



February 6, 2004

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Subject: Sampling Plan Amendment
Monthly Groundwater Monitoring Activity
PG&E Topock Compressor Station, Needles, California

Dear Mr. Yue:

This letter transmits the *Sampling Plan Addendum for Evaluating Monitoring Well Sampling Methods, February 2004 Groundwater Monitoring Event* (February 6, 2004 draft). This Sampling Plan Addendum describes the approach, field methods, and procedures to be used to evaluate the groundwater quality results obtained from the low-flow and traditional purge sampling methods from monitoring wells in the floodplain area at the Topock site. A comparison field test of groundwater sampling methods was recommended during recent technical discussions involving DTSC, PG&E, and members of the Topock Consultative Workgroup (CWG).

It is our understanding that DTSC and CWG comments on the proposed plan will be discussed in a teleconference scheduled for February 12, 2004. Pending DTSC approval, PG&E is preparing to conduct the proposed sampling test as part of the upcoming Monthly groundwater monitoring event, scheduled for the week of February 16, 2004.

If you have any questions on the sampling plan or groundwater monitoring program, please call me at (925) 974-4081.

Sincerely,

for Linda Gonsalves
Senior Project Manager
Environmental Services

Enclosures:
Sampling Plan Amendment, February 2004 Groundwater Monitoring Event

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Sampling Plan Addendum for Evaluating Monitoring Well Sampling Methods February 2004 Groundwater Monitoring Event PG&E Topock Project

DRAFT - February 6, 2004

This technical memorandum presents an Addendum to the Sampling Plan for monthly groundwater monitoring being performed at Pacific Gas and Electric Company's (PG&E) Topock compressor station near Needles, California. The monthly monitoring activity is part of the groundwater and surface water monitoring program (GMP) being performed under a Corrective Action Consent Agreement (CACCA) issued for the Topock site by the California Department of Toxics Substances Control (DTSC). CH2M HILL is performing the GMP activities for PG&E.

BACKGROUND

Since November 2003, at DTSC's request, PG&E has been conducting monthly sampling of selected monitoring wells at the Topock site to provide for more frequent groundwater monitoring along the Colorado River floodplain. The wells monitored in the Monthly program are MW-21, MW-27, MW-28, MW-30-30, MW-30-50, MW-32-20, MW-32-35, MW-33-40, MW-33-90, MW-34-55, and MW-34-80 (Figure 1). The monthly sampling and analysis activities are performed following the DTSC-approved *Sampling Plan for Monthly Groundwater Monitoring, PG&E Topock Project*, dated November 4, 2003 and related *Sampling and Analysis Plan for September 2003 Quarterly Groundwater Monitoring*, dated September 4, 2003 (PG&E 2003a, 2003b).

As shown on Figure 1, ten of the eleven monitoring wells in the Monthly program are located on the Colorado River floodplain on U.S. Bureau of Land Management property (eight wells) and U.S. Fish and Wildlife land (two wells). All of the well sites on the river floodplain are in limited access sensitive habitat area not accessible to conventional or 4 wheel-drive sampling vehicles. Due to the limited access to these well sites, the floodplain wells are accessed by sampling crews via compact all terrain vehicle (ATV) and sampled with dedicated or disposable sampling systems using low-flow groundwater purging and sampling techniques (herein referred to as **Low-Flow Method**).

All other groundwater wells in the Topock GMP are sampled from dedicated submersible well pumps using a higher-rate purging technique involving the removal of multiple well-casing volumes prior to sampling (herein referred to as **Well-Volume Method**). The concepts, applicability, and purging considerations of the Low-Flow and Well-Volume groundwater sampling methods are described and detailed in U.S. Environmental Protection Agency (U. S. EPA) guidance documents (Puls and Barcelona, 1996; Yeskis and Zavala, 2002) and industry standard operating procedures (ASTM D-6771-02, 2002).

PURPOSE AND TEST APPROACH

The purpose of this Sampling Plan Addendum is to describe the approach, field methods, and procedures to be used to evaluate the groundwater quality results obtained from the **Low-Flow** and **Well-Volume** methods from monitoring wells in the floodplain area at the Topock site. A "comparison field test" of groundwater sampling methods for these wells was recommended during recent technical discussions involving DTSC, PG&E, and members of the Topock Consultative Workgroup (CWG).

The groundwater sampling method evaluation proposed in this Addendum involves the following steps and activities:

1. Conduct a comparison field test of the low-flow and well-volume purging and sampling methods on the ten floodplain wells in the monthly program. Samples will be collected and analyzed for hexavalent chromium [Cr(VI)] using Method SW 7199 and total dissolved chromium [Cr(T)] using Method SW 6010B. The comparison sampling is proposed to be conducted during the upcoming monthly monitoring event, scheduled for February 18-19, 2004.
2. Based on comparison test results, evaluate all sampling methods (e.g., low-flow, well-volume, or modified methods) applicable for the monitoring wells and field conditions in the floodplain area.
3. Prepare an evaluation report for DTSC and CWG review, that summarizes the results of the comparison test and presents recommendations for the sampling methods to be used for ongoing monitoring of the floodplain wells.
4. Based on DTSC and the CWG comments and consensus, prepare a updated Sampling Plan for the Topock GMP.

During the period of the comparative test and agency/CWG review, the floodplain wells will be sampled using the current low-flow method per the existing GMP sampling plans (PG&E, 2003a, 2003b). A brief summary of the floodplain wells, the current sampling methods, and the proposed comparison test activities and procedures are described below.

EXISTING SAMPLING PROCEDURES

Table 1 summarizes well construction and sampling information for the ten floodplain wells monitored in the Monthly program. The groundwater monitoring wells in the floodplain area are sampled by low-flow method using the following methods and equipment:

- Peristaltic pumps, utilizing disposable or dedicated tubing with pump intakes placed in the middle of the well screen (see Table 1 for wells and screen depths). The peristaltic pump method is applicable for low-flow sampling in wells where static water levels are < 25 feet below ground surface.
- Battery-powered, adjustable-rate submersible purge pumps, utilizing dedicated or disposable tubing with pump intakes placed in the middle of the well screen (see Table 1 for wells and screen depths). The deeper wells in the floodplain area are generally sampled with the dedicated purge pump equipment.

Low-Flow Methods and Criteria

The objective of low-flow purging is to remove water from the monitoring well screen interval in a manner that minimizes stress to the groundwater/aquifer system (reducing potential mobilization of clay/silt sediment), and thereby obtain samples representative of groundwater conditions within a known or specified volume of the aquifer (Puls and Barcelona, 1996; Yeskis and Zavala, 2002). In low-flow sampling, the well pump intake is placed in the middle-portion of the well screen and water is removed at purge rates between 0.3 and 1.0 liters per minute (depending on aquifer recharge).

Using the low-flow method, the following two criteria are used to assess the time for collection of water samples representative of the aquifer:

- The water level in the well is monitored throughout low-flow purging to document stabilized and minimal (i.e., < 0.33 foot) drawdown. Purging at a low-rate, with negligible or minimal drawdown effectively isolates the screen interval from the overlying stagnant casing water so that the water sample is collected from the aquifer interval directly adjacent to the pump system intake.
- Field indicator parameters (pH, specific conductance, oxidation-reduction potential, dissolved oxygen, turbidity) are recorded throughout low-flow purging to document stabilization of water quality parameters, indicating acquisition of formation water from the aquifer. Criteria for determining stabilized water quality parameters and low-flow sample collection are provided in U.S. EPA guidance (Yeskis and Zavala, 2002).

The current Topock GMP utilizes the above-listed criteria during groundwater sampling of floodplain monitoring wells using the low-flow method. The low-flow purging equipment, procedures, and sampling criteria will be used during the proposed comparison sampling test.

PROPOSED SAMPLING METHOD COMPARISON TEST

Table 2 identifies the wells to be evaluated and summarizes the well information, methods/equipment, and procedures to be used for the sampling method comparison test. The ten floodplain monitoring wells (locations shown on Figure 1) will be sampled as follows:

1. Each well will be initially sampled with the **low-flow method** using either peristaltic or adjustable-rate purge pumps. The purging and sampling activities will follow U.S. EPA guidelines and prior GMP procedures (Table 1). The samples collected by the low-flow method for Cr(T) and Cr(VI) analyses will be uniquely identified and all field measurements during purging and sampling will be recorded.
2. Immediately following low-flow sample collection, the purging equipment installed in the well will be replaced (if peristaltic pump) or modified (if purge pump was used for low-flow sampling) to accomplish the **well-volume purging** for sampling. Purging and sampling pump intakes will be within the middle-portion of the well screen (same as the low-flow sampling depth). Either the dedicated or temporary purge pumps (battery- or generator-powered) will be used for the well-volume purging and sampling (Table 2).

3. Samples for Cr(T) and Cr(VI) analyses will be collected from the dedicated (or disposable) tubing on the purge pumps after water quality parameters have stabilized (per U.S. EPA criteria) and a minimum 3-well-casing volumes have been purged from the well (see Table 2 for estimated purge volumes). The water samples collected by the well-volume method will be uniquely identified and all field measurements during purging and sampling will be recorded.

During the sampling method comparison test, field turbidity readings and additional inorganic parameters will be analyzed to evaluate the potential occurrence/mobilization of precipitates and colloidal-sized particles in groundwater. Samples collected from both the low-flow and traditional purge methods will also be analyzed for dissolved aluminum, silica, iron, and manganese to assess the geochemical significance of fine particulate matter (colloids) in the floodplain aquifer.

All non-dedicated/disposable sampling equipment (temporary purge pumps, etc.) will be fully decontaminated between wells sampled during the comparison test. Field rinsate samples for Cr(T) and Cr(VI) will be collected to assess decontamination procedures.

All purge water generated from sampling activities will be temporarily contained at the well sites in 5-gallon buckets and/or 55-gallon containers. At the completion of the sampling day, the purge water will be transferred by purge pump and hose (or by ATV batch transfers) to a water trailer staged near the sampling sites for ultimate consolidation in the GMP purge water holding tank at the compressor station.

SCHEDULE

Pending DTSC and CWG concurrence, the comparison well sampling field test is proposed to be performed during the upcoming February Monthly sampling event, scheduled for February 18-19, 2004. The samples will be submitted to the GMP laboratory for expedited analyses, consistent with the Monthly and Weekly monitoring activities.

The test results will be initially reported to DTSC and the CWG after the laboratory analytical data has been validated, approximately 2 weeks after sampling. A draft report summarizing the comparison test results and recommendations for the GMP sampling activity will be submitted to DTSC and the CWG approximately 4 weeks after sampling. Pending DTSC and CWG comments and concurrence, the Sampling Plan for the GMP will be updated to reflect the confirmed and agreed sampling method to be used for future groundwater sampling of the floodplain wells at the site.

REFERENCES

- ASTM Standards, March 2002 edition, D-6771-02: Standard Practice for Low-Flow Purging and Sampling for Wells and Devices used for Ground-Water Quality Investigations.
- Pacific Gas and Electric Company, 2003a. *Groundwater and Surface Water Monitoring Report, Third Quarter 2003, PG&E Topock Compressor Station, Attachment A – Sampling Plan for Monthly Groundwater Monitoring*, final November 4, 2003.

Pacific Gas and Electric Company, 2003b. *Sampling and Analysis Plan for September 2003 Quarterly Groundwater Monitoring, PG&E Topock Project*, September 4, 2003.

Puls, R. and M. Barcelona, 1996. *Ground Water Issue, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. U.S. EPA/540/S-95/504, April 1996.

Yeskis, D. and B. Zavala, 2002. *Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers*. U.S. EPA/542-S-02-001, TSP Ground Water Forum Issue Paper, May 2002.

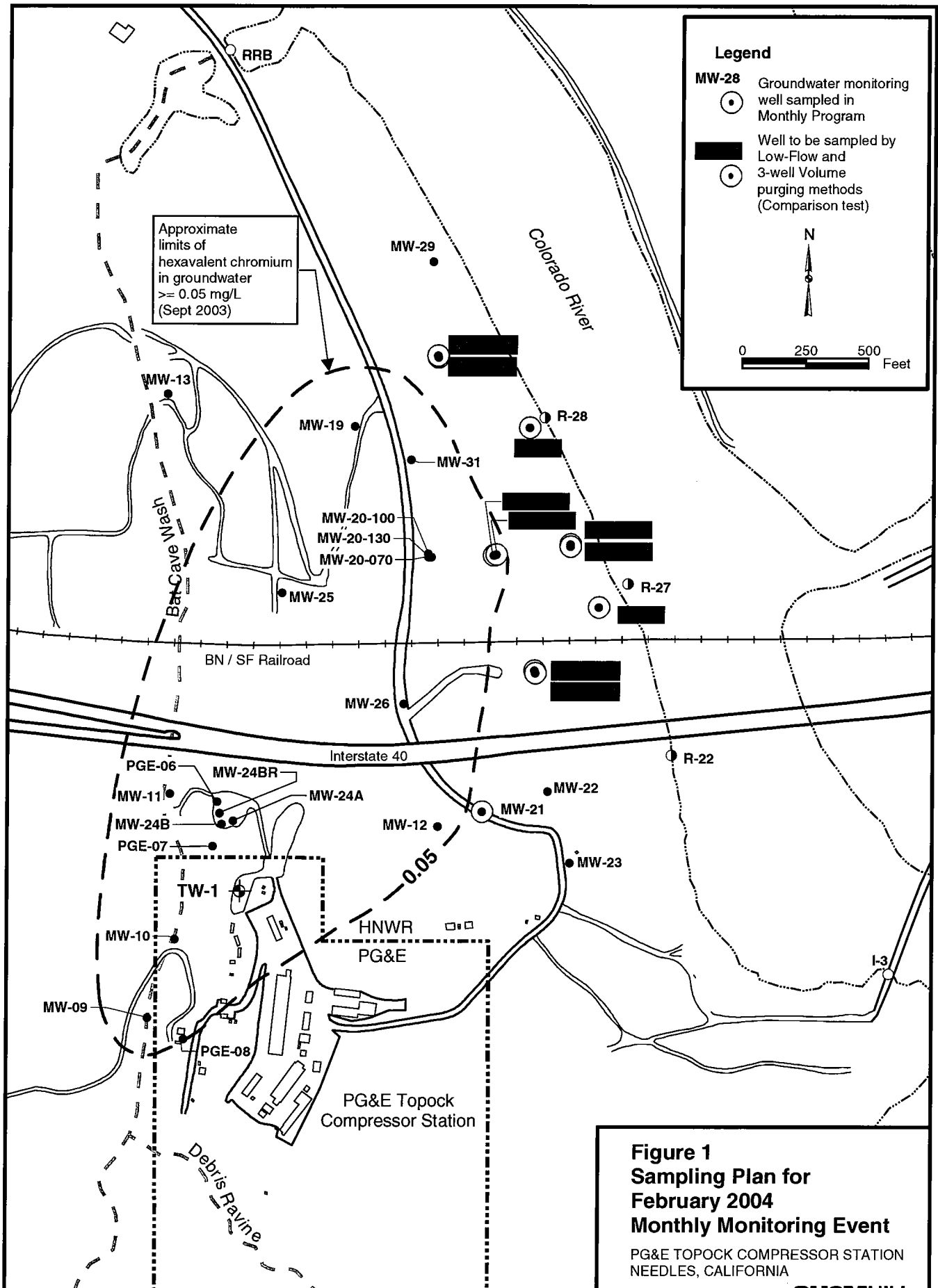


Table 1
WELL CONSTRUCTION AND SAMPLING SUMMARY
 Floodplain Groundwater Monitoring Wells, Topock Monthly Monitoring Program

Well ID	Date Installed	Well Screen Interval (feet BGS)	Screen Length (feet)	Casing Diameter	Jan-2004 Depth to Water (feet BGS)	Jan-2004 Water Column (feet)	One Casing Volume (gallons)	Average Salinity (%)	Current Well Purging & Sampling Method	Jan-2004 Low-Flow Purge Rate (mL/min)	Jan-2004 Volume Purged Low-Flow (gallons)
MW-27	Apr-99	7 - 17	10	2"	5.4	11.6	2.0	0.05	Low-Flow - Peristaltic Pump	540	0.7
MW-28	Apr-99	13 - 23	10	2"	11.4	11.6	2.0	0.10	Low-Flow - Peristaltic Pump	540	0.7
MW-30-30	Apr-99	12 - 32	20	2"	12.5	19.5	3.3	3.80	Low-Flow - Peristaltic Pump	640	1.0
MW-30-50	Mar-03	39 - 49	10	4"	12.3	36.7	24.2	0.20	Low-Flow - Peristaltic Pump	540	0.9
MW-32-20	Mar-03	10 - 20	10	2"	5.8	14.2	2.4	0.70	Low-Flow - Peristaltic Pump	300	0.5
MW-32-35	Mar-03	27.5 - 35	7.5	4"	5.6	29.4	19.4	0.40	Low-Flow - Whale Purge Pump	440	0.5
MW-33-40	Mar-03	28 - 38	10	4"	30.9	7.1	4.7	0.40	Low-Flow - Monsoon Purge Pump	810	1.1
MW-33-90	Mar-03	68 - 88	20	4"	31.1	56.9	37.6	1.10	Low-Flow - Whale Purge Pump	400	0.8
MW-34-55	Jun-03	45 - 55	10	4"	5.4	49.6	32.7	0.20	Low-Flow - Peristaltic Pump	540	0.7
MW-34-80	Jun-03	72 - 82	10	4"	5.1	76.9	50.8	0.80	Low-Flow - Whale Purge Pump	540	0.9

NOTES:

1. Well screen depths in feet below ground surface (BGS), rounded-off to 0.5-foot values.
Water column data from January 13-14, 2004 monthly event and rounded-off to 0.1-foot values.
2. All floodplain wells are completed with above-grade monuments. Top of well casing measure points range from 1.8 to 2.5 feet above ground surface.
Monthly well MW-21 (not listed above) is a flush-mount 4" diameter monitoring well equipped with dedicated electric submersible pump (Well-Volume sampling method).
3. All well sites on Colorado River floodplain (dredged sand and floodplain soils) are not accessible by vehicle.
Sampling crew access by foot or compact all terrain vehicle (ATV) only.
4. All floodplain monitoring wells are currently purged and sampled by Low-Flow method using following sampling equipment:
 - peristaltic pump (wells with shallow-depth water levels)
 - battery-powered, adjustable-rate purge pumps (Whale or Monsoon models).

Table 2

DRAFT 02/06/2004

PROPOSED WELL SAMPLING COMPARISON TEST
Floodplain Groundwater Monitoring Wells, Topock February 2004 Monthly Monitoring Event

Well ID	Well Screen Interval (feet BGS)	Well Screen Length (feet)	Jan-2004 Depth to Water (feet BGS)	Jan-2004 Water Column (feet)	One Casing Volume (gallons)	February 2004 Comparison Test Samples		Three Casing Volumes (gallons)
						Low-Flow Pump	Well-Volume Pump	
MW-27	7 - 17	10	5.4	11.6	2.0	Peristaltic Pump	Whale Purge Pump	6
MW-28	13 - 23	10	11.4	11.6	2.0	Peristaltic Pump	Whale Purge Pump	6
MW-30-30	12 - 32	20	12.5	19.5	3.3	Peristaltic Pump	Whale Purge Pump	10
MW-30-50	39 - 49	10	12.3	36.7	24.2	Peristaltic Pump	Whale Purge Pump	73
MW-32-20	10 - 20	10	5.8	14.2	2.4	Peristaltic Pump	Whale Purge Pump	7
MW-32-35	27.5 - 35	7.5	5.6	29.4	19.4	Monsoon Purge Pump	Monsoon Purge Pump	58
MW-33-40	28 - 38	10	30.9	7.1	4.7	Monsoon Purge Pump	Monsoon Purge Pump	14
MW-33-90	68 - 88	20	31.1	56.9	37.6	Whale Purge Pump	Whale Purge Pump	113
MW-34-55	45 - 55	10	5.4	49.6	32.7	Peristaltic Pump	Whale Purge Pump	98
MW-34-80	72 - 82	10	5.1	76.9	50.8	Whale Purge Pump	Whale Purge Pump	152

NOTES:

- 1 For the Sampling Method Comparison Test, the ten floodplain wells will be sampled as follows:
 - 1st - with **Low-Flow Method**, using either peristaltic pump or adjustable-rate purge pump at purging rates of 0.4 to 1.0 liters per minute
 - 2nd - with **Well-Volume Method**, using adjustable-rate purge pump at increased discharge rates ranging from 1-3 gallons per minute
 Well pumps in **bold** are currently dedicated sampling pumps. A temporary purge pump will be used to conduct the Well-Volume sampling in the other wells.
2. Well screen depths in feet below ground surface (BGS), rounded-off to 0.5-foot values.
 Water column data from January 13-14, 2004 event, rounded-off to 0.1-foot values.
3. All well sites on Colorado River floodplain (dredged sand and floodplain soils) are not accessible by vehicle.
 Sampling crew access by foot or compact all terrain vehicle (ATV) only.