5.7.4 Spill Prevention and Control

Definition and Purpose

Procedures and practices implemented to prevent and control spills in a manner that minimizes discharges of spilled materials to the drainage system or watercourse.

Appropriate Applications

- Required for all construction activities. Spill control procedures are implemented anytime chemicals and/or hazardous substances are stored.

Limitations

- This BMP description is very general. The contractor must identify appropriate practices for the specific materials used or stored on-site.

Standards and Specifications

- A spill prevention and control plan shall be developed for the project and implemented throughout construction. The plan should include:
  Procedures for storage and use that will prevent spills.
  Procedures for spill clean up including minor and significant/hazardous spills..
  Procedures for the containment of spills.

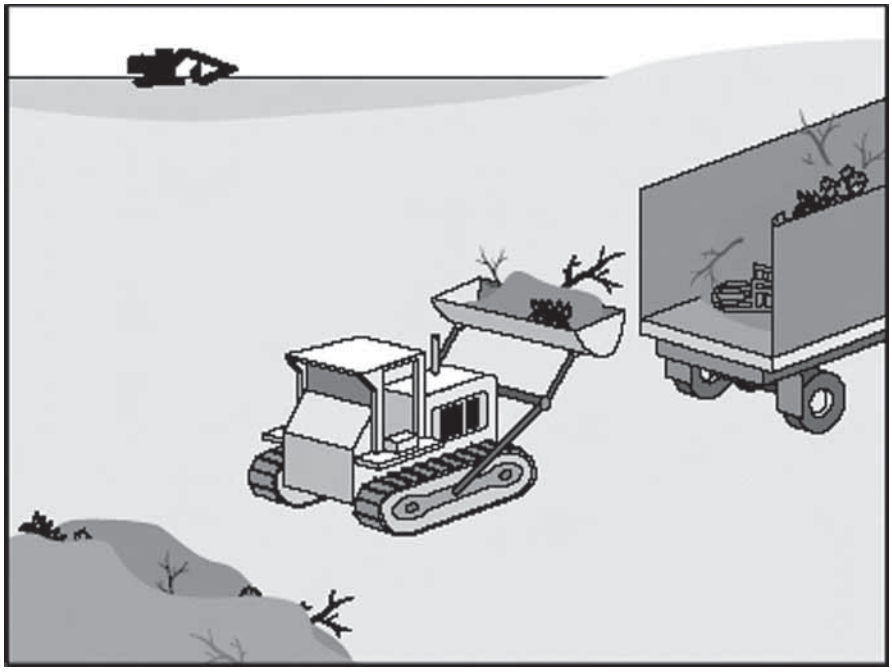
Procedures for the disposal of spilled materials and the material used for clean up.
Employee education programs.

- Water used for cleaning and decontamination shall not be allowed to enter storm drains nor watercourses and shall be collected and disposed of as described in BMP "Liquid Waste Management."
- The 24-hour direct access to ADEQ's Emergency Response Duty Office is (602) 771-2330 or toll free at (800) 234-5677.
- Information for the handling of potential pollutants on construction sites is available from ADEQ Waste Management Program.
- General Information: Patty Sharit (602) 771-4153

Maintenance and Inspection

- Verify weekly that spill control clean up materials are located near material storage, unloading and use areas.
- To prevent spills do regular preventive maintenance on tanks and fuel lines.
- Update spill prevention and control plan if changes occur in the types of chemicals on site.

Solid Waste Management



5.7.5 Solid Waste Management

Definition

The regular collection and disposal of accumulated solid wastes generated at a construction site.

Purpose

- To control a major cause of pollution on construction sites.
- To prevent the contamination of storm water from stockpiled waste materials.
- To prevent the clogging of storm drain systems.

Appropriate Applications

- Required for all construction projects that generate solid waste such as construction wastes (brick, pavement, timber), vegetative material and litter.

Standards and Specifications

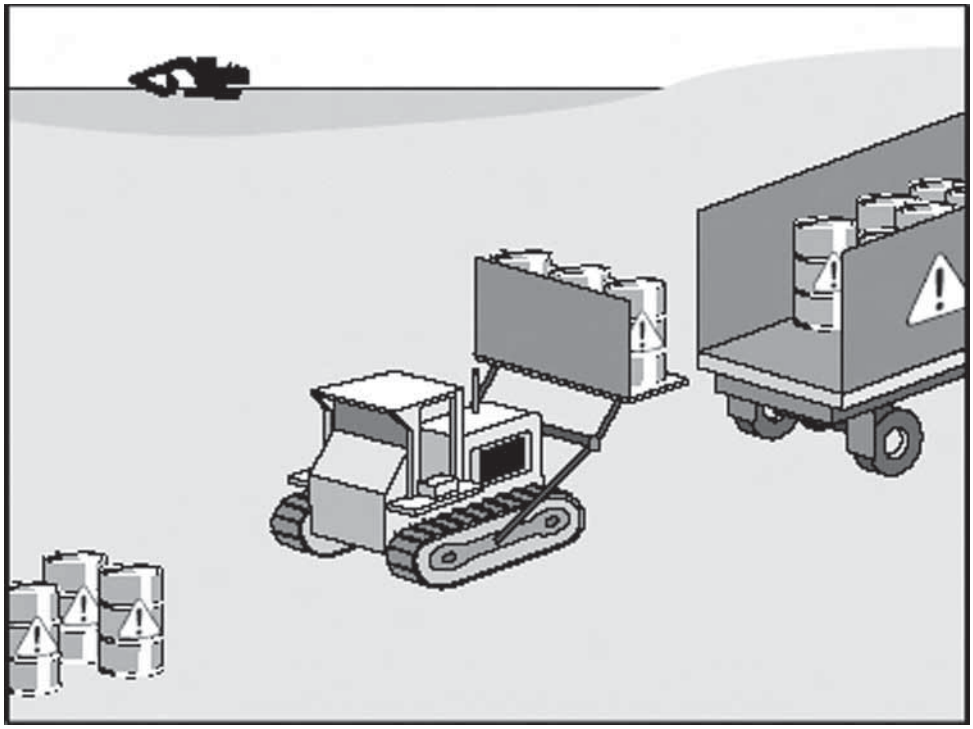
- The Contractor's Erosion Control Coordinator shall oversee and enforce proper solid waste procedures and practices.
- Material that is to be stockpiled or disposed of offsite shall be in accordance with Subsection 107.11.

- Solid waste storage areas shall be located at least 50 feet from drainages and shall not be located in areas prone to flooding or ponding.
- Divert storm water away from stored solid waste with temporary berms or dikes or by other means.
- Plan the frequency of disposal to remove solid waste before it accumulates beyond the capacity of the on-site facilities.
- Place on-site facilities in convenient locations.
- Prohibit littering by employees, subcontractors and visitors. Litter from work areas within the construction limits of the project shall be collected and placed in watertight dumpsters at least weekly regardless of whether the litter was generated by the contractor, the public or others.
- Watertight trash receptacles shall be provided in the contractor's yard, field trailer areas and other locations where workers congregate for lunch and break periods.
- Dumpster washout on the project site is not permitted.
- Notify trash-hauling contractors that only watertight dumpsters are permitted for use on project site.
- Disposal of construction debris and all domestic garbage must be coordinated with the local jurisdiction.
- Consider using inert waste material as fill.
- Consider separating green waste to be composted and used as mulch.

Inspections and Maintenance

- Check for and remove litter and debris from drainage grates and other drainage structures.
- Regular on-site trash collection.
- Regular maintenance of trash containers and dumpsters.
- Provide cover for dumpsters and waste containers to prevent entry of rainwater and loss of contents by high winds.

Hazardous Waste Management



5.7.6 Hazardous Waste Management

Definition

The planning and practice to meet the requirements for handling hazardous waste materials on a construction site.

Purpose

- To control the release of hazardous materials.
- To prevent the contamination of storm water.
- To prevent a delay in the project schedule due to environmental investigations/ enforcement actions.

Appropriate Applications

- Required for all construction activities that use hazardous materials and generate hazardous waste. Hazardous wastes area generated from the use of:
  - Petroleum products
  - Concrete curing compounds
  - Septic wastes
  - Paints and stains
  - Wood preservatives

Asphalt products
Pesticides
Acids
Solvents
Roofing tar
Any materials deemed hazardous waste in Arizona.

- In the event of a spill of a hazardous material, the contractor shall follow the provisions of Subsection 107.07. In addition, the Erosion Control Coordinator shall modify the SWPPP as necessary within 14 calendar days to include a description of the release, the circumstances leading to the release, and the date of the release.
- The contractor shall assist in any efforts to clean up hazardous material spills, as directed by the Engineer or other authorities. Soil contaminated from spills shall be disposed of according to applicable state and federal regulations.

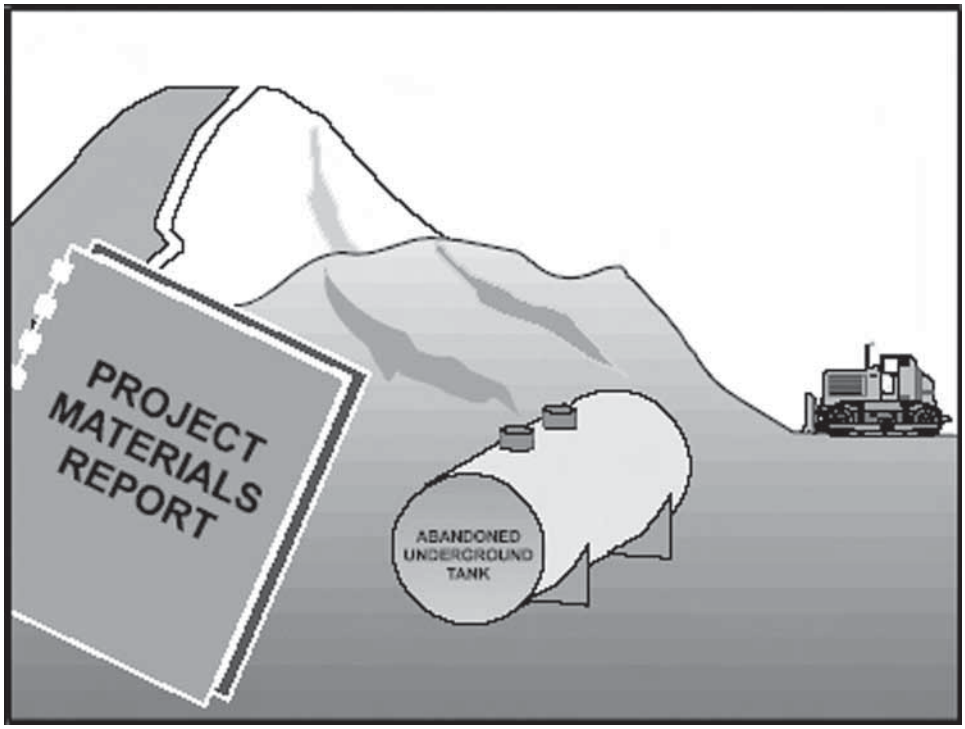
Standards and Specifications

- Contractor must comply with all federal, state and local laws regarding hazardous materials on a construction site.
- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Identify hazardous materials that will be needed on the construction site and plan for storage, use and disposal.
- Designate hazardous waste storage areas on site away from storm drains or watercourses and away from moving vehicles and equipment.
- Segregate hazardous waste from non-hazardous construction site debris.
- Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drum or similar) and under cover.
- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Dispose of waste within 90 days of being generated or as directed by the Engineer.
- Information about the requirements for the handling of hazardous waste on construction sites is available from the Arizona Department of Environmental Quality Waste Management Program.
  - General Information: Patty Sharit (602) 771-4153
- The 24-hour ADEQ Emergency Response Duty Office number is (602) 771-2330 or toll free (800) 234-5677.
- The National Response Center (800-424-8802) shall be notified of spills of Federal reportable quantities.

Inspections and Maintenance

- The contractor's Erosion Control Coordinator shall monitor on-site hazardous waste storage and disposal procedures.
- Maintain a clean and orderly work environment.
- Maintain careful records of the storage, handling and disposal of hazardous materials.
- Perimeter controls, containment structures, covers and liners shall be inspected on a weekly basis and immediately repaired or replaced as needed.

Contaminated Soil Management



5.7.7 Contaminated Soil Management

Definition and Purpose

These are procedures and practices to minimize or eliminate the discharges of pollutants to the drainage system or to watercourses from contaminated soil.

Appropriate Applications

- Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, and leaks from underground storage tanks.
- It may also apply to highway widening projects in older areas where median and shoulder soils may have been contaminated by aerially deposited lead (ADL).

Limitations

- The procedures and practices presented in this BMP are general. The contractor shall identify appropriate practices and procedures for the specific contaminants known to exist or discovered on site.

Standards and Specifications

Identifying Contaminated Areas

- Contaminated soils are often identified during project planning and development with known locations identified in the plans and specifications. The contractor shall review applicable reports and investigate appropriate call-outs in the plans and specifications.
- The contractor may further identify contaminated soils by investigating:
  - Past site uses and activities;
  - Detected or undetected spills and leaks; and
  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris. Test suspected soils at a certified laboratory.

Education

- Prior to performing any excavation work at the locations containing material classified as hazardous, employees and subcontractors shall complete a safety training program covering the potential hazards as identified.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material and Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations shall result in no visible dust.
- Use caution to prevent spillage of lead containing material during transport.
- Monitor the air quality during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Test suspected soils at an approved certified laboratory.
- If the soil is contaminated, work with the local regulatory agencies to develop options for treatment and/or disposal.

- Avoid temporary stockpiling of contaminated soils or hazardous material.
- If temporary stockpiling is necessary:
  - Cover the stockpile with plastic sheeting or tarps;
  - Install a berm around the stockpile to prevent runoff from leaving the area; and
  - Do not stockpile in or near storm drains or watercourses.
- Contaminated material and hazardous material on exteriors of transport vehicles shall be removed and placed either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat and/or dispose of it at appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavation, transport, and disposal of contaminated material and hazardous material shall be in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
  - U.S. Department of Transportation (USDOT);
  - U.S. Environmental Protection Agency (USEPA);
  - Arizona Department of Environmental Quality (ADEQ);
  - Arizona Division of Occupation Safety and Health Administration; and
  - Local regulatory agencies.

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies which have jurisdiction over such work.
- Arrange to have tested, as directed by the Engineer, any liquid or sludge found in the underground tank prior to its removal to determine if it contains hazardous substances.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).

- The underground storage tank, any liquid and/or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal shall be transported to disposal facilities permitted to accept such waste.

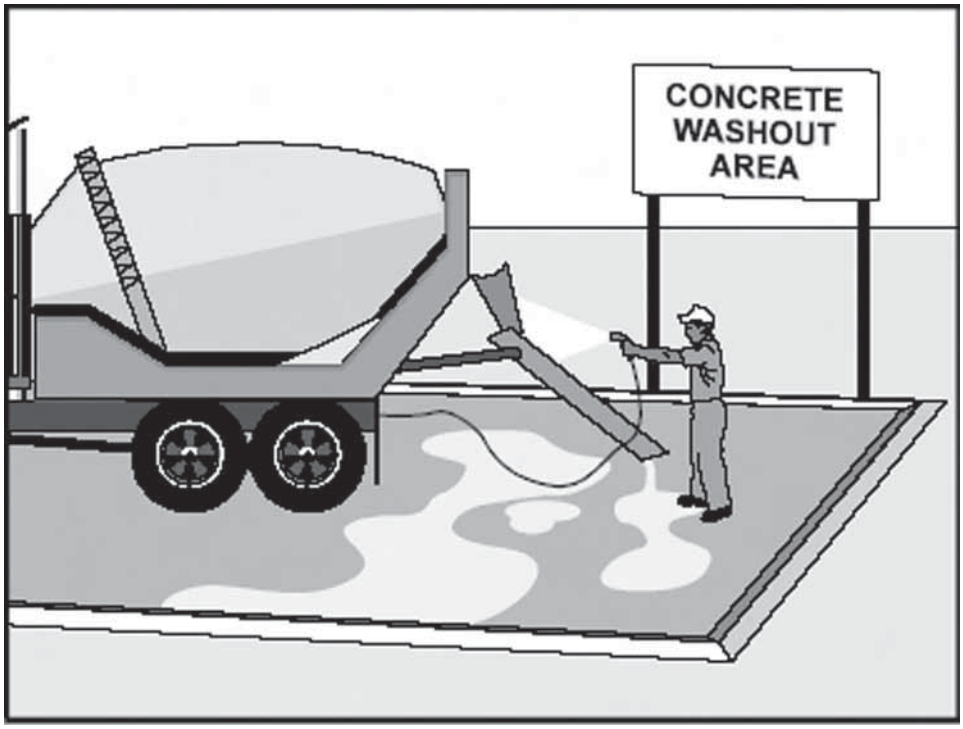
Water Control

- Take all necessary precautions and preventive measures to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to: berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, shall be discharged to clean, closed top, watertight holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Inspections and Maintenance

- The Contractor's Erosion Control Coordinator and/or construction supervisor shall monitor on-site contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.
- Inspect hazardous waste receptacles and areas regularly.

Concrete Waste Management



5.7.8 Concrete Waste Management

Definition and Purpose

A temporary pit or bermed area for washout of concrete trucks, tools, mortar mixers, etc., to prevent fresh concrete or cement-laden mortar to enter a storm drainage system and/or receiving water.

Appropriate Applications

- Where concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Where slurries containing Portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from saw-cutting, coring, grinding, milling, grooving, and hydro-concrete demolition.
- Where concrete trucks and other concrete-coated equipment are washed on site, when approved the Engineer.

Limitations

- None identified.

Standards and Specifications

- Educate employees, subcontractors and suppliers on the concrete waste management techniques described herein.

Concrete Slurry Wastes:

- PCC and AC wastes shall not be permitted to enter storm drains or watercourses. Place temporary berms, sandbags or other BMPs around construction activity to capture and contain slurry runoff.
- PCC and AC wastes shall be collected and properly disposed of outside the highway right-of-way.
- Below-grade facilities are typical.
- Vacuum slurry residues and dispose in a temporary pit and allow to dry. Dispose of dry slurry residue properly.

On-site Temporary Concrete Washout Facility, Transit Truck Washout Procedures:

- Temporary concrete washout facilities shall be located a minimum of 50 feet from storm drain inlets, open drainage facilities and watercourses, unless determined unfeasible by Engineer. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.
- Temporary concrete washout facilities shall have a temporary pit (below grade) or bermed area (above grade) of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures. If located above grade, the washout area shall be lined with an impermeable material.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed and disposed of per BMP “Solid Waste Management.”

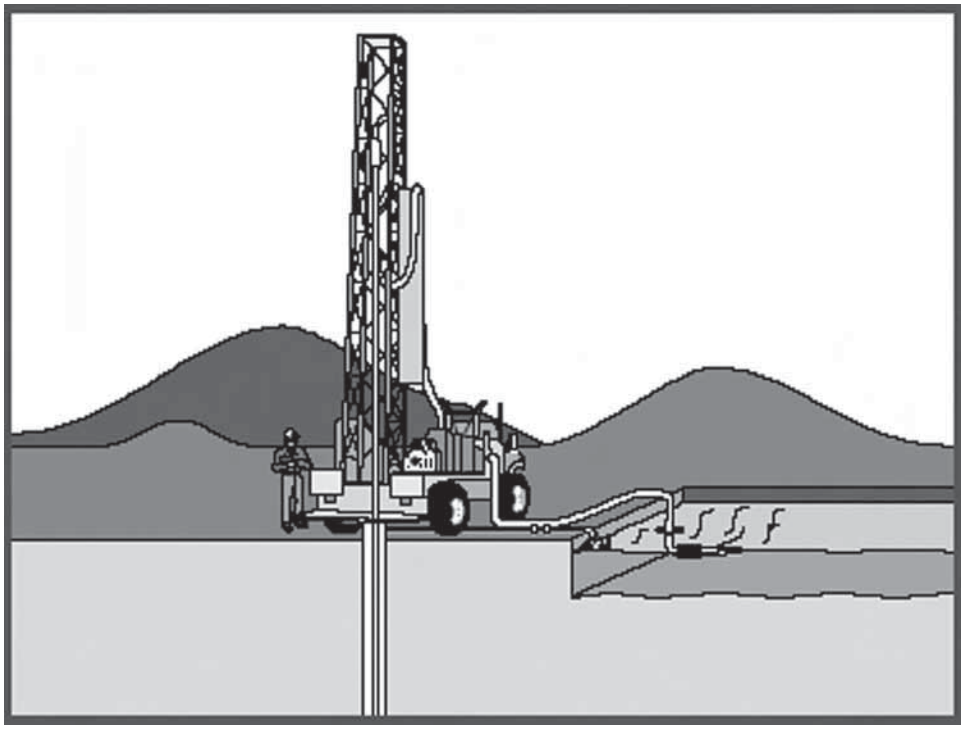
On-site Temporary Concrete Washout Facility, Transit Truck Washout Procedures:

- When temporary concrete washout facilities are no longer required for the work, as determined by the Engineer, the hardened concrete shall be removed and properly disposed of. Materials used to construct temporary concrete washout facilities shall be come the property of the contactor, shall be removed the site of the work and shall be disposed of outside the highway right-of-way.
- Hole, depressions or other ground disturbance caused by the removal of the facilities shall be backfilled and repaired.

Inspections and Maintenance

- The contractor's Erosion Control Coordinator shall monitor on-site concrete waste storage and disposal procedures at least weekly.
- Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 4 inches for above grade facilities and 12 inches for below grade facilities. Maintenance shall include removing and disposing of hardened concrete and returning the facilities to a functional condition.

Liquid Waste Management



5.7.9 Liquid Waste Management

Definition and Purpose

Procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Appropriate Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous byproducts, residuals, or wastes, such as:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-storm water liquid discharges not permitted by separate permits.

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations, or to requirements of other permits secured for the construction project.
- Does not apply to dewatering operations (see BMP "Dewatering Operations"), solid waste management (see BMP "Solid Waste Management"), hazardous wastes (see BMP "Hazardous Waste Management"), or concrete slurry residue (see BMP "Concrete Waste Management").

- Does not apply to non-storm water discharges permitted by any ADEQ permit held by the pertinent ADOT District, unless the discharge is determined by ADOT to be a source of pollutants. Typical permitted non-storm water discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and, discharges or flows from emergency fire fighting activities.

Standards and Specifications

General Practices

- The Contractor's Erosion Control Coordinator shall oversee and enforce proper liquid waste management procedures and practices.
- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities, and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-storm water discharges are permitted by the ADOT Statewide AZPDES permit; different regions might have different requirements not outlined in this permit. Some listed discharges may be prohibited if ADOT determines the discharge to be a source of pollutants.
- Apply the "Vehicle and Equipment Cleaning" BMP for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids shall not be allowed to enter storm drains and watercourses and shall be properly disposed of outside the highway right-of-way.
- If an appropriate location is available, as determined by the Engineer, drilling residue and drilling fluids may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in BMP "Concrete Waste Management".

- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, shall be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Contain liquid wastes in a controlled area, such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.
- Take precautions to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in BMP "Spill Prevention and Control".
- Do not locate containment areas or devices where accidental release of the contained liquid can threaten health or safety, or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes running off a surface which has the potential to affect the storm drainage system such as wash water and rinse water from cleaning walls or pavement.
- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.
- If the liquid waste is sediment laden, use a sediment trap (see BMP "Sediment Trap") for capturing and treating the liquid waste stream, or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- Typical method is to dewater the contained liquid waste using procedures such as described in BMP "Dewatering Operations" and BMP "Desilting Basin" and dispose of resulting solids per BMP "Solid Waste Management" or per Standard Specifications for off-site disposal.
- Method of disposal for some liquid wastes may be prescribed in Water Quality Reports, AZPDES permits, Environmental Impact Reports, 401 or 404 permits, local agency discharge permits, etc., and may be defined elsewhere in the Special Provisions.
- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined. For disposal of hazardous waste, see BMP "Hazardous Waste Management".
- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Inspection and Maintenance

- Spot check employees and subcontractors at least monthly throughout the job to ensure appropriate practices are being employed.
- Remove deposited solids in containment areas and capturing devices as needed, and at the completion of the task. Dispose of any solids as described in BMP "Solid Waste Management".
- Inspect containment areas and capturing devices frequently for damage, and repair as needed.

APPENDIX A

PERMITTING FORMS AND CHECKLISTS

A.1 SWPPP Checklist

A.2 Notice of Intent (NOI) Form

A.3 SWPPP Index Sheet (non-tribal lands)

A.4 SWPPP Index Sheet (tribal lands)

A.5 ADOT AZPDES Inspection Checklist

A.6 Methods for Determining Final Stabilization

A.7 Notice of Termination (NOT) Form

CONSTRUCTION SWPPP CHECKLIST

This optional form is intended to assist the applicant in the preparation of the Stormwater Pollution Prevention Plan (SWPPP). The "Permit Citation" column indicates where the particular requirement can be found in the AZPDES Construction General Permit (CGP). Use the "Location" column to note where the requirement can be found in the SWPPP. In the "OK?" column, indicate whether you think the SWPPP adequately addresses the corresponding requirements. Once this form has been completed, your SWPPP should meet ADEQ's CGP requirements. Although this checklist is intended to reflect ADEQ's requirements for an acceptable SWPPP, all responsibility for a complete SWPPP remains with the permittee. A full description of the required contents of the SWPPP, as well as additional permit requirements, may be found in the CGP at http://www.adeq.state.az.us/environ/water/permits/download/constgp.pdf.

The shaded areas are subject headers and are not intended to be filled out. SW = stormwater.

Your SWPPP does not have to follow the format of the checklist. Rather the purpose of this checklist is to ensure that your SWPPP contains all required components.

Sometimes a single section of your SWPPP may address more than one permit requirement. In this event, you may reference the applicable section within your SWPPP instead of repeating the same language in several locations. If your SWPPP does reference other sections, when completing this checklist you may want to provide more than one SWPPP location reference in last column of the checklist. (For example: The Inspections procedures are in Section E.2. of the SWPPP which also references Section B.1. In the "location" column write: Sections E.2. (p. 15) and B.1. (p. 10).)

Permit Citation	**Description**	**OK ?**	**Location in SWPPP & Notes**
Part IV.C.1.	Identify all operators for the project and the areas over which each operator has control		
	PROJECT DESCRIPTION		
Part IV.C.2.	Describe the nature of the construction activity:		
Part IV.C.2.a.	Describe the project and its intended use after NOT is filed		
Part IV.C.2.b.	Describe the intended sequence of disturbance activities		
Part IV.C.2.c.	Indicate the total area of site and estimate of total area expected to be disturbed (include off-site borrow and fill areas)		
Part IV.C.2.d.	Estimate the pre-construction and post-construction runoff coefficient and provide soil data and any existent data on the quality of the discharge		
Part IV.C.2.e.	Include a general location map (e.g. U.S.G.S. quadrangle, portion of a city or county map) showing 1 mile radius around site		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
	SITE MAP		
Part IV.C.3.	Include a legible site map, complete-to-scale, of the entire site. Try to include the following on a single map, but use multiple maps, to the same scale, if needed		
Part IV.C.3.a.	Identify on the map drainage patterns and estimated slopes after grading		
Part IV.C.3.b.	Identify on the map areas of soil disturbance		
	Identify on the map areas not to be disturbed		
Part IV.C.3.c.	Identify on the map locations of structural and nonstructural controls identified in the SWPPP		
Part IV.C.3.d.	Identify on the map locations where stabilization practices are expected to occur		
Part IV.C.3.e.	Identify on the map locations of off-site material, waste, borrow areas, or equipment storage		
Part IV.C.3.f.	Identify on the map locations of all surface water bodies (including wetlands)		
Part IV.C.3.g.	Identify on the map locations where sw is discharged to a surface water (e.g. ephemeral waters or dry washes) and to MS4s		
Part IV.C.3.h.	Identify on the map locations and registration numbers of on-site drywells		
Part IV.C.3.i.	Identify on the map areas where final stabilization has been accomplished and no further construction phase permit requirements apply		
Part IV.C.4.	Identify on the map or in a narrative, the nearest receiving water(s), including ephemeral and intermittent streams, dry sloughs, arroyos. If applicable, identify the areal extent and describe any wetlands near the site that could be disturbed or potentially receive run-off from disturbed areas		
Part IV.C.5.	Identify on the map the location and describe sw or non-sw discharges at the site associated with non-construction activity and other pollutant sources such as fueling operations, asphalt plants, concrete plants		
Part IV.C.6.	Identify on the map and address offsite material storage areas or borrow areas used solely for the project		
	EROSION AND SEDIMENT CONTROLS		
Part IV.D.1.	Describe all pollution control measures (BMPs)		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
Part IV.D.1.	For each major activity, describe the BMP, the general sequence for implementing BMPs, and which operator is responsible for each BMP. Include BMPs used at offsite material storage areas if the storage areas are used solely by the permittee for this project		
Part IV.D.2.a.	Describe the erosion and sediment controls designed to retain sediment on site to the extent practicable		
Part IV.D.2.b.	Describe the selection, installation and maintenance of BMPs per manufacturers' specifications and good engineering practices, including procedures for modifying or replacing BMPs if one is found to be ineffective or installed incorrectly		
Part IV.D.2.c.	Describe the practice and schedule to routinely remove offsite accumulation of sediment routinely		
Part IV.D.3.	Describe good housekeeping procedures to be used (prevent litter, debris and chemicals from being exposed to sw)		
	Stabilization Efforts		
Part IV.D.4.a.	Describe and identify interim and permanent stabilization practices for the site. Document where existing vegetation will be preserved		
Part IV.D.4.b.	Describe when the operator will initiate stabilization procedures in the timeframe provided in the permit, and what stabilization efforts will occur		
Part IV.D.4.c.	Describe record keeping efforts, include forms/checklists used for keeping the required data		
Part IV.D.4.c.i.	Maintain records of the dates when major grading activities occurred		
Part IV.D.4.c.ii.	Maintain records of when construction activities cease (temporarily or permanently)		
Part IV.D.4.c.iii.	Maintain records of when stabilization is initiated and completed and any reason for delays		
Part IV.D.5.	Describe structural practices used to divert flows from exposed soils, store flows and limit runoff and the discharge of pollutants from exposed areas to degree attainable. (Combination of sediment and erosion controls must be used)		
	If any structural controls are used in the floodplain, the SWPPP should document why effective controls could not alternatively be placed outside of the floodplain		
Part IV.D.5.a.i	Describe the location, size and retention capacity of the drainage basin(s) and the areas that drain into them		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
	For a drainage area of • 10 disturbed acres, describe how and where a basin with storage for a 2yr, 24hr storm per disturbed acre drained will be used OR		
	Describe how and where a basin with 3600 ft^3 of storage per disturbed acre drained will be used OR		
	If a sediment basin is not attainable, then provide explanation within SWPPP		
	If basins are not used due to public safety concerns, describe the concerns and the alternative sediment controls to be used		
Part IV.D.5.a.ii.	For a drainage area of • 10 disturbed acres that can't meet size specified in Part IV.D.5.a.i, describe the smaller sediment basins and/or sediment traps to be used		
	For a drainage area of • 10 disturbed acres where sediment basin isn't attainable, describe how and where silt fences, vegetative buffer strips, or alternatives will be used on all side slope boundaries		
Part IV.D.5.a.iii.	For a drainage area of < 10 disturbed acres, describe how and where smaller sediment basins or sediment traps are used along with silt fences, vegetative buffer strips, or alternatives on all side slope boundaries OR		
	Describe how and where a sediment basin with storage for a 2yr, 24hr storm per disturbed acre drained will be used OR		
	Describe how and where a sediment basin with 3600 ft^3 of storage per disturbed acre drained will be used		
Part IV.D.5.b	Describe where and what type of velocity dissipation devices will be used at discharge locations and along outfall channel		
Part IV.D.6.	Describe post-construction sw management measures, if applicable		
	Describe where and what structural measures were placed in upland soils to the degree attainable		
	Confirm in the narrative whether structural measures comply with local or state sw management requirements		
Part IV.D.7.	Identify all allowable sources of non-sw discharges except for flows from fire-fighting activities		
	Describe how all non-sw discharges will be eliminated or reduced to the extent feasible		
	Describe how BMPs will be implemented for non-sw discharges		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
	If superchlorinated wastewaters will be generated, describe how they will be dechlorinated or held on site until chlorine levels have dissipated, unless used for firefighting		
Part IV.D.8.a.	Describe measures to be used to prevent discharge of solid materials to waters of U.S.		
Part IV.D.8.b.	Describe measures to be used to minimize off-site vehicle tracking of sediments and the generation of on-site dust		
Part IV.D.8.c.	Describe the location and type of all construction and waste materials stored on site (Update SWPPP as necessary)		
Part IV.D.8.c.	Describe controls to be used to reduce pollutants from construction and waste materials stored on-site (including storage practices, and spill prevention and response practices)		
Part IV.D.8.d.	Describe pollutant sources from areas other than construction (including sw discharges from dedicated asphalt plants and concrete plants)		
	Describe controls and measures to be used to minimize the discharge of pollutants from those sources		
Part IV.D.8.e.	Describe measures to be used to sufficiently stabilize soil at culvert locations		
	MAINTENANCE OF CONTROLS		
Part IV.E.1.	Describe procedure and activities to be used to maintain all erosion and sediment controls and other protective measures in effective operating condition		
	Describe procedures and activities to be used to maintain BMPs as soon as possible, if site inspections identify BMPs are not operating effectively		
Part IV.E.2.	Describe procedures and activities to be used to modify or add BMPs before next storm event, if necessary or as soon as practicable		
Part IV.E.3.	Describe procedures and activities to be used to remove sediment from traps or ponds when design capacity is reduced by 50%		
	AZPDES PERMIT AND OTHER SOIL AND EROSION CONTROL REQUIREMENTS		
Part IV.F.	Include copy of AZPDES permit (AZG2003-001), NOI and ADEQ authorization as part of the SWPPP		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
	Include other agreements with any state, local or federal agencies that affect the provisions or implementation of the SWPPP		
Part IV.G.	Describe whether SWPPP is consistent with federal, state, or local soil and erosion control or sw management requirements		
	INSPECTIONS		
Part IV.H.1.	Describe routine inspection schedule and procedures to ensure BMPs are functional and SWPPP is being implemented		
	Indicate if the inspection frequency is to be at least once every 7 calendar days OR		
	Indicate if the inspection frequency is to be at least once every 14 days and also within 24 hours of the end of each storm event of • 0.5 inches		
Part IV.H.2.	If the site is eligible for reduced inspection frequency indicate why it is eligible and how it will be inspected once each month AND anytime rain is predicted AND within 24 hours of the end of a storm event of • 0.5 inches		
Part IV.H.3.	Indicate who the qualified personnel will be to perform inspections and describe the persons' qualifications		
Part IV.H.4.	Describe all areas to be inspected including all disturbed areas of site, and areas used to store materials exposed to precipitation		
	Describe inspection procedures how inspectors will look for evidence of, or potential for, pollutants entering drainage system		
	Describe in inspection procedures how inspectors will observe sedimentation and erosion control measures		
	Describe inspection procedures and how inspectors will look at accessible discharge points, and ascertain whether erosion control measures are effective		
	Describe in inspection procedures how inspectors will look at nearby stream downstream locations when discharge points are inaccessible		
	Describe in inspection procedures how inspectors will look for sediment tracking at entrances and exits		
	Describe how inspectors will document all findings and what the inspection form will look like		

Permit Citation	Description	OK ?	Location in SWPPP & Notes
Part IV.H.5.	Describe how inspectors will complete an inspection report for each inspection that includes inspection date; name, title and qualifications of each qualified person making the inspection; weather information for period since last inspection; location of discharges of sediment or other pollutants; list of BMPs that need to be maintained, failed to operate or prove inadequate; list of additional needed BMPs; corrective actions required; sources of all non-sw and control measures; and materials storage areas with evidence of pollutant discharge		
Part IV.H.6.	Describe how and where the inspection records will be maintained for at least three years; how the report will document noncompliance or certify full compliance; and indicate who will be authorized to sign the report		
Part IV.H.7.	Describe how the SWPPP will be modified when needed, within 7 calendar days of inspection. BMPs must be modified or added before next storm event or as soon as practicable		
	MODIFICATIONS TO SWPPP		
Part IV.I.1.	Describe how the SWPPP will be modified within 15 business days after change in design, construction, operation or maintenance at site that has a significant effect on discharge or not previously addressed in SWPPP		
Part IV.I.2.	Describe how the SWPPP will be modified within 15 business days if it is determined that discharge is causing or contributing to WQ exceedances OR SWPPP is ineffective		
	SIGNATURES AND NOTICE OF SWPPP		
Part IV.J.1.	The Operator must sign the SWPPP		
	Describe how and where a copy of the SWPPP will be retained on site. A copy is to be submitted to ADEQ with the NOI if the site is within 1/4 mile of a Unique or impaired waters.		
Part IV.J.2.	Describe how and where the operator will post a sign at main entrance to site containing: AZPDES authorization number (or copy of NOI authorization), construction site contact name and telephone number, brief project description, location of SWPPP if the site is inactive or does not have an on-site storage location		

NOTICE OF INTENT (NOI)

For Coverage Under AZPDES Permit No. AZG2003-001 for
Construction Activity Discharges to Waters of the United States

FOR COVERAGE, A COMPLETE AND ACCURATE NOI MUST BE SUBMITTED TO:

Stormwater Program- Water Permits Section/ NOI
Arizona Department of Environmental Quality
1110 West Washington, 5415B-3, Phoenix Arizona 85007

Is this NOI a revision to one previously filed under the 2003 AZPDES Construction General Permit?

____ YES ____ NO If yes, provide your current authorization No. _____

Is the Site Located on Indian Country Lands?

____ YES ____ NO

I. OWNER/OPERATOR (Applicant) **INFORMATION**

Operator Name:_____ Phone: _____

Operator's Business Name _____

Operator's Address: _____

City: _____ State: |___|___| Zip Code: _____

OPERATOR STATUS: Federal ____ State ____ Other Public ____ Private ____ Tribal ____

II. CONSTRUCTION SITE INFORMATION

Project/Site Name:_____ Phone: _____

Type of Project (subdivision, school, commercial, etc.) _____

If a subdivision, has state or local subdivision approval been obtained? ____ YES ____ NO

If yes, provide the subdivision approval number: _____

Is the project part of a greater plan of development? ____ YES ____ NO

Does the project have/need other environmental permits or approvals? If so, list and provide the permit/approval number (attached sheet, if necessary):

_____

_____

Site physical location (include address, if applicable and directions from nearest municipality):

_____

_____

City: _____ County: _____ Zip Code: _____

Provide the latitude/longitude of the construction site at the point nearest the receiving water:

Latitude: |___|___| |___|___| |___|___| (Degrees, minutes, seconds)

Longitude: |___|___|___| |___|___| |___|___| (Degrees, minutes, seconds)

NOI for Coverage under AZPDES Permit No. AZG2003-001

Estimated Project Start Date _____ Estimated Completion Date _____

Estimate of total acres (to the nearest 1/2 acre) to be disturbed with the entire construction project _____

Estimate of total acres (to the nearest 1/2 acre) to be disturbed by your operations _____

List all non-stormwater discharges expected to be associated with construction-related activities:

_____

_____

_____

III. DISCHARGE LOCATION

Identify the closest receiving waters to construction site: (including dry washes, named waterbodies, and unnamed tributaries): _____

Is there a potential for any discharges from the site to enter a municipal storm sewer system (MS4), canal, or a privately-owned conveyance? ____ YES ____ NO

If yes, enter name of MS4 or conveyance owner: _____

If this is a linear construction project (i.e., utility lines, pipelines, etc.) is any portion of the planned project within 1/4 mile of any impaired or unique water?

____ YES ____ NO ____ N/A (not linear construction)

IV. Permit authorization can not occur until a Stormwater Pollution Prevention Plan (SWPPP) has been developed and implemented according to the terms of the Construction General Permit, AZG2003-001:

____ I confirm that a SWPPP meeting the requirements of this general permit has been developed and will be implemented prior to commencing construction activities at this site.

The SWPPP may be viewed at the following location: _____

To view the SWPPP, contact: (name and phone of contact person) _____

____ This project may discharge within 1/4 mile of an impaired or unique waterbody, so a copy of my SWPPP is enclosed with this NOI as required. The SWPPP will be implemented prior to commencing construction activities at this site.

V. CERTIFICATION BY AUTHORIZED SIGNATORY (PER PART VII.K.1 OF THE PERMIT)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons direction responsible for gathering the information, I believe the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition I certify that the operator will comply with all terms and conditions stipulated in General Permit No. AZG2003-001 issued by the Director."

Printed Name: _____ Title: _____

Signature: _____ Date: _____

Business Name: _____

Address: _____

Phone: _____

Revised – June 2003

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

PART 1 - To be completed by the Landscape Architect or Design Engineer

I. PROJECT DESCRIPTION

A. Owner Name and Address:

Arizona Department of Transportation
205 South 17th Avenue
Phoenix, Arizona 85007-3213

B. Project TRACS Number: _____

C. Project Location: _____

City: _____ County: _____

Beginning Latitude (NAD 83): ___° ___' ____"
Beginning Longitude (NAD 83): ___° ___' ____"

Ending Latitude (NAD 83): ___° ___' ____"
Ending Longitude (NAD 83): ___° ___' ____"

D. Project Description: _____

II. HYDROLOGIC INFORMATION

A. Project Size:

Length (Mi.) _____

Area (Ac.) _____

B. Area to be Graded (Ac.): _____

C. Runoff Coefficient:

Existing _____

Developed _____

D. Receiving Water(s): _____

III. PRESERVATION OF EXISTING VEGETATION

A. In accordance with the specifications, existing vegetation will be preserved. Clearing limits shall be confined to areas that require grading. Existing vegetation outside the boundaries of the cleared area shall be protected from damage by construction activities. Existing trees within the area to be cleared shall be preserved and protected, wherever possible.

IV. SOIL STABILIZATION MEASURES

A. All disturbed soil, which will not be paved, riprapped or otherwise covered to prevent erosion, will be revegetated and/or landscaped in accordance with the project plans and specifications.

B. Scheduling of the revegatation effort can be found on PART 2 of this sheet under SCHEDULE OF MAJOR ACTIVITIES.

V. MEASURES TO CONTROL EROSION AND SEDIMENT

A. Temporary Erosion and Sediment Controls: (Refer to the Following SWPPP Site Plan and Specifications)

_____ Erosion Control Mattings
_____ Temporary Diversion Dikes
_____ Check Dams
_____ Rock Inlet/Outlet Protection
_____ Sediment Control Berms
_____ Silt Fences
_____ Wattles (Excelsior/Straw)
_____ Excelsior Logs / Sediment Logs
_____ Seeding (Class II with mulch)
_____ Others Describe: _____

B. Permanent Erosion and Sediment Controls: (Refer to Project Plans SWPPP Site Plan and Specifications)

_____ Crown Ditch/Dike
_____ Rock Protection
_____ Rock Riprap Channel Lining
_____ Sediment Basin
_____ Embankment Curb
_____ Spillways and Downdrains
_____ Minibenching
_____ Seeding established as a perennial vegetative cover with a density of 70% of the native background vegetative cover.
_____ Others Describe: _____

VI. MAINTENANCE AND INSPECTIONS

A. Frequency of Inspections:

___ At least once every 7 calendar days, OR
___ Every 14 calendar days and within 24 hours after a rainfall of 0.5 inches (12.7 mm) or more.

NOTE: RAINFALL GAUGE TO BE KEPT ON-SITE TO DETERMINE DEPTH OF RAINFALL

B. Inspection Procedure:

ADEQ's AZPDES inspection checklist and AZPDES Compliance Evaluation Report will be completed by the contractor, or his representative, and will be kept on file. If repairs are necessary, they shall be initiated within 24 hours of the inspection report.

VII. CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

A. This Storm Water Pollution Prevention Plan has been prepared in accordance with ADOT's EROSION AND POLLUTION CONTROL MANUAL FOR HIGHWAY DESIGN AND CONSTRUCTION, published by ADOT, Highways Division. (June 1995)

___ No other Federal, State or Local Regulations Apply.

PART 2 - To be completed by ADOT & CONTRACTOR

I. SCHEDULE OF MAJOR ACTIVITIES

A. Project Schedule: _____

Start Date: _____

End Date: _____

B. Construction Sequencing Schedule:
(Attach Additional Sheets)

Construction Activity

_____
_____
_____
_____
_____
_____
_____
_____

II. INVENTORY OF POLLUTANTS

A. The materials or substances checked below are expected to be onsite during construction:

___Concrete ___Asphalt
___Paints ___Fertilizer
___Herbicides ___Wood
___Fuel ___ Oil
___Others, List: _____

_____

III. POLLUTION CONTROL MEASURES

A. Other Best Management Practices:

___Solid Waste Management
___Equipment Maintenance Procedures
___Designated Washout Areas
___Stabilized Construction Entrance
___Protected Chemical and Material Storage Area
___Other, Describe: _____

_____

_____

IV. SPILL PREVENTION AND RESPONSE

A. Spill Prevention:
The procedures outlined in the Best Management Practices listed under Pollution Control Measures will be followed to prevent and contain spills of hazardous material. These preventative action include BMP's on equipment maintenance and proper handling, storage and disposal of chemicals and materials. All manufacturer's recommendations for usage, clean-up and disposal shall be followed.

B. Spill Response:
In the event of any accidental spill of chemicals or hazardous materials, contact the ADOT Hazardous Materials Specialist at ADOT's Safety and Health Section (Ph. # (602)712-7744 or Pager # (520) 320-8772). If a reportable quantity is discharged in the storm water, ADOT shall contact the National Response Center and document the spill to the EPA. ADOT's Hazardous Materials Specialist shall provide instructions.

V. POLLUTION PREVENTION PLAN CERTIFICATION

A. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application. I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

B. The operator/contractor as defined in AZPDES should sign the SWPPP in accordance with Part VII. K, and retain the plan on-site at the construction site or other location easily accessible during normal business hours.

Signature: _____
Date: _____
Name: _____
Title: _____
Company: _____

C. ADOT Resident Engineer

Signature: _____
Date: _____
Name: _____
Title: _____
ADOT District: _____

D. MUNICIPALITY (For local Government Project)

Signature: _____
Date: _____
Name: _____
Title: _____
Municipality: _____

VI. OTHER REQUIREMENTS

A. A copy of the General Permit is attached in accordance to AZPDES General Permit for Storm Water Discharges From Construction Activities To The Water Of The United States.

B. Projects that are within ¼ mile of impaired or unique waters require the SWPPP to be sent to ADEQ in combination with the NOI.

	NAME	DATE
DESIGN		
DESIGN		
DRAWN		
CHECKED		
TEAM LEADER		

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADSIDE DEVELOPMENT SECTION

AZPDES SWPPP INDEX SHEET

ROUTE | MP | LOCATION | SHEET OF

TRACS NO. | | | ___ OF ___

NO.1 DESCRIPTION OF REVISION | DATE | MADE BY
NO.2 DESCRIPTION OF REVISION | DATE | MADE BY

DATE	MADE BY	NO.	DESCRIPTION OF REVISION	DATE	MADE BY

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
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PART 1 - To be completed by the Landscape Architect or Design Engineer

I. PROJECT DESCRIPTION

A. Owner Name and Address:

Arizona Department of Transportation
205 South 17th Avenue
Phoenix, Arizona 85007-3213

B. Project TRACS Number: _____

C. Project Location: _____

City: _____ County: _____

Beginning Latitude (NAD 83): ___° ___ ' ____ "
Beginning Longitude (NAD 83): ___° ___ ' ____ "

Ending Latitude (NAD 83): ___° ___ ' ____ "
Ending Longitude (NAD 83): ___° ___ ' ____ "

D. Project Description: _____

II. HYDROLOGIC INFORMATION

A. Project Size:

Length (Mi.) _____

Area (Ac.) _____

B. Area to be Graded (Ac.): _____

C. Receiving Water(s): _____

III. PRESERVATION OF EXISTING VEGETATION

A. In accordance with the specifications, existing vegetation will be preserved. Clearing limits shall be confined to areas that require grading. Existing vegetation outside the boundaries of the cleared area shall be protected from damage by construction activities. Existing trees within the area to be cleared shall be preserved and protected, wherever possible.

IV. SOIL STABILIZATION MEASURES

A. All disturbed soil, which will not be paved, ripraped or otherwise covered to prevent

V. MEASURES TO CONTROL EROSION AND SEDIMENT

A. Temporary Erosion and Sediment Controls: (Refer to the Following SWPPP Site Plan and Specifications)

_____ Erosion Control Mattings
_____ Temporary Diversion Dikes
_____ Check Dams
_____ Rock Inlet/Outlet Protection
_____ Sediment Control Berms
_____ Silt Fences
_____ Watties (Excelsior/Straw)
_____ Excelsior Logs / Sediment Logs
_____ Seeding (Class II with mulch)
_____ Others Describe: _____

B. Permanent Erosion and Sediment Controls: (Refer to Project Plans SWPPP Site Plan and Specifications)

_____ Crown Ditch/Dike
_____ Rock Protection
_____ Rock Riprap Channel Lining
_____ Sediment Basin
_____ Embankment Curb
_____ Spillways and Downdrains
_____ Minibenching
_____ Seeding established as a perennial vegetative cover with a density of 70% of the native background vegetative cover.
_____ Others Describe: _____

VI. MAINTENANCE AND INSPECTIONS

A. Frequency of inspections to meet either of the following requiements:

____ At least once every 7 calendar days (weekly), OR

____ At least 14 calendar days (biweekly) and within 24 hours after a rainfall of 0.5 in. or greater.

NOTE: RAINFALL GAUGE TO BE KEPT ON-SITE TO DETERMINE DEPTH OF RAINFALL

B. Inspection Procedure:

ADOT's NPDES inspection checklist will be completed by the ADOT resident engineer, or his representative, and will be kept on file. If repairs are necessary, they shall be initiated within 24 hours of the inspection report.

VII. CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

PART 2 - To be completed by ADOT & CONTRACTOR

I. SCHEDULE OF MAJOR ACTIVITIES

A. Project Schedule: _____

Start Date: _____

End Date: _____

B. Construction Sequencing Schedule:
(Attach Additional Sheets)

Construction Activity

_____
_____
_____
_____
_____
_____
_____
_____

II. INVENTORY OF POLLUTANTS

A. The materials or substances checked below are expected to be onsite during construction:

__Concrete __Asphalt
__Paints __Fertilizer
__Herbicides __Wood
__Fuel __ Oil
__Others, List: _____

III. POLLUTION CONTROL MEASURES

A. Other Best Management Practices:

__Solid Waste Management
__Equipment Maintenance Procedures
__Designated Washout Areas
__Stabilized Construction Entrance
__Protected Chemical and Material Storage Area
__Other, Describe: _____

IV. SPILL PREVENTION AND RESPONSE

A. Spill Prevention:
The procedures outlined in the Best Management Practices listed under Pollution Control Measures will be followed to prevent and contain spills of hazardous material. These preventative action Include BMP's

B. Spill Response:
In the event of any accidental spill of chemicals or hazardous materials, contact the ADOT Hazardous Materials Specialist at ADOT's Health and Safety Section (Ph. # (602)712-7744 or Pager # (520) 320-8772). If a reportable quantity is discharged in the storm water, ADOT shall contact the National Response Center and document the spill to the EPA. ADOT's Hazardous Materials Specialist shall provide instructions.

V. POLLUTION PREVENTION PLAN CERTIFICATION

A. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application. I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

B. The operator / contractor

Signature: _____
Date: _____
Name: _____
Title: _____
ADOT District: _____

C. ADOT Resident Engineer

Signature: _____
Date: _____
Name: _____
Title: _____
ADOT District: _____

D. MUNICIPALITY (For local Government Project)

Signature: _____
Date: _____
Name: _____
Title: _____
Municipality: _____

VI. OTHER REQUIREMENTS

A. A copy of the General Permit should be attached.

B. A copy of the page from the environmental clearance for the project that discusses endangered or threatened species should be attached.

C. Use the process in NPDES General Permit Appendix C (ESA Review Procedures) to determine eligibility prior to submittal of the Notice of Intent (NOI) for Endangered and Threatened Species and Critical Habit Protection.

D. A seven-day waiting/review period between NOI submittal and authorization to begin construction will be used by U.S. Fish and Wildlife Service and National Marine Fisheries Service to screen proposed construction activities for potential impacts on endangered species.

ADOT AZPDES
Inspection Checklist

Project: _____Date: _____

( ) Monthy Inspection ( ) Weekly Inspection ( ) Rainfall Event Inspection

Rainfall: _____inches Beginning of Last Storm Event _____ Duration _____

Inspected by: _____ Title _____

Qualifications _____(attach or reference SWPPP)

Yes	No	Does not Apply	
( )	( )	( )	Are there any BMPs called for on the SWPPP that are either not installed or installed improperly
( )	( )	( )	Are there any operational storm sewer inlets that are not protected from sediment inflow?
( )	( )	( )	Do any structural practices require repair or clean out to maintain adequate function?
( )	( )	( )	Are there any on-site traffic routes, parking and storage of equipment and supplies that are located outside of areas specifically designated for those uses?
( )	( )	( )	Are there any temporary soil stockpiles or construction materials located outside of the approved areas?
( )	( )	( )	Do any seeded or landscaped areas require maintenance, irrigation, fertilization, seeding, or mulching?
( )	( )	( )	Is there any evidence that sediment is leaving the site?
( )	( )	( )	Is there any evidence of erosion on cut or fill slopes or in roadside ditches?
( )	( )	( )	Is there any evidence of sediment, debris, or mud on public roads at intersections with site access roads?
( )	( )	( )	Does the Storm Water Prevention Plan require revisions?

If the answer is YES to any of the above, describe the location, and explain necessary maintenance actions or plan revisions (attach additional sheets if necessary).

_____

_____

_____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: _____ Date:_____

Methodology for Determining "Final Stabilization"

"Final Stabilization" is a stipulation that must be met in order for an operator of a construction site to submit a Notice of Termination (NOT) to the Arizona Department of Environmental Quality (ADEQ) under the Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program (Permit No. AZG2003-001). A NOT is submitted by the operator to terminate coverage for discharges from construction activities to waters of the U.S.

According to AZPDES, "Final Stabilization" means that either:

1. All soil disturbing activities at the site have been completed and either of the two following criteria are met:
    a. A uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or
    b. Equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.
2. When background native vegetation will cover less than 100% of the ground (e.g., arid areas, beaches), the 70% coverage criteria is adjusted as follows: if the native vegetation covers 50% of the ground, 70% of 50% (.70 X .50 = .35) would require 35% total cover for final stabilization. On a beach with no natural vegetation, no stabilization is required.

A methodology for determining final stabilization for native seeded/unpaved areas is described below.

Within seeded areas, sample plots with a nominal size of 100 square feet shall be used for projects that occur within low rainfall areas (defined as locations receiving 20 inches or less average annual rainfall). Sample plots with a nominal size of 25 square feet shall be used for all other project locations. The rationale for the larger plot size in low rainfall areas is that a larger sample size is necessary to accurately measure the vegetative cover, which is expected to be less dense than in areas of higher rainfall. As an option, data may be gathered at the 100-square-foot plot locations by means of four 25 square foot sub-plots established at that same location.

Multiple sample plots may be required on a project site; the number of samples shall be determined by the total disturbance area of the project. The total area represented by the sample plots shall be approximately 0.1% of the total site disturbance area. For example, a project in a low rainfall area with 600,000 square feet of disturbance would require six sample plots (for a total sample area of 600 square feet) representing 0.1% of the total disturbance area.

The sample areas shall represent the variety of conditions found on a project. A project that has both cut and fill slopes, for example, should have roughly the same number of

sample plots on cut as on fill. Final design plans should be utilized to identify each cut and fill slope. Each slope shall be assigned a number by the evaluator (e.g., C1, C2, C3; F1, F2, F3). The slopes to be sampled shall be randomly selected. The sample plot locations within each sampling area should be predetermined, either by selecting a point on the plans prior to going into the field, or by using the same selection method in the field for each plot. For example, on a roadway project, the midpoint (longitudinally) of the cut or fill could be identified in the field, and from that point a set number of paces could be taken from the edge of road to arrive at the sampling location. If conditions at the predetermined sample plot location are not typical of the project site the location of the sample plot may be adjusted.

In order to determine if a reseeded site has achieved 70% of the vegetative coverage of the surrounding, undisturbed landscape, it is necessary to conduct sample plot measurements for those undisturbed areas in a manner similar to the reseeded portions of the project site. A corresponding undisturbed sample plot shall be established for each project site sample plot, the location of which should be determined before going into the field. In the above roadway project example, the location for the undisturbed plot could be along an extension of the same theoretic line as the project site sample plot (perpendicular to the roadway) at a set number of paces beyond the limit of construction disturbance.

A sampling frame, preferably of a circular shape (to reduce edge effect) should be utilized to delineate the sample plot. When a single 25 square foot sample is used, the frame shall be dropped at the sample location. If four 25 square foot sub-plots are required to obtain a total sample of 100 square feet, the sub-plots shall be established in each ordinal direction and within a few feet of the intended sample location.

The cover provided by perennial vegetation and inert material (gravel, cobble, boulders) shall be documented. The percentage of vegetative cover shall be determined as noted below. The percentage of inert material shall be estimated by the evaluator.

All perennial plants encompassed by the sampling frame should be counted, including plants on which the frame lands. Dividing the frame into quadrants may make counting the plants easier. The species and canopy diameter of each plant shall be recorded. The area covered by the plant can be calculated based on the recorded canopy diameter. The sum of the canopy area of all perennial plants shall be used to calculate the vegetative cover percentage within the sample plot area. If multiple sample plots are required for a single project, the average cover percentage of all plots shall constitute the reseeded/unpaved cover percentage. Inert material cover should be visually estimated as a percentage of the total area within the sampling frame.

A photograph should be taken of each sample plot. The photograph should include the area encompassed by the sampling frame and a label identifying the plot.

The sum of the perennial vegetation and/or inert material coverage percentages will be used to determine if final stabilization has been achieved. As the AZPDES permit

stipulates, “A uniform perennial vegetative cover with a density of 70% of the native background vegetative cover” or “equivalent permanent stabilization measures” must occur before final stabilization is considered to have been achieved. In a situation where neither perennial vegetative cover nor inert material cover individually meet the 70% coverage requirement, the two types of cover may be combined. For example, if the perennial vegetation provides cover equivalent to 50% of the background cover, and the inert material provides 25% cover, the combined coverage (75%) would exceed the minimum requirement of 70% for final stabilization.

The draft results of the above analysis shall be provided to the ADOT Roadside Development Section (Roadside) in a memo format, with appropriate backup documentation and calculations to support the memo conclusions. At a minimum, a declarative statement similar to the following shall be provided: “The _____ project has achieved __% coverage in unpaved areas and has/has not achieved final stabilization as defined by AZPDES.” Once the results have been agreed to by Roadside, ___ copies of the memo shall be submitted to Roadside for distribution.

NOTICE OF TERMINATION (NOT)

Construction Activity Discharges to Waters of The United States

AZPDES Permit No. AZG2003-001

Submission of this NOT constitutes notice that the party identified on this form is terminating coverage under the AZPDES general permit, and authorization to construction activity discharges to waters of the United States terminates at midnight on the day the NOT is received by ADEQ. **TO TERMINATE, A COMPLETE AND ACCURATE NOT** must be submitted to:

Stormwater Program- Water Permits Section/ NOT
Arizona Department of Environmental Quality
1110 West Washington, 5415B-3
Phoenix, Arizona 85007

I. PERMITTEE INFORMATION

AZPDES/NPDES Stormwater Construction GP Authorization Number: _____

Name of Operator on Notice of Intent (NOI) submitted to ADEQ/EPA: _____

Operator Address: _____

Phone: _____

II. CONSTRUCTION SITE INFORMATION

Project/Site Name:_____

Site address if applicable, and the physical location (provide directions from nearest municipality):

_____

City _____ Zip _____ County: _____

Provide the latitude/longitude of the construction site at the point nearest the receiving water:

Latitude: |___|___| |___|___| |___|___| (Degrees, minutes, seconds)

Longitude: |___|___|___| |___|___| |___|___| (Degrees, minutes, seconds)

III. COVERAGE IS BEING TERMINATED BECAUSE: (Check those below as applicable)

____ Final stabilization has been achieved on all portions of the site for which the operator is responsible.

____ Another operator has assumed control over all areas of the site that have not been finally stabilized.

____ For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

____ The operator has obtained coverage under an alternative AZPDES permit.

IV. CERTIFICATION BY AUTHORIZED SIGNATORY (PER PART VII.K.2 OF THE PERMIT)

"I certify under penalty of law that all stormwater discharges associated with construction activity from the identified facility that are authorized by a general permit have been eliminated or that I am no longer the operator of the facility or construction site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge stormwater associated with construction activity under this general permit, and that discharging pollutants in stormwater associated with construction activity to waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by a NPDES or AZPDES permit. I also understand that the submittal of this Notice of Termination does not release an operator from liability for any violations of this permit or the Clean Water Act."

Printed Name: _____ Title: _____

Address (If different from above): _____

Signature: _____ Date: _____

APPENDIX B

ABBREVIATIONS, ACRONYMS AND DEFINITION OF TERMS

AASHTO American Association of State Highway Officials

ADEQ Arizona Department of Environmental Quality

ADOT The Arizona Department of Transportation

AZCGP (Arizona Construction General Permit)

This permit provides Authorization to Discharge Under the Arizona Pollutant Discharge Elimination System program, in compliance with the provisions of the Arizona Revised Statutes, Title 49, Chapter 2, Article 3.1, the Arizona Administrative Code, Title 18, Chapter 9, Articles 9 and 10 and the Clean Water Act as amended (33 U.S.C. 1251 et seq.).

AZPDES Arizona Pollutant Discharge Elimination System

BMP (Best Management Practices)

Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the U.S. BMPs also include treatment requirements, operating procedures, and practice to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage (EPA NPDES Glossary).

BIA Bureau of Indian Affairs

BLM Bureau of Land Management

CGP Construction General Permit (see AZCGP)

Contractor

The individual, partnership, firm, corporation, or any acceptable combination thereof, or joint venture, contracting with the Department (ADOT) for performance of work (ADOT Standard Specifications for Road and Bridge Construction).

Corps U.S. Army Corps of Engineers

CWA (Clean Water Act)

The Act established the basic structure for regulating discharges of pollutants into the waters of the United States. It gave EPA the authority to implement pollution control programs such as setting wastewater standards for industry. The Clean Water Act also continued requirements to set water quality standards for all contaminants in surface waters. The Act made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions (EPA Clean Water Act History).

Discharge

The direct or indirect addition of any pollutant to the waters of the state from a facility. (AZ revised statutes 49 Chapter 2).

EPG ADOT Environmental Planning Group

Engineer

The State Engineer, acting by and under the authority of the laws of the State of Arizona, or the State Engineer's representative in matters relating to contract development, administration and construction activities (ADOT Standard Specifications for Road and Bridge Construction)

EPA Environmental Protection Agency

Erosion Removal of soil particles by wind or water.

Erosion Control Coordinator

Appointed by the contractor and approved by ADOT. The erosion control coordinator shall be responsible for preparing, implementing, monitoring, and revising the approved SWPPP throughout the project, and for implementing any other permit requirements stipulated in the AZPDES general permit. The person shall be knowledgeable in the principles and practice of erosion and sediment controls, and possess the skills to assess conditions at the site that could impact stormwater quality and the effectiveness of the contractor's erosion control measures used to control the quality of the stormwater discharges. Specific required qualifications for the erosion control coordinator are specified in the ADOT Stored Specification 104SWDEQ and 104SWEPA.

FCGP Federal Construction General Permit

FHWA Federal Highway Administration

Final Stabilization

As defined in the CGP means that either:

1. All soil disturbing activities at the site have been completed and either of the two following criteria are met:

    a. A uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or

    b. Equivalent permanent stabilization measures (e.g., the use of riprap, gabions, or geotextiles) have been employed.

2. When background native vegetation will cover less than 100 percent of the ground (e.g., arid areas, beaches), the 70 percent coverage criteria is adjusted as follows: if the native vegetation covers 50 percent of the ground, 70 percent of 50 percent (.70 X .50 = .35) would require 35% total cover for final stabilization. On a beach with no naturalvegetation, no stabilization is required.

Impaired Waters

Under section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters. These impaired waters do not meet water quality standards that states, territories, and authorized tribes have set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology. A list and map of impaired waters in the State of Arizona http://www.adeq.state.az.us/environ/water/assessment/download/305-02/att5.pdf

ISTEA 1991 Intermodel Transportation Efficiency Act

MS4 (Municipal Separate Storm Sewer System

[40 CFR 122.26(b)(8)]. A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

1. Owned and operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the U.S.;
2. Designed or used for collecting or conveying storm water;
3. Which is not a combined sewer; and
4. Which is not part of a publicly owned treatment works (POTW).

NPDES (National Pollutant Discharge Elimination System)

The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of CWA (EPA NPDES Glossary).

Non-point source pollution

Any conveyance, which is not a point source from which pollutants are or may be discharged to navigable waters (AZ revised statutes 49 Chapter 2).

NOI (Notice of Intent)

An application to notify the permitting authority of a facility's intention to be covered by a general permit.

NOT (Notice of termination)

An application to notify the permitting authority of a facility's intention to terminate coverage by a general permit.

Operator – For the purpose of the 2003 Construction General Permit and in the context of storm water associated with construction activity, any party associated with a construction project that meets either of the following two criteria:

1. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications
2. The party has day-to-day operational control of those activities at a project which are necessary to ensure compliance with a SWPPP for the site or other permit conditions (e.g., authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions).

Point Source Pollution

Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft fromwhich pollutants are or may be discharged to navigable waters. Point source does not include return flows from irrigated agriculture. A.R.S. § 49-201(27).

Pollutant

Fluids, contaminants, toxic wastes, toxic pollutants, dredged spoil, solid waste, substances and chemicals, pesticides, herbicides, fertilizers and other agricultural chemicals, incinerator residue, sewage garbage, sewage sludge, munitions, petroleum products, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and mining, industrial, municipal and agricultural wastes or any other liquid, solid, gaseous, or hazardous substances. A.R.S. § 49-201(28)

Section 401 of the Clean Water Act

Enables the States to review federal permit activities affecting the nations waters and to ensure thatproposed activity does not adversely affect the environment and that it meets the states water quality standards.

Section 404 of the Clean Water Act

Regulates the discharge of dredged or fill materials within the water of the United States and establishes a program to issue permits.

Sedimentation

The accumulation of soil particles that have been transported away from their natural location by wind or water action.

Storm water

The runoff from storms, snow melt runoff, and surface runoff and drainage [40 CFR 122.26(b)(13)].

SWPPP (Storm Water Pollution Prevention Plan)

A SWPPP is a written document that describes the construction operator's activities to comply with the requirements in the CGP. The SWPPP is intended to facilitate a process whereby the operator evaluates potential pollutant sources at the site and selects and implements appropriate measures designed to prevent or control the discharge of pollutants in storm water runoff (EPA NPDES Glossary).

Tribal Lands

In this document, is defined at 40 Code of Federal Regulations (CFR) 122.2 to mean:

1. All land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation;
2. All dependent Indian communities with the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and
3. All Indian allotments, the Indian titles to which have not been extinguished, including rights-of-ways running through the same.

TMDL (Total Daily Maximum Load)

Specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and allocates pollutant loadings among point and nonpoint pollutant sources (EPA NPDES Glossary).

Unique Waters

Outstanding state resource waters as established by ADEQ under A.A.C. R18-11-112. A list of unique waters in the State of Arizona. http://www.adeq.state.az.us/environ/water/permits/download/uniquewat.pdf

Waters of the U.S.

All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide. Waters of the U.S. include all interstate waters and intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. [See 40 CFR 122.2 for the complete definition.]

APPENDIX C

REFERENCES AND RESOURCES

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Attachment C
Inspection and Corrective Action Report Form

2013 Construction General Permit
Inspection & Corrective Action Report Form

ADEQ Arizona Department of Environmental Quality

Section I. General Information (see instructions)

Name of Project		CGP Tracking No.	AZCON – _____	Inspection Date	___ / ___ / _____

☐ **Check box when using this form to inspect an inactive/ unstaffed construction site (this option applies to an entire site only).** See Part 4.2(4) of the permit. Inspect the site immediately before becoming inactive/ unstaffed and every 6 months thereafter and within 24 hours of each storm event of 0.5 inch or greater in 24 hours.

Inspector Name, Title & Contact Information	**Name:** _____ **Title:** _____ **Contact information:** _____
Present Phase of Construction	

Inspection Schedule (all days are calendar days) *(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply.)*

Routine Schedule: ☐ Every 7 days ☐ Every 14 days and within 24 hours of a 0.5" storm event

☐ Once per month, but not within 14 days of the previous inspection and within 24 hours of a 0.25" storm event

Reduced Schedule: once per month (but not within 14 days of the previous inspection) and before an anticipated storm event and within 24 hours of the end of each storm event of 0.5 inch or greater in 24 hours.

☐ Once per month (in stabilized areas)

☐ Once per month (where discharges are unlikely based on seasonal rainfall patterns)

☐ Once per month (where winter conditions exist and earth-disturbing activities are being conducted)

Discharge points within 1/4 mile of an impaired water or outstanding Arizona water (OAW): ☐ Every 7 days and within 24 hours of a 0.5" storm event

Was this inspection triggered by either a 0.25" or 0.5" storm event? ☐ Yes ☐ No

If yes, duration of storm event: ☐ < 1 hour ☐ < 6 hrs ☐ > 6 hrs

If yes, how was the storm event determined (either 0.25" or 0.5")?

☐ Rain gauge on site ☐ Weather station representative of site. Specify weather station source: _____

Total rainfall amount that triggered the inspection (in inches)**:** _____

Identify all sources of non-stormwater discharges occurring at the site and the associated control measures in place

sources of non-stormwater discharges:	control measures associated with the non-stormwater discharges:
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____

Adverse or Unsafe Conditions for Inspection

Did you determine that any portion of the site was unsafe for inspection per CGP Part 4.2(6)? ☐ Yes ☐ No

If "yes", complete the following:

- Describe the conditions that prevented you from conducting the inspection in this location:

- Location(s) where conditions were found:

Note: *Inspections may be postponed when adverse or unsafe conditions exist such as local flooding, high winds, or electrical storms, or situations that otherwise make inspections unsafe. However, the inspection must resume as soon as conditions are safe.*

Section II. Description of Discharges and Condition of the Discharge Locations (CGP Part 4.3(11)) (see instructions)

Discharge Point	Observations *(Note: discharges may not occur at every discharge point on the site after a storm event. Check all that apply.)*
1.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
2.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
3.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	

Section II. **CONTINUATION SHEET FOR: Description of Discharges and Condition of the Discharge Locations** **[Print additional sheets as necessary]**

Discharge Point	Observations *(Note: discharges may not occur at every discharge point on the site after a storm event. Check all that apply.)*
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	
#___.	Describe the discharge: ☐ Stormwater ☐ Non-stormwater ☐ None Since the last inspection, do you see any evidence of erosion, sediment accumulation and/ or other pollutants that can be attributed to your discharge? ☐ Yes ☐ No
If yes, describe the characteristics of the discharge (color, odor, clarity, etc.) specify the location(s) of these conditions, and indicate whether modification, maintenance, or corrective action is needed to correct the problem. Also, describe any visible signs of erosion or sediment accumulation.	

Section III. Condition and Effectiveness of All On-site Control Measures (Erosion and Sediment (E&S)), Stabilization and Pollution Prevention (P2) Practices (CGP Part 3.1.1 through 3.1.3) (see instructions)					
Description of Control Measures	**Type of Control Measure:** ▪ **Erosion and Sediment (E&S)** ▪ **Stabilization** ▪ **Pollution Prevention (P2)**	**Additional controls required?**	**Repairs or other maintenance needed?[1]**	**Corrective action required?[1, 2]** Date of discovery	**Specify stabilization method** (mulch, rock, planted vegetation, etc.)
1.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					
Description of Control Measures	**Type of Control Measure:** ▪ **Erosion and Sediment (E&S)** ▪ **Stabilization** ▪ **Pollution Prevention (P2)**	**Additional controls required?**	**Repairs or other maintenance needed?[1]**	**Corrective action required?[1, 2]** Date of discovery	**Specify stabilization method** (mulch, rock, planted vegetation, etc.)
2.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Note 1: The permit differentiates between conditions requiring repairs and maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition and requires repairs if controls are not operating as intended. Corrective actions are triggered only for specific, more serious conditions, which include: 1) A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 3.1 and/or Part 3.2; 2) One of the prohibited discharges in Part 1.4 is occurring or has occurred; or 3) ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

Note 2: If answering "Yes" (i.e., a site condition that meets one or more of the three criteria in Note 1 above requires a corrective action), you must complete Section IV (Corrective Action Report) below. See Part 5 of the permit for more information.

Section III. CONTINUATION SHEET FOR: Control Measure Condition and Effectiveness [Print additional sheets as necessary]

Description of Control Measures	Type of Control Measure: ▪ Erosion and Sediment (E&S) ▪ Stabilization ▪ Pollution Prevention (P2)	Additional controls required?	Repairs or other maintenance needed?[1]	Corrective action required?[1, 2] Date of discovery	Specify stabilization method (mulch, rock, planted vegetation, etc.)
#___.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Description of Control Measures	Type of Control Measure: ▪ Erosion and Sediment (E&S) ▪ Stabilization ▪ Pollution Prevention (P2)	Additional controls required?	Repairs or other maintenance needed?[1]	Corrective action required?[1, 2] Date of discovery	Specify stabilization method (mulch, rock, planted vegetation, etc.)
#___.	☐ E&S ☐ Stabilization ☐ P2	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No ___ / ___ / _____	
Notes (e.g., provide details about needed additional control measures, maintenance performed, etc.)					

Note 1: The permit differentiates between conditions requiring repairs and maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition and requires repairs if controls are not operating as intended. Corrective actions are triggered only for specific, more serious conditions, which include: 1) A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 3.1 and/or Part 3.2; 2) One of the prohibited discharges in Part 1.4 is occurring or has occurred; or 3) ADEQ or USEPA determines that modifications to the control measures are necessary to meet the requirements of Part 3.

Note 2: If answering "Yes" (i.e., a site condition that meets one or more of the three criteria in Note 1 above requires a corrective action), you must complete Section IV (Corrective Action Report) below. See Part 5 of the permit for more information.

ADEQ Arizona Department of Environmental Quality

Section IV. Corrective Action Report Form

Section IV.A. – General Information

(Complete this section within 24 hours of discovering the condition that triggered corrective action)

Date/ Time Problem First Discovered	Date: ___ / ___ / _____ Time: _____ ___AM ___PM	**Today's Date**	___ / ___ / _____

Name and Contact Information of Individual Completing this Form	**Name:** _____ **Contact information:** _____

What site conditions triggered the requirement to conduct corrective action? *(Check the box that applies)*

- ☐ A necessary stormwater control was never installed, was installed incorrectly, or not in accordance with the requirements in Part 2 and/or 3
- ☐ A prohibited discharge described in Part 1.4 has occurred or is occurring
- ☐ ADEQ or USEPA has determined that modifications to the control measures are necessary to meet the requirements of Part 3.

Provide a description of the problem: (Provide description of the specific problem that triggered the need for corrective action, and the specific location where it was found. If you have already provided this explanation in an inspection report, you can refer to that report.)

Deadline for completing corrective action:

- ☐ Work will be completed no more than 7 calendar days after the date the problem was discovered (enter date): ____ / ____ / _____
- ☐ It is infeasible to complete work within the first 7 days, therefore, the work will be completed as soon as practicable following the 7th day (enter date): ____ / ____ / _____

If the estimated date of completion falls after the 7-day deadline, document the following: (1) The reason it is infeasible to complete work within 7 days, and (2) The schedule for installing and making the new or modified stormwater control operational in the soonest practicable timeframe.

NOTE: *Any corrective actions that result in changes to any of the stormwater controls or procedures shall be documented in the SWPPP within 7 calendar days of completing the corrective action work.*

Section IV.B. – Stormwater Control Modifications to be Implemented in Response to a Corrective Action Trigger [Print additional sheets as necessary]			
List of stormwater control(s) to be modified or replaced to correct the condition that required the Corrective Action	**Actual or Planned Completion Date**	**SWPPP Update Necessary?** **If yes, specify date SWPPP modified**	**Notes and observations**
1.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
2.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
3.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
4.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
5.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
6.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	
7.	___ / ___ / _____	☐ Yes ☐ No ___ / ___ / _____	

Section V. CONTINUATION SHEET for Miscellaneous Items (see instructions) [Print additional sheets as necessary]

Use this space for miscellaneous information or as continuation of items found elsewhere in this report.

Section VI. Certification and Signature (CGP Appendix B. 9.)

Section VI.A. – Certification and Signature by Contractor or Subcontractor performing the inspections (if applicable)

Check one of the following:

- ☐ No instances of non-compliance were discovered during this inspection and the project was in full compliance with the SWPPP and permit.
- ☐ Inspection follow-up is required, in accordance with Parts 4.5(1) and 4.5(2) of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Contractor or Subcontractor: _____ Title: _____

Printed name : _____ Date: _____

Business / Agency: _____ Phone number: _____

Section VI.B. – Certification and Signature by Permittee (permittee / operator or a duly authorized representative is required to sign)

Check one of the following:

- ☐ No instances of non-compliance were discovered during this inspection and the project was in full compliance with the SWPPP and permit.
- ☐ Inspection follow-up is required, in accordance with Parts 4.5(1) and 4.5(2) of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Permittee or
"Duly Authorized Representative": _____ Title: _____

Printed Name: _____ Date: _____

Business / Agency: _____ Phone number: _____

Attachment D
Risk Determination Calculations

Sediment Risk Factor Worksheet	Entry
A) R Factor (from EPA Calculator)	
Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.	
http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm	
	3.60
B) K Factor (weighted average, by area, for all site soils) (from Google Earth)	
The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted. Use the K Factor as provided by Web Soil Survey.	
Site-specific K factor guidance	
K Factor Value	0.37
C) LS Factor (weighted average, by area, for all slopes) (from Google Earth)	
The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS Factor as provided by the SEA, USDA, Agricultural Handbook Number 537, December 1978.	
LS Table	
LS Factor Value	2.07
Watershed Erosion Estimate (=RxKxLS) in tons/acre	2.7562188
Site Sediment Risk Factor	**Low**
Low Sediment Risk: < 15 tons/acre	
Medium Sediment Risk: >=15 and <75 tons/acre	
High Sediment Risk: >= 75 tons/acre	

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below:	**no**	**Low**
2006 Approved Sediment-impared WBs Worksheet		
http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml		
OR		
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY?		
http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp		
A.2.1 Is project area or section located within the flood plain or flood prone area (riparian zone) of a Sensitive Receiving Water Body?	**no**	

Combined Risk Type Matrix

Receiving Water Risk	Project Sediment Risk: Low	Medium	High
Low	Type 1	Type 1	Type 2
Medium	Type 1	Type 2	Type 3
High	Type 2	Type 3	Type 3

Project Sediment Risk: Low

Project RW Risk: Low

Project Combined Risk: Type 1

Construction Rainfall Erosivity Value (R Factor)

Reference: EPA Storm Water Phase II Final Rule - Construction Rainfall Erosivity Waiver
http://www.epa.gov/npdes/pubs/fact3-1.pdf

SITE: **Topock**

CONSTRUCTION DATES

Start: **8/1/2013**
End: **10/1/2013**

EROSIVITY INDEX (EI) ZONE (From Figure 1 - Erosivity Index Zone Map)

Location of Site: **Topock, Arizona**
EI Zone: **65**

EROSIVITY INDEX (From Table 1 - Erosivity Index Table)

After Start Date:	**29-Jul-13**	***Before Start Date:***	**13-Aug-13**	***Actual Start Date:***	**1-Aug-13**
After Start Date EI:	**50**	***Before Start Date EI:***	**66.2**	***Interpolated Start Date EI:***	**53.24**
After End Date:	**27-Sep-13**	***Before Start Date:***	**12-Oct-13**	***Actual End Date:***	**1-Oct-13**
After End Date EI:	**88.8**	***Before Start Date EI:***	**90.4**	***Interpolated End Date EI:***	**89.23**

ISOERODENT # (From Figure 4 - Isoerodent Map of California)

Isoerodent #: **10**

CALCULATED R FACTOR

R = **3.60**

Figure 1. Erosivity Index Zone Map

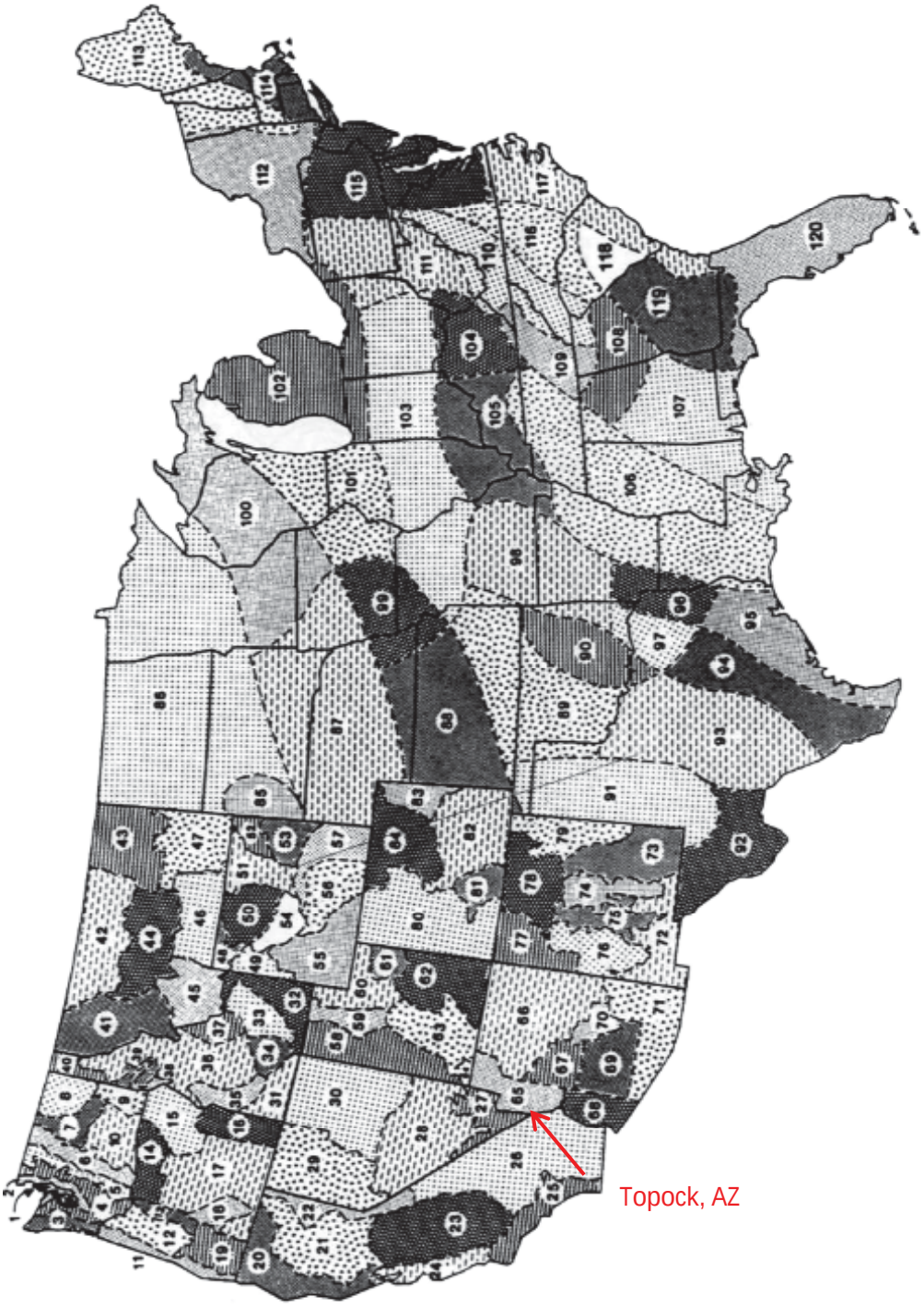
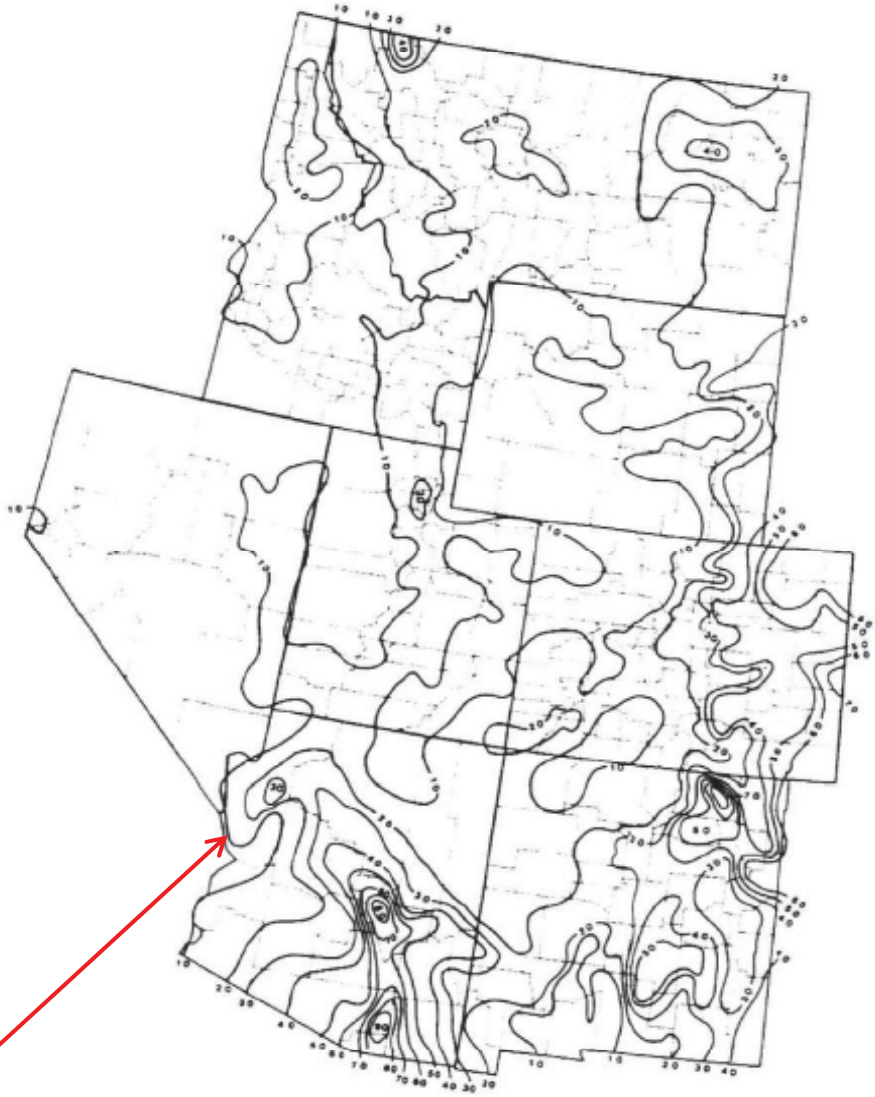


Table 1. Erosivity Index (%EI Values extracted from USDA Manual 703)

All values are at the end of the day listed below - Linear interpolation between dates is acceptable.
EI as a percentage of Average Annual R Value Computed for Geographic Areas Shown in Figure 1

Month	Jan	Jan	Jan	Feb	Mar	Mar	Mar	Apr	Apr	May	May	Jun	Jun	Jul	Jul	Aug	Aug	Sept	Sept	Oct	Oct	Nov	Nov	Dec	Dec
Day	1	16	31	15	1	16	31	15	30	15	30	14	29	14	29	13	28	12	27	12	27	11	26	11	31
EI Zone																									
36	0	0.0	0.0	0.0	0.0	0.9	3.4	6.7	12.7	18.5	26.6	36.3	46.0	53.5	60.2	68.3	75.8	82.6	88.3	96.3	99.3	99.9	100.0	100.0	100
37	0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	3.9	9.1	19.1	26.7	36.3	47.9	61.4	75.1	84.5	92.3	96.0	99.1	100.0	100.0	100.0	100.0	100
38	0	0.0	0.0	1.1	4.3	7.2	11.0	13.9	17.9	22.3	30.3	43.1	55.1	61.3	65.7	72.1	77.9	82.6	86.3	90.3	93.8	98.4	100.0	100.0	100
39	0	0.0	0.0	0.0	0.0	1.6	6.5	11.0	17.8	24.7	33.1	42.8	50.3	54.9	59.7	68.9	78.1	83.6	87.5	93.0	96.5	99.2	100.0	100.0	100
40	0	0.0	0.0	0.0	0.0	1.5	6.2	10.1	16.3	23.3	32.5	42.2	50.1	55.6	60.5	67.5	74.3	79.4	84.1	91.1	95.8	99.1	100.0	100.0	100
41	0	0.1	0.2	0.2	0.2	0.2	0.2	0.4	1.1	6.8	22.9	40.1	54.9	63.8	70.7	81.5	89.8	96.3	98.7	99.2	99.3	99.4	99.4	99.7	100
42	0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	5.2	17.3	33.8	53.2	66.5	75.9	87.6	93.7	97.5	99.0	99.7	100.0	100.0	100.0	100.0	100
43	0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	2.7	9.5	21.9	42.7	58.6	71.1	84.6	91.9	97.1	99.0	99.8	100.0	100.0	100.0	100.0	100
44	0	1.7	2.3	2.4	2.4	2.4	2.4	2.7	3.5	7.6	18.5	34.3	52.5	64.0	72.3	83.3	90.0	95.1	97.3	98.5	98.9	98.9	98.9	99.2	100
45	0	0.2	0.2	0.3	0.3	0.4	0.6	0.8	1.4	3.7	10.2	22.6	41.8	54.0	64.5	78.7	88.4	96.0	98.7	99.4	99.7	99.7	99.8	99.9	100
46	0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.6	7.5	19.6	32.9	48.9	63.0	73.5	83.3	89.5	95.6	98.3	99.6	100.0	100.0	100.0	100.0	100
47	0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	5.8	17.0	33.0	52.5	66.4	75.7	85.5	91.3	96.5	98.8	100.0	100.0	100.0	100.0	100.0	100
48	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	8.1	15.4	27.8	40.7	52.6	61.1	69.3	82.6	92.0	98.0	100.0	100.0	100.0	100.0	100
49	0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	2.7	8.3	20.0	27.5	35.6	44.6	46.0	70.2	81.3	89.2	93.6	98.5	100.0	100.0	100.0	100.0	100
50	0	0.0	0.0	0.0	0.0	0.1	0.4	2.4	8.2	13.7	23.8	38.8	55.1	66.1	73.6	81.8	87.7	93.8	97.0	99.4	100.0	100.0	100.0	100.0	100
51	0	0.0	0.0	0.0	0.0	0.3	1.0	3.1	8.7	18.8	35.8	49.6	60.4	70.2	77.0	84.0	88.8	93.8	96.6	99.1	100.0	100.0	100.0	100.0	100
52	0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.5	6.8	17.5	29.8	46.1	60.5	72.7	86.0	92.8	96.8	98.4	99.7	100.0	100.0	100.0	100.0	100
53	0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.0	9.5	24.2	35.3	48.0	63.1	76.1	87.7	93.5	97.2	98.6	99.5	99.8	99.9	100.0	100.0	100
54	0	0.0	0.0	0.0	0.0	0.2	0.7	2.4	7.2	14.7	27.2	37.2	47.3	58.8	67.6	74.0	79.2	86.7	92.6	97.9	99.8	99.9	100.0	100.0	100
55	0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	5.4	13.3	25.5	31.6	38.8	52.5	66.8	75.5	81.2	87.9	92.8	98.3	100.0	100.0	100.0	100.0	100
56	0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	5.1	11.4	22.3	29.5	38.5	51.1	65.2	77.8	85.6	91.7	95.0	98.7	100.0	100.0	100.0	100.0	100
57	0	0.0	0.0	0.0	0.0	0.0	0.1	1.0	3.5	9.2	21.5	31.0	43.5	60.4	75.1	86.1	91.6	96.2	98.1	99.4	99.9	99.9	100.0	100.0	100
58	0	0.0	0.0	0.0	0.0	0.2	0.9	2.9	8.0	13.2	21.0	29.1	38.0	45.9	54.5	65.4	74.8	82.1	87.5	95.4	98.8	99.7	100.0	100.0	100
59	0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	8.9	15.6	24.2	31.1	38.3	46.0	54.9	64.2	73.2	81.9	88.5	95.7	98.6	99.4	99.7	99.7	100
60	0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.5	4.0	9.5	13.3	20.5	33.6	52.8	66.5	76.7	88.1	94.2	98.6	100.0	100.0	100.0	100.0	100
61	0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	5.0	8.5	15.5	29.8	41.8	46.0	49.2	56.0	65.1	71.6	78.6	91.1	97.3	99.3	100.0	100.0	100
62	0	0.0	0.0	0.1	0.3	0.8	2.1	3.6	6.5	9.7	13.7	16.5	20.8	27.3	40.1	56.9	72.6	83.4	89.4	95.5	98.1	99.6	100.0	100.0	100
63	0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	3.7	7.8	13.3	15.8	19.9	29.0	46.8	64.7	78.3	88.8	93.9	98.5	100.0	100.0	100.0	100.0	100
64	0	0.0	0.0	0.7	2.8	7.4	12.4	14.4	15.6	17.3	19.4	21.0	24.4	32.3	48.0	61.4	72.1	81.9	87.0	90.1	92.4	98.1	100.0	100.0	100
65	0	3.6	7.0	9.6	11.4	13.0	14.4	16.3	17.7	18.4	19.3	20.5	23.6	32.0	50.0	66.2	77.2	85.4	88.8	90.4	91.3	92.7	94.8	97.0	100
66	0	0.0	0.0	0.0	0.0	0.1	0.5	1.1	2.2	3.6	6.0	7.6	11.1				.4	83.2			97.7	99.4	100.0	100.0	100
67	0	0.0	0.0	0.0	0.0	0.1	0.4	0.9	1.6	1.9	2.4	5.0	12.1				.5	92.0			97.9	99.5	100.0	100.0	100
68	0	2.3	4.5	7.8	10.4	12.0	13.3	16.3	17.7	18.1	18.2	18.3	18.4	19.9	24.5	35.0	54.4	69.4	78.6	85.7	89.2	91.9	93.9	97.0	100
69	0	2.0	3.7	5.7	7.8	10.5	12.4	13.7	14.3	14.7	15.1	15.7	17.1	22.7	36.7	50.4	63.6	75.0	81.8	87.8	90.8	93.2	94.9	97.5	100
70	0	0.5	0.7	1.0	1.3	1.7	2.2	2.8	3.4	3.9	4.7	5.4	7.4	15.7	36.5	55.8	70.3	80.9	86.4	90.9	93.4	96.4	98.1	99.4	100
71	0	0.7	1.2	1.6	2.1	2.8	3.3	3.6	4.0	4.5	5.6	6.5	9.1	18.5	40.6	59.7	74.0	86.3	91.7	94.7	96.0	96.7	97.3	98.8	100
72	0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.7	0.8	1.3	3.5	9.9	24.7	51.4	71.5	83.6	93.8	97.7	99.2	99.8	99.9	99.9	100.0	100
73	0	0.0	0.1	0.1	0.2	0.2	0.3	0.6	1.3	4.1	11.5	18.1	28.3	40.2	54.1	67.0	77.2	87.7	93.3	97.5	99.1	99.6	99.8	100.0	100
74	0	0.0	0.0	0.0	0.0	0.1	0.2	0.5	1.2	2.7	6.4	10.2	18.4	31.0	50.7	68.7	81.2	91.6	96.1	98.4	99.2	99.8	100.0	100.0	100
75	0	0.1	0.1	0.1	0.2	0.5	1.3	1.9	3.0	4.1	6.6	10.0	17.6	28.3	44.7	59.4	71.6	83.9	90.3	94.7	96.7	98.8	99.6	99.9	100

Figure 3. Isoerodent Map of the Western U.S.



Note: Units for all maps on this page are hundreds ft•tonf•in(ac•h•yr)$^{-1}$

Topock, AZ

Upstream Location	Lat:	N	34	43	57.3	Long:	W	- 114 28 41.09
Downstream Location	Lat:	N	34	43	56.4	Long:	W	- 114 28 40.08

Upstream Elevation (UE)	473	Feet
Downstream Elevation (DE)	460	Feet
Flow Length (λ)	100	Feet
Slope = 100(UE-DE)/λ	13.0	%
m	0.5	Check m value ==>
Sine of slope angle (sinϕ) = (UE-DE)/λ	0.1300	
LS Factor	2.0694	

slope	m
<1%	0.2
1%-3%	0.3
3.5%-4.5%	0.4
>=5%	0.5

$$LS = \left(\frac{\lambda}{72.6}\right)^{m}\left(65.41\sin^{2}\phi + 4.56\sin\phi + 0.065\right)$$

Source: SEA, USDA, Agricultural Handbook Number 537, December 1978

Attachment E
Project-specific SOPs

Standard Operating Procedure
PG&E Topock Groundwater Remedy
Operations and Maintenance Plan

Title: Safe Fueling and Fuel Handling Procedures
Number: Remedy-SOP-02_Rev0
Created Date: June 24, 2012

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1 Background

PG&E is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 10 miles west of Needles, California at the Pacific Gas and Electric Company (PG&E) Topock Compressor Station (TCS). The objective of this SOP is to describe the procedures required to fuel vehicles, fuel tanks, and refuel equipment/portable containers safely during work on and off the project site.

2 Work Description

Several steps must be accomplished before refueling can be initiated in order to avoid spills and incident. The following considerations and procedure will be followed during refueling:

Preparation, Pre-Fueling and Fueling Considerations

- Turn off all equipment or engines before refueling.
- Put vehicle in park and set the emergency brake.
- Material Safety Data Sheets (MSDSs) for diesel and gasoline product must be readily available and current.
- After exiting the vehicle, always touch a metal part away from the fuel door and pump to discharge any static buildup before fueling.
- Stage spill containment such as a spill pad (bermed) and absorbent pads under the equipment that is being refueled.
- Never smoke, light matches use lighters or conduct hot work such as welding and cutting during refueling operations.
- Keep fire extinguisher nearby.
- Do not breathe vapors.
- Do not use cell phones or other personal electronics while fueling. Keep them in the vehicle.
- Allow small engines (such as generators) to cool down before refueling as gasoline spilled on hot engine parts may ignite.

- While fueling, remain attentive and be prepared to shut-off the flow of fuel. Do not leave the equipment fueling point while refueling to avoid spills and spark ignition (Do not enter your vehicle during refueling).
- Never jam or force the hold-open latch open by using some other object.
- Use only UL approved container for portable gasoline storage cans. They must be:
    a. Red in color
    b. Have a vapor-tight cap
    c. Be no more than 5 gallons in size and in good repair.
- When filling a portable container, always place the container on level ground and keep the pump nozzle in contact with the container when refueling to avoid a static electricity ignition of fuel vapors. Fill slowly to avoid spillage and skin/clothing contact and use a funnel if needed.
- When fueling from a portable container, stage spill containment such as a spill pad (bermed) and absorbent pads under the equipment that is being refueled.
- Never store fuel near a generator or near any ignition sources.
- If a flash fire occurs during refueling, you should attempt to stop the flow of fuel before backing away from the equipment or vehicle.

General Remote Fueling Procedure

1. Position the fuel supply source as close to the equipment to be fueled, as practicable and safe. Chock wheels of involved vehicles to avoid adjustments in vehicle position during fueling.
2. Prepare the work area by positioning bermed spill pad(s) at both the fuel source, equipment fill point, and ALL areas between. A spill containment kit containing sorbent pads should be positioned nearby and its contents should be verified prior to fueling.
3. Don appropriate PPE as defined in the Health and Safety Plan.
4. Inspect fuel conveyance hose/equipment and all connections and fittings for signs of wear or defects prior to the initiation of fuel pumping or pouring. If pouring fuel from a portable container, a funnel constructed of suitable material must be used to avoid splashing.
5. Ensure the area is free from ignition sources (i.e., hot equipment/work, sources of spark or static electricity).
6. Position one crew member at the fuel pump and one crew member at the equipment fill point, and begin fueling. Only one crew member is required for filling equipment from a portable container. Do not over fill or top off the fuel tank.
7. Once fueling is complete, deactivate the fuel supply pump prior to removing the fill nozzle from the equipment, and ensure that residual fuel has been emptied from the conveyance hose (as appropriate based on design of the equipment used).

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8. Replace all fueling equipment and re-inspect for signs of wear or defect (i.e. identify areas that may be seeping fuel at a slow rate).
9. Inspect work area for any signs of spills, and remove spill pad(s), as appropriate.

3 Communication and Contingency Action

If a spill occurs the appropriate clean-up actions should commence as efficiently and safely as possible. Further, the reason for the spill will be investigated, and the team will modify the fueling procedure or conduct equipment repairs, as determined appropriate to minimize the potential for future spills. Further, PG&E Site Operations Manager or designee must be notified immediately.

4 Waste Management

All waste generated during refueling, such as oily absorbent pads, must be transported and disposed as directed by PG&E immediately following generation. Do not dispose of any oil/fuel contaminated pads or rags in the soil roll-off bins or waste dumpsters.

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SOP-A13

Spill Prevention, Containment, and Control Measures for Monitoring Well Development, Purging, and Sampling Standard Operating Procedures for PG&E Topock Program

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This standard operating procedure (SOP) addresses the procedures and equipment to be used for spill prevention, containment, and control associated with monitor well activities at the Topock site. This SOP applies to containment and control of potential spills from purge and equipment decontamination water generated during the development, purging, and sampling of monitoring wells.

REQUIRED DOCUMENTS:

- Topock Program Health and Safety Plan (HSP).
- Emergency Notification Binder.
- SOP-A16 Access Routes and Sensitivity to Biological and Cultural Resources.
- SOP-B6 Disposal of Waste Fluid and Solids (IDW).

REQUIRED EQUIPMENT:

- Large (10′ by 11′ by 4″ deep) bermed spill containment pad. This pad is to be placed on the ground beneath the truck or UTV mounted purge water tank. It will be placed so that the work area at the rear of the vehicle is covered and so that small spills or drips from the purge tank or work area are captured.
- Medium (4′ by 8′ by 4″ deep) bermed spill containment pad. This pad is used at the FLUTe wells, Blatypus wells, and peristaltic wells, or for additional work space at any well.
- Small (4′ by 4′ by 4″ deep) bermed spill containment. This pad fits inside the UTV beds beneath the purge tank when sampling using UTVs (flood plain and special access wells, see SOP-A16).
- Small (2′ by 4′ by 4″ deep) bermed "pizza cut" spill containment pad for placement around well heads.
- Additional spill containment pads as necessary or as directed by the field team leader.
- Purge water tanks as appropriate for the task.
- Extra spring clamps, fittings, paper towels, and tools, etc…
- Small trash bags for temporary storage of dedicated transducers removed from wells.
- Trash pump, for transferring purge and decon. water at IM-3.
- 4 or more 5-gallon buckets and specially cut "pouring lid"
- Hydrophilic sorbent material (absorbent pads, booms, or mats)
- Plastic sheeting
- Shovel and/or other hand tools
- Plastic bags or buckets for storage and disposal of used sorbent material

PREPARATION & SETUP:

- Review this and other applicable SOP's, as well as the Emergency Notification Binder.
- Inspect all required spill containment pads for holes or tears that would compromise their effectiveness. Report such damage to the CH2M HILL Topock site coordinator or field team leader. Repair or replace damaged spill containment pads before use.
- Load spill containment equipment onto appropriate vehicle(s) and secure.

GENERAL SPILL PREVENTION PRACTICES:

- Topock is a "No Spill" site. We have all the necessary spill containment equipment, ***use it!***
- Place all items exposed to purge or decon water on the spill containment pads, not directly on the ground.
- No drops of well or purge water should ever hit the ground. Use 5-gallon buckets and spill containment pads to prevent any water from sampling equipment reaching the ground.
- Double check all fittings and connections for tightness before activating any pump.
- Check all fittings and connections for leaks immediately after starting the pump.
- Place the flow through cell and associated fittings in a 5 gal. bucket. There is often a small amount of leakage from the cell.
- If a spill does occur, immediately stop the pump, or take such action as is necessary to safely mitigate the volume or severity of the spill.
- Report all spills to the CH2M HILL site coordinator or field team leader immediately, no matter how small.
- Only use restroom facilities at the CH2M HILL job trailer or the IM3 facility.

SPILL RESPONSE ACTIONS:

In the event purge water is spilled outside of containment basins, the field team will take the following actions:

PROCEDURES:

- Stop the pump or take what action is necessary to safely stop or mitigate the volume or severity of the spill.
- Notify the CH2M HILL Site Coordinator or field team leader immediately, no matter how small the spill, and follow their instructions. PG&E and CH2M HILL staff may want to photo document the incident, so do not proceed with any clean-up until cleared to do so.
- The CH2M HILL Site Coordinator will perform the notifications as required in the Emergency Notification Binder and complete the Notification Documentation Form provided in the Binder.

- When cleared to do so, use sorbent material and bermed spill containment to absorb and contain the spilled purge water if possible.
- Transfer any contained purge water into the purge water tank.
- When cleared to do so, manually dig up any saturated soil and place in 5-gallon bucket(s) or other appropriate containers for disposal.
- Dispose of containerized soil, used sorbent material, and gloves in accordance with SOP-B6, *Disposal of Waste Fluids and Solids (IDW)*.

CONTAINMENT SCENARIO 1: SAMPLING OF UTV ACCESS WELLS USING DEDICATED OR TRANSIENT PUMPS:

For monitor well sampling at UTV access wells with dedicated or transient pumps, purge water is pumped to a tank placed on 4′ X 4′spill containment pad in the back of the UTV. The UTV is parked on a 10′ X 11′ spill containment pad adjacent to the monitoring well to be sampled. Purge water is pumped directly to a YSI flow through cell contained in a 5 gal. bucket in the work area, and then into the purge tank through a discharge tube at the appropriate purge rate for that well. The small amount of leakage from the YSI flow cell is contained in a 5-gallon bucket and is manually transferred into the purge water tank using the special "pouring lid" to prevent spills.

Potential Spill Scenarios:

- Overfill of UTV-mounted purge water tank
- Failing to place lid on purge tank before mobilizing to next well
- Spills at time of tubing disconnection from tank or during manual transfer into tank from bucket
- Spills from tubing disconnection or leakage from flow cell
- Spills from tubing disconnection at well head between dedicated and non-dedicated tubing
- Spilled bucket of purge water from flow cell
- During removal of dedicated transducers from wells

PROCEDURES:

- Before mobilization to any well, place appropriately sized tanks on small 4′ X 4′ bermed spill containment pads in UTV beds.
- Evaluate the remaining capacity of the tank prior to initiating well purging to ensure that there is sufficient capacity to hold the amount of purge water anticipated to be generated during purging of the well. Offload if needed following procedures under Containment Scenario 4.
- At the well, deploy the large 10′ X 11′ bermed spill containment pad adjacent to the well. Park the UTVs with purge water tanks on the spill pad and as close to the well head as possible, while still leaving room to work. Deploy a second or third spill containment pad as necessary to ensure adequate coverage. There should be no exposed soil between the work area and the well.

- Place the small 2′ X 4′ "pizza cut" bermed spill containment around well head.
- For a dedicated pump well: Attach the transfer tubing to the existing dedicated pump tubing at the top of the well so that the tubing connection is located ***inside*** the well protective casing and any leakage will be contained within the well head.
- Secure the transfer tubing to the bottom connection of the flow cell using hose clamps. Attach the flow through cell discharge tubing to the top fitting of the flow through cell and place the cell into a 5 gal. bucket to contain any leakage from the cell.
- Route the discharge tubing to the purge tank opening and secure using spring clamps.
- Stuff a large, unused trash bag into the top of the protective casing above the tubing connection so that any leakage or spray will be contained inside the protective casing.
- For a transient pump well: Attach the new or well specific dedicated discharge tubing to a decontaminated transient submersible pump and install into well following *SOP-A1 Purging and Sampling of Groundwater Monitoring Wells.* Transport the pump to the well head in a 5 gal. bucket to contain leakage of any residual water. With no tubing connections at the top of the well, no additional spill containment is necessary at the well head.
- All equipment is to be placed on the 10′ X 11′ bermed spill containment pad prior to the start of purging.
- Double check all tubing connections for tightness before activating the pump.
- Double check that discharge tubing is properly secured with spring clamp at purge water tank.
- Immediately after starting the pump, check all tubing connections for leakage.
- During purging, field staff will monitor the transfer of water into the purge water tank. When the tank reaches 80% full, discontinue purging to that tank. Depending on the situation, either stop the pump and properly dispose the purge water according to the SOP's in *Program Procedures Manual* for handling of investigation-derived waste (IDW), or briefly stop the pump and switch to a different purge tank. Such IDW is typically disposed to the process stream at IM-3, see Containment Scenario 4 below for instructions.
- At the completion of purging, stop the pump and carefully disconnect the discharge tubing from both ports of the flow through cell, working inside the bucket and over containment, and allow the tubing and flow cell to drain inside of the bucket.
- Working over containment, clamp the pump discharge tubing inside a 5 gal. bucket and start the pump at low speed. Collect the sample directly from the pump discharge line, allowing excess flow to pump into the 5 gallon bucket.
- When sampling is complete, stop the pump and carefully disconnect and drain all other tubing while working over spill containment to ensure that any drips of purge water are contained on the pad.

- If a transient pump was installed, double fold the end of the dedicated down-hole tubing and secure with wire-ties to prevent leakage during pump removal. Carefully remove the pump from the well while wiping the water and power lines as they emerge with a paper towel, and coiling the tubing neatly. As the pump clears the well, place it immediately in a 5 gal. bucket, over containment, to drain.
- Disconnect the dedicated tubing from the pump and double fold the end of the tubing, securing with wire ties to prevent leakage of the residual water still contained in the tubing. Place the tubing in its designated storage bag. At the end of the day, use compressed air from the sampling truck to carefully push the residual water out of the dedicated tubing and into the purge tank.
- Place the specially cut "pouring lid" on any 5 gallon buckets containing purge water and carefully pour contents into the purge water tank.
- If any purge water is present on the containment pad, either wipe up the water using paper towels, or collect it a bucket and dump it to the purge tank. Dispose the wet paper towels with the rest of the contaminated trash.
- Close purge water tank openings and ensure that the tank is well secured to the UTV.
- Before mobilization, check back of UTVs for any drips that may have occurred and wipe up with a paper towel if needed.
- Pull the UTV off of the spill containment pad, fold the pad, load, and secure.
- Mobilize to the next well to be sampled and repeat the preceding steps.
- When the UTV-mounted purge water tank is 80% full, continue with procedures under Containment Scenario 4 to dump the water at IM-3.

CONTAINMENT SCENARIO 2: SAMPLING UTV ACCESS WELLS USING A PERISTALTIC PUMP:

For monitor well sampling using a peristaltic pump, purge water is placed in a small UTV or truck mounted purge tank, or 5 gallon bucket with lid. The purge tank or bucket is situated adjacent to the monitoring well to be sampled. Purge water is pumped directly to a YSI flow cell in a 5 gal. bucket, then to a 5-gallon bucket with lid, or purge tank for storage. The purge water in the bucket is manually dumped to the purge tank using the specially cut "pouring lid" to prevent spills.

Potential Spill Scenarios:

- Spills at time of hose disconnection from pump mechanism
- Spills during manual transfer into purge tank from bucket
- Spills from leakage from flow cell
- During removal or placement of tubing
- Disrupted bucket of purge water

PROCEDURES:

- Before mobilization to any well, place appropriately sized tank on small 4′ X 4′ bermed spill containment pad in UTV bed.
- Evaluate the remaining capacity of the tank prior to initiating well purging to ensure that there is sufficient capacity to hold the amount of purge water anticipated to be generated during purging of the well. Offload if needed following procedures under Containment Scenario 4.
- At the well, deploy the large 10′ X 11′ bermed spill containment pad adjacent to the well. Park the UTV with the purge water tank on the spill pad and as close to the well as possible, while still leaving room to work. Deploy a second or third spill containment pad as necessary to ensure adequate coverage. There should be no exposed soil between the work area and the well head.
- Place the small 2′ X 4′ "pizza cut" bermed spill containment around well head. With no tubing connections at the well, there is no need for additional spill containment at the well-head.
- Install the dedicated down-hole tubing. Take care to ensure that any residual water in the tubing is contained on spill pads. In the slant wells (MW-52's, 53's and 56's) the dedicated tubing is stored in the well itself.
- Attach the peristaltic pump-head tubing to both the dedicated down-hole tubing and the pump discharge tubing, and use a wire-tie to secure each. Clamp the pump-head tubing into the peristaltic pump, ensuring that it is not pinched in the clamp (this could wear a hole), and place the pump on the 10′ X 11′ bermed spill containment pad.
- Attach the pump discharge tubing to the bottom connection of the flow cell and secure with a wire-tie. Attach the flow cell discharge tubing to the top fitting of the cell, secure with a wire-tie and place the cell into a 5 gal. bucket to contain any leakage.
- Route the discharge tube to a 5-gallon bucket or purge tank and secure with a spring clamp. Make sure additional empty purge buckets are available.
- All equipment is to be placed on the 10′ X 11′ bermed spill containment pad prior to the start of purging.
- Double check all tubing connections for tightness before activating the pump.
- Double check that discharge tubing is properly secured with spring clamp at purge water tank or bucket.
- Immediately after starting the pump, check all tubing connections for leakage.
- During purging, field staff will monitor the transfer of water into the bucket or purge water tank. If purging to a 5 gallon bucket, briefly shut down the pump and move the discharge line to another 5 gal. bucket when the bucket reaches 50% full, then use the specially cut "pouring lid" to transfer the water from the purge bucket to the purge tank. If purging to the UTV mounted purge tank, discontinue purging to that tank when the tank reaches 80% full. Depending on the situation, either stop the pump and properly

dispose the purge water according to the SOP's in *Program Procedures Manual* for handling of investigation-derived waste (IDW), or briefly stop the pump and switch to a different purge bucket or tank. Such IDW is typically disposed to the process stream at IM-3. Refer to Containment Scenario 4 below for instructions.

- At the completion of purging, stop the pump and carefully disconnect the discharge tubing from the flow through cell, working inside the bucket and over containment, and allow the tubing and flow cell to drain inside of the bucket.
- Working over containment, clamp the pump discharge tubing inside a 5 gal. bucket and start the pump. Collect the sample directly from the pump discharge line, allowing excess flow to pump into the 5 gallon bucket.
- When sampling is complete, stop the pump and carefully disconnect and drain all other tubing while working over spill containment to ensure that any drips of purge water are contained on the pad.
- Remove the dedicated tubing from the well and carefully drain any remaining water into purge tank. Working over containment, coil the tubing and place it into the marked ziplock bag from which it was removed.
- Place the specially cut "pouring lid" on any 5 gallon buckets containing purge water and carefully pour contents into the purge water tank.
- If any purge water is present on the containment pad, either wipe up the water using paper towels, or collect it a bucket and dump it to the purge tank. Dispose the wet paper towels with the rest of the contaminated trash.
- Close purge water tank openings and ensure that the tank is well secured to the UTV.
- Before mobilization, check back of UTVs for any drips that may have occurred and wipe up with a paper towel if needed.
- Pull the UTV off of the spill containment pad, fold the pad, load, and secure.
- Mobilize to the next well to be sampled and repeat the preceding steps.
- When the UTV-mounted purge water tank is 80% full, continue with procedures under Containment Scenario 4.

CONTAINMENT SCENARIO 3: SAMPLING TRUCK ACCESS MONITOR WELLS:

For monitor well sampling in upland, truck accessed areas of the site, purge water is placed in a 400-gallon truck-mounted tank. Purge water is pumped directly into this tank via a transfer tube at rates up to 10 gpm. Purge water leakage from the YSI flow cell is contained in a 5-gallon bucket and is manually transferred into the purge water tank using the specially cut "pouring lid". For upland wells that are UTV access only, follow procedures under Containment Scenarios 1 or 2, as applicable.

Potential Spill Scenarios:

- Overfill of truck-mounted purge water tank

- Spills at time of hose disconnection from tank or during manual transfer into tank from bucket
- Spills from hose disconnection at well head between dedicated and non-dedicated tubing
- Spills from hose disconnection or leakage from flow cell
- During removal of dedicated transducers in wells
- Disrupted bucket of purge water
- During removal or placement of pump and/or tubing
- Spills or leaks from "splitter" if used at wells with higher velocity purge rates

PROCEDURES:

- Evaluate the remaining capacity of the tank prior to initiating well purging to ensure that there is sufficient capacity to hold the amount of purge water anticipated to be generated during purging of the well. Offload if needed following procedures under Containment Scenario 4.

- At the well, deploy the large 10′ X 11′ bermed spill containment pad adjacent to the well. Park the sampling truck on the spill pad and as close to the well as possible, while still leaving room to work. Deploy a second or third spill containment pad as necessary to ensure adequate coverage. There should be no exposed soil between the work area and the well head.

- Place the small 2′ X 4′ "pizza cut" bermed spill containment around well head.

- For a dedicated pump well: Attach the transfer tubing to the existing dedicated pump tubing at the top of the well using the riser and valve provided.

- If a splitter is used to split the flow between the flow cell and the purge tank at high flow wells, wrap the splitter with a fresh trash bag such that any leakage or spray will be contained inside the well head or on containment. Route the high flow purge line to the purge tank and secure.

- For a transient pump well: Working over containment, attach the well specific dedicated discharge tubing to a decontaminated transient submersible pump and install into well following *SOP-A1 Purging and Sampling of Groundwater Monitoring Wells.* Transport the pump to the well head in a 5 gal. bucket to contain leakage of any residual water. With no tubing connections at the top of the well, no additional spill containment is necessary at the well head.

- Secure the transfer tubing to the bottom connection of the flow cell using hose clamps. Attach the flow through cell discharge tubing to the top fitting of the flow through cell and place the cell into a 5 gal. bucket to contain any leakage from the cell.

- Route the flow cell discharge tubing to the purge tank opening and secure using spring clamps.

- All equipment is to be placed on the 10′ X 11′ bermed spill containment pad prior to the start of purging.

- Double check all tubing connections for tightness before activating the pump.

- Double check that discharge tubing is properly secured with spring clamp at purge water tank.
- Immediately after starting the pump, check all tubing connections for leakage.
- During purging, field staff will monitor the transfer of water into the purge water tank. When the tank reaches 90% full, discontinue purging to that tank. Stop the pump and properly dispose the purge water according to the SOP's in *Program Procedures Manual* for handling of investigation-derived waste (IDW). Such IDW is typically disposed to the process stream at IM-3. Refer to Containment Scenario 4 below for instructions. Resume pumping to the empty tank.
- At the completion of purging, stop the pump and carefully disconnect the discharge tubing from the flow through cell, working inside the bucket and over containment, and allow the tubing and flow cell to drain inside of the bucket.
- Clamp the pump discharge line to the sink at the rear of the sampling truck and start the pump at low speed. Collect the sample over containment directly from the pump discharge line, allowing excess flow to pump into the sink.
- When sampling is complete, stop the pump and carefully disconnect and drain all other tubing while working over spill containment to ensure that any drips of purge water are contained on the pad.
- If a transient pump was installed, double fold the end of the dedicated down-hole tubing and secure with wire-ties to prevent leakage during pump removal. Carefully remove the pump from the well while wiping the water and power lines as they emerge with a paper towel, and coiling the tubing neatly. As the pump clears the well, place it immediately in a 5 gal. bucket, over containment, to drain.
- Disconnect the dedicated tubing from the pump and double fold the end of the tubing, securing with wire ties to prevent leakage of the residual water still contained in the tubing. Place the tubing in its designated storage bag. At the end of the day, use compressed air from the sampling truck to carefully push the residual water out of the dedicated tubing and into the purge tank.
- Place the specially cut "pouring lid" on any 5 gallon buckets containing purge water and carefully pour contents into the purge water tank.
- If any purge water is present on the spill containment pad, either wipe up the water using paper towels, or collect it a bucket and dump it to the purge tank. Dispose the wet paper towels with the rest of the contaminated trash.
- Ensure that all water is pumped from sink into the truck-mounted tanks. Inspect back of truck and sink and wipe off any purge water drops with paper towel.
- Before mobilization, ensure that all tank openings are secure, and wipe up any drips that may have occurred in the work area.
- Mobilize to the next well to be sampled and repeat the preceding steps.

- When the truck mounted purge water tank is 90% full, continue with procedures under Containment Scenario 4 below.

CONTAINMENT SCENARIO 4: TRANSFER OF PURGE WATER FROM TRUCK MOUNTED TANK OR UTV MOUNTED TANK TO IM-3:

When the truck or UTV mounted purge water tank requires emptying, the following procedures will be used. Purge water is transferred into a 5,500-gallon storage tank at the IM3 Treatment Plant, at rates up to 20 gpm. The 5,500-gallon tank is located within a permanent containment structure.

Potential Spill Scenarios:

- Overfill of tank at final storage location
- Pump or transfer hose leakage during pumping into tank or at time of hose disconnection.

PROCEDURES:

- See an IM-3 plant operator for assistance in transferring purge water.
- Park the truck or UTV on the bermed spill containment pad at the IM-3 transfer location.
- Follow the instructions of the IM-3 plant operator and use the trash pump to transfer purge water from the purge tank to the receiving tank. The IM-3 plant operator and field staff will be present during the entire transfer to monitor the water level in the receiving tank and to ensure no leakage or spills occur. If the receiving tank approaches being full, discontinue transfer operations.
- At the completion of transfer operations, take care when removing the transfer hose from the truck or UTV mounted purge water tank opening, since some residual water will be present in the hose.
- Secure tank openings on the truck-mounted or UTV-mounted purge water tank.
- Proceed to the next well for sampling.

Following review of the BMP Plan, ADEQ issue the following comment (also see Attachment A3 to the FWIP):

The BMP Plan is in general compliance with the following sections of the Arizona Pollutant Discharge Elimination System (AZPDES) General Permit for Stormwater Discharges associated with Construction Activity to Waters of the United States (AZG2013-001): 3.0, 4.0, and 5.0. However, the BMP Plan is missing several elements contained with Section 6.0: Stormwater Pollution Prevention Plan (SWPPP) Preparation. Since this project falls under the CERCLA process and PG&E is only required to comply with the substantive portions of the permit.

The table below details the substantive criteria included in Section 6, and the associated actions taken by PG&E or references to sections of the FWIP where the information is already provided, to document compliance with these criteria.

Permit No. AZG2013-001 Section	**Compliance Notes**	**Actions Take by PG&E to Compliance Actions**
6.1 - General Information	BMP Plan should include statement that document shall be prepared and implemented in accordance with good engineering practices.	BMP Plan states that it has been prepared by a Qualified SWPPP Developer (QSD), and will be implemented prior to Project activities under the direction of a Qualified SWPPP Practitioner (QSP). BMP Plan was revised to state: it has been prepared by a Qualified SWPPP Developer (QSD), and will be implemented in accordance with good engineering practices prior to Project activities under the direction of a Qualified SWPPP Practitioner (QSP).
6.2 - Types of Operators	BMP Plan should specify operators with operational control over construction plans and specifications, operators with control over day-to-day activities, and operators with control over only a portion of a larger project.	Section 5 has been added to the BMP Plan to include statement of the project team responsible for implementation of the BMP Plan. Text has also been added to the fourth paragraph of the BMP Plan.

Permit No. AZG2013-001 Section	Compliance Notes	Actions Take by PG&E to Compliance Actions
6.3 - SWPPP Contents	BMP Plan should identify all operators, including contact information, for the project site and the areas and phases over which each operator has control. Plan should include detailed project schedule with sequence of activities. Site map should include enough detail (BMP locations).	Section 5 has been added to the BMP Plan to include statement of the project team responsible for implementation of the BMP Plan. Text has also been added to the fourth paragraph of the BMP Plan. Schedule is presented in Section 5 of the FWIP and in Figure 5. A list of waters of the U.S. within one mile of the site has been added as the fifth paragraph of the BMP Plan. Figure D1 has been added to the BMP Plan. This figure includes topography detail, the approximately location of drainage divides (e.g., created and natural berms), estimated surface water flow directional arrows, and potential storm water discharge locations/areas.
6.4 - Documentation Requirements including Permit Related Records	The BMP Plan should state that the operator shall keep the inspection, monitoring, and certification records complete and up-to-date	Section 3 of the BMP Plan has been revised to include record-keeping procedure (e.g., operator will keep, with the BMP Plan, the inspection, monitoring, certification, and repair records complete and up-to-date).
6.5 - SWPPP Updates and Modification Requirements	The BMP Plan should include information regarding updates and modification requirements.	Text has been added to the end of Section 3 of the BMP Plan to indicate that the BMP Plan shall be revised as necessary to reflect current conditions and to maintain accuracy.
6.6 - Deficiencies in the SWPPP	The BMP Plan should include information regarding what the operator must do in the event the document does not meet one or more requirements of this permit.	Text has been added to the end of Section 3 of the BMP Plan to indicate that the BMP Plan shall be revised as necessary in the event the document does not meet one or more requirements of the AZPDES General Permit.
6.7 - Posting, SWPPP Review and Making SWPPPs Available	The BMP Plan should require the operator to post authorization numbers in conspicuous locations near the main entrance of the construction site and retain a copy of the authorization certificate in the document. The BMP Plan should include a statement confirming a copy of this plan is located onsite.	Section 3 of the BMP Plan has been revised to indicate that the HNWR-1 well shed is the location where the BMP Plan and the AZPDES General Permit will be posted. Section 3 of the BMP Plan has been revised to indicate that the HNWR-1 well shed is the location where the BMP Plan and the AZPDES General Permit will be posted.

Permit No. AZG2013-001 Section	Compliance Notes	Actions Take by PG&E to Compliance Actions
6.8 - Procedures for Inspection, Maintenance, and Corrective Action	The BMP Plan should include procedures for inspection, maintenance, and corrective action.	The inspection program is specified in Section 3.0 of the BMP Plan. The inspection form is provided in Attachment C of the BMP Plan. Section 3 of the BMP Plan has been revised to include the procedures and recordkeeping requirements for corrective actions.

Attachment E
Health and Safety Plan

Revision 18

Health and Safety Plan

PG&E TOPOCK

Prepared for
Pacific Gas and Electric

June 2013

CH2MHILL®
155 Grand Avenue
Suite 800
Oakland, California

Contents

Attachments

Approval

This site-specific Health and Safety Plan (HSP) has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions and identified scope(s) of work and must be amended if those conditions or scope(s) of work change.

By approving this HSP, the Responsible Health and Safety Manager (RHSM) certifies that the personal protective equipment has been selected based on the project-specific hazard assessment.

Original Plan

Plan Preparer: Rick Cavil/BAO, CSP **Date**: 01/10/2010

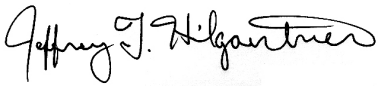
RHSM Approval: **Date**:

Field Operations Manager Approval: **Date:**

Revisions

Revisions Made By: Jeffrey T. Hilgaertner/PHX **Date: 1 June 2010**

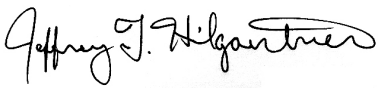
Description of Revisions to Plan: Overall HSP updated into new template and revised procedures.

Revisions Approved By:  **Date: 1 June 2010**

Revisions

Revisions Made By: Jeffrey T. Hilgaertner/PHX **Date: 1 March 2011**

Description of Revisions to Plan: Tasks covered under HSP updated.

Revisions Approved By:  **Date: 1 March 2011**

Revisions

Revisions Made By: Eric Hamm **Date: January 26, 2012**

Description of Revisions to Plan:

The revisions include current policies and procedures incorporated from the current HSE template. Revisions to the following Sections: 3.0; 4.0; 7.0; 8.0; 9.0; 10.0; 11.0; 12.0; and Attachment 4.

Revisions Approved By: Eric Hamm  **Date: May 30, 2012**

Revisions

Revisions Made By: Eric Hamm **Date: June 12, 2013**

Description of Revisions to Plan: The revisions include current policies and procedures incorporated from the current HSE template. Revisions to the following Sections: 3.0; 4.0; 7.0; 8.0; 9.0; 10.0; 11.0; 12.0; and Attachment 4.

Revisions Approved By: Eric Hamm  **Date: June 13, 2013**

1.0 Introduction

CH2MHILL

HSSE Target Zero

Health, Safety, Security and Environment Policy

Protection of people and the environment is a CH2M HILL core value. It is our vision to create a culture within CH2M HILL that empowers employees to drive this value into all global operations and achieve excellence in health, safety, security and environment (HSSE) performance. CH2M HILL deploys an integrated, enterprise-wide behavior based HSSE management system to fulfill our mission and the expectations of our clients, staff, and communities based on the following principles:

- We require all management and supervisory personnel to provide the leadership and resources to inspire and empower our employees to take responsibility for their actions of their fellow employees to create a safety, healthy, secure and environmentally-responsible workplace.
- We provide value to clients by tailoring HSSE processes to customer needs and requiring all CH2M HILL employees and subcontractors to delivery projects with agility, personal service, and responsiveness and in compliance with HSSE requirements and company standards to achieve health, safety, and security and pollution prevention excellence. Our performance will aspire to influence others and continually redefine world-class HSSE excellence.
- We systematically evaluate our design engineering and physical work environment to verify safe and secure work conditions and practices are established, consistently followed, and timely corrected.
- We continually assess and improve our HSSE program to achieve and maintain world-class performance by setting and reviewing objectives and targets, reporting performance metrics, and routinely reviewing our program.
- We care about the safety and security of every CH2M HILL employee and expect all employees to embrace our culture, share our core value for the protection of people and the environment, understand their obligations, actively participate, take responsibility, and "walk the talk" on and off the job.

The undersigned pledge our leadership, commitment, and accountability for making this policy a reality at CH2M HILL.

Dated the 29th date of March, 2011.

Lee McIntire
Chief Executive Officer

John Madia
Chief Human Resources Officer

Mike Lucki
Chief Financial Officer

Margaret McLean
Chief Legal Officer

Mike McKelvy
President, Government, Environment, & Nuclear Division

Bob Card
President, Energy & Water Division

Jacqueline Rast
President, Facilities & Infrastructure Division

Fred Brune
President, International Division

Gene Lupis
President, Delivery Excellence

Keith Christopher
Senior Vice President, Health, Safety, Security and Environment

1.1 CH2M HILL Policy and Commitment

1.1.1 Safe Work Policy

It is the policy of CH2M HILL to perform work in the safest manner possible. Safety must never be compromised. To fulfill the requirements of this policy, an organized and effective safety program must be carried out at each location where work is performed.

CH2M HILL believes that all injuries are preventable, and we are dedicated to the goal of a safe work environment. To achieve this goal, every employee on the project must assume responsibility for safety.

Every employee is empowered to:

- Conduct their work in a safe manner;
- Stop work immediately to correct any unsafe condition that is encountered; and
- Take corrective actions so that work may proceed in a safe manner.

Safety, occupational health, and environmental protection will not be sacrificed for production. These elements are integrated into quality control, cost reduction, and job performance, and are crucial to our success.

1.1.2 Health and Safety Commitment

CH2M HILL has embraced a philosophy for health and safety excellence. The primary driving force behind this commitment to health and safety is simple: employees are CH2M HILL's most significant asset and CH2M HILL management values their safety, health, and welfare. Also, top management believes that all injuries are preventable. CH2M HILL's safety culture empowers employees at all levels to accept ownership for safety and take whatever actions are necessary to eliminate injury. Our company is committed to world-class performance in health and safety and also understands that world-class performance in health and safety is a critical element in overall business success.

CH2M HILL is committed to the prevention of personal injuries, occupational illnesses, and damage to equipment and property in all of its operations; to the protection of the general public whenever it comes in contact with the Company's work; and to the prevention of pollution and environmental degradation.

Company management, field supervisors, and employees plan safety into each work task in order to prevent occupational injuries and illnesses. The ultimate success of CH2M HILL's safety program depends on the full cooperation and participation of each employee.

CH2M HILL management extends its full commitment to health and safety excellence.

1.1.3 Project-Specific Health, Safety, and the Environment Goals

All management and employees are to strive to meet the project-specific Health, Safety, and the Environment (HSE) goals outlined below. The team will be successful only if everyone makes a concerted effort to accomplish these goals. The goals allow the project to stay focused on optimizing the health and safety of all project personnel and, therefore, making the project a great success.

The Project has established eleven specific goals and objectives:

- Create an injury-free environment;
- Have zero injuries or incidents;
- Provide management leadership for HSE by communicating performance expectations, reviewing and tracking performance, and leading by example;
- Ensure effective implementation of the HSP through education, delegation, and team work;
- Ensure 100 percent participation in HSE compliance;
- Continuously improve our safety performance;

- Maintain free and open lines of communication;
- Make a personal commitment to safety as a value;
- Focus safety improvements on high-risk groups;
- Continue strong employee involvement initiatives; and
- Achieve health and safety excellence.

2.0 Applicability

This HSP applies to:

- All CH2M HILL staff, including subcontractors and tiered subcontractors of CH2M HILL working on the site; and
- All visitors to the construction site in the custody of CH2M HILL (including visitors from the Client, the Government, the public, and other staff of any CH2M HILL company).

This HSP does not apply to the third-party contractors, their workers, their subcontractors, their visitors, or any other persons not under the direct control or custody of CH2M HILL.

This HSP defines the procedures and requirements for the health and safety of CH2M HILL staff and visitors when they are physically on the work site. The work site includes the project area (as defined by the contract documents) and the project offices, trailers, and facilities thereon.

This HSP will be kept onsite during field activities and will be reviewed as necessary. The HSP will be amended or revised as project activities or conditions change or when supplemental information becomes available. The HSP adopts, by reference, the Enterprise-wide Core Standards and Standard Operating Procedures (SOPs), as appropriate. In addition, the HSP may adopt procedures from the project Work Plan and any governing regulations. If there is a contradiction between this HSP and any governing regulation, the more stringent and protective requirement shall apply.

This HSP incorporates the regulatory requirements described in the State of California OSHA agency – Cal/OSHA Title 8 CCR, Section 3203, Injury and Illness Prevention Program (IIPP), and section 1509, Construction Injury and Illness Prevention Program. The current version of CH2M HILL Cal/OSHA IIPP written program can be accessed on the HSSE website under Programs.

All CH2M HILL staff and subcontractors must sign the employee sign-off form included in this document as Attachment 1 to acknowledge review of this document. Copies of the signature page will be maintained onsite by the Safety Coordinator (SC).

3.0 General Project Information

3.1 Project Information and Background

Projects: Combined Monitoring, Field Activities, and Downstream Sampling

Client: Pacific Gas & Electric

Project/Site Name: Topock Site Remediation, PG&E Topock Gas Compressor Station

Site Address: 15 miles southeast of Needles, California (eastern San Bernardino County)

CH2M HILL Project Manager(s):	Jill Bensen/BAO (Program Manager) Christina Hong/LAC (Site Manager) Eric Hamm/SCO (PG&E Program Health and Safety Manager) Jay Piper/LAS (Monitoring PM) Scott O'Donnell/TPK (IM3 Treatment Plant Manager) Mike Cavaliere/BAO (Field Projects PM)
TASK MANAGER(s):	Christy Hall/LAS (Monitoring Programs) Dennis Fink/BAO (IM3 Engineer) John Porcella/BAO (IM3 Engineer) Barry Collom/CVO (Topock Onsite Safety Coordinator) Christy Hall/LAS (PMP/GMP)

CH2M HILL Office: Oakland, California Office (BAO)

DATE HSP Prepared: rev1 - 11/20/2001, rev2 - 10/28/2003, rev3 – 02/19/2004, rev4- 04/02/2004, rev5- 08/20/2004, rev6-04-26-2005, rev 8 09-19-2005. Revision 01-15-2007, Revision 03-30-2007, revised 02/28/2008, revised 07-15-08, revised 04-15-2009, revised 12-23-2009, revised 06-01-2010, revised 3-01-2011, revised 01/26/2012; revised 05/30/2013; revised 06/13/2013

Date(s) of Site Work: Project startup in November 2001 (site visit/observe other samplers); ongoing groundwater and surface water sampling; drilling of exploratory boring/well in November 2003; interim corrective measures scheduled for 2004; Numerous work tasks, including water sampling, remediation work and such will continue through 2014.

3.2 Site Background and Setting

SITE ACCESS: Active PG&E gas compressor facility, requires sign-in & safety orientation: most sampling locations and wells are on federal (BLM) land.

SITE SIZE: approximately 1/2-mile square study area

SITE TOPOGRAPHY: high desert, hills & dry wash/alluvial terrain

PREVAILING WEATHER: dry; very hot during summer

SITE DESCRIPTION AND HISTORY: Active natural gas compressor facility which was subject of a RCRA Facility Investigation (RFI) to investigate extent of chromium-impacts to soil and groundwater resulting from past wastewater disposal. The RFI Report and ongoing groundwater monitoring will be used to define the extent of the groundwater plume. It is anticipated that RFI field activities will be completed in 2008. Interim corrective measures (IM2/IM3) began in 2004 to provide hydraulic control of the groundwater plume. After completion of the RFI, the Corrective Measure Studies/Feasibility Study (CMS/FS) will be initiated to evaluate remedial alternatives and select a preferred remedy.

DESCRIPTION OF SPECIFIC TASKS TO BE PERFORMED:

Field activities identified for 2013-14 include the following tasks:

1. Groundwater Monitoring Program: Includes water level monitoring and groundwater and surface water sample collection, shipment for analysis of water samples, sampling equipment and decontamination, purge water handling and management for PG&E-arranged disposal. Surface water and depth-specific river channel sampling from boats and shoreline locations. There is potential for pore water sampling in the future in the wetlands.
2. Development and testing of future monitoring and injection wells.
3. Construction projects –MW 20 Bench truck loading facility and AOC 4 Time Critical Removal Action. These tasks are complete, although there are other potential construction tasks in the future.
4. Biological survey and monitoring
5. Miscellaneous field support to PG&E and to other contractors at PG&E's request.
6. Additional Soil Sampling, Opportunistic soil sampling. This requires soil sampling at various AOC's surrounding and inside the compressor station. Efforts to collect soil samples involve shallow samples using hand auger, and deeper samples requiring excavation and drilling, or taking advantage of sampling excavations completed for other purposes. Many sites are in steep terrain and will require unique approaches to complete the work safely.
7. Support for Final Remedy Design: Adhoc data collection activities including potholing for utility verification, baseline noise data collection, and ground surveys. . .
8. Freshwater exploratory borehole drilling and installation/testing of fresh water wells, described below:

    - Biological assessments - Programmatic Biological Assessment (PBA) will be performed on up to 1 acre of upland habitat that may be disturbed during exploratory borings and water well drilling.
    - . . Exploratory drilling - Exploratory boreholes, to a total depth of up to 400 feet bgs with a diameter of up to 8 inches (nominal), will be drilled and tested at up to two locations to assess groundwater quality and qualitatively assess groundwater quantity. Exploratory boreholes will be drilled using a rotary drilling method with casing advance capabilities. The equipment required to conduct the exploratory drilling will include the following:
        - a drilling rig(s),
        - rig support truck (highway-rated),
        - water truck (highway-rated),
        - forklift and/or backhoe (rubber tire), and
        - crew vehicles (highway-rated).
        - Additional miscellaneous equipment may include the following - mobile storage tanks and bins, auxiliary compressors, pumps, and generators.
    - Supply well installation - Mobilize to install and test up to two supply wells. Boreholes for supply well construction will be drilled using drilling methods similar to the exploratory boreholes (i.e., casing advance), with a diameter up to 42 inches in the uppermost part of the well where surface casing will be set, with the borehole diameter in the deeper sections of the supply well will likely be 18 to 24 inches.
    - Hydraulic tests—including step-rate and constant-rate extraction tests—will be conducted at each newly installed supply well and existing supply well HNWR-1 to collect data about both well and aquifer performance and changes in water quality when pumped over a period of multiple days.
    - Management of IDW.

3.3 Description of Tasks

All CH2M HILL and Subcontractor employees engaging in hazardous waste operations (HAZWOPER) or emergency response shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65 (or if required by Subcontract). Personnel who have not met these training requirements shall not be allowed to engage in hazardous waste operations or emergency response activities. See the following tasks that fall under HAZWOPER requirements.

3.3.1 Hazwoper-Regulated Tasks

- Soil and surface water sampling
- Drilling, well install, rehab, abandon
- Groundwater sampling
- Water level monitoring and transducer downloads and maintenance
- Backhoe excavation
- Video flow/logging of wells
- Excavation removal actions of COC's
- IDW drum sampling and disposal
- O&M of groundwater extraction and treatment system operations
- Treatment system upgrade work (CCI)
- AOC 4 survey and recon work
- Pre-work nesting bird surveys or other biological surveys
- Hydro/Vacuum excavating

3.3.2 Non-Hazwoper-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Contact the Responsible Health and Safety Manager prior to using non-Hazwoper-trained personnel for the following tasks when working on a regulated hazardous waste site.**

TASKS	CONTROLS
• Green construction projects • Minor grounds keeping tasks, road repair • Crane work for installation of equipment • Surveying in non-controlled areas without COC's. • Utility locates • Pre-work nesting bird surveys or other biological surveys • Baseline noise data collection • Freshwater exploration and well installation tasks, which are not in the vicinity of the groundwater plume.	• Brief on hazards, limits of access, and emergency procedures. • Post areas of contamination as appropriate. • Perform air sampling/monitoring as specified in this HSP.

Site Map

This page is reserved for a Site Map.

Note locations of Support, Decontamination, and Exclusion Zones; site telephone; first aid station; evacuation routes; and assembly areas.

4.0 Project Organization and Responsibilities

4.1 Client

Contact Name: Yvonne Meeks, PG&E Project Manager
Phone: (805) 546-5243
Facility Contact Name: Curt Russell, Topock Facility Site Environ. Manager
Phone: (760) 326-5524

4.2 CH2M HILL

4.2.1 Project Manager

Project Site Manager Name: Christina Hong/LAC
CH2M HILL Office: Los Angeles
Telephone Number: 626-703-4475
Cellular Number: 626-297-5292

Program Manager: Jill Bensen/BAO

Project Manager (Field Activities): Mike Cavaliere/BAO

Project Manager (groundwater program): Jay Piper/LAS

Project Manager (interim corrective measures): Dennis Fink/BAO

Health and Safety Manager: Eric Hamm/SCO (Jim Bushnell/DSE – alternate)

Overall Site Safety Coordinator: Barry Collom (overall site), others for task specific jobs.

The project manager (PM) is responsible for providing adequate resources (budget and staff) for project-specific implementation of the HSE management process. The PM has overall management responsibility for the tasks listed below. The PM may explicitly delegate specific tasks to other staff, as described in sections that follow, but retains ultimate responsibility for completion of the following in accordance with this document:

- Incorporate standard terms and conditions, and contract-specific HSE roles and responsibilities in contract and subcontract agreements (including flow-down requirements to lower-tier subcontractors).
- Select safe and competent subcontractors by:
  - Choosing potential subcontractors based on technical ability and HSE performance;
  - Implementing the subcontractor prequalification process;
  - Ensuring that acceptable certificates of insurance, including CH2M HILL as named additional insured, are secured as a condition of subcontract award; and
  - Ensuring HSE submittals, subcontract agreements, and appropriate site-specific safety procedures are in place and accepted prior field mobilization.
- Ensure copies of training and medical monitoring records, and site-specific safety procedures are being maintained in the project file accessible to site personnel.
- Provide oversight of subcontractor HSE practices per the site-specific safety plans and procedures.
- Manage the site and interfacing with 3rd parties in a manner consistent with the contract and subcontract agreements and the applicable standard of reasonable care.
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented.
- Provide visible support and motivation for HSE programs, rules, procedures, processes, and training, leading by example and encouraging CH2M HILL employees to take ownership of HSE issues.

- Intervene or stop work when an unsafe condition or behavior is observed, and/or when an environmentally compromising condition is encountered.
- Make available to and require CH2M HILL employees to complete required HSE training within established timelines and provide project numbers for such training.
- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites.
- Promptly report all work-related HSE incidents or near misses.
- Wear any required personal protective equipment.
- Ensure CH2M HILL employees complete required HSE training within established timelines.
- Conduct, cooperate, or assist with HSE incident investigations.
- Consult with the Human Resources Delivery Partner before taking any disciplinary action (other than verbal counseling) associated with CH2M HILL Policy 203 and/or HSE programs rules, procedures, processes and training.

4.2.2 CH2M HILL Responsible Health and Safety Manager

RHSM Name: Eric Hamm
Job Title: Project HSM (alternate)
CH2M HILL Office: Santa Ana
Cellular Number: +1 (626) 644-2563

The RHSM is responsible for the following:

- Review and evaluate subcontractor HSE performance using the pre-qualification process;
- Approve HSP and its revisions as well as Activity Hazard Analyses (AHA);
- Review and evaluate subcontractor site-specific safety procedures for adequacy prior to start of subcontractor's field operations;
- Support the oversight (or SC's direct oversight) of subcontractor and tiered subcontractor HSE practices;
- Permit upgrades and downgrades in respiratory protection after reviewing analytical data;
- Conduct audits as determined by project schedule and coordination with PM; and
- Participate in incident investigations, lessons learned, loss and near loss reporting.

4.2.3 CH2M HILL Project Environmental Manager

EM Name: John Blasco/BAO
CH2M HILL Office: BAO
Telephone Number: 1 (707) 827-3614
Cellular Number:

The Project EM is responsible for the following:

- Provide environmental program support in areas such as training, auditing, planning, permit tracking, and subcontractor oversight as needed or as specified in the project environmental plan;
- Review and evaluate qualifications for subcontractors with a history of environmental non-compliance and for waste transportation and disposal subcontractors;
- Evaluate any spills, releases, or environmental permit incidents for appropriate follow-up actions, notifications, and recordkeeping requirements; and

- Provide environmental compliance and environmental management expertise and advice to the project team as needed during the course of the project.

4.2.4 CH2M HILL Safety Coordinator

SC Name: Barry Collom
Job Title: Topock SC
CH2M HILL Office: RIV
Telephone Number: 541-768-3687
Cellular Number: 541-740-3250

Alternate SC Name: Ryan Phelps
Job Title: IM3 SC
Telephone Number: 760-326-3328

The SC is responsible for verifying that the project is conducted in a safe manner including the following specific obligations:

- Verify this HSP is current and amended when project activities or conditions change;
- Verify CH2M HILL site personnel and subcontractor personnel read the HSP and sign the Employee Sign-Off Form, prior to commencing field activities;
- Verify CH2M HILL site personnel have completed any required specialty training (for example, fall protection, confined space entry, among others) and medical surveillance as identified in this HSP;
- Verify that project files include copies of subcontractor training and medical monitoring records, and accepted site-specific safety procedures prior to start of subcontractor's field operations;
- Act as the project "Hazard Communication Coordinator" and perform the responsibilities outlined in the HSP;
- Act as the project "Emergency Response Coordinator" and perform the responsibilities outlined in the HSP;
- Post the Occupational Safety and Health Administration (OSHA) job-site poster; the poster is required at sites where project field offices, trailers, or equipment-storage boxes are established. If you work in a state with an OSHA State Plan, make sure the State Plan poster is posted, if required;
- Hold and/or verify that safety meetings are conducted and documented in the project file initially and as needed throughout the course of the project (as tasks or hazards change);
- Verify that project health and safety forms and permits are being used as outlined this HSP;
- Perform oversight and assessments of subcontractor HSE practices per the site-specific safety plan and verify that project activity self-assessment checklists are being used as outlined this HSP;
- Coordinate with the RHSM regarding CH2M HILL and subcontractor operational performance, and 3rd party interfaces;
- Verify appropriate personal protective equipment (PPE) use, availability, and training;
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented;
- Conduct accident investigations including root cause analysis;
- Calibrate and conduct air monitoring in accordance with the HSP; maintain all air monitoring records in project file;
- Maintain HSE records and documentation;
- Facilitate OSHA or other government agency inspections including accompanying inspector and providing all necessary documentation and follow-up;

- Deliver field HSE training as needed based on project-specific hazards and activities;
- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites;
- Wear any required personal protective equipment;
- Conduct, cooperate, or assist with HSE incident investigations;
- Contact the PM and RHSM when standards of conduct or CH2M HILL Policy 203 has been violated by a CH2M HILL employee;
- Contact the RHSM and PM in the event of an incident;
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, stop affected work until adequate corrective measures are implemented, and notify the PM and RHSM as appropriate; and
- Document all oral health and safety-related communications in project field logbook, daily reports, or other records.

4.3 CH2M HILL Subcontractors

(Reference CH2M HILL SOP HSE-215, *Contracts and Subcontracts)*

Advanced Technology Laboratories, Las Vegas, NV (direct to CH2M HILL) and Truesdail Laboratories, Tustin, CA (2nd tier sub under E2) will pickup samples from the site to take them to the laboratory for analysis. (APPL, EMAX, other labs direct to CH2M)

. **Captain Doyle River Excursions,** Topock Marina**.** Boat charter service and captains for boat tasks.

Northstar, Rob Tweidt, (949) 580-2800. Oversight of well installation and sampling.

Util-Locate, Alex Bogdanoff, (714) 296-9680

Besst INC, San Rafael, CA will provide specialized well testing services. (**pass through Northstar)**

William Self and Associates, will provide biological survey and oversight services.

NorCal Geophysical, will provide surface geophysical survey services.

Groundwater Partners, will provide on call technical services associated with exploratory drilling and well installation.

E2 Consulting Engineers, will provide on call technical consulting services.

Drilling contractor for freshwater exploration and supply well installation is to be determined.

Subcontractors must comply with the following activities, and are responsible to:

- Comply with all local, state, and federal safety standards;
- Comply with project and owner safety requirements;
- Actively participate in the project safety program and either hold or attend and participate in all required safety meetings;
- Provide a qualified safety representative to interface with CH2M HILL;
- Maintain safety equipment and PPE for their employees;
- Maintain and replace safety protection systems damaged or removed by the subcontractor's operations;
- Notify the SC of any accident, injury, or incident (including spills or releases) immediately and submit reports to CH2M HILL within 24 hours;

- Install contractually required general conditions for safety (for example, handrail, fencing, fall protection systems, floor opening covers);
- Conduct and document weekly safety inspections of project-specific tasks and associated work areas;
- Conduct site-specific and job-specific training for all subcontractor employees, including review of the CH2M HILL HSP, subcontractor HSPs, and subcontractor AHAs and sign appropriate sign-off forms; and
- Determine and implement necessary controls and corrective actions to correct unsafe conditions.

The subcontractors listed above may be required to submit their own site-specific HSP and other plans such as lead or asbestos abatement compliance plans. Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit their plans to CH2M HILL for review and acceptance before the start of field work.

Subcontractors are also required to prepare AHAs before beginning each activity posing hazards to their personnel. The AHA shall identify the principle steps of the activity, potential health and safety hazards for each step and recommended control measures for each identified hazard. In addition, a listing of the equipment to be used to perform the activity, inspection requirements, and training requirements for the safe operation of the equipment listed must be identified.

4.4 Employee Responsibilities

All personnel are assigned responsibility for safe and healthy operations. This concept is the foundation for involving all employees in identifying hazards and providing solutions. For any operation, individuals have full authority to stop work and initiate immediate corrective action or control. In addition, each worker has a right and responsibility to report unsafe conditions or practices. This right represents a significant facet of worker empowerment and program ownership. Through shared values and a belief that all accidents are preventable, our employees accept personal responsibility for working safely.

Each employee is responsible for the following performance objectives:

- Understanding and abiding by CH2M HILL and client HSE programs, rules, procedures, processes, and training, including any that are project-specific;
- Completing all required HSE training made available and accessible within established timelines;
- Always wearing any required personal protective equipment;
- Intervening or stopping work for you or other CH2M HILL employees when an unsafe condition or behavior is encountered or observed, and/or when an environmentally compromising condition exists;
- Promptly notifying a supervisor, PM, SC, or RHSM when an unsafe condition or behavior is observed, and/or when an environmentally compromising condition exists;
- Promptly reporting a supervisor, PM, SC, or RHSM all work-related health, safety , and environmental incidents or near misses;
- Attending required project HSE pre-task briefings and meeting prior to performing work; and
- Cooperating or assisting with HSE incident investigations.

4.4.1 Employee Authority

Each employee on the project has the obligation and authority to shut down any perceived unsafe work and during employee orientation, each employee will be informed of their authority to do so.

4.5 Client Contractors

(Reference CH2M HILL SOP HSE-215, *Contracts, Subcontracts and HSE Management Practices*)

Contractor:
Contact Name:
Telephone:
Contractor Task(s):

Contractor:
Contact Name:
Telephone:
Contractor Task(s):

This HSP does not cover contractors that are contracted directly to the client or the owner. CH2M HILL is not responsible for the health and safety or means and methods of the contractor's work, and we must never assume such responsibility through our actions (such as advising on health and safety issues). In addition to these instructions, CH2M HILL team members should review contractor safety plans so that we remain aware of appropriate precautions that apply to us. Self-assessment checklists are to be used by the SC and CH2M HILL team members to review the contractor's performance only as it pertains to evaluating CH2M HILL exposure and safety. The RHSM is the only person who is authorized to comment on or approve contractor safety procedures.

Health and safety-related communications with contractors should be conducted as follows:

- Request the contractor to brief CH2M HILL team members on the precautions related to the contractor's work;
- When an apparent contractor non-compliance or unsafe condition or practice poses a risk to CH2M HILL team members:
  - Notify the contractor safety representative;
  - Request that the contractor determine and implement corrective actions;
  - If necessary, stop affected CH2M HILL work until contractor corrects the condition or practice; and
  - Notify the client, PM, and RHSM as appropriate.

If apparent contractor non-compliance or unsafe conditions or practices are observed, inform the contractor safety representative (CH2M HILL's obligation is limited strictly to informing the contractor of the observation; the contractor is solely responsible for determining and implementing necessary controls and corrective actions).

If an apparent imminent danger is observed, immediately warn the contractor employee(s) in danger and notify the contractor safety representative (CH2M HILL's obligation is limited strictly to immediately warning the affected individual(s) and informing the contractor of the observation; the contractor is solely responsible for determining and implementing necessary controls and corrective actions).

All verbal health and safety-related communications will be documented in project field logbook, daily reports, or other records.

5.0 Standards of Conduct

All individuals associated with this project must work injury-free and drug-free and must comply with the following standards of conduct, the HSP, and the safety requirements of CH2M HILL. Commonly accepted standards of conduct help maintain good relationships between people. They promote responsibility and self-development. Misunderstandings, frictions, and disciplinary action can be avoided by refraining from thoughtless or wrongful acts.

5.1 Standards of Conduct Violations

All individuals associated with this project are expected to behave in a professional manner. Violations of the standards of conduct would include, but not be limited to:

- Failure to perform work;
- Inefficient performance, incompetence, or neglect of work;
- Willful refusal to perform work as directed (insubordination);
- Negligence in observing safety regulations, poor housekeeping, or failure to report on-the-job injuries or unsafe conditions;
- Unexcused or excessive absence or tardiness;
- Unwillingness or inability to work in harmony with others;
- Discourtesy, irritation, friction, or other conduct that creates disharmony;
- Harassment or discrimination against another individual;
- Failure to be prepared for work by wearing the appropriate construction clothing or bringing the necessary tools; or
- Violation of any other commonly accepted reasonable rule of responsible personal conduct.

5.2 Disciplinary Actions

The Environmental Services (ES) business group employees, employees working on ES business group projects, and subcontractor employees are subject to disciplinary action for not following HSE rules and requirements. Potential disciplinary action is equally applicable to all employees including management and supervision. Disciplinary action may include denial of access to the worksite, warnings, reprimands, and other actions up to and including termination depending on the specific circumstances.

5.3 Subcontractor Safety Performance

CH2M HILL should continuously endeavor to observe subcontractors' safety performance and adherence to their plans and AHAs. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. CH2M HILL oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

5.3.1 Observed Hazard Form

When apparent non-compliance or unsafe conditions or practices are observed, notify the subcontractor's supervisor or safety representative verbally, and document using the Observed Hazard Form, included as an attachment to this HSP, and require corrective action.

If necessary, stop subcontractor's work using the Stop Work Order Form until corrective actions is implemented for observed serious hazards or conditions. Update the Observed Hazard Form to document corrective actions

have been taken. The subcontractor is responsible for determining and implementing necessary controls and corrective actions.

5.3.2 Stop Work Order

CH2M HILL has the authority, as specified in the contract, and the responsibility to stop work in the event any CH2M HILL employee observes unsafe conditions or failure of the subcontractor to adhere to its safe-work practices, or observes a condition or practice that may result in a release or violation of an environmental requirement. This authority and action does not in any way relieve the subcontractor of its responsibilities for the means and methods of the work or, therefore, of any corrective actions. Failure to comply with safe work practices can be the basis for restriction or removal of the subcontractor staff from the job site, termination of the subcontract, restriction from future work, or all three.

When an apparent imminent danger is observed, immediately stop work and alert all affected individuals. Remove all affected CH2M HILL employees and subcontractor staff from the danger, notify the subcontractor's supervisor or safety representative, and do not allow work to resume until adequate corrective measures are implemented. Notify the PM, Contract Administrator (KA) and RHSM.

When repeated non-compliance or unsafe conditions are observed, notify the subcontractor's supervisor or safety representative and stop affected work by completing and delivering the Stop Work Order Form (attached to this HSP) until adequate corrective measures are implemented. Consult the KA to determine what the contract dictates for actions to pursue in event of subcontractor non-compliance including work stoppage, back charges, progress payments, removal of subcontractor manager, monetary penalties, or termination of subcontractor for cause.

5.4 Incentive Program

Each project is encouraged to implement a safety incentive program that rewards workers for exhibiting exemplary safety behaviors. Actions that qualify are those that go above and beyond what is expected. Actions that will be rewarded include spotting and correcting a hazard, bringing a hazard to the attention of your foreman, telling your foreman about an incident, coming up with a safer way to get the work done, or stopping a crew member from doing something unsafe. The program will operate throughout the project, covering all workers. The incentive program will be communicated to all employees during the project employee orientation and project safety meetings.

5.5 Reporting Unsafe Conditions/Practices

Responsibility for effective health and safety management extends to all levels of the project and requires good communication between employees, supervisors, and management. Accident prevention requires a pro-active policy on near misses, close calls, unsafe conditions, and unsafe practices. All personnel must report any situation, practice, or condition which might jeopardize the safety of our projects. All unsafe conditions or unsafe practices will be corrected immediately. CH2M HILL has zero tolerance of unsafe conditions or unsafe practices.

No employee or supervisor will be disciplined for reporting unsafe conditions or practices. Individuals involved in reporting the unsafe conditions or practices will remain anonymous.

The following reporting procedures will be followed by all project employees:

- Upon detection of any unsafe condition or practice, the responsible employee will attempt to safely correct the condition;
- The unsafe condition or practice will be brought to the attention of the worker's direct supervisor, unless the unsafe condition or practice involves the employee's direct supervisor. If so, the SC needs to be notified at once by the responsible employee;
- Either the responsible employee or responsible employee's direct supervisor is responsible for immediately reporting the unsafe condition or practice to the SC;

- The SC will act promptly to correct the unsafe condition or practice; and
- Details of the incident or situation will be recorded by the SC in the field logbook or use the Observed Hazard Form if subcontractor was involved.

6.0 Safety Planning and Change Management

6.1 Daily Safety Meetings and Pre-Task Safety Plans

Daily safety meetings are to be held with all project personnel in attendance to review the hazards posed and required HSE procedures and AHAs that apply for each day's project activities. The Pre-Task Safety Plans (PTSPs) serve the same purpose as these general assembly safety meetings, but the PTSPs are held between the crew supervisor and their work crews to focus on those hazards posed to individual work crews.

At the start of each day's activities, the crew supervisor completes the PTSP, provided as an attachment to this HSP, with input from the work crew, during their daily safety meeting. The day's tasks, personnel, tools and equipment that will be used to perform these tasks are listed, along with the hazards posed and required HSE procedures, as identified in the HSP and AHA. The use of PTSPs promotes worker participation in the hazard recognition and control process while reinforcing the task-specific hazard and required HSE procedures with the crew each day.

6.2 Change Management

This HSP addresses all known activities and associated hazards. As work progresses, if significant changes are identified which could affect health and safety at the site, coordinate with the RHSM to determine whether a HSP update is necessary.

The following are examples of changes that may require a revision to the plan:

- Change in CH2M HILL staff;
- New subcontractor to perform work;
- New chemicals brought to site for use;
- Change in scope or addition of new tasks;
- Change in contaminants of concern (COCs) or change in concentrations of COCs; and
- New hazards or hazards not previously identified that are not addressed in this HSP.

6.3 Agency Inspection Guidance

(Reference CH2M HILL SOP HSE-201, *Agency Inspections and Communications*)

Agency inspections (e.g., OSHA, EPA, other regulatory agencies) are on the rise. CH2M HILL implements safety and environmental programs in order to ensure safety to workers, the public, and the environment. This plan addresses things like labeling containers, completing the hazard communication training using the attachments to this HSP, listing training requirements and PPE requirements, and addressing project-specific hazards. Field personnel need to contact the RHSM to update this plan if hazards are encountered that are not addressed.

SOP HSE-201 addresses agency inspections in detail, and the attached **Target Zero Bulletin on Agency Inspections** provides a good summary of the inspection process and what to do if an agency such as OSHA or EPA shows up at the site. It is critical to make immediate notification to the RHSM if an inspector arrives (and EM if it is environmental-related); they can help facilitate and make additional notifications.

Review the Target Zero Bulletin and keep it with your Health and Safety Plan/Environmental Plan. Make it a topic at a safety meeting and keep it readily available in the event of an inspection.

7.0 Project Hazard Analysis

A health and safety risk analysis (Table 1) has been performed for each task. In the order listed below, the RHSM considers the various methods for mitigating the hazards. Employees are trained on this hierarchy of controls during their hazardous waste training and reminded of them throughout the execution of projects:

- Elimination of the hazards (use remote sampling methodology to avoid going into a confined space);
- Substitution (reduce exposure to vapors by using of a geoprobe instead of test pitting);
- Engineering controls (ventilate a confined space to improve air quality);
- Warnings (establish exclusion zones to keep untrained people away from hazardous waste work);
- Administrative controls (implement a work-rest schedule to reduce chance of heat stress); or
- Use of PPE (use of respirators when action levels are exceeded).

The hazard controls and safe work practices are summarized in the following sections of this HSP:

- General hazards and controls;
- Project-specific hazards and controls;
- Physical hazards and controls;
- Biological hazards and controls; and
- Contaminants of concern.

7.1 Activity Hazard Analysis

An AHA must be developed for each CH2M HILL job activity. The AHA shall define the work tasks required to perform each activity, along with potential HSE hazards and recommended control measures for each hazard. In addition, a listing of the equipment to be used to perform the activity, inspection requirements to be performed and training requirements for the safe operation of the equipment listed must be identified. Workers are briefed on the AHA before performing the work and their input is solicited prior, during, and after the performance of work to further identify the hazards posed and control measures required. The AHA shall identify the work tasks required to perform each activity, along with potential HSE hazards and recommended control measures for each hazard.

The following hazard controls and applicable CH2M HILL core standards and SOPs should be used as a basis for preparing AHAs.

AHAs prepared for CH2M HILL activities are included as an attachment to this HSP.

7.2 Subcontractor Activity Hazard Analysis

CH2M HILL subcontractors are required to provide AHAs specific to their scope of work on the project for acceptance by CH2M HILL. Each subcontractor shall submit AHAs for their field activities, as defined in their scope of work, along with their project-specific safety plan and procedures. Additions or changes in field activities, equipment, tools, or material used to perform work or hazards not addressed in existing AHAs requires either a new AHA to be prepared or an existing AHA to be revised.

TABLE 1
General Activity Hazard Analysis

Associated Hazard Section / Project Activity	Surveying, utility locate	Drilling, all types, hydraulic testing, Hydro, Vacuum & Backhoe excavate	Groundwater monitoring, aquifer testing, water level monitoring/transducer downloads, tracer study, well video logging, flow meter	Surface water and sediment sampling using a boat	Surface water and sediment sampling from the shore or water	IDW drum sampling and disposal	Observation of loading material for offsite disposal	Remediation & construction oversight	Soil sampling using Hand Auguring, excavation and drilling	
Refer to Section 8.0 – General Hazards and Controls										
Blood Borne Pathogens	X	X	X	X	X	X	X	X	X	
Chemical Storage	X		X				X	X		
Driving	X									
Electrical Safety	X	X	X	X				X		
Field Vehicles	X				X					
Firearms, Explosives and Weapons Policy	X	X	X	X	X	X	X	X	X	
Fire Prevention	X	X	X	X	X	X	X	X	X	
General Practices and Housekeeping	X	X	X	X	X	X	X	X	X	
Hazardous Communication	X		X			X	X	X		
Knife Use	X									
Lighting	X	X	X	X	X	X	X	X	X	
Manual Lifting and Field Ergonomics	X	X	X	X	X	X	X	X	X	
Personal Hygiene	X	X	X	X	X	X	X	X	X	
Shipping and Transportation of Hazardous Materials	X					X				
Substance Abuse	X	X	X	X	X	X	X	X	X	
Refer to Section 9.0 – Project Specific Hazards and Controls										
ATV/UTV Safety	X	X		X						
Arsenic		X	X	X	X	X				
Asbestos	X								X	
Chainsaws	X	X	X							
Compressed Gas Cylinders	X	X		X				X		
Asphalt/Concrete Cutting or Core Drilling										
Confined Space Entry	X	X						X		
Drum and Portable Tank	X	X	X	X	X	X	X	X		

TABLE 1
General Activity Hazard Analysis

Project Activity / Associated Hazard Section	Surveying, utility locate	Drilling, all types, hydraulic testing, Hydro, Vacuum & Backhoe excavate	Groundwater monitoring, aquifer testing, water level monitoring/transducer downloads, tracer study, well video logging, flow meter	Surface water and sediment sampling using a boat	Surface water and sediment sampling from the shore or water	IDW drum sampling and disposal	Observation of loading material for offsite disposal	Remediation & construction oversight	Soil sampling using Hand Auguring, excavation and drilling	
Handling										
Drum Sampling Safety	X					X				
Energized Electrical Work	X	X						X		
Fall Protection Activities	X	X					X	X		
Forklift Operations	X				X					
Hand & Power Tools	X	X	X	X	X	X	X	X	X	
Hexavalent Chromium (Cr VI) Exposure	X	X	X	X				X		
Lockout/Tagout	X	X	X					X		
Portable Generator	X			X						
Pressure Line/Vessel Systems	X	X	X					X		
Pressure Washing Operations	X		X					X		
Scaffolds	X	X	X				X	X		
Stairways and Ladders	X	X	X				X	X		
Utilities (underground)	X	X								
Utilities (overhead)	X	X								
Vacuum Trucks	X		X					X		
Visible Lighting	X	X	X		X		X	X		
Welding & Cutting	X	X								
Working Around Material Handling Equipment	X				X	X				
Work Alone		X					X	X	X	
Refer to Section 10.0 – Physical Hazards and Controls										
Noise	X	X	X	X	X	X	X	X		
Ultraviolet Light exposure (sunburn)	X	X	X	X	X	X	X	X	X	
Temperature Extremes	X	X	X	X	X	X	X	X	X	
Refer to Section 11.0 – Biological Hazards and Controls										
Africanized Bees	X	X	X	X	X	X	X	X	X	

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Associated Hazard Section / Project Activity	Surveying, utility locate	Drilling, all types, hydraulic testing, Hydro, Vacuum & Backhoe excavate	Groundwater monitoring, aquifer testing, water level monitoring/transducer downloads, tracer study, well video logging, flow meter	Surface water and sediment sampling using a boat	Surface water and sediment sampling from the shore or water	IDW drum sampling and disposal	Observation of loading material for offsite disposal	Remediation & construction oversight	Soil sampling using Hand Auguring, excavation and drilling	
Bees and Other Stinging Insects	X	X	X	X	X	X	X	X	X	
Cactus	X			X					X	
Cougars/Mountains Lions	X			X						
Coyotes	X			X						
Feral Dogs	X			X						
Fire Ants	X			X						
Hazards during hunting season	X			X						
Scorpions	X	X	X	X	X	X	X	X	X	
Snakes	X	X	X	X	X	X	X	X	X	
Spiders – Brown Recluse and Black Widow	X	X	X	X	X	X	X	X	X	

8.0 General Hazards and Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. It is a summarized list of requirements. Always consult the appropriate CH2M HILL SOP to ensure all requirements are implemented.

8.1 Bloodborne Pathogens

(Reference CH2M HILL SOP HSE-202, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first aid or cardiopulmonary resuscitation (CPR), or when coming into contact with landfill waste or waste streams containing potentially infectious material (PIM).

Employees trained in first-aid/CPR or those exposed to PIM must complete CH2M HILL's 1-hour bloodborne pathogens computer-based training module annually. When performing first-aid/CPR the following shall apply:

- Observe universal precautions to prevent contact with blood or other PIMs. Where differentiation between body fluid types is difficult or impossible, consider all body fluids to be potentially infectious materials;
- Always wash your hands and face with soap and running water after contacting PIMs. If washing facilities are unavailable, use an antiseptic cleanser with clean paper towels or moist towelettes; and
- If necessary, decontaminate all potentially contaminated equipment and surfaces with chlorine bleach as soon as possible. Use one part chlorine bleach (5.25 percent sodium hypochlorite solution) diluted with 10 parts water for decontaminating equipment or surfaces after initially removing blood or other PIMs. Remove contaminated PPE as soon as possible before leaving a work area.

CH2M HILL will provide exposed employees with a confidential medical examination should an exposure to PIM occur. This examination includes the following procedures:

- Documenting the exposure;
- Testing the exposed employee's and the source individual's blood (with consent); and
- Administering post-exposure prophylaxis.

8.2 Chemical Storage

The following are general guidelines for storing chemicals and other hazardous materials:

- Keep acids away from bases;
- Keep oxidizers (nitric acid, nitrates, peroxides, chlorates) and organics away from inorganic reducing agents (metals);
- Keep flammables and corrosives in appropriate storage cabinets;
- Do not store paper or other combustibles near flammables;
- Use secondary containment and lipped shelving that is secured; and
- Have a fire suppression system available.

8.2.1 Storage of Flammable/Combustible Liquids

- Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.
- Approved safety cans shall be used for the handling and use of flammable liquids in quantities of 5 gallons (19 liters) or less. Do not use plastic gas cans.

- For quantities of 1 gallon (3.78 liters) or less, the original container may be used for storage and use of flammable liquids.
- Flammable or combustible liquids shall not be stored in areas used for stairways or normally used for the passage of people.

8.2.2 Indoor Storage of Flammable/Combustible Liquids

- No more than 25 gallons (95 liters) of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet.
- Quantities of flammable and combustible liquids in excess of 25 gallons (95 liters) shall be stored in an acceptable or approved cabinet.
- Cabinets shall be conspicuously lettered: "FLAMMABLE: KEEP FIRE AWAY."
- Not more than 60 gallons (228 liters) of flammable or 120 gallons (456 liters) of combustible liquids shall be stored in any one storage cabinet. Not more than three such cabinets may be located in a single storage area.

8.2.3 Outside Storage of Flammable/Combustible Liquids

- Storage of containers (not more than 60 gallons [228 liters] each) shall not exceed 1,100 gallons (4180 liters) in any one area. No area shall be within 20 feet (6.1 meters) of any building.
- Storage areas shall be graded to divert spills away from buildings and surrounded by an earthen dike.
- Storage areas may not be located near a storm drain. Overflow and spills must be diverted away from storm drains or surface waters.
- Storage areas shall be free from weeds, debris, and other combustible materials.
- Outdoor portable tanks shall be provided with emergency vent devices and shall not be closer than 20 feet (6.1 meters) to any building.
- Signs indicating no smoking shall be posted around the storage area.

8.2.4 Storage of Hazardous Waste

- All facilities storing ignitable and combustible liquids and hazardous wastes must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any release of hazardous constituents.
- Flammable wastes should be stored more than 50 feet from the property line.

8.2.5 Storage of Chemical Injection Chemicals/Materials

When chemical injection remediation technologies are being used at a site, the following storage guidelines must be followed:

- Some injection chemicals, such as strong oxidizers, may have stringent storage requirements per local or National Fire Codes. Verify that appropriate storage provisions are in place prior to starting work.

  NOTE: Counties and cities may have requirements specific to storing these chemicals. Also, storage and use of certain chemicals such as potassium permanganate and hydrogen peroxide may be subject to the new Chemical Facility Anti-Terrorism Standards of the Department of Homeland Security – the applicability depends on the chemical, quantity/concentration, and type of facility. Please contact the project Environmental Manager to determine whether chemicals are subject to these standards.

- Injection chemicals must be stored in a designated, secured area with spill prevention capabilities. Review MSDS or other information to determine potential incompatible materials. Incompatible materials shall not be stored together. Ensure all containers are labeled.

8.3 Driving Safety

(Reference CH2M HILL HSE Policy 205, Distracted Driving – Wireless Devices, Vehicle Safety Core Standard)

All CH2M HILL employees are prohibited from using Wireless Devices while operating a Motor Vehicle when conducting company business regardless of the location or vehicle ownership and whether or not during regular working hours.

All CH2M HILL contractors and subcontractors are prohibited from using Wireless Devices while operating a CH2M HILL- or CH2M HILL client-owned, leased, or rented Motor Vehicle, or while operating any other Motor Vehicle on the project site.

- Prohibited use includes the following:
  - Dialing or speed dialing
  - Using a hands-free or voice recognition (blue tooth) device to dial or speed dial
  - Engaging in conversation or listening to a conversation using a Wireless Device
  - Checking emails or surfing the internet using a Wireless Device
  - Texting or e-mailing (reading, sending, or screening) with a Wireless Device
  - Programming or entering coordinates into a global positioning system (GPS) device (following directions by a GPS is permitted)
  - Using a Wireless Device for voice recording or dictation
- Employees, contractors, and subcontractors who need to use a wireless device must pull off the road to a safe location, with the vehicle securely stopped and emergency flashers on, or wait until they reach their destination.
- Avoid distractions from mobile phones, smartphones, voice recognition systems, PDAs, notebook, tablets (or similar devices), or laptops, by turning off or silencing the wireless devices before operating a motor vehicle.

Follow the guidelines below when operating a vehicle:

- All vehicles have blind spots to the side and the rear.
- Backing up — safe practices:
  - Walk around your vehicle prior to moving
  - Try to position your vehicle so that you don't have to back up.
  - Back into the space if possible when you're parking.
  - Back to the left if possible so that you can see objects on the driver's side.
  - Have a spotter guide your vehicle when you're backing up

Get Out and Look (GOAL)

- Obey speed limits; be aware of blind spots or other hazards associated with low visibility. Practice defensive driving techniques, such as leaving plenty of room between your vehicle and the one ahead of you;
- Do no drive while drowsy. Drowsiness can occur at any time, but is most likely after 18 hours or more without sleep;
- Maintain focus on driving. Eating, drinking, smoking, adjusting controls can divert attention from the road. Take the time to park and perform these tasks when parked rather than while driving; and
- Ensure vehicle drivers are familiar with the safe operation of vehicles of the type and size to be operated. Large vehicles such as full size vans and pick-ups have different vision challenges and handling characteristics than smaller vehicles.

8.4 Electrical Safety

(Reference CH2M HILL SOP HSE-206, *Electrical Safety*)

Below are the hazard controls and safe work practices to follow when using electrical tools, extension cords, and/or other electrical-powered equipment or when exposed to electrical hazards. Ensure the requirements of the referenced SOP are followed:

- Only qualified personnel are permitted to work on unprotected energized electrical systems;
- Only authorized personnel are permitted to enter high-voltage areas;
- CH2M HILL employees who might from time to time work in an environment influenced by the presence of electrical energy must complete Awareness Level Electrical Safety Training located on the CH2M HILL Virtual Office;
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented;
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service;
- CH2M HILL has selected Ground Fault Circuit Interrupters (GFCIs) as the standard method for protecting employees from the hazards associated with electric shock;
  - GFCIs shall be used on all 120-volt, single phase 15 and 20-amphere receptacle outlets which are not part of the permanent wiring of the building or structure.
- An assured equipment grounding conductor program may be required under the following scenarios:
  - GFCIs cannot be utilized;
  - Client requires such a program to be implemented; or
  - Business group decides to implement program in addition to GFCI protection.
- Extension cords must be equipped with third-wire grounding. Cords passing through work areas must be covered, elevated or protected from damage. Cords should not be routed through doorways unless protected from pinching. Cords should not be fastened with staples, hung from nails, or suspended with wire;
- Electrical power tools and equipment must be effectively grounded or double-insulated and Underwriters Laboratory (UL) approved;
- Operate and maintain electric power tools and equipment according to manufacturers' instructions;
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet (3 meters) from overhead power lines for voltages of 50 kV or less, and 10 feet (3 meters) plus 0.4 inches (1.0 cm) for every 1 kV over 50 kV;
- Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage; and
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

8.5 Field Vehicles

- Field vehicles may be personal vehicles, rental vehicles, fleet vehicles, or project vehicles.
- Maintain a first aid kit, bloodborne pathogen kit, and fire extinguisher in the field vehicle at all times.
- Utilize a rotary beacon on vehicle if working adjacent to active roadway.
- Familiarize yourself with rental vehicle features prior to operating the vehicle:

  - Vision Fields and Blind Spots
  - Vehicle Size
  - Mirror adjustments
  - Seat adjustments
  - Cruise control features, if offered
  - Pre-program radio stations and Global Positioning System (GPS), if equipped

- Always wear seatbelt while operating vehicle.
- Adjust headrest to proper position.
- Tie down loose items if utilizing a van or pick-up truck.
- Close car doors slowly and carefully. Fingers can get pinched in doors.
- Park vehicle in a location where it can be accessed easily in the event of an emergency. If not possible, carry a phone.
- Have a designated place for storing the field vehicle keys when not in use.
- Ensure back-up alarms are functioning, if equipped. Before backing a vehicle, take a walk around the vehicle to identify obstructions or hazards. Use a spotter when necessary to back into or out of an area.
- See the Vehicle Accident Guidance attached to this HSP, if a vehicle incident is experienced in a rental or fleet vehicle.

8.6 Firearms, Explosives and Weapons Policy

CH2MHILL policy prohibits the use, possession or storage of any weapon, ammunition or explosive device on company property or in any company vehicle or vehicle being used for company business. No individual may have in his or her possession, bring to the project site, or maintain on CH2M HILL property, concealed or otherwise, any weapon, explosive device or substance, firearm, ammunition or instrument that could be used as a weapon. All weapons, explosive devices or substances, firearms, and ammunition are banned from all project sites, properties, vehicles and/or any CH2M HILL activities or events.

Weapons specified in the CH2MHILL Security/Asset Protection Manual include:

- Firearm, gun, pistol, rifle, or shotgun
- Knife with a blade longer than 3 inches, a switchblade, stiletto, or knife having an automatic spring release device
- Night stick/club/baton, martial arts weapons, bow and arrow or crossbow
- Malicious intent explosive device
- Concealed Weapon

Concealed weapons permit holders are not allowed to bring any weapon to CH2M HILL property or CH2M HILL site, project, office or facility. All project personnel are required to sign-off on the “Weapons Policy” in Attachment 1. Refer to Section 5.2 for possible disciplinary actions related to this policy.

8.7 Fire Prevention

(Reference CH2M HILL SOP HSE-403, *Hazardous Material Handling*)

Follow the fire prevention and control procedures listed below.

8.7.1 Fire Extinguishers and General Fire Prevention Practices

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet (30.5 meters). When 5 gallons (19 liters) or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet (15.2 meters). Extinguishers must:
  - be maintained in a fully charged and operable condition;
  - be visually inspected each month; and
  - undergo a maintenance check each year.
- The area in front of extinguishers must be kept clear.
- Post "Exit" signs over exiting doors, and post "Fire Extinguisher" signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet (3 meters) from any building.
- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.
- Keep areas neat. Housekeeping is important.

8.7.2 Dispensing of Flammable/Combustible Liquids

- Areas in which flammable or combustible liquids are dispensed in quantities greater than 5 gallons (22.7 liters) (shall be separated from other operations by at least 25 feet (7.6 meters).
- Drainage away from storm drains or surface waters or other means of containment shall be provided to control spills.
- Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable vapor at or below 10 percent of the lower flammable limit.
- Dispensing of flammable liquids from one container to another shall be done only when containers are electrically interconnected (bonded).
- Dispensing flammable or combustible liquids by means of air pressure on the container or portable tanks is prohibited.
- Dispensing devices and nozzles for flammable liquids shall be of an approved type.

8.8 General Practices and Housekeeping

The following are general requirements applicable to all portions of the work:

- Site work should be performed during daylight hours whenever possible;
- Good housekeeping must be maintained at all times in all project work areas;
- Common paths of travel should be established and kept free from the accumulation of materials;
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions;
- Provide slip-resistant surfaces, ropes, or other devices to be used;
- Specific areas should be designated for the proper storage of materials;
- Tools, equipment, materials, and supplies shall be stored in an orderly manner;
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area;
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals;
- All spills shall be quickly cleaned up; oil and grease shall be cleaned from walking and working surfaces;

- Review the safety requirements of each job you are assigned to with your supervisor. You are not expected to perform a job that may result in injury or illness to yourself or to others;
- Familiarize yourself with, understand, and follow jobsite emergency procedures;
- Do not fight or horseplay while conducting the firm's business;
- Do not use or possess firearms or other weapons while conducting the firm's business;
- Report unsafe conditions or unsafe acts to your supervisor immediately;
- Report emergencies, occupational illnesses, injuries, vehicle accidents, and near misses immediately;
- Do not remove or make ineffective safeguards or safety devices attached to any piece of equipment;
- Report unsafe equipment, defective or frayed electrical cords, and unguarded machinery to your supervisor;
- Shut down and lock out machinery and equipment before cleaning, adjustment, or repair. Do not lubricate or repair moving parts of machinery while the parts are in motion;
- Do not run in the workplace;
- When ascending or descending stairways, use the handrail and take one step at a time;
- Do not apply compressed air to any person or clothing;
- Do not wear steel taps or shoes with metal exposed to the sole at any CH2M HILL project location;
- Do not wear finger rings, loose clothing, wristwatches, and other loose accessories when within arm's reach of moving machinery;
- Remove waste and debris from the workplace and dispose of in accordance with federal, state, and local regulations;
- Note the correct way to lift heavy objects (secure footing, firm grip, straight back, lift with legs), and get help if needed. Use mechanical lifting devices whenever possible; and
- Check the work area to determine what problems or hazards may exist.

8.9 Hazard Communication

(Reference CH2M HILL SOPs HSE-107, *Hazard Communication* and HSE-403, *Hazardous Material Handling*)

The hazard communication coordinator is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using the chemical inventory form included as an attachment to this HSP;
- Confirm that an inventory of chemicals brought on site by CH2M HILL subcontractors is available;
- Request or confirm locations of material safety data sheets (MSDSs) from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed;
- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical and include on the chemical inventory sheet (attached to this HSP) and add the MSDS to the MSDS attachment section of this HSP;
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly;
- Give employees required chemical-specific HAZCOM training using the chemical-specific training form included as an attachment to this HSP; and
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

8.10 Knife Use

Open-bladed knives (for example, box cutters, utility knives, pocket knives, machetes, and multi-purpose tools with fixed blades such as a Leatherman™) are prohibited at worksites except where the following three conditions are met:

- The open-bladed knife is determined to be the best tool for the job;
- An approved Activity Hazard Analysis (AHA) or written procedure is in place that covers the necessary safety precautions (work practices, PPE, and training); and
- Knife users have been trained and follow the AHA.

8.11 Lighting

Lighting shall be evaluated when conducting work inside buildings, confined spaces, or other areas/instances where supplemental light may be needed (e.g., work before sunrise or after sunset). A light meter can be used to evaluate the adequacy of lighting. The following are common requirements for lighting and the conditions/type of work being performed:

- While work is in progress outside construction areas shall have at least 33 lux (lx);
- Construction work conducted inside buildings should be provided with at least 55 lux light;
- The means of egress shall be illuminated with emergency and non-emergency lighting to provide a minimum 11 lx measured at the floor. Egress illumination shall be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb will not leave any area in total darkness.

8.12 Manual Lifting and Field Ergonomics

(Reference CH2M HILL SOP HSE-112, *Manual Lifting*)

Some of the most common injuries during field work are the result of performing work in an awkward body position (poor ergonomics) or pushing the body beyond its natural limits. Workers who have to lift, stoop, kneel, twist, grip, stretch, reach overhead, or work in other awkward positions regularly are at risk of developing discomfort or even an injury. Additionally, back injuries are one of the leading causes of work disability and most back injuries are the result of improper lifting techniques or overexertion.

Contact the RHSM to determine hazard control measures if your task involves:

- Repetitive motions;
- Lifting and carrying items over long distances or on steep or sloped terrain;
- Heavy lifting;
- Use of vibrating tools or equipment; or
- Being in a static position for extended periods of time;

There are a variety of ergonomically designed tools and work practices that can reduce the potential for discomfort and injury. Following are requirements (“must” or “shall”) and recommendations (“should”) to aid in the prevention of discomfort or injuries while working in the field.

Fitness for Duty

If manual lifting and repetitive activities are not part of your normal work duties, contact your PM and/or RHSM to help determine if you have the physical capability to perform the work. In many cases adding lifting or repetitive tasks to a subcontractor’s scope of work is desirable to prevent injury. If the work task causes any pain or discomfort stop and get assistance.

Manual Lifting

- All CH2M HILL workers must have training in proper manual lifting either through New Employee Orientation or through the Manual Lifting module located on the VO;
- When possible, the task should be modified to minimize manual lifting hazards or awkward body positions;
- Lifting loads weighing more than 40 pounds (18 kilograms) shall be evaluated by the SC using the Lifting Evaluation Form contained in SOP HSE-112;
- Personnel shall seek assistance when performing manual lifting tasks that appear beyond their physical capabilities.
- Using mechanical lifting devices such as forklifts; cranes, hoists, and rigging; hand trucks; and trolleys; is the preferred means of lifting heavy objects;
- Work in the Power Zone - The power zone for lifting or working is close to the body, between mid-thigh and mid-chest height. This zone is where arms and back can lift the most with the least amount of effort.
- Work near elbow height to avoid bending excessive bending (avoid working above the shoulders and below the knees);
- Plan before carrying:
  - Wear appropriate shoes to avoid slips, trips or falls
  - If you wear gloves, wear gloves that fit. Tight-fitting gloves can put pressure on the hands, while loose-fitting gloves reduce grip strength and pose other safety hazards.
  - Avoid carrying large or bulky loads that limit or obstruct your vision
  - Slide, push, or roll instead of carrying when appropriate
  - When there is a choice, push instead of pull
  - Carry only as much as you can safely handle
  - Try to avoid slopes, stairs, or other obstacles that make carrying materials more difficult
  - Beware of and try to avoid slippery floors (e.g., liquids, ice, oil, and fine powders)
  - Use extra caution when moving loads that may be unstable
- In general, the following steps must be practiced when planning and performing manual lifts:
  - Examine the load and the surrounding area
  - Bend knees when lifting a load
  - Look forward to keep back straight
  - Position the load close to the body
  - Maintain a firm grip on the load
  - Test the load for stability and weight prior to lifting
  - Use smooth, controlled movements
  - Keep arms in front of body
  - Turn feet in direction of movement to avoid twisting
  - Avoid carrying objects more than 100 feet;

Ergonomic Work Practices

- Avoid repetitive motions, overhead reaching, and kneeling when possible;
- If prolonged awkward postures are unavoidable, use a “supported” posture to compensate; a supported posture uses part of your body to support the weight of another body segment that is in an awkward position;

- Watch your pace—attempting to do something faster can cause you to lose proper form;
- Use a table or move work to a location where you don't have to be in a bent-over position to do your work; and
- Where awkward postures or repetitive motions are unavoidable, rotate with another worker, change tasks, stretch, and take short breaks frequently.

8.13 Competent Person

The term "Competent Person" is used in many OSHA and International standards and documents. OSHA defines a "competent person" as one who, by way of training and/or experience, is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. Some standards add additional specific requirements which must be met by the competent person.

CH2M HILL's practice is that the employer responsible for directing the means and methods of an activity (typically the employer responsible for actually performing the work) is responsible for designating the qualified competent person for that activity. This is typically a subcontractor or a third party contractor, unless CH2M HILL is actually self-performing the work.

Should CH2M HILL self-perform work and an employee needs to be designated as a competent person, the CH2M HILL site or project manager shall coordinate with the BG HSE Lead or RHSM to verify that the employee has the requisite training and experience to be identified as the competent person.

8.14 Personal Hygiene

Good hygiene is essential for personal health and to reduce the potential of cross-contamination when working on a hazardous waste site. Implement the following:

- Keep hands away from nose, mouth, and eyes during work;
- Keep areas of broken skin (chapped, burned, etc.) covered; and
- Wash hands with soap and water prior to eating, smoking, or applying cosmetics.

8.15 Shipping and Transportation of Hazardous Materials

(Reference CH2M HILL SOP HSE-417, *Hazardous Materials Transportation*)

The U.S. Department of Transportation (DOT) has specific regulations governing shipping of hazardous materials (also called dangerous goods). Chemicals brought to the site might be defined as hazardous materials by the U.S DOT. Hazardous wastes that may be shipped offsite are also defined as hazardous materials by U.S. DOT. Other wastes may also be U.S. DOT hazardous materials. To confirm whether a material or a waste is a U.S. DOT hazardous material, check with the ESBG Waste Coordinator (Lisa Schwan/ATL), the project EM, or the CH2M HILL Dangerous Goods Shipping Coordinators (John Blasco/BAO or Rob Strehlow/MKW).

All staff who affect shipment of hazardous materials, including receiving hazardous materials, preparing profiles or manifests, packaging hazardous wastes, labeling, or transporting hazardous materials by road, are called HazMat employees (note CH2M HILL cannot transport hazardous wastes by public road). HazMat employees must receive CH2M HILL online training in shipping dangerous goods. CH2M HILL's online Dangerous Goods Shipping course can be found on the CH2M HILL HSSE website.

All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. If the material is a product that is being shipped (e.g., calibration gas), use the HazMat ShipRight tool on the CH2M HILL virtual office (under Company Resources – Online Shipping). Contact the Dangerous Goods Shipping coordinators, the ESBG Waste Coordinator or the project EM for additional information.

49 CFR 172 requires that all hazmat employees be aware of potential transportation security concerns. Hazardous materials security is addressed in CH2M HILL's Hazardous Materials SOP (HSE-403). The following points are provided as an overview of security measures to increase awareness of this important matter:

- It is essential that each employee understand the security risks involved with transporting hazardous materials;
- All transporters of hazardous materials must be prequalified by a Contracts Administrator who evaluate the carrier's safety rating, security measures, and employee screening procedures;
- When shipping hazardous materials, check driver credentials and ask about shipping details;
- When receiving a hazardous materials shipment, inspect packages for signs of tampering or damage to the contents. Verify the drivers and company information on the form with the driver; and
- If there is suspicious or unusual behavior (e.g., driver without credentials, evasive answers) or any discrepancies identified, do not offer or accept the shipment, and immediately notify the project manager or the RHSM.

Employees responsible for shipping hazard materials must also review the CH2M HILL Transportation Security Plan (HSE-417 Appendix A).

8.16 Substance Abuse

(Reference CH2M HILL SOP HSE-105, *Drug-Free Workplace)*

Employees who work under the influence of controlled substances, drugs, or alcohol may prove to be dangerous or otherwise harmful to themselves, other employees, clients, the company, the company's assets and interests, or the public. CH2M HILL does not tolerate illegal drug use, or any use of drugs, controlled substances, or alcohol that impairs an employee's work performance or behavior.

Prohibitions onsite include:

- Use or possession of intoxicating beverages while performing CH2M HILL work;
- Abuse of prescription or nonprescription drugs;
- Use or possession of illegal drugs or drugs obtained illegally;
- Sale, purchase, or transfer of legal, illegal or illegally obtained drugs; and
- Arrival at work under the influence of legal or illegal drugs or alcohol.

Drug and/or alcohol testing is applicable under CH2M HILL Constructors, Inc. and munitions response projects performed in the United States. In addition, employees may be required to submit to drug and/or alcohol testing as required by clients. When required, this testing is performed in accordance with SOP HSE-105, Drug-Free Workplace. Employees who are enrolled in drug or alcohol testing are required to complete annual training located on the CH2M HILL Virtual Office (VO).

9.0 Project-Specific Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the work or the particular hazard. Each person onsite is required to abide by the hazard controls. Always consult the appropriate CH2M HILL SOP to ensure all requirements are implemented. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the RHSM for clarification.

9.1 All-Terrain Vehicles and Utility-Type Vehicle Safety

An all-terrain vehicle (ATV) means any recreational vehicle with three or more tires, has handlebar steering, and a seat designed to be straddled by the operator and are not intended for use on paved roads.

Utility-type vehicle (UTV) means any recreational motor vehicle other than an ATV, motorbike, or snowmobile designed for and capable of travel over designated roads, traveling on four (4) or more tires.

ATVs/UTVs shall not be operated on site unless determined to be the most appropriate vehicle(s) to use and their use is pre-approved by the PM and RHSM.

Operators shall be trained and qualified before operation of the ATV or UTV onsite and will possess a valid driver's license.

Training shall consist of manufacturer's operating manual, hands-on training by a competent person, a demonstration of basic skills, and when required by the state, completion of an ATV safety course. An AHA shall also be developed for the use of ATVs/UTVs and operators shall be trained on the AHA. All individuals are required meet all training aspects before ATV/UTV use and documentation of training shall be maintained at the site.

Some states listed below as requiring an ATV license actually require an ATV or even a motorcycle endorsement on the operator's current driver's license. Be sure to contact the local division of motor vehicles (DMV) office for details. The following are states that require a specialized driver's license: Arizona, Oregon, Georgia, and Illinois. New Hampshire's and Montana's requirements vary by city.

Keep in mind, that states not mentioned above may still:

- Impose age restrictions for operating ATVs;
- Require an ATV safety or education course certification (even if you're older than 18);
- Require ATV insurance.

Daily inspections of vehicles for safety and maintenance are required. See the inspection checklist in the attachments to this HSP.

Minimum PPE required for operators and passengers on ATVs include:

- Safety glasses, goggles, or face-shield at all times when moving;
- Leather boots or shoes (if safety-toed boots are not required by this HSP); and
- A properly fitted DOT/ANSI/SNELL-approved helmet.

Other safety requirements include:

- ATVs with fewer than four wheels are not allowed on site;
- ATVs and UTVs shall be operated in accordance with the manufacturer's operating manual, any state or client requirements, and task-specific AHA;

- Speed is not to exceed 20 mph. Keep all parts of your body inside any roll over protection;
- Always use the seat belt on UTVs;
- Make sure the engine is turned off before dismounting the vehicle;
- Avoid driving over any extremely large obstacles (i.e., wood/logs, fences, boulders, etc);
- When using trailers, watch your turning radius;
- Shut engine down prior to refueling;
- ATVs/UTVs must have fenders;
- Utilize high visibility flag and wear high visibility vest when operating adjacent to heavy equipment or haul vehicles.

9.2 Arsenic

(Reference CH2M HILL, SOP HSE-501, *Arsenic*)

Arsenic is considered a "Confirmed Human Carcinogen." CH2M HILL is required to control employee exposure to arsenic when exposures are at or above 5.0 micrograms per cubic meter ($\mu g/m^3$), or if there is the possibility of skin or eye irritation from arsenic. The elements of the CH2M HILL arsenic program include the following:

- Exposure monitoring;
- Methods of control, including PPE and respirators;
- Medical surveillance;
- Training on hazards of arsenic and control measures (includes project-specific training and the computer-based training on CH2M HILL's Virtual Office, *Arsenic Exposure);* and
- Recordkeeping requirements.

If air monitoring indicates there is potential exposure at the action level concentrations, notify the RHSM to ensure the above have been adequately addressed. Full implantation of SOP HSE-501, Arsenic, will be required. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas;
- Avoid skin and eye contact with liquid and particulate arsenic or arsenic trichloride;
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person; and
- Review the fact sheet included as an attachment to this HSP.

9.3 Asbestos

(Reference CH2M HILL SOP HSE-502, *Asbestos*)

Asbestos is a cancer-causing mineral that was included in many building materials. When disturbed harmful asbestos fibers can be released and inhaled and ingested by workers. Materials suspected of containing asbestos shall be treated as asbestos unless documentation and testing results indicate otherwise. Where the presence of asbestos is suspected, if at all possible, design all operations to avoid contact.

When there is a risk of disturbing asbestos and making it friable (able to release fibers when the materials are crushed, abraded or cut) the activity becomes regulated. The asbestos standard for construction regulates asbestos exposure for the following activities:

- Demolishing or salvaging structures where asbestos is present in concentrations greater than 1%;
- Removing or encapsulating asbestos-containing materials (1% or greater asbestos content);
- Constructing, altering, repairing, maintaining, or renovating asbestos-containing structures or substrates;
- Installing asbestos containing products;
- Cleaning up asbestos spills/emergencies; and
- Transporting, disposing, storing, containing and housekeeping involving asbestos or asbestos containing products on a construction site.

CH2M HILL is required to control employee exposure to asbestos when exposures are at or above 0.1 fibers per cc (f/cc) by implementing a program that meets the requirements of the OSHA Asbestos standard, 29 Code of Federal Regulations (CFR) 1926.1101. The elements of the CH2M HILL asbestos program include the following:

- Exposure monitoring;
- Methods of control, including PPE and respirators;
- Medical Surveillance;
- Training on hazards of asbestos and control measures; and
- Record keeping requirements.

If air monitoring indicates there is potential exposure at the action level concentrations, notify the RHSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas;
- Avoid skin and eye contact asbestos;
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person;
- Review the fact sheet included as an attachment to this HSP; and
- Do not disturb waste or other materials labeled “Danger - Asbestos Fibers.”

Subcontractors performing asbestos abatement activities are required to obtain state or special licenses and permits and have a written compliance/abatement plan that has been reviewed and accepted by CH2M HILL before work begins. Subcontractors are required to provide proof that all asbestos workers medically qualified, training and a competent person has been appointed before work begins.

9.4 Chainsaws

(Reference CH2M HILL SOP HSE-210, *Hand and Power Tools*)

Below are the hazard controls and safe work practices to follow when working around or operating chainsaws. Ensure the requirements in the referenced SOP are followed.

9.4.1 Equipment

Only chainsaws equipped with a spark arrestor and fully functioning chain brake or “safety chain” shall be used. The following safety equipment shall be readily available while operating a chainsaw:

- Chainsaw operator's manual;
- Fully stocked first aid kit;
- Multipurpose fire extinguisher;
- Grounded extension cord approved for outdoor use and ground fault circuit interrupter (GFCI) for electrical-powered chainsaws;
- Approved safety gasoline container and funnel or flexible nozzle for refueling gasoline-powered chainsaws; and
- Sledge hammer and non-metallic wedges when necessary to prevent pinching of the chain.

9.4.2 PPE Requirements

The following personal protective equipment shall be worn while operating chainsaws:

- Safety glasses with side shields and face shield to prevent injury from wood chips, sawdust, or other flying objects;
- Hard hat with properly fitted suspension to prevent head injury from falling debris;
- Steel-toed safety shoes or boots to prevent foot injury from falling objects and accidental contact with the moving chain;
- Hearing protection to prevent permanent damage to hearing. Ear muffs or plugs will have a decibel noise reduction rating (NRR) assigned to them. The higher the rating, the greater the protection offered;
- Non-leather, fabric work gloves to prevent hand injury from abrasions, splinters and cuts;
- Clothing that is well-fitted and free of loose edges that could become entangled in the saw; and
- Protective chaps or leggings that cover the area from the groin to about 2 inches (5.08 cm) above the ankles should be used. These chaps are made from synthetic fabrics that are designed to prevent the running saw chain from coming in contact with your legs.

9.4.3 Safe Operation

The following safe operation guidelines shall be followed regardless of the purpose for using a chainsaw:

- Inspect the chainsaw prior to use;
- Chainsaws shall be held firmly with both hands, with thumbs and fingers encircling both chain saw handles;
- Stand slightly to the left side of the saw, out of the plane of the cutting chain and guide bar to reduce the risk of injury in the event of a kickback;
- Position saw so that it is between the waist and mid-chest level. Overreaching or cutting above the mid-chest height shall be avoided;
- Maintain a full throttle setting while cutting. Chainsaws are designed to be run at full speed;
- Always be aware of what is in the saw's downward path after the cut;
- Do not attempt to cut material that is larger than the guide bar of the saw;
- Avoid cuts that will cause the chainsaw to jam. Always cut into the compression wood first until the cut starts to close; then cut from the other side toward the compression cut;
- Use a non-metallic wedge to prevent the compression cut jamming on the blade;
- Chainsaws are designed to feed themselves into the wood and require only light pressure to cut efficiently. If extra force is required to keep cutting, the chain requires sharpening. Additional signs of a dull chain include a

saw that is cutting crooked, results in fine sawdust instead of chips, or the smell of burnt wood. Do not use a dull chain;

- Bystanders and helpers shall be kept at a safe distance from operation;
- Do not operate a chainsaw when fatigued; take frequent breaks;
- Work slowly; don't rush; and
- A fire extinguisher shall be present at all times when operating the chainsaw in forest or brushy areas.

9.4.4 Refueling the Engine

The fuel for gasoline-powered chainsaws shall be mixed in accordance with the manufacturer's recommendations as outlined in the chainsaw operator's manual. Fuel shall be stored and transported in an approved safety container. The following precautions should also be followed:

- The engine shall be shut off and allowed to cool before refueling; never refuel a hot engine;
- A fire extinguisher shall be present during fueling and refueling;
- Smoking around fueling or refueling operations shall be prohibited; and
- A funnel or a flexible nozzle shall be used to avoid spilling fuel on the engine.

9.5 Compressed Gas Cylinders

(Reference CH2M HILL SOP HSE-403, *Hazardous Materials Handling*)

Below are the hazard controls and safe work practices to follow when working around or using compressed gas cylinders. Ensure the requirements in the referenced SOP are followed.

- Cylinders and pressure-controlling apparatus shall be inspected for defects and leakage prior to use. Damaged or defective items shall not be used. If a cylinder is found to be defective, the gas distributor shall be notified and subsequent instructions followed. If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the work area.
- Cylinders shall be labeled with the identity of the contents. Cylinders not labeled shall be sent back to the cylinder distributor. The color of the cylinder shall not be used exclusively to identify cylinder contents.
- Valve caps must be in place when cylinders are transported, moved, or stored.
- Cylinders must be secured in an upright position at all times.
- Cylinder valves must be closed when cylinders are not being used and when cylinders are being moved.
- Cylinders must be secured on a cradle, basket, or pallet when hoisted; they may not be hoisted by choker slings.
- Eye protection (safety glasses or goggles) shall be worn when using cylinders.
- Cylinders must be shielded from welding and cutting operations and positioned to avoid being struck or knocked over; contacting electrical circuits; or exposed to extreme heat sources.
- Cylinders inside buildings shall be stored in dry, well-ventilated locations at least 20 feet (6.1 meters) from highly combustible materials. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage areas shall be located where cylinders will not be knocked over or damaged.
- Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials by a minimum of 20 feet (6.1 meters) or by a noncombustible barrier at least 5 feet (1.5 meters) high, having a fire resistance rating of at least 0.5 hour.

- Signs indicating no smoking shall be provided for storage areas containing flammable gas cylinders.
- Complete the self-assessment checklist for compressed gas cylinders are being used.

9.6 Drilling Safety

(Reference CH2M HILL SOP HSE-204, *Drilling*)

Below are the hazard controls and safe work practices to follow when working around or performing drilling. Ensure the requirements in the referenced SOP are followed.

- The drill rig is not to be operated in inclement weather.
- The driller is to verify that the rig is properly leveled and stabilized before raising the mast.
- Personnel should be cleared from the sides and rear of the rig before the mast is raised.
- The driller is not to drive the rig with the mast in the raised position.
- The driller must check for overhead power lines before raising the mast. Maintain a minimum distance of 10 feet (3 meters) between mast and overhead lines (<50 kV) and an additional 0.4 inches for every 1 kV over 50kV. Verify the voltage of nearby overhead power lines to determine the minimum distance.
- If the project site is suspected of munitions or explosives of concern (MEC) contamination, requirements of the *Explosives Usage and Munitions Response (MR)* SOP HSE-610 shall be followed. MECs include unexploded ordnance (UXO), discarded military munitions, materials that present a potential explosive hazard, chemical warfare materials, munitions constituents, and contaminated soil or groundwater. "Down-hole" avoidance support may be required to prevent accidental contact with UXO. Safety requirements will be based on the risk assessment identified within the MR (safety) ORE (Opportunity Risk Evaluation).
- Personnel should stand clear before rig startup.
- The driller is to verify that the rig is in neutral when the operator is not at the controls.
- Become familiar with the hazards associated with the drilling method used (cable tool, air rotary, hollow-stem auger, etc.).
- Do not wear loose-fitting clothing, watches, etc., that could get caught in moving parts.
- Do not smoke or permit other spark-producing equipment around the drill rig.
- The drill rig must be equipped with a kill wire or switch, and personnel are to be informed of its location.
- Be aware and stand clear of heavy objects that are hoisted overhead.
- The driller is to verify that the rig is properly maintained in accordance with the drilling company's maintenance program.
- The driller is to verify that all machine guards are in place while the rig is in operation.
- The driller is responsible for housekeeping (maintaining a clean work area).
- The drill rig should be equipped with at least one fire extinguisher.
- If the drill rig comes into contact with electrical wires and becomes electrically energized, do not touch any part of the rig or any person in contact with the rig, and stay as far away as possible. Notify emergency personnel immediately.
- Use the drilling self-assessment checklist attached to this HSP to evaluate drilling operations.

9.7 Drum and Portable Tank Handling

Below are the hazard controls and safe work practices to follow when overseeing the movement of drums or when handling drums:

- Ensure that personnel are trained in proper lifting and moving techniques to prevent back injuries;
- Ensure drum or tank bungs and lids are secured and are labeled prior to moving;
- Ensure that drums and tanks remain covered except when removing or adding material or waste. Covers and/or lids will be properly secured at the end of each workday;
- Provide equipment to keep the operator removed from the drums to lessen the likelihood of injury. Such equipment might include: a drum grappler attached to a hydraulic excavator; a small front-end loader, which can be either loaded manually or equipped with a bucket sling; a rough terrain forklift; Roller conveyor equipped with solid rollers; drum carts designed specifically for drum handling;
- Make sure the vehicle selected has sufficient rated load capacity to handle the anticipated loads, and make sure the vehicle can operate smoothly on the available road surface;
- Ensure there are appropriately designed Plexiglas cab shields on loaders, backhoes, etc., when handling drums containing potentially explosive materials;
- Equipment cabs should be supplied with fire extinguishers, and should be air-conditioned to increase operator efficiency;
- Supply operators with appropriate respiratory protective equipment when needed;
- Ensure that drums are secure and are not in the operator's view of the roadway;
- Prior to handling, all personnel should be warned about hazards of handling;
- Before moving anything, determine the most appropriate sequence in which the various drums, portable tanks, and other containers should be moved (e.g. small containers may have to be removed first to permit heavy equipment to enter and move the drums;
- Overpack drums and an adequate volume of absorbent should be kept near areas where minor spills may occur;
- Use containers or overpacks that are compatible with the waste or materials;
- Drums containing liquids or hazardous waste will be provided with secondary containment and may not be located near a storm water inlet or conveyance;
- Allow enough aisle space between drum pallets and between drums and other equipment that the drums can be easily accessed (at least 2 to 3 feet) by fire control equipment and similar equipment.; and
- Make sure that a spill kit is available in drum or tank storage areas (or where liquids are transferred from one vessel to another).

9.8 Drum Sampling Safety

Personnel are permitted to handle and/or sample drums containing certain types of waste (drilling waste, investigation-derived waste, and waste from known sources) only. Handling or sampling drums with unknown contents requires a plan revision or amendment approved by the RHSM. The following control measures will be taken when sampling drums:

- Minimize transportation of drums;
- Sample only labeled drums or drums from a known waste stream;
- Do not sample bulging or swollen drums. Contact the RHSM;

- If drums contain, or potentially contain, flammable materials, use non-sparking tools to open;
- Use the proper tools to open and seal drums;
- Reseal bung holes or plugs whenever possible;
- Avoid mixing incompatible drum contents;
- Sample drums without leaning over the drum opening;
- Transfer/sample the content of drums using a method that minimizes contact with material;
- Use the PPE and perform air monitoring as specified in the PPE and Site Monitoring sections of this HSP;
- Take precautions to prevent contaminated media from contacting the floor or ground, such as having plastic under the sampling area, having a spill kit accessible during sampling activities; and
- If transferring/sampling drums containing flammable or combustible liquids, drums and liquid transfer equipment should be grounded and bonded to reduce the potential of a static discharge.

9.9 Earthmoving Equipment

(Reference CH2M HILL, SOP HSE-306, *Earthmoving Equipment*)

Below are the hazard controls and safe work practices to follow when working around or operating heavy equipment. Ensure the requirements in the referenced SOP are followed.

- CH2M HILL authorizes only those employees qualified by training or previous experience to operate material handling equipment.
- CH2M HILL employees must be evaluated prior to operating earthmoving equipment by a CH2M HILL earthmoving equipment operator evaluation designated person. This evaluation will be documented according to SOP HSE-306, Earthmoving Equipment.
- Equipment must be checked at the beginning of each shift to ensure the equipment is in safe operating condition and free of apparent damage. The check should include: service brakes, parking brakes, emergency brakes, tires, horn, back-up alarm, steering mechanism, coupling devices, seat belts and operating controls. All defects shall be corrected before the equipment is placed in service. Documentation of this inspection must be maintained onsite at all times (use the Earthmoving Equipment Inspection form if operated by CH2M HILL).
- Equipment must be on a stable foundation such as solid ground or cribbing; outriggers are to be fully extended.
- Equipment must not be used to lift personnel; loads must not be lifted over the heads of personnel.
- Equipment, or parts thereof, which are suspended must be substantially blocked or cribbed to prevent shifting before personnel are permitted to work under or between them. All controls shall be in a neutral position, with the motors stopped and brakes set.
- Equipment which is operating in reverse must have a reverse signal alarm distinguishable from the surrounding noise or a signal person when the operators view is obstructed.
- When equipment is used near energized power lines, the closest part of the equipment must be at least 10 feet (3 meters) from the power lines less than 50 kilovolts (kV). Provide an additional 4 feet (1.2 meters) for every 10 kV over 50 kV. A person must be designated to observe clearances and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. All overhead power lines must be considered to be an energized until the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded.

- Underground utility lines must be located before excavation begins; refer to the Utilities (underground) section.
- Operators loading and unloading from vehicles are responsible for seeing that vehicle drivers are in the vehicle cab or in a safe area.
- The parking brake shall be set whenever equipment is parked; wheels must be chocked when parked on inclines.
- When not in operation, the blade or bucket must be blocked or grounded; the master clutch must be disengaged when the operator leaves the cab. When equipment is unattended, power must be shut off, brakes set, blades or buckets landed and shift lever in neutral.

9.10 Excavation Activities

(Reference CH2M HILL SOP HSE-307, *Excavation and Trenching Safety*)

The requirements in this section shall be followed whenever excavation is being performed. Refer to the Earthmoving Equipment section and SOP for additional requirements applicable to operating/oversight of earthmoving equipment. Below are the hazard controls and safe work practices to follow when working around or performing excavation. Ensure the requirements in the referenced SOP are followed.

- If the project site is suspected of munitions or explosives of concern (MEC) contamination, requirements of the *Explosives Usage and Munitions Response (MR)* SOP HSE-610 shall be followed. MECs include unexploded ordnance (UXO), discarded military munitions, materials that present a potential explosive hazard, chemical warfare materials, munitions constituents, and contaminated soil or groundwater. "Down-hole" avoidance support may be required to prevent accidental contact with UXO. Safety requirements will be based on the risk assessment identified within the MR (safety) ORE (Opportunity Risk Evaluation).
- Do not enter the excavations unless completely necessary, and only after the excavation competent person has completed their daily inspection and has authorized entry. An inspection shall be conducted by the competent person prior to the start of work, as needed throughout the shift, after every rainstorm, and after any hazard increasing occurrence. Documentation of the inspection must be maintained onsite at all times.
- Follow all excavation entry requirements established by the excavation competent person and any excavation permit being used.
- Sloping, benching, shoring, shielding, or other protective systems are required to protect personnel from cave-ins except when the excavation is made entirely in stable rock or is less than 5 feet deep (1.5 meters) and there is no indication of possible cave-in, as determined by the excavation competent person. Protective systems for excavations deeper than 20 feet (6.1 meters) must be designed or approved by a registered professional engineer.
- Trenches greater than 4 feet (1.2 meters) deep shall be provided with a ladder, stairway, or ramp positioned so that the maximum lateral travel distance is no more than 25 feet (7.6 meters).
- The atmosphere of excavations greater than 4 feet (1.2 meters) deep shall be tested prior to entry when a hazardous atmosphere exists or could reasonably be expected to exist, such as excavating landfills, hazardous waste dumps; or areas containing sewer or gas utility systems, petroleum distillates, or areas where hazardous substances are stored nearby.
- Spoil piles, material, and equipment must be kept at least 2 feet (61 centimeters) from the edge of the excavation, or a retaining device must be used to prevent the material from falling into the excavation.
- Excavations shall not be entered when:
  - Protective systems are damaged or unstable;
  - Objects or structures above the work location may become unstable and fall into the excavation;

  - The potential for a hazardous atmosphere exists, unless the air has been tested and found to be at safe levels; or
  - Accumulated water exists in the excavation, unless precautions have been taken to prevent excavation cave-in.
- The excavation self-assessment checklist shall be used to evaluate excavations prior to entry.

9.11 Fall Protection Activities

(Reference CH2M HILL, SOP HSE-308, *Fall Protection*)

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are exposed to unprotected heights. Ensure the requirements in the referenced SOP are followed.

- Fall protection systems must be used to eliminate fall hazards when performing construction activities at a height of 6 feet (1.8 meters) or greater and when performing general industry activities at a height of 4 feet (1.2 meters) or greater.
- CH2M HILL staff exposed to fall hazards must complete initial fall protection training by completing either the CH2M HILL 10-Hour Construction Safety Awareness training course or the Fall Protection computer-based training module. Staff must also and receive project-specific fall protection training using the fall protection evaluation form attached to this HSP. Staff shall not use fall protection systems for which they have not been trained.
- The SC or designee must complete the Project Fall Protection Evaluation Form and provide project-specific fall protection training to all CH2M HILL staff exposed to fall hazards.
- The company responsible for the fall protection system shall provide a fall protection competent person to inspect and oversee the use of fall protection system. CH2M HILL staff shall be aware of and follow all requirements established by the fall protection competent person for the use and limitation of the fall protection system.
- When CH2M HILL designs or installs fall protection systems, staff shall be qualified as fall protection competent persons or work directly under the supervision of a CH2M HILL fall protection competent person.
- When horizontal lifelines are used, the company responsible for the lifeline system shall provide a fall protection qualified person to oversee the design, installation, and use of the horizontal lifeline.
- Inspect personal fall arrest system components prior to each use. Do not use damaged fall protection system components at any time, or for any reason. Fall protection equipment and components shall be used only to protect against falls, not to hoist materials. Personal fall arrest systems that have been subjected to impact loading shall not be used. SC shall periodically inspect CH2M HILL fall protection equipment using the Fall Protection Inspection Log form.
- Personal fall arrest systems shall be configured so that individuals can neither free-fall more than 6 feet (1.8 meters) or contact any lower level.
- Only attach personal fall arrest systems to anchorage points capable of supporting at least 5,000 pounds (2268 kg). Do not attach personal fall arrest systems to guardrail systems or hoists.
- Remain within the guardrail system when provided. Leaning over or stepping across a guardrail system is not permitted. Do not stand on objects (boxes, buckets, bricks, blocks, etc.) or ladders to increase working height on top of platforms protected by guardrails.
- Only one person shall be simultaneously attached to a vertical lifeline and shall also be attached to a separate independent lifeline.

9.12 Groundwater Sampling/Water Level Measurements

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are performing groundwater sampling and/or water level measurements.

- Full coolers are heavy. Plan in advance to have two people available at the end of the sampling effort to load full coolers into vehicles. If two people won't be available use several smaller coolers instead of fewer large ones.
- Wear the appropriate PPE when sampling, including safety glasses, nitrile gloves, and steel toe boots (see PPE section of this HSP).
- Monitor headspace of wells prior to sampling to minimize any vapor inhalation (refer to the "Site Monitoring" section of this HSP).
- Use caution when opening well lids. Wells may contain poisonous spiders and hornet or wasp nests.
- Use the appropriate lifting procedures (see CH2M HILL SOP HSE-112) when unloading equipment and sampling at each well.
- Avoid sharp edges on well casings.
- If dermal contact occurs with groundwater or the acid used in sample preservation, immediately wash all affected skin thoroughly with soap and water.
- Avoid eating and drinking on site and during sampling.
- Use ear plugs during sampling if sampling involves a generator.
- Containerize all purge water and transport to the appropriate storage area.
- Use two people to transport full coolers/containers whenever possible. If two people are not available use a dolly to move coolers. If the coolers weigh more than 40 pounds Attachment 1 of the HSE-112, *Manual Lifting,* shall be completed by the SC. If the coolers weigh more than 50 pounds they should never be lifted by one person.

9.13 Hand and Power Tools

(Reference CH2M HILL, SOP HSE-210, *Hand and Power Tools*)

- Below are the hazard controls and safe work practices to follow when personnel or subcontractors are using hand tools. Ensure the requirements in the referenced SOP are followed:
- Hands are one of the most complex parts of your body
- Every employee uses their hands to help them make a living
- There are more on-the-job injuries to hands than any other body part

Hand Injuries

- According to the Bureau of Labor statistics, there are close to one million workplace hand and finger incidents per year.
- Nearly 205,000 injuries and illnesses to wrists/hands/fingers involved days away from work in 2006.
- In the United States, workers with acute traumatic hand injuries account for over 1 million emergency room visits annually
- One in every four recordable injuries are hand injuries requiring sutures

Causes of Hand Injuries:

- Bee stings
- Chemicals
- Punctures
- Blood-borne pathogens
- Insect bites
- Rotating equipment
- Extreme temperatures
- Pinch points
- Cuts
- Vibrating equipment

Safety Measures for Hand Tools

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are using hand tools. Ensure the requirements in the referenced SOP are followed:

- Use the right tool for the job
- Keep cutting tools sharp – less force will be needed for the cut
- Carry and store tools correctly and never put sharp or pointed tools in your pocket or belt
- Screwdrivers are one of the most used and abused tools, NEVER:
    - Hammer with a screwdriver
    - Use as a pry bar
    - Use with a broken handle
    - Use with worn out blades
- Never use pocket knives (only safety knives or alternative cutting tools, e.g., self-retracting utility knives, guarded utility knives, shears, snips or scissors)
- Tools shall be inspected prior to use and damaged tools will be tagged and removed from service;
- Hand tools will be used for their intended use and operated in accordance with manufacturer's instructions and design limitations;
- Maintain all hand tools in a safe condition;
- Use PPE (such as gloves, safety glasses, earplugs, and face shields) when exposed to a hazard from a tool;
- Store tools properly in a place where they will not be damaged or come in contact with hazardous materials;
- Tools used in an explosive environment must be rated for work in that environment (that is, intrinsically safe, spark-proof, etc.); and

Working with manual and pistol-grip hand tools may involve highly repetitive movement, extended elevation, constrained postures, and/or awkward positioning of body members (for example, hand, wrist, arm, shoulder, neck, etc.). Consider alternative tool designs, improved posture, the selection of appropriate materials, changing work organization, and sequencing to prevent muscular, skeletal, repetitive motion, and cumulative trauma stressors.

Safety Measures for Power Tools

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are using hand and power tools. Ensure the requirements in the referenced SOP are followed:

- Tools shall be inspected prior to use and damaged tools will be tagged and removed from service;
- Hand tools will be used for their intended use and operated in accordance with manufacturer's instructions and design limitations;
- Maintain all hand and power tools in a safe condition;
- Use PPE (such as gloves, safety glasses, earplugs, and face shields) when exposed to a hazard from a tool;
- Do not carry or lower a power tool by its cord or hose;
- Portable power tools will be plugged into GFCI protected outlets;
- Portable power tools will be Underwriters Laboratories (UL) listed and have a three-wire grounded plug or be double insulated;
- Disconnect tools from energy sources when they are not in use, before servicing and cleaning them, and when changing accessories (such as blades, bits, and cutters);
- Safety guards on tools must remain installed while the tool is in use and must be promptly replaced after repair or maintenance has been performed;
- Store tools properly in a place where they will not be damaged or come in contact with hazardous materials;
- If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications;
- Tools used in an explosive environment must be rated for work in that environment (that is, intrinsically safe, spark-proof, etc.); and
- Working with manual and pistol-grip hand tools may involve highly repetitive movement, extended elevation, constrained postures, and/or awkward positioning of body members (for example, hand, wrist, arm, shoulder, neck, etc.). Consider alternative tool designs, improved posture, the selection of appropriate materials, changing work organization, and sequencing to prevent muscular, skeletal, repetitive motion, and cumulative trauma stressors.

Machine Guarding

- Ensure that all machine guards are in place to prevent contact with drive lines, belts, chains, pinch points or any other sources of mechanical injury.
- Unplugging jammed equipment will only be performed when equipment has been shut down, all sources of energy have been isolated and equipment has been locked/tagged and tested.
- Maintenance and repair of equipment that results in the removal of guards or would otherwise put anyone at risk requires lockout of that equipment prior to work.

9.14 Hexavalent Chromium (Cr VI) Exposure

(Reference the CH2M HILL SOP HSE-513, *Hexavalent Chromium - Chromium VI*)

The OSHA permissible exposure limit (PEL) and ACGIH Threshold Limit Value (TLV) for Chromium VI is 5 ug/m^3 (insoluble) and 1 ug/m^3 (soluble) with an action level (AL) of 2.5 ug/m3 for insoluble and 0.5 ug/ m^3 for soluble. Hexavalent Chromium is considered a Human Carcinogen.

The precautions listed below shall be followed when exposed to Cr VI:

- Exposure assessments must be performed for workers who may be exposed to Cr VI above the AL.
- Avoid exposure by inhalation, skin and eye contact with fume, liquid and/or particulate Cr VI.
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person.

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.
- Review the fact sheet included as an attachment to this HSP.

9.15 Lead

(Reference CH2M HILL SOP HSE-508, *Lead*)

CH2M HILL is required to control employee exposure to lead when exposures are at or above 30 $\mu g/m^3$ by implementing a program that meets the requirements of the OSHA Lead standard, 29 CFR 1910.1025 and 29 CFR 1926.62. The elements of the CH2M HILL lead program include the following:

- Exposure monitoring;
- Methods of control, including personal protective equipment (PPE) and respirators;
- Medical surveillance;
- Training on hazards of lead and control measures (includes project-specific training and the computer-based training on CH2M HILL's Virtual Office, *Lead Exposure Training);* and
- Record keeping requirements.

If air monitoring indicates there is potential exposure at the action level concentrations above, notify the RHSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas;
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person; and
- Review the fact sheet included as an attachment to this HSP.

These procedures are strictly as a precaution, but shall be followed as they re-enforce good hygiene practices.

Potential contact with Contaminated Surficial Soils and Debris

Tasks involving biological, cultural and land surveying, and drilling shall conduct work in the **listed areas AOC 4 and 10 (see attached map)** with minimal soil disturbance practices. Vehicles shall be parked outside the listed zones if possible.

Contact with any body part other than boots, shall be addressed in the AHA's.

Decon of boots shall be conducted upon exiting the areas with the following procedure:

- Set up a wet wipe decon station.
- Don nitrile gloves.
- Wet wipe the boots and lower pants leg with a disposable cloth or sponge with clean water.
- Place wipes in a provided garbage bag, along with gloves.

For vehicles that have accessed these areas:

- Conduct visible inspection of dust on exterior.
- If a layer of visible dust is apparent, conduct a wet wipe of the exterior using similar method as boots.
- Do not create airborne dusts that pose an inhalation hazard.

If possible, limit use of vehicles into listed areas.

9.16 Portable Generator Hazards

(Reference CH2M HILL SOP HSE-206, Electrical Safety)

- Portable generators are useful when temporary or remote electric power is needed, but they also can be hazardous. The primary hazards to avoid when using a generator are carbon monoxide (CO) poisoning from the toxic engine exhaust, electric shock or electrocution, and fire.
- NEVER use a generator indoors or in similar enclosed or partially-enclosed spaces. Generators can produce high levels of carbon monoxide (CO) very quickly. When you use a portable generator, remember that you cannot smell or see CO. Even if you can't smell exhaust fumes, you may still be exposed to CO.
- If you start to feel sick, dizzy, or weak while using a generator, get to fresh air RIGHT AWAY. DO NOT DELAY. The CO from generators can rapidly lead to full incapacitation and death.
- If you experience serious symptoms, get medical attention immediately. Inform project staff that CO poisoning is suspected. If you experienced symptoms while indoors have someone call the fire department to determine when it is safe to re-enter the building.
- Follow the instructions that come with your generator. Locate the unit outdoors and away from doors, windows, and vents that could allow CO to come indoors.
- Ensure the generator is grounded in accordance with the manufacturer's operation manual.
- Keep the generator dry and do not use in rain or wet conditions. To protect from moisture, operate it on a dry surface under an open, canopy-like structure. Dry your hands if wet before touching the generator.
- Plug appliances directly into the generator. Or, use a heavy duty, outdoor-rated extension cord that is rated (in watts or amps) at least equal to the sum of the connected appliance loads. Check that the entire cord is free of cuts or tears and that the plug has all three prongs, especially a grounding pin.
- Most generators come with Ground Fault Circuit Interrupters (GFCI). Test the GFCIs daily to determine whether they are working
- If the generator is not equipped with GFCI protected circuits plug a portable GFCI into the generator and plug appliances, tools and lights into the portable GFCI.
- Never store fuel near the generator or near any sources of ignition.
- Before refueling the generator, turn it off and let it cool down. Gasoline spilled on hot engine parts could ignite.

9.17 Pressure Line/Vessel Systems

- Operate and maintain pressure vessels, pumps and hosing in accordance with the manufacturer's recommendations.
- Do not exceed the rated pressure of the vessels and hosing of the system.
- The system must be provided with a pressure relief valve/controller that safely reduces the system pressure to within the system rated pressure.
- The pressure relief valve must be rated at no more than 110% the rated pressure of the system and must be tested at regular intervals.
- Each vessel must be equipped with a functioning pressure gauge to monitor pressure.

9.18 Pressure Washing Operations

Below are the hazard controls and safe work practices to follow when working around or performing pressure washing.

- Only trained, authorized personnel may operate the high-pressure washer.
- Follow manufacturer's safety and operating instructions.
- Inspect pressure washer before use and confirm deadman trigger is fully operational
- The wand must always be pointed at the work area.
- The trigger should never be tied down
- Never point the wand at yourself or another worker.
- The wand must be at least 42 inches (1.1 meter) from the trigger to the tip and utilize greater than 10 degree tips.
- The operator must maintain good footing.
- Non-operators must remain a safe distance from the operator.
- No unauthorized attachment may be made to the unit.
- Do not modify the wand.
- All leaks or malfunctioning equipment must be repaired immediately or the unit taken out-of-service.
- Polycoated Tyvek or equivalent, 16-inch-high steel-toed rubber boots, safety glasses, hard hat with face shield, and inner and outer nitrile gloves will be worn, at a minimum.

9.19 Rigging

(Reference CH2M HILL SOP HSE-316, *Rigging*)

Below are the hazard controls and safe work practices to follow when personnel are overseeing or performing rigging. Ensure the requirements in the referenced SOP are followed.

9.19.1 General

- All rigging equipment shall be used only for its intended purpose, inspected by a competent person prior to use, and shall not be loaded in excess of its capacity rating. Defective rigging shall be removed from service.
- When CH2M HILL is in control of rigging operations, CH2M HILL shall provide a rigging competent person that will inspect, maintain oversee all rigging operations. The competent person shall use the appropriate rigging inspection log form to inspect wire rope, synthetic slings and/or shackles.
- Tag lines shall be attached to every load being lifted by a crane.
- Rigging equipment shall be protected from flame cutting and electric welding operations, and or contact avoided with solvents and chemicals.
- Rigging equipment, when not in use, shall be stored in an area free from damage caused by environmental elements, hazardous substances, and other factors that may compromise equipment integrity and performance.
- No modification or addition, which that could affect the capacity and or safe operation of the equipment, shall be made without the manufacturer's written approval.
- Rigging equipment shall not be shortened with knots, bolts or other makeshift devices.
- All rigging equipment shall be load tested at least annually by a competent person and documented.
- Special hoisting devices, slings, chokers, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof -tested prior to initial use to 125 percent of their rated load. Vendors or suppliers will provide documentation of proof testing documentation.

9.19.2 Equipment

- Protruding end strands of wire rope shall be covered or blunted.
- Wire rope shall not be used, if in any length of eight diameters, the number of total number of visible broken wires exceeds 10% percent of the total number of wires, or if the rope shows other signs of excessive wear, corrosion, or defect.
- When inspecting the end fittings of wire rope slings, if more than one wire in a lay is broken in the fitting, do not use the sling.
- Synthetic web slings shall be immediately removed from service if any of the following conditions are present:
  - acid or caustic burns; melting or charring of any part of the sling
  - surface; snags, punctures, tears or cuts; broken or worn stitches; distortion of fittings;
  - discoloration of or rotting; red warning line showing.
- Never use makeshift hooks, links or other fasteners. Job or shop hooks and links, or makeshift fasteners, formed from bolts, rods, etc., or other such attachments, shall not be used.
- Alloy steel chains shall have permanently affixed identification stating size, grade, rated capacity and reach.
- Shackles and hooks shall be constructed of forged alloy steel with the identifiable load rating on the shackle or hook.

9.19.3 Rigging Use

- Rigging shall not be pulled from under a load when the load is resting on the rigging.
- Place sling(s) in center bowl of hook.
- When attaching slings to the load hoist hook, corners and sharp edges should be “packed” to prevent cutting or damaging the rope or slings.
- Never use nylon, polyester, or polypropylene web slings, or web slings with aluminum fittings shall not be used where fumes, vapors, sprays, mists or liquids of acids, caustics or phenolics are present.
- Natural and synthetic fiber rope slings, except for wet frozen slings, may be used in a temperature range form from minus 20º F to plus 180º F without decreasing the working load limit. For operations outside this temperature range, and for wet frozen slings, the sling manufacturer’s recommendations shall be followed.
- When used for eye splices, the U-bolt shall be installed so that the “U” section is in contact with the dead end of the rope.

9.20 Stairways and Ladders

(Reference CH2M HILL SOP HSE-214*, Stairways and Ladders*)

Below are the hazard controls and safe work practices to follow when using stairways and ladders. Ensure the requirements in the referenced SOP are followed.

- Stairway or ladder is generally required when a break in elevation of 19 inches (48.3 cm) or greater exists.
- Personnel should avoid using both hands to carry objects while on stairways; if unavoidable, use extra precautions.
- Personnel must not use pan and skeleton metal stairs until permanent or temporary treads and landings are provided the full width and depth of each step and landing.
- Ladders must be inspected by a competent person for visible defects prior to each day’s use. Defective ladders must be tagged and removed from service.

- Always obey and pay attention to warning labels or stickers on the specific ladder being used.
- Ladders must be used only for the purpose for which they were designed and shall not be loaded beyond their rated capacity.
- Ladder safety training on safe use (e.g., review SOP HSE-214 as part of a safety meeting) must be documented and kept with the project files.
- Only one person at a time shall climb on or work from an individual ladder.
- User must face the ladder when climbing; keep belt buckle between side rails.
- Ladders shall not be moved, shifted, or extended while in use.
- User must use both hands to climb; use rope to raise and lower equipment and materials.
- Straight and extension ladders must be tied off to prevent displacement.
- Ladders that may be displaced by work activities or traffic must be secured or barricaded.
- Personnel climbing ladders shall face the ladder and maintain 3 points of contact with the ladder.
- Portable ladders must extend at least 3 feet (91.5 cm) above landing surface.
- Straight and extension ladders must be positioned at such an angle that the ladder base to the wall is one-fourth of the working length of the ladder.
- Stepladders are to be used in the fully opened and locked position.
- Users are not to stand on the top two steps of a stepladder; nor are users to sit on top or straddle a stepladder.
- Fixed ladders $\geq$ 24 feet (7.3 meters) in height must be provided with fall protection devices.
- Fall protection should be considered when working from extension, straight, or fixed ladders greater than six feet (1.8 meters) from lower levels and both hands are needed to perform the work, or when reaching or working outside of the plane of ladder side rails.

9.21 Traffic Control

(Reference CH2M HILL SOP HSE-216, *Traffic Control*)

The following precautions must be taken when working around traffic, and in or near an area where traffic controls have been established by a sub contractor. Ensure the requirements in the referenced SOP are followed.

- Exercise caution when exiting traveled way or parking along street – avoid sudden stops, use flashers, etc.
- Park in a manner that will allow for safe exit from vehicle, and where practicable, park vehicle so that it can serve as a barrier.
- All staff working adjacent to traveled way or within work area must wear reflective/high-visibility safety vests.
- Eye protection should be worn to protect from flying debris.
- Remain aware of factors that influence traffic related hazards and required controls – sun glare, rain, wind, flash flooding, limited sight-distance, hills, curves, guardrails, width of shoulder (i.e., breakdown lane), etc.
- Always remain aware of an escape route (e.g., behind an established barrier, parked vehicle, guardrail, etc).
- Always pay attention to moving traffic – never assume drivers are looking out for you.
- Work as far from traveled way as possible to avoid creating confusion for drivers.

- When workers must face away from traffic, a "buddy system" should be used, where one worker is looking towards traffic.
- When working on highway projects, obtain a copy of the contractor's traffic control plan.
- Work area should be protected by a physical barrier – such as a K-rail or Jersey barrier.
- Review traffic control devices to ensure that they are adequate to protect your work area. Traffic control devices should: 1) convey a clear meaning, 2) command respect of road users, and 3) give adequate time for proper traffic response. The adequacy of these devices are dependent on limited sight distance, proximity to ramps or intersections, restrictive width, duration of job, and traffic volume, speed, and proximity.
- Either a barrier or shadow vehicle should be positioned a considerable distance ahead of the work area. The vehicle should be equipped with a flashing arrow sign and truck-mounted crash cushion (TMCC). All vehicles within 40 feet (12.2 meters) of traffic should have an orange flashing hazard light atop the vehicle.
- Except on highways, flaggers should be used when 1) two-way traffic is reduced to using one common lane, 2) driver visibility is impaired or limited, 3) project vehicles enter or exit traffic in an unexpected manner, or 4) the use of a flagger enhances established traffic warning systems.
- Lookouts should be used when physical barriers are not available or practical. The lookout continually watches approaching traffic for signs of erratic driver behavior and warns workers.
- Vehicles should be parked at least 40 feet (12.2 meters) away from the work zone and traffic. Minimize the amount of time that you will have your back to oncoming traffic.
- Traffic control training module on the VO shall be completed when CH2M HILL workers who work in and around roadways and who exposed to public vehicular traffic.

9.22 Utilities (underground)

An assessment for underground utilities must be conducted where there is a potential to contact underground utilities or similar subsurface obstructions during intrusive activities. Intrusive activities include excavation, trenching, drilling, hand augering, soil sampling, or similar activities.

The assessment must be conducted before any intrusive subsurface activity and must include at least the following elements:

1. A background and records assessment of known utilities or other subsurface obstructions.
2. Contacting and using the designated local utility locating service.
3. Conducting an independent field survey to identify, locate, and mark potential underground utilities or subsurface obstructions. *Note: This is independent of, and in addition to, any utility survey conducted by the designated local utility locating service above.*
4. A visual survey of the area to validate the chosen location.

When any of these steps identifies an underground utility within 5 feet (1.5 meters) of intrusive work, then non-aggressive means must be used to physically locate the utility before a drill rig, backhoe, excavator or other aggressive method is used.

Aggressive methods are never allowed within 2 feet of an identified high risk utility (see paragraph below).

Any deviation from these requirements must be approved by the Responsible HS Manager and the Project Manager.

Background and Records Assessment of Known Utilities

Identify any client- or location-specific permit and/or procedural requirements (e.g., dig permit or intrusive work permit) for subsurface activities. For military installations, contact the Base Civil Engineer and obtain the appropriate form to begin the clearance process.

Obtain available utility diagrams and/or as-built drawings for the facility.

Review locations of possible subsurface utilities including sanitary and storm sewers, electrical lines, water supply lines, natural gas lines, fuel tanks and lines, communication lines, lighting protection systems, etc. Note: Use caution in relying on as-built drawings as they are rarely 100 percent accurate.

Request that a facility contact with knowledge of utility locations review and approve proposed locations of intrusive work.

Designated Local Utility Locating Service

Contact your designated local utility locating service (e.g., Dig-Safe, Blue Stake, One Call) to identify and mark the location of utilities. Call 811 in the US or go to www.call811.com to identify the appropriate local service group. Contacting the local utility locating service is a legal requirement in most jurisdictions.

Independent Field Survey (Utility Locate)

The organization conducting the intrusive work (CH2M HILL or subcontractor) shall arrange for an independent field survey to identify, locate, and mark any potential subsurface utilities in the work area. This survey is in addition to any utility survey conducted by the designated local utility locating service.

The independent field survey provider shall determine the most appropriate instrumentation/technique or combinations of instrumentation/techniques to identify subsurface utilities based on their experience and expertise, types of utilities anticipated to be present, and specific site conditions.

A CH2M HILL or subcontractor representative must be present during the independent field survey to observe the utility locate and verify that the work area and utilities have been properly identified and marked. If there is any question that the survey was not performed adequately or the individual was not qualified, then arrangements must be made to obtain a qualified utility locate service to re-survey the area. Obtain documentation of the survey and clearances in writing and signed by the party conducting the clearance. Maintain all documentation in the project file.

If the site owner (military installation or client) can provide the independent field survey, CH2M HILL or the subcontractor shall ensure that the survey includes:

- Physically walking the area to verify the work location and identify, locate, and mark underground utility locations:
- Having qualified staff available and instrumentation to conduct the locate;
- Agreeing to document the survey and clearances in writing.
- Should any of the above criteria not be met, CH2M HILL or subcontractor must arrange for an alternate independent utility locate service to perform the survey.
- The markings from utility surveys must be protected and preserved until the markings are no longer required. If the utility location markings are destroyed or removed before intrusive work commences or is completed, the PM, SC, or designee must notify the independent utility locate service or the designated local utility locating service to resurvey and remark the area.

Visual Assessment before and during Intrusive Activities

Perform a “360 degree” assessment. Walk the area and inspect for utility-related items such as valve caps, previous linear cuts, patchwork in pavement, hydrants, manholes, utility vaults, drains, and vent risers in and around the dig area.

The visual survey shall include all surface landmarks, including manholes, previous liner cuts, patchwork in pavement, pad-mounted transformers, utility poles with risers, storm sewer drains, utility vaults, and fire hydrants.

If any unanticipated items are found, conduct further research before initiating intrusive activities and implement any actions needed to avoid striking the utility or obstruction.

Subsurface Activities within 5 feet of an Underground Utility or if there is Uncertainty

When aggressive intrusive activities will be conducted within 5 feet (1.5 meters) of an underground utility or when there is uncertainty about utility locations, locations must be physically verified by non-aggressive means such as air or water knifing, hand digging, or human powered hand augering. Non-conductive tools must be used if electrical hazards may be present. If intrusive activities are within 5 feet (1.5 meters) and parallel to a marked existing utility, the utility location must be exposed and verified by non-aggressive methods every 100 feet (30.5 meters). Check to see if the utility can be isolated during intrusive work.

Intrusive Activities within 2 feet of an Underground Utility

Use non-aggressive methods (hand digging, vacuum excavation, etc.) to perform intrusive activities within 2 feet of a high risk utility (i.e., a utility that cannot be de-energized or would cause significant impacts to repair/replace). Hazardous utilities shall be de-energized whenever possible.

Spotter

A spotter shall be used to monitor for signs of utilities during advancement of intrusive work (e.g., sudden change in advancement of auger or split spoon, presence of pea gravel or sand in soils, presence of concrete or other debris in soils, refusal of auger or excavating equipment). If any suspicious conditions are encountered stop work immediately and contact the PM or RHSM to evaluate the situation. The spotter must have a method to alert an operator to stop the intrusive activity (e.g., air horn, hand signals).

9.23 Utilities (overhead)

Proximity to Power Lines

No work is to be conducted within 50 feet (15.2 meters) of overhead power lines without first contacting the utility company to determine the voltage of the system. No aspect of any piece of equipment is to be operated within 50 feet (15.2 meters) of overhead power lines without first making this determination.

Operations adjacent to overhead power lines are PROHIBITED unless one of the following conditions is satisfied:

- Power has been shut off, positive means (such as lockout) have been taken to prevent the lines from being energized, lines have been tested to confirm the outage, and the utility company has provided a signed certification of the outage.
- The minimum clearance from energized overhead lines is as shown in the table below, or the equipment will be repositioned and blocked to ensure that no part, including cables, can come within the minimum clearances shown in the table.

MINIMUM DISTANCES FROM POWERLINES

Powerlines Nominal System Kv	Minimum Required Distance, Feet (Meters)
0-50	10 (3.0)
50-200	15 (4.6)
201-350	20 (6.1)
351-500	25 (7.6)
501-750	35 (10.7)
751-1000	45 (13.7)
Over 1000	Established by utility owner/operator or by a professional engineer in electrical power transmission/distribution

(These distances have been determined to eliminate the potential for arcing based on the line voltage.)

- The power line(s) has been isolated through the use of insulating blankets which have been properly placed by the utility. If insulating blankets are used, the utility will determine the minimum safe operating distance; get this determination in writing with the utility representative's signature.
- All inquiries regarding electric utilities must be made in writing and a written confirmation of the outage/isolation must be received by the PM prior to the start of work.

9.24 Vacuum Trucks

When CH2M HILL personnel are exposed to vacuum truck operations, the following safe work practices/hazard controls shall be implemented.

- A pre-operational check should be performed on the vacuum truck before use. Operators must be familiar with the operator's manual.
- Operators of vacuum trucks should be trained and familiar with the equipment. At least one person should be operating the boom and one person signaling and assisting the boom operator.
- Before use the hoses and lines should be checked for fraying and connections checked for leakage. Proper selection of hose diameter and type of hose (smooth bore hose vs. corrugated hose) is vital before the job is performed.
- The amount of force produced by a vacuum truck can kill hose operators. If an eight-inch hose gets stuck to your body at 27 inches Hg, it can be fatal. All trucks should be equipped with an emergency release the hose operator or assistant can initiate if a worker gets sucked into a hose. A remote release, manual release near the truck and an inline "T" should be present on the truck. The inline "T" should be installed between the very last section of hose and the working section of hose. The cord that releases the in-line relief should be tethered to the hose handler’s belt or a watch buddy should be nearby holding the cord and ready to relieve in the event of an emergency. Operators should never attempt to vacuum hose with any part of their body to check for suction.
- Tanks on vacuum trucks are a confined space. Before the tank is opened and anyone enters a confined space assessment should be performed.
- The truck should always be grounded before use. The static electricity produced when sucking materials into the system can produce a spark and ignite anything in the tank or hose. Use of a grounding wire will prevent

static electric explosions. Vacuum trucks should not be used to pump mixtures with a flash point less than 140 degrees or less - this is an accepted industry standard - refer to the operators manual for more information.

- When positioning truck to work, be extra cautions of personnel and other equipment located next to truck.
- Wet and dry material should not be mixed in the tank.
- When swinging the boom, change directions slowly.
- Do not load dump body beyond rated capacity. Be aware of possible load surge when turning or braking.

9.25 Working Around Material Handling Equipment

When CH2M HILL personnel are exposed to material handling equipment, the following safe work practices/hazard controls shall be implemented:

- Never approach operating equipment from the rear. Always make positive contact with the operator, and confirm that the operator has stopped the motion of the equipment.
- Never approach the side of operating equipment; remain outside of the swing and turning radius.
- Maintain distance from pinch points of operating equipment.
- Never turn your back on any operating equipment.
- Never climb onto operating equipment or operate contractor/subcontractor equipment.
- Never ride contractor/subcontractor equipment unless it is designed to accommodate passengers and equipped with firmly attached passenger seat.
- Never work or walk under a suspended load.
- Never use equipment as a personnel lift; do not ride excavator buckets or crane hooks.
- Always stay alert and maintain a safe distance from operating equipment, especially equipment on cross slopes and unstable terrain.
- Wear a high visibility safety vest or high visibility clothing

9.26 Working Alone

(Reference CH2M HILL Core Standard, *Working Alone*)

Personnel can only be tasked to work alone by the Project Manager who shall assess potential hazards and appropriate control measures, with assistance from the Responsible Health and Safety Manager (RHSM).

“Lone workers” with an accountability system in place is permitted, depending on the hazards presented during the execution of the task. Reference the “Lone Worker Protocol” included as an attachment to this HSP.

Only limited operations task are permitted to be performed alone. Activities that are not permitted to be performed by a lone worker include the following:

- Working at heights (e.g., on ladders, lifts, scaffolding);
- Energy isolation (e.g., lockout/tagout);
- Any entry into a confined space; and
- Work involving electricity or other hazardous equipment (e.g., chainsaws);
- Work over or near water; and
- Working in an area where there is an increased potential for violence.

An AHA shall be developed that shall include:

- Type or nature of work to be conducted by the lone worker;
- Location of the work
- Length of time the worker will be working alone; and
- Any characteristics of the individual working alone which may increase the risk to the worker (e.g., medical conditions).

The employee working alone shall at all times be equipped with a working voice communication device such as a cellular phone, satellite phone, personal alarms, or two-way radio to check-in to their project contact (s) at pre-determined times. For some work, a satellite-based communication system may be appropriate (i.e., a "SPOT" device).

Call-In System for Lone Worker Accountability

The employee working alone shall at all times be equipped with a working voice communication device such as a cellular phone, satellite phone, personal alarms, or two-way radio to check-in to their project contact (s) at pre-determined times.

Each time before going into the field, the "Call in contact Form" attached to this HSP (Attachment 6) shall be completed by the lone worker and given to the call-in office worker contact prior to going into the field.

During field work, a copy of "The Lone Worker Call-In Contact Form" should be maintained by both the "Office Contact Worker" and the field-worker ("Lone Worker"). Lone Worker and Office Contact Worker must both have cell phones and each others' phone number, plus one other alternate phone number.

Lone worker shall call the office contact worker when he/she has arrived on-site, before exiting his/her vehicle. On this phone call, a time shall be arranged for a "check-in" call to be made by the field worker, based on duration of task. On each "check-in" call a time should be arranged for the next "check-in" call. Document these times on the form.

Lone Worker shall carry his or her cell-phone throughout the field event and put the ringer on its loudest setting as wind or other noise can muffle the sound. If, for any reason the cell-phone becomes inoperable, the field-worker shall immediately stop work, leave the site and find an alternative method of contacting the Office Contact Worker to verify their safety and to inform them of the issue.

Work shall not proceed in the field until the Lone Worker has a working device that provides communication with the Office Contact Worker.

Upon completion of work activities, Lone Worker should pack up all materials and prepare to leave site. Then, before starting the engine of the vehicle to leave site, the Lone Worker should contact the office-worker and inform him or her that work is complete and that he or she is leaving the site. A final call shall be made by the lone work to the office worker to confirm he/she has reached their destination.

If at any time, the Office Contact Worker does not receive a "check-in" call at the scheduled time he/she should attempt to contact Lone Worker. If no contact is made then the Office Contact Worker should contact the facility contact person to check on the Lone Worker.

If no contact is made with the Lone Worker, then the Office Contact Worker shall contact the PM and/or RHSM to let them know they are going to inform emergency services inform that there is a possible emergency and instruct them to go to the field location and assist the Lone Worker. The Office Contact Worker will provide to emergency services the Lone Worker's name, their last known location, vehicle description and their contact information.

Call in contact Form shall be completed by lone worker and given to call in contact prior to going into the field. Refer to the "Lone Worker Protocol" attached to this HSP.

9.27 Working Over Water and Boating Safety

9.27.1.1 Working Over or Near Water

If any activities pose a risk to drowning implement the following during the activity:

- Fall protection should be provided to prevent personnel from falling into water. Where fall protection systems are not provided and the danger of drowning exists, U.S. Coast Guard-approved personal flotation devices (PFDs), or a life jacket, shall be worn.
- Provide employees with an approved (USCG for U.S. operations) life jacket or buoyant work vest.
  - Employees should inspect life jackets or work vests daily before use for defects. Do not use defective jackets or vests.
- Post ring buoys with at least 90 feet (27.4 meters) of 3/8-inch solid-braid polypropylene (or equal) line next to the work area. If the work area is large, post extra buoys 200 feet (61 meters) or less from each other.
- Provide at least one life saving skiff, immediately available at locations where employees are working over or adjacent to water.
  - Ensure the skiff is in the water and capable of being launched by one person and is equipped with both motor and oars.
- Designate at least one employee on site to respond to water emergencies and operate the skiff at times when there are employees above water.
  - If the designated skiff operator is not within visual range of the water, provide him or her with a radio or provide some form of communication to inform them of an emergency.
  - Designated employee should be able to reach a victim in the water within three to four minutes.
- Ensure at least one employee trained in CPR and first aid is on site during work activities.

9.27.1.2 Boating Safety

Personnel who will operate a boat during the course of a project shall first demonstrate to the site manager that they are experienced in operating boats similar to those used for the project and that they are knowledgeable of the U.S. Coast Guard Boating Safety requirements (33 CFR Subchapter S). Project boats shall be operated by experienced boat operators only. Boat operators shall also possess basic mechanical knowledge necessary to troubleshoot common mechanical problems that can and do occur. The boat operator shall be responsible for the safety of all personnel on board the boat he or she is operating and for the integrity of all boat and safety equipment.

Each designated boat operator shall give a safety briefing to all occupants of the boat prior to leaving the shore. Boats are to be occupied during use by not less than one qualified operator plus one additional person.

The boat skipper has the final authority with regard to boat safety and navigational safety.

Use the attached boat safety checklist to evaluate and verify necessary equipment prior to leaving shore

9.27.2 Boat Requirements

All project boats will meet or exceed U.S. Coast Guard requirements for safety equipment, as applicable to the operation and type of boat. These requirements are summarized below for small craft (less than forty feet [12 meters] in length).

9.27.3 Flame Arresters

All gasoline engines, except outboard motors, installed in a boat must have an approved flame arrestor (backfire preventer) fitted to the carburetor.

9.27.4 Sound Signaling Devices

Boats shall carry at least one air horn or similar sound-signaling device. Radio or cell-phone communication must be in place as well.

9.27.5 Personal Flotation Devices

All personnel and passengers shall wear an approved personal flotation device (PFD) at all times when operating or being transported in a boat. A positively buoyant wet suit or dry suit may be substituted for a PFD. PFDs shall be Type II or higher (capable of turning its wearer in a vertical or slightly backward position in the water). In addition, each boat shall be equipped with at least one Type IV PFD, designed to be thrown to a person in the water and grasped and held by the user until rescued. A buoyant boat cushion equipped with straps and a float ring are two common examples of a Type IV PFD.

9.27.6 Fire Extinguishers

Each boat shall carry at least one Type B-I or B-II fire extinguisher (for use in gasoline, oil and grease fires) approved by Underwriters Laboratories (UL). Each fire extinguisher shall be inspected to ensure that it is sufficiently charged and that the nozzles are free and clear. Discharged fire extinguishers shall be replaced or recharged immediately.

9.27.7 Emergency Planning

As part of the project HSP and AHAs, emergencies and response actions must be addressed for potential emergencies such at fire, sinking, flooding, severe weather, man over-board, hazardous material incidents, etc.

9.27.8 Load Capacity

Boats shall not be loaded (passengers and gear) beyond the weight capacity printed on the U.S. Coast Guard information plate attached to the stern. In addition, several factors must be considered when loading a boat: distribute the load evenly, keep the load low, do not stand up in a small boat or canoe, and do not overload the boat.

9.27.9 Tool Kit

All motorized boats shall carry a tool kit sufficient for the boat operator to troubleshoot common mechanical problems such as fouled spark plugs, flooded carburetor, electrical shorts, etc. Boats operated in remote areas shall also carry appropriate spare parts (propellers, shear pins, patch kits, air pumps, etc). The tool kit shall be maintained by the boat operator and supplies used up shall be replaced immediately.

9.27.10 Communications

All boats operated shall carry a two-way radio or cellular telephone that enables communication back to the field camp or other pre-established location.

9.27.11 Good Housekeeping

Personnel using a boat shall properly stow and secure all gear and equipment against unexpected shifts when underway. Decks and open spaces must be kept clear and free from clutter and trash to minimize slip, trip, and fall hazards.

9.27.12 Fuel Management

Personnel shall utilize the "one-third rule" in boating fuel management. Use one-third of the fuel to get to the destination, one-third to return, and keep one-third in reserve.

No smoking is permitted on board vessels or during refueling operations.

9.27.13 Pollution Control

The Refuse Act of 1989 prohibits the throwing, discharging, or depositing of any refuse matter of any kind (including trash, garbage, oil, and other liquid pollutants) into the waters of the United States. The Federal Water Pollution Control Act prohibits the discharge of oil or hazardous substances in quantities that may be harmful into U.S. navigable waters. No person may intentionally drain oil or oily wastes from any source into the bilge of any

vessel. Larger vessels equipped with toilet facilities must be equipped with a U.S. Coast Guard-approved marine sanitation device.

Employees shall report any significant oil spills to water to the Environmental Manager and Project Manager who must report the spill to the U.S. Coast Guard or other applicable regulatory agency. The procedure for incident reporting and investigation shall be followed when reporting the spill.

9.27.14 Training

All operators and passengers shall be trained on the requirements outlined above, as well as trained on the HSP/AHA(s), including emergency response actions.

10.0 Physical Hazards and Controls

Physical hazards include exposure to temperature extremes, sun, noise, and radiation. If you encounter a physical hazard that has not been identified in this plan, contact the RHSM so that a revision to this plan can be made.

10.1 Noise

(Reference CH2M HILL SOP HSE-108, *Hearing Conservation*)

CH2M HILL is required to control employee exposure to occupational noise levels of 85 decibels, A-weighted, (dBA) and above by implementing a hearing conservation program that meets the requirements of the OSHA Occupational Noise Exposure standard, 29 CFR 1910.95. A noise assessment may be conducted by the RHSM or designee based on potential to emit noise above 85 dBA and also considering the frequency and duration of the task.

- Areas or equipment emitting noise at or above 90dBA shall be evaluated to determine feasible engineering controls. When engineering controls are not feasible, administrative controls can be developed and appropriate hearing protection will be provided.
- Areas or equipment emitting noise levels at or above 85 dBA, hearing protection must be worn.
- Employees exposed to 85 dBA or a noise dose of 50% must participate in the Hearing Conservation program including initial and annual (as required) audiograms.
- The RHSM will evaluate appropriate controls measures and work practices for employees who have experienced a standard threshold shift (STS) in their hearing.
- Employees who are exposed at or above the action level of 85 dBA are required to complete the online Noise Training Module located on CH2M HILL's virtual office.
- Hearing protection will be maintained in a clean and reliable condition, inspected prior to use and after any occurrence to identify any deterioration or damage, and damaged or deteriorated hearing protection repaired or discarded.
- In work areas where actual or potential high noise levels are present at any time, hearing protection must be worn by employees working or walking through the area.
- Areas where tasks requiring hearing protection are taking place may become hearing protection required areas as long as that specific task is taking place.
- High noise areas requiring hearing protection should be posted or employees must be informed of the requirements in an equivalent manner and a copy of the OSHA standard 29 CFR 1910.95 shall be posted in the workplace.

10.2 Ultraviolet Radiation (sun exposure)

Health effects regarding ultraviolet (UV) radiation are confined to the skin and eyes. Overexposure can result in many skin conditions, including erythema (redness or sunburn), photoallergy (skin rash), phototoxicity (extreme sunburn acquired during short exposures to UV radiation while on certain medications), premature skin aging, and numerous types of skin cancer. Implement the following controls to avoid sunburn.

Limit Exposure Time

- Rotate staff so the same personnel are not exposed all of the time.
- Limit exposure time when UV radiation is at peak levels (approximately 2 hours before and after the sun is at its highest point in the sky).
- Avoid exposure to the sun, or take extra precautions when the UV index rating is high.

Provide Shade

- Take lunch and breaks in shaded areas.
- Create shade or shelter through the use of umbrellas, tents, and canopies.
- Fabrics such as canvas, sailcloth, awning material and synthetic shade cloth create good UV radiation protection.
- Check the UV protection of the materials before buying them. Seek protection levels of 95 percent or greater, and check the protection levels for different colors.

Clothing

- Reduce UV radiation damage by wearing proper clothing; for example, long sleeved shirts with collars, and long pants. The fabric should be closely woven and should not let light through.
- Head protection should be worn to protect the face, ears, and neck. Wide-brimmed hats with a neck flap or "Foreign Legion" style caps offer added protection.
- Wear UV-protective sunglasses or safety glasses. These should fit closely to the face. Wrap-around style glasses provide the best protection.

Sunscreen

- Apply sunscreen generously to all exposed skin surfaces at least 20 minutes before exposure, allowing time for it to adhere to the skin.
- Re-apply sunscreen at least every 2 hours, and more frequently when sweating or performing activities where sunscreen may be wiped off.
- Choose a sunscreen with a high sun protection factor (SPF). Most dermatologists advocate SPF 30 or higher for significant sun exposure.
- Waterproof sunscreens should be selected for use in or near water, and by those who perspire sufficiently to wash off non-waterproof products.
- Check for expiration dates, because most sunscreens are only good for about 3 years. Store in a cool place out of the sun.
- No sunscreen provides 100 percent protection against UV radiation. Other precautions must be taken to avoid overexposure.

10.3 Temperature Extremes

(Reference CH2M HILL SOP HSE-211, *Heat and Cold Stress*)

Each employee is responsible for the following:

- Recognizing the symptoms of heat or cold stress;
- Taking appropriate precautionary measures to minimize their risk of exposure to temperature extremes (see following sections); and
- Communicating any concerns regarding heat and cold stress to their supervisor or SC.

10.3.1 Heat

California has a specific heat illness prevention regulation that must be implemented. This includes,

- Having enough water onsite so that each worker can consume at a minimum, **one quart per hour per shift**.
- Frequent reminders and/or water breaks shall be taken so that each person can consume enough water.

- Access to shade (i.e., blockage from direct sunlight) shall be provided at all times and shall be reasonably close to the work area. Keep in mind that a vehicle or other enclosed are with no air conditioning is NOT considered shade. Must be a well ventilated area or have air conditioning.
- Workers suffering from heat illness-related symptoms OR if needed for preventative recovery shall be provided access to shade for at least 5 minutes, or longer, for recovery. (if heat related symptoms are occurring, contact the RHSM).
- Training on risk factors, signs and symptoms of heat illness, importance of hydration and acclimatization, and importance of reporting symptoms and what to do in case of heat illness emergency, and contacting emergency medical services (see sections that follow).

Heat-related illnesses are caused by more than just temperature and humidity factors.

Physical fitness influences a person's ability to perform work under heat loads. At a given level of work, the more fit a person is, the less the physiological strain, the lower the heart rate, the lower the body temperature (indicates less retrained body heat—a rise in internal temperature precipitates heat injury), and the more efficient the sweating mechanism.

Acclimatization is a gradual physiological adaptation that improves an individual's ability to tolerate heat stress. Acclimatization requires physical activity under heat-stress conditions similar to those anticipated for the work. With a recent history of heat-stress exposures of at least two continuous hours per day for 5 of the last 7 days to 10 of the last 14 days, a worker can be considered acclimatized. Its loss begins when the activity under those heat-stress conditions is discontinued, and a noticeable loss occurs after 4 days and may be completely lost in three to four weeks. Because acclimatization is to the level of the heat-stress exposure, a person will not be fully acclimatized to a sudden higher level; such as during a heat wave.

Dehydration reduces body water volume. This reduces the body's sweating capacity and directly affects its ability to dissipate excess heat.

The ability of a body to dissipate heat depends on the ratio of its surface area to its mass (surface area/weight). **Heat dissipation** is a function of surface area, while heat production depends on body mass. Therefore, overweight individuals (those with a low ratio) are more susceptible to heat-related illnesses because they produce more heat per unit of surface area than if they were thinner. Monitor these persons carefully if heat stress is likely.

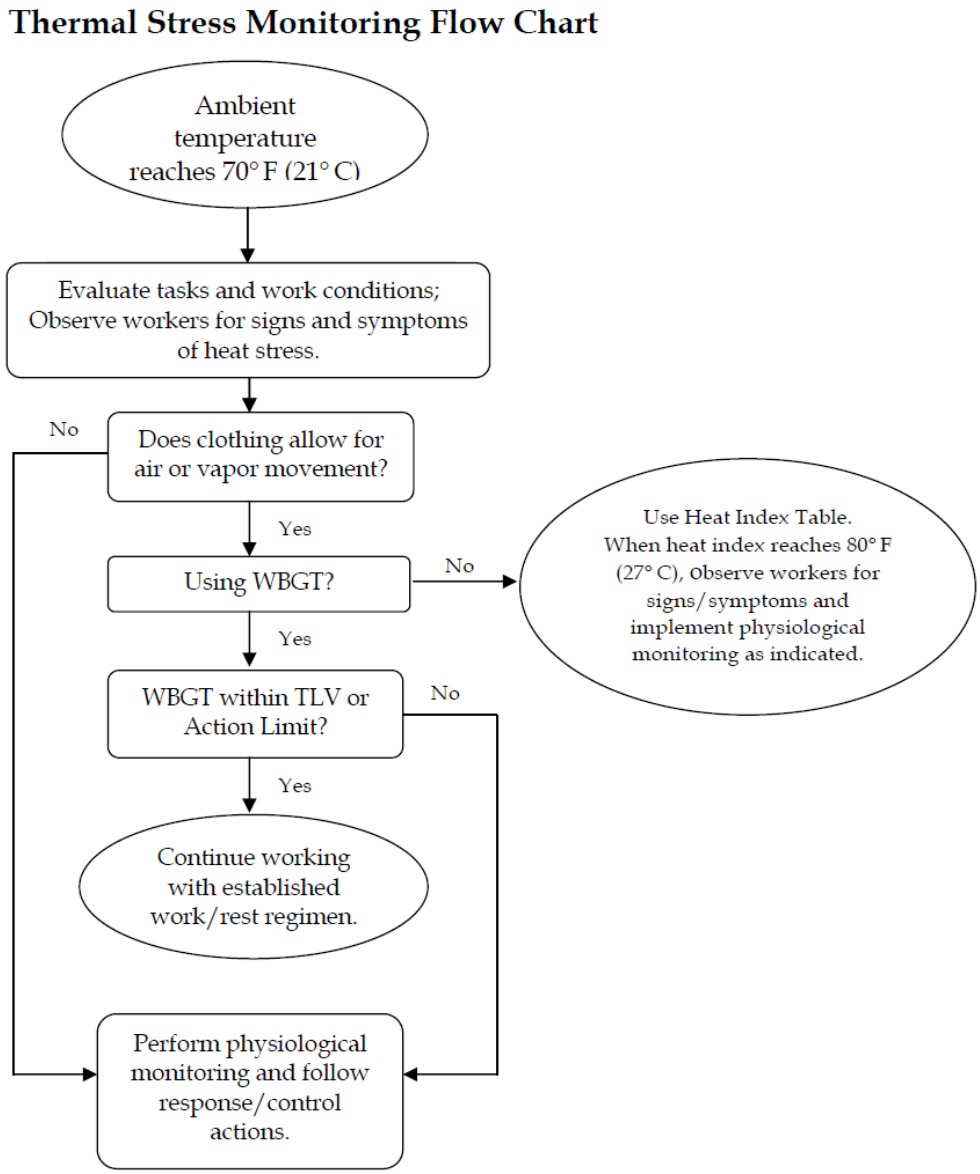
When wearing **impermeable clothing**, the weight of an individual is not as important in determining the ability to dissipate excess heat because the primary heat dissipation mechanism, evaporation of sweat, is ineffective.

SYMPTOMS AND TREATMENT OF HEAT STRESS					
	Heat Syncope	**Heat Rash**	**Heat Cramps**	**Heat Exhaustion**	**Heat Stroke**
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool– but not cold– water. Call ambulance, and get medical attention immediately!

Precautions

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°Fahrenheit (10 degrees Celsius [C]) to 60°Fahrenheit (F) (15.6 degrees C) should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons (7.5 liters) per day. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate yourself by slowly increasing workloads (do not begin with extremely demanding activities).
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shade to protect personnel against radiant heat (sun, flames, hot metal).
- Maintain good hygiene standards by frequently changing clothing and showering.
- Observe one another for signs of heat stress. PREVENTION and communication is key.

Thermal Stress Monitoring



Permeable Clothing – Monitoring Using WBGT

A Wet Bulb Globe Thermometer (WBGT) is the established and preferred means of measuring the environmental factors associated with heat stress and for providing indication of when physiological monitoring or rest regimens should be incorporated into the work schedule. The WBGT is the composite temperature used to estimate the effect of temperature, humidity, wind speed, and solar radiation on the human body.

When permeable work clothes are worn (street clothes or clothing ensembles over modesty clothes), physiological monitoring may be required based on the outcome of the WBGT measurements, taking into account the clothing adjustment factors. Use of the WBGT should generally begin when the heat index reaches 80° F (27° C) as indicated in the Heat Index Table below, or when workers exhibit symptoms of heat stress as indicated above.

If the WBGT is within the TLV (acclimatized workers) or Action Limit (unacclimatized workers) per the tables below, then work may continue while maintaining the established work/rest regimen. If the WBGT reading meets

or exceeds either the TLV or Action Level for a work/rest regimen of 15 minutes work and 45 minutes rest, then physiological monitoring will be implemented.

Screening Criteria for TLV and Action Limit for Heat Stress Exposure								
Allocation of work in a cycle of work and recovery	TLV (WBGT Values in ˚F/C˚) (Acclimatized Workers)				Action Limit (WBGT Values in ˚F/˚C˚) (Unacclimatized Workers)			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75-100%	88/31	82/28	--	--	82/28	77/25	--	--
50-75%	88/31	84/29	82/28	--	83/29	79/26	75/24	--
25-50%	90/32	86/30	84/29	82/28	85/30	81/27	78/26	76/25
0-25%	91/33	89/32	87/31	86/30	86/30	84/29	82/28	81/27
Work Category Descriptions:								
Light	Sitting or standing with light manual work using hands or arms; occasional walking.							
Moderate	Sustained moderate hand, arm, and leg work; light pushing and pulling; normal walking.							
Heavy	Intense arm and trunk work, carrying, shoveling, manually sawing, pushing and pulling heavy loads, walking at a fast pace.							
Very Heavy	Very intense activity at fast to maximum pace.							
Notes: WBGT values are expressed to the nearest degree. "—"Dashes indicate the need for physiological monitoring because screening criteria are not recommended for this type of work. Data included in this table is published by the American Conference of Governmental Industrial Hygienists (ACGIH)								

Clothing Adjustment Factors for Some Clothing Ensembles*	
Clothing Type	Addition to WBGT ˚F/˚C˚
Work Clothes (sleeved shirt and pants)	0/0
Cloth (woven material) coveralls	0/0
Double-layer woven clothing	5.4/3
Polypropylene coveralls	0.9/0.5
Limited Use Vapor barrier coveralls	19.8/11
* These values must not be used for completely encapsulating (impermeable) coveralls/suits. Coveralls assume that only modesty clothing is worn beneath.	

Thermal Stress Monitoring – Permeable or Impermeable Clothing

When permeable work clothes are worn (street clothes or clothing ensembles over street clothes), regularly observe workers for signs and symptoms of heat stress and implement physiological monitoring as indicated below. This should start when the heat index reaches 80° F (27° C) [see Heat Index Table below], or sooner if workers exhibit symptoms of heat stress indicated in the table above. These heat index values were devised for shady, light wind conditions; exposure to full sunshine can increase the values by up to 15°F (8°C). Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

When wearing **impermeable clothing** (e.g., clothing doesn't allow for air or water vapor movement such as Tyvek), physiological monitoring as described below shall be conducted when the ambient temperature reaches 70° F (21° C) or at a lower temperature when workers begin to exhibit signs and symptoms of heat stress.

Heat Index	Possible Heat Disorders	Minimum Frequency of Physiological Monitoring
80°F - 90°F (27°C - 32°C)	Fatigue possible with prolonged exposure and/or physical activity	Observe Workers for signs of heat stress and implement physiological monitoring if warranted.
90°F - 105°F (32°C - 41°C)	Sunstroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity	Every 2 hours, or sooner, if signs of heat stress are observed.
105°F - 130°F (41°C - 54°C)	Sunstroke, heat cramps, or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.	Every 60 minutes or sooner if signs of heat stress are observed.
130°F or Higher (54°C or Higher)	Heat/Sunstroke highly likely with continued exposure.	Every 30 minutes or sooner if signs of heat stress are observed.
Source: National Weather Service		

Physiological Monitoring and Associated Actions

The following physiological monitoring protocol below, using either radial pulse or aural temperature, will occur when the heat index is 80 degrees F or greater (or when personnel exhibit signs of heat stress), the following will be performed:

- The sustained heart rate during the work cycle should remain below 180 beats per minute (bpm) minus the individual's age (e.g. 180 – 35 year old person = 145 bpm). The sustained heart rate can be estimated by measuring the heart rate at the radial pulse for 30 seconds as quickly as possible prior to starting the rest period.
- The heart rate after one minute rest period should not exceed 120 beats per minute (bpm).
- If the heart rate is higher than 120 bpm, the next work period should be shortened by 33 percent, while the length of the rest period stays the same.
- If the pulse rate still exceeds 120 bpm at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent.
- Continue this procedure until the rate is maintained below 120 bpm.
- Alternately, the body temperature can be measured, either oral or aural (ear), before the workers have something to drink.
- If the oral or aural temperature exceeds 99.6° F (37.6 ° F) at the beginning of the rest period, the following work cycle should be shortened by 33 percent.
- Continue this procedure until the oral or aural (ear) temperature is maintained below 99.6 ° F (37.6° C). While an accurate indication of heat stress, oral temperature is difficult to measure in the field, however, a digital aural (aural) thermometer is easy to obtain and inexpensive to purchase.
- Use the form attached to this HSP to track workers' measurements and actions taken (Attachment 4).

Procedures for when Heat Illness Symptoms are Experienced

- **Always** contact the RHSM when any heat illness related symptom is experienced so that controls can be evaluated and modified, if needed.
- In the case of cramps, reduce activity, increase fluid intake, move to shade until recovered.

- In the case of all other heat-related symptoms (fainting, heat rash, heat exhaustion), and if the worker is a CH2M HILL worker, contact the occupational physician at 1-866-893-2514 and immediate supervisor.
- In the case of heat stroke symptoms, call 911, have a designee give location and directions to ambulance service if needed, follow precautions under the emergency medical treatment of this HSP.
- Follow the Incident Notification, Reporting, and Investigation section of this HSP.

10.3.2 Cold

General

Low ambient temperatures increase the heat lost from the body to the environment by radiation and convection. In cases where the worker is standing on frozen ground, the heat loss is also due to conduction.

Wet skin and clothing, whether because of water or perspiration, may conduct heat away from the body through evaporative heat loss and conduction. Thus, the body cools suddenly when chemical protective clothing is removed if the clothing underneath is perspiration soaked.

Movement of air across the skin reduces the insulating layer of still air just at the skin's surface. Reducing this insulating layer of air increases heat loss by convection.

Non-insulating materials in contact or near-contact with the skin, such as boots constructed with a metal toe or shank, conduct heat rapidly away from the body.

Certain common drugs, such as alcohol, caffeine, or nicotine, may exacerbate the effects of cold, especially on the extremities. These chemicals reduce the blood flow to peripheral parts of the body, which are already high-risk areas because of their large surface area to volume ratios. These substances may also aggravate an already hypothermic condition.

Precautions

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in wet weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- Wind-Chill Index (below) is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- Persons who experience initial signs of immersion foot, frostbite, and/or hypothermia should report it immediately to their supervisor/PM to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

SYMPTOMS AND TREATMENT OF COLD STRESS			
	Immersion (Trench) Foot	**Frostbite**	**Hypothermia**
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm–but **not** hot–water. Have victim drink warm fluids, but **not** coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but **not** coffee or alcohol. Get medical attention.

Wind Chill Chart

Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

11.0 Biological Hazards and Controls

Biological hazards are everywhere and change with the region and season. If you encounter a biological hazard that has not been identified in this plan, contact the RHSM so that a revision to this plan can be made. Whether it is contact with a poisonous plant, a poisonous snake, or a bug bite, do not take bites or stings lightly. If there is a chance of an allergic reaction or infection, or to seek medical advice on how to properly care for the injury, contact the occupational nurse at 1-866-893-2514.

11.1 Africanized Honey Bees

Africanized honey bees are present in the Phoenix, Arizona area and other parts of the southwestern United States. They can be more aggressive than the common honey bee. The following precautions should be taken:

- Aside from watching for nests, be extra careful when moving discarded materials on the ground.
- Be alert for bees that appear to be acting more aggressive or strange. Do not disturb colonies.
- If bees begin to fly at your face or buzz around over your head, quickly retrace your steps and leave the area immediately. Report this occurrence to the SC and fellow workers at the site. Avoid this area until instructed that it is safe to reenter.
- Wear light colored clothing as dark clothing/colors appears to attract and anger bees.
- Avoid wearing any type of aftershave or perfume. This may also attract bees.
- If swarmed by bees, run quickly to an enclosed shelter. Do not stop to pickup belongings or materials. Do not flail at bees as this will increase their attack, but cover head and face as best able.
- Once away from bees evaluate your condition. If you have been stung or if you are having any symptoms other than local pain and swelling, call the occupational nurse at 1-866-893-2514.

11.2 Bees and Other Stinging Insects

Bees and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform your supervisor and/or a buddy. If you are stung, contact the occupational nurse at 1-866-893-2514. If a stinger is present, remove it as soon as possible using something with a thin, hard edge (e.g., credit card) to scrape the stinger out. Be sure to sanitize the object first with hand sanitizer, alcohol or soap and water. Wash and disinfect the wound, cover it, and apply ice. Watch for an allergic reaction if you have never been stung before. Call 911 if the reaction is severe.

11.3 Cactus

Cacti are present onsite. Contact with cacti can result in dermatitis as well as causing immunologic and infectious reactions. The spines can scratch the skin or induce wounds and multiple abrasions. Some cacti have glochids (hair-like spines or short prickles, generally barbed). Glochids can induce more troublesome, more persistent, dermatological manifestations such as papules or nodules.

Set up the work area to ensure avoidance of cacti. Wear leather glove if working near cacti. Keep any clothing such as jackets away from cacti as spines can become lodged into the clothing and can be contacted by the skin later. Contact the occupational nurse if cactus contact occurs.

11.4 Cougars/Mountain Lions

Like bears, cougars will often retreat if given the opportunity. Walking in groups and making noise will give the cougar the chance to retreat and reduce the likelihood of a sudden encounter. Be especially cautious during dusk and dawn.

If you see a cougar—do not play dead, do not run. Running may trigger an attack. Face the cougar and retreat slowly maintaining eye contact. If the cougar continues advancing, raise your arms above your head to make yourself look larger than normal. This may help to intimidate the cougar. Sometimes aggressive yelling and rock throwing may scare it off.

If attacked, fight back with whatever is at hand (without turning your back)—people have utilized rocks, jackets, garden tools, tree branches, and even bare hands to turn away cougars.

11.5 Coyotes

While far from domesticated, coyotes show little fear of humans and have become comfortable living in close proximity to our communities. Although they tend to do most of their hunting after dusk, coyotes can be active at any time. Under normal circumstances, a coyote is not a danger to humans. They are, however, territorial and will respond aggressively if they or their family are threatened.

If you encounter a coyote that behaves aggressively, you have probably gotten too close to its prey or its family. Try to scare the coyote by yelling and waving your arms. Throw rocks, sticks or other objects. Do not turn away and run.

11.6 Feral Dogs

Avoid all dogs – both leashed and stray. Do not disturb a dog while it is sleeping, eating, or caring for puppies. If a dog approaches to sniff you, stay still. An aggressive dog has a tight mouth, flattened ears and a direct stare. If you are threatened by a dog, remain calm, do not scream and avoid eye contact. If you say anything, speak calmly and firmly. Do not turn and run, try to stay still until the dog leaves, or back away slowly until the dog is out of sight or you have reached safety (e.g. vehicle). If attacked, retreat to vehicle or attempt to place something between you and the dog. If you fall or are knocked to the ground, curl into a ball with your hands over your head and neck and protect your face. If bitten, contact the occupational nurse at 1-866-893-2514. Report the incident to the local authorities.

11.7 Fire Ants

There are several types of fire ants in the United States that can cause painful bites and allergic reactions. Fire ants aggressively defend their nests by stinging several times after climbing on their victims. Large ant mounds are easily visible, but there can be smaller mounds or nests with little “worked” soil that can be stepped on inadvertently. They can also be under rocks, wood or other debris. Implement the following when fire ants are observed:

- Be aware of fire ants and take care not to stand on ant nests;
- Use insect repellents on clothing and footwear to temporarily discourage ants from climbing; and
- Tuck pants into socks.

If stung, get away from the area you are standing on, briskly brush off ants—wash affected area with soap. Call the occupational nurse.

11.8 Poodle Dog Bush

A species of plant that thrives in areas scorched by wildfire, the lavender-flowered Turricula parryi also known as the “poodle dog bush.” Skin contact can cause rashes, blisters, swelling and general irritation. The plant appears only periodically and is frequently mistaken for lupine, which also has purple flowers.

It is endemic to California and Baja California, and can be found from the southern Sierra Nevada and San Joaquin Valley southwards to Baja California.

It is found in chaparral, on slopes and ridges from 100 to 2300 meters. Its seeds can remain dormant in soil for long periods, with the plant springing up quickly when the soil is disturbed or after a wildfire. It is very common in the area burned by the 2009 Station Fire in Southern California.

It grows into a moderate size, perennial woody shrub, branching from the base but with main stems extending for up to 3 meters. Its leaves are long and narrow, and may be toothed at the edge; they can be from 4 to 30 cm long. It flowers from June to August, having clusters (cymes) of attractive bell-shaped blue, lavender or purple flowers. However it has a rank smell. Its flower clusters and hairy stem are similar to those of many plants in the genus Phacelia, but it can be distinguished from them by its greater height.

11.9 Scorpions

Scorpions usually hide during the day and are active at night. They may be hiding under rocks, wood, or anything else lying on the ground. Some species may also burrow into the ground. Most scorpions live in dry, desert areas; however, some species can be found in grasslands, forests, and inside caves.

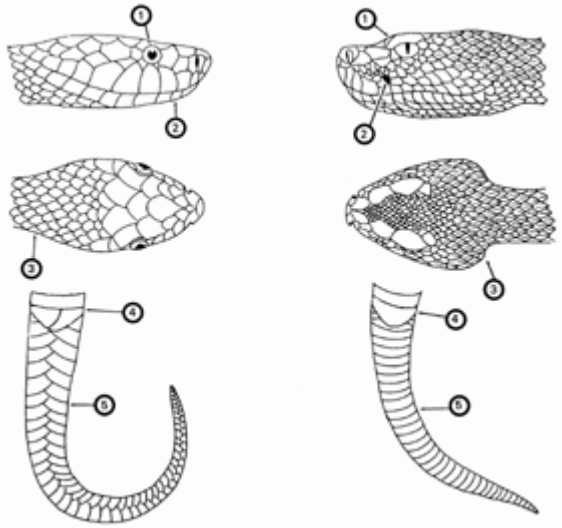
When entering an area that has the potential to contain scorpions, the following PPE is recommended: long pants, long sleeved shirts with collars, leather work gloves and leather work boots. Reaching into enclosures or recesses without prior visual inspection is not recommended. Thoroughly inspect each area before accessing. Shake out clothing, jackets, shoes or boots prior to putting them on.

11.10Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Call the occupational nurse at 1-866-893-2514 immediately. Do not apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings. Below is a guide to identifying poisonous snakes from non-poisonous snakes.

Identification of Poisonous Snakes

Major Identification Features Non-venomous Snake	Major Identification Features Venomous Snake
1. Round pupils 2. No sensing pit 3. Head slightly wider than neck 4. Divided anal plate 5. Double row of scales on the underside of the tail	1. Elliptical pupils 2. Sensing pit between eye and nostril 3. Head much wider than neck 4. Single anal plate 5. Single scales on the underside of the tail



11.11Spiders - Brown Recluse and Widow

The Brown Recluse spider can be found most anywhere in the United States. It varies in size in shape, but the distinguishing mark is the violin shape on its body. They are typically non-aggressive. Keep an eye out for irregular, pattern-less webs that sometimes appear almost tubular built in a protected area such as in a crevice or between two rocks. The spider will retreat to this area of the web when threatened.

The Black Widow, Red Widow and the Brown Widow are all poisonous. Most have globose, shiny abdomens that are predominantly black with red markings (although some may be pale or have lateral stripes), with moderately long, slender legs. These spiders are nocturnal and build a three-dimensional tangled web, often with a conical tent of dense silk in a corner where the spider hides during the day.

Hazard Controls

- Inspect or shake out any clothing, shoes, towels, or equipment before use.
- Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.
- Minimize the empty spaces between stacked materials.
- Remove and reduce debris and rubble from around the outdoor work areas.
- Trim or eliminate tall grasses from around outdoor work areas.
- Store apparel and outdoor equipment in tightly closed plastic bags.

- Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores.

If you think you have been bit by a poisonous spider, immediately call the occupational nurse at 1-866-893-2514 and follow the guidance below:

- Remain calm. Too much excitement or movement will increase the flow of venom into the blood;
- Apply a cool, wet cloth to the bite or cover the bite with a cloth and apply an ice bag to the bite;
- Elevate the bitten area, if possible;
- Do not apply a tourniquet, do not try to remove venom; and
- Try to positively identify the spider to confirm its type. If the spider has been killed, collect it in a plastic bag or jar for identification purposes. Do not try to capture a live spider—especially if you think it is a poisonous spider.

Black Widow

Red Widow

Brown Widow

Brown Recluse

If you are stung by a scorpion, call the occupational nurse 1-866-893-2514 and try to note the description of the scorpion. Cleanse the sting area and apply ice.

12.0 Contaminants of Concern

The table below summarizes the potential contaminants of concern (COC) and their occupational exposure limit and signs and symptoms of exposure. The table also includes the maximum concentration of each COC and the associated location and media that was sampled (groundwater, soil boring, surface soil). These concentrations were used to determine engineering and administrative controls described in the "Project-Specific Hazard Controls" section of this HSP, as well as PPE and site monitoring requirements.

Contaminants of Concern

Contaminant	Location and Maximum[a] Concentration (ppm)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Arsenic (AOC 4)	GW: 0.157 (MW-12) SS: 40 (AOC4-D20) SD: 13 (AOC1-BCW6) SW: 0.0032 (C-MAR)	0.01 mg/m^3	5 Ca	Ulceration of nasal septum, respiratory irritation, dermatitis, gastrointestinal disturbances, peripheral neuropathy, hyperpigmentation	NA
Asbestos (AOC 4)	SS: detected	0.1 f/cc	Ca	Dyspnea, restricted pulmonary function	Dust
Barium (AOC 4)	GW: 5.3 (MW-23) SS: 2900 (AOC4-15) SD: 320 (AOC1-BCW6) SW: 170 (I-3)	500 ug/m3	50 mg/m3	Muscle spasms, slow pulse, bronchial irritation	Dust
Cadmium (AOC 4)	GW: .0012 (MW-38S) SS: 27 (AOC4-15) SD: ND SW: ND	0.005 mg/m^3	9 Ca	Pulmonary edema, coughing, chest tightness/pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, difficulty breathing, loss of sense of smell, emphysema, mild anemia	NA
Chromium (as Cr(II) & Cr(III))	GW: 23 (MW-68-180) SB: 4.9 (4', RR Debris site) SS: 4300 (SS#6) SD: 71 (AOC1-BCW6) SW: 0,0147 (RRB)	0.5 mg/m^3	25	Irritated eyes, sensitization dermatitis, histologic fibrosis of lungs	NA
Hexavalent Chromium (AOC 4, 10)	GW: 22 (MW-68-180) SB: 15.4 (4, RR Debris site) SS: 1560 (AOC4-STAINED) SD: 2.36 (AOC1-BCW6) SW: 0.0257 (RRB)	5 ug/m^3 (insoluble) 1 ug/m^3 (soluble)	ND	Acute: Coughing, sneezing, chest pain, breathing difficulty, itching and burning sensation to skin and lungs. Long term (Chronic): Allergic (asthma like symptoms) respiratory reaction, skin and eye irritation, nosebleeds, contact dermatitis, allergic like skin reaction, ulceration and perforation of the nasal septum.	NA

Contaminants of Concern

Contaminant	Location and Maximum[a] Concentration (ppm)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Cobalt (AOC 4)	GW: 10 (OW-05M) SS: 61 (DR-6) SD: 7.7 (AOC1-BCW6) SW: ND	20 mg/m3	> 1 mg/m3	Coughing, respiratory sensitivity, pneumoconiosis, dyspnea	NA
Copper (AOC 4)	GW: 0.640 (CW-01D) SS: 5900 (AOC4-15) SD: 22 (AOC1-BCW6) SW: 0.119 (R-22)	1 mg/m3		Nasal perforation, metal taste	NA
Dioxins/Furans (AOC 4)	SS: 34 (AOC4-D-3)	1 ug/m3		Chloracne, loss of feeling, fatigue	
Lead (AOC4)	GW: 0.076 (MW-22) SS: 11000 (AOC4-15) SD: 23 (AOC1-BCW6) SW: 0.0026 (VERNAL POOL)	0.05 mg/m^3	100	Weakness lassitude, facial pallor, pal eye, weight loss, malnutrition, abdominal pain, constipation, anemia, gingival lead line, tremors, paralysis of wrist and ankles, encephalopathy, kidney disease, irritated eyes, hypertension	NA
Manganese	GW: 1.150 (PT7M) SS: 1300 (AOC10-5) SD: 420 (AOC1-BCW6) SW: 0.033 (C-MAR)	.2 mg/m3	500 mg/m3	Dead face", dry throat, cough metal fume fever, pneumonia	
Mercury (AOC 4)	GW: 0.0019 (PT7M) SS: 29 (AOC4-D20)	0.05 mg/m^3	10	Skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pneumontitis, tremors, insomnia, irritability, indecision, headache, fatigue, weakness, GI disturbance	
Molybdenum	GW: 0.301 (MW-10) SS: 720 (JP-2-S) SW: 0.008 (CON)	5 mg/m3	1000 mg/m3	Loss of appetite, incoordination, eye, nose & throat irritation	NA
Nickel (AOC 4)	GW: 0.911 (MW-03) SS: 580 (AOC4-15) SD: 18 (AOC1-BCW6) SW: 0.030 (R-28)	100 ug/m3		Skin sensitivity, chest pain, "asthma"	NA
PCBs (Limits as Aroclor 1254)	GW: ND SS: 6 (AOC4-HO4)	0.5 mg/m^3	5 Ca	Eye and skin irritation, acne-form dermatitis, liver damage, reproductive effects	UK

Contaminants of Concern

Contaminant	Location and Maximum[a] Concentration (ppm)	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
PAH's (AOC 4)	GW: 44 (CW-02) SS: 110 (AOC4-13) SD: 0.052 (AOC1-BCW6)	200 ug/m3	80 mg/m3	Confusion, nausea, eye irritant, headaches, stomach pain	UK
Selenium (AOC 4)	GW: 0.173 (PT9M) SS: 6.2 (24soil-1)	200 ug/m3	1 mg/m3	Headache, chill, fever, garlic breath, disturbed vision	
Vanadium (AOC 4)	GW: 0.326 (MW-37D) SS: 100 (AOC4-D02) SD: 37 (AOC1-BCW6) SW: 0.253 (R-28)	50 ug/m3	35 mg/m3	Green tongue, metal taste, coughing, throat irritation	
Zinc (AOC 4)	GW: 2200 (UPR-150) SS: 9900 (ACO4-15) SD: 81 (AOC1-BCW6) SW: 1.06 (R-28)	5 mg/m3		Sweet metal taste, dry throat, cough, tight chest, chills	

Footnotes:

[a] Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), SS (Surface Soil), SL (Sludge), SW (Surface Water), SD (Sediment).

[b] Appropriate value of permissible exposure limit (PEL), recommended exposure limit (REL), or threshold limit valute (TLV) listed.

[c] IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.

[d] PIP = photoionization potential; NA = Not applicable; UK = Unknown.

eV = electron volt

mg/kg = milligram per kilogram

mg/m^3 = milligrams per cubic meter

ug/m^3 = micrograms per cubic meter

Potential Routes of Exposure

Dermal: Contact with contaminated media. This route of exposure is minimized through use of engineering controls, administrative controls and proper use of PPE.	**Inhalation:** Vapors and contaminated particulates. This route of exposure is minimized through use of engineering controls, administrative controls and proper use of respiratory protection when other forms of control do not reduce the potential for exposure.	**Other:** Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).

13.0 Site Monitoring

(Reference CH2M HILL SOP HSE-207, *Exposure Monitoring for Airborne Chemical Hazards*)

When performing site monitoring, record all the information, such as in a field logbook. Note date and time, describe monitoring location (for example, in breathing zone, at source and site location), and what the reading is. If any action levels are reached, note it in the field logbook and note the action taken.

Exposure records (air sampling) must be preserved for the duration of employment plus thirty years. Ensure that copies of the field log book are maintained in the project file.

Copies of all project exposure records (e.g., copies of field logbook pages where air monitoring readings are recorded and associated calibration) shall be sent to the regional SPA for retention and maintained in the project files.

Air monitoring is required in AOC4 & 10, since there is a potential for personal exposure during planned site activities. The primary pathway for exposure to chromium and other metals is via inhalation of Hexavalent Chromium-containing dust or groundwater removal causing misting, so as long as dust and mist exposure are controlled, there should be no exposure problems. If work changes or if dust is generated during work activities, then the HSM must be notified so that air monitoring and PPE can be further evaluated. Most of these potential exposures are part of the subcontractor tasks, and every task will be assessed with the subcontractors HS&E Manager and the CH2M HILL HSE Manager prior to the start of field work.

13.1 Direct Reading Monitoring Specifications

Instrument	Tasks	Action Levels[a]	Action to be Taken when Action Level reached	Frequency [b]	Calibration
PID: MiniRAE PID with 10.6 eV lamp or equivalent	Subsurface work in AOC 4 and 10	< 5 ppm > 5 ppm	Level D stop work, contact HSM	Initially and every 15 minutes.	Daily
Toxic Gas Monitor: MultiRAE Plus with 10.6 eV lamp (VOCs, O_2, LEL, CO,, H_2S)	CSE work	See CSE plan	Level D Level C not permitted	Continuous	Daily
Dust Monitor: DataRAM or equivalent (Based on SS lead levels of 11000 mg/Kg, AOC4-15)	Subsurface work in AOC's.	< 2.5 mg/m^3 > 2.5 mg/m^3	Level D Level C	Continuously in breathing zones	Zero Daily
Visual Dust Assessment:	Well abandonment; excavation activities outside AOC's	No Visual Dust Visual Dust	Level D Implement dust suppression methods	Initially and periodically during tasks	Zero Daily
Nose-Level Monitor [d]	All noise areas	<85 dB(A) 85-120 dB(A) 120 dB(A)	No action required Hearing protection required Stop; re-evaluate	Initially and periodically during task	Daily

[a] Action levels apply to sustained breathing-zone measurements above background.
[b] The exact frequency of monitoring depends on field conditions and is to be determined by the SC; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate.
[c] If the measured percent of O_2 is less than 10, an accurate LEL reading will not be obtained. Percent LEL and percent O_2 action levels apply only to ambient working atmospheres, and not to confined-space entry. More-stringent percent LEL and O_2 action levels are required for confined-space entry.
[d] Noise monitoring and audiometric testing also required.

13.2 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
PID: OVM, 10.6 or 11.8 eV bulb	100 ppm isobutylene	RF = 1.0	100 ppm	1.5 lpm reg T-tubing
PID: MiniRAE, 10.6 eV bulb	100 ppm isobutylene	CF = 100	100 ppm	1.5 lpm reg T-tubing
PID: TVA 1000	100 ppm isobutylene	CF = 1.0	100 ppm	1.5 lpm reg T-tubing
Dust Monitor: DataRAM	Dust-free air	Not applicable	0.00 mg/m^3 in "Measure" mode	Dust-free area OR Z-bag with HEPA filter
CGI: MSA 260, 261, 360, or 361	0.75% pentane	N/A	50% LEL $\pm$ 5% LEL	1.5 lpm reg direct tubing

Calibrate air monitoring equipment daily (or prior to use) in accordance with the instrument's instructions. Document the calibration in the field logbook (or equivalent) and include the following information:

- Instrument name
- Serial Number
- Owner of instrument (for example, CH2M HILL, HAZCO)
- Calibration gas (including type and lot number)
- Type of regulator (for example, 1.5 lpm)
- Type of tubing (for example, direct or T-tubing)
- Ambient weather condition (for example, temperature and wind direction)
- Calibration/instrument readings
- Operator's name and signature
- Date and time

13.3 Integrated Personal Air Sampling

Sampling, in addition to real-time monitoring, may be required by other OSHA regulations where there may be exposure to certain contaminants. Air sampling typically is required when site contaminants include lead, cadmium, arsenic, asbestos, and certain volatile organic compounds. Contact the RHSM immediately if these contaminants are encountered.

Personal Breathing Zone and Area Samples

Personal breathing zone and area sampling results must be sent immediately to the RHSM.

Employees potentially exposed to the substances for which air sampling is being performed shall be given the opportunity to observe the exposure measurements, and records shall be made available to all affected employees upon request or when they are required to be provided by a specific regulation. Employees may also receive a copy of their exposure records from the Medical Surveillance Program Administrator (MSPA).

14.0 Personal Protective Equipment

(Reference CH2M HILL- SOP HSE-117, *Personal Protective Equipment*)

14.1 Required Personal Protective Equipment

PPE must be worn by employees when actual or potential hazards exist and engineering controls or administrative practices cannot adequately control those hazards.

A PPE assessment has been conducted by the RHSM based on project tasks (see PPE specifications below). Verification and certification of assigned PPE by task is completed by the RHSM that approved this plan. Below are items that need to be followed when using any form of PPE:

- Employees must be trained to properly wear and maintain the PPE;
- Employees must be trained in the limitations of the PPE;
- In work areas where actual or potential hazards are present at any time, PPE must be worn by employees working or walking through the area;
- Areas requiring PPE should be posted or employees must be informed of the requirements in an equivalent manner;
- PPE must be inspected prior to use and after any occurrence to identify any deterioration or damage;
- PPE must be maintained in a clean and reliable condition;
- Damaged PPE shall not be used and must either be repaired or discarded; and
- PPE shall not be modified, tampered with, or repaired beyond routine maintenance.

The table below outlines PPE to be used according to task based on project-specific hazard assessment. If a task other than the tasks described in this table needs to be performed, contact the RHSM so this table can be updated.

Project-Specific Personal Protective Equipment Requirements[a]

Task	Level	Body	Head	Respirator [b]
General site entry Surveying Observation of material loading for offsite disposal Oversight of remediation and construction Groundwater extraction system site set-up and general inspections Backhoe use	D	Work clothes; safety toed leather work boots and gloves	Hardhat [c] Safety glasses with side shields Ear protection [d]	None required
Surface water sampling Aquifer testing Sediment sampling Drilling new wells, soil sampling. GW sampling, IDW sampling, Hydro/Vacuum excavation	Modified D	Work clothes or cotton coveralls **Boots:** Safety-toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Safety glasses with side shields Ear protection [d]	None required
Soil disturbance work in AOC's.	Modified D	**Coveralls:** Uncoated Tyvek® **Boots:** Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Safety glasses with side shields Ear protection [d]	None required.

Project-Specific Personal Protective Equipment Requirements[a]

Task	Level	Body	Head	Respirator [b]
Work near vehicular traffic ways or earth moving equipment.	All	Appropriate level of ANSI/ISEA 107-2004 high-visibility safety vests.	Work near vehicular traffic ways or earth moving equipment.	
River work from a boat	Modified D	**Work clothes:** long pants, t-shirt with sleeves, leather work boots, USCG approved flotation device. Upgrade to steel toed may be required if carrying heavy objects. **Gloves:** Nitrile gloves may be necessary for sampling.	Hat Safety glasses, tinted	NR
Equipment decontamination if using pressure washer	Modified D with splash protection	**Coveralls:** Polycoated Tyvek® **Boots:** 16-inch-high steel-toed rubber boots **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] over safety glasses with side shields or splash goggles Ear protection [d]	None required.
Excavation work in AOC's, drilling if action limits are exceeded.	C	**Coveralls:** Polycoated Tyvek® **Boots:** Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; HEPA Cartridge
Tasks requiring upgrade	B	**Coveralls:** Polycoated Tyvek® **Boots:** Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	Positive-pressure demand self-contained breathing apparatus (SCBA); MSA Ultralite, or equivalent.

Reasons for Upgrading or Downgrading Level of Protection (with approval of the RHSM)

Upgrade[f]	Downgrade
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels in the "Site Monitoring" section exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decrease the hazard. • Change in work task that will reduce contact with hazardous materials.

[a] Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

[b] No facial hair that would interfere with respirator fit is permitted.

[c] Hardhat and splash-shield areas are to be determined by the SC.

[d] Ear protection should be worn when conversations cannot be held at distances of 3 feet (1 meter) or less without shouting.

[e] See cartridge change-out schedule.

[f] Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the RHSM, and an SC qualified at that level is present.

14.2 Respiratory Protection

(Reference CH2M HILL SOP HSE-121, *Respiratory Protection*)

Implement the following when using respiratory protection:

- Respirator users must have completed appropriate respirator training within the past 12 months. Level C training is required for air-purifying respirators (APR) use and Level B training is required for supplied-air respirators (SAR) and self-contained breathing apparatus (SCBA) use. Specific training is required for the use of powered air-purifying respirators (PAPR);
- Respirator users must complete the respirator medical monitoring protocol and been approved for the specific type of respirator to be used;
- Tight-fitting facepiece respirator (negative or positive pressure) users must have passed an appropriate fit test within past 12 months;
- Respirator use shall be limited to those activities identified in this plan. If site conditions change that alters the effectiveness of the specified respiratory protection, the RHSM shall be notified to amend the written plan;
- Tight-fitting facepiece respirator users shall be clean-shaven and shall perform a user seal check before each use;
- Canisters/cartridges shall be replaced according to the change-out schedule specified in this plan. Respirator users shall notify the SC or RHSM of any detection of vapor or gas breakthrough. The SC shall report any breakthrough events to the RHSM for schedule upgrade;
- Respirators in regular use shall be inspected before each use and during cleaning;
- Respirators in regular use shall be cleaned and disinfected as often as necessary to ensure they are maintained in a clean and sanitary condition;
- Respirators shall be properly stored to protect against contamination and deformation;
- Field repair of respirators shall be limited to routine maintenance. Defective respirators shall be removed from service;
- When breathing air is supplied by cylinder or compressor, the SC or RHSM shall verify the air meets Grade D air specifications; and
- The SC or designee shall complete the Self-Assessment Checklist – Respiratory Protection included in as attachment to this plan to verify compliance with CH2M HILL's respiratory protection program.

Respirator Change-Out Schedule

Contaminant	Change-Out Schedule
Metals, dust	Dependent on site tasks, will be determined upon new task order, or set per 3rd party contractor.

15.0 Worker Training and Qualification

15.1 CH2M HILL Worker Training

(Reference CH2M HILL SOP HSE-110, *Training*)

15.1.1 Hazardous Waste Operations Training

All employees engaging in hazardous waste operations or emergency response shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65. At a minimum, the training shall have consisted of instruction in the topics outlined in 29 CFR 1910.120 and 29 CFR 1926.65. Personnel who have not met these training requirements shall not be allowed to engage in hazardous waste operations or emergency response activities.

15.1.1.1 Initial Training

General site workers engaged in hazardous waste operations shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations, unless otherwise noted in the above-referenced standards.

Employees who may be exposed to health hazards or hazardous substances at treatment, storage, and disposal (TSD) operations shall receive a minimum of 24 hours of initial training to enable the employee to perform their assigned duties and functions in a safe and healthful manner.

Employees engaged in emergency response operations shall be trained to the level of required competence in accordance with 29 CFR 1910.120.

15.1.1.2 Three-Day Actual Field Experience

General site workers for hazardous waste operations shall have received three days of actual experience (on-the-job training) under the direct supervision of a trained, qualified supervisor and shall be documented. If the field experience has not already been received and documented at a similar site, this supervised experience shall be accomplished and documented at the beginning of the assignment of the project.

15.1.1.3 Refresher Training

General site workers and TSD workers shall receive 8-hours of refresher training annually (within the previous 12-month period) to maintain qualifications for fieldwork. Employees engaged in emergency response operations shall receive annual refresher training of sufficient content and duration to maintain their competencies or shall demonstrate competency in those areas at least annually.

15.1.1.4 Eight-Hour Supervisory Training

On site management or supervisors who will be directly responsible for, or supervise employees engaged in hazardous waste site operations, will have received at least 8 hours of additional specialized training on managing such operations. Employees designated as Safety Coordinator – Hazardous Waste are considered 8-hour HAZWOPER Site Safety Supervisor trained.

15.1.2 First Aid/Cardiopulmonary Resuscitation

First aid and CPR training consistent with the requirements of a nationally recognized organization such as the American Red Cross Association or National Safety Council shall be administered by a certified trainer. A minimum of two personnel per active field operation will have first aid and CPR training. Bloodborne pathogen training located on CH2M HILL's Virtual Office is also required for those designated as first aid/CPR trained.

15.1.3 Safety Coordinator Training

SCs are trained to implement the HSE program on CH2M HILL field projects. A qualified SC is required to be identified in the site-specific HSP for CH2M HILL field projects. SCs must also meet the requirements of the worker category appropriate to the type of field project (construction or hazardous waste). In addition, the SCs shall have

completed additional safety training required by the specific work activity on the project that qualifies them to implement the HSE program (for example, fall protection, excavation).

15.1.4 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed site-specific training that will address the contents of applicable HSPs, including the activities, procedures, monitoring, and equipment used in the site operations. Site-specific training will also include site and facility layout, potential hazards, risks associated with identified emergency response actions, and available emergency services. This training allows field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and work operations for their particular activity.

15.1.5 Project-Specific Training Requirements

Project-specific training for this project includes:

- HSPs/AHAs
- Hexavalent Chromium
- Asbestos for work in AOC 4
- Compressor station site orientation by the client
- Electrical safety for O&M work
- 10 Hr. OSHA Construction safety for construction related tasks
- Safety coordinator training Construction and Hazwaste for assigned safety officers.
- Noise, Hearing conservation
- Other task specific training as determined

16.0 Medical Surveillance and Qualification

(Reference CH2M HILL SOP HSE-113, *Medical Surveillance*

All site workers participating in hazardous waste operations or emergency response (HAZWOPER) will maintain an adequate medical surveillance program in accordance with 29 CFR 1910.120 or 29 CFR 1926.65 and other applicable OSHA standards. Documentation of employee medical qualification (e.g., physician's written opinion) will be maintained in the project files and made available for inspection.

16.1 Hazardous Waste Operations and Emergency Response

CH2M HILL personnel expected to participate in on site HAZWOPER tasks are required to have a current medical qualification for performing this work. Medical qualification shall consist of a qualified physician's written opinion regarding fitness for duty at a hazardous waste site, including any recommended limitations on the employee's assigned work. The physician's written opinion shall state whether the employee has any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response, or from respirator use.

16.2 Job or Site-Specific Medical Surveillance

Due to the nature of hazards for a particular job or work site, specialized medical surveillance may be necessary. This surveillance could include biological monitoring for specific compounds, or specialized medical examinations.

Site-specific medical surveillance includes:

- Not applicable at this time

16.3 Respirator User Qualification

Personnel required to wear respirators must have a current medical qualification to wear respirators. Medical qualification shall consist of a qualified physician's written opinion regarding the employee's ability to safely wear a respirator in accordance with 29 CFR 1910.134.

16.4 Hearing Conservation

Personnel working in hazardous waste operations or operations that fall under 29 CFR 1910.95 and exposed to noise levels in excess of the 85dBA time-weighted average shall be included in a hearing conservation program that includes annual audiometric testing.

17.0 Site-Control Plan

17.1 Site-Control Procedures

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations)*

Site control is established to prevent the spread of contamination throughout the site and to ensure that only authorized individuals are permitted into potentially hazardous areas.

The SC will implement site control procedures including the following bulleted items.

- Establish support, contamination reduction, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals;
  - Air horn; and
  - Two-way radio or cellular telephone if available.
- Establish offsite communication.
- Establish and maintain the "buddy system."

17.2 Remediation Work Area Zones

(Reference CH2M HILL SOP HSE-218 Hazardous Waste Operations)

A three-zone approach will be used to control areas where site contaminants exist. Access will be allowed only after verification of appropriate training and medical qualification. The three-zone approach shall include an EZ, Contamination Reduction Zone (CRZ) and a Support Zone (SZ). The three-zone approach is not required for construction work performed outside contaminated areas where control of site contamination is not a concern.

Specific work control zones shall be established as necessary during task planning. Site work zones should be modified in the field as necessary, based on such factors as equipment used, air monitoring results, environmental conditions, or alteration of work plans. The following guidelines shall be used for establishing and revising these preliminary zone designations.

17.2.1 Support Zone

The SZ is an uncontaminated area (trailers, offices, field vehicles, etc.) that will serve as the field support area for most operations. The SZ provides field team communications and staging for emergency response. Appropriate sanitary facilities and safety and emergency response equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged and decontaminated materials, or personnel with medical emergencies that cannot be decontaminated.

17.2.2 Contamination Reduction Zone

The CRZ is established between the EZ and the SZ, upwind of the contaminated area where possible. The CRZ provides an area for decontamination of personnel, portable handheld equipment and tools, and heavy equipment. In addition, the CRZ serves as access for heavy equipment and emergency support services.

17.2.3 Exclusion Zone

The EZ is where activities take place that may involve exposure to site contaminants and/or hazardous materials or conditions. This zone shall be demarcated to prevent unauthorized entry. More than one EZ may be established if there are different levels of protection to be employed or different hazards that exist in the same work area. The EZ shall be large enough to allow adequate space for the activity to be completed, including field personnel and equipment, as well as necessary emergency equipment.

The EZ shall be demarcated with some form of physical barrier or signage. The physical barrier or signage shall be placed so that they are visible to personnel approaching or working in the area. Barriers and boundary markers shall be removed when no longer needed.

17.2.4 Other Controlled Areas

Other work areas may need to be controlled due to the presence of an uncontrolled hazard, to warn workers of requirements, or to prevent unauthorized entry. Examples include general construction work areas, open excavations, high noise areas, vehicle access areas, and similar activities or limited access locations. These areas shall be clearly demarcated with physical barriers (fencing, cones, reinforced caution tape or rope) as necessary and posted with appropriate signage.

18.0 Decontamination

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations*)

Decontamination areas will be established for work in potentially contaminated areas to prevent the spread of contamination. Decontamination areas should be located upwind of the exclusion zone where possible and should consider any adjacent or nearby projects and personnel. The SC must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SC. The SC must ensure that procedures are established for disposing of materials generated on the site.

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SC should establish areas for eating, drinking, and smoking.

18.1 Contamination Prevention

Preventing or avoiding contamination of personnel, tools, and equipment will be considered in planning work activities at all field locations. Good contamination prevention and avoidance practices will assist in preventing worker exposure and result in a more efficient decontamination process. Procedures for contamination prevention and avoidance include the following:

- Do not walk through areas of obvious or known contamination;
- Do not directly handle or touch contaminated materials;
- Make sure there are no cuts or tears in PPE;
- Fasten all closures in suits and cover them with duct tape, if appropriate;
- Take particular care to protect any skin injuries;
- Stay upwind of airborne contamination, where possible;
- Do not eat or drink in contaminated work areas;
- Do not carry food, beverages, tobacco, or flame-producing equipment into contaminated work areas;
- Minimize the number of personnel and amount of equipment in contaminated areas to that necessary for accomplishing the work;
- Choose tools and equipment with nonporous exterior surfaces that can be easily cleaned and decontaminated;
- Cover monitoring and sampling equipment with clear plastic, leaving openings for the sampling ports, as necessary; and
- Minimize the amount of tools and equipment necessary in contaminated areas.

18.2 Personnel and Equipment Decontamination

Personnel exiting an EZ must ensure that they are not spreading potential contamination into clean areas or increasing their potential for ingesting or inhaling potential contaminants. Personal decontamination may range from removing outer gloves as exiting the EZ, to proceeding through an outer layer doffing station including a boot and glove wash and rinse, washing equipment, etc. Equipment that has come into contact with contaminated media must also be cleaned/decontaminated when it is brought out of the EZ.

18.3 Decontamination Specifications

Personnel

- Boot wash/rinse
- Glove wash/rinse
- Outer-glove removal
- Body-suit removal
- Inner-glove removal
- Respirator removal
- Hand wash/rinse
- Face wash/rinse
- Shower ASAP
- Dispose of PPE in municipal trash, or contain for disposal
- Dispose of personnel rinse water to facility or sanitary sewer, or contain for offsite disposal

Sample Equipment

- Wash/rinse equipment
- Solvent-rinse equipment
- Contain solvent waste for offsite disposal

Heavy Equipment

- Power wash
- Steam clean
- Dispose of equipment rinse water to facility or sanitary sewer, or contain for offsite disposal

18.4 Diagram of Personnel-Decontamination Line

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SC should establish areas for eating, drinking, and smoking.

The following figure illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SC to accommodate task-specific requirements.

18.5 Decontamination During Medical Emergencies

Standard personnel decontamination practices will be followed whenever possible. For emergency life saving first aid and/or medical treatment, normal decontamination procedures may need to be abbreviated or omitted. In this situation, site personnel shall accompany contaminated victims to advise emergency response personnel on potential contamination present and proper decontamination procedures.

Outer garments may be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Protective clothing can be cut away. If the outer garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances or medical personnel. Outer garments can then be removed at the medical facility.

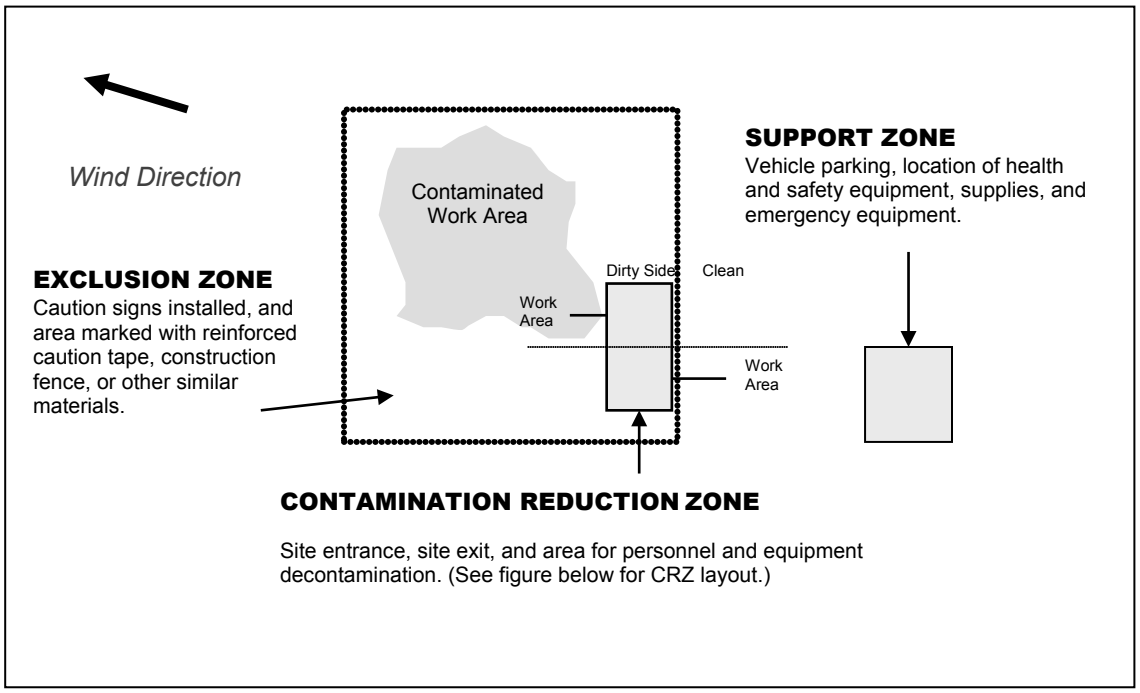
18.6 Waste Collection and Disposal

All contaminated material generated through the personnel and equipment decontamination processes (e.g., contaminated disposable items, gross debris, liquids, sludges) will be properly containerized and labeled, stored at a secure location, and disposed in accordance with the project plans.

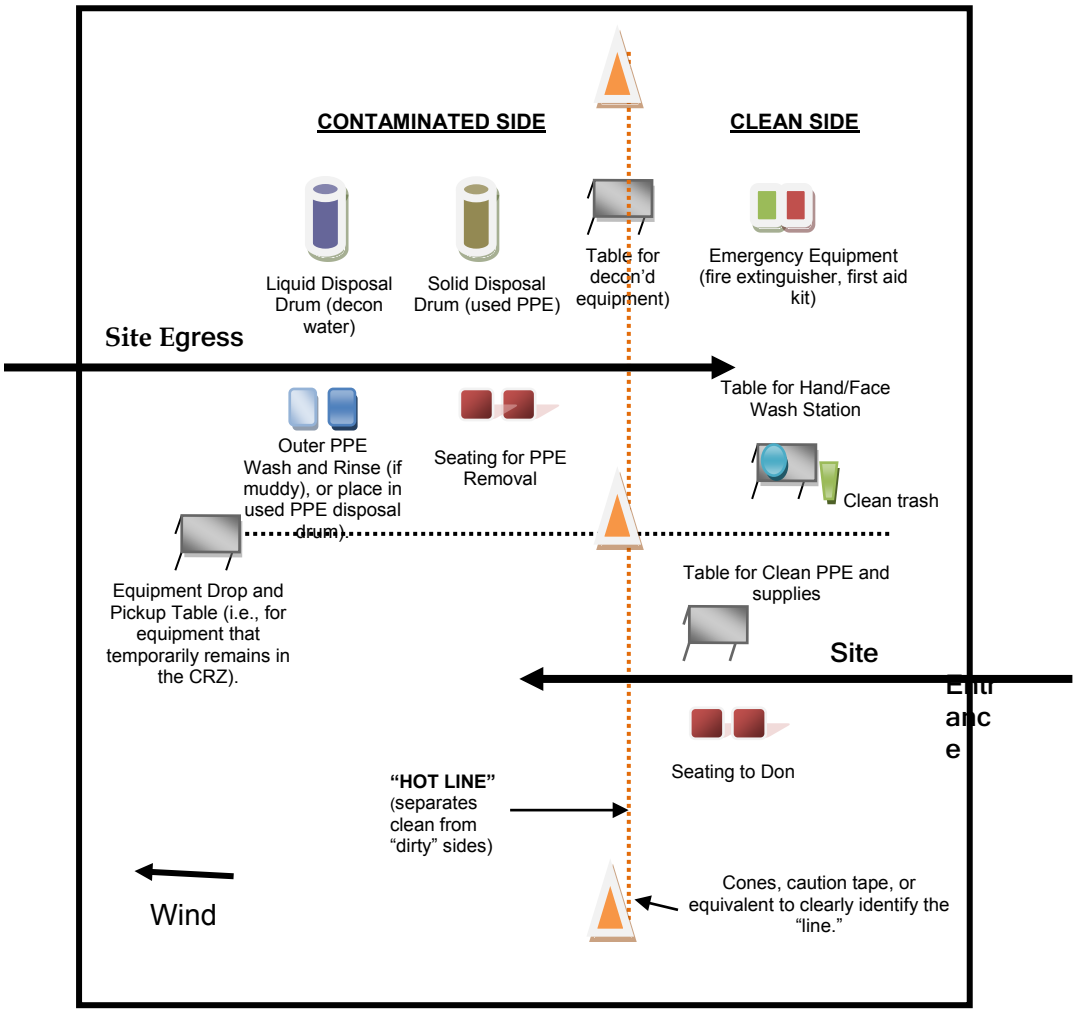
18.7 Diagram of Personnel-Decontamination Line

The following figure illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SC to accommodate task-specific requirements.

Work Area - Set up appropriately based on wind direction



Typical Contamination Reduction Zone



19.0 Emergency Response Plan

(Reference CH2M HILL SOP HSE-106, *Emergency Planning*)

19.1 Pre-Emergency Planning

The Emergency Response Coordinator (ERC), typically the SC or designee, performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate. Pre-Emergency Planning activities performed by the ERC include:

- Review the facility emergency and contingency plans where applicable;
- Determine what onsite communication equipment is available (two-way radio, air horn);
- Determine what offsite communication equipment is needed (nearest telephone, cell phone);
- Confirm and post the "Emergency Contacts" page and route to the hospital located in this section in project trailer(s) and keep a copy in field vehicles along with evacuation routes and assembly areas. Communicate the information to onsite personnel and keep it updated;
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear;
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures;
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies;
- Inventory and check site emergency equipment, supplies, and potable water;
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases;
- Rehearse the emergency response plan before site activities begin. This may include a "tabletop" exercise or an actual drill depending on the nature and complexity of the project. Drills should take place periodically but no less than once a year;
- Brief new workers on the emergency response plan; and
- The ERC will evaluate emergency response actions and initiate appropriate follow-up actions.

19.2 Emergency Equipment and Supplies

The ERC shall ensure the following emergency equipment is on the site. Verify and update the locations of this equipment as needed. The equipment will be inspected in accordance with manufacturer's recommendations. The inspection shall be documented in a field logbook or similar means to be kept in the project files.

Emergency Equipment and Supplies	Location
Class A,B,C fire extinguisher	Field offices, heavy equipment, site vehicles, person
First aid kit	Field offices, heavy equipment, site vehicles, person
Eye Wash	Field offices, heavy equipment, site vehicles, person
Potable water (at 50-60F, in personal ice chest)	Field offices, heavy equipment, site vehicles, person
Bloodborne-pathogen kit	With all FA kits.
Additional equipment (specify): 2 way radio and/or cell phone	Field offices, heavy equipment, site vehicles, person

19.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Notify appropriate response personnel;
- Shut down CH2M HILL operations and evacuate the immediate work area;
- Account for personnel at the designated assembly area(s);
- Assess the need for site evacuation, and evacuate the site as warranted;
- Implement HSE-111, Incident Notification, Reporting and Investigation; and
- Notify and submit reports to clients as required in contract.

Small fires or spills posing minimal safety or health hazards may be controlled with onsite spill kits or fire extinguishers without evacuating the site. When in doubt evacuate. Follow the incident reporting procedures in the "Incident Notification, Reporting, and Investigation" section of this HSP.

19.4 Emergency Medical Treatment

Emergency medical treatment is needed when there is a life-threatening injury (such as severe bleeding, loss of consciousness, breathing or heart has stopped). When in doubt if an injury is life-threatening or not, treat it as needing emergency medical treatment.

- Notify 911 or other appropriate emergency response authorities as listed in the "Emergency Contacts" page located in this section.
- The ERC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury, perform decontamination (if applicable) where feasible; lifesaving and first aid or medical treatment takes priority.
- Initiate first aid and CPR where feasible.
- Notify supervisor and if the injured person is a CH2M HILL employee, the supervisor will call the occupational nurse at 1-866-893-2514 and make other notifications as required by HSE SOP-111, *Incident Notification, Reporting and Investigation*.
- Make certain that the injured person is accompanied to the emergency room.
- Follow the Serious Incident Reporting process in HSE SOP-111, Incident Notification, Reporting and Investigation, and complete incident report using the HITS system on the VO or if not feasible, use the hard copy forms provided as an attachment to this HSP.
- Notify and submit reports to client as required in contract.

19.5 Evacuation

- Evacuation routes, assembly areas, and severe weather shelters (and alternative routes and assembly areas) are to be specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the ERC or designee before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The ERC and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The ERC will account for all personnel in the onsite assembly area.

- A designated person will account for personnel at alternate assembly area(s).
- The ERC will follow the incident reporting procedures in the "Incident Notification, Reporting and Investigation" section of this HSP.

19.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

19.7 Inclement Weather

Sudden inclement weather can rapidly encroach upon field personnel. Preparedness and caution are the best defenses. Field crew members performing work outdoors should carry clothing appropriate for inclement weather. Personnel are to take heed of the weather forecast for the day and pay attention for signs of changing weather that indicate an impending storm. Signs include towering thunderheads, darkening skies, or a sudden increase in wind. If stormy weather ensues, field personnel should discontinue work and seek shelter until the storm has passed.

Protective measures during a lightning storm include seeking shelter; avoiding projecting above the surrounding landscape (don't stand on a hilltop--seek low areas); staying away from open water, metal equipment, railroad tracks, wire fences, and metal pipes; and positioning people several yards apart. Some other general precautions include:

- Know where to go and how long it will take to get there. If possible, take refuge in a large building or vehicle. Do not go into a shed in an open area;
- The inclination to see trees as enormous umbrellas is the most frequent and most deadly mistake. Do not go under a large tree that is standing alone. Likewise, avoid poles, antennae, and towers;
- If the area is wide open, go to a valley or ravine, but be aware of flash flooding;
- If you are caught in a level open area during an electrical storm and you feel your hair stand on end, drop to your knees, bend forward and put your hands on your knees or crouch. The idea is to make yourself less vulnerable by being as low to the ground as possible and taking up as little ground space as possible. Lying down is dangerous, since the wet earth can conduct electricity. Do not touch the ground with your hands; and
- Do not use telephones during electrical storms, except in the case of emergency.

Remember that lightning may strike several miles from the parent cloud, so work should be stopped and restarted accordingly. The lightning safety recommendation is 30-30: Seek refuge when thunder sounds within 30 seconds after a lightning flash; and do not resume activity until 30 minutes after the last thunder clap.

High winds can cause unsafe conditions, and activities should be halted until wind dies down. High winds can also knock over trees, so walking through forested areas during high-wind situations should be avoided. If winds increase, seek shelter or evacuate the area. Proper body protection should be worn in case the winds hit suddenly, because body temperature can decrease rapidly.

24-hour CH2M HILL Injury Reporting– 1-866-893-2514
24-hour CH2M HILL Serious Incident Reporting Contact – 720-286-4911

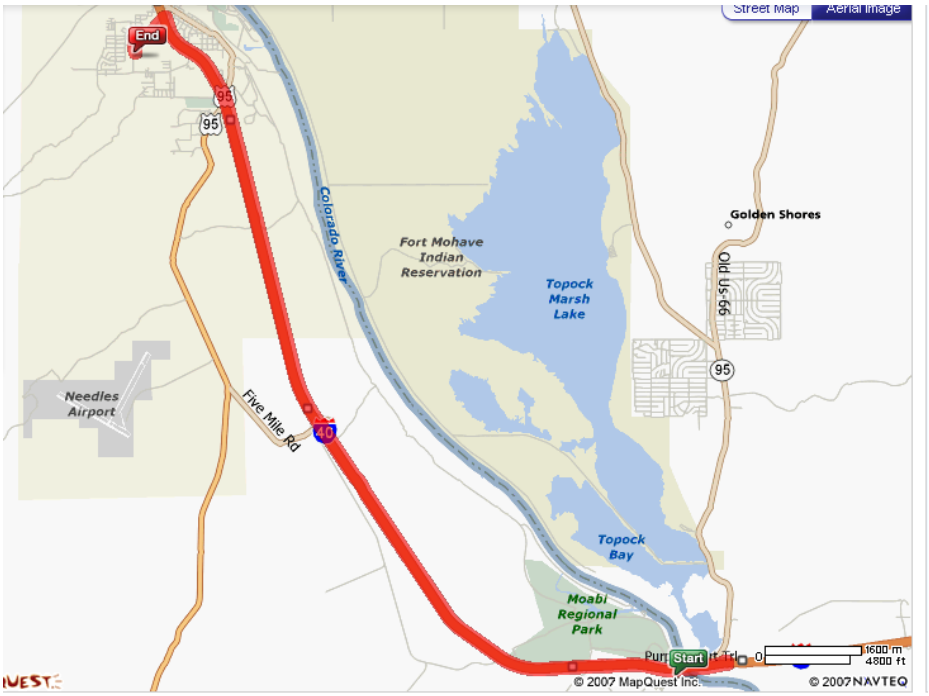
Medical Emergency – 911 **Colorado River Medical Center** **1401 Bailey Ave.** **Needles, CA 92363** **(760) 326-4531** Ambulance (760) 326-5299	**CH2M HILL- Medical Consultant** WorkCare Dr. Peter Greaney M.D. 300 S. Harbor Blvd, Suite 600 Anaheim , CA 92805 800-455-6155/866-893-2514 714-978-7488
Fire/Spill Emergency – 911 Fire Dept. Emergency (760) 326-2211 Needles Fire Department (760) 326-2833	**CH2M HILL Director – Health, Safety, Security & Environment** Andy Strickland/DEN (720) 480-0685 (cell) or (720) 286-2393 (office)
Security & Police – 911 Highway Patrol (760) 326-9200 Needles Sheriff (760) 326-9200 Park Moabi Regional Park Ranger (760) 326-3831	**CH2M HILL Responsible Health and Safety Manager (RHSM)** Name: Eric Hamm Phone: 626-644-2563
CH2M HILL Project Manager Name: Christina Hong/LAC Phone: 213-228-8248 Cell: 714-552-2653	**CH2M HILL Worker's Compensation:** Contact Business Group HR dept. to have form completed or contact Jennifer Rindahl after hours: (720)891-5382
CH2M HILL Safety Coordinator (SC) Barry Collom/TPK: 541-768-3687 Name: Ryan Phelps/TPK cell: (760) 326-3328	**Media Inquiries Corporate Strategic Communications** Name: John Corsi Phone: (720) 286-2087
CH2M HILL Project Environmental Manager Name: John Blasco/BAO Phone: 1 (707) 827-3614	**Automobile Accidents** Rental: Linda Anderson/COR 720/286-2401 CH2M HILL owned vehicle: Linda George 720-286-2057
Federal Express Dangerous Goods Shipping Phone: 800/238-5355	**CHEMTEL (hazardous material spills)** **Phone: 800/255-3924**
Fire/Spill Emergency – 911 Fire Dept. Emergency (760) 326-2211 Needles Fire Department (760) 326-2833	**CH2M HILL Director – Health, Safety, Security & Environment** Andy Strickland/DEN (720) 480-0685 (cell) or (720) 286-2393 (office)
Facility Alarms: PGE compressor station orientation covers this.	Evacuation Assembly Area(s): TBD prior to beginning field operations

Facility/Site Evacuation Route(s): TBD prior to beginning field operations

Directions to Local Hospital

Local Hospital- Exit facility & drive northwest approximately 10 miles on Highway 40 west to Needles. Take the "J" Street exit & turn left onto "J Street. Go several blocks & turn left onto Bailey Ave.

The Hospital is on the left after the park.


Street Map
Aerial Image
End
95
Colorado River
Fort Mohave Indian Reservation
Topock Marsh Lake
Golden Shores
Old US-66
Needles Airport
Five Mile Rd
40
Topock Bay
Moabi Regional Park
Start
1600 m
4800 ft
© 2007 MapQuest Inc.
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Street Map
Aerial Image
McShans Ln
Balboa Pl
W Broadway St
Colorado River
Ross Pkwy
Merriman Ave
Bush St
Vine St
Race St
Needles
Harbor Ave
Meadow Ln
Jamaica Dr
Levee Dr
Plantation Dr
Barrackman Rd
Front St
Eagle Pass Rd
River Rd
Marina Dr
Rivers Edge Golf Course
Washington St
Collins St
Erin Dr
J St
Luna Vis
Flora Vis
Rio Vis
Cortez St
Peru St
Parkway Dr
3rd St
Nevada St
Palm Way
Quivera St
A St
F St
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40
400 m
1200 ft
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20.0 Spill Containment Procedures

CH2M HILL and subcontractor personnel working at the project site shall be knowledgeable of the potential health, safety and environmental concerns associated with petroleum and other substances that could potentially be released at the project site.

The following is a list of criteria that must be addressed in CH2M HILL's or the subcontractor's plans in the event of a spill or release. In the event of a large quantity spill notify emergency services. Personnel discovering a spill shall (only if safe to do so):

- Stop or contain the spill immediately (if possible) or note source. Shut off the source (e.g., pump, treatment system) if possible. If unsafe conditions exist, then leave the area, call emergency services, inform nearby personnel, notify the site supervisors, and initiate incident reporting process. The SC shall be notified immediately;
- Extinguish sources of ignition (flames, sparks, hot surfaces, cigarettes);
- Clear personnel from the spill location and barricade the area;
- Use available spill control equipment in an effort to ensure that fires, explosions, and releases do not occur, recur, or spread;
- Use sorbent materials to control the spill at the source;
- Construct a temporary containment dike of sorbent materials, cinder blocks, bricks or other suitable materials to help contain the spill;
- Attempt to identify the character, exact source, amount, and extent of the released materials. Identification of the spilled material should be made as soon as possible so that the appropriate cleanup procedure can be identified;
- Assess possible hazards to human health or the environment as a result of the release, fire or explosion; and
- Follow incident notification, reporting, and investigation section of this plan.

21.0 Inspections

21.1 Project Activity Self-Assessment Checklists

In addition to the hazard controls specified in this document, Project Activity Self-Assessment Checklists are contained as an attachment to this HSP. The Project-Activity Self–Assessment Checklists are based upon minimum regulatory compliance and some site-specific requirements may be more stringent. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. The self-assessment checklists, including documented corrective actions, shall be made part of the permanent project records and maintained by the SC.

The self-assessment checklists will also be used by the SC in evaluating the subcontractors and any client contractors' compliance on site.

The self-assessment checklists for the following tasks and exposures are required when the task or exposure is initiated and weekly thereafter while the task or exposure is taking place. The checklists shall be completed by the SC or other CH2M HILL representative and maintained in project files.

- Drilling
- Hand and Power Tools
- Electrical Safety
- Lockout/Tagout
- Respiratory Protection
- Traffic Control
- Hazardous Materials Handling
- PPE
- Excavation

21.2 Safe Behavior Observations

Safe Behavior Observations (SBOs) are a tool to be used by supervisors to provide positive reinforcement for work practices performed correctly, while also identifying and eliminating deviations from safe work procedures that could result in a loss.

The SC or designee shall perform at least one SBO each week for any field work performed by subcontractors or when there are at least two CH2M HILL personnel performing field work.

The SC or designee shall complete the SBO form (attached to this HSP) for the task/operation being observed and submit them weekly.

For commercial projects, SBOs may be submitted electronically by e-mailing them to the address, "CH2MHILL ES COM Safe Behavior Observations" when connected to the network or at SafeBehaviorObservations@ch2m.com. For Federal projects, SBOs may be submitted electronically by e-mailing them to the address, "CH2M HILL ES FED Safe Behavior Observations" when connected to the network or at CH2MHILLESFEDSafeBehaviorObservation@ch2m.com.

22.0 Incident Notification, Reporting, and Investigation

(Reference CH2M HILL SOP HSE-111, *Incident Notification, Reporting and Investigation*)

22.1 General Information

This section applies to the following:

- All injuries involving employees, third parties, or members of the public;
- Damage to property or equipment;
- Interruptions to work or public service (hitting a utility);
- Incidents which attract negative media coverage;
- Near misses;
- Spills, leaks, or regulatory violations; and
- Motor vehicle accidents.

Documentation, including incident reports, investigation, analysis and corrective measure taken, shall be kept by the SC and maintained onsite for the duration of the project.

22.2 Section Definitions

Incident: An incident is an event that causes or could have caused undesired consequences. An incident may be caused by natural forces, employees, subcontractors, or third parties in any location associated with CH2M HILL operations, including offices, warehouses, project sites, private property, or public spaces. Incidents include:

- Injury or illness to a CH2M HILL employee or subcontractor employee, or member of the public;
- Property damage;
- Spill or release;
- Environmental requirement or permit violation;
- A “near-miss”; or
- Other (e.g., fire, explosion, bomb threat, workplace violence, threats)**Accident**: an incident involving actual loss through injury, damage to assets, or environmental harm.

Near Miss: A near-miss occurs when an intervening factor prevented an injury or illness, property damage, spill or release, permit violation or other event from occurring. Examples of near-miss situations include: a hard hat or other personal protective equipment (PPE) prevented an injury; secondary containment or emergency shutoff prevented a spill; or an alert co-worker prevented an incident.

Serious Incident:

A Serious Incident must be immediately reported to senior management includes:

- Work related death, or life threatening injury or illness of a CH2M HILL employee;
- subcontractor, or member of the public;
- Kidnap/missing person;
- Acts or threats of terrorism;
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 in damage; or

- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

22.3 Reporting Requirements

All employees and subcontractors' employees shall immediately report any incident (including "near misses," as defined in the section above) in which they are involved or witness to their supervisor.

The CH2M HILL or Subcontractor supervisor, upon receiving an incident report, shall inform his immediate superior and the CH2M HILL SC.

The SC shall immediately report the following information to the RHSM and PM by phone and e-mail:

- Project Name and Site Manager;
- Date and time of incident;
- Description of incident;
- Extent of known injuries or damage;
- Level of medical attention; and
- Preliminary root cause/corrective actions

The RHSM shall immediately inform the EM (or available alternate) of spills, potential environmental permit compliance, or any environmental situation that could result in a notice of violation from an agency.

The CH2M HILL team shall comply with all applicable statutory incident reporting requirements such as those to OSHA, the police, or state or Federal environmental agency.

22.4 HITS System and Incident Report Form

CH2M HILL maintains a HITS entry and/or Incident Report Form (IRF) for all work-related injuries and illnesses sustained by its employees in accordance with recordkeeping and insurance requirements. A HITS entry and/or IRF will also be maintained for other incidents (property damage, fire or explosion, spill, release, potential violation, and near misses) as part of our loss prevention and risk reduction initiative.

The SC shall complete an entry into the Hours and Incident Tracking System (HITS) database system located on CH2M HILL's Virtual Office (or if VO not available, use the hard copy Incident Report Form and Root Cause Analysis Form and forward it to the RHSM) within 24 hours and finalize those forms within 3 calendar days.

22.5 Injury Management/Return-to-Work (for US/Puerto Rico based CH2M HILL Staff Only)

(Reference CH2M HILL, SOP HSSE-124, Injury Management/Return-to-Work)

22.5.1 Background

The Injury Management Program has been established to provide orderly, effective and timely medical treatment and return-to-work transition for an employee who sustains a work-related injury or illness. It also provides guidance and assistance with obtaining appropriate treatment to aid recovery, keep supervisors informed of employee status, and to quickly report and investigate work-related injury/illnesses to prevent recurrence.

To implement the Injury Management/Return-to-Work Program successfully, supervisors and/or SC should:

- Ensure employees are informed of the Injury Management/Return-to-Work Program;
- Become familiar with the Notification Process (detailed below); and
- Post the Injury Management/Return-to-Work Notification Poster.

22.5.2 The Injury Management/Return-to-Work Notification Process:

- Employee informs their supervisor.

- Employee calls the Injury Management Program toll free number 1-866-893-2514 immediately and speaks with the Occupational Injury Nurse. This number is operable 24 hours per day, 7 days a week.
- Supervisor ensures employee immediately calls the Injury Management Program number. Supervisor makes the call with the injured worker or for the injured worker, if needed.
- Nurse assists employee with obtaining appropriate medical treatment, as necessary schedules clinic visit for employee (calls ahead, and assists with any necessary follow up treatment). The supervisor or SC accompanies the employee if a clinic visit is necessary to ensure that employees receive appropriate and timely care.
- Supervisor or SC completes the HITS entry or Incident Report Form immediately (within 24 hours) and forwards it to the Project Manager and RHSM.
- Nurse notifies appropriate CH2M HILL staff by e-mail (supervisor, Health & Safety, Human Resources, Workers' Compensation).
- Nurse communicates and coordinates with and for employee on treatment through recovery.
- Supervisor ensures suitable duties are identified and available for injured or ill workers who are determined to be medically fit to return to work on transitional duty (temporary and progressive).
- Supervisor ensures medical limitations prescribed (if any) by physician are followed until the worker is released to full duty.

22.6 Serious Incident Reporting Requirements

(Reference CH2M HILL SOP HSE-111, *Incident Reporting, Notification and Investigation*)

The serious incident reporting requirements ensures timely notification and allows for positive control over flow of information so that the incident is handled effectively, efficiently, and in conjunction with appropriate corporate entities. This standard notification process integrates Health, Safety, Security and Environment and Firm Wide Security Operations requirements for the consistent reporting of and managing of serious events throughout our operations.

22.6.1 Serious Incident Determination

The following are general criteria for determining whether an incident on CH2M HILL owned or managed facilities or program sites is considered serious and must be immediately reported up to Group President level through the reporting/notification process:

- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public;
- Kidnap or missing person;
- Acts or threats of terrorism;
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 in damage; or
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

22.6.2 Serious Incident Reporting

If an incident meets the "Serious Incident" criteria, the Project Manager is to immediately contact the Crisis Manager at 720-286-4911, then follow the standard incident reporting procedure.

For all serious incidents this standard reporting process is implemented immediately so as to ultimately achieve notification to the Business Group President within 2 hours of incident onset or discovery, and notification to appropriate corporate Crisis Management Support Team.

ESBG US Operations
Incident Reporting Flow Diagram

Direct Reporting Responsibility — Informational Reporting

Incident:
- Injury or illness
- Hazardous substance exposure
- Damage to property
- Fire or explosion
- Spill, release, potential violation, or permit exceedance
- A "near-miss"

If incident is an **injury** to US or Puerto Rico based CH2M HILL personnel contact the Occupational Health Nurse at 866/893-2514. Outside the US, the supervisor must notify the HR

The Ops Leader is responsible for completing the Incident Report Form (IRF) in **HITS** when there is an injury to a CH2M HILL employee. The PM, CM or SC is responsible for completing the IRF for all other incidents. ***The IRF/HITS must be completed within 24 hours of the incident and does not replace the required immediate PM and RHSM notifications.***

Incident
Ensure that Emergency Responders have been notified as necessary

Employee or Subcontractor
Provide immediate notification.

Supervisor – Construction Manager - Safety Coordinator
Provide immediate notification by phone and email to PM and RHSM. In addition, for spills, NOVs, and permit issues you may also call the EM.

Third Party – Incidents outside of our contractual obligations do not need to be communicated, unless they are serious and/or may affect CH2M HILL. The RHSM will determine the level of communication necessary for third party incidents.

Serious Incident:
- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
- Kidnap/missing person
- Acts or threats of terrorism
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 US in damage.
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

CRISIS MANAGER:
If the incident meets the "**Serious Incident**" criteria, contact the Crisis Manager
(720.286.4911)

Responsible HSM (RHSM)
Immediately notify the Sector OR Client Program HSE Manager, immediately notify the Responsible Environmental Manager (EM) for spills, NOVs, and permit issues, and direct the incident investigation.

Client Program HSE Manager
Notify Sector HSM, and coordinate communication and incident investigations.

Immediate notification to the Sector HSM is not required for some minor incidents. Follow the program or sector protocol.

Sector HSE Manager
Coordinate communication, direct significant incident investigations, notify Sector EM for spills, NOVs, & permit issues.

HSSE Director
Provide decision-making assistance or direction for incident resolution.

Project Manager
Provide notification to the Sector OR Program Project Delivery (PD) or Operations (Ops) Manager or designee. Notification is based on program or sector specific criteria.

Immediate notification to the PD/Ops Manager is not required for some minor incidents. Follow the program or sector protocol.

Sector or Program PD/Ops Manager
Notify Client Program Manager OR Sector Director, provide guidance and follow the incident through to resolution.

Client Program Manager
Notify Sector Director; provide decision-making assistance or direction for incident resolution.

Keep unnecessary communication of serious incidents to a minimum.

Sector Director
Provide decision-making assistance or direction for incident resolution.

ES US Operations Director/ Executive Leadership Team
Provide decision-making assistance, direction for incident resolution, and make higher level notifications as necessary

Post-event incident communications regarding serious incidents at a CH2M HILL office or project (regardless of the party involved) shall be considered sensitive in nature and must be controlled in a confidential manner.

22.7 Incident Root Cause Analysis

The accident analysis is essential if all causes of the incident are to be identified for the correct remedial actions to be taken to prevent the same and similar type of incident from recurring. Root Cause Analysis (RCA) shall be completed for all recordable injuries, property damage incidents in excess of $5000.00 (US), environmental permit violations, spills and releases which are required to be reported to regulatory agencies, and any other incident, including near misses where they RHSM or PM determines an RCA is appropriate. The RHSM/REM is responsible for ensuring it is completed and results entered in the incident report form in HITS. RCA's must be completed using a Team that includes, at least the RHSM or designee, the involved party(ies), a responsible operations representative (e.g. PM, construction manager, crew supervisor, etc.) and an independent management representative not associated with the incident.

The Root Cause Analysis Form must be completed for all Loss Incidents and Near Loss Incidents. This form must be submitted to the investigation team for review.

For minor losses or near losses, the information may be gathered by the supervisor or other personnel immediately following the loss. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the loss, determine the root cause, and develop recommendations. More complex situations may require the investigation team to revisit the loss site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and damaged equipment should be taken from all sides and from various distances. This point is especially important when the investigation team will not be able to review the loss scene.

The investigation team must follow the Root Cause Analysis Flow Chart (see Attachment 4 of the SOP) to assist in identifying the root cause(s) of a loss. Any loss may have one or more root causes and contributing factors. The root cause is the primary or immediate cause of the incident, while a contributing factor is a condition or event that contributes to the incident happening, but is not the primary cause of the incident. Root causes and contributing factors that relate to the person involved in the loss, his or her peers, or the supervisor should be referred to as "personal factors." Causes that pertain to the system within which the loss or injury occurred should be referred to as "job factors."

Personal factors include:

- Lack of skill or knowledge;
- Correct way takes more time and/or requires more effort;
- Short-cutting standard procedures is positively reinforced or tolerated; or
- Person thinks there is no personal benefit to always doing the job according to standards.

Job Factors include:

- Lack of or inadequate operational procedures or work standards;
- Inadequate communication of expectations regarding procedures or standards; or
- Inadequate tools or equipment.

The root cause(s) could be any one or a combination of these seven possibilities or some other uncontrollable factor. In the vast majority of losses, the root cause is very much related to one or more of these seven factors. Uncontrollable factors should be used rarely and only after a thorough review eliminates all seven other factors.

22.7.1 Corrective Actions

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a timeframe for completion. Be sure the corrective actions address the causes.

Once the investigation report has been completed, the PM shall hold a review meeting to discuss the incident and provide recommendations. The responsible supervisors shall be assigned to carry out the recommendations, and shall inform the SC upon successful implementation of all recommended actions.

- Evaluation and follow-up of the IRF will be completed by the type of incident by the RHSM, EM, or FWSO.
- Incident investigations must be initiated and completed as soon as possible but no later than 72 hours after the incident.

23.0 Records and Reports

An organized project filing system is essential for good documentation and recordkeeping. There are many benefits to an organized filing system:

- Other CH2M HILL employees can easily and quickly find documents;
- Records are readily available for review;
- Records may be needed during OSHA investigations, audits, or other legal matters;
- Records may be needed on short notice in case of an accident, illness or other emergency; and
- Systematic recordkeeping aids in overall project organization.

The project filing system shall be established at the beginning of the project and maintained throughout all phases of construction and archived in accordance with CH2M HILL's Records Retention Policy. The information contained in the filing system shall be updated regularly and/or as specified in this document. The PM and SC are responsible for collecting documentation, including subcontractor documentation, and maintaining a complete and organized filing system.

Below are examples of records that must be maintained as the project progresses:

- Exposure records includes air monitoring data (including calibration records), MSDSs, exposure modeling results;
- Physical hazard exposure records include noise, ionizing radiation, non-ionizing radiation, vibration, and lasers exposure assessments and measurements;
- Respiratory fit test records;
- Training records;
- Incident reports, investigations and associated back-up information such as agency notifications, calculations, and corrective actions taken;
- Federal or state agency inspection records;
- Other Records:
  - Ergonomic evaluations;
  - HSE audits and assessments;
  - Project-specific HSE plans;
  - Confined space entry permits;
  - Equipment inspections;
  - Equipment maintenance;
  - Emergency equipment inspection records;
  - SBOs;
  - Self-assessment checklists
- The RHSM shall coordinate with the PM or designee to ensure that final project-specific HSE records described in this section, including negative exposure determinations, are maintained with the project files in accordance with the CH2M HILL records retention schedule, or forwarded to the Medical Surveillance Program Administrator, as appropriate. Records retention requirements are detailed in the Recordkeeping and Access to Records SOP, HSE-119.

CH2M HILL Health and Safety Plan

Attachment 1

Health and Safety Plan Employee Sign-off Form

EMPLOYEE SIGNOFF FORM

Health and Safety Plan

The CH2M HILL project employees and subcontractors listed below have been provided with a copy of this HSP, have read and understood it, and agree to abide by its provisions.

Project Name: **Project Number:**

EMPLOYEE NAME (Please print)	**EMPLOYEE SIGNATURE**	**COMPANY**	**DATE**

CH2MHILL Project-Specific Security Policy

CH2MHILL Weapons Policies

The following policies apply to all CH2MHILL staff and contingent staff, and CH2MHILL subcontractors working on CH2MHILL projects.

Project-Specific Weapons Policy

No individual may have in his or her possession, bring the project site, or maintain on CH2MHILL property, concealed or otherwise, any weapon, explosive device or substance, firearm, ammunition or instrument that could be used as a weapon. All weapons, explosive devices or substances, firearms, and ammunition are banned from all project sites, properties, vehicles, and/or any CH2MHILL activities or events. This policy applies to all CH2MHILL staff and contingent staff, and CH2MHILL subcontractors. Weapons specified in CH2MHILL's Security/Asset Protection Manual include:

- Firearm, gun, pistol, rifle, or shotgun
- Knife with a blade longer than 3 inches, a switchblade, stiletto, or knife having an automatic spring release device
- Night stick/club/baton, martial arts weapons, bow and arrow, or crossbow
- Malicious intent explosive device
- Concealed weapon**

** Concealed weapons permit holders are not allowed to bring any weapon to CH2MHILL property, project site, office or facility.

CH2MHILL Project-Specific Knife Policy

CH2MHILL policy prohibits having any fixed open bladed knives on CH2MHILL project sites. Scissors or auto-retractable safety knives are the only allowed tools for cutting. This policy regarding knives applies to all CH2MHILL staff and contingent staff, and CH2MHILL subcontractors.

Acknowledgment

By signing below, you are acknowledging that you have been given a copy of the company's weapons policy and the project specific weapons policy, have read and understand the requirements of the policies, agree to comply with all of its requirements, and understand that noncompliance with either of these policies will result in disciplinary action, up to and including termination for CH2MHILL employees and revocation of project/site access for CH2MHILL subcontractor employees.

Check One:

□ CH2MHILL Employee
□ Other (Company Name): _____

Project Name: _____

_____ _____
Signature CH2MHILL Employee Number

_____ _____
Printed Name Date

_____
Witness Signature
(Please have someone sign that they did witness you signing this form.)

CH2M HILL Health and Safety Plan

Attachment 2

Chemical Inventory/Register Form

CH2MHILL

CHEMICAL INVENTORY/REGISTER FORM

Refer to SOP HSE-107, Attachment 1, for instructions on completing this form.

Location:

HCC:

☐ Office ☐ Warehouse ☐ Laboratory ☐ Project:

Project No.:

Regulated Product	Location	Container labeled (✓if yes)	MSDS available (✓if yes)

MSDS for the listed products will be maintained at:

CH2M HILL Health and Safety Plan

Attachment 3

Chemical-Specific Training Form

CH2MHILL

CHEMICAL-SPECIFIC TRAINING FORM

Refer to SOP HSE-107 Attachment 1 for instructions on completing this form.

Location:	Project # :
HCC:	Trainer:

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

☐ Physical and health hazards

☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)

☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

CH2M HILL Health and Safety Plan

Attachment 4

Project Activity Self-Assessment Checklists/Permits/Forms

Heat Stress Monitoring
ATV/UTV Checklist
Drilling
Earthmoving Equipment
Electrical
Excavations
Aerial Lifts
Hand and Power Tools
Hazardous Materials Handling
Hexavalent Chromium
Manual Lifting
Personal Protective Equipment
Respiratory Protection
Rigging
Stairways & Ladders
Traffic Control

HEAT STRESS PHYSIOLOGICAL MONITORING FORM

Project:	
Date:	Company:

1. Take and record measurement of temperature or pulse at the frequency indicated in the safety plan.
2. Follow the Physiological Monitoring Protocol in the safety plan.
3. Never continue work if your body temperature is more than 100.4° F/38° C, or if you are experiencing sudden and severe fatigue, nausea, dizziness, or lightheadedness.

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

Employee:

Describe action taken below if measurements are exceeded:

Time								
Temp								
Pulse								

CH2M HILL Health and Safety Plan

Attachment 5

Key Target Zero Program Elements

(blank forms for field use)

Activity Hazard Analysis

Pre-Task Safety Plans

Safe Behavior Observation

Incident Report and Investigation
(use electronic form when possible)
HITS

Lessons Learned Template

Activity:	**Date**:
	Project Name:
Description of the work:	**Site Supervisor**:
	Site Safety Officer:
	Review for latest use: Before the job is performed

Work Activity Sequence (Identify the principal steps involved and the sequence of work activities)	**Potential Health and Safety Hazards** (Analyze each principal step for potential hazards)	**Hazard Controls** (Develop specific controls for each potential hazard)

PLEASE SUBMIT COMPLETED FORM TO EITHER:
CH2MHILL ES COM
CH2MHILL ES FED

Equipment to be used (List equipment to be used in the work activity)	**Inspection Requirements** (List inspection requirements for the work activity)	**Training Requirements** (List training requirements including hazard communication)

ACTIVITY HAZARD ANALYSIS

	PRINT NAME	SIGNATURE
Supervisor Name:		
Date/Time:		
Safety Officer Name:		
Date/Time:		
Employee Name(s):		
Date/Time:		
Date/Time:		
Date/Time:		
Date/Time:		
Date/Time:		
Date/Time:		
Date/Time:		
Date/Time:		
Date/Time:		

CH2MHILL

Pre-Task Safety Plan (PTSP) and Safety Meeting Sign-in Sheet

Project:_____ Location: _____ Date:_____

Supervisor: _____ Job Activity:_____

_____

Attendees: Print Name Sign Name

_____

_____

_____

_____

_____

_____

_____

List Tasks and verify that applicable AHAs have been reviewed:

_____

_____

_____

Tools/Equipment Required for Tasks (ladders, scaffolds, fall protection, cranes/rigging, heavy equipment, power tools):

_____

_____

_____

Potential H&S Hazards, including chemical, physical, safety, biological and environmental (check all that apply):

__ Chemical burns/contact	__ Trench, excavations, cave-ins	__ Ergonomics
__ Pressurized lines/equipment	__ Overexertion	__ Chemical splash
__ Thermal burns	__ Pinch points	__ Poisonous plants/insects
__ Electrical	__ Cuts/abrasions	__ Eye hazards/flying projectile
__ Weather conditions	__ Spills	__ Inhalation hazard
__ Heights/fall > 6 feet	__ Overhead Electrical hazards	__ Heat/cold stress
__ Noise	__ Elevated loads	__ Water/drowning hazard
__ Explosion/fire	__ Slips, trip and falls	__ Heavy equipment
__ Radiation	__ Manual lifting	__ Aerial lifts/platforms
__ Confined space entry	__ Welding/cutting	__ Demolition
__Underground Utilities	__ Security	__ Poor communications

Other Potential Hazards (Describe):

_____

_____

_____

PLEASE SUBMIT COMPLETED FORM TO EITHER:
CH2MHILL ES COM
CH2MHILL ES FED

Hazard Control Measures (Check All That Apply):

PPE	Protective Systems	Fire Protection	Electrical
__ Thermal/lined	__ Sloping	__ Fire extinguishers	__ Lockout/tagout
__ Eye	__ Shoring	__ Fire watch	__ Grounded
__ Dermal/hand	__ Trench box	__ Non-spark tools	__ Panels covered
__ Hearing	__ Barricades	__ Grounding/bonding	__ GFCI/extension cords
__ Respiratory	__ Competent person	__ Intrinsically safe equipment	__ Power tools/cord inspected
__ Reflective vests	__ Locate buried utilities		__ Overhead line clearance
__ Flotation device	__ Daily inspections		__ Underground utils ID'd
__ Hard Hat	__ Entry Permits/notification		
Fall Protection	**Air Monitoring**	**Proper Equipment**	**Welding & Cutting**
__ Harness/lanyards	__ PID/FID	__ Aerial lift/ladders/scaffolds	__ Cylinders secured/capped
__ Adequate anchorage	__ Detector tubes	__ Forklift/heavy equipment	__ Cylinders separated/upright
__ Guardrail system	__ Radiation	__ Backup alarms	__ Flash-back arrestors
__ Covered opening	__ Personnel sampling	__ Hand/power tools	__ No cylinders in CSE
__ Fixed barricades	__ LEL/O2	__ Crane with current inspection	__ Flame retardant clothing
__ Warning system	__ No visible dust	__ Proper rigging	__ Appropriate goggles
	__ Other	__ Operator qualified	
Confined Space Entry	**Medical/ER**	**Heat/Cold Stress**	**Vehicle/Traffic**
__ Isolation	__ First-aid kit	__ Work/rest regime	__ Traffic control
__ Air monitoring	__ Eye wash	__ Rest area	__ Barricades
__ Trained personnel	__ FA-CPR trained personnel	__ Liquids available	__ Flags
__ Permit completed	__ Route to hospital	__ Monitoring	__ Signs
__ Rescue		__ Training	
Permits	**Demolition**	**Inspections:**	**Training:**
__ Hot work	__ Pre-demolition survey	__ Ladders/aerial lifts	__ Hazwaste (current)
__ Confined space	__ Structure condition	__ Lanyards/harness	__ Construction
__ Lockout/tagout	__ Isolate area/utilities	__ Scaffolds	__ Competent person
__ Excavation	__ Competent person	__ Heavy equipment	__ Task-specific
__ Demolition	__ Hazmat present	__ Drill rigs/geoprobe rigs	__ FA/CPR
__ Energized work		__ Cranes and rigging	__ Confined Space
		__ Utilities marked	__ Hazcom

Underground Utilities	Incident Communications	AHA' s
__Dig alert called	__Work stops until cleared by TM/CM	__reviewed and approved by HSM
__3rd Party locater	__Immediate calls to TM/CM	__on site and current
__As-builts reviewed	__Client notification	__applicable for this day's work
__Interview site staff	__24 hour notification setup	__Communication and incident processes included?
__Client review	__Clear communications	
__soft locate necessary?		

Field Notes (including observations from prior day, etc.):

_____

_____

_____

Name (Print): _____

Signature:_____ Date:_____

PLEASE SUBMIT COMPLETED FORM TO EITHER:
CH2MHILL ES COM
CH2MHILL ES FED

CH2MHILL

Safe Behavior Observation Form

☐Federal or ☐Commercial Sector (check one)	☐Construction or ☐Consulting (check one)
Project Number:	Client/Program:
Project Name:	Observer: Date:
Position/Title of worker observed:	Background Information/ comments:
Task/Observation Observed:	

- ❖ Identify and reinforce safe work practices/behaviors
- ❖ Identify and improve on at-risk practices/acts
- ❖ Identify and improve on practices, conditions, controls, and compliance that eliminate or reduce hazards
- ❖ Proactive PM support facilitates eliminating/reducing hazards (do you have what you need?)
- ❖ Positive, corrective, cooperative, collaborative feedback/recommendations

Actions & Behaviors	Safe	At-Risk	Observations/Comments
Current & accurate Pre-Task Planning/Briefing (Project safety plan, STAC, AHA, PTSP, tailgate briefing, etc., as needed)			**Positive Observations/Safe Work Practices:**
Properly trained/qualified/experienced			
Tools/equipment available and adequate			
Proper use of tools			**Questionable Activity/Unsafe Condition Observed:**
Barricades/work zone control			
Housekeeping			
Communication			
Work Approach/Habits			
Attitude			
Focus/attentiveness			**Observer's Corrective Actions/Comments:**
Pace			
Uncomfortable/unsafe position			
Inconvenient/unsafe location			
Position/Line of fire			
Apparel (hair, loose clothing, jewelry)			
Repetitive motion			**Observed Worker's Corrective Actions/Comments:**
Other…			

For ES Federal Sector projects please email completed forms to: CH2M HILL ES FED Safe Behavior Observation
For ES Commercial Sector projects please email completed forms to: CH2M HILL ES COM Safe Behavior Observation
For CNR ES staff please email completed forms to: cnressafe@ch2m.com

PLEASE SUBMIT COMPLETED FORM TO EITHER:
CH2MHILL ES COM
CH2MHILL ES FED

HITS Incident Report Hardcopy (Phase 1 – Initial Entry)

Phase 1 – Initial Entry

Type of Incident (May select more than one)

☐	Injury/Illness	☐	Spill/Release	☐	Near Miss
☐	Property Damage	☐	Environment/Permit	☐	Other

General Information Section

Preparer's Name: _____ **Preparer's Phone Number:** _____

Date of Incident: _____ **Time of Incident**: _____ AM / PM

What Business Group is accountable for this incident:

_____

What Business Group SubGroup is accountable for this incident:

_____

What CH2M HILL Company is accountable for this incident:

_____

Where did the Incident occur?

- ☐ United States, Geographic Region: _____
- ☐ Canada, Province/Territory: _____
- ☐ International, County: _____

Location of Incident?

- ☐ Company Premises, CH2M HILL Office (use 3 letter office code if available):

_____

- ☐ Project, Project name:

_____

- ☐ In Transit

  Traveling from:

_____

  Traveling to:

_____

- ☐ At Home
- ☐ Other, Specify:

_____

Describe the incident:

_____

_____

_____

Describe how this event could have been prevented:

_____

_____

_____

Provide Witness Information:

Name: _____ Phone: _____

Name: _____ Phone: _____

Name: _____ Phone: _____

Personnel Notified of Incident (Provide name, date and time):

CH2M HILL Personnel:

_____

Client Personnel:

_____

Additional Comments:

_____

_____

_____

_____

Injury/Illness Section **[Complete only if Injury/Illness Incident type selected]**

Who was injured?

- ☐ CH2M HILL Employee or CH2M HILL Temp Employee

☐ Subcontractor to CH2M HILL (Non-LLC Joint Venture Project)
☐ LLC Joint Venture Partner Employee
☐ LLC Joint Venture Project Subcontractor/Contractor
☐ Other

Name of Injured: _____ **Job Title:** _____

Employer Name: _____ **Supervisor of Employee:** _____

Complete for CH2M HILL Employee Injuries

Business Group of Injured Employee:
_____

Has the employee called the Injury Management Administrator (1-800-756-1130)?
☐ Yes ☐ No ☐ Not Sure

Has the injured employee's supervisor been notified of this incident?
☐ Yes ☐ No ☐ Not Sure

Complete for Non-CH2M HILL Employee Injuries

Has the project safety coordinator been notified of this incident?
☐ Yes ☐ No ☐ Not Sure

Project Safety Coordinator:
_____

Body Part Affected:
_____

Injury/Illness (Result):
_____

Describe treatment provided (if medication provided, identify whether over-the-counter or prescription):
_____

Describe any work restriction prescribed (include dates and number of days):
_____

Physician/Health Care Provider Information
Name: _____ Phone: _____

Was treatment provided away from the worksite?
☐ No
☐ Yes
Facility Name:
_____
Address:
_____
City: _____ Phone Number: _____

Was injured treated in an emergency room?
☐ No ☐ Yes

Was injured hospitalized overnight as an in-patient?
☐ No ☐ Yes

General Information Environmental Section **[Complete only if Environment/Permit or Spill/Release Incident type selected]**

Who had control of the area during the incident?
☐ CH2M HILL, Company:
_____
☐ Subcontractor, Company:
_____
☐ Joint Venture Partner/Contractor/Subcontractor, Company:
_____
☐ Other, Company:
_____

Relationship to CH2M HILL:
_____

Property Damage Section **[Complete only if Property Damage Incident type selected]**

Property Damaged:
_____

Property Owner:
_____

Damage Description:
_____

Estimated US Dollar Amount:
_____

Spill or Release Section **[Complete only if Spill/Release Incident type selected]**

Substance:
_____

Estimated Quantity:
_____

Did the spill/release move off the property?:
_____

Spill/Release From:
_____

Spill/Release To:
_____

Environment/Permit Section **[Complete only if Environment/Permit Incident type selected]**

Describe Environmental or Permit Issue:
_____

Permit Type:
_____

Permitted Level or Criteria (e.g., discharge limit):
_____

Permit Name and Number (e.g., NPDES No. ST1234):
_____

Substance and Estimated Quantity:
_____

Duration of Permit Exceedence:
_____

HSSE Lessons Learned

[Date] ESBG LL-11-xx

Subject	**[Insert Descriptive Name of Lessons Learned]**
CH2M HILL Project?	[Yes or No]
Situation	[Describe incident or situation that occurred in general terms. Try to be brief and avoid unnecessary details such as names of people or projects, business groups, divisions, dates, location, etc.]
Lessons Learned (Recommendations and Comments)	• Bullet out any lessons learned, recommendations or other important "take away" information that would benefit others. Tie the recommendations to the incident or event, and avoid including information that is not directly tied to the event.
Submitted By	[Name/Office Location/Phone]
Additional Information Contact	[Name/Office Location/Phone]
Keywords/Categories	[Insert any keywords or incident categories that would aid in a search for this lessons learned]

Send completed Lessons Learned to the ESBG HSSE Director for posting and distribution. Please include a recommended distribution list.

CH2M HILL Health and Safety Plan

Attachment 6

Fact Sheets

Tick Fact Sheet

Vehicle Accident Guidance

Working Alone

Tick-Borne Pathogens — A Fact Sheet

Most of us have heard of Lyme disease or Rocky Mountain Spotted Fever (RMSF), but there are actually six notifiable tick-borne pathogens that present a significant field hazard. In some areas, these account for more than half of our serious field incidents. The following procedures should be applied during any field activity—even in places that are predominantly paved with bordering vegetation.

Hazard Recognition

An important step in controlling tick related hazards is understanding how to identify ticks, their habitats, their geographical locations, and signs and symptoms of tick-borne illnesses.

Tick Identification

There are five varieties of hard-bodied ticks that have been associated with tick-borne pathogens. These include:

- Deer (Black Legged) Tick (eastern and pacific varieties)
- Lone Star Tick
- Dog Tick
- Rocky Mountain Wood Tick

These varieties and their geographical locations are illustrated on the following page.

Tick Habitat

In eastern states, ticks are associated with deciduous forest and habitat containing leaf litter. Leaf litter provides a moist cover from wind, snow, and other elements. In the north-central states, is generally found in heavily wooded areas often surrounded by broad tracts of land cleared for agriculture.

On the Pacific Coast, the bacteria are transmitted to humans by the western black-legged (deer) tick and habitats are more diverse. For this region, ticks have been found in habitats with forest, north coastal scrub, high brush, and open grasslands. Coastal tick populations thrive in areas of high rainfall, but ticks are also found at inland locations.

Illnesses and Signs & Symptoms

There are six notifiable tick-borne pathogens that cause human illness in the United States. These pathogens may be transmitted during a tick bite—normally hours after attachment. The illnesses, presented in approximate order of most common to least, include:

- Lyme (bacteria)
- RMSF (bacteria)
- Ehrlichiosis (bacteria)
- STARI (Southern Tick-Associated Rash Illness) (bacteria)
- Tularemia (Rabbit Fever) (bacteria)
- Babesia (protozoan parasite)

Symptoms will vary based on the illness, and may develop in infected individuals typically between 3 and 30 days after transmission. Some infected individuals will not become ill or may develop only mild symptoms. These illnesses present with some or all of the following signs & symptoms: fever, headache, muscle aches, stiff neck, joint aches, nausea, vomiting, abdominal pain, diarrhea, malaise, weakness, small solid, ring-like, or spotted rashes. The bite site may be red, swollen, or develop ulceration or lesions. For Lyme disease, the bite area will sometimes resemble a target pattern. A variety of long-term symptoms may result if the illness is left untreated, including debilitating effects and death.

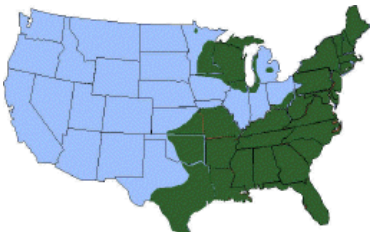
Deer Tick

From Left: adult female, adult male, nymph, and larvae Deer Tick (cm scale)

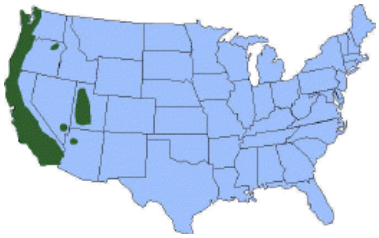
Lone Star Tick

Dog Tick

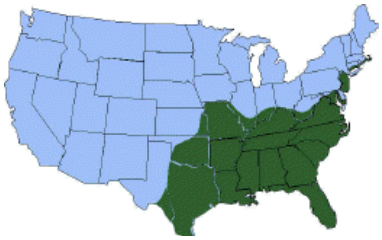
Rocky Mountain Wood Tick



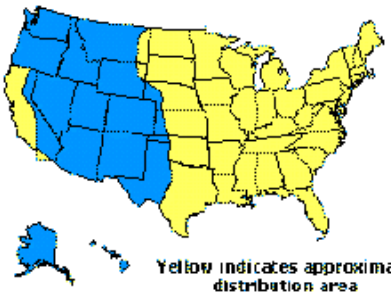
Distribution of Deer Tick (dark green)

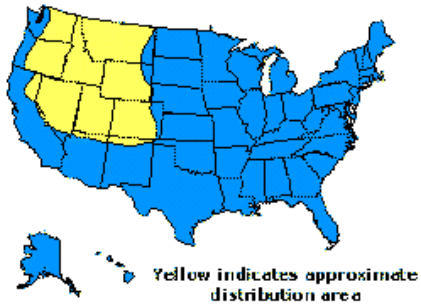


Distribution of Pacific Deer Tick (dark green)



Distribution of Lone Star Tick (Green)





Hazard Control

The methods for controlling exposure to ticks include, in order of most- to least-preferred:

- Avoiding tick habitats and ceasing operations in heavily infested areas
- Reducing tick abundance through habitat disruption or application of acracide
- Personal protection through use of repellants and protective clothing
- Frequent tick inspections and proper hygiene

Vaccinations are not available and preventative antibiotic treatment after a bite is generally not recommended.

Avoidance and Reduction of Ticks

To the extent practical, tick habitats should be avoided. In areas with significant tick infestation, consider stopping work and withdrawing from area until adequate tick population control can be achieved. Stopping and withdrawing should be considered as seriously as entering an area without proper energy control or with elevated airborne contaminants—tick-borne pathogens present risk of serious illness!

In areas where significant population density or infestation exists, tick reduction should be considered. Tick reduction can be achieved by disrupting tick habitats and/or direct population reduction through the use of tick-toxic pesticides (Damminix, Dursban, Sevin, etc.).

Habitat disruption may include only simple vegetative maintenance such as removing leaf litter and trimming grass and brush. Tick populations can be reduced by between 72 and 100 percent when leaf litter alone is removed. In more heavily infested areas, habitat disruption may include grubbing, tree trimming or removal, and pesticide application (Damminix, Dursban, Sevin, etc.). This approach is practical in smaller, localized areas or perimeter areas that require occasional access. Habitat controls are to be implemented with appropriate health and safety controls, in compliance with applicable environmental requirements, and may be best left to the property owner or tenant or to a licensed pesticide vendor. Caution should be exercised when using chemical repellents or pesticides in or around areas where environmental or industrial media samples will be collected for analysis.

Personal Protection

After other prevention and controls are implemented, personal protection is still necessary to control exposure to ticks. Personal protection must include all of the following steps:

- So that ticks may be easily seen, wear light-colored clothing. Full-body New Tyvek (paper-like disposable coveralls) may also be used
- To prevent ticks from getting underneath clothing tuck pant legs into socks or tape to boots
- Wear long-sleeved shirts, a hat, and high boots
- Apply DEET repellent to exposed skin or clothing per product label
- Apply permethrin repellent to the outside of boots and clothing before wearing, per product label
- Frequently check for ticks and remove from clothing
- At the end of the day, search your entire body for ticks (particularly groin, armpits, neck, and head) and shower
- To prevent pathogen transmission through mucous membranes or broken/cut skin, wash or disinfect hands and/or wear surgical-style nitrile gloves any time ticks are handled

Pregnant individuals and individuals using prescription medications should consult with their physician and/or pharmacists before using chemical repellents. Because human health effects may not be fully known, use of chemical repellents should be kept to a minimum frequency and quantity. Always follow manufacturers' use instructions and precautions. Wash hands after handling, applying, or removing protective gear and clothing. Avoid situations such as hand-to-face contact, eating, drinking, and smoking when applying or using repellents.

Remove and wash clothes per repellent product label. Chemical repellents should not be used on infants and children.

Vaccinations are generally not available for tick-borne pathogens. Although production of the LYMErix™ Lyme disease vaccination has been ceased, vaccination may still be considered under specific circumstances and with concurrence from the consulting physician.

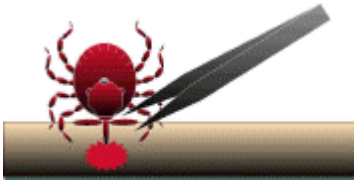
Tick Check

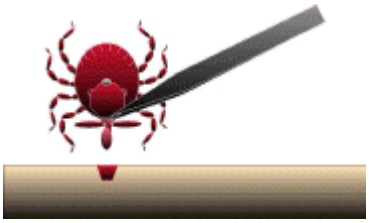
A tick check should be performed after field survey before entering the field vehicle (you do not want to infest your field vehicle with ticks). Have your field partner check your back; the backs of your legs, arms, and neck; and your hairline. Shake off clothing as thorough as possible before entering the vehicle. Once the field day is complete, repeat this procedure and perform a thorough self check.

If a tick has embedded itself into the skin, remove the tick as described below.

Tick Removal

1. Use the tick removal kit obtained through the CH2M HILL Milwaukee warehouse, or a fine-tipped tweezers or shield your fingers with a tissue, paper towel, or nitrile gloves.
Error! Objects cannot be created from editing field codes.
2. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. If this happens, remove mouthparts with tweezers. Consult your healthcare provider if infection occurs.





3. Avoid squeezing, crushing or puncturing the body of the tick because its fluids (saliva, hemolymph, gut contents) may contain infectious organisms. Releasing these organisms to the outside of the tick's body or into the bite area may increase the chance of infectious organism transmission.

4. Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin. This precaution is particularly directed to individuals who remove ticks from domestic animals with unprotected fingers. Children, elderly persons, and immunocompromised persons may be at greater risk of infection and should avoid this procedure.

5. After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.

6. Should you wish to save the tick for identification, place it in a plastic bag, with the date of the tick bite, and place in your freezer. It may be used at a later date to assist a physician with making an accurate diagnosis (if you become ill).

Note: Folklore remedies such as petroleum jelly or hot matches do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided. In

addition, a number of tick removal devices have been marketed, but none are better than a plain set of fine tipped tweezers.

First-Aid and Medical Treatment

Tick bites should always be treated with first-aid. Clean and wash hands and disinfect the bite site after removing embedded tick. Individuals previously infected with Lyme disease does not confer immunity—re-infection from future tick bites can occur even after a person has contracted a tick-borne disease.

The employee should contact the Injury Management/Return To Work provider (IMRTW), WorkCare using the toll-free number 866-893-2514 to report the tick bite. WorkCare will follow-up with each CH2M Hill employee who reports a tick bite and is at risk of developing Lyme disease by monitoring for symptoms up to 45 days, and will refer the employee to a medical provider for evaluation and treatment as necessary.

2011 Vehicle Accident Guidance—ESBG

Remember that if you a **renting** a non-CH2M HILL owned vehicle (short-term rental) in the U.S., you should carry the insurance card from the state where your driver's license is issued.

If you operate a **fleet vehicle**, carry the insurance card where the vehicle is registered.

For ALL Vehicles if you are in an accident:

1. If you are injured, call 911 for emergency medical treatment or 1-866-893-2514 to contact the CH2M HILL Occupational Nurse/Physician for minor injuries. If you feel you have not been injured, contact the RHSM for guidance on whether calling the CH2M HILL Occupation Nurse/Physician is applicable.

2. **Call the Police--**For any vehicle accident/damage, it is recommended that the local police (or site security/emergency services if working on a client site that provides such services) be called to determine if a report needs to be filed. In some instances, a report may not be required (during accident alerts, or in public parking lots). Document that the authorities were called and follow up with any guidance they give you. State requirements vary. If a report is filed, obtain a copy.

3. Notify Supervisor, (and PM/RHSM if working on a project site)

4. Complete a HITS report on the VO.

Additional Steps

To report an auto accident, and before a claim can be taken by telephonic reporting, have available your name (the company name alone is no longer accepted, a driver's name must be provided even for fender benders), location of accident and your office address if different than the accident location, business group and project number. A claim cannot be taken without your name, address, business group and your project number. By location the state where the accident occurred, and which office you are aligned to, i.e., accident occurs in Idaho, but you are out of the Denver office. Advise the claim recorder the accident occurred in ID, but that your office location is Denver. This will assist the claim intake person in identifying location coding for the claims.

Auto accidents involve two different sections of an Auto policy:

1) Liability to others due to Bodily Injury and Property Damage
2) Physical Damage - Comprehensive and Collision - damage to the vehicle CH employee is driving

CH2M Hill has Liability coverage for any auto - our policy will respond on either a primary or excess basis.

Refer to the table below for additional notifications to make based on the type of accident experienced and type of vehicle being used.

Liability - Bodily Injury or Property Damage to Others

Scenario	Which Coverage Responds	What to do if in an accident
CH2M Hill fleet, pool or project vehicle - long term lease - lower 48	CH2M Hill - Primary	Contact Broadspire (1-800-753-6737); Jennifer Rindahl/DEN (720-286-2449); Linda George/DEN (720-286-2057)
CH2M Hill fleet, pool or project vehicle - long term lease - Alaska (North Slope)	CH2M Hill - Primary	Contact Jennifer Rindahl/DEN (720-286-2449)
Client vehicle driven by CH2M Hill employee	Client's auto policy unless client has made CH2M Hill responsible for vehicle	Contact Broadspire (1-800-753-6737); Contact Jennifer Rindahl/DEN (720-286-2449); contact client;
Short term lease (30 days or less)	Rental car company if rented through Enterprise, Budget or Hertz; CH2M Hill excess	Contact Broadspire (1-800-753-6737); Contact local branch of rental car company where vehicle leased (ERAC includes 24 hour roadside assistance) and Jennifer Rindahl/DEN (720-286-2449)

Liability - Bodily Injury or Property Damage to Others

Scenario	Which Coverage Responds	What to do if in an accident
Short term lease (30 days or less)	CH2M Hill - Primary if rented through company other than our national agreements; $100,000 deductible	Contact Broadspire (1-800-753-6737); Contact rental car company and Jennifer Rindahl/DEN (720-286-2449)
Personal vehicle used on business	Employee's personal auto policy; CH2M Hill on an excess basis	Contact personal auto insurance company; contact Jennifer Rindahl/DEN (720-286-2449)

Physical Damage - damage to vehicle CH employee was driving

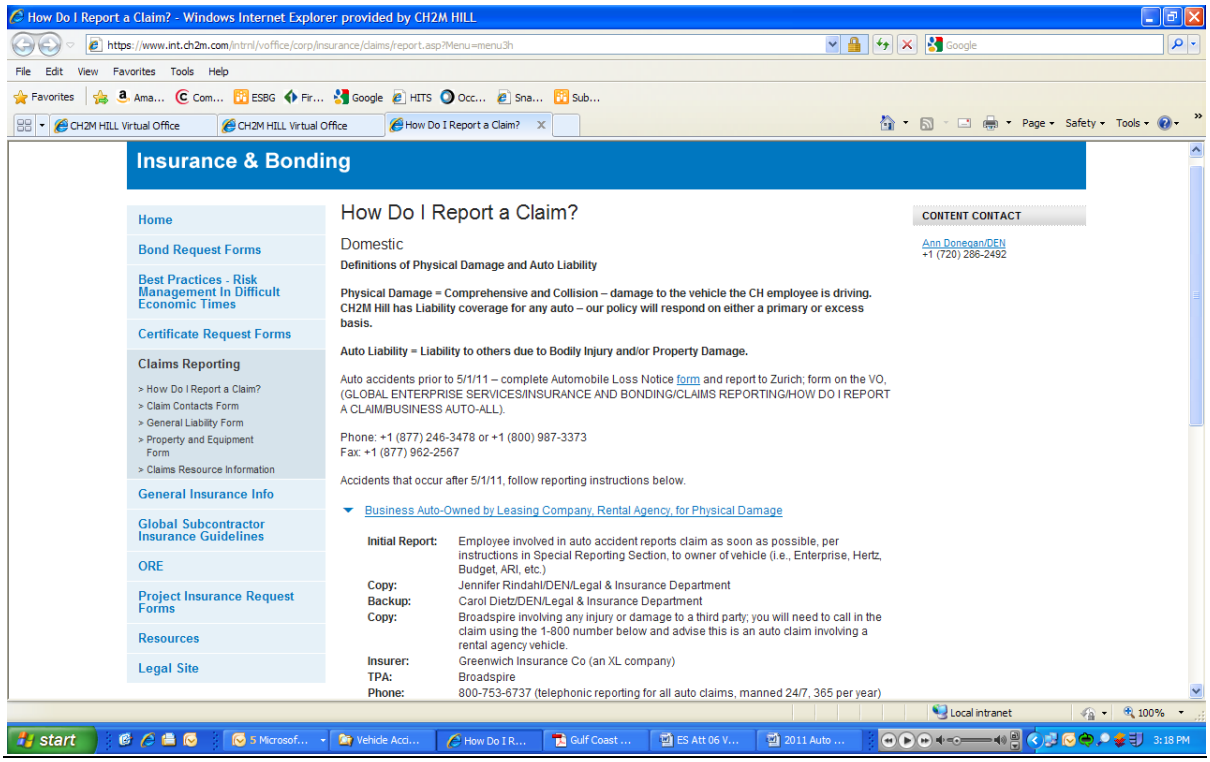
Scenario	Which Coverage Responds	What to do if in an accident
CH2M Hill fleet, pool or project vehicle - long term lease - lower 48	CH2M Hill ONLY if vehicle is scheduled on policy - $5,000 deductible	Contact Broadspire (1-800-753-6737); Jennifer Rindahl/DEN (720-286-2449); Linda George/DEN (720-286-2057)
CH2M Hill fleet, pool or project vehicle - long term lease - Alaska (North Slope)	CH2M Hill Equipment Schedule if scheduled on policy	Contact Jennifer Rindahl/DEN (720-286-2449)
CH2M Hill fleet, pool or project vehicle - long term lease	ARI if physical damage coverage purchased - $500 deductible	Contact Jennifer Rindahl/DEN 720.286.2449; call ARI at 1-800-221-1645 give them Client Code and ARI fleet vehicle number; and notify Linda George/DEN - Fleet Coordinator - 720-286-2057
Client vehicle CH2M Hill Employee is driving	Client's auto policy unless client has made CH2M Hill contractually responsible for vehicle	Contact Jennifer Rindahl/DEN (720-286-2449); contact client; contact Broadspire (1-800-753-6737)
Short term lease (30 days or less) using corporate VISA	VISA if corporate credit card used and vehicle is not a pickup, truck, cargo van or used off-road	Contact VISA - 1-800-847-2911 or http://www.visa.com/eclaim
Short term lease (30 days or less) through Enterprise (ERAC) and vehicle is used off-road and physical damage coverage included when vehicle leased	ERAC up to $3,000 in damage; CH2M Hill's coverage is excess	Notify Rental Car Company; contact Jennifer Rindahl/DEN (720-286-2449) if damage over $5,000
Short term lease (30 days or less) did **not** use corporate VISA	CH2M Hill - $5,000 deductible (project responsibility)	Contact Broadspire (1-800-753-6737); Contact Jennifer Rindhal/DEN 720-286-2449; contact VISA - 1-800-847-2911 or http://www.visa.com/eclaim
Personal vehicle used on business	CH will reimburse the amount of the deductible carried on the employee's policy up to $500 whichever is less	Contact Jennifer Rindahl/DEN (720-286-2449); contact client; contact Broadspire (1-800-753-6737)

Details for reporting a claim on the CH2M Hill VO are accessed by going to the VO home page and clicking:

GLOBAL ENTERPRISE SERVICES/INSURANCE & BONDING/CLAIMS REPORTING

HOW DO I REPORT A CLAIM TAB or access the following URL:

https://www.int.ch2m.com/intrnl/voffice/corp/insurance/claims/report.asp?Menu=menu3h



For Personally Owned Vehicles (POVs):

CH2M HILL does not provide auto insurance for POVs, it is responsibility of the owner. If you are in a vehicle accident conducting company business, contact the police as above, supervisor, and 911 or CH2M HILL's occupational nurse/physician as stated above. Complete a HITS report. Contact Jennifer Rindahl/DEN for assistance for meeting personal insurance deductibles (up to $500) with proof of insurance and deductible.

If using your POV for extended project use, notify the PM to make sure a rental car is not needed. Check your insurance policy for guidance on using the POV for business use.

Additional Resources:

Claims Resource Manual

WORKING ALONE PROTOCOL
CALL – IN CONTACT FORM

Date of site work:_____ Expected start time:_____
Name of CH2M HILL employee in the field:_____
Name of CH2M HILL employee responsible to receive contact:
Client Emergency Contact (if any):
CH2M HILL employee's contact numbers:
Radio #_____
Cell Phone #_____
Address and Location of work:_____
Directions/Map:

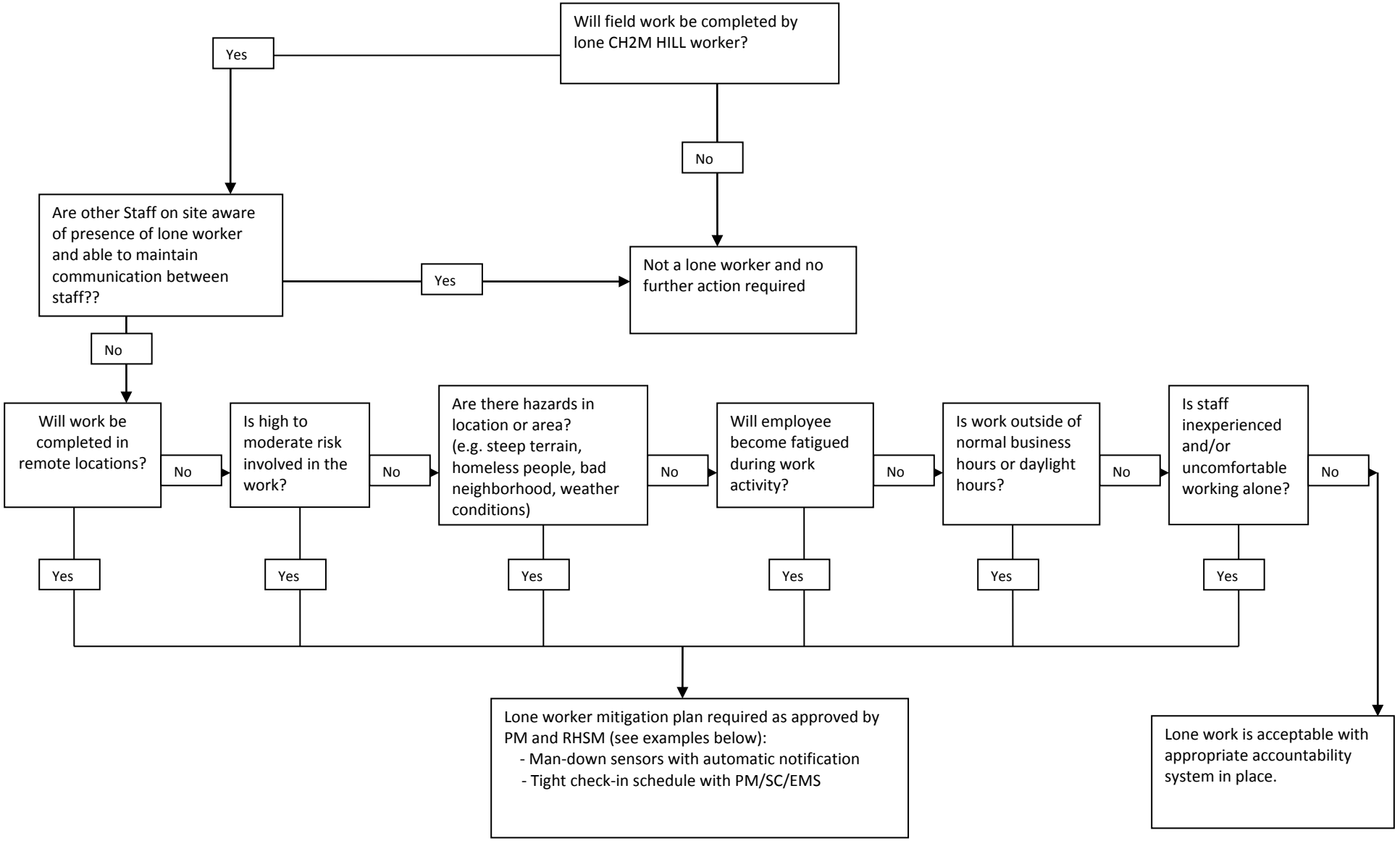
Planned Activity:_____
Specified Frequency and time for call in:_____

Time	Verified	Location

If lone worker fails to call in at specified frequency/time:

1) Call worker's radio and cell to determine if an emergency exists.
2) If no reply, immediately call Client security/emergency service if there is one at the site.
3) If there is no client security call Emergency Services (911). Inform the dispatcher there is a lone worker that cannot be contacted and there may be an emergency on site. Provide the lone worker's name, their last known location, and your contact information.
4) After Emergency Services have been contacted, call the other emergency contacts, Project Manager, and Responsible Health and Safety Manager.

Lone Worker Protocol



CH2M HILL HEALTH AND SAFETY PLAN

Attachment 7

Observed Hazard Form

CH2MHILL

OBSERVED HAZARD FORM

Name/Company of Observer (*optional*):

Date reported:_____

Time reported:_____

Contractor/s performing unsafe act or creating unsafe condition:

1. _____

2. _____

3. _____

Unsafe Act or Condition:

_____
_____
_____
_____
_____
_____
_____
_____
_____

Location of Unsafe Act or Condition:

Name of CH2M HILL Representative:

_____

Corrective Actions Taken: Date: _____

_____
_____
_____
_____
_____

Project Safety Committee Evaluation: Date: _____

_____
_____
_____
_____

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 8

Stop Work Order Form

CH2MHILL

Stop Work Order

REPORT PREPARED BY:

Name:	Title:	Signature:	Date:

ISSUE OF NONPERFORMANCE:

Description:	Date of Nonperformance:
	_____

SUBCONTRACTOR SIGNATURE OF NOTIFICATION:

Name:	Title:	Signature:	Date:

**** Corrective action is to be taken immediately. Note below the action taken, sign and return to CCI.* Work may not resume until authorization is granted by CH2M HILL Constructors, Inc. Representative,***

SUBCONTRACTOR'S CORRECTIVE ACTION

Description:	Date of Nonperformance:
	_____

SUBCONTRACTOR SIGNATURE OF CORRECTION

Name:	Title:	Signature:	Date:

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 9

Agency Inspection Target Zero Bulletin

Environmental Services Business Group

TARGET ZERO BULLETIN

Subject: HSSE Agency Inspections (OSHA, EPA, DOT, State Health Department)

Do you know what YOU would do if an agency inspector arrived at your site unannounced?

Recently, a State Occupational Safety and Health Administration (OSHA) inspector made an unannounced visit to one of our Federal project sites. OSHA, U.S. Environmental Protection Agency (EPA), and authorized state or local agencies have authority to inspect any facility that is subject to health, safety, and environmental legislation. Inspections may be announced or unannounced. This particular inspector indicated that the project was targeted for an inspection because the work was funded by the American Recovery and Reinvestment Act (ARRA).

Enterprise Standard Operating Procedure (SOP) HSE-201, *Agency Inspections and Communications,* describes the responsibilities, procedures, and requirements associated with inspections conducted by external regulatory agencies, as well as the methods for communicating information to key individuals. This Target Zero Bulletin is a brief summary of what to do in the event of an agency inspection at your site. Refer to the SOP for more specific guidance.

Notification of Inspections

- If the inspection is an announced regulatory agency inspection, the Project Manager (PM) should notify the Responsible Health and Safety Manager (RHSM) and Responsible Environmental Manager (REM) well in advance of the inspection.
- If an unannounced agency inspector visits one of our projects, Field personnel must immediately notify the project Emergency Response Coordinator (ERC). Typically the ERC is the Safety Coordinator (SC).
- The ERC must immediately notify the RHSM/REM, as appropriate, of unannounced inspections, or designate someone to call the RHSM/REM. The RHSM/REMs can provide guidance to the field staff and PM.

Inspector Credential Verification

- Upon arrival, the ERC must request the inspector to provide official credentials. Record the inspector's name and office phone number or obtain the inspector's business card.
- The inspector shall sign the visitors log and be given a site-specific health, safety, and environmental protection briefing.
- The inspector shall meet any site access requirements associated with security clearances, specialized training, and medical monitoring. The CH2M HILL representative shall verify that the inspector possesses these requirements; access will only be granted to those areas where appropriate access requirements are met. Some inspectors have the authority to gain access to any work area at any time, such as an inspector with a search warrant. In these cases, we can stop work operations as necessary to protect the safety of the inspector(s).

Opening Conference

- The CH2M HILL Project Manager, ERC, RHSM, or REM, and the inspector shall determine attendees for the opening conference. The RHSM (for OSHA and other worker health and safety inspections) or REM (for environmental inspections) shall join the opening conference via conference call.
- The inspector shall inform CH2M HILL of the purpose of the inspection and provide a copy of the complaint, if applicable.

- The inspector shall outline the scope of the inspection, including employee interviews conducted in private, physical inspection of the workplace and records, possible referrals, discrimination complaints, and the closing conference(s).

Requests for OSHA Logs

- An OSHA inspector may request to review the project OSHA Injury/Illness log, better known as the OSHA 300 Log. Contact your RHSM for assistance in obtaining the OSHA 300 Log.
- Field projects with a continuous duration of one year or longer are considered to be separate establishments and are required to maintain an OSHA 300 log specific to the project. The project OSHA 300 log should be maintained onsite and kept current.
- Recordable injuries and illnesses sustained on field projects less than one year in duration are maintained on the CH2M HILL office log where the injured employee is based.

The Inspection

- The scope of the inspection shall be limited to that indicated by the inspector in the opening conference. The inspector shall be escorted to relevant areas only. The ERC or other designated by the RHSM or REM must accompany the inspector during the inspection.
- Ensure that the inspection is limited to the scope that the inspector disclosed during the opening conference. The ERC should always take notes which identify: areas inspected, machinery or equipment and materials examined, employees or other persons interviewed, and photographs taken by the inspector.
- The inspector will observe safety, health, and environmental conditions and practices and document the inspection process. The inspector may also take photos and instrument readings, examine records, collect air samples, measure noise levels, survey existing engineering controls, and monitor employee exposure to toxic vapors, gases, and dusts.
- CH2M HILL should gather duplicate information (photographs, readings, samples) in the same manner and condition as the inspector. If the equipment needed to take duplicate samples is not onsite, ask the inspector if the sampling can wait until the equipment is available. If samples are taken, request a description of the tests that the agency intends to perform on the samples and request results as soon as they are available.
- Employees may be questioned during the inspection tour. The employee can refuse to speak to an inspector, can speak to the inspector with a company representative (including management) present, or can speak to the inspector privately. It is CH2M HILL policy that employees who wish to speak to the inspector are not discriminated against, intimidated, or otherwise mistreated for exercising their rights during compliance inspections.
- Copies of documents should not be provided to the inspector without the approval of the RHSM or REM or Legal Insurance Department (LID). **DO NOT** voluntarily release documents. Respond only to inspection team requests.
- During the course of the inspection, the inspector may point out violations. For each violation, the CH2M HILL representative should ask the inspector to discuss possible corrective action. Where possible, violations detected by the inspector should be corrected immediately and noted by the inspector as corrected.
- For those items which cannot be corrected immediately, an action plan shall be formulated for timely correction. In any instance, employees exposed to hazards shall be removed from the area.

Closing Conference

After the inspection, a closing conference is normally held as follows:

- The CH2M HILL PM, ERC, RHSM or REM shall be involved via conference call in the closing conference, at a minimum;
- The inspector shall describe the apparent violations found during the inspection and other pertinent issues as deemed necessary by the inspector. CH2M HILL shall be advised of their rights to participate in any subsequent conferences, meetings or discussions. Any unusual circumstances noted during the closing conference shall be documented by the ERC;
- The inspector shall discuss violations observed during the inspection and indicate for which violations a citation and a proposed penalty may be issued or recommended;

- The ERC shall request receipts for all samples and approved documents photocopied by the inspector, request a photocopy of the inspector's photograph log, and request a copy of the final inspection report; and
- Any documentation from an agency inspection must be transmitted immediately to the RHSM or REM, and LID.

Unannounced regulatory agency inspections may happen at any time on our projects -

Get your RHSM/REM and PM involved immediately if an Inspector arrives.

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 10

Completed CH2M HILL AHAs

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 11

Material Safety Data Sheets

Attachment F
Potential Additives for Drilling and Well Development

Soda Ash

Specialty Chemical

Description

Soda Ash is a white, granular powder primarily used to condition and soften make-up water and raise pH

Applications/Functions

- Treat out hardness due to calcium in make-up water
- Raise pH

Advantages

- Can eliminate calcium ions by removing them as insoluble calcium carbonate
- Can maximize the performance of bentonite and polymer product

Typical Properties

• Appearance	Variable-colored powder (gray to tan)
• pH of 5% solution	11.5
• Bulk density, lb/ft^3	57-65

Recommended Treatment

- Hardness and pH levels of make-up water should be checked prior to addition of Soda Ash.
- Addition of Soda Ash should always be done prior to addition of bentonite or polymer to the fluid system.
- Soda Ash should not be added at the same time as other drilling fluid components.
- When treating make-up water pH ranges should be maintained between 8.5 – 9.5

General Treatment:

- 1-2 pounds per 100 gallons of make-up water or 1.2-2.4 kilograms per cubic meter of make-up water.
- Use as required to remove calcium ions but do not add in excess as overtreatment can lead to detrimental effects and reduced performance of the drilling fluid components and/or system.
- Mix slowly through a jet mixer or sift slowly into the vortex of a high-speed stirrer.

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Rev. 5/2008 · IDP 055

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.

Packaging	Soda Ash is packaged in 50-lb (22.7 kg) or 100-lb (45.4 kg) multiwall paper bags.
Availability	Soda Ash can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy. E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **SODA ASH**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: SODA ASH
Synonyms: None
Chemical Family: Carbonate
Application: Buffer

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium carbonate	497-19-8	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 0, Reactivity 0
HMIS Ratings: Health 2, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.

Storage Information Store away from acids. Store in a cool, dry location. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Localized ventilation should be used to control dust levels.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Dust proof goggles.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	White
Odor:	Odorless
pH:	11.5

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	2.5
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	48- 62
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	105.99

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	Prolonged or repeated contact may cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach.
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: 4220 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not applicable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: TLM24: 385 mg/l (Lepomis macrochirus)
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

QUIK-GEL®

Viscosifier

Description

QUIK-GEL® viscosifier is an easy-to-mix, finely ground (200-mesh), premium-grade, high-yielding Wyoming sodium bentonite. QUIK-GEL viscosifier imparts viscosity, fluid loss control and gelling characteristics to freshwater-based drilling fluids.

Applications/Functions

- Can mix with fresh water to form a low-solids drilling fluid for general drilling applications
- Can viscosify water-based drilling fluids
- Can reduce filtration by forming a thin filter cake with low permeability
- Can improve hole-cleaning capability of drilling fluids
- Can mix with foaming agents to make "gel/foam" drilling fluids for air/foam drilling applications

Advantages

- NSF/ANSI Standard 60 certified
- Single-sack product and cost effective
- Can provide lubricity for drilling fluids
- Can mix easily and quickly reaches maximum viscosity
- Can yield more than twice as much mud of the same viscosity as an equal weight of API oilfield grades of bentonite

Typical Properties

Appearance	Grey to tan powder
Bulk density, lb/ft^3	68 to 72 (compacted)
pH (3% solution)	8.9

Recommended Treatment

Mix slowly through a jet mixer or sift slowly into the vortex of a high-speed stirrer.

Approximate Amounts of QUIK-GEL Viscosifier Added to Freshwater

Application/Desired Result	lb/100 gal	lb/bbl	kg/m^3
Normal Drilling Conditions	15-25	6-10	18-30
Unconsolidated Formations	35-50	15-21	42-60
Make-Up For Gel/Foam Systems	12-15	5-7	14-18

- 1 bbl = 42 U.S. gallons

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Rev. 5/2008 · IDP 009

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.

Additional Information

***Note*:**

- For optimum yield, pre-treat make-up water with 1-2 pounds of soda ash per 100 gallons of water (1.2-2.4 kg/m^3).

Packaging

QUIK-GEL viscosifier is packaged in 50-lb (22.7-kg) multiwall paper bags.

Availability

QUIK-GEL viscosifier can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products

Product Service Line, Halliburton

3000 N. Sam Houston Pkwy. E.

Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **QUIK-GEL®**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: QUIK-GEL®
Synonyms: None
Chemical Family: Mineral
Application: Viscosifier

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Bentonite	1302-78-9	60 - 100%	Not applicable	Not applicable
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m^3	$\frac{10\ mg/m^3}{\%SiO2 + 2}$
Crystalline silica, cristobalite	14464-46-1	0 - 1%	0.025 mg/m^3	1/2 x $\frac{10\ mg/m^3}{\%SiO2 + 2}$
Crystalline silica, tridymite	15468-32-3	0 - 1%	0.05 mg/m^3	1/2 x $\frac{10\ mg/m^3}{\%SiO2 + 2}$

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Not applicable.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0*, Flammability 0, Physical Hazard 0 , PPE: E

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Keep from excessive heat. Do not reuse empty container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	Various
Odor:	Mild earthy
pH:	8-10
Specific Gravity @ 20 C (Water=1):	2.6
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	47.6-72.1
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Slightly soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Molecular Weight (g/mole): Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A). Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).
Skin Contact	May cause mechanical skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	None known
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information

For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: TLM96: 10000 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity: Not determined

Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels:	None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

QUIK-TROL® LV

Modified Natural Cellulosic Material

Description

QUIK-TROL® LV modified natural cellulosic polymer can provide filtration control in most water-based drilling fluids without substantially increasing viscosity. QUIK-TROL LV modified natural cellulosic polymer when added to a QUIK-GEL® or BORE-GEL® slurry, yields a drilling mud system suitable for drilling in sandy formation. QUIK-TROL LV polymer can be added to vegetable or mineral oil to provide an oil-based fluid suspension, which can be poured into drill string directly.

Applications/Functions

- Can provide filtration control in fresh or brackish water-based drilling fluids
- Can reduce fluid loss without significantly increasing fluid viscosity
- Can encapsulate shale to prevent swelling and disintegration
- Can promote borehole stability in water sensitive formations
- Can minimize rod chatter, rotational torque and circulating pressure
- Can improve hole cleaning and core recovery

Advantages

- NSF/ANSI Standard 60 certified
- Effective in fresh water, salt water and brackish water-based drilling fluids
- Effective in small quantities for filtration control
- Non-fermenting
- Compatible with other Baroid drilling fluid additives
- Resistant to harsh environments and contaminants

Typical Properties

Appearance	White, free-flowing powder
pH (1% aqueous solution)	7.75

Recommended Treatment

- Using a Venturi mixer, or into vortex of a high-speed stirrer, add slowly and uniformly to the entire circulating system.

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Rev. 5/2008 · IDP 062

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.

Recommended Treatment (continued)

Approximate Amounts of QUIK-TROL LV Polymer Added to Water-based Fluids		
Desired Condition/Result		
Added to fresh or salt water	**lb/100 gal**	**kg/m^3**
• To help stabilize water sensitive formation	3 – 7	4 – 8.5
• To help reduce torque and lower circulating pressure	0.5 - 2	0.6 – 2.4
Added to QUIK-GEL® slurry (25 lb/100 gallons) or (30 kilograms per m^3)	**lb/100 gal**	**kg/m^3**
• To help reduce filtration rate and improve borehole stability	0.5 - 2.0	0.6 – 2.4
Added to BORE-GEL® slurry (35 lb/100 gallons) or (42 kilograms per m^3)	**lb/100 gal**	**kg/m^3**
• To help reduce filtration rate and improve borehole stability	0.5 – 2.0	0.6 – 2.4

Note:
Very salty waters may require twice as much QUIK-TROL LV polymer as fresh water. Preferably, QUIK-TROL LV polymer should be mixed in fresh water before it is added to very salty water.

Packaging

QUIK-TROL LV polymer is packaged in a 20-lb plastic can containing 10 airtight sealed plastic bags. Each bag contains 2-lb (0.91 kg). QUIK-TROL LV polymer is also available in 40-lb plastic cans.

Availability

QUIK-TROL LV polymer can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy. E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **QUIK-TROL GOLD LV**

Revision Date: 02-Oct-2009

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: QUIK-TROL GOLD LV
Synonyms: None
Chemical Family: Carbohydrate
Application: Fluid Loss Additive

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Cellulose derivative		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do NOT induce vomiting. Give nothing by mouth. Obtain immediate medical attention.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	> 698
Autoignition Temperature (C):	> 370
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 1, Reactivity 0
HMIS Ratings: Health 1, Flammability 1, Physical Hazard 0 , PPE: E

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Avoid creating and breathing dust. Slippery when wet.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Avoid dust accumulations. Slippery when wet. Ground and bond containers when transferring from one container to another. Wash hands after use. Launder contaminated clothing before reuse. Do NOT consume food, drink, or tobacco in contaminated areas.

Storage Information Store away from oxidizers. Keep container closed when not in use. Store in a cool, dry location. Store away from direct sunlight. Keep from heat, sparks, and open flames. Store in a well ventilated area. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls A well ventilated area to control dust levels. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection	Normal work coveralls.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	White to off white
Odor:	Odorless
pH:	5-9 (1%)
Specific Gravity @ 20 C (Water=1):	Not Determined
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	37-56
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Forms gel
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	May cause mild skin irritation. May cause an allergic skin reaction.
Eye Contact	May cause mild eye irritation.
Ingestion	May cause allergic reaction.

Aggravated Medical Conditions None known.

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 1% are chronic health hazards.

Other Information None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Readily biodegradable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM96: 100-1000 ppm (Lepomis macrochirus) TLM96: 100-1000 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG

Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

QUIK-TROL® LV

Modified Natural Cellulosic Material

Description

QUIK-TROL® LV modified natural cellulosic polymer can provide filtration control in most water-based drilling fluids without substantially increasing viscosity. QUIK-TROL LV modified natural cellulosic polymer when added to a QUIK-GEL® or BORE-GEL® slurry, yields a drilling mud system suitable for drilling in sandy formation. QUIK-TROL LV polymer can be added to vegetable or mineral oil to provide an oil-based fluid suspension, which can be poured into drill string directly.

Applications/Functions

- Can provide filtration control in fresh or brackish water-based drilling fluids
- Can reduce fluid loss without significantly increasing fluid viscosity
- Can encapsulate shale to prevent swelling and disintegration
- Can promote borehole stability in water sensitive formations
- Can minimize rod chatter, rotational torque and circulating pressure
- Can improve hole cleaning and core recovery

Advantages

- NSF/ANSI Standard 60 certified
- Effective in fresh water, salt water and brackish water-based drilling fluids
- Effective in small quantities for filtration control
- Non-fermenting
- Compatible with other Baroid drilling fluid additives
- Resistant to harsh environments and contaminants

Typical Properties

Appearance	White, free-flowing powder
pH (1% aqueous solution)	7.75

Recommended Treatment

- Using a Venturi mixer, or into vortex of a high-speed stirrer, add slowly and uniformly to the entire circulating system.

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Rev. 5/2008 · IDP 062

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.

Recommended Treatment (continued)

Approximate Amounts of QUIK-TROL LV Polymer Added to Water-based Fluids		
Desired Condition/Result		
Added to fresh or salt water	**lb/100 gal**	**kg/m^3**
• To help stabilize water sensitive formation	3 – 7	4 – 8.5
• To help reduce torque and lower circulating pressure	0.5 - 2	0.6 – 2.4
Added to QUIK-GEL® slurry (25 lb/100 gallons) or (30 kilograms per m^3)	**lb/100 gal**	**kg/m^3**
• To help reduce filtration rate and improve borehole stability	0.5 - 2.0	0.6 – 2.4
Added to BORE-GEL® slurry (35 lb/100 gallons) or (42 kilograms per m^3)	**lb/100 gal**	**kg/m^3**
• To help reduce filtration rate and improve borehole stability	0.5 – 2.0	0.6 – 2.4

Note:
Very salty waters may require twice as much QUIK-TROL LV polymer as fresh water. Preferably, QUIK-TROL LV polymer should be mixed in fresh water before it is added to very salty water.

Packaging

QUIK-TROL LV polymer is packaged in a 20-lb plastic can containing 10 airtight sealed plastic bags. Each bag contains 2-lb (0.91 kg). QUIK-TROL LV polymer is also available in 40-lb plastic cans.

Availability

QUIK-TROL LV polymer can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy. E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **QUIK-TROL® LV**

Revision Date: 05-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: QUIK-TROL® LV
Synonyms: None
Chemical Family: Carbohydrate
Application: Filtrate Reducer

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Cellulose derivative		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	430
Flash Point/Range (C):	221
Flash Point Method:	Not Determined
Autoignition Temperature (F):	752
Autoignition Temperature (C):	400
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Avoid creating and breathing dust.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust. Avoid dust accumulations.

Storage Information Store away from oxidizers. Store in a dry location. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls A well ventilated area to control dust levels. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Solid

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	White to off white
Odor:	Mild
pH:	7.75 @ 1%
Specific Gravity @ 20 C (Water=1):	1.6
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	40-55
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Forms gel
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	May cause mild skin irritation.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: 1260 mg/kg (Rat)

Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Readily biodegradable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM96: > 500 mg/l (Golden orfe)
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

EZ-MUD® PLUS

Polymer Emulsion

Description

EZ-MUD® PLUS liquid polymer emulsion contains partially hydrolyzed polyacrylamide/polyacrylate (PHPA) copolymer and is used primarily as a viscosifier and borehole stabilizer to prevent reactive shales and clays from swelling and sloughing. EZ-MUD PLUS is also added to low-solids drilling fluids to increase lubricity and to improve the carrying capacity of air/foam injection fluids.EZ-MUD PLUS polymer emulsion is a high molecular weight version of EZ-MUD polymer emulsion with improved properties.

Applications/Functions

The use of EZ-MUD PLUS polymer assists or promotes the following:

- Stabilize reactive shale and clay formations
- Improve borehole and excavation stability
- Enhance slurry rheological properties
- Alleviate mud rings, bit balling and booting-off in clay formations
- Reduce drill pipe torque and pumping pressure
- Minimize rod chatter in diamond core drilling
- Create "stiff-foam" and maintain foam integrity
- Flocculate non-reactive solids in reserve pit at low concentrations

Advantages

- Liquid form – mixes easily with minimum shear in fresh water
- Efficient shale/clay stabilizer and viscosifier
- Non-fermenting
- Cost-effective - small amounts produce desired results
- Breaks down chemically with bleach (sodium hypochlorite)
- NSF/ANSI Standard 60 Certified

Typical Properties

Appearance	Thick, opaque white liquid
Density	8.5 lb/gal (1.02 g/cm^3)
pH (1 qt per 100 gal of fresh water)	8.5
Flash point, PMCC °F, °C	>200 (>93.3)
Thermal stability, °F, °C	250 (121)

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Rev. 03/2011 · IDP 030

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.

Recommended Treatment

Approximate Amounts of EZ-MUD® PLUS polymer emulsion Added to Drilling Fluid System			
Drilling Application/Desired Result	**Quarts/ 100 gal**	**Pints/bbl**	**Liters/m³**
Added to fresh water (To formulate a clay-free drilling fluid)			
• To stabilize reactive clay and shale	0.5-1.0	0.5-1.25	2.5-6.5
• To retard rod vibration, reduce torque and pumping pressure	0.5-1.0	0.5-1.25	2.5-6.5
Added to QUIK-GEL® bentonite drilling fluid (25 lb/100 gal) or (30 kg/m³)			
• To improve hole cleaning, increase hole stability and enhance lubricity	0.5-1.0	0.25-0.5	1.25-2.5
Added to injection liquid in air/foam drilling applications			
• To improve foam performance and hole conditions	0.5-1.0	0.25-0.5	1.25-2.5

Notes:

- Make-up water used to mix EZ-MUD PLUS polymer should meet the following quality:
  total chloride less than 1500 ppm (mg/L)
  total hardness less than 150 ppm as calcium
  total chlorine less than 50 ppm
  water pH between 8.5-9.5
- Reduce total hardness of make-up water by adding soda ash (sodium carbonate) at 0.5 to 1 pound per 100 gallons (0.6 - 1.2 kg/m³) of make-up water.
- EZ-MUD PLUS polymer emulsion can be chemically broken down with liquid bleach in regular household concentration (5% sodium hypochlorite). Use one gallon of liquid bleach per 100 gallons (10 liters/m³) of fluid formulated with EZ-MUD PLUS polymer. Do not use perfumed liquid bleach or solid calcium hypochlorite.

Packaging

EZ-MUD PLUS polymer emulsion is packaged in 5-gal (19-liter) and 1-gal (3.8-liter) plastic containers.

Availability

EZ-MUD PLUS polymer emulsion can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

EZ-MUD® GOLD

Clay/Shale Stabilizer

Description

EZ-MUD® GOLD clay and shale stabilizer provides inhibition of clay and shale formations in water-based drilling fluids without substantially increasing viscosity. EZ-MUD GOLD stabilizer, when added to a QUIK-GEL® or BORE-GEL® slurry, yields an inhibitive drilling fluid system while maintaining manageable and effective fluid properties. EZ-MUD GOLD stabilizer can be mixed easily at minimal shear thereby eliminating the need for liquid emulsions.

Applications/Functions

The use of EZ-MUD GOLD stabilizer aids or promotes the following:

- Enhanced rheological properties of a low-solids drilling mud
- Clay and shale stabilization to prevent swelling and/or dispersion
- Borehole stability in water sensitive formations
- Minimized rotational torque and circulating pressure
- Enhancement of air-foam system capabilities
- Enhanced core recovery in continuous wireline coring operations

Advantages

- NSF/ANSI Standard 60 certified
- Easy dispersion and mixing with minimal shear
- Can be used at increased concentrations to gain inhibition without producing excess viscosity
- No petroleum distillates present
- Breaks down chemically with bleach (sodium hypochlorite)
- Compatible with other Baroid drilling fluid additives when added in proper sequence
- Non-fermenting

Typical Properties

Appearance	White, free-flowing beads
Bulk density, lb/ft^3	52
pH (1% aqueous solution)	7.75

Recommended Treatment

- Using a Venturi Mixer, or into vortex of a high-speed stirrer, add slowly and uniformly to the entire circulating system.

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Rev. 03/21/2011 · IDP-067

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.

Recommended Treatment (continued)

Approximate Amounts of EZ-MUD® GOLD stabilizer Added to Water Based Fluids			
Drilling Application/Desired Property	**lb/bbl**	**lbs/100 gal**	**kg/m^3**
Added to fresh water (to formulate a clay-free drilling fluid)			
• To help stabilize water sensitive formation • To help reduce torque and lower circulating pressure	0.25 - 1.0	0.6 – 2.4	0.7 – 2.9
Added to QUIK-GEL® or BORE-GEL® drilling fluids			
• To help retard reactive shale and clay and enhance lubricity	0.1 - 0.3	0.25 – 0.75	0.3 – 0.9
Added to injection liquid in air/foam drilling applications			
• To help improve foam performance and hole conditions	0.25 - 1.0	0.6 – 2.4	0.7 – 2.9

- *Note:*
  Make-up water used to mix EZ-MUD GOLD stabilizer should meet the following quality:
  total chloride less than 1500 ppm (mg/L)
  total hardness less than 100 ppm as calcium
  total chlorine less than 50 ppm
  water pH between 8.5-9.5
- Reduce total hardness of make-up water by adding soda ash (sodium carbonate) at 0.5 to 1 pound per 100 gallons (0.6 - 1.2 kg/m^3) of make-up water.

EZ-MUD GOLD stabilizer can be chemically broken down with regular household liquid bleach (5% sodium hypochlorite). Use one gallon of liquid bleach per 100 gallons (10 liters/m^3) of fluid formulated with EZ-MUD GOLD stabilizer.
Do not use perfumed liquid bleach or solid calcium hypochlorite.

Packaging

EZ-MUD GOLD stabilizer is packaged in 10-lb (4.54-kg) and 40-lb (18.1-kg) plastic containers with re-sealable flip top lids.

Availability

EZ-MUD GOLD clay and shale stabilizer can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy. E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **EZ-MUD GOLD**

Revision Date: 05-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: EZ-MUD GOLD
Synonyms: None
Chemical Family: Anionic Polymer
Application: Additive

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Contains no hazardous substances	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and skin irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Health 1, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust. Slippery when wet.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Slippery when wet.

Storage Information Store away from oxidizers. Store in a cool, dry location. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%) Not normally needed. But if significant exposures are possible then the following respirator is recommended:

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Granules
Color:	Off white
Odor:	Odorless
pH:	7.75 (1%)
Specific Gravity @ 20 C (Water=1):	0.8-1.0
Density @ 20 C (lbs./gallon):	6.66-8.33
Bulk Density @ 20 C (lbs/ft3):	52
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Ammonia. Oxides of nitrogen. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	None known.
Skin Contact	May cause mild skin irritation.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not readily biodegradable.

Bio-accumulation Will not bio-accumulate.

Ecotoxicological Information

Acute Fish Toxicity:	TLM96: >1000 mg/l (Pimephales promelas)
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	EC50: > 500 mg/l (Selenastrum capricornutum)

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

PENETROL®

Wetting Agent

Description

PENETROL wetting agent is a water miscible, non-ionic surfactant designed to counteract the sticking tendencies of clay.

Applications/Functions

The use of PENETROL wetting agent aids the following:

- Reduce or eliminate bit balling
- Reduce surface tension of drilling fluid, which allows faster chip removal without continuously grinding the hard shale formations
- Improve drilling efficiency by preferentially coating the bottom-hole assembly and drill string
- Minimize differential sticking
- Increase bit life and reduce drill pipe and bottom-hole assembly wear

Advantages

- Easy to mix
- Effective in low concentrations
- Compatible with other Baroid drilling fluid additives
- Biodegradable

Typical Properties

Appearance	forest green liquid
Specific gravity	0.98
pH (1%) solution	9.5
Flash point, TOC, °F, °C	>300, (149)

Recommended Treatment

Added uniformly through entire circulation system

- 1 to 4 quarts of PENETROL wetting agent per 100 gallons of drilling fluid
- 2.5 to 10 liters of PENETROL wetting agent per m^3 of drilling fluid

As a slug down drill rods to counteract the sticking tendencies of clay

- 1 to 2 quarts of PENETROL wetting agent per drill rod
- 1 to 2 liters of PENETROL wetting agent per drill rod

Alternate application

- Dilute 1 gallon of PENETROL wetting agent with 10 gallons of water and inject one gallon of mixture per minute into the pump suction
- Dilute 3.8 liters of PENETROL wetting agent with 38 liters of water and inject 3.8 liters of mixture per minute into the pump suction

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Rev. 03/2011 · IDP 050

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.

Packaging

PENETROL® wetting agent is packaged in 5-gal (19-liter) plastic containers.

Availability

PENETROL wetting agent can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products

Product Service Line, Halliburton

3000 N. Sam Houston Pkwy. E.

Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

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PENETROL is a registered trademark of Halliburton

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.

N-SEAL™

Lost Circulation Material

Description

N-SEAL™ acid soluble lost circulation material is specially formulated, extrusion-spun mineral fiber. Due to its solubility in weak acids, N-SEAL lost circulation material is easily removed from production zones.

Applications/Functions

N-SEAL lost circulation material can be used as an additive for loss of circulation in concentrations up to 70 lb/100 gallons (86 kg/m^3).

Advantages

- NSF/ANSI Standard 60 certified
- Acid soluble
- Can be easily wetted
- Inorganic and non-fermenting

Typical Properties

• Appearance	Gray to white fiber
• Specific gravity	2.6

Recommended Treatment

N-SEAL lost circulation material can be added directly through the hopper.

- For normal treatment to the active system, add 5-20 lb/100 gallons drilling fluid (6-24 kg/m^3)
- As a pill, add 20-70 lb/100 gallons of drilling fluid (24-86 kg/m^3)

N-SEAL lost circulation material is 95% acid soluble. To dissolve 1 lb of N-SEAL lost circulation material treat with either:

- 1-2 lb AQUA-CLEAR® MGA modified granular acid (1-2 kg/kg)

or

- 0.5-1 gal of 10% HCl/5% Acetic acid blend (1-2 liters/kg)

Packaging

N-SEAL lost circulation material is packaged in 30-lb (14 kg) multiwall paper bags.

Availability

N-SEAL lost circulation material can be purchased through any Baroid Industrial Drilling Productgs Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

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N-SEAL is a trademark of Halliburton

Rev. 10/10/2012

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **N-SEAL™**

Revision Date: 19-Mar-2009

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: N-SEAL™
Synonyms: None
Chemical Family: Silicate
Application: Viscosifier

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Slag wool fiber	65996-69-2	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing.

Storage Information Store in a dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	fibers
Color:	White to gray
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	2.6

9. PHYSICAL AND CHEMICAL PROPERTIES

Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	12-26
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	May cause mechanical skin irritation.
Eye Contact	May cause mechanical irritation to eye.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: LC50: > 1,000,000 ppm 96-hour (Americamysis bahia)

Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	Product contains one or more components not listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	Product contains one or more components not listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **SODIUM HYPOCHLORITE SOLUTION**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: SODIUM HYPOCHLORITE SOLUTION
Synonyms: None
Chemical Family: Inorganic
Application: Solvent

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium hypochlorite	7681-52-9	10 - 30%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview
May cause eye and skin burns. May cause respiratory irritation. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation
If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes
In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion
Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician
Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Releases oxygen at high temperatures. Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 0, Reactivity 2 , Oxidizing agent
HMIS Ratings: Health 3, Flammability 0, Reactivity 2

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Neutralize to pH of 6-8. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from acids. Store away from reducing agents. Store in a cool well ventilated area. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Acid gas respirator.
In high concentrations, supplied air respirator or a self-contained breathing apparatus.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear light yellow
Odor:	Pungent
pH:	11.2-11.4
Specific Gravity @ 20 C (Water=1):	1.14
Density @ 20 C (lbs./gallon):	9.50
Bulk Density @ 20 C (lbs/ft3):	11.2-11.4
Boiling Point/Range (F):	85
Boiling Point/Range (C):	29
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong acids. Reducing agents. Contact with metals. Ammonium compounds.
Hazardous Decomposition Products	Hydrogen chloride. Chlorine. Hypochlorous acid.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Causes severe respiratory irritation.
Skin Contact	Causes severe skin irritation. May cause skin burns.
Eye Contact	Causes severe eye irritation May cause eye burns.
Ingestion	Causes burns of the mouth, throat and stomach.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Readily biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN1791,Hypochlorite Solution(10% Available Chlorine), 8, III
RQ (Sodium Hypochlorite - 454 kg.)
NAERG 154

Canadian TDG
Hypochlorite Solution(10% Available Chlorine), 8, UN1791, III

ADR

UN1791,Hypochlorite Solution(10% Available Chlorine), 8, III

Air Transportation

ICAO/IATA

UN1791,Hypochlorite Solution, 8, III
(10% Available Chlorine)
RQ (Sodium Hypochlorite - 454 kg.)

Sea Transportation

IMDG

UN1791,Hypochlorite Solution(10% Available Chlorine), 8, III
RQ (Sodium Hypochlorite - 454 kg.)
EmS F-A, S-B

Other Shipping Information

Labels: Corrosive

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Fire Hazard Reactive Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 105 Gallons based on Sodium hypochlorite (CAS: 7681-52-9).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	E Corrosive Material C Oxidizing Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **AQUA-CLEAR® PFD**

Revision Date: 05-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: AQUA-CLEAR® PFD
Synonyms: None
Chemical Family: Blend
Application: Surfactant

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Anionic polyacrylamide		30 - 60%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined**Min:** > 212
Flash Point/Range (C):	Not Determined**Min:** > 100
Flash Point Method:	COC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 1, Reactivity 0
HMIS Ratings: Health 1, Flammability 1, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Spills of this product are very slippery.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing.

Storage Information Store away from oxidizers. Store in a cool, dry location. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally necessary.

Hand Protection Impervious rubber gloves.

Skin Protection Normal work coveralls.

Eye Protection Safety glasses.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Yellowish
Odor:	Ammonia
pH:	6.5-7.5
Specific Gravity @ 20 C (Water=1):	1.3

9. PHYSICAL AND CHEMICAL PROPERTIES

Density @ 20 C (lbs./gallon):	10.84
Bulk Density @ 20 C (lbs/ft3):	81.16
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	50
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	Prolonged or repeated contact may cause slight skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	Swallowing a relatively large amount of this material is unlikely to produce serious illness or death.
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: > 10000 mg/kg (Rat)
Dermal Toxicity:	LD50: > 10000 mg/kg (Rabbit)
Inhalation Toxicity:	Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Biodegradable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: EC50: > 1000 mg/l (Skeletonema costatum)

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

AQUA-CLEAR® PFD

Phosphate-Free Dispersant

Description

AQUA-CLEAR® PFD concentrated liquid polymer dispersant provides superior mud and sediment removal from the producing formation and gravel pack. This product is also a highly effective mud thinner. AQUA-CLEAR PFD dispersant contains no phosphates.

Applications/Functions

- Can disperse mud, sediment and clay from the producing formation and gravel pack in the screened interval.
- Can reduce viscosity and gel strength of drilling fluids

Advantages

- NSF/ANSI Standard 60 certified
- Helps reduce development time
- Helps increase well yield and capacity
- Safe to use on most plastics, rubber and metals
- Non-fermenting
- Helps reduce pumping costs

Typical Properties

Appearance	straw colored liquid
Specific gravity	1.2 to 1.4
pH (neat)	6.5 to 7.5

Recommended Treatment

As a Well Development Aid

- Determine volume of water in screen area and double the calculated volume to account for water in gravel pack and formation interface ***or*** determine the static volume of water and add 50% excess.
- Once the water volume is determined, calculate the required treatment volume of AQUA-CLEAR PFD dispersant by the following formula:
  AQUA-CLEAR PFD dispersant (gal or L) = 0.002 x Water Volume (gal or L)

This equates to one gallon of AQUA-CLEAR PFD dispersant for every 500 gallons of water (0.2% by volume) or 2.0 liters of AQUA-CLEAR PFD dispersant for every cubic meter of water.

- Mix thoroughly before introducing into well.
- The preferable application method utilizes a tremie line with the product applied into the screened area.
- If necessary, the AQUA-CLEAR PFD water solution may be poured into the well.
- Mixture should be thoroughly blended in well, then agitated using a surge

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Rev. 5/2008 · IDP 058

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.

Recommended Treatment (continued)

and swab, jetting, or other developmental technique repeatedly every two hours for a period of up to 24 hours.

- Pump to waste until turbidity clears up and then connect well to distribution system.

As a Mud Thinner

- Start by adding one pint of AQUA-CLEAR PFD dispersant to 500 gallons of mud. Increase concentration until desired viscosity is achieved.

Well Capacity Chart (Gallons per Foot)					
Well Diameter (Inches)	**Well Capacity in Gallons/ft**	**Well Diameter (Inches)**	**Well Capacity in Gallons/ft**	**Well Diameter (Inches)**	**Well Capacity in Gallons/ft**
2	0.2	12	5.9	24	23.5
4	0.7	14	8.0	26	27.6
6	1.5	18	13.2	30	36.7
8	2.6	20	16.3	36	52.9
10	4.1	22	19.7	48	94.0

Well Capacity Chart (Liters per Meter)					
Well Diameter (millimeters)	**Well Capacity Liters/meter**	**Well Diameter (millimeters)**	**Well Capacity Liters/meter**	**Well Diameter (millimeters)**	**Well Capacity Liters/meter**
51	2.0	305	73.0	610	292.0
102	8.1	356	99.3	660	342.6
152	18.3	457	164.2	762	456.1
203	32.4	508	202.7	914	656.8
254	50.7	559	245.3	1219	1167.7

Note: The volumes in these tables show only the volume of water in a 1 foot or 1 meter section of a given size of screen. Excess volume must be included to account for water present in the formation interface and gravel pack.

Packaging

AQUA-CLEAR PFD dispersant is packaged in a 5-gal (19-liters) plastic pail or 1-gal (3.8-liter) plastic container.

Availability

AQUA-CLEAR PFD dispersant can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you, contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

Attachment G
Wetland Assessment for Freshwater Well Locations

Pacific Gas and Electric Company Topock Compressor Station
Wetland Assessment for Freshwater Well Locations
San Bernardino County, California

Prepared For: Pacific Gas and Electric Company

Prepared By: Russell Huddleston, Certified Professional Wetland Scientist/E2 Consulting Engineers

Date: December 20, 2012

Copies: Marjorie Eisert/CH2M HILL
Mike Cavalier/CH2MHILL

Introduction

In December 1951, the Topock Compressor Station began operations to compress natural gas supplied from the southwestern U.S. for transport through pipelines to Pacific Gas and Electric Company's (PG&E) service territory in central and northern California. The compressor station is still active and is anticipated to remain active into the foreseeable future. The operations at the compressor station consist of six major activities: water conditioning; compressing natural gas; cooling compressed natural gas and compressor lubricating oil; wastewater treatment; facility and equipment maintenance; and miscellaneous operations.

In 1996, PG&E entered into a Corrective Action Consent Agreement with the California Department of Toxic Substances Control (DTSC) to oversee the investigation and remediation of the Topock Compressor Station site under California state law. DTSC is the California state lead agency charged with directing investigative activities in the action area in accordance with the Resource Conservation and Recovery Act (RCRA). In July 2005, PG&E and the Federal Agencies entered into a Consent Agreement that outlined the process by which PG&E would comply with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements during the investigation and remediation of the action area, which included coordinating response actions with the requirements of the DTSC to the extent practicable. DTSC issued a Final Environmental Impact Report (FEIR) for the project in January 2011.

PG&E is evaluating three potential locations for the installation of a freshwater well in support of remedial activities. This memorandum presents the results of a wetland assessment for each of the three well location alternatives.

Project Location and Land Use

The Topock Compressor Station is located near the California and Arizona border in eastern San Bernardino County, approximately 12 miles southeast of the city of Needles, California. Potential well locations A and B are located in Mohave County, Arizona on the Havasu National Wildlife Refuge. These sites are located north of Interstate 40 and east of the Topock Marsh (Figure 1). Site C is located in California, on the south side of the Colorado River just northwest of the Park Moabi campground (Figure 1).

Methods

Russell Huddleston, a wetland ecologist, conducted a site visit on December 12 and 13, 2012. The purpose of the site visit was to identify and map potential wetlands and other waters that may be subject to state and federal regulations pertaining to discharge and/or fill into waters of the United States or Waters of the State. The preliminary mapping of water features (ephemeral washes) was based on the methods and procedures described in *A Field Guide to Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley 2008) and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010). Field observations included changes in sediment size, indicators of flow events such as drift and debris deposits, scouring, mud cracks, defined bed and bank and the presence of vegetation characteristic of desert washes. The limits of the larger channels were determined based on the lateral extent of the active floodplain that was considered to be representative of low to moderate flow events that are expected to occur every five to ten years. Smaller erosional drainage features, characterized by single, relatively narrow channels were mapped based on evidence of recent flow such as sediment deposits, scouring and drift deposits.

The boundaries of many of the water features were mapped in the field using a Trimble Geo XH Global Positioning System (GPS) unit. A portion of the northwest part of Site C was mapped based on aerial photographs due to heavy rainfall on December 13 and 14th that resulted in unsafe field conditions in the wash areas.

Results

Site A

Site A is located on the north side of the Burlington Northern –Santa Fe Railroad track, east of Arizona County Highway 10 (Figure 2). Vegetation in this area is characterized by a dense athel (*Tamarix aphylla*) with scattered creosote bush (*Larrea tridentata*) and white bur-sage (*Ambrosia dumosa*). Native blue palo verde trees (*Parkinsonia florida*) are also present in scattered locations. A large pipeline easement bisects the area to the northeast of the well sites; this area is generally devoid of vegetation and may be used as a sprinkler site. The Sacramento Wash is located near the northern end of the Site A well location (Figure 2). The Sacramento wash is shown as a blue line stream on the Topock United States Geological Survey (USGS) 7.5minute quadrangle as an intermittent stream in the National Hydrologic Dataset (NHD). Within the project area the Sacramento Wash is a broad, open sandy channel that has a flat, generally uniform bed that lacks well defined low flow channels. There are minor benches and terraces along the channel in a few locations, but there is no active floodplain outside of the main channel. There is a secondary overflow channel that runs to the southwest of the main channel that appears to convey flows during high flow events that overtop the main channel banks. This overflow channel, as well as additional overland flooding, enters what appears to be a constructed storm water channel with large earthen levees. This constructed channel conveys excess flows to the west back into the main channel of the Sacramento Wash (Figure 2). The majority of the channel is devoid of vegetation with extensive athel tamarisk thickets present along both sides of the wash.

No other wetlands or waters were identified in Site A.

Site B

Site B is located on the east side of Arizona County Highway 10 (Oatman-Topock Highway), immediately north of the Sacramento Wash (Figure 3). Immediately south and east of the proposed well site the Sacramento Wash is bisected by Highway 10 with an at-grade crossing. Just south of the proposed well location the wash flows through a channel confined by large earthen levees for approximately 950 feet where it then broadens out along the floodplain adjacent to the Topock Marsh. Some blue palo verde trees are present along the levees on the west side of the road and a few small trees and shrubs including saltcedar (*Tamarix ramosissima*), smoke tree (*Psorothamnus spinosus*), bush seepweed (*Suaeda nigra*) and creosote bush occur within the wash channel in this area. In October of 2008 a wildfire burned 240 acres of dense tamarisk in the Havasu National Wildlife Refuge on the west side of the highway, including the area of the proposed well location. After the fire the U.S. Fish and Wildlife Service began clearing the area of dead trees, logs and woody debris. At the time of the survey both the proposed well location on the north side of the Sacramento Wash, as well as the proposed sprinkler area on the south side of the wash were devoid of vegetation with the exception of the occasional Russian thistle (*Salsola tragus*) and one or two re-sprouting tamarix.

No other wetlands or waters were identified in Site B.

Site C

Site C is located on the southwest side of the Colorado River just north of the Park Moabi Campground (Figure 4). Most of the site characterized by highly dissected terraces composed of Tertiary and Quaternary alluvium and surficial deposits consisting of moderately consolidated sandy gravel and silty-clayey gravel. A portion of the site is located on the low terrace along the Colorado River that is comprised of Quaternary and recent floodplain deposits. The majority of the vegetation in this area is characterized by open creosote bush shrubs with areas of dense tamarix along the low terrace adjacent to the Colorado River. The natural hydrology of the area has been significantly altered by a large railroad berm that is present along the southwestern edge of the study area. Water flows in this area are channeled under a large wooded railroad trestle at the southwestern site boundary (Figure 4). On the northeast side of the trestle the wash broadens out into a wide floodplain characterized by multiple low flow channels. Near the northeastern corner of the site the wash is confined by a large roadway berm that has been partial reinforced with concrete. There is a narrow area where the road dips down allowing flows to continue to the east, where the floodplain quickly broadens out and eventually becomes unconfined sheet flow through dense tamarix, eventually discharging into the Colorado River (Figure 4). This large wash is shown as a blue line stream on the Whale Mountain USGS topographic quadrangle map and is also included in the NHD as an ephemeral stream. A smaller wash feature is also present along the northern border of the site, but appears to have a much smaller effective watershed as a result of the railroad berm. This stream is not shown as a blue line on the USGS topographic map, nor is it included in the NHD; however, it exhibits a defined channel with an active floodplain, contains typical wash vegetation and is a direct tributary to the Colorado River; it was therefore considered a potential water of the United States.

The vegetation associated with the larger wash features is notably different that the surrounding creosote bush scrub and tamarix thickets. Within the active floodplain areas the vegetation is characterized by native species such as blue palo verde and cheesebush (*Ambrosia salsola*) with scattered catclaw (*Senegalia greggii*), smoke tree, sweetbush (*Bebbia juncea* var*. aspera*), and desert lavender (*Hyptis emoryi*). Some creosote bush is also present. Herbaceous vegetation was largely absent at the time of the survey with the exception of scattered spurge (*Chamaesyce* spp.).

In addition to the larger washes there are a number of small erosional features that were likely formed prior to the construction of the railroad and roadway berms. These features all occur within the

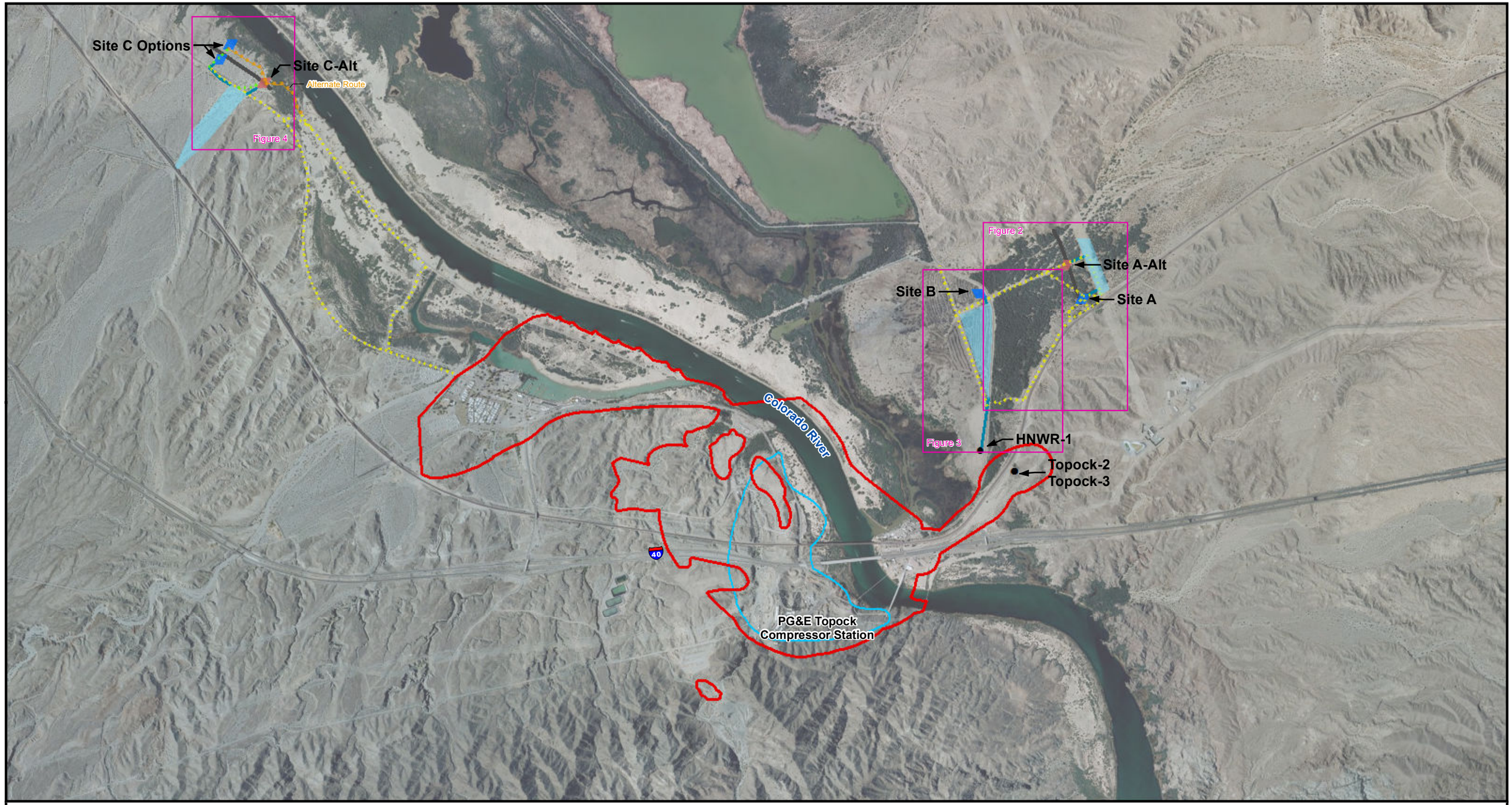
creosote bush scrub habitat and lack most of the plant species typically found in the larger washes. In general the bed and banks of these features are only moderate to weakly expressed and while the historic hydrology has been significantly altered, they exhibit evidence of recent flows such as sediment deposits, debris lines and scouring.

No other wetlands or waters were identified in Site C.

References

Curtis and Lichvar. 2010. *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States.* ERDC/CRREL TN-10-1. US Army Corps of Engineers Research and Development Center, Cold regions Research and Engineering Laboratory.

Lichvar, R. W. and S.M. McColley. 2008. *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States.* ERDC/CRREL TR-08-12. US Army Corps of Engineers Research and Development Center, Cold regions Research and Engineering Laboratory.



Approximate 1-acre area for primary work activities

- Freshwater Source Evaluation Locations
- Contingency Freshwater Source Evaluation Locations
- Surface Resistivity Survey
- EIR Project Area
- Approximate Route of Sprinkler Piping
- Approximate Sprinkled Area
- Existing Unpaved Access Route
- New Unpaved Access Route
- New Unpaved Access Route (Alternate)

Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on second quarter 2012 sampling events.

0 1,000 2,000 4,000 Feet

Notes

1. Groundwater source evaluation sites (including contingency sites) and access routes are not precisely located, and will be adjusted as necessary to minimze disturbance of biological and cultural resources.
2. Sprinkled Area at Site C is Awaiting Cultural and Biological Surveys.

Work in Progress, 12/04/2012

FIGURE 1
SITE MAP

PROJECT DESCRIPTION FOR EVALUATION OF ALTERNATIVE FRESHWATER SOURCES IN THE TOPOCK REMEDIATION PROJECT AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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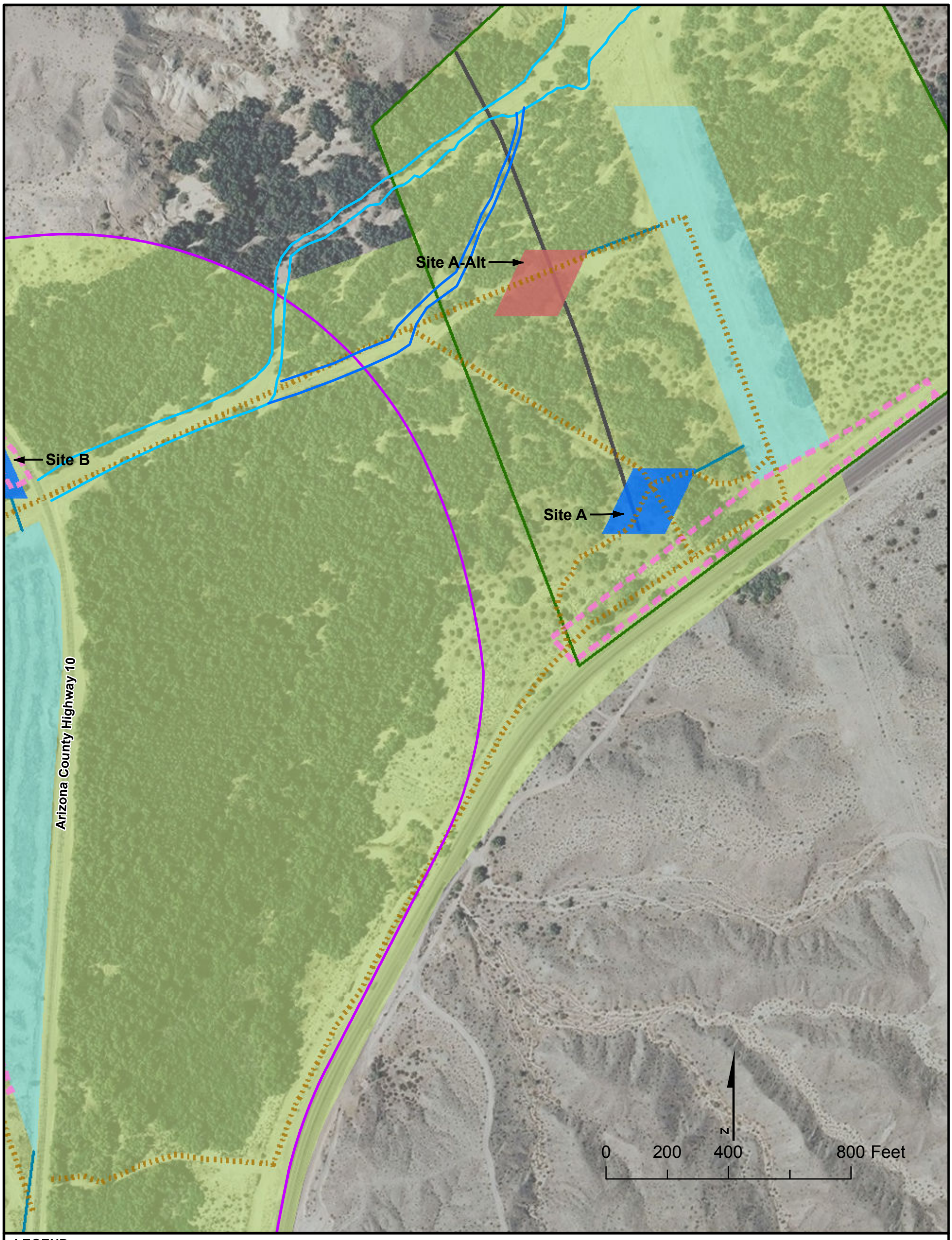

LEGEND

- Approximate Freshwater Source Evalutation Work Area (1 acre)
- Approximate Contigency Freshwater Source Evalutation Work Area (1 acre)
- Potential Tank Storage Area
  - Actual area used will be less than area shown, and when combined with area used for drilling, will be within the one acre disturbance limit.
- Approximate Sprinkled Area
- Additional Area Surveyed for Biological and Cultural Resources
- Approximate Route of Sprinkler Piping
- Surface Resistivity Survey
- Existing Unpaved Access Route
- New Unpaved Access Route
- Action Area for 2012 PBA re-initiation
- Geophysical Survey Area
- Waters of the State
- USACE Jurisdiction

Work in Progress, 12/17/2012

Notes

1. Groundwater source evaluation sites (including contingency sites) and access routes are not precisely located, and will be adjusted as necessary to minimze disturbance of biological and cultural resources.
2. Jurisdictional areas willl be added after the completion of the biological survey planned for the week of December 10, 2012

FIGURE 2
SITE A WORK AREA

Project Description for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area
PG&E Topock Compressor Station
Needles, California

CH2MHILL

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Site B

Arizona County Highway 10

HNWR-01

N

0 200 400 800 Feet

LEGEND

- Approximate Freshwater Source Evalutation Work Area (1 acre)
- Approximate Contigency Freshwater Source Evalutation Work Area (1 acre)
- Potential Tank Storage Area
  - Actual area used will be less than area shown, and when combined with area used for drilling, will be within the one acre disturbance limit.
- Approximate Sprinkled Area
- Additional Area Surveyed for Biological and Cultural Resources
- Action Area for 2012 PBA re-initiation
- Geophysical Survey Area
- Approximate Route of Sprinkler Piping
- Existing Unpaved Access Route
- New Unpaved Access Route
- Waters of the State
- USACE Jurisdiction

Work in Progress, 12/17/ 2012

Notes

1. Groundwater source evaluation sites (including contingency sites) and access routes are not precisely located, and will be adjusted as necessary to minimze disturbance of biological and cultural resources.
2. Jurisdictional areas willl be added after the completion of the biological survey planned for the week of December 10, 2012.

FIGURE 3
SITE B WORK AREA

Project Description for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area
PG&E Topock Compressor Station
Needles, California

CH2MHILL

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UNITED STATES OF AMERICA 065020107

UNITED STATES OF AMERICA 065020113

UNITED STATES OF AMERICA 065020112

ANUL CUWHAL SANTA ISABEL MUSEU 065019202

Site C Options

UNITED STATES OF AMERICA 065019206

Site C-Alt

UNITED STATES OF AMERICA 065019207

ANUL CUWHAL SANTA ISABEL MUSEU 065019203

ATCHISON TOPEKA & SANTA FE RR 065019204

N

0 250 500 1,000 Feet

LEGEND

- Approximate Freshwater Source Evalutation Work Area (1 acre)
- Approximate Contigency Freshwater Source Evalutation Work Area (1 acre)
- Potential Tank Storage Area
  - Actual area used will be less than area shown, and when combined with area used for drilling, will be within the one acre disturbance limit.
- Property Boundary
- Approximate Route of Sprinkler Piping
- Approximate Sprinkled Area
- Surface Resistivity Survey
- Additional Area Surveyed for Biological and Cultural Resources
- Existing Unpaved Access Route
- New Unpaved Access Route
- New Unpaved Access Route (Alternate)
- Waters of the State
- USACE Jurisdiction

Work in Progress, 12/17/ 2012

Notes

1. Groundwater source evaluation sites (including contingency sites) and access routes are not precisely located, and will be adjusted as necessary to minimze disturbance of biological and cultural resources.
2. Sprinkled Area at Site C is Awaiting Cultural and Biological Surveys.
3. Jurisdictional areas willl be added after the completion of the biological survey planned for the week of December 10, 2012

FIGURE 4
SITE C WORK AREA

Project Description for Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area
PG&E Topock Compressor Station
Needles, California

CH2MHILL

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Attachment H
Arizona Pollutant Discharge Elimination System General Permit for De Minimis Discharges to Waters of the U.S.

Permit No: AZG2010-001

STATE OF ARIZONA
DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY DIVISION
PHOENIX, ARIZONA 85007

ARIZONA POLLUTANT DISCHARGE ELIMINATION SYSTEM

GENERAL PERMIT FOR DE MINIMIS DISCHARGES TO WATERS OF THE U. S.

This permit provides Authorization to Discharge under the Arizona Pollutant Discharge Elimination System program, in compliance with the provisions of the Arizona Revised Statutes, Title 49, Chapter 2, Article 3.1 and Arizona Administrative Code, Title 18, Chapter 9, Article 9, and the Clean Water Act as amended (33 U.S.C. 1251 et seq.)

This permit specifically authorizes only De Minimis discharges as defined and certified under this general permit to waters of the United States in Arizona. All discharges authorized by this general permit shall be consistent with the terms and conditions of this general permit.

This permit consists of this Cover Sheet, Table of Contents, Parts I through VII and Appendix A.

This general permit becomes effective on April 27, 2010.

This general permit and the authorization to discharge under this permit expire at midnight, April 26, 2015.

Issued this 27th day of April, 2010.

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Michael A. Fulton, Director
Water Quality Division

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PART I. COVERAGE UNDER THIS GENERAL PERMIT

A. Permit Area and Applicability. This general permit is applicable to De Minimis discharges to all waters of the United States (U. S.) in Arizona, except for those in Indian Country.[1]

B. Eligibility. This general permit covers discharges that are found to be "De Minimis" by the Arizona Department of Environmental Quality (ADEQ).

Discharges resulting from the following types of activities are considered De Minimis, unless otherwise determined per Part I.C. of this permit, when discharged in accordance with the provisions of this general permit:

1. Potable water systems. Discharges related to installation, maintenance, and repair of potable water supply systems (pipelines, tanks, wells, reservoirs, fire hydrants, etc.) including:

   a. Disinfection and flushing activities;
   b. Discharges resulting from pressure releases or overflows;
   c. Hydrostatic testing of pipes, tanks, and vessels pertaining to a potable system;
   d. Discharge from wells that have been approved by ADEQ for drinking water use; and
   e. Military Tactical Water Purification System training operations of 30 days or less.

2. Subterranean dewatering. Discharges of:

   a. Groundwater from foundation, footer drain, basement, underground structure or construction dewatering, provided the discharge is not contaminated with pollutants or co-mingled with other wastewaters; and
   b. Water from subterranean seepage, except for discharges from vaults (unless approved under Part I.B.7., below) or mining activities.

   These discharges may also include incidental collection of stormwater.

3. Well development and maintenance and/or aquifer testing. Discharges of water associated with drilling, rehabilitation and maintenance of non-potable water wells, wells being developed for potable water supply, and piezometers; and discharges from water supply or water quality evaluations including:

   a. Discharges from any borehole not fully developed;
   b. Well purging;
   c. Well/aquifer test pumping not associated with groundwater remediation activities;
   d. Well/aquifer pump tests associated with groundwater remediation activities if the following criteria are met:
      (1) the pump test does not exceed 72 hours;
      (2) the discharge is treated (as necessary) to meet the applicable Surface Water Quality Standards (SWQS) (A.A.C. R18-11 Article 1 and Appendix A thereof) ; and
      (3) a specific approval (Part I. B. 7.) has been issued by ADEQ for the discharge;
   e. Backflushing of injection wells, provided the discharge meets the applicable SWQS.

[1] The State of Arizona, Department of Environmental Quality, Water Quality Division, does not have permitting authority for Indian Country. Authorization for De Minimis discharges in Indian Country must be obtained through EPA Region IX or other appropriate authority.

4. Hydrostatic testing (other than potable water systems, Part I.B.1.c.). Discharges of:

   a. Groundwater, surface water, or potable water associated with testing of new pipes, tanks or vessels;
   b. Groundwater, surface water, or potable water associated with the testing of reclaimed water system or sewer collection system components;
   c. Groundwater, surface water, or potable water associated with the testing of pipes, tanks or vessels that have been used to store or transport oil or gas; provided the conditions of a Type 1.03 General Permit under Aquifer Protection Permit rules (A.A.C. R18-9-B301. C.) or the conditions of an individual Aquifer Protection Permit have been met, and the water quality has been determined to meet all applicable surface water quality standards;
   d. Groundwater, surface water, or potable water associated with the installation and maintenance of reclaimed water transport systems; and
   e. Class A+ or B+ reclaimed water used to perform the specified hydrostatic testing, when the discharge is to an ephemeral or effluent-dependent water, or non-DWS use canal. For perennial, intermittent, or impaired surface waters that are not of the types listed in Part I.C.5, occasional short-term discharges of Class A+ or B+ reclaimed water may be allowable, but are subject to specific approval under Part I.B.7.

5. Reclaimed water systems. Discharges relating to post-repair flushings and pressure releases, when the discharge is to an ephemeral or effluent-dependent water, or non-DWS use canal, and the reclaimed water is Class A+ or B+. (See dechlorination requirements in Part IV.D.2.c.) For perennial, intermittent, or impaired surface waters that are not of the types listed in Part I.5.C., occasional short-term discharges of Class A+ or B+ reclaimed water may be allowable, but are subject to specific approval under Part I.B.7.

6. Other. Discharges from the following sources, when the discharge is to an ephemeral or effluent-dependent water or non-DWS use canal:

   a. Residential non-contact cooling water (including overflow from residential evaporative coolers or air conditioning condensate);
   b. Charitable noncommercial car washes when only the exterior of vehicles are being washed, and only biodegradable soaps and/or water are used;
   c. Building and/or street wash water (where only biodegradable soap and/or water are used, and accumulations of pollutants, if present, have been physically removed prior to conducting washing activities that will result in a discharge); or
   d. Freshwater swimming pool drainage that has been dechlorinated/debrominated before release from the permittee's premises. Such pool drainage must be visually clear, colorless, and free of suspended solids, floating material, and debris.

7. Specific approvals. Other similar types of short-term (generally less than 30 days) discharges determined to be De Minimis and approved in writing by ADEQ. This also applies to discharges requiring specific approval under Parts I.B.2.- 5., above.

NOTE: if any discharge above will occur continuously for longer than 30 days, the discharge may be covered by this permit only if written approval for the extended discharge has been granted by ADEQ in advance.

C. Limitations on Coverage. This general permit does not authorize:

1. Discharges from soil and/or groundwater remediation activities, except for those specified in Part I.B.3.a., b., d., or e.;

2. Discharges from industrial processes or ongoing operations of permanent domestic or industrial water or wastewater treatment plants;

3. Discharges that include solvents, halogenated hydrocarbons (other than disinfection by-products), biocides or other pollutants, which are not readily biodegradable or are present in concentrations that could adversely affect water quality or aquatic life;

4. Discharges from vehicle washes other than those specified in Part I. B. 6.;

5. Discharges of reclaimed water other than Class A+ or B+; and discharges of reclaimed water to Outstanding Arizona Waters (OAWs) and waters with the domestic water source (DWS) designated use;

6. Discharges from any source for which Effluent Limitation Guidelines have been adopted per CWA Section 304(b);

7. Discharges required to be authorized under a stormwater permit issued per CWA Section 402(p) (Municipal and Industrial Stormwater);

8. Discharges required to be authorized under other general permits (e.g., Vessel Discharges);

9. Discharges that cause or contribute to exceedances of Arizona water quality standards; or

10. Discharges that are not in conformance with an approved Total Maximum Daily Load (TMDL).

PART II. AUTHORIZATION UNDER THIS GENERAL PERMIT

A. Application for Coverage for De Minimis Discharges.

Except as specified in subsections 4, 5, and 6 of this section, an application (Notice of Intent) for authorization to discharge under this permit is for one type of discharge activity at one discharge location ("single-source discharge").

The applicant submitting a Notice of Intent (NOI) must be a person having control of those activities related to the subject discharge which are necessary to ensure compliance with the conditions of this permit, and who takes responsibility for such compliance. (See definition of "person", Part VII. B.) Signatory requirements are specified in Part V.K. of this permit. NOTE: the applicant, as the person in control of said activities, is liable for adherence to the conditions of the permit, which include potential civil and criminal penalties for noncompliance (Part VI of the permit).

1. For discharges authorized and not terminated under the 2004 De Minimis General Permit (DMGP, No. AZG2004-001): see Part III.A.1. and the application requirements below (Part II.A.2 - II.A.6).

2. Application for coverage for single-source De Minimis discharges to ephemeral waters, effluent-dependent waters (EDW), and non-domestic water source (non-DWS) use canals.

   a. For the above listed waters (Part II.A.2.): A person seeking authorization to discharge residential non-contact cooling water; qualifying car wash discharges, building wash water, street wash water, or drainage from freshwater swimming pools (as listed in Part I.B.6.) is not required to submit an NOI or develop a Best Management Practices Plan (BMPP), but shall comply with all other applicable provisions (Parts I, IV.A., IV.B, and V.) of this permit.

b. A person seeking authorization to discharge to an above listed water (unless specified in Part II.A.2.a. above), shall submit to the Department a complete and accurate NOI as specified in Part III.B. Persons authorized to discharge must also comply with all other provisions of this permit, including applicable monitoring and reporting, and implementation of BMPPs.

If the discharge is to or has the potential to reach a public or privately owned storm sewer, drainage system, canal, or other conveyance, the applicant must also forward a copy of the completed NOI to the owner/operator of the conveyance at the time it is submitted to the Department.

3. Application for coverage for single-source De Minimis discharges to perennial, intermittent, domestic water source (DWS) use canals, outstanding Arizona waters (OAW), or impaired waters.

A person seeking authorization to discharge to an above listed water shall submit to the Department a complete NOI and a copy of a BMPP prepared in accordance with the provisions of this permit. This includes discharges that may reasonably be expected to reach these waters under conditions expected to be present during the discharge, although made directly to ephemeral or non-DWS use canals. (See Part III.B.10.d. for water quality data to be submitted with the NOI.)

If the discharge is to or has the potential to reach a public or privately owned storm sewer, drainage system, canal, or other conveyance, the applicant must also forward a copy of the completed NOI to the owner/operator of the conveyance at the time it is submitted to the Department.

4. Application for Areawide coverage for De Minimis Discharges.

In lieu of single-source NOIs, a person representing a municipality, water utility, military facility conducting TWPS training operations, and/or a provider of Class A+ or B+ reclaimed water, seeking authorization for multiple discharges from multiple locations (within the water supply service area, municipal boundary, or military facility), may submit to the Department a complete NOI for Areawide De Minimis Discharges. The NOI must be accompanied by a copy of a BMPP prepared in accordance with the provisions of this permit. The NOI must inclusively identify all activities and list all specified discharge locations (and categories of unspecified discharge locations) to be covered.

If a discharge is to or has the potential to reach a public or privately owned storm sewer, drainage system, canal, or other conveyance, the applicant must also forward a copy of the completed NOI to the owner/operator of the conveyance at the time it is submitted to the Department.

5. Application for Project-wide coverage for De Minimis Discharges.

In lieu of single-source NOIs, a person representing a utility, government agency, hydrogeologic consulting firm, or other entity seeking authorization for multiple discharges from multiple locations and/or an extended time period associated with a specific project, may submit to the Department a complete NOI for Project-wide De Minimis Discharges. The NOI must be accompanied by a copy of a BMPP prepared in accordance with the provisions of this permit. The NOI must inclusively identify all activities and list all specified discharge locations (and categories of unspecified discharge locations) to be covered.

Project-wide NOIs for discharges from vault dewatering are subject to Specific Approval (see Parts I.B.7., II.B.5.a., and II.B.6.)

Discharges from hydrostatic tests of pipelines or vessels previously used to transport oil or gas are not eligible for Project-wide coverage. For this type of discharge, an individual NOI including the items specified in Part III.B.11. must be submitted for each discharge location.

If a discharge is to or has the potential to reach a public or privately owned storm sewer, drainage system, canal, or other conveyance, the applicant must also forward a copy of the completed NOI to the owner/operator of the conveyance at the time it is submitted to the Department.

6. Application for Facility-wide coverage for De Minimis Discharges.

In lieu of single-source NOIs, a person representing a commercial, industrial, governmental, or other facility which provides its own water supply for potable use, irrigation, or fire suppression, may seek authorization for multiple discharges associated with maintenance and testing of said water supply system. This is done by submitting to the Department a complete NOI for Facility-wide De Minimis Discharges. The NOI must be accompanied by a copy of a BMPP prepared in accordance with the provisions of this permit. The NOI must inclusively identify all activities and list all specified discharge locations (and categories of unspecified discharge locations) to be covered.

Facility-wide coverage pertains only to the facility's own water system(s) that supply potable use, irrigation, or fire suppression. Discharges from industrial processes or from the ongoing operations of permanent water or wastewater treatment facilities are not eligible for De Minimis coverage (Part I.C.2.). Where the same water sources and/or system provide water for industrial uses along with potable, irrigation, or fire suppression uses, the source(s) and entire supply system are eligible under this section to seek Facility-wide authorization for multiple discharges. However, for systems supplying industrial uses, DMGP coverage applies only to discharges from points prior to addition of any additives associated with the industrial use. DMGP coverage is not appropriate if discharges from the water supply system are already included in an individual AZPDES permit for the facility.

Eligibility for reclaimed water discharges is limited to systems utilizing Class A+ or B+ reclaimed water, in accordance with Parts I.B.4., I.B.5., and I.C.5. of this permit.

If a discharge is to or has the potential to reach a public or privately owned storm sewer, drainage system, canal, or other conveyance, the applicant must also forward a copy of the completed NOI to the owner/operator of the conveyance at the time it is submitted to the Department.

B. <u>Authorization to Discharge and Timeframes.</u>

1. For discharges authorized and not terminated under the 2004 DMGP: see Part III.A.1. and the provisions below (Part II.B.2 - II.B.11).

2. Unless the Director notifies the person to the contrary, a person who submits a complete and accurate single-source NOI is authorized to discharge to an ephemeral or effluent-dependent water or non-DWS use canal, under the terms and conditions of this general permit, five (5) business days after the date the NOI is received by the Department. EXCEPTIONS: see II.B.4, and II.B.6.- 8., below. If the discharge is from a pipeline that has been used to transport oil or gas (Part I.B.4.c.) a complete NOI must include written approval from ADEQ as required by A.A.C. R18-9-B301(C)(5) and documentation that the water to be discharged meets applicable surface water quality standards.

3. Unless the Director notifies the person to the contrary, a person who submits a complete and accurate single-source NOI, including BMPP, is authorized to discharge to a perennial water, intermittent water, or DWS use canals, under the terms and conditions of this

general permit, thirty (30) business days after the date the NOI is received by the Department. This includes discharges that may reasonably be expected to reach these waters although made directly to ephemeral waters or non-DWS use canals. (EXCEPTIONS: see II.B.4, and II.B.6.- 8., below.)

4. A person who submits an NOI for a discharge to or located within 1/4 mile of an OAW or impaired water is not authorized to discharge until receipt of written authorization from the Director.

5. Unless the Director notifies the person to the contrary, a person who submits a complete and accurate NOI for Areawide, Project-wide, or Facility-wide De Minimis discharges, including BMPP, is:

   a. Authorized for discharges that are not within ¼ mile of an OAW or impaired water, 30 business days after the NOI is received by the Department. EXCEPTIONS: see II.B.6., and II.B. 8.

   b. **Not** authorized to discharge within ¼ mile of an OAW or impaired water until receipt of written authorization from the Director.

6. A person who submits an NOI for a discharge that requires specific approval under Parts I.B.2. – 5. or I.B.7. is not authorized to discharge until receipt of written authorization from the Director.

7. A person who submits a single-source NOI for a De Minimis discharge that will occur continuously for longer than 30 days is not authorized to begin discharging until receipt of written authorization from the Director.

8. A person who submits an NOI for a De Minimis discharge that may reasonably be expected to reach Indian Country under conditions anticipated to be present during the discharge, is not authorized to begin discharging until receipt of written authorization from the Director.

9. A complete and accurate NOI must contain the information specified in Part III.B.

10. If the Department determines that a complete and accurate NOI has been submitted, and that the subject discharge is eligible for coverage under this permit, the Director will transmit a discharge authorization letter (DAL) to the permittee. The DAL will specify the effective date of authorization any special conditions applicable to the discharge in addition to those specified in this permit.

11. If the Director notifies an applicant that a discharge is ineligible for coverage under this general permit, the person shall obtain an individual AZPDES permit (or alternative general permit, if available) before discharging to a water of the U.S., and shall not discharge unless and until appropriate permits are obtained.

C. Modification of Coverage.

1. Except for minor amendments to single-source discharge NOIs, and as specified in II.C.2. below, authorizations to discharge under this permit may not be modified. For minor amendments, a revised NOI form must be submitted to ADEQ with a cover letter referencing the original DMGP authorization number, describing the changes and the reasons they are needed. The NOI must be clearly identified as “AMENDED.” If a discharge is to or has the potential to reach a public or privately owned storm sewer, drainage system, canal, or other conveyance, the applicant must also forward a copy of the revised NOI to the owner/operator of the conveyance at the time it is submitted to the Department. ADEQ will notify the permittee whether 1) the changes are accepted as an amendment, or 2) a new NOI must be submitted. Authorization is immediate for changes

accepted as amendments.

2. Additional discharge locations may be added to an Areawide, Project-wide, or Facility-wide Authorization by submitting additional Discharge Information (DI) Forms. For discharges to ephemeral or effluent-dependent waters or non-DWS use canals, authorizations for additional discharge locations are effective five business days after the complete and accurate DI Forms are received by ADEQ. For discharges to other types of surface waters, the authorization becomes effective as specified in Part II.B.5 of this permit.

D. Terminating Coverage.

1. A permittee shall end coverage under this general permit by providing a Notice of Termination (NOT) to the Department. Authorization to discharge terminates at midnight on the day the NOT is received by the Department by postal mail, hand-delivery, or fax. The NOT shall be submitted to the address given in Part III.C., below, or to the fax number provided on the NOT form.

2. A permittee shall submit an NOT to the Department within 30 days after the permittee:

   a. Permanently ceases the discharge(s) addressed in the NOI;

   b. Obtains coverage under an individual permit;

   c. Obtains coverage under an alternative general permit; or

   d. Transfers ownership of, or responsibility for, the facilities or discharge activities addressed in the NOI.

3. If the discharge is in, or has the potential to reach a municipal separate storm sewer system (MS4), the permittee must also forward a copy of the completed NOT to the operator of the MS4 at the time it is submitted to the Department.

4. See Appendix A, Part B.1., regarding monitoring results that may be required to be submitted with the NOT.

PART III. NOTICE OF INTENT REQUIREMENTS

A. Deadlines for Notification.

1. Discharges authorized under the 2004 DMGP, No. AZG2004-001:

   Unless ADEQ notifies the permittee to the contrary, discharge authorizations that have not been terminated under the 2004 DMGP remain administratively continued subject to the following conditions:

   a. The BMPP shall be updated, as necessary, to comply with the requirements of Part IV.D. within 90 days of the effective date of this permit. Unless specifically requested by ADEQ, the updated BMPP need not be *submitted* except as required by Part III.A.1.b., below.

   b. A complete and accurate NOI in accordance with Parts II.A and III.B. shall be submitted to ADEQ within 120 days of the effective date of this permit (*EXCEPTION*: see Part III.A.1.c., below). The BMPP shall be submitted with the NOI if submittal is required by Part II.A. The authorization number (AZDGP-XXXXX) issued under the 2004 DMGP must be included on the NOI.

   c. If the permittee permanently ceases the discharge(s), or if any other conditions of Part II.D.2 of this permit are met within 120 days of the effective date of this permit,

the permittee shall submit a notice of termination (NOT) in lieu of the NOI .

d. Except as required under Part III.A.1.a. (updated BMPP), the permittee shall continue to comply with the terms and conditions of the 2004 DMGP until:

- coverage is obtained for the subject discharge(s) under the 2010 DMGP or another AZPDES permit; or
- the permittee submits a NOT for the subject discharge(s); or
- ADEQ notifies the permittee that the subject discharges are not eligible for coverage under the 2010 DMGP.

2. For new discharge authorizations (NOIs other than those filed according to Part III. A.1., above):

a. The applicant shall ensure that the timing of the NOI submittal accounts for the authorization timeframes specified in Part II.B.;

b. For discharges with stated authorization timeframes, the applicant shall not discharge before the specified time period has elapsed (unless the discharge is currently authorized by another permit); and

c. For discharges that are not authorized until receipt of written authorization from ADEQ, the NOI should be submitted at least 30 business days in advance of the planned discharge. No discharge shall be conducted until such authorization is received (unless the discharge is currently authorized by another permit).

B. Contents of Notice of Intent. Except as provided in Part II.A.2.a., persons seeking authorization for De Minimis discharges under this general permit must submit a complete and accurate AZPDES De Minimis NOI to the Department. A complete NOI must contain the following information:

1. The name, address, and telephone number of the owner of the discharging facility;

2. The name, address, and telephone number of the operator of the discharging facility, if different from the owner;

3. The name, address, and telephone number of an agent or contact person, if different from III.B.1. and 2. above;

4. The name of the project and the address or location description for the discharge activity (NOTE: address/location information is not required for unspecified discharge locations identified in Table 2 of the Areawide, Project-wide, or Facility-wide NOI unless specifically requested by ADEQ);

5. The latitude and longitude of the point(s) of discharge (NOTE: This is not required for unspecified discharge locations identified in Table 2 of the Areawide, Project-wide, or Facility-wide NOI unless specifically requested by ADEQ);

6. Whether the proposed discharge is in Indian Country, or may reasonably be expected to reach Indian Country under conditions anticipated to be present during the discharge;

7. Whether the proposed discharge is to or has the potential to reach a public or privately owned storm sewer, drainage system, canal, or other conveyance; and if so, the name of the owner/operator of the conveyance;

8. The issuance number or permit number for any individual or general environmental permits currently held by the applicant, which are directly associated with the discharge;

9. The Arizona Department of Water Resources (ADWR) well registration number, if the discharge is from a well;

10. Complete description of the proposed discharge(s), including:

    a. The purpose of the discharge activities;

    b. The name and description of the discharge activities and identification of any added chemicals or solvents used;

    c. Any known or suspected constituent(s) of concern in the discharge;

    d. For specific approvals (Part I.B.7.) or discharges to perennial, intermittent, effluent-dependent, DWS-use canal, OAW, or impaired waters: sampling results or other water quality data that is representative of the proposed discharge, as prescribed by ADEQ. This requirement applies to discharges that may reasonably be expected to reach such waters under conditions expected to be present during the discharge, although made directly to ephemeral waters or non-DWS use canals.

    e. A description of the proposed treatment system(s) (if applicable);

    f. The estimated average and maximum daily flow rates;

    g. The estimated total volume to be discharged;

    h. The type and location of the discharge(s);

    i. The date(s) of the discharge;

    j. The approximate frequency and duration of the discharge(s);

    k. The receiving streams or waterbodies (including all waterbodies the discharge may reasonably be expected to reach under conditions expected to be present during the discharge); and

    l. If the surface water receiving the discharge is an ephemeral water, the name of the closest perennial or intermittent water and the approximate distance from the discharge point to the perennial or intermittent water.

    NOTE: for Areawide, Facility-wide, or Project-wide applicants proposing discharge activities with unspecified locations: the information called for in Part III.B.10 may be generally summarized in Table 2 of the Areawide, Facility-wide, or Project-wide NOI. Table 2 is to be used for categories of discharges that have unpredictable locations (*e.g.*, system repairs) or are too numerous to specify (*e.g.*, fire hydrants).

    However, for discharges to OAWs or impaired waters, Table 2 may be used only for system repairs for which the locations are not known in advance (such as repairs of line breaks). The applicant must provide a map showing the area in which the unspecified discharges would go to OAWs or impaired waters. For discharges to OAWs, authorization may be conditioned upon monitoring and/or reporting each discharge event. For discharges to all surface water types except ephemeral and non-DWS use canals, the use of Table 2 will be subject to ADEQ approval based on compliance with the applicable water quality standards, TMDLs, or other limitations.

11. For hydrostatic testing discharges from pipes, tanks, or vessels that have been used to store or transport oil or gas: written authorization from ADEQ for removal of the test water under the applicable Aquifer Protection Permit; and documentation that the water to be discharged meets the applicable surface water quality standards;

12. A legible, scaled map showing the path from the point of initial release and the point of discharge to a surface water. If the discharge is conveyed to the surface water through an MS4, canal or other stormwater conveyance, the point where the discharge enters the

conveyance is to be shown. (NOTE: This is not required for unspecified discharge locations identified on Table 2 of the Areawide, Project-wide, or Facility-wide NOI);

13. For Areawide, Project-wide, and Facility-wide NOIs: in addition to the map called for in III.B.12. above, an overview map of the service area or other area for which permit coverage is being requested;

14. Information concerning the BMPs implemented for the discharge or a copy of the BMPP if required (per Part II.A.), prepared in accordance with Part IV.D.; and

15. Applicant certification: The name, title, and signature of the applicant or the official certifying the NOI information and compliance with this permit (see Part V.K., Signatory Requirements).

C. Where to Submit. The person shall submit the NOI and associated documents by mail, delivery service, or hand-delivery to:

Arizona Department of Environmental Quality
Surface Water Section -- De Minimis General Permit
1110 West Washington Street, 5415A-1
Phoenix, Arizona 85007

or to the fax number provided on the NOI form.

D. Notification to Owner/Operator of Receiving Conveyance If the discharge is to or has the potential to reach a public or privately owned storm sewer, drainage system, canal or other conveyance, the applicant must also forward a copy of the completed NOI to the owner/ operator of the conveyance system at the time it is submitted to the Department. The corresponding item on the NOI form must reflect that this has been done. This requirement applies to revised NOIs (Part II.C.1.) as well as new submittals.

PART IV. SPECIAL CONDITIONS

A. Permittee.

1. A permittee shall make all reasonable efforts to minimize or prevent any discharge that has a potential to adversely affect human health or the environment.

2. A permittee shall make all reasonable efforts to minimize any adverse impact to waters of the U. S. resulting from noncompliance with any discharge limitations specified in this general permit, including performing accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

3. Authorization to discharge under this general permit is not transferable to any person. Submittal of a new NOI is required when there is a change in the party responsible for compliance with this permit (the original signer of the NOI).

B. Discharge Prohibitions. The following are prohibited:

1. Discharges in a location or manner different from that described in the NOI or regulated by this general permit;

2. The introduction of additives to the discharge unless approved by the Director or described as part of the permittee's BMPP and subject to monitoring and reporting if required under Part IV, Section E;

3. Discharges that cause or contribute to a violation of any applicable numeric surface water

quality standard under A.A.C. R18-11-109, R18-11-110, Appendix A thereof, or any site-specific standard adopted pursuant to R-18-11-115;

4. Discharges that contain pollutants in amounts or combinations that (A.A.C. R18-11-108(A):

   a. Settle to form bottom deposits that inhibit or prohibit the habitation, growth, or propagation of aquatic life;

   b. Cause objectionable odor in the area in which the surface water is located;

   c. Cause off-taste or odor in drinking water;

   d. Cause off-flavor in aquatic organisms;

   e. Are toxic to humans, animals, plants, or other organisms;

   f. Cause the growth of algae or aquatic plants that inhibit or prohibit the habitation, growth, or propagation of other aquatic life or the impair recreational uses;

   g. Cause or contribute to a violation of an aquifer water quality standard, as prescribed in R18-11-405 or R18-11-406; or

   h. Change the color of the surface water from natural background levels of color;

5. Discharges that cause degradation of the surface water quality or impair the designated uses of surface waters that receive the discharges (A.A.C. R18-11-107);

6. Discharges shall not contain oil, grease, or any other constituent that floats as debris, foam, or scum; or that causes a film or iridescent appearance on the surface of the water; or that causes a deposit on a shoreline, bank, or aquatic vegetation (A.A.C. R18-11-108(B));

7. A surface water shall not contain, as a result of a discharge activity authorized under this permit, suspended solids in quantities or concentrations that interfere with the treatment processes at the nearest downstream potable water treatment plant or substantially increase the cost of handling solids produced at the nearest downstream potable water treatment plant (A.A.C. R18-11-108(C)); and

8. A surface water shall not contain, as a result of a discharge activity authorized under this permit, solid waste such as refuse, rubbish, demolition or construction debris, trash, garbage, motor vehicles, appliances, or tires (A.A.C. R18-11-108(D)).

C. Discharge Limitations and Action Levels. This permit includes discharge limitations and action levels to protect the designated uses of the affected surface waters (A.A.C R18-11-104 and -105). Appendix A, Tables A, B, C, and D reference the applicable Discharge Limitations, Action Levels (ALs), and monitoring requirements.

1. No permitted discharge shall contain concentrations of constituents that exceed the limitations in the above-referenced tables.

2. Exceedance of an AL, in itself, is not a permit violation. However, whenever an AL is exceeded, the permittee must evaluate and revise existing BMPs and implement alternative practices or treatments as necessary to further reduce the level of constituents of concern in the discharge; or terminate discharge.

D. Best Management Practices (BMP).

1. A permittee shall prepare and implement a written BMP Plan (BMPP) prior to commencement of discharge (EXCEPTIONS: see Part II.A.2.a.). The BMPP shall be submitted to ADEQ with the NOI (if submittal is required under Part II. A.), or upon request by the Director. A permittee shall implement BMP measures to ensure compliance with the terms and conditions of this general permit. The permittee must consider the following

factors in development of the BMPP:

a. Setting of discharge;

- Climate and topography;
- Adjacent land uses and downstream uses;
- Potential flow path for given quantity of discharge;

b. Constituents of concern (COCs);

- Potential sources and quantities;
- Containment/reduction methods;
- Possible need for sampling the affected surface water prior to discharge (not required for ephemeral waters);

c. Identification of possible spills from chemicals or equipment and proper containment; and

d. Location and accessibility of temporary containment materials.

2. The BMPP must include:

a. Identification of sources of potential COCs, if any, that may be discharged as a result of the discharge activity;

b. Description of appropriate controls that will be implemented to minimize COCs in the discharge to ensure compliance with the terms and conditions of this general permit;

c. Provisions for dechlorination, if needed in accordance with the following:

i. Unless otherwise stated by ADEQ for a specific discharge, the limitation for total residual chlorine (TRC) concentration shall apply at the point of discharge into a surface water.

ii. The discharge must meet the permit limit for TRC, or any additional TRC limitation stated by ADEQ for the specific discharge. The permit limits are listed in Appendix A, Tables A, B, or C of this permit, according to the type of surface water receiving the discharge.

iii. Dechlorination may be accomplished by retaining the water on-site to allow the chlorine to dissipate; by chemical dechlorination; or by an alternative method authorized by ADEQ. For a proposed alternative method, the applicant shall submit information and/or data to ADEQ documenting the effectiveness of the method for reducing TRC sufficiently to meet the applicable permit limits.

iv. For discharges to perennial, intermittent, or effluent-dependent waters: Appendix A, Table 1, of this permit requires TRC field monitoring equipment with a sensitivity of 19 µg/L, based on the permit limit for these waters. However, as an alternative to that sensitivity requirement, the BMPP may include a treatment plan specifying dechlorination methods that will ensure compliance with the TRC limit. Dechlorination chemicals may be used in amounts sufficient to achieve “0” TRC, but shall not be present in excessive amounts in the discharge.

v. Because TRC tests measure levels of other halogenated disinfectants, the BMP requirements for dechlorination also apply to removal of other halogens such as bromine.

vi. Unless otherwise required by ADEQ for a specific discharge, there is no numeric TRC limit for discharges to non-DWS use canals, provided the discharges will not reach any other type of surface water. However, narrative water quality standards (listed in Part IV.B.4.– 8.) apply to all surface waters. Dechlorination BMPs should be considered for these discharges and implemented as appropriate. TRC must be controlled according to the canal owner/operator's requirements, if any (see Part V.G. of this permit).

d. Description of controls that will be implemented to minimize erosion, scour, or sedimentation in the affected surface water due to discharge;

e. Plans for minimizing the duration of discharge during system failures (line breaks, leaks, or overflows);

f. Contact information (including telephone numbers) for individual(s) or position titles responsible for on-site monitoring, observation sampling, maintenance/inspection, reporting, and/or compliance; and

g. Provisions for training of personnel to implement, manage, maintain and remove BMPs upon completion.

3. The BMPP may be modified only if the changes will result in equivalent or greater effectiveness in minimizing pollutants in the discharge. A permittee must amend the BMPP if existing BMPs are found ineffective, or whenever a change in discharge conditions might otherwise cause an increase in the discharge of COCs and/or an increase in the potential for erosion, scour, or sedimentation. The BMPP must also be updated to identify any changes to the responsible individuals or position titles listed per IV.D.2.f., above. Resubmittal of the revised/updated BMPP to ADEQ is not required unless specifically requested by the Director.

4. The BMPP must be signed in accordance with Part V.K.2., and must be retained at the discharge site (when actively discharging under single-source authorizations). When not actively discharging, or for Areawide, Facility-wide, or Project-wide authorizations, the BMPP may be kept at a location that is easily accessible during normal business hours. Upon request, the permittee shall provide a copy of the BMPP to ADEQ representatives. If the department makes a written request for submittal of the Plan, the permittee shall provide a copy within 14 calendar days.

5. Deficiencies in the BMPP. The Department may notify the permittee at any time that the BMPP does not meet one or more requirements of this permit. The notification will identify the provisions of this permit that are not being met and that require modification. Within 15 days of receipt of notification from the Department (or as otherwise provided in writing by ADEQ), the applicant/permittee must make the required changes to the BMP and submit to the Department a written certification that the changes have been made. The Department may request submittal of the revised BMP or other written confirmation that all deficiencies have been adequately addressed.

E. Monitoring and Reporting.

1. Monitoring.

a. The Monitoring and Reporting Program in Appendix A applies to monitoring and reporting for all discharges, except those specified in Part I.B.6. of this permit.

b. Except for discharges specified in Part I.B.6. of this permit, the permittee shall, at a minimum, monitor as indicated under "Monitoring Requirements" in Appendix A,

Tables A through D, based on the type of discharge activity and the appropriate classification of the surface water that receives the discharge.

c. When sampling is required, representative samples and measurements shall be taken of the discharge. The samples shall be taken at a point after any final treatment process and prior to mixing with the surface water receiving the discharge.

2. Reporting.

a. All monitoring results shall be maintained by the permittee as indicated in Appendix A and submitted to ADEQ if required (Appendix A, Section B. 1). All results shall be available for review by ADEQ upon request.

b. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity that may result in noncompliance with the discharge requirements of this permit. Notice is required only when the alteration or addition could significantly change the nature or increase the quantity of COCs discharged.

c. Twenty-four hour reporting.

i. The permittee shall report any discharge or noncompliance that may endanger human health or the environment. The permittee shall notify (by phone or fax) the office listed below within 24 hours from the time the permittee becomes aware of the circumstances.

Arizona Department of Environmental Quality
Water Quality Compliance Section, Mailcode 5415B-1
1110 W. Washington Street
Phoenix, Arizona 85007
Phone: (602) 771-2330 or Fax: (602) 771-4505

ii. A written submission shall also be provided to the office identified above within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; remedial actions taken to repair damage, if any, caused by the discharge or noncompliance condition being reported; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

d. The permittee shall report all instances of noncompliance not otherwise required to be reported under this section at the time the NOT and/or discharge monitoring reports are submitted. The report(s) shall contain the information listed in paragraph IV.E.2.c.ii., above.

e. When the permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the NOI or in any other report to the Director, the permittee shall promptly submit the facts or information.

PART V. STANDARD PERMIT CONDITIONS

A. Duty to Comply. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(a)(1) and A.R.S. §§ 49-261, 49-262, 49-263.01, and 49-263.02.]

1. The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act; A.R.S. Title 49, Chapter 2, Article 3.1; and A.A.C. Title 18, Chapter 9, Article 9, and is grounds for enforcement action, termination or modification of permit coverage, or denial of a permit renewal application.

2. The issuance of this permit does not waive any federal, state, county, or local regulations or permit requirements with which a person discharging under this permit is required to comply. This permit also does not authorize any discharge related condition (i.e., odors, vectors, etc.) that may be otherwise determined a nuisance per A.R.S 49-141.

3. The permittee shall comply with the effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

B. Duty to Reapply. [A.A.C. R18-9-C903(B)]

1. Upon issuance of a successor to this De Minimis General Permit, any permittee with an active De Minimis discharge authorization and wishing to continue discharging shall file a new NOI within the time-frame specified in the new general permit. Authorization will be subject to the terms and conditions of the successor general permit.

2. If the Director does not issue a successor general permit before the expiration date of this permit, the current general permit will be administratively continued and remain in force and effect until the new general permit is issued, or a decision is issued in accordance with Part V. B. 3. d., below.

3. If the current general permit is administratively continued, any permittee who was granted authorization to discharge under the general permit before the expiration date automatically remains covered by the continued general permit until earliest of the following:

   a. Reissuance or replacement of the general permit, at which time the permittee shall comply with the NOI conditions of the new general permit to maintain authorization to discharge; or

   b. The date the permittee submits a Notice of Termination; or

   c. The date the Director issues an individual permit for the discharge; or

   d. The date the Director issues a formal permit decision not to reissue the general permit, at which time the permittee shall seek coverage under an alternative general permit or an individual permit, or cease discharge.

C. Need to Halt or Reduce Activity Not a Defense. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(c)]
It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(d)]
The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(e)]
The permittee shall at all times properly operate and maintain all facilities and systems of

treatment and/or control (and related appurtenances) that are installed or used by the permittee to comply with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

F. Permit Actions. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(f)]
This permit and/or coverage under this permit may be modified, revoked and reissued, or terminated for cause.

G. Property Rights. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(g)]
This permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or invasion of personal rights, nor any infringement of federal, state, tribal, or local laws or regulations.

H. Duty to Provide Information. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(h)]
The permittee shall furnish to ADEQ, within a reasonable time, any information that the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating coverage under this permit or to determine compliance with this permit. The permittee shall also furnish to ADEQ upon request, copies of records required to be kept by this permit.

I. Inspection and Entry. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(i)]
The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and such other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the terms of the permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring equipment or control equipment), practices, or operations regulated under this permit; and

4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by A.R.S. Title 49, Chapter 2, Article 3.1, and A.A. C. Title 18, Chapter 9, Articles 9 and 10, any substances or parameters at any location.

J. Monitoring and Records. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(j)]

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

2. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for at least 3 years from the date this permit expires or from the date an NOT is filed. This period may be extended by request of the Director at any time.

3. Any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained in this permit is subject to the enforcement actions established under A.R.S. Title 49, Chapter 2, Article 4, which includes the possibility of fines and/or imprisonment.

K. Signatory Requirements. [A.A.C. R18-9-A905(A)(3)(a), which incorporates 40 CFR 122.41(k) and (l); A.A.C. R18-9-A905(A)(1)(c), which incorporates 40 CFR 122.22]

1. NOIs. All NOIs must be signed and certified as follows:

   a. For a corporation: by a responsible corporate officer. For the purpose of this Part, a responsible corporate officer means:

      i. A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

      ii. The manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions that govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

   b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

   c. For a municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer is the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (*e.g.*, Regional Administrators of EPA.).

2. Reports and Other Information. All BMPPs, NOTs, reports, certifications, or information required by this general permit and other information requested by an authorized representative of the Department shall be signed by a person described in Part V.K.1 or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Part V.K.1; and

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of manager, superintendent, or position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the permittee. (A "duly authorized representative" may be either a named individual or any individual occupying a named position.).

3. Changes to Authorization. If the information on the NOI filed for general permit coverage is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new NOI must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under the terms of this permit shall make the following certification:

"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I certify that the operator will comply with all terms and conditions stipulated in General Permit No. AZG2010-001 issued by the Director."

L. Reopener Clause. [A.A.C. R18-9-C905]. The Department may elect to modify or revoke and reissue the permit prior to its expiration (rather than waiting for the new permit cycle) to comply with any new statutory or regulatory requirements, such as for effluent limitation guidelines or water quality standards that may be promulgated in the course of the current permit cycle.

M. Other Environmental Laws. No condition of this general permit releases the permittee from any responsibility or requirements under other environmental statutes or regulations. For example, this permit does not authorize the "take" of endangered or threatened species as prohibited by section 9 of the Endangered Species Act, 16 U.S.C. 1538. Information regarding the location of endangered and threatened species and guidance on what activities constitute a "take" are available from the U.S. Fish and Wildlife Service at www.fws.gov. NOTE: All AZPDES discharges are required to have either an individual or general Aquifer Protection Permit [A.R.S. § 49-241(B)(9)], unless exempt under A.R.S. § 49-250.

N. State or Tribal Law. [A.A.C. R18-9-A904(C)]
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state or tribal law or regulation under authority preserved by section 510 of the Clean Water Act.

O. Severability. The provisions of this general permit are severable, and if any provision of this general permit, or the application of any provision of this general permit to any circumstance, is held invalid, the application of the provision to other circumstances, and the remainder of this general permit shall not be affected.

P. Requiring Coverage Under an Individual Permit or an Alternative General Permit. [A.A.C. R18-9-C902(A)]

1. The Director may require a person authorized by this permit to apply for and/or obtain either an individual AZPDES permit or an alternative AZPDES general permit. Any interested person may petition the Department to take action under this section. The Department may require a permittee authorized to discharge under this permit to apply for an individual AZPDES permit in any of the following cases:

    a. A change occurs in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the point source;

    b. Effluent limitation guidelines are promulgated for point sources covered by the general permit;

    c. An Arizona Water Quality Management Plan containing requirements applicable to the point sources is approved;

    d. Circumstances change after the time of the request to be covered so that the discharger is no longer appropriately controlled under the general permit, or either a temporary or permanent reduction or elimination of the authorized discharge is necessary;

e. If the Director determines that the discharge is a significant contributor of pollutants. When making this determination, the Director shall consider:

i. The location of the discharge with respect to waters of the United States,

ii. The size of the discharge,

iii. The quantity and nature of the pollutants discharged to waters of the U.S., and

iv. Any other relevant factor.

2. If an individual permit is required, the Director shall notify the discharger in writing of the decision. The notice shall include:

a. A brief statement of the reasons for the decision;

b. An application form or process;

c. A statement setting a deadline to file the application;

d. A statement that on the effective date of issuance or denial of the individual permit, coverage under the general permit will automatically terminate;

e. The applicant's right to appeal the individual permit requirement with the Water Quality Appeals Board under A.R.S. § 49-323, the number of days the applicant has to file a protest challenging the individual permit requirement, and the name and telephone number of the Department contact person who can answer questions regarding the appeals process; and

f. The applicant's right to request an informal settlement conference under A.R.S. §§ 41-1092.03(A) and 41-1092.06.

3. The discharger shall apply for an individual permit within 90 days of receipt of the notice, unless the Director grants a later date. In no case shall the deadline be more than 180 days after the date of the notice.

4. If the permittee fails to submit the individual permit application within the time period established in Part V.P.3, the applicability of the general permit to the permittee is automatically terminated at the end of the day specified by the Director for application submittal.

5. Coverage under the general permit shall continue until an individual permit is issued or denied unless the general permit coverage is terminated under Part V.F.

Q. Request for an Individual Permit. [A.A.C. R18-9-C902(B)]

1. An owner or operator authorized by a general permit may request an exclusion from coverage of a general permit by applying for an individual permit.

a. The owner or operator shall submit an individual permit application under A.A.C. R18-9-B901(B) and include the reasons supporting the request no later than 90 days after publication of the general permit.

b. The Director shall grant the request if the reasons cited by the owner or operator are adequate to support the request.

2. If an individual permit is issued to an owner or operator otherwise subject to a general permit, the applicability of the general permit to the discharge is automatically terminated on the effective date of the individual permit. However, a Notice of Termination must still be submitted per Part II.D.2.

PART VI. PENALTIES FOR VIOLATIONS OF PERMIT CONDITIONS

A. Civil Penalties. A.R.S. § 49-262(C) provides that any person who violates any provision of A.R.S. Title 49, Chapter 2, Article 2, 3, or 3.1 or a rule, permit, discharge limitation or order issued or adopted under A.R.S. Title 49, Chapter 2, Article 3.1, is subject to a civil penalty not to exceed $25,000 per day per violation.

B. Criminal Penalties. Any a person who violates a condition of this general permit, or violates a provision under A.R.S. Title 49, Chapter 2, Article 3.1, or 18 A.A.C. Chapter 9, Article 9, is subject to the enforcement actions established under A.R.S. Title 49, Chapter 2, Article 4.

PART VII. DEFINITIONS , ACRONYMS, AND ABBREVIATIONS

A. ACRONYMS AND ABBREVIATIONS

A&Wc	Aquatic and Wildlife (cold water) use as defined in R18-11-101(5)
A&Ww	Aquatic and Wildlife (warm water) use as defined in R18-11-101(8)
A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
AWQS	Aquifer Water Quality Standards (A.A.C. Title 18, Chapter 11, Article 4)
AZPDES	Arizona Pollutant Discharge Elimination System
A.R.S.	Arizona Revised Statutes
BMP	best management practices
CFR	Code of Federal Regulations
CFU	colony forming units
COC	constituent of concern
DMGP	De Minimis General Permit
DDMR	De Minimis Discharge Monitoring Report
DWS	domestic water source
LOD	limit of detection
MGD	million gallons per day
mg/L	milligrams per liter, also equal to parts per million (ppm)
MS4	Municipal Separate Storm Sewer System
NOI	Notice of Intent
NOT	Notice of Termination
OAW	Outstanding Arizona Water
SWQS	Surface Water Quality Standards (A.A.C. Title 18, Chapter 11, Article 1)
TMDL	Total Maximum Daily Load

TRC	total residual chlorine
ug/L	micrograms per liter, also equal to parts per billion (ppb)

B. DEFINITIONS

"Arithmetic mean" means the number obtained by dividing the sum of a given set of quantities or values by the number of quantities or values in the set.

"Best management practices" means those methods, measures or practices to prevent or reduce discharges and includes structural and nonstructural controls and operation and maintenance procedures. Best management practices may be applied before, during and after discharges to reduce or eliminate the introduction of pollutants into receiving waters. Economic, institutional and technical factors shall be considered in developing best management practices. (A.R.S. § 49-201.3)

"DWS use canal" means a canal that is listed in 18 A.A.C. 11, Appendix B, which has domestic water source and agricultural use designations.

"Class A+ or B+ reclaimed water" means reclaimed water that meets the treatment requirements for either Class A+ or B+ as defined in 18 A.A.C. 11, Article 3.

"Cold waters" for purposes of this permit means surface waters that have the designated use of Aquatic and Wildlife (cold water) as defined in R18-11-101(5). These are generally perennial or intermittent waters at elevations above 5,000 feet.

"Constituent of concern" for the purposes of this permit means any constituent that has the potential to be present in the discharge at levels exceeding the SWQS or limit or action level specified in this permit; or that has the potential to cause or contribute to a violation of an AWQS. The constituent may be present in the discharge due to its presence in the source water or due to introduction by the permittee.

"Date received" for the purposes of this permit means:

1. The date the NOI, NOT, or other document was faxed to the Department;
2. The date of hand-delivery of the NOI, NOT, or other document to the Department;
3. The date the NOI, NOT, or other document was delivered to the Department by mail or delivery service, as indicated by a Department date-stamp on the document; or
4. The date the Department signs for certified mail containing the NOI, NOT, or other document.

The above submittals must be made to the address or fax number specified in Part III. C.

"De Minimis discharge" means a discharge to waters of the U. S. which:

- meets the applicable surface water quality standards (18 A.A.C. 11, Article 1);
- is a low-flow and/or low-frequency event, or is otherwise determined by ADEQ to have no significant impacts on water quality or the environment;
- is conducted with appropriate BMPs in accordance with Part IV.D. of this permit; and
- does not last continuously for more than 30 days unless written approval for a longer discharge duration is issued in advance by the Department.

NOTE: proposed De Minimis discharges are also subject to the "Limitations on Coverage" stated in Part I.C. of this permit.

"Department" means the Arizona Department of Environmental Quality.

"Director" means the Director of the Department or his/her designee.

"Domestic water source" for purposes of this permit means the use of a surface water as a source of potable water. Treatment may be necessary to yield a finished water suitable for human consumption.

"Effluent-dependent water" means a surface water classified under A.A.C. R18-11-113, that consists of a point source discharge of wastewater. An effluent-dependent water is a surface water that, without the point source discharge of wastewater, would be an ephemeral water (A.A.C. R18-11-101(17)). Effluent-dependent waters are listed with the designated use of aquatic and wildlife (effluent-dependent water) (A&Wedw) in 18 A.A.C. 11, Article 1, Appendix B, along with other designated uses.

"Ephemeral water" means a surface water that has a channel that is at all times above the water table and flows only in direct response to precipitation. (A.A.C. R18-11-101(18)). Ephemeral waters generally have designated uses of aquatic and wildlife (ephemeral) (A&We) and partial-body contact (AAC R18-11-105 (1)). Ephemeral waters listed in 18 A.A.C. 11, Article 1, Appendix B, may have additional designated uses.

"Extended discharge" for purposes of this permit means a discharge that occurs continuously for longer than 30 days.

"Facility" for purposes of this permit means any AZPDES point source, including any land, building, installation, structure, equipment, device, conveyance, area, activity or practice from which there is, or with reasonable probability may be, a discharge [A.R.S §49-201(17)].

"Impervious material" for purposes of this permit means a material that does not allow water to pass through it.

"Intermittent water" means a stream or reach that flows continuously only at certain times of the year, as when it receives water from a spring or from another source, such as melting snow (A.A.C. R18-11-101(25)). Intermittent waters generally have aquatic and wildlife (warm water) (A&Ww) or aquatic and wildlife (cold water) (A&Wc) uses along with other protected uses as listed in 18 A.A.C. 11, Article 1, Appendix B.

"Impaired water" for purposes of this permit means a water that is listed in *Arizona's Integrated 305(b) Assessment and 303(d) Listing Report,* Appendix B, in any of the following tables:

- Category 4 – A TMDL has been completed but the surface water is not yet attaining all standards for all designated uses (still impaired);
- Category 5 (ADEQ) – Assessed as impaired by ADEQ; or
- Category 5 (EPA) - Assessed as impaired by EPA.

These listings can be found within the following document on the ADEQ website:. http://www.azdeq.gov/environ/water/assessment/download/2008/appb.pdf

"Indian Country", as defined in U. S. Code Title 18 §1151, includes all land within the limits of any Indian reservation under the jurisdiction of the United States government.

"Limit of Detection" means an analyte-specific and matrix-specific estimate of the minimum amount of a substance that an analytical process can reliable detect, which may be laboratory dependent and is developed according to R9-14-615(C)(7). (A.A.C. R9-14-601(54))

"Municipal Separate Storm Sewer System" (MS4) for purposes of this permit, means a regulated municipal separate storm sewer system.

"Non-DWS use canals" means a canal that is listed in 18 A.A.C. 11, Appendix B, which only has

agricultural use designations.

“Notice of Intent” means a Notice of Intent for coverage of De Minimis discharges under this general permit (No. AZG2010-001), using the form specified for this purpose by ADEQ.

“Notice of Termination” means a Notice of Termination for De Minimis discharges under this general permit (No. AZG2010-001), using the form specified for this purpose by ADEQ.

“Outstanding Arizona Water” (OAW) means a surface water designated under A.A.C. R18-11-112 (Formerly “Unique Waters”).

“Operator” for purposes of this permit means a person having control of those activities related to the subject discharge which are necessary to ensure compliance with the conditions of this permit, and who takes responsibility for such compliance.

“Parameter” for purposes of this permit means a constituent, property, or characteristic that can be measured, quantified, and/or analyzed.

“Perennial water” means a surface water that flows continuously throughout the year (A.A.C. R18-11-101(30)). Perennial waters generally have aquatic and wildlife (warm water) (A&Ww) or aquatic and wildlife (cold water) (A&Wc) uses along with other protected uses as listed in Title 18, Chapter 11, Appendix B.

“Person” means an individual, employee, officer, managing body, trust, firm, joint stock company, consortium, public or private corporation, including a government corporation, partnership, association or state, a political subdivision of this state, a commission, the United States government or any federal facility, interstate body or other entity (A.R.S. §49-201(27)).

“Pollutant” is defined at A.A.C. R18-9-A901(27).

“Received” – see “Date received.”

“Single-source discharge” means one type of discharge activity at one discharge location.

“Surface water” is defined at A.A.C. R18-11-101(41).

“Total maximum daily load” means an estimation of the total amount of a pollutant from all sources that may be added to a water while still allowing the water to achieve and maintain applicable surface water quality standards. Each total maximum daily load shall include allocations for sources that contribute the pollutant to the water, as required by section 303(d) of the clean water act (33 United States Code section 1313(d)) and regulations implementing that statute to achieve applicable surface water quality standards. (A.R.S. § 49-231(4) and A.C.C. R18-11-601(24)).

“Total residual chlorine” means the total of free residual chlorine and combined residual chlorine or other halogen (such as bromine).

“Vault” for purposes of this permit means a structure or compartment (such as a utility vault) that may accumulate subterranean seepage or surface runoff in a portion below ground surface.

“Warm waters” for purposes of this permit means surface waters that have the designated use of Aquatic and Wildlife (warm water) as defined in R18-11-101(8). These are generally perennial or intermittent waters at elevations below 5,000 feet.

“Water utility” for the purposes of this permit, means an operator of a system to provide for the distribution of water to the public.

“Waters of the United States (U. S.)” is defined at 40 CFR 122.2.

APPENDIX A

MONITORING & REPORTING PROGRAM

A. Monitoring Requirements.

1. General. Pursuant to Part IV.E.1. of this permit, the permittee must conduct monitoring as specified in this Section and in the pertinent "Monitoring Requirements" section of the attached Tables A through D, except for discharges listed in Part I.B.6. of this permit and/or as specifically provided in writing by the Director. The Director may require additional sampling for Specific Approvals (Part I.B.7.) or for discharges with a potential to reach OAW or Impaired waters under this general permit. For constituents of concern (COCs), the Director may increase or decrease routine monitoring requirements for a specific discharge source based on water quality data submitted. The Director may reduce or eliminate routine monitoring for a potential COC if the data demonstrate that the discharge is unlikely to exceed the applicable limit, action level, or SWQS.

   For discharges that occur on a frequent and regular basis, a footnote in each table allows a periodic statement describing the average flow rate, duration of discharge, and discharge characterization in lieu of per-discharge monitoring.

   NOTE: Tables A through D also contain numeric Discharge Limitations and Action Levels (see Part IV.C. of this permit). Parameters with Discharge Limitations or Action Levels are not necessarily required for monitoring for a given discharge (see explanation in each table).

2. Analytical Monitoring. All sample collection, handling, sample containers, and preservation must be in accordance with 40 CFR 136 unless otherwise specified. Laboratory analysis (where required) must be conducted under an approved method (per 40 CFR 136) by a state-licensed laboratory, certified for the method used. Metals (where required) must be analyzed as total recoverable metals, except Chromium VI (analyze as dissolved).

   a. **The permittee must ensure that the analytical method selected for each parameter has a limit of detection (LOD) that is at or below the permit limit or SWQS for the class of surface water that receives the discharge, where such analytical methods exist**.

   b. If there is no analytical method with a detection level at or below the permit limit/SWQS, then the most sensitive method must be used. If the sample result is "non-detect," the permittee shall report the result as less than the LOD ("ND") and provide the actual detection level achieved. Assuming the most sensitive analytical method is used, the reporting of "ND" when the LOD is above the permit limit is not considered a violation of the permit.

3. Field Screening. For the purposes of this permit, the permittee may use alternate field test kits and instrumentation for field screening. If field screening is used, the permittee must have adequate internal controls including written procedures to ensure that all testing is conducted consistently. A number of field test options exist, including colorimetric test kits, titrimetric test kits, and spectrophotometric field test instruments. Field-testing is permitted, using suitable methods, for flow, pH, total residual chlorine, turbidity, temperature, conductivity, and dissolved oxygen provided the selected test is capable of achieving the sensitivity/accuracy levels denoted in Table 1, below. (Matrix interferences may result in less sensitivity, but the test method should be rated for the noted levels). The permittee is responsible for calibrating the instruments to manufacturer's specification to ensure accuracy of the results.

   Unless otherwise specified by ADEQ, monitoring for oil and grease may be conducted in the field by means of visual observation for a film or iridescent appearance on the water surface.

Table 1. Field Equipment Sensitivity or Accuracy Requirements

Field Parameter	Sensitivity/Accuracy
Conductivity	± 0.5 microSiemens (μS) or equivalent
Dissolved Oxygen	0.2 mg/l
Flow	± 10% if measured, or a reasonable estimate if not measured
pH	± 0.1 standard units
Temperature	± 0.5 C / ± 1.0 F
Total Residual Chlorine	0.2 mg/l for discharges to ephemeral waters and DWS-use canals; 0.019 mg/l for discharges to perennial, intermittent, or effluent-dependent waters. (See Appendix A, Item A. 1. b., above, regarding allowable detection limits; and Part IV. D. 2. c. iv. regarding alternatives to the sensitivity requirement.)
Turbidity	± 1 NTU or equivalent

If field screening indicates results above the permit limitation or action level (or LOD if the LOD is above the permit limit / action level), discharge must cease until either a follow up laboratory analysis confirms pollutant levels at or below permit limitations or approved detection limits; or the permittee takes all necessary actions to modify treatment and/or BMPs such that a second, confirmatory field screen sample meets the required limitations.

4. Minimum Monitoring Frequencies/Parameters. See the "Monitoring Requirements" sections of Tables A through D, below, and/or any monitoring specified by ADEQ in a De Minimis discharge authorization letter.

5. Photographic documentation. Photographic documentation of pre-discharge and post-discharge site conditions in the area of the outfall is required for discharges lasting more than 4 days continuously and/or exceeding 0.50 million gallons in any one day. The photographs shall include areas potentially affected by erosion, streambed scour, or sedimentation resulting from the discharge. Post-discharge photographs shall be taken from the same viewpoint(s) as pre-discharge photographs.

   EXCEPTIONS: Only post-discharge photographs are required for unplanned discharges. Unless specifically requested by the Director, photographic documentation is not required for discharges made directly to concrete-lined canals or conveyances consisting of pavement, underground piping, or other impervious material.

6. Field Log. The permittee shall document data collection, observations, and field activities in the form of a field log, such as hardbound field notebook, or the permittee may develop and use field data sheets. All entries shall be legible, dated, written in permanent ink, signed, and shall contain accurate information. The permittee shall retain the field log at the discharge site or other location easily accessible during normal business hours, together with the BMPP or a copy thereof. The record shall document the date and time of testing; the name of the individual taking the test; flow information; visual observations; sampling equipment or field screening techniques used; name, model number, range, and accuracy of the equipment; sampling results; BMPs or treatment technologies in use; and other factors as necessary.

B. Reporting and Records Retention.

1. Reporting Results of Monitoring (pursuant to Part IV.E.2.(a) of this permit).

   a. Permittees terminating single-source coverage or Project-wide coverage must submit the

results of all monitoring required by this permit for continuous discharges lasting more than 4 days and/or exceeding 0.50 million gallons in any one day, to ADEQ with the NOT at completion of the project, or as required by ADEQ. EXCEPTION: Field Logs (Appendix A, Part A. 5. above) are not required to be submitted unless specifically requested by the Director.

i. Monitoring results must be reported on a De Minimis Discharge Monitoring Report (DDMR) Form specified by the Director.

ii. If the permittee monitors any constituent of concern more frequently than required by the permit, using test procedures approved under 40 CFR 136 or other method specified in this permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DDMR.

iii. Calculations for all limitations that require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director.

b. Permittees with Areawide, Facility-wide, or ongoing Project-wide coverage must submit results of all monitoring required by this permit, for continuous discharges lasting more than 4 days and/or exceeding 0.50 million gallons in any one day and conducted prior to January 1, 2013, to ADEQ no later than February 28, 2013. EXCEPTION: Field Logs (Appendix A, Part A.5. above) are not required to be submitted unless specifically requested by the Director. Conditions in Appendix A, Section B. 1. a. i. – iii., above, are applicable to reporting under this section.

c. Permittees are not required to submit monitoring results for discharges other than those specified in Appendix A, Section B.1.(a) or (b), above, unless specifically requested by the Director.

2. Laboratory Analyses. The permittee shall retain records in accordance with subsection 4, below, of all laboratory analyses related to discharges under this permit. Such records shall include the date, exact location and time of sampling or measurements performed, and any preservatives used; names of individual(s) who performed the sampling or measurements; date(s) the analyses were performed; the laboratory or laboratories that performed the analyses; and the analytical techniques or methods used, with the LODs for those methods.

3. Address for Submittal. Where submittal of monitoring data is required and/or requested, signed copies of these and any other reports required, shall be submitted to the following address:

Arizona Department of Environmental Quality
Surface Water Section - De Minimis General Permit
1110 West Washington Street, 5415A-1
Phoenix, Arizona 85007

or to the fax number provided on the NOT form.

4. Records Retention.

a. All permittees shall retain copies of all monitoring information, including field logs and monitoring results, data used to complete the NOI, and copies of the BMPP, for at least three years from the date this permit expires or 3 years after a NOT is filed whichever is earlier.

b. Permittees with day-to-day operational control over the implementation of BMPs shall retain a copy of the BMPP and a copy of this permit at the discharge site for use by all operators, when actively discharging under single-source authorizations. When not actively discharging, or for Areawide, Facility-wide, or Project-wide authorizations, the BMPP may be kept at another location easily accessible during normal business hours.

TABLE A.

De Minimis Discharges to
Ephemeral Waters and Non-DWS Use Canals

Pursuant to Part IV.C. of this permit, the following are discharge limitations and action levels for some parameters that may be of concern for De Minimis discharges. Not all of these are required for monitoring for a given discharge, unless specified by ADEQ or identified as constituents of concern (COCs) by ADEQ or the permittee. However, the permittee is responsible for ensuring that these limits are met and may wish to document compliance.

DISCHARGE LIMITATIONS

BORON – 1,000 µg/L (for waters with Agricultural Irrigation designated use)

TOTAL RESIDUAL CHLORINE - 4,000 µg/L (ppb) for ephemeral waters (see BMP section, Part IV. D. 2. c.);
No numeric limit * for Non-DWS Use Canals

E.Coli - 576 cfu / 100 mL

TURBIDITY - No numeric limit *

SUSPENDED SEDIMENT – no numeric limit *

pH - 6.5 - 9.0 standard units

COCs - For any COCs identified by ADEQ or permittee, check Surface Water Quality Standards in 18 A.A.C. 11, Article 1.

ACTION LEVELS

OIL & GREASE - Action level of 10 mg/l or film/iridescence on surface of discharge

Methyl tertiary-butyl ether (MTBE) – Action level of 20 ug/l based on narrative standard for odor

* Where no numeric limit is listed, the narrative standards in Part IV.B.4.– 8. of this permit still apply. The permittee must implement BMPs (Part IV.D.) to control the discharge of these constituents, as appropriate, when they are known or suspected to be present in the discharge.

Monitoring Requirements [(1)]

Discharge Activity	Parameters	Monitoring Frequency [(5)]
Potable water systems		
Potable Water System O&M Flushing; Well Flushing	FR, DoF, C [(3)], COC	Daily [(2)]
Potable Water System post-repair flushing; tank/reservoir draining,	FR, DoF, C [(3)], COC	Per discharge
Discharges resulting from system pressure releases or overflows	FR, C [(3)],COC	Per discharge [(2)]
Discharges from wells that have been approved by ADEQ for drinking water	FR, DoF, C [(3)], COC	Per discharge [(2)]
Subterranean dewatering		
Groundwater from foundation, footer drain, basement, underground structure or construction dewatering (see exclusions in Part I. B. 2.)	FR, DoF, NTU, COC	Per discharge [(2)]
Water from subterranean seepage (see exclusions in Part I. B. 2.)	FR, DoF, COC	Per discharge [(2)]
Well Development & Maintenance (includes piezometers)		
Well Construction	FR, DoF, C [(3)], O&G, NTU, COC	Daily

TABLE A (continued)		
Discharge Activity	**Parameters**	**Monitoring Frequency [5]**
Well test pumping & purging	FR, DoF, C [3], O&G, COC	Daily
Discharges from any borehole not fully developed	FR, DoF, C [3], NTU, COC	Per discharge
Well rehabilitation using chemical treatment	FR, DoF, pH, C [3], COC	Daily
Well/piezometer development & purging associated with soil and/or ground water remediation activities	FR, DoF, COC, NTU	Per discharge
Hydrostatic Testing		
Groundwater, surface water, potable water or Class A+ or B+ reclaimed water associated with testing of new pipes, tanks, or vessels, or potable water system components.	FR, DoF, C [3], E [4] COC	Per discharge
Groundwater, surface water, potable water or Class A+ or B+ reclaimed water associated with testing components of sewer collection systems or reclaimed water systems.	FR, DoF, C [3], E [4], COC	Per Discharge
Groundwater, surface water, potable water or Class A+ or B+ reclaimed water associated with testing of pipes, tanks, or vessels previously used to transport oil or gas (see requirements under Part I.B.4.c.)	FR, DoF, C [3], O&G, COC,	Per discharge
Reclaimed Water Systems		
Discharges of Class A+ or B+ reclaimed water from reclaimed water distribution system repair flushings and pressure releases.	FR, DoF, C [3], E., COC	Per Discharge
Other		
Specific approvals (Part I.B.7.)	(As specified by ADEQ)	

(1) For requirements for reporting results of monitoring, see Appendix A, Part B.1.

(2) For unplanned discharges or those that occur on a frequent and regular basis, a statement describing the average flow rate, duration of discharge, and discharge characterization is acceptable in lieu of per-discharge monitoring. Any constituents required to be monitored shall be analyzed at least quarterly, unless otherwise directed by ADEQ.

(3) For discharges to these types of surface waters, total residual chlorine or alternative disinfectant must be monitored whenever the water to be discharged has contained chlorine or alternative disinfectant at a level higher than 4,000 µg/L. (See also BMP requirement, Part IV.D.2.c.)

(4) *E. Coli* must be sampled if existing sewer system components are being tested, or if reclaimed water is used.

(5) The monitoring frequencies shown are applicable unless modified in writing by ADEQ for a specific discharge source (see Appendix A, Part A.1.).

Key to List of Water Quality Parameters Potentially Monitored:

C	Total Residual Chlorine or alternative disinfectant if used
COC	Constituents of Concern
DoF	Duration of flow
E	*E. Coli*
FR	Flow rate
O&G	Oil & Grease
pH	pH
NTU	Turbidity

TABLE B.

De Minimis Discharges to

Effluent-dependent Waters

Pursuant to Part IV.C. of this permit, the following are discharge limitations and Action Levels for some parameters that may be of concern for De Minimis discharges. Not all of these are required for monitoring for a given discharge, unless specified by ADEQ or identified as constituents of concern (COCs) by ADEQ or the permittee. However, the permittee is responsible for ensuring that these limits/ALs are met and may wish to document compliance.

DISCHARGE LIMITATIONS

BORON – 1,000 µg/L (for waters with Agricultural Irrigation designated use)

TOTAL RESIDUAL CHLORINE - 19 µg/L (ppb)

E. Coli - 576 cfu / 100 ml

TURBIDITY - No numeric limit *

SUSPENDED SEDIMENT – no numeric limit *

pH - 6.5 - 9.0 standard units

TEMPERATURE - Maximum increase over ambient due to thermal discharge = 3°C

DISSOLVED OXYGEN (DO) - minimum = 3 mg/L (three hours after sunrise to sunset)

1 mg/L (sunset to three hours after sunrise)

The discharge shall not cause the affected surface water to fall below the stated dissolved oxygen levels, unless the percent saturation of dissolved oxygen is equal to or greater than 90%.

COCs - For any COCs identified by ADEQ or permittee, check Surface Water Quality Standards in 18 A.A.C. 11, Article 1

ACTION LEVELS

OIL & GREASE - Action level of 10 mg/l or film/iridescence on surface of discharge

Methyl tertiary-butyl ether (MTBE) – Action level of 20 ug/l based on narrative standard for odor

* Where no numeric limit is listed, the narrative standards in Part IV.B.4.– 8. of this permit still apply. The permittee must implement BMPs (Part IV.D.) to control the discharge of these constituents, as appropriate, when they are known or suspected to be present in the discharge.

Monitoring Requirements [1]

Discharge Activity	Parameters	Monitoring Frequency [5]
Potable water systems		
Potable Water System O&M Flushing; Well Flushing	FR, DoF, C [2], COC	Per discharge [3]
Potable Water System post-repair flushing : tank/reservoir draining	FR, DoF, C [2], COC	Per discharge
Discharges resulting from system pressure releases, or overflows	FR, C [2], COC	Per discharge [3]
Discharges from wells that have been approved by ADEQ for drinking water	FR, DoF, C [2], COC	Per discharge [3]
Subterranean dewatering		
Groundwater from foundation, footer drain, basement, underground structure or construction dewatering (see exclusions in Part I.B.2.)	FR, DoF, NTU, COC	Per discharge [3]

TABLE B (continued)		
Discharge Activity	**Parameters**	**Monitoring Frequency (5)**
Water from subterranean seepage (see exclusions in Part I.B.2.),	FR, DoF, COC	Per discharge (3)
Well Development & Maintenance (includes piezometers)		
Well Construction	FR, DoF, C (2), O&G, NTU, COC	Daily
Well test pumping & purging	FR, DoF, C (2), O&G, NTU, COC	Daily
Discharges from any borehole not fully developed	FR, DoF, C (2), NTU, COC	Per discharge
Well Rehabilitation using chemical treatment	FR, DoF, pH, C(2), NTU, COC,	Daily
Well/piezometer development & purging associated with soil and/or ground water remediation activities	FR, DoF, NTU, COC, C (2)	Per discharge
Hydrostatic Testing		
Groundwater, surface water, Class A+ or B+ reclaimed water or potable water associated with testing of new pipes, tanks, or vessels, or potable water system components.	FR, DoF, C (2), E (4), COC	Per discharge
Groundwater, surface water, potable water or Class A+ or B+ reclaimed water associated with testing of pipes, tanks , or vessels previously used to transport oil or gas (see requirements under Part I.B.4.c.)	FR, DoF, C (2), E (4) O&G, NTU, COC	Per discharge
Groundwater, surface water, Class A+ or B+ reclaimed water or potable water associated with testing of sewer system components or reclaimed water systems.	FR, DoF, C(2), E (4), COC	Per discharge
Reclaimed water systems		
Discharges of Class A+ or B+ reclaimed water from reclaimed water distribution system post repair flushings and pressure releases.	FR, DoF, C(2), E, COC	Per discharge
Other		
Specific approvals (Part I.B.7.)	(As specified by ADEQ)	

(1) For requirements for reporting results of monitoring, see Appendix A, Part B. 1.

(2) Total Residual Chlorine or alternative disinfectant is required to be sampled only when present in the source water, or where chlorine or halogenated disinfectant agents have been added.

(3) For unplanned discharges or those that occur on a frequent and regular basis, a statement describing the average flow rate, duration of discharge, and discharge characterization is acceptable in lieu of per discharge monitoring. Any constituents required to be monitored shall be analyzed at least quarterly, unless otherwise directed by ADEQ.

(4) *E. Coli* must be sampled if existing sewer system components are being tested or if reclaimed water is used.

(5) The monitoring frequencies shown are applicable unless modified in writing by ADEQ for a specific discharge source (see Appendix A, Part A.1.).

Key to List of Water Quality Parameters Potentially Monitored:

C	Total Residual Chlorine or alternative disinfectant if used
COC	Constituents of Concern
DoF	Duration of flow
E	E. Coli
FR	Flow rate
O&G	Oil & Grease
pH	pH
NTU	Turbidity

TABLE C.

De Minimis Discharges to

Perennial or Intermittent Waters or DWS Use Canals

Pursuant to Part IV.C. of this permit, the following are discharge limitations and action levels for some parameters that may be of concern for De Minimis discharges. Not all of these are required for monitoring for a given discharge, unless specified by ADEQ or identified as constituents of concern (COCs) by the permittee. However, the permittee is responsible for ensuring that these limits are met and may wish to document compliance.

DISCHARGE LIMITATIONS

BORON – 1,400 µg/L for DWS designated use; 1,000 µg/L for Agricultural Irrigation designated use.

TOTAL RESIDUAL CHLORINE - 19 µg/L (ppb) for perennial / intermittent;
4,000 µg/L for DWS Use Canals

E. COLI - 235 cfu / 100 ml

NITROGEN - No numeric limit except as specified for certain waters in A.A.C. R18-11-109(F).

NITRATE / NITRITE (where DWS use applies) - 10 mg/l

TURBIDITY - no numeric limit *

SUSPENDED SEDIMENT – no numeric limit * unless otherwise specified by ADEQ

pH - 6.5 - 9.0 standard units

TEMPERATURE (A&Ww and A&Wc uses) - Maximum increase over ambient due to thermal discharge:
1°C for cold waters
3°C for warm waters

DISSOLVED OXYGEN (A&Ww and A&Wc uses) - minimum = 6 mg/l for discharges to warm waters,
7 mg/l for discharges to cold waters

The discharge shall not cause the affected surface water to fall below the stated dissolved oxygen levels, unless the percent saturation of dissolved oxygen is equal to or greater than 90%.

COCs - For any COCs identified by ADEQ or permittee, check Surface Water Quality Standards in 18 A.A.C. 11, Article 1

ACTION LEVELS

OIL & GREASE - Action level of 10 mg/l or film/iridescence on surface of discharge

Methyl tertiary-butyl ether (MTBE) – Action level of 20 ug/l based on narrative standard for odor

* Where no numeric limit is listed, the narrative standards in Part IV.B.4.– 8. of this permit still apply. The permittee must implement BMPs (Part IV.D.) to control the discharge of these constituents when they are known or suspected to be present in the discharge.

Monitoring Requirements (1)

Discharge Activity	Parameters	Monitoring Frequency (5)
Potable water systems		
Limited Duration Potable Water System O&M Flushing; Well Flushing	FR, DoF, C (2), COC	Per discharge (3)
Potable Water System post-repair flushing; tank/reservoir draining	FR, DoF, C (2), COC	Per discharge
Discharges resulting from system pressure releases or overflows	FR, DoF, C (2), COC	Per discharge (3)

TABLE C (continued)		
Discharge Activity	**Parameters**	**Monitoring Frequency (5)**
Discharges from wells that have been approved by ADEQ for drinking water	FR, DoF, C (2) , COC	Per discharge (3)
Subterranean dewatering		
Groundwater from foundation, footer drain, basement, underground structure, or construction dewatering (see exclusions in Part I.B.2.)	FR, DoF, NTU, COC	Per discharge (monthly for extended discharges)
Water from subterranean seepage (see exclusions in Part I.B.2.)	FR, DoF, COC	Per discharge
Well Development & Maintenance (includes piezometers)		
Well Construction	FR, DoF, O&G, C (2) COC, NTU	Daily
Well test pumping & purging	FR, DoF, NTU, O&G, C (2), COC	Daily
Discharges from any borehole not fully developed	FR, DoF, C (2), COC, NTU	Daily
Well Rehabilitation using chemical treatment	FR, DoF, C (2), pH, NTU, COC	Daily
Well/piezometer development & purging from areas associated with soil and/or ground water remediation activities.	FR, DoF, C (2), NTU, COC	Per discharge
Hydrostatic Testing		
Groundwater, surface water, or potable water associated with testing of new pipes, tanks, or vessels, potable water system components	FR, DoF, C (2), COC	Per discharge
Groundwater, surface water, or potable water associated with testing of pipes, tanks , or vessels previously used to transport oil or gas (see requirements under Part I.B.4.c.)	FR, DoF, O&G, NTU, COC	Per discharge
Groundwater, surface water, or potable water associated with testing components of sewer collection systems or reclaimed water systems.	FR, DoF, E (4), C (2), COC	Per discharge
Other		
Specific approvals (Part I.B.7.)	(As specified by ADEQ)	

(1) For requirements for reporting results of monitoring, see Appendix A, Part B.1.

(2) Total Residual Chlorine or alternative disinfectant is required to be sampled only when present in the source water, or where chlorine or halogenated disinfectant agents have been added.

(3) For unplanned discharges or those that occur on a frequent and regular basis, a quarterly statement describing the average flow rate, duration of discharge, and discharge characterization is acceptable in lieu of per discharge monitoring. Any constituents required to be monitored shall be analyzed at least monthly, unless otherwise directed by ADEQ.

(4) *E. Coli* must be sampled if existing sewer system components are being tested.

(5) The monitoring frequencies shown are applicable unless modified in writing by ADEQ for a specific discharge source (see Appendix A, Part A.1.).

Key to List of Water Quality Parameters Potentially Monitored:

C	Total Residual Chlorine or alternative disinfectant if used		
COC	Constituents of Concern	O&G	Oil & Grease
DoF	Duration of flow	pH	pH
E	*E. Coli*	NTU	Turbidity
FR	Flow rate		

TABLE D.

De Minimis Discharges to

Outstanding Arizona Waters or Impaired Waters

Due to the variability of standards for specific waters in these classes, the need for additional limits or monitoring on discharges to these waters will be reviewed by ADEQ on a case-by-case basis. At a minimum, the permittee will be required to ensure that the parameters listed in the table below do not cause or contribute to an exceedance of water quality standards as listed in A.A.C. R18-11-109, and R18-11 Appendix A. For a list of specific limits on specific waters in these groups, refer to:

Outstanding Arizona Waters: any site-specific standards adopted in accordance with A.A.C. R18-11-115.

Impaired Waters: Arizona Water Quality Limited Waters 303(d) List (2006-2008 or most recent version) and any waterbody with a TMDL.

Monitoring Requirements (1)

Discharge Activity	Parameters	Minimum Monitoring Frequency (5)
Potable water systems		
Limited Duration Potable Water System O&M Flushing; Well Flushing	FR, DoF, C (2), COC	Per discharge (3)
Potable Water System post-repair flushing; tank/reservoir draining	FR, DoF, C (2), COC	Per discharge
Discharges resulting from system pressure releases, or overflows	FR, DoF, C (2), COC	Per discharge
Discharges from wells that have been approved by ADEQ for drinking water	FR, DoF, C (2), COC	Daily (3)
Subterranean dewatering		
Groundwater from foundation, footer drain, basement, underground structure or construction dewatering, if not contaminated with pollutants or co-mingled with other wastewaters	FR, DoF, NTU (construction dewatering), COC	Per discharge
Water from subterranean seepage (see exclusions in Part I.B.2.)	FR, DoF, COC	Per discharge
Well Development & Maintenance (includes piezometers)		
Well Construction	FR, DoF, NTU, O&G, COC, C (2),	Daily
Well test pumping & purging	FR, DoF, NTU, C (2), O&G, COC	Daily
Discharges from any borehole not fully developed	FR, DoF, NTU, C (2), COC	Daily
Well Rehabilitation using chemical treatment	FR, DoF, C (2), pH, NTU, COC	Per discharge or Daily
Well/piezometer development & purging from areas with contaminated groundwater	FR, DoF, NTU, COC, C (2)	Per discharge or Daily
Hydrostatic Testing		
Groundwater, surface water, or potable water associated with testing of new pipes, tanks, or vessels, or potable water system components.	FR, DoF, C (2), COC,	Per discharge
Groundwater, surface water, or potable water associated with testing of pipes, tanks or vessels previously used to transport oil or gas (see requirements under Part I.B.4.c.).	FR, DoF, NTU, O&G, COC, C (2)	Per discharge
Groundwater, surface water, or potable water associated with testing of components of sewer collection systems or reclaimed water systems.	FR, DoF, E (4), COC, NTU, C (2)	Per discharge
Other		

Specific approvals (Part I.B.7.)	(As specified by ADEQ)

(1) For requirements for reporting results of monitoring, see Appendix A, Part B.1.

(2) Total Residual Chlorine or alternative disinfectant is required to be sampled only when present in the source water, or where chlorine or halogenated disinfectant agents have been added.

(3) For unplanned discharges or those that occur on a frequent and regular basis, a statement describing the average flow rate, duration of discharge, and discharge characterization may justify a reduced sampling schedule in lieu of per discharge monitoring. The frequency of monitoring for chlorine or any constituent of concern for these discharges shall be determined by ADEQ upon authorization.

(4) *E. Coli* monitoring required for testing of existing sewer system components.

(5) The monitoring frequencies shown are applicable unless modified in writing by ADEQ for a specific discharge source (see Appendix A, Part A.1.).

Key to List of Water Quality Parameters Potentially Monitored:

C	Total Residual Chlorine or alternative disinfectant if used
COC	Constituents of Concern
DoF	Duration of flow
E	E. Coli
FR	Flow rate
NTU	Turbidity
O&G	Oil & Grease
pH	pH