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December 13, 2005

Norman Shopay
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Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Interim Measures Compliance Monitoring Program
Addendum to the Compliance Monitoring Plan for the Interim Measures No. 3 Injection Area
PG&E Topock Compressor Station, Needles, California

Dear Mr. Shopay:

Enclosed is the *Addendum to the Groundwater Compliance Monitoring Plan for the Interim Measures No. 3 Injection Area* at the PG&E Topock Compressor Station. This document is submitted in compliance with Condition No. 15 of DTSC's July 15, 2005 letter. As directed in Condition No. 15, this Addendum to the June 17, 2005 Compliance Monitoring Plan contains the response to Comments 5 and 6 from DTSC's Geological Service Unit (GSU) Technical Memorandum that was attached to the DTSC letter. Specifically, this document presents procedures for determining Action Levels and the proposed Action Levels that result from applying the procedures.

This Addendum is also being submitted to the Colorado River Basin Regional Water Quality Control Board, in compliance with Monitoring and Reporting Program (MRP) associated with Board Order No. R7-2004-0103.

If you have any questions on the Addendum, please contact me at (805) 546-5243.

Sincerely,

Julie Eakins for Yvonne Meeks

cc. Liann Chavez/CRBRWQCB
Jose Cortez/ CRBRWQCB
Kate Burger/ DTSC

Enclosure

Addendum to the Compliance Monitoring Plan for the IM No. 3 Injection Area PG&E Topock Compressor Station

DATE: December 13, 2005

Introduction

This technical memorandum presents an Addendum to the Compliance Monitoring Plan (CMP) for the Interim Measure No. 3 (IM3) injection well field area. Figure 1 provides a map of the project area. In their letter dated July 15, 2005 (DTSC, 2005a), the California Department of Toxic Substances Control (DTSC) granted conditional approval to begin injection in the IM3 injection well field. The letter included a memorandum dated July 15, 2005 (DTSC, 2005b), that provided comments from DTSC's Geological Service Unit (GSU). Condition No. 15 of the DTSC letter requires the preparation of an addendum to the June 17, 2005 CMP for the injection well field. This Addendum to the CMP provides updates and revisions to:

- The baseline groundwater quality data set (Comment 3 of GSU memorandum).
- Data evaluation procedures for evaluating compliance with water quality requirements identified in the RWQCB Waste Discharge Requirements, i.e., recalculate target and reference concentrations (Comment 5 of GSU memorandum).
- Action levels presented in the CMP contingency plan (Comment 6 of GSU memorandum).

The GSU memorandum provided two separate sets of recommended interim standards; the first labeled "Target Values and Action Levels for Selected Monitoring Parameters", and the second labeled "Reference Concentrations for Selected Monitoring Parameters". Target Values and Action Levels were developed as part of the Compliance Monitoring Plan, and are used to evaluate compliance with applicable WDRs. Reference Concentrations were included as a part of the July 15, 2005 GSU technical memorandum, and were recommended by DTSC to evaluate observation well data. These interim standards are presented in Table 1 and Table 2. The Contingency Plan is triggered only by Action Levels, and not by Reference Concentrations. However, this CMP Addendum establishes procedures for determining potential adverse impacts to any IM3 groundwater quality parameter, and will be applied to both sets of parameters.

Baseline Data Set

The baseline data set used in this Addendum comprises all sampling events for CW and OW series wells, including the data used in the June 2005 analysis, the three additional rounds of sampling (July, August, and September) for OW series wells, and one round of sampling (September) for CW series wells. Figure 2 provides a map of these well locations. The addition of the monthly sampling rounds increased the data set to over 2100 measurements. These data were presented and summarized in the Compliance Monitoring Program Groundwater Monitoring Report, Third Quarter, 2005 (CH2M HILL, 2005), and are not reproduced here. Three individual samples were not used in the analyses because they were believed to be influenced by injection of treated groundwater. The deleted samples include well OW-02D August and September 2005, and OW-02M September 2005. All other sample points used in the analyses are believed to be unaffected by injection, and representative of non-impacted conditions.

Figure 3a, 3b and 3c are graphical representations of the current baseline groundwater quality data set. The data set has been divided into individual compounds, with results for each well displayed in concentration versus time plots. The time axis is the same for all compounds, and represents approximately one year (Sept 2004 to September 2005). The wide spread between high and low values is clearly evident for most of the compounds. In general, there appears to be little change to the high and low values of the entire data set with the addition of the three most recent monthly sampling rounds, but there are some exceptions to this. Sulfate (Figure 3C) illustrates how the addition of recent sample results changes the highest value. In this example, the value of sulfate in well CW-03D was reported as 672 mg/L in September 2005, which exceeded the previous high of 616 mg/L reported in well OW-02D in July 2005. Neither of these samples comes from a well affected by injection, so the change is not a reflection of impacts from treated water injection.

This exception, that a new high value for any compound can be established at non-impacted wells with additional sampling, is related to both the amount of samples available and to the nature of the aquifer water quality. As more samples are collected, the "natural" range will become better defined and new high values will occur less frequently. However, the nature of the groundwater quality in the IM3 injection area is such that a new high value can occur during any sampling event, even if less frequently. This presents difficulties in using a single Action Level for determining impact, because it is likely that future sampling will result in a new "naturally occurring" high value, which in turn will falsely trigger the contingency plan.

This Addendum describes procedures to minimize the effect of new high non-impacted values, by applying a two step statistical analysis. The first step uses the current baseline data set to establish a baseline value for each compound and setting this value at a confidence level so that an exceedance is likely due to an outside influence (such as injection). The second step uses the analytical results for the exceeding compound from the entire sampling event, and compares the symmetry of those results to the symmetry of the current baseline data set. In this way, changes seen within a single compound can be used to determine when change is local versus site-wide. Additional detail on how these procedures were selected, and how they will be implemented in IM3 Compliance Monitoring, is provided in the following sections.

Statistical Methods for Establishing Action Levels

Establishing an action level for comparison with future groundwater data involves an assessment of previously obtained baseline data to help understand what concentration range can be considered typical. There are a wide variety of methods to calculate an estimate of the upper tail of the baseline population for prospective use as an action level. Regardless of the choice of this action level, there is the real possibility that concentrations drawn randomly from a population equivalent to the baseline data could be higher than the action level. There is also the possibility that concentrations drawn randomly from a population shifted higher in concentration than the baseline data could fall below the action level. Triggering the contingency plan for random occurrences, or not triggering contingency for adverse impacts masked by large variability, are exactly the type of outcomes that need to be taken into account when developing Action Level procedures.

Statistical Methodology

Most statistical methods require some assumption of the statistical distribution of the sampled population (the target population). When no statistical distribution is considered appropriate, it is often prudent to choose a non-parametric method. To evaluate the statistical distribution in the baseline data set, data for each parameter were checked for adherence to normality via the Shapiro-Wilk test (USEPA 2000). If the p-value (probability of encountering the observed deviations from normality, assuming the parent distribution is normally distributed) for this test was greater than 0.05, the assumption of normality could be accepted. Of the 32 parameters evaluated, only two (fluoride and sulfate) had p-values exceeding 0.05. Similarly, adherence to lognormality can be checked by applying the Shapiro-Wilk test to log-transformed data. Data for only three parameters (magnesium, molybdenum, and potassium) exhibit lognormality via this test. The p-values for normality and lognormality are presented in Table 3. (Note: non-detect values were used in the analysis at the detection limit level).

A nonparametric method was used because of the large number of cases where the assumptions of normality or lognormality were not accepted (Table 3). This decision was based not only on the low number of parameters that could be assigned an assumption of normality or lognormality, but also on the large number of samples available in the baseline data. One consideration in selecting a nonparametric Upper Tolerance Limit (UTL) application is having sufficient data to provide an estimate of the 95th percentile (with 95% confidence). For instance, if the sample set is smaller, one may only be able to provide an estimate of a lower percentile, say the 80th, with 95% confidence. In reviewing the nonparametric UTLs for the current baseline data set, they came very close to being estimates of the 95th percentile (Table 3). Therefore, the number of samples available for the nonparametric method appears to be sufficient, and the method is appropriate for use with the IM3 data. (Note: UTLs were calculated for each parameter detected at least once. No UTL was calculated for ammonia as nitrogen, mercury, or thallium, as these anaytes were not detected in the current baseline data set. The detection limit serves as the action level for these parameters.)

A non-parametric UTL is computed by first ranking the concentrations, and then choosing the lowest-ranked detected concentration that provides a coverage of 95 percent of the data set,

with 95 percent confidence. These are presented in Table 3. For data sets with fewer than 59 points, 95 percent coverage is not possible with 95 percent confidence, even when the maximum concentration is assigned as the UTL. For all of the parameters in this evaluation, however, the number of samples provided estimates very close to the 95th percentile - ranging from the 94.9 to the 96.3 percentiles. The estimated percentile (with 95 percent confidence) associated with the maximum concentration can be calculated using the following equation:

$$p = B_{0.95,n,m} \quad (1)$$

where B is a beta distribution defined by n (the number of sample results) and m (the rank of the result from all n results).

pH required a Lower Tolerance Limit as well as a UTL, since pH values could be of concern if they are too high or too low. For pH, the targeted 5th and 95th percentiles were almost achieved, with actual estimates (with 95% confidence) of the 4.5th and 95.5th percentiles.

Table 4 presents the Action Levels for Selected Monitoring Parameters, and Reference Concentrations for Selected Monitoring Parameters, which were developed using the 95/95 UTL statistical procedures.

Screening Against Action Levels

The statistically calculated values chosen to serve as the Action Levels for the Topock site are the 95/95 (95 percent confidence, 95th percentile) UTLs. This statistic is discussed in RCRA guidance for groundwater background comparisons (USEPA 1989, 1992). The UTL is an upper confidence limit on an elevated percentile of the baseline population. Concentrations higher than an elevated percentile— in this case, the 95th percentile—of a population do exist. Exceedances of the Action Level would be expected to occur in 5 percent of the future non-impacted groundwater samples. Future groundwater sample results will be screened against the Action Levels as an initial step toward determining if there is a change from baseline conditions.

Central Tendency Tests to Confirm an Exceedance Identified in Screening

If one or more future groundwater concentrations exceeds the Action Level, further analysis will be performed to determine whether the exceedance is part of an overall upward shift of parameter concentrations (over baseline), or simply a randomly high concentration above the 95th percentile but within the normal baseline range. To perform this test, a central tendency comparison will be performed using the Wilcoxon Rank Sum test.

The Wilcoxon Rank Sum test, a non-parametric central tendency comparison between two sample populations, is discussed in the United States Environmental Protection Agency (USEPA) and DTSC guidance (USEPA 1992, 2000; DTSC 1997). The Wilcoxon Rank Sum test makes use of the ranks of the data to make a judgment on whether there is an overall upward shift in future groundwater concentrations versus historic baseline concentrations. It is essentially a non-parametric version of a two-sample t test. Thus, as a comparison of central tendency, it evaluates the overall data distributions, rather than focusing only on comparison of the upper tails of the baseline with future groundwater concentrations.

If an exceedance of an Action Level occurs, a second evaluation will be conducted, via the Wilcoxon Rank Sum test. To conduct this evaluation, the data from all wells in the sampling event for the parameter values that exceed action levels will be compared with the data from the baseline data. Non-detect values will be used at half the reporting limit. If the two data sets were found to be significantly different (p-value greater than 0.05), an adverse impact would be confirmed and the contingency plan would be triggered. Use of the Wilcoxon Rank Sum test in conjunction with the Action Levels will prevent triggering the contingency plan on the basis of randomly occurring high concentrations that are above the 95th percentile but still within the normal range of basline concentrations.

Example Evaluation of Groundwater Quality Changes

As a example of how this process will be applied, a statistical comparison was performed using the data from the September 2005 CMP sampling event. Using the previously described procedures, the individual sample results are compared to the Action Level from Table 4. For this event, no concentrations exceeded the Action Levels presented in Table 4, so the Wilcoxon Rank Sum test did not need to be performed. If any of the parameters listed in Table 5 had exceeded their Action Level, the rank sum for the September data set for the exceeding compound would be compared to the rank sum of the baseline data. A comparison of the Wilcoxan rank sum for both data sets would be made, and if they were found to be significantly different (p-value greater than 0.05), an adverse impact would be confirmed and the contingency plan would be triggered.

It is worth noting that the larger the baseline data set (either UTL or rank sum), the more confidence there is in the application of these statistical tests. It is therefore recommended that the baseline data set continue to be updated as long as the data are determined to be unaffected by injection.

References

CH2M HILL. 2005. Compliance Monitoring Program Groundwater Monitoring Report, Third Quarter, 2005, Topock Compressor Station, Needles, California. October 14.

Department of Toxic Substances Control (DTSC). *Selecting Inorganic Constituents as Chemicals of Potential Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities,* Sacramento, CA. 1997.

_____. 2005a. Letter to PG&E. " Conditional Approval for the Start-up and Operation of the Interim Measures No. 3 Treatment System and Injection Wells, Pacific Gas & Electric Company, Topock Compressor Station, Needles, California". July 15.

_____. 2005b. Letter to PG&E. "Memorandum: Interim Measures No. 3 Injection Well Field Investigation and Monitoring, Pacific Gas & Electric Company, Topock Compressor Station, Needles, California". July 15.

United States Environmental Protection Agency (USEPA). *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance.* 1989.

_____. *Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance.* 1992.

_____. *Guidance for Data Quality Assessment. Practical Methods for Data Analysis*. Office of Research and Development. 2000.

_____. *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites, Office of Emergency and Remedial Response.* 2002.

Tables

TABLE 1
Recommended Interim Target Values and Action Levels for Selected Monitoring Parameters
Groundwater Compliance Monitoring Plan
Interim Measures No 3. Compliance Monitoring PG&E Topock Compressor Station Needles, California

Constituent	Range	units	Target Value	Action Level
Aluminum	ND (52)	μg/L	52	52
Ammonia (as N)	ND (0.5)	mg/L	0.5	0.5
Barium	0.0319 - 0.119	mg/L	0.12	0.12
Boron	0.374 - 1.80	mg/L	1.8	1.8
Copper	1.55 - 10.6	μg/L	11	11
Fluoride	ND (0.5) - 3.58	mg/L	3.6	3.6
Hexavalent Chromium	ND(1.0) - 32.6	μg/L	33	33
Iron (total)	ND (0.021) - 0.407	mg/L	0.41	0.41
Lead	ND (1) - 2.9	μg/L	3	3
Manganese	1.07 - 577	μg/L	580	580
Molybdenum	11.5 - 89.3	μg/L	98	98
Nickel	ND (1) - 20	μg/L	20	20
Nitrate as N	0.1011 - 3.18	mg/L	3.2	3.2
pH	7.53 - 8.62	units	8.62	8.62
Sulfate	107 - 571	mg/L	570	570
TDS	908 - 10,800	mg/L	10,800	10,800
Total Chromium	ND(1.0) - 28.1	μg/L	28	28
Zinc	ND (10) - 80.2	μg/L	80	80

TABLE 2
Recommended Interim Reference Concentrations for Selected Monitoring Parameters
Groundwater Compliance Monitoring Plan
Interim Measures No 3. Compliance Monitoring PG&E Topock Compressor Station Needles, California

Constituent	units	Reference Concentration
Chloride	mg/L	5,100
Magnesium	mg/L	29
Potassium	mg/L	35
Sodium	mg/L	3,000
Antimony	µg/L	< 5
Arsenic	µg/L	4.8
Beryllium	µg/L	< 3
Cadmium	mg/L	< 3
Cobalt	µg/L	< 3
Mercury	µg/L	< 0.2
Selenium	µg/L	17
Silver	µg/L	20
Thallium	µg/L	< 15
Vanadium	µg/L	0.12

TABLE 3
Background Statistics
Interim Measures No. 3 Compliance Monitoring Program PG&E Topock Compressor Station Needles, California

Parameter	Number of Detcts	Number of Samples	p-value for Normality	Can Data Defensibly be Considered Normally Distributed?	p-value for Lognormality	Can Data Defensibly be Considered Lognormally Distributed?	Mean	Nonparametric UTL	Estimated Percentile (with 95% Confidence)
Aluminum	1	65	0.000	no	0.000	no	0.0286	0.202	95.5
Ammonia as nitrogen	0	51	0.000	no	0.000	no	0.25	NA	NA
Antimony	1	65	0.000	no	0.000	no	0.00235	0.0111	95.5
Arsenic	8	65	0.000	no	0.000	no	0.00461	0.0144	95.5
Barium	69	69	0.006	no	0.000	no	0.0604	0.119	95.8
Beryllium	1	57	0.000	no	0.000	no	0.00155	0.0088	94.9
Boron	60	60	0.016	no	0.000	no	1.11	1.85	95.1
Cadmium	1	57	0.000	no	0.000	no	0.00161	0.0105	94.9
Chloride	58	58	0.019	no	0.000	no	2330	5260	95.0
Chromium	69	106	0.000	no	0.000	no	0.00816	0.0266	95.6
Cobalt	2	57	0.000	no	0.000	no	0.00162	0.01	94.9
Copper	16	69	0.000	no	0.000	no	0.00435	0.0218	95.8
Fluoride	46	58	0.126	Yes	0.000	no	2.08	4.59	95.0
Hexavalent chromium	48	77	0.000	no	0.000	no	0.00879	0.0326	96.2
Iron	13	80	0.000	no	0.000	no	0.148	0.407	96.3
Lead	10	69	0.000	no	0.001	no	0.00197	0.0102	95.8
Magnesium	69	69	0.002	no	0.346	Yes	12.9	29.5	95.8
Manganese	36	72	0.000	no	0.000	no	0.12	0.81	95.9
Mercury	0	57	0.000	no	0.000	no	0.000118	NA	NA
Molybdenum	69	69	0.002	no	0.664	Yes	0.034	0.0893	95.8
Nickel	23	69	0.000	no	0.000	no	0.00394	0.0201	95.8
Nitrate as Nitrogen	55	58	0.000	no	0.098	Yes	1.13	3.81	95.0
Potassium	69	69	0.001	no	0.225	Yes	20.1	46.6	95.8
Selenium	3	65	0.000	no	0.000	no	0.00464	0.0186	95.5
Silver	3	57	0.000	no	0.000	no	0.00301	0.0649	94.9
Sodium	69	69	0.007	no	0.000	no	1340	3160	95.8
Sulfate	58	58	0.104	Yes	0.000	no	345	672	95.0
Thallium	0	57	0.000	no	0.000	no	0.00664	NA	NA
Total dissolved solids	69	69	0.009	no	0.000	no	4330	10800	95.8
Vanadium	54	57	0.000	no	0.002	no	0.0257	0.121	94.9
Zinc	37	69	0.000	no	0.001	no	0.0276	0.248	95.8
pH *	65	65	0.000	no	0.000	no	7.98	7.60 / 8.89	4.5 / 95.5

* pH requires upper and lower tolerance limits

TABLE 4
Recommended Action Levels and Reference Concentrations for Selected Monitoring Parameters
Groundwater Compliance Monitoring Plan
Interim Measures No 3. Compliance Monitoring PG&E Topock Compressor Station Needles, California

Constituent	units	Action Level
Aluminum	μg/L	202
Ammonia (as N)	mg/L	0.5
Barium	mg/L	0.119
Boron	mg/L	1.85
Copper	μg/L	21.8
Fluoride	mg/L	4.59
Hexavalent Chromium	μg/L	32.6
Iron (total)	mg/L	40.7
Lead	μg/L	10.2
Manganese	μg/L	810
Molybdenum	μg/L	89.3
Nickel	μg/L	20.1
Nitrate as N	mg/L	3.81
pH	units	7.60 / 8.89
Sulfate	mg/L	672
TDS	mg/L	10,800
Total Chromium	μg/L	28
Zinc	μg/L	248

Constituent	units	Reference Concentration
Chloride	mg/L	5,260
Magnesium	mg/L	29.5
Potassium	mg/L	46.6
Sodium	mg/L	3,160
Antimony	μg/L	11.1
Arsenic	μg/L	14.4
Beryllium	μg/L	8.8
Cadmium	mg/L	10.5
Cobalt	μg/L	10
Mercury	μg/L	< 0.2
Selenium	μg/L	18.6
Silver	μg/L	64.9
Thallium	μg/L	< 15
Vanadium	μg/L	0.121

TABLE 5

Results of Groundwater Monitoring, September 2005

Groundwater Compliance Monitoring Plan

Interim Measures No. 3 Injection Area

PG&E Topock Compressor Station

		Location ID	CW0-01M	CW-01D	CW-02M	CW-02M (FD)	CW-02D	CW-03M	CW-03D	CW-04M	CW-04D	OW-01S	OW-01M	OW-01M (FD)	OW-01D	OW-02S	OW-02M	OW-02D	OW-05S	OW-05M	OW-05D
		Sample Date	9/15/05	9/15/05	9/15/05	9/15/05	9/15/05	9/16/05	9/16/05	9/13/05	9/13/05	9/15/05	9/14/05	9/14/05	9/14/05	9/14/05	9/14/05	9/14/05	9/13/05	9/13/05	9/13/05
Method	**Analytes**	**Units**																			
300	Chloride	mg/L	1600	3320	1880	1870	4170	2960	4930	1560	3710	589	1680	1690	2910	418	1730	1770	392	2580	3370
300	Fluoride	mg/L	2.34	0.951	2.30	2.30	0.982	2.57	1.40	1.50	1.01	2.04	1.99	2.08	1.16	3.59	2.22	1.78	1.98 J	1.07	1.26
300	Sulfate	mg/L	318	379	342	341	601	464	672	240	534	126	325	328	439	128	368	381	98.5	401	501
1201	Specific conductance	UMHOS/CM	5630	10900	6370	6370	15600	8700	18000	5880	12700	2370	6270	6270	9960	1880	6480	6440	1780	9000	11700
1501	pH	PHUNITS	7.80	7.79	8.01	8.00	7.85	7.76	7.72	7.83	7.76	7.94	7.95	7.95	7.82	8.12	7.93	8.15	7.98	7.84	7.83
1601	Total dissolved solids	mg/L	2990	6230	3500	3440	8770	4740	9550	3310	7470	1330	3430	3360	5600	1020	3430	3500	965	5060	6640
1801	Turbidity	NTU	1.04	ND (1.0)	1.03	ND (1.0)	1.01	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	2.19	ND (1.0)	1.29	2.52	2.75	ND (1.0)	ND (1.0)	1.36	ND (1.0)	ND (1.0)
3101	Alkalinity, as carbonate	mg/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
3101	Alkalinity, bicarb. as caco	mg/L	56.1	35.7	51.0	48.4	33.1	45.9	33.1	51.7	31.0	68.8	36.2 J	46.5 J	36.2	103	41.3	38.7	80.1	41.3	31.0
3101	Alkalinity, total as caco3	mg/L	56.1	35.7	51.0	48.4	33.1	45.9	33.1	51.7	31.0	68.8	36.2 J	46.5 J	36.2	103	41.3	38.7	80.1	41.3	31.0
3502	Ammonia as nitrogen	mg/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
3533	Nitrate/Nitrite as Nitrogen	mg/L	1.11	0.972	0.908	0.96	0.28	0.642	0.304	1.18	0.188	2.42	1.35	1.35	0.601	3.40	2.33	2.99	2.68	0.69	0.334
6010B	Aluminum	mg/L	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)	ND (0.052)
6010B	Boron	mg/L	1.04	1.39	1.14	1.06	1.74	1.07	1.67	0.906	1.51	0.32	1.12	1.08	1.47	0.743	1.15	1.29	0.398	1.32	1.59
6010B	Calcium	mg/L	122	290	110	103	355	205	422	149	367	97.0	124	137	247	43.1	144	90.3	73.7	225	314
6010B	Chromium	mg/L	0.0178	0.0016	0.0155	0.0147	0.0016	0.0081	ND (0.001)	0.019	ND (0.001)	0.0168	0.0073	0.0075	0.0015	0.0224	0.0039	ND (0.001)	0.0218	0.0106	ND (0.001)
6010B	Iron	mg/L	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
6010B	Magnesium	mg/L	9.41	19.1	7.09	6.33	13.9	14.0	29.2	10.4	21.9	14.6	8.90	8.39	17.0	5.33	9.84	4.65	10.1	13.2	16.6
6010B	Manganese	mg/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.259	ND (0.05)	0.181	ND (0.05)	ND (0.05)	ND (0.05)	0.17	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.113
6010B	Potassium	mg/L	19.3	22.9	16.0	14.2	30.9	21.1	39.8	20.9	36.6	13.0	20.2	18.8	29.7	9.13	19.3	21.5	11.3	27.7	32.8
6010B	Sodium	mg/L	1430	2080	1330	1180	2950	1550	3030	1230	2490	361	1290	1250	1990	452	1290	1570	304	2050	2450
6020A	Antimony	mg/L	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)
6020A	Arsenic	mg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
6020A	Barium	mg/L	0.0566	0.0478	0.0481	0.0453	0.0449	0.0413	0.0693	0.0697	0.0375	0.0666	0.0527	0.0504	0.0615	0.0625	0.0449	0.0199	0.0483	0.042	0.0538
6020A	Beryllium	mg/L	ND (0.003)	ND (0.0042)	ND (0.003)	ND (0.003)	ND (0.0042)	ND (0.003)	ND (0.0042)	ND (0.0031)	ND (0.0031)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)
6020A	Cadmium	mg/L	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.0042)	ND (0.003)	ND (0.0042)	ND (0.0031)	ND (0.0031)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.0042)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.0042)	ND (0.0042)
6020A	Cobalt	mg/L	ND (0.003)	ND (0.0042)	ND (0.003)	ND (0.003)	ND (0.0042)	ND (0.003)	ND (0.0042)	ND (0.0031)	ND (0.0031)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.0042)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.0042)	ND (0.0042)
6020A	Copper	mg/L	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.0218	0.0154	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.0063	0.015	0.0114	0.015
6020A	Lead	mg/L	0.0054	0.0036	0.0067	0.0049	ND (0.0042)	0.0029	ND (0.0042)	0.0055	ND (0.005)	0.0047	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)
6020A	Molybdenum	mg/L	0.0216	0.0321	0.0231	0.0211	0.0416	0.0242	0.0292	0.0123	0.026	0.0096	0.0174	0.0162	0.0308	0.0323	0.0215	0.0113	0.0157	0.0286	0.0425
6020A	Nickel	mg/L	ND (0.005)	0.0055	ND (0.005)	ND (0.005)	ND (0.005)	0.0057	0.0062	ND (0.005)	ND (0.005)	0.0064	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	ND (0.005)	0.0054	0.0065
6020A	Selenium	mg/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
6020A	Silver	mg/L	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.0042)	ND (0.003)	ND (0.0042)	ND (0.0031)	ND (0.0031)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.0042)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.0042)	ND (0.0042)
6020A	Thallium	mg/L	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)	ND (0.015)
6020A	Vanadium	mg/L	0.0283	0.0342	0.0341	0.0307	0.0422	0.0274	0.0316	0.0103	0.0079	0.013	0.0125	0.0133	0.016	0.0107	0.0124	0.017	0.0079	0.0134	0.0144
6020A	Zinc	mg/L	0.248	0.111	0.215 J	ND (0.02)J	0.0262	0.0267	ND (0.021)	0.0315	0.0323	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.021)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.0264	0.0227
7199	Hexavalent chromium	mg/L	0.0181	ND (0.001)	0.0156	0.0158	ND (0.001)	0.0088	ND (0.001)	0.0192	ND (0.001)	0.0192	0.0081	0.0081	ND (0.001)	0.0237	0.0038	0.00047	0.0235	0.0113	ND (0.001)
7470A	Mercury	mg/L	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)
3701	SILICA	mg/L	17.5	16.7	17.2	16.7	15.8	16.9	14.6	16.9	13.6	19.6	16.7	16.3	15.1	20.0	15.8	13.3	20.7	17.7	15.6

NOTES:

mg/L = milligrams per liter
umhos/cm = microSiemens per centimeter
NTU = Nephelometric Turbidity Unit
FD = field duplicate
ND = parameter not detected at the listed reporting limit
J = concentration or reporting limits estimated by laboratory or validation

Figures

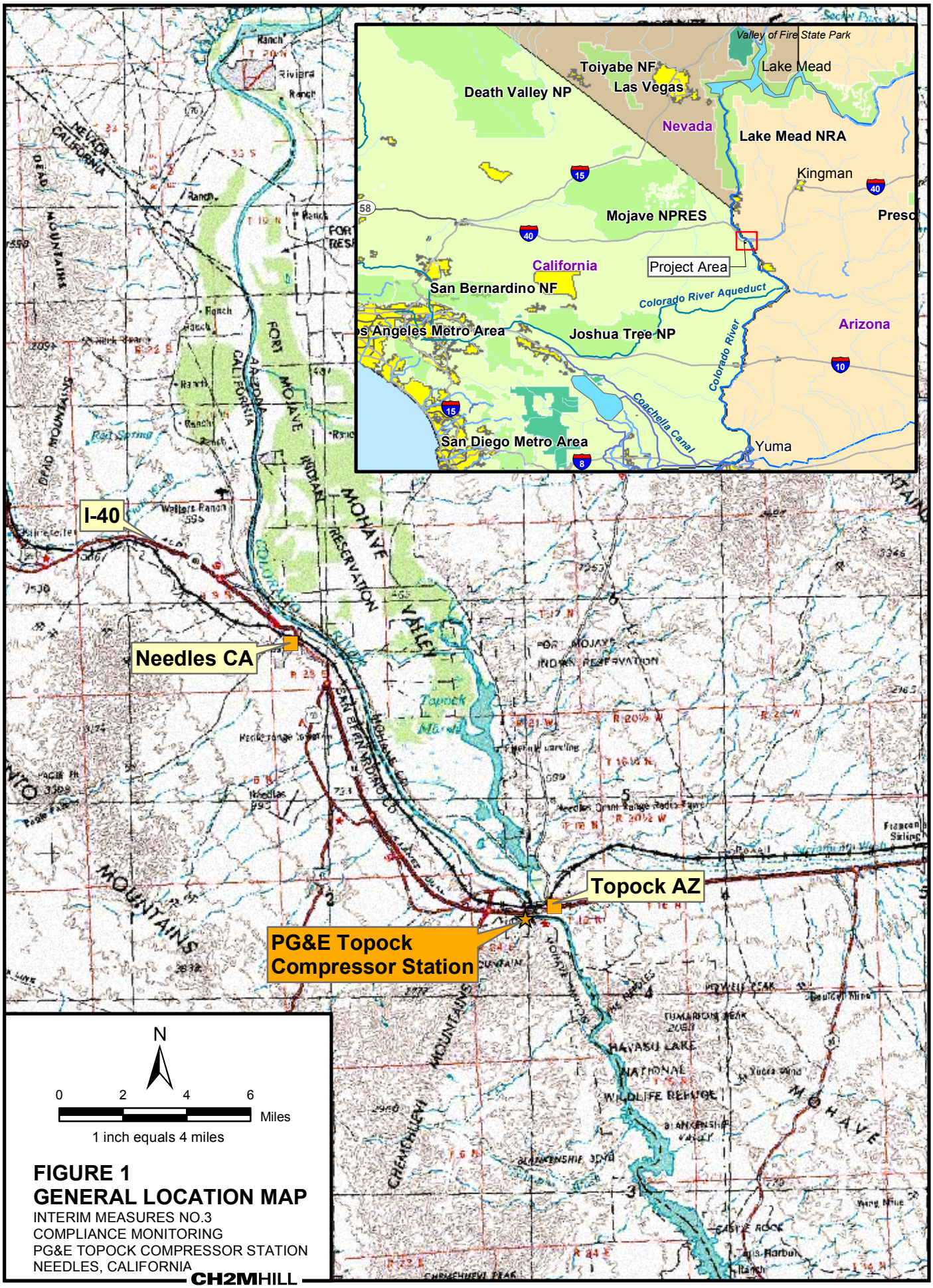

FIGURE 1
GENERAL LOCATION MAP
INTERIM MEASURES NO.3
COMPLIANCE MONITORING
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2005\IM3_LOCATION_MAP_PORTRAIT.MXD
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N

0 150 300 Feet

1 inch equals 150 feet
California State Plane NAD83 Zone 5 US Feet

BLM

PG&E

MW-41S
MW-41M
MW-41D

CW-3

CW-4

East Mesa

Treatment Plant Site

OW-2

IW-2

CW-2

MW-13

Center Mesa

IW-1

OW-1

OW-5

IW-3

BLM

MW-18

MW-37D
MW-37S

BAT CAVE WASH

Historic Route 66

MW-14

CW-1

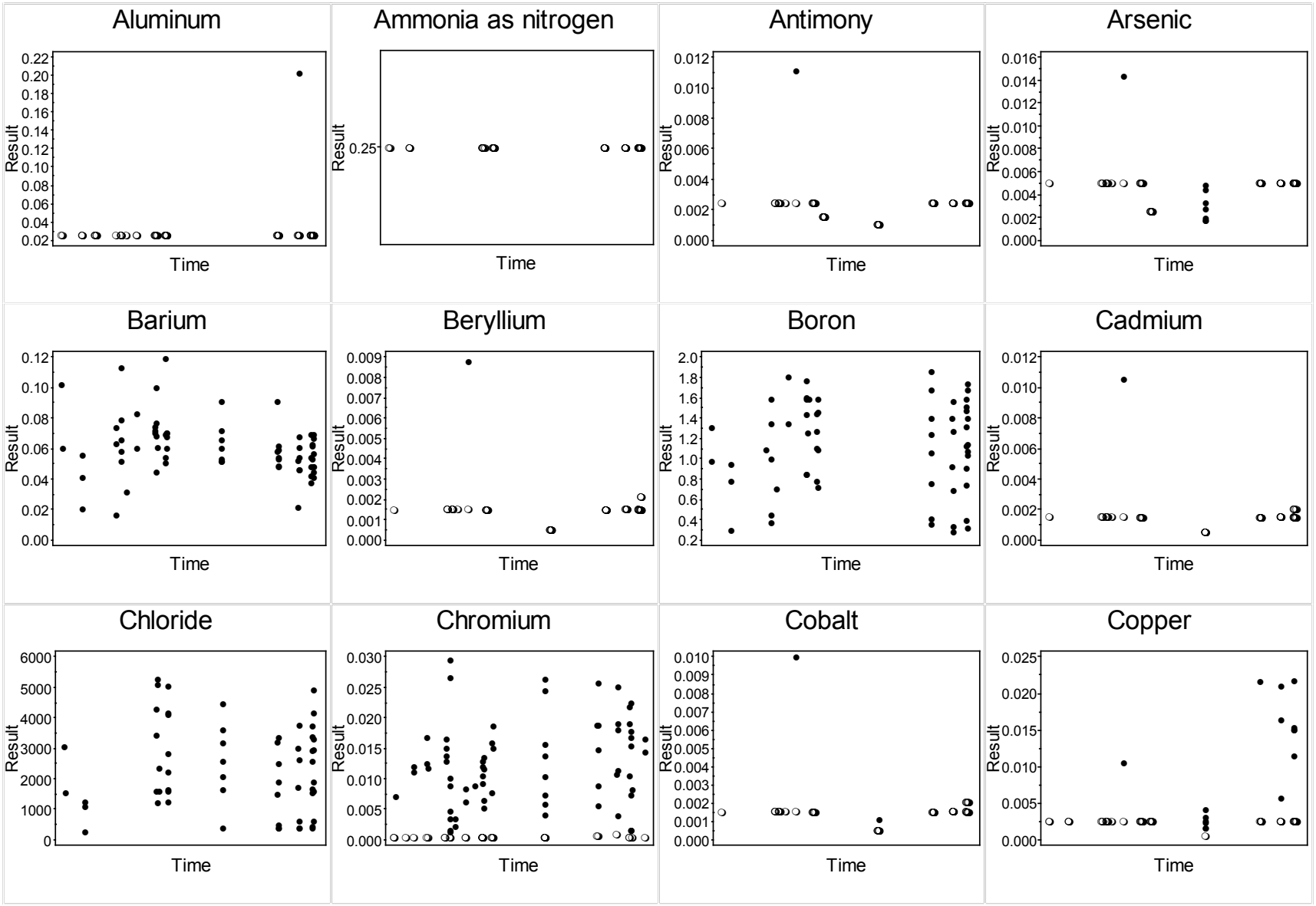
Legend

- IM-3 Injection Well
- Injection Well Exploratory Boring
- Observation Well
- Groundwater Monitoring Well
- Compliance Monitoring Well

FIGURE 2
EAST MESA WELL LOCATIONS
INTERIM MEASURES NO.3 COMPLIANCE MONITORING
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

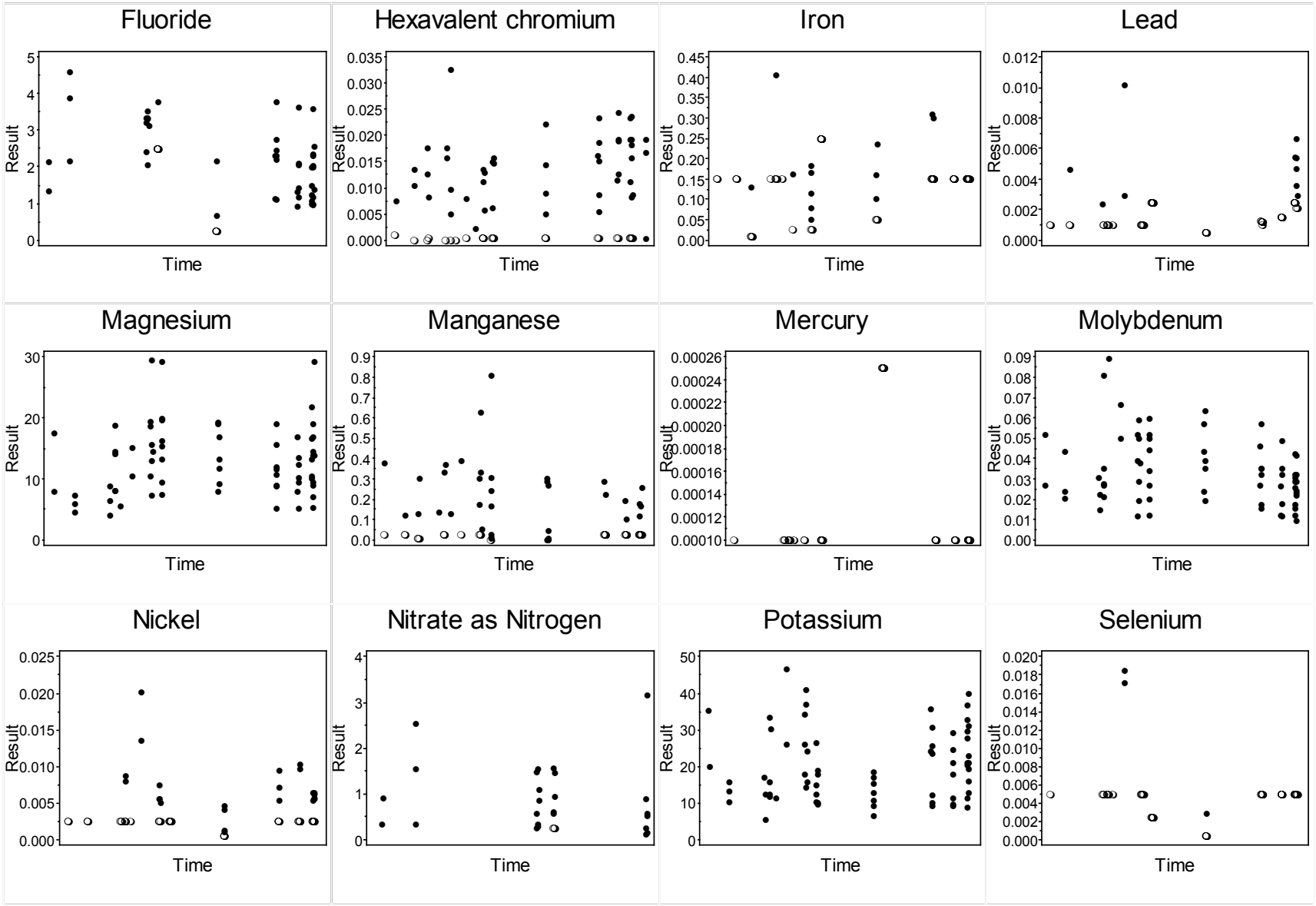
BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2005\IM3_EAST_MESA_AREA_WELLS_BASEMAP_ORTHO_NOV05.MXD IM3_EAST_MESA_AREA_WELLS_BASEMAP_ORTHO_NOV05.PDF 11/30/2005 15:08:14



Open Symbol is a Non-Detect Proxy

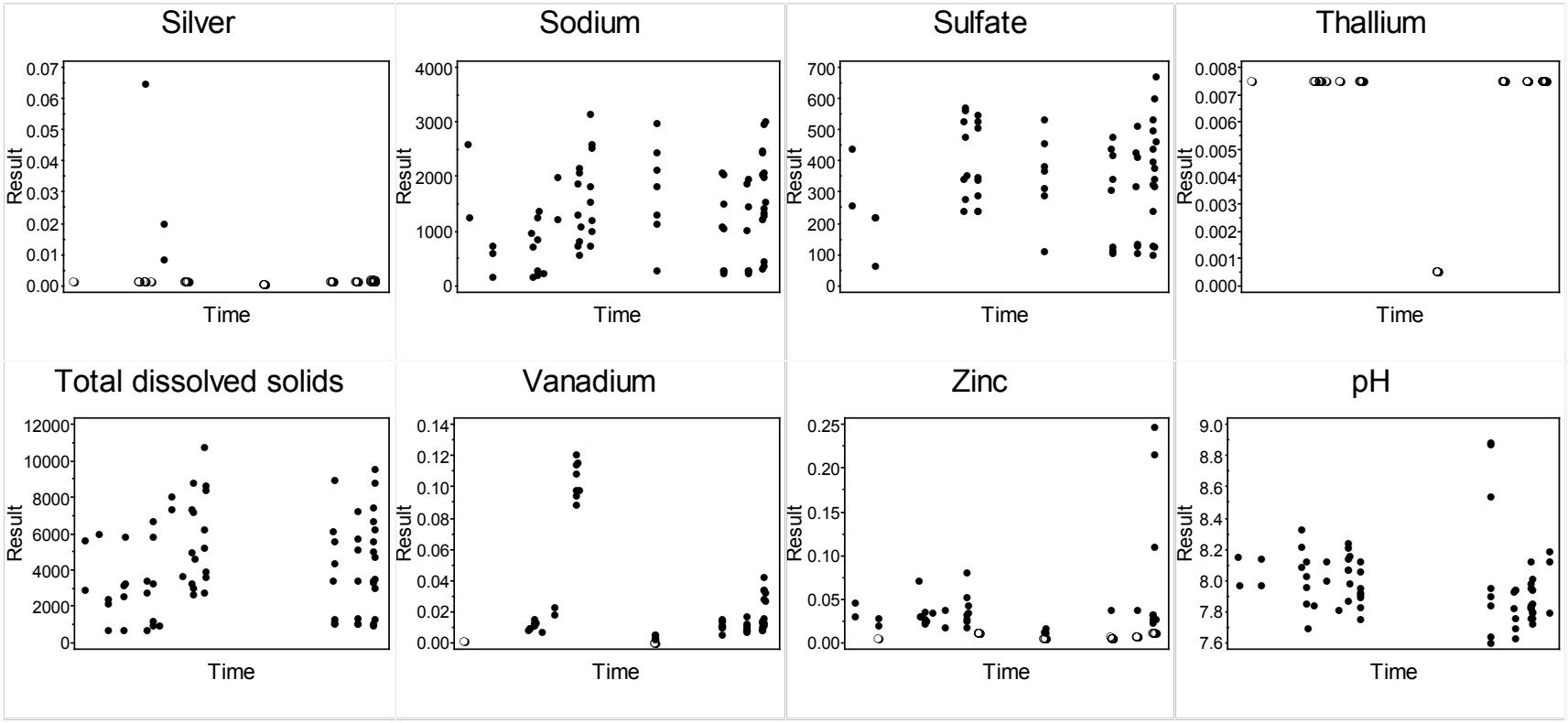
FIGURE 3-A
TIME PLOTS OF BASELINE DATA
INTERIM MEASURES NO. 3 COMPLIANCE MONITORING
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

CH2MHILL



Open Symbol is a Non-Detect Proxy

FIGURE 3-B
TIME PLOTS OF BASELINE DATA
INTERIM MEASURES NO. 3 COMPLIANCE MONITORING
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA



Open Symbol is a Non-Detect Proxy

FIGURE 3-C
TIME PLOTS OF BASELINE DATA
INTERIM MEASURES NO. 3 COMPLIANCE MONITORING
PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA