

Mr. Christopher Guerre  
Project Manager  
Department of Toxic Substances Control  
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Subject:

Request for Approval of Second and Third Injection Events, Floodplain Reductive Zone In Situ Pilot Test, Pacific Gas and Electric Company, Topock Compressor Station

ENVIRONMENT

Dear Mr. Guerre:

Date:  
25 July 2006

On behalf of Pacific Gas and Electric Company (PG&E), ARCADIS is requesting your approval of second and third injection events associated with the PG&E Topock Compressor Station floodplain reductive zone in situ pilot test (ISPT). The floodplain ISPT area is shown on Figure 1. This request for approval is submitted in accordance with the following: *In-Situ Hexavalent Chromium Reduction Pilot Test Work Plan, Floodplain Reductive Zone Enhancement (Work Plan)*, dated August 2005; *Final Addendum to the In-Situ Hexavalent Chromium Reduction Plan, Floodplain Reductive Zone Enhancement (Work Plan Addendum 1)*, dated December 5, 2005; and *Addendum 2 to the In-Situ Hexavalent Chromium Reduction Plan, Floodplain Reductive Zone Enhancement (Work Plan Addendum 2)*, dated April 14, 2006. Review of the ISPT data collected to date indicates that the initial injection into the deep zone (completed May 6, 2006) achieved partial reduction of hexavalent chromium in groundwater within the monitored zone (Table 1). Additional injections are required to continue the reductive process.

Contact:  
Alison Jones  
  
Phone:  
415.374.2744 ext 20

Email:  
ajones@arcadis-us.com

Our ref:  
RC000689.0001.00005

The injections will adhere to all procedures presented in the Work Plan and Work Plan Addenda 1 and 2, with the following modifications:

- Two additional injection events, with a reductant concentration of approximately 2,000 milligrams per liter (mg/L) (100 pounds) of lactate (up from approximately 1,000 mg/L [50 pounds] per well during the first injection), will be completed approximately one month apart. These amounts are less than the 500 pounds of lactate per well described in Work Plan Addendum 1. Two events are proposed in order to sustain elevated carbohydrate concentrations in the aquifer for a longer period of time. A higher dose of lactate than was used during the first injection is proposed to account for the higher degradation rate expected now that microbes in

the aquifer are acclimated to the presence of the carbohydrate. The volume of the injections will remain 6,000 gallons, as proposed in the approved Work Plan and Addenda.

- Injections will be completed in the deep zone only (injection into well PTI-1D); existing data from the shallow and middle zones of the floodplain ISPT is adequate to evaluate the establishment of enhanced reductive conditions in the fluvial deposits, and additional injections in these zones are unnecessary at this time.
- Fluorescein and iodide, non-toxic tracers, will be used to track the migration of the injected solution and verify the groundwater gradient during the second and third injections, respectively. During the first injection, fluorescein was injected into the shallow zone and iodide was injected into the deep zone. Fluorescein is proposed for injection into the deep zone during the second event to avoid interference with the iodide currently migrating through the deep zone. The fluorescein will also allow the iodide used in the first and third injection events to be distinguished. Note that PG&E is seeking approval from the Regional Water Quality Control Board for this modification of location of the fluorescein tracer injection.

In addition to the monthly groundwater monitoring currently being implemented (see Work Plan Addendum 2), ARCADIS proposes that the tracer test parameters (i.e. hexavalent chromium, total organic carbon, and two tracers) will be monitored weekly at the injection well (PTI-1D), three monitoring wells (PT-1D, PT-2D, and PT-3D), and two extraction wells (TW-2D and TW-3D). The weekly monitoring will continue for 12 weeks following the second injection.

Upon approval, ARCADIS will begin the second injection event at PTI-1D. The proposed schedule for implementation of the second injection is August 10 and 11, 2006; the third event will follow approximately one month later.

If you have any questions regarding the proposed second injection event, please call Yvonne Meeks of PG&E at (805) 546-5243, or me at (415) 374-2744 ext 20.

Sincerely,

ARCADIS G&M, Inc.



Alison Jones, PhD, PE  
Senior Project Manager  
Principal Engineer

Enclosures:

Table 1          Summary of Primary Results  
Figure 1        Site Plan

Copies:

Mr. Jose Cortez, Water Board  
Ms. Liann Chavez, Water Board  
Mr. Robert Perdue, Water Board  
Ms. Kate Burger, DTSC  
Ms. Karen Baker, DTSC  
Mr. Aaron Yue, DTSC  
Ms. Cathy Wolff-White, BLM

**Table 1**  
**Summary of Primary Analytical Parameters**  
 PG&E Topock  
 Needles, California

Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)
PT-1S	17-Mar-06	N	35-45	<1	1.3	<1	<.5	ND	<.5	<.1	3,050	1,930	1,320	198	2.98
	06-Apr-06	N		<0.2	<1	<1	<.5	ND	<.5	<.5	1,910	1,860	779	181	3.04
	04-May-06	N		<1	---	<1	<1	ND	---	---	---	---	---	---	---
	05-May-06	N		<1	---	<1	<1	ND	---	---	---	---	---	---	---
	06-May-06	N		<0.2	<1	<1	<.5	ND	<.5	<.1	5,560	2,960	947	90.1	6.66
	07-May-06	N		<1	---	<1	<1	ND	---	---	---	---	---	---	---
	08-May-06	N		<0.2	---	<1	<1	ND	---	---	---	---	---	---	---
	09-May-06	N		<1	<1	<1	0.846	ND	<.5	<.1	2,360	4,770	1,070	144	4.16
	10-May-06	N		<1	---	<1	<2.5	ND	---	---	---	---	---	---	---
	11-May-06	N		<1	---	<1	<2.5	ND	---	---	---	---	---	---	---
	12-May-06	N		<1 J/HD	---	<1	<1	ND	---	---	---	---	---	---	---
	13-May-06	N		<1 J/HD	4.48	<1	<1	ND	<1	<.2	3,900	3,220	800	122	4.58
	23-May-06	N		<1	<1	<1	<.5	ND	<.5	<.5	117,000	826	790	157	4.53
	01-Jun-06	N		<1	<1	<1	<.5	ND	<.5	<.1	89,600	2,570	911	126	5.11
06-Jun-06	N	<1	<1	<1	<.5	ND	<.5	<.5	43,400	3,020	857	125	5.77		
PT-1M	17-Mar-06	N	60-70	<1	<1	<1	<.5	ND	<.5	<.1	<500	<500	1,330	411	1.14
	06-Apr-06	N		<1	1	<1	<.5	ND	<.5	<.5	591	557	1,350	446	1.1
	04-May-06	N		<1	---	<1	<.5	ND	---	---	---	---	---	---	---
	06-May-06	N		<1	<1	<1	258	0.452	<.5	<.1	554	535	1,230	397	27.9
	07-May-06	N		<1	---	<1	390	0.466	---	---	---	---	---	---	---
	08-May-06	N		<1	---	<1	377	0.429	---	---	---	---	---	---	---
	09-May-06	N		<1	<1	<1	341	0.232	<.5	<.1	543	550	2,430	391	25.4
	10-May-06	N		<1	---	<1	296	0.458	---	---	---	---	---	---	---
	11-May-06	N		<1	---	<1	273	0.433	---	---	---	---	---	---	---
	12-May-06	N		<1 J/HD	---	<1	245	0.423	---	---	---	---	---	---	---
	13-May-06	N		<1 J/HD	3.69	<1	216	0.354	<.5	<.1	696	668	4,390	451	5.39
	24-May-06	N		<1	10.8	<1	96	0.160	<.5	<.5	673	6,900	3,560	425	2.02
	31-May-06	N		<1	3.29	<1	48.9	0.101	<.5	<.5	7,360	577	3,950	430	2.4
	06-Jun-06	N		<1	<1	<1	36.7	0.083	<.5	<.5	5,230	637	3,450	501	1.82

**Table 1**  
**Summary of Primary Analytical Parameters**  
 PG&E Topock  
 Needles, California

Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)	
PT-1D	17-Mar-06	N	95-105	2,470	2,270	<1	0.581	ND	1.84	<.5	<500	<500	88.2	943	1.07	
	17-Mar-06	FD		2,460	2,230	<1	<.5	ND	1.84	<.5	<500	<500	85.7	941	1.18	
	06-Apr-06	N		3,080	2,770	5.45	<.5	ND	2.27	<.5	<500	<500	51	978	1.09	
	06-Apr-06	FD		2,960	2,690	6.15	<.5	ND	2.26	<.5	<500	<500	54.8	963	1.1	
	06-May-06	N		4,140	4,350	<1	<.5	ND	2.64	<.1	<500	<500	26.7	930	1.24	
	07-May-06	N		3,560	---	50.9	<1	ND	---	---	---	---	---	---	---	---
	08-May-06	N		3,190	---	252	1.26	ND	---	---	---	---	---	---	---	---
	09-May-06	N		2,870	2,780	441	2.63	0.023	1.18	<.2	<500	<500	48.9	846	37.5	
	10-May-06	N		2,670	---	464	2.92	0.029	---	---	---	---	---	---	---	---
	11-May-06	N		2,660	---	528	2.87	0.016	---	---	---	---	---	---	---	---
	12-May-06	N		2,520	---	578	3.01	0.022	---	---	---	---	---	---	---	---
	13-May-06	N		2,380 J/HD	2,390	613	3	0.016	<1	<.2	<500	<500	60.1	529	58.4	
	24-May-06	N		1,320	1,330	488	2.61	0.164	<.5	<.5	<500	<500	507	653	30.7	
	31-May-06	N		970	896	373	1.86	ND	<.5	<.5	<500	<500	992	665	16	
	05-Jun-06	N		931	859	371	1.71	ND	<.5	<.5	<500	<500	1,270	730	10.1	
PT-2S	17-Mar-06	N	35-45	<1	<1	<1	0.563	ND	<.5	<.1	34,300	976	1,170	11.7	7.42	
	06-Apr-06	N		<0.2	<1	<1	<.5	ND	<.5	<.5	30,200	1,850	1,240	8.91	8.57	
	24-May-06	N		<1	<1	<1	<.5	ND	<.5	<.5	164,000	<500	1,160	3.02	11	
	01-Jun-06	N		<1	<1	<1	<.5	ND	<.5	<.1	91,900	934	1,300	3.06	9.65	
	07-Jun-06	N		1	<1	<1	<.5	ND	<.5	<.5	42,300	950	1,280	2.77	10.8	
PT-2M	17-Mar-06	N	60-70	<1	8.19	<1	<.5	ND	<.5	<.5	<500	<500	547	474	<1	
	06-Apr-06	N		<0.2	7.58	<1	<.5	ND	<.5	<.1	<500	<500	380	471	<1	
	24-May-06	N		<1	<1	<1	40	0.114	<.5	<.5	20,000	<500	431	423	1.76	
	31-May-06	N		<1	<1	<1	12.1	0.033	<.5	<.5	3,430	<500	363	438	2.21	
	31-May-06	FD		<1	<1	<1	12	0.038	<.5	<.5	4,150	<500	371	429	2.28	
	07-Jun-06	N		1	<1	<1	5.29	0.024	<.5	<.5	1,220	<500	353	487	1.85	

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PG&E Topock  
Needles, California

Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)
PT-2D	17-Mar-06	N	95-105	1,660	1,580	<1	<.5	ND	1.23	<.5	<500	<500	154	931	1.09
	17-Mar-06	FD		1,670	1,570	<1	<.5	ND	1.26	<.5	<500	<500	161	924	1.24
	06-Apr-06	N		2,310	2,160	4.44	<.5	ND	1.68	<.5	<500	<500	79.7	924	1.02
	06-Apr-06	FD		2,290	2,170	4.1	<.5	ND	1.84	<.5	<500	<500	78.3	946	<1
	24-May-06	N		1,800	1,760	374	2.11	ND	<.5	<.5	507	<500	173	691	26.9
	31-May-06	N		1,180	1,170	388	1.85	ND	<.5	<.5	1,400	<500	320	689	17.6
	07-Jun-06	N		951	930	390	1.99	ND	<.5	<.5	<500	<500	423	724	14.4
PT-3S	16-Mar-06	N	35-45	<1	40.3	<1	<.5	ND	<.5	<.1	6,370	4,860	1,160	217	4.27
	03-Apr-06	N		<1	1.48	<1	<.5	ND	<.5	<.5	5,510	4,990	988	221	4.66
	04-May-06	N		<0.2	---	<1	<1	ND	---	---	---	---	---	---	---
	05-May-06	N		<0.2	---	<1	<1	ND	---	---	---	---	---	---	---
	06-May-06	N		<1	1.46	<1	<.5	ND	<.5	<.1	7,370	5,660	968	80.2	5.05
	06-May-06	FD		<1	1.01	<1	<.5	ND	<.5	<.1	6,500	5,820	950	80.4	5.26
	07-May-06	N		<0.2	---	<1	<1	ND	---	---	---	---	---	---	---
	09-May-06	N		<0.2 J/HD	1.54	<1	<1	9.61	<1	<.2	7,850	6,280	973	112	5.83
	10-May-06	N		<1	---	<1	19	34.4	---	---	---	---	---	---	---
	11-May-06	N		<1	---	<1	1.07	5.49	---	---	---	---	---	---	---
	12-May-06	N		<0.2	---	<1	64.6	42.3	---	---	---	---	---	---	---
	13-May-06	N		<1 J/HD	2.38	<1	93.7	56.0	<1	<.2	6,710	5,890	872	112	14.6
	23-May-06	N		<1	<1	<1	68.1	1,060	<1	<.5	130,000	1,750	830	30.5	49.9
	30-May-06	N		<1	1.36	<1	470	1,510	<2.5	<.5	27,600	695	762	24.4	93.5
	06-Jun-06	N		<1	<1	<1	749	1,220	<2.5	<.5	21,900	3,220	750	23.2	119

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 PG&E Topock  
 Needles, California

Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)
PT-3M	18-Mar-06	N	60-70	<1	<1	<1	<.5	ND	<.5	<.5	<500	<500	1,670	571	1.33
	07-Apr-06	N		<1	<1	<1	<.5	ND	<.5	<.5	<500	<500	2,020	672	1.01
	04-May-06	N		<1	---	<1	<.5	ND	---	---	---	---	---	---	---
	05-May-06	N		<1	---	<1	<.5	ND	---	---	---	---	---	---	---
	06-May-06	N		<1 J/FD	<1	<1	<.5	ND	<.5	<.1	508	<500	1,720	597	1.11
	07-May-06	N		<1	---	<1	2.32	0.025	---	---	---	---	---	---	---
	09-May-06	N		<0.2 J/HD	<1	<1	28.8	0.075	<.5	<.1	518	<500	1,350	559	2.94
	10-May-06	N		<1	---	<1	60.2	0.148	---	---	---	---	---	---	---
	11-May-06	N		<1	---	<1	75.8	0.2	---	---	---	---	---	---	---
	12-May-06	N		<1 J/HD	---	<1	87.1	0.223	---	---	---	---	---	---	---
	13-May-06	N		<1 J/HD	2.46	<1	72.9	0.135	<.5	<.1	620	597	1,250	530	3.22
	13-May-06	FD		<0.2	9.68	<1	73.3	0.180	<.5	<.1	620	589	1,270	517	3.89
	23-May-06	N		<1	<1	<1	27.4	0.104	<.5	<.5	12,000	<500	1,550	573	1.59
	30-May-06	N		<1	3.09	<1	9.74	0.043	<.5	<.5	33,100	<500	1,260	533	1.94
	06-Jun-06	N		<1	<1	<1	4.86	0.031	<.5	<.5	5,140	<500	1,100	583	1.77
06-Jun-06	FD	<1	1.61	<1	4.5	0.034	<.5	<.5	24,400	<500	1,130	575	2.41		
PT-3D	18-Mar-06	N	95-105	4,390	4,370	<1	<.5	ND	3.33	<.5	<500	<500	16.7	984	<1
	05-Apr-06	N		4,440	4,680	8.87	<.5	ND	3.28	<.5	<500	<500	10.2	966	<1
	05-May-06	N		3,980	---	<1	<1	ND	---	---	---	---	---	---	---
	06-May-06	N		3,090 J/FD	3,420	666	2.93	0.031	1.73	<.1	<500	<500	28.4	699	80.3
	07-May-06	N		4,140	---	515	3.15	0.023	---	---	---	---	---	---	---
	09-May-06	N		3,900 J/HD	3,920	268	2.1	0.020	2.02	<.2	<500	<500	42	853	36
	10-May-06	N		3,680	---	199	<2.5	0.013	---	---	---	---	---	---	---
	11-May-06	N		3,700	---	159	---	ND	---	---	---	---	---	---	---
	12-May-06	N		1,940	---	127	<2.5	ND	---	---	---	---	---	---	---
	13-May-06	N		3,550 J/HD	3,630	96.8	3.07	0.151	2.1	<.2	<500	<500	309	909	9.41
	23-May-06	N		4,380	3,940	21.7	<.5	ND	2.73	<.5	671	<500	113	854	2.39
	30-May-06	N		3,880	4,030	<1	<1	ND	2.82	<.5	<500	<500	83.8	843	2.23
	06-Jun-06	N		3,730	3,770	2.92	<.5	ND	2.82	<.5	1,630	<500	67.5	985	1.31

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PG&E Topock  
Needles, California

Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)	
PT-4S	15-Mar-06	N	35-45	<1	3.83	0.714 J	<.5	ND	<.5	<.1	4,060	713	919	474	1.69	
	06-Apr-06	N		<1	5.84	<1	<.5	ND	<.5	<.5	2,510	1,350	707	450	1.69	
	04-May-06	N		<1	---	<1	<1	ND	---	---	---	---	---	---	---	---
	05-May-06	N		<1	---	<1	<1	ND	---	---	---	---	---	---	---	---
	09-May-06	N		<0.2 J/HD	<1	<1	<.5	ND	<.5	<.1	10,800	1,490	657	472	2.4	
	10-May-06	N		<1	---	<1	<2.5	ND	---	---	---	---	---	---	---	---
	11-May-06	N		<1	---	<1	<.5	ND	---	---	---	---	---	---	---	---
	12-May-06	N		<1	---	<1	<1	ND	---	---	---	---	---	---	---	---
	13-May-06	N		<1 J/HD	3.18	<1	<1	ND	<1	<.2	2,320	1,940	673	415	2.02	
	23-May-06	N		<1	<1	<1	<.5	ND	<.5	<.5	18,600	<500	683	436	2.29	
	30-May-06	N		<1	1.15	<1	<.5	ND	<.5	<.5	20,000	<500	650	426	2.72	
	06-Jun-06	N		<1	<1	<1	<.5	0.073	<.5	<.5	8,530	1,340	610	492	2.56	
PT-4M	15-Mar-06	N	60-70	<1	<1	0.75 J	<.5	ND	<.5	<.1	<500	<500	966	609	<1	
	07-Apr-06	N		<1	1.63	<1	<.5	ND	<.5	<.5	<500	<500	766	722	1.05	
	04-May-06	N		<1	---	<1	<.5	ND	---	---	---	---	---	---	---	---
	08-May-06	N		<1	---	<1	<.5	ND	---	---	---	---	---	---	---	---
	09-May-06	N		<0.21 J/HD	<1	<1	<.5	ND	<.5	<.1	723	700	686	504	1.12	
	10-May-06	N		<1	---	<1	<.5	ND	---	---	---	---	---	---	---	---
	11-May-06	N		<1 J/HD	---	<1	<.5	ND	---	---	---	---	---	---	---	---
	12-May-06	N		<1	---	<1	<.5	ND	---	---	---	---	---	---	---	---
	13-May-06	N		<1 J/HD	2.05	<1	<.5	ND	<.5	<.1	988	899	612	529	1.22	
	23-May-06	N		<1	<1	<1	<.5	ND	<.5	<.5	3,700	<500	613	565	1.58	
	30-May-06	N		<1	229	<1	<.5	ND	<.5	<.5	929	<500	492	534	2.05	
	06-Jun-06	N		<1	2.24	<1	<.5	ND	<.5	<.5	1,330	<500	523	570	1.31	



**Table 1**  
**Summary of Primary Analytical Parameters**  
PG&E Topock  
Needles, California

Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)	
PT-4D	15-Mar-06	N	95-105	5,670	5,510	<1	1.32	ND	4.28	<.5	<500	<500	8.27	1,080	<1	
	05-Apr-06	N		5,960	5,480	12.9	<.5	ND	4.7	<.5	<500	<500	<5	1,110	1.05	
	08-May-06	N		5,870	---	<1	<1	ND	---	---	---	---	---	---	---	---
	09-May-06	N		5,900 J/HD	5,900	<1	<2.5	ND	4.6	<.5	<500	<500	<5	1,110	1.16	
	10-May-06	N		5,830	---	<1	<2.5	ND	---	---	---	---	---	---	---	---
	11-May-06	N		5,790	---	<1	<1	ND	---	---	---	---	---	---	---	---
	12-May-06	N		5,810	---	<1	<1	ND	---	---	---	---	---	---	---	---
	13-May-06	N		5,710 J/HD	5,900	<1	<1	ND	4.36	<.2	<500	<500	<5	1,050	1.21	
	23-May-06	N		5,750	5,880	<1	<.5	ND	4.91	<.5	<500	<500	<5	1,010	1.6	
	23-May-06	FD		---	5,970	<1	<.5	ND	4.89	<.5	<500	<500	<5	1,010	1.87	
	30-May-06	N		5,730	5,740	<1	<1	ND	4.75	<.5	2,390	<500	21	989	2.32	
06-Jun-06	N	5,800	5,560	<1	<.5	0.078	4.7	<.5	<500	<500	<5	1,130	1.44			
PT-5S	16-Mar-06	N	35-45	<1	2.71	<1	<.5	ND	<.5	<.1	949	971	2,440	401	3.2	
	07-Apr-06	N		<1	<1	<1	<.5	ND	<.5	<.5	995	1,030	1,850	490	2.76	
	01-Jun-06	N		<1	<1	<1	<.5	ND	<.5	<.1	4,250	1,870	1,530	372	4.14	
PT-5M	16-Mar-06	N	60-70	<1	<1	<1	<.5	ND	<.5	<.1	<500	<500	707	463	1.04	
	07-Apr-06	N		<1	<1	<1	<.5	ND	<.5	<.5	1,850	1,820	1,770	443	3.31	
	01-Jun-06	N		<1 J/HD	<1	<1	<.5	ND	<.5	<.1	4,570	<500	168	437	1.62	
PT-5D	16-Mar-06	N	95-105	6,150	5,650	<1	<.5	ND	4.86	0.258	<500	<500	355	1,080	<1	
	07-Apr-06	N		<0.2	<1	<1	<.5	ND	<.5	<.5	2,280	2,200	1,700	403	3.49	
	12-May-06	N		4,250	4,680	<1	1.17	0.02	3.58	<1	<500	<500	209	1,020	1.34	
	01-Jun-06	N		3,900	3,930	<1	<.5	ND	3.18	<.1	3,550	<500	132	919	1.27	

**Table 1**  
**Summary of Primary Analytical Parameters**  
PG&E Topock  
Needles, California

Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)
PT-6S	16-Mar-06	N	35-45	<1	---	---	---	---	---	---	---	---	---	---	---
	18-Mar-06	N		---	4.6	<1	1.18	ND	<.5	<1	4,560	3,530	9,260	60	13.4
	04-Apr-06	N		<1	<1	<1	1.3	ND	<.5	<.5	11,600	6,310	7,650	57.8	14.2
	13-May-06	N		<1 J/HD	2.83	<1	<1	ND	<1	<.2	33,000	13,400	4,400	3.03	13
	22-May-06	N		<1 J/HD	26	<1	<.5	ND	<.5	<.5	22,600	1,180	3,710	5.91	13.9
	01-Jun-06	N		<1 J/HD	1.38	<1	<.5	ND	<.5	<.1	17,000	12,600	3,710	6.96	13.4
	06-Jun-06	N		<1	1.44	<1	<2.5	ND	<2.5	<.5	19,000	17,100	3,250	4.57	14.8
PT-6M	16-Mar-06	N	60-70	<1	<1	<1	<.5	ND	<.5	<.1	<500	<500	56.1	486	<1
	04-Apr-06	N		<1	<1	<1	<.5	ND	<.5	<.5	<500	<500	55.2	498	1.22
	13-May-06	N		<1 J/HD	4.53	<1	<.5	ND	<.5	<.1	<500	<500	71.2	509	1.7
	23-May-06	N		<1	<1	<1	<.5	ND	<.5	<.5	1,690	<500	71.2	476	1.11
	01-Jun-06	N		<1	1.24	<1	<.5	ND	<.5	<.1	1,150	<500	77.6	479	1.4
	06-Jun-06	N		<1	1.66	<1	<.5	ND	<.5	<.5	1,650	<500	76.4	528	3.14
PT-6D	16-Mar-06	N	95-105	3,310	3,140	<1	<.5	ND	2.5	0.218	<500	<500	361	844	<1
	04-Apr-06	N		2,270	2,180	4.23	<.5	ND	1.73	<.5	<500	<500	258	750	<1
	13-May-06	N		1,760 J/HD	1,720	<1	<1	ND	1.49	<.2	1,320	<500	169	810	1.16
	22-May-06	N		1,610 J/HD	1,970	<1	<.5	ND	1.42	<.5	2,520	<500	168	719	1.96
	01-Jun-06	N		1,440	1,420	<1	<.5	ND	1.2	<.1	764	<500	152	711	1.08
	06-Jun-06	N		1,340	1,290	<1	1.85	0.105	1.38	<.5	1,130	<500	134	750	2.45

**Table 1**  
**Summary of Primary Analytical Parameters**  
 PG&E Topock  
 Needles, California

Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)	
PTI-1S	15-Mar-06	N	35-45	<1	19.8	0.708 J	<.5	ND	<.5	<.1	7,360	8,350	717	122	4.55	
	05-Apr-06	N		<1	<1	<1	<.5	ND	<.5	<.5	7,730	3,320	606	120	4.84	
	06-May-06	N		<1 J/FD	4.15	<1	1,130	1,950	<2.5	<.5	21,500	19,900	980	15	588	
	07-May-06	N		<1 J/FD	---	<1	449	3,820	---	---	---	---	---	---	---	452
	09-May-06	N		<1	---	<1	360	3,820	---	---	---	---	---	---	---	474
	09-May-06	FD		<0.2	---	<1	360	3,770	---	---	---	---	---	---	---	467
	10-May-06	N		<1	---	<1	362	3,560	---	---	---	---	---	---	---	506
	11-May-06	N		<1	---	<1	316	3,760	---	---	---	---	---	---	---	543
	12-May-06	N		<1	---	<1	284	3,710	---	---	---	---	---	---	---	558
	13-May-06	N		---	---	<1	288	3,730	---	---	---	---	---	---	---	525
	23-May-06	N		---	---	<1	213	3,810	---	---	---	---	---	---	---	214
	31-May-06	N		---	---	<1	56.4	4,090	---	---	---	---	---	---	---	188
	05-Jun-06	N		---	---	<1	28.7	3,750	---	---	---	---	---	---	---	136
PTI-1M	15-Mar-06	N	60-70	3.9	8.2	0.718 J	<.5	ND	<.5	<.1	<500	<500	141	510	<1	
	04-Apr-06	N		3.3	11.1	<1	<.5	ND	<.5	<.5	<500	<500	99.5	529	<1	
	06-May-06	N		<1 J/FD	<1	<1	1,430	0.853	<.5	<.1	<500	<500	1,770	18.7	210	
	07-May-06	N		<1 J/FD	---	<1	1,510	0.728	---	---	---	---	---	---	---	215
	09-May-06	N		<1	---	---	621	0.272	---	---	---	---	---	---	---	83.4
	10-May-06	N		<1	---	<1	1,080	0.746	---	---	---	---	---	---	---	111
	11-May-06	N		<1	---	<1	1,130	0.79	---	---	---	---	---	---	---	101
	12-May-06	N		<1	---	<1	1,090	0.934	---	---	---	---	---	---	---	77.6
	13-May-06	N		---	---	<1	1,060	1.04	---	---	---	---	---	---	---	67.6
	23-May-06	N		---	---	<1	1,490	1.58	---	---	---	---	---	---	---	77.8
	31-May-06	N		---	---	<1	169	0.298	---	---	---	---	---	---	---	3.56
	05-Jun-06	N		---	---	<1	125	0.281	---	---	---	---	---	---	---	2.18

**Table 1**  
**Summary of Primary Analytical Parameters**  
 PG&E Topock  
 Needles, California

Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)	
PTI-1D	15-Mar-06	N	95-105	1,620	1,580	<1	2.63	ND	<.5	<.5	<500	<500	1,070	907	1.3	
	03-Apr-06	N		3,350	3,370	6.42	<.5	ND	2.59	<.5	<500	<500	140	912	<1	
	07-May-06	N		<1 J/FD	---	1,640	8.27	0.153	---	---	---	---	---	---	---	195
	09-May-06	N		<1	---	1,950	19.2	0.794	---	---	---	---	---	---	---	204
	10-May-06	N		937	---	672	4.56	0.087	---	---	---	---	---	---	---	46.4
	11-May-06	N		1,050	---	613	3.76	0.059	---	---	---	---	---	---	---	31.9
	12-May-06	N		<1 J/HD	---	2,400	12.6	0.603	---	---	---	---	---	---	---	215
	13-May-06	N		---	---	1,760	8.24	0.145	---	---	---	---	---	---	---	206
	22-May-06	N		---	---	57.9	0.942	ND	---	---	---	---	---	---	---	2.34
	31-May-06	N		---	---	<1	<.5	ND	---	---	---	---	---	---	---	3.26
05-Jun-06	N	---	---	20	<.5	ND	---	---	---	---	---	---	---	2.45		
PE-1	17-Mar-06	N	79-89	148	138	<1	<.5	ND	<.5	<.5	<500	<500	12.7	900	2.14	
	05-Apr-06	N		140	136	<1	<.5	ND	<.5	<.5	<500	<500	12.3	939	1.99	
	01-Jun-06	N		114	111	<1	<.5	ND	<.5	<.1	<500	<500	12.5	773	2.34	
TW-2D	17-Mar-06	N	113-148	1,430	1,530	<1	<.5	ND	1.67	<.5	<500	<500	<5	501	<1	
	05-Apr-06	N		1,350	1,240	2.55	<.5	ND	1.51	<.5	<500	<500	<5	509	<1	
TW-3D	17-Mar-06	N	111-156	3,350	3,070	<1	<.5	ND	4.87	<.2	<500	<500	<5	613	1.04	
	05-Apr-06	N		3,140	2,980	6.12	<.5	ND	4.61	<.5	<500	<500	<5	645	<1	
INJ_SOLUTION_01	04-May-06	N	NA	---	---	---	---	5,620	---	---	---	---	---	---	265	
	05-May-06	N		---	---	---	<5	---	---	---	---	---	---	---	---	
INJ_SOLUTION_02	05-May-06	N	NA	---	---	---	1,790	---	---	---	---	---	---	---	276	
INJ_SOLUTION_03	06-May-06	N	NA	---	---	1,960	---	---	---	---	---	---	---	---	258	
Make_Up_Water	05-May-06	N	NA	---	---	<1	<.5	---	---	---	---	---	---	---	---	

**Table 1**  
**Summary of Primary Analytical Parameters**  
PG&E Topock  
Needles, California

Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)
Field Blank	17-Mar-06	FB	NA	<0.21	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	<1
	04-Apr-06	FB		<0.2	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	<1
	09-May-06	EB		<0.2 J/HD	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	<1
	13-May-06	FB		<0.2	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	<1
	24-May-06	FB		0.25	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	2.45	1.53
	01-Jun-06	FB		<0.2	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	21.4
	05-Jun-06	FB		<0.2	<1	<1	<.5	0.027	<.5	<.1	<500	<500	<5	<.5	<1
Equipment Blank	17-Mar-06	EB	NA	<0.21	2.91	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	<1
	07-Apr-06	EB		<0.2	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	<1
	09-May-06	FB		<0.2 J/HD	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	<1
	13-May-06	EB		<0.2	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	1.33
	24-May-06	EB		0.23	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	2.47	1.17
	01-Jun-06	EB		<0.2	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	<1
	05-Jun-06	EB		<0.2	<1	<1	<.5	ND	<.5	<.1	<500	<500	<5	<.5	1.03

**Table 1**  
**Summary of Primary Analytical Parameters**  
 PG&E Topock  
 Needles, California

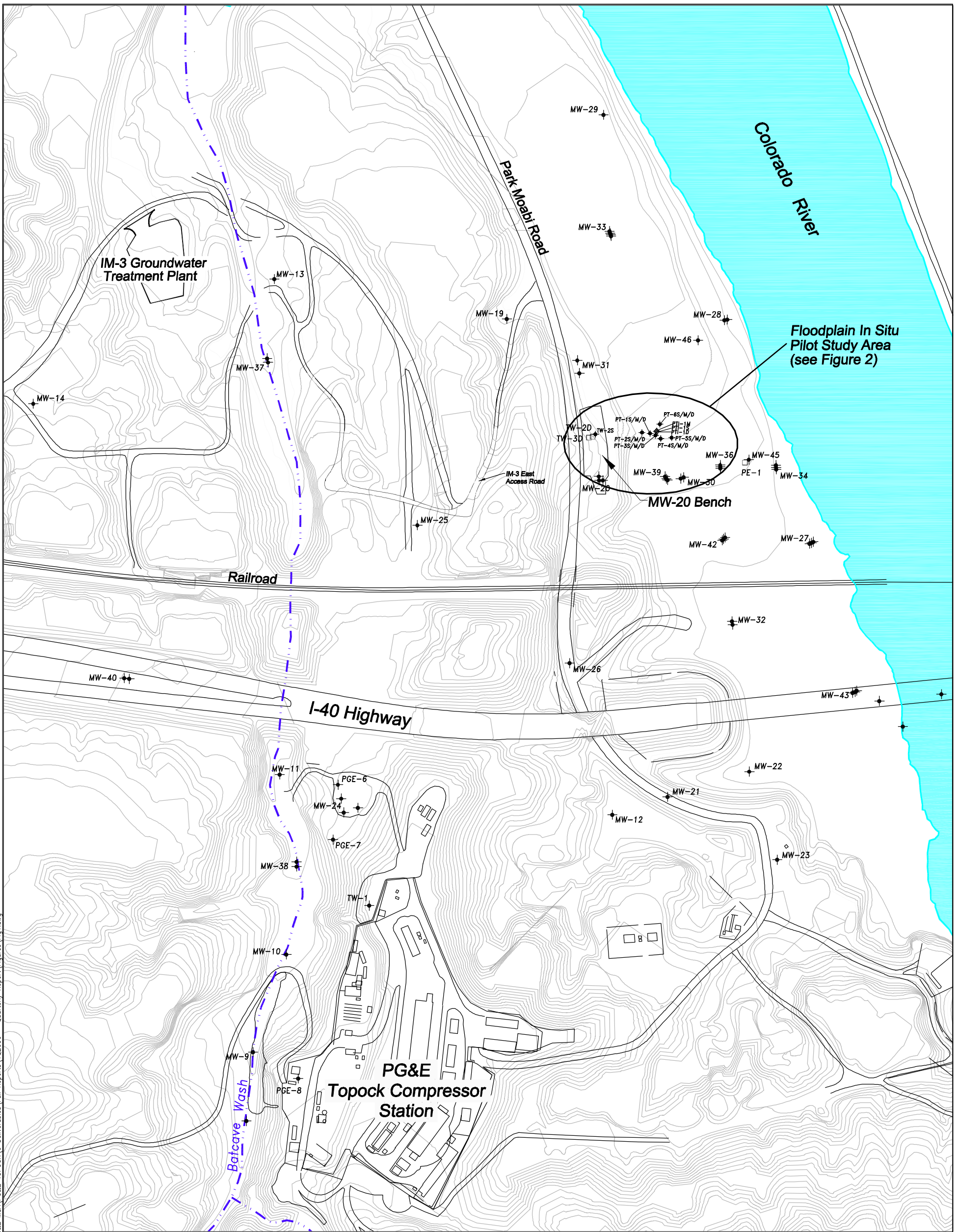
Location Name	Sample Date	Sample Type	Screen Interval (ft bgs)	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Iodide (mg/L)	Bromide (mg/L)	Fluorescein (ppb)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Total Iron (µg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Sulfate (mg/L)	Total Organic Carbon (mg/L)
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Notes:

- ft bgs Feet below ground
- mg/L Milligrams per liter
- µg/L Micrograms per liter
- ppb Parts per billion
- < Symbol indicates not detected at or above the laboratory reporting limit as noted.
- N Normal
- EB Equipment blank
- FB Field blank
- FD Field duplicate
- J Reported value is estimated
- J/HD Sample analyzed beyond USEPA-recommended holding time. Results may still be used for their intended purpose.
- NA Not applicable
- ND Not detected

Notes continued:

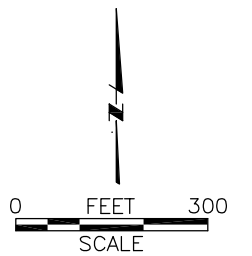
- Nitrate-N Nitrate as Nitrogen
- Nitrite-N Nitrite as Nitrogen
- Not analyzed/Not sampled
- USEPA United States Environmental Protection Agency
- Dissolved Samples were field filtered with a 0.45 micron filter.



Source: MWH Draft In-Situ Hexavalent Chromium Reduction Pilot Test Work Plan, Upland Plume Treatment, 2006.

**Legend**

- ✦ Monitoring Well Locations
- Extraction Well Locations
- ◇ Injection Well Locations



Date/Time : Mon, 17 Apr 2006 - 9:30am  
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 Acad Version : R16.1s (LMS Tech)  
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Project Director <b>N. MORGAN-BUTCHER</b>	Area Manager <b>J. PETERS</b>
Task Manager <b>H. VOSCOTT</b>	Technical Review
Drawing Date <b>05 APR 06</b>	Drawn By <b>M. CHIU</b>

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**SITE PLAN**  
**PG&E TOPOCK FACILITY**  
**NEEDLES, CALIFORNIA**

Project Number <b>RC000689.0001</b>
Figure <b>1</b>