



Department of Energy
Office of Legacy Management

JUL 1 2005

WM-86

Mr. William VonTill
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Two White Flint North
Mail Stop 8A33
Rockville, MD 20828-2738

Subject: Naturita and Slick Rock, Colorado, Sites

Dear Mr. VonTill:

Thank you for touring the Naturita and Slick Rock sites on May 3. You requested information regarding several issues that were raised, and we are enclosing responses to these requests.

Considerable effort was expended in 2001 at the Slick Rock West processing site to determine the extent of the hydrocarbon contamination that we observed in well 0319. You will find enclosed information and results pertaining to this effort, most of which can be found in the 2002 *Site Observational Work Plan for the Slick Rock, Colorado, UMTRA Project Sites*.

If you or your staff require additional information for the review of documents, please contact me at the above address or call me at (970) 248-6004.

Sincerely,

Michael K. Tucker
General Engineer

Enclosures

cc w/o enclosures:
ULGAF 1.2.1 (E. Cotter)

mkt\NRCSlickRockNaturita.doc

Responses to Bill VonTill Questions for May 3, 2005 Visit

Naturita Processing Site

1. Q. Is uranium increasing at the seep?
A. A time/concentration graph for the seep at Naturita, location 0538, is enclosed. It shows an increase from sampling conducted in 1994 – 1995 to sampling started in 2001. From 2001 forward, it shows a fairly steady concentration. The reason for the low value in late 2001 is unknown.
2. Q. What is the source of drinking water for the family on east side of San Miguel River.
A. Dick Dayvault contacted the Maupin family. They haul water from Nucla and use a cistern.
3. Q. What is the source of drinking water for the family (Richardson property) located about a mile north of the Calamity Bridge
A. Dick Dayvault contacted the Maupin family. They believe water was hauled there also, but were not positive. Do not believe anyone is currently living there.
4. A copy of the Environmental Covenant with the State of Colorado and the Maupin family is enclosed.

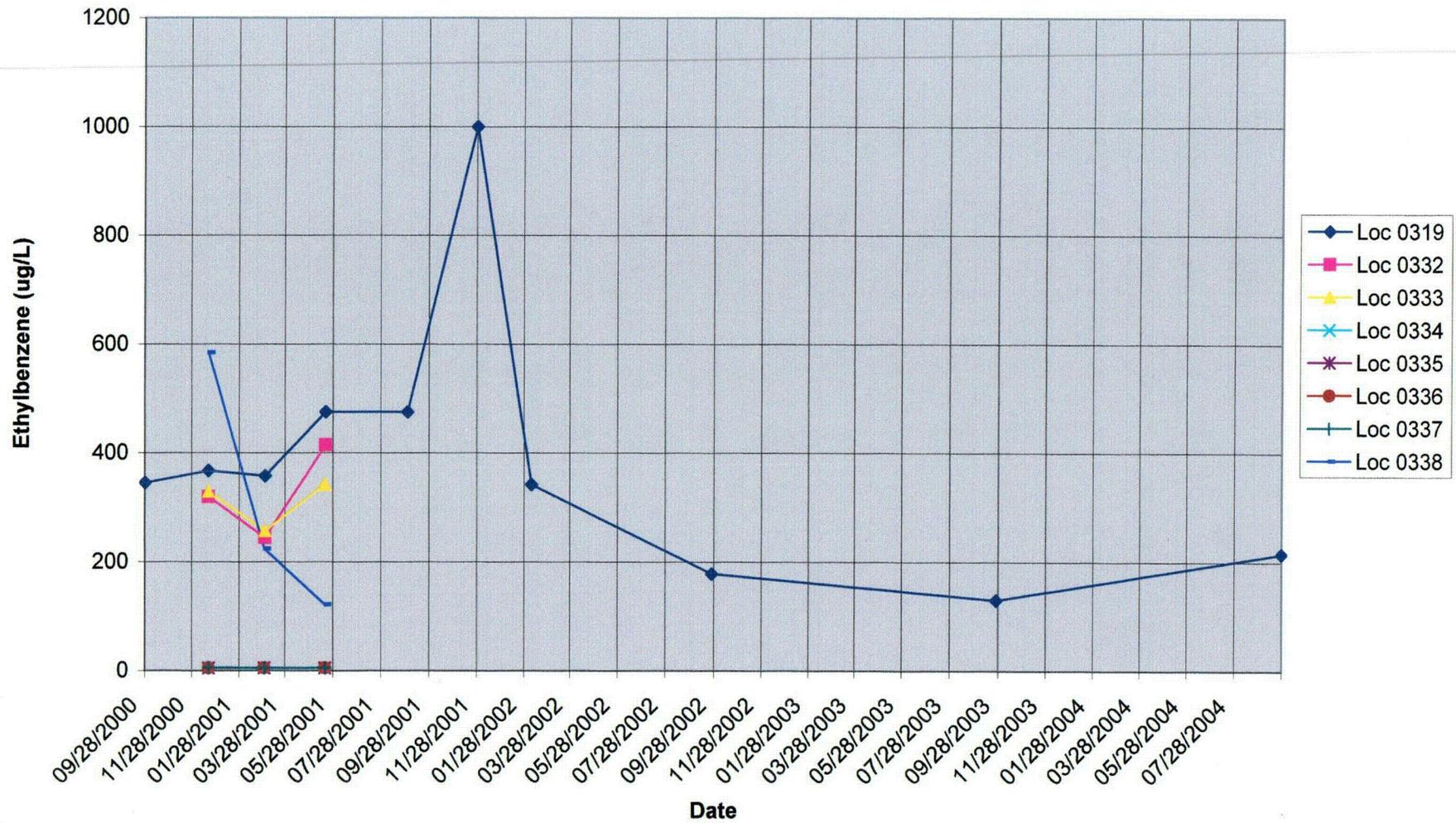
Slick Rock Processing Site

1. Q. What is the source of drinking water for the families living adjacent to the NC or East site?
A. Ed Cotter contacted Dan Woodard, one of the residents there, and asked the question. The families share water from a well in the Navajo Sandstone. The well is labeled 0672 in DOE records and it produces uncontaminated and potable water. A list of analytical results is enclosed. A D-scale map of both sites showing the location of the well is also enclosed.
2. Q. What is the source of drinking water from the residence along the Dolores River on the NC or East site?
A. There was once a shallow hand dug alluvial well located there, location 0675. It has collapsed and is no longer used. Water from well 0672 is shared at this location as needed. The owner of the property along the river is the same person who owns well 0672.
3. Q. Provide more information about the hydrocarbon spike found in well 0319. Is free produce found in the well? Was there more characterization? Was the plume mapped? Was free produce found in the well?
A. Considerable effort was expended in 2000 and 2001 to study the hydrocarbons found at the site. A number of well points were installed and sampled and were decommissioned in 2001. Time/concentration plots of data collected from these shallow wells are provided for BTEX, see enclosed graphs. Only well 0319 remains and is being sampled. A brief description of the Characterization Plan and Results is enclosed. According to the sampling team, free produce did not appear on the surface of the water in well 0319. It was concluded that the plume

covered an area of about 150 by 250 feet and that it attenuated more than 100 feet before reaching the Dolores River. Figure 5-22 from the Site Observational Work Plan (SOWP) is a spot plot for benzene concentrations that shows the approximate location for the plume. A discrete plume diagram was not generated for this study. Page 5-54 from the SOWP indicates a source was never determined and the benzene is probably the remnant from a gasoline spill. The concentrations in Figure 5-22 suggest a steady-state source because high concentrations are located in the middle of the plume. Therefore, it was surmised that microorganisms would reduce the potential risk by degrading the hydrocarbons before they reach the Dolores River. Concentrations of benzene in well 0319 have generally decreasing over the past 5 years.

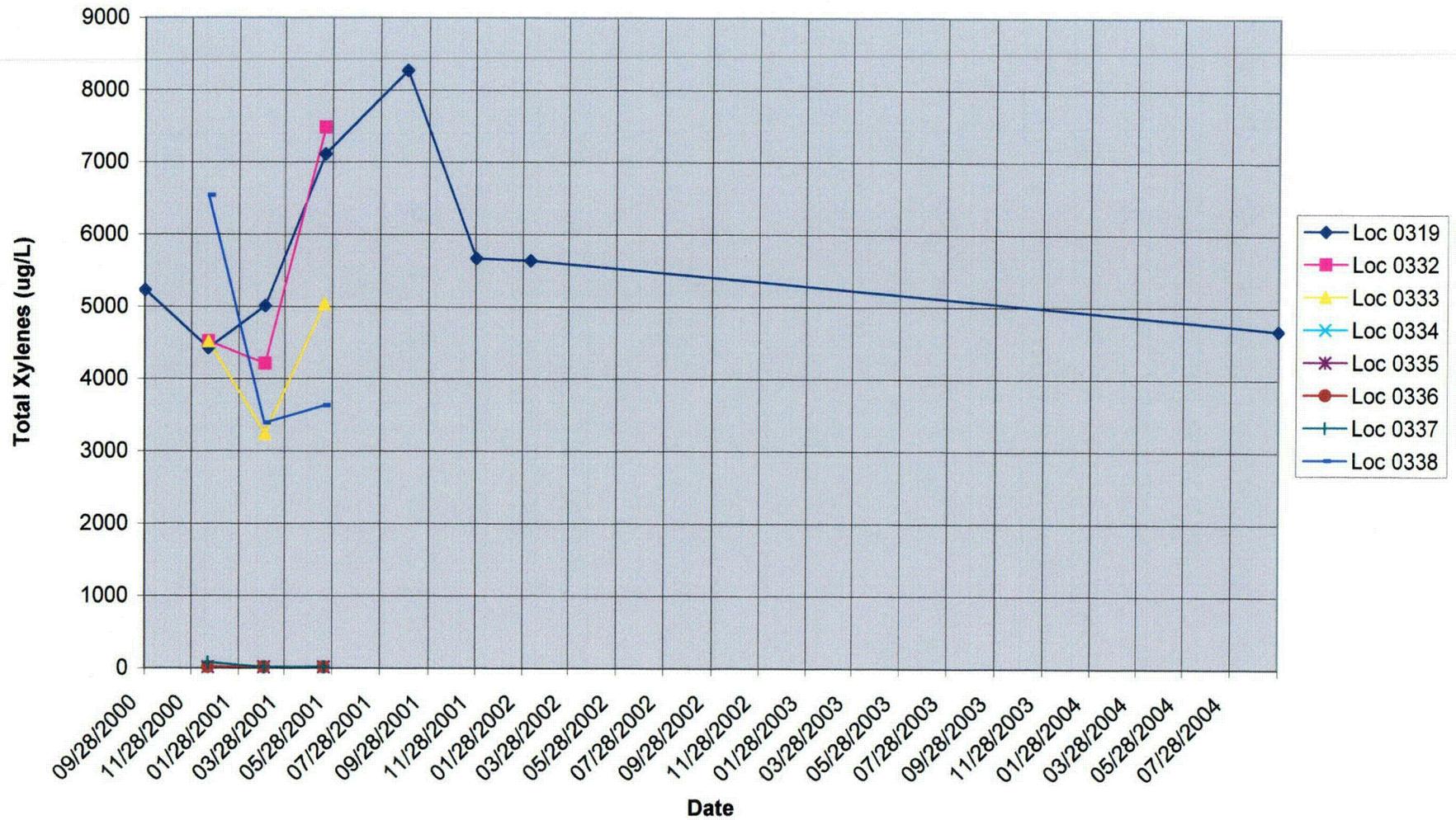
Slick Rock Processing Sites (SRK01)

Ethylbenzene Concentration



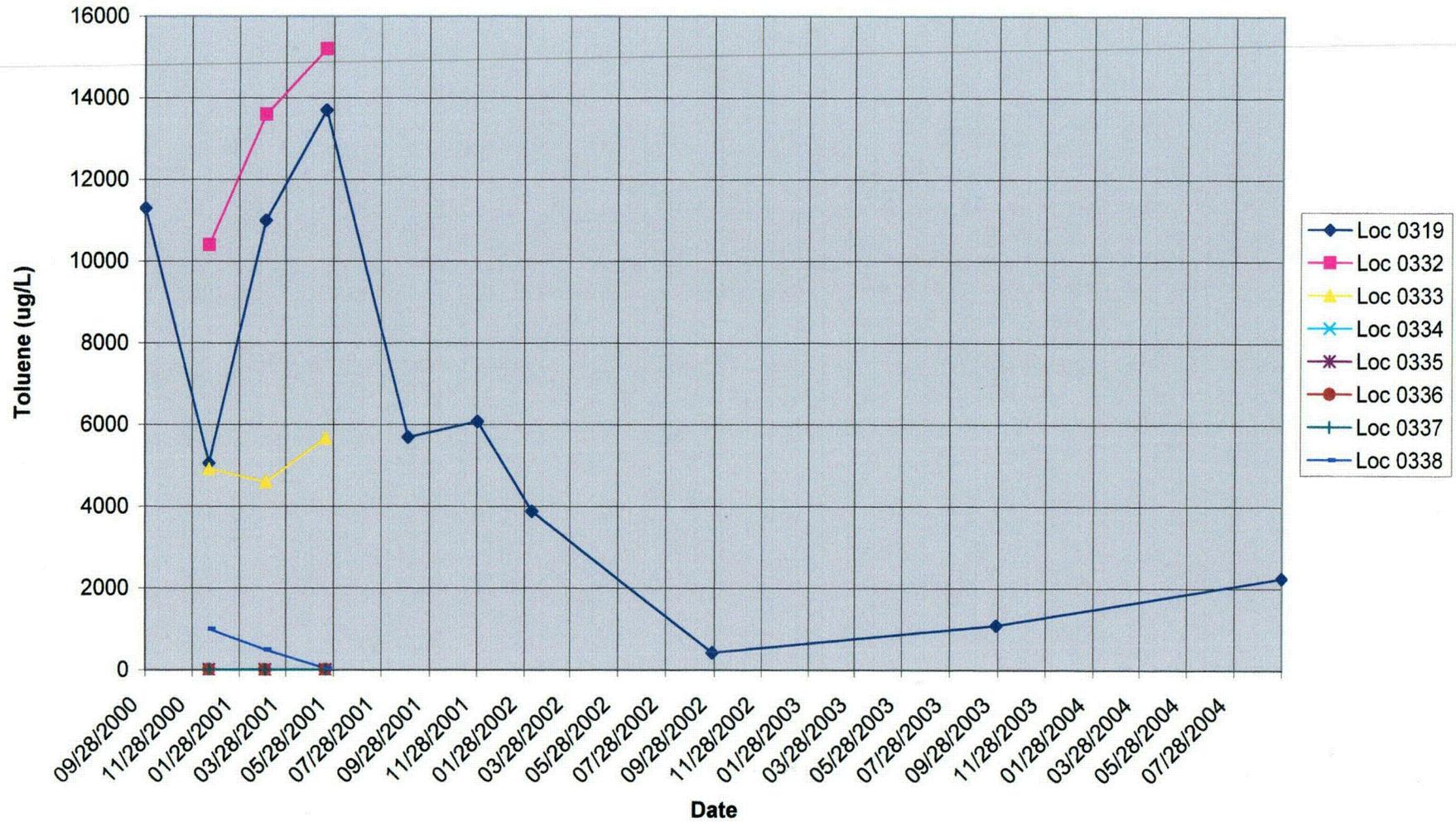
Slick Rock Processing Sites (SRK01)

Total Xylenes Concentration



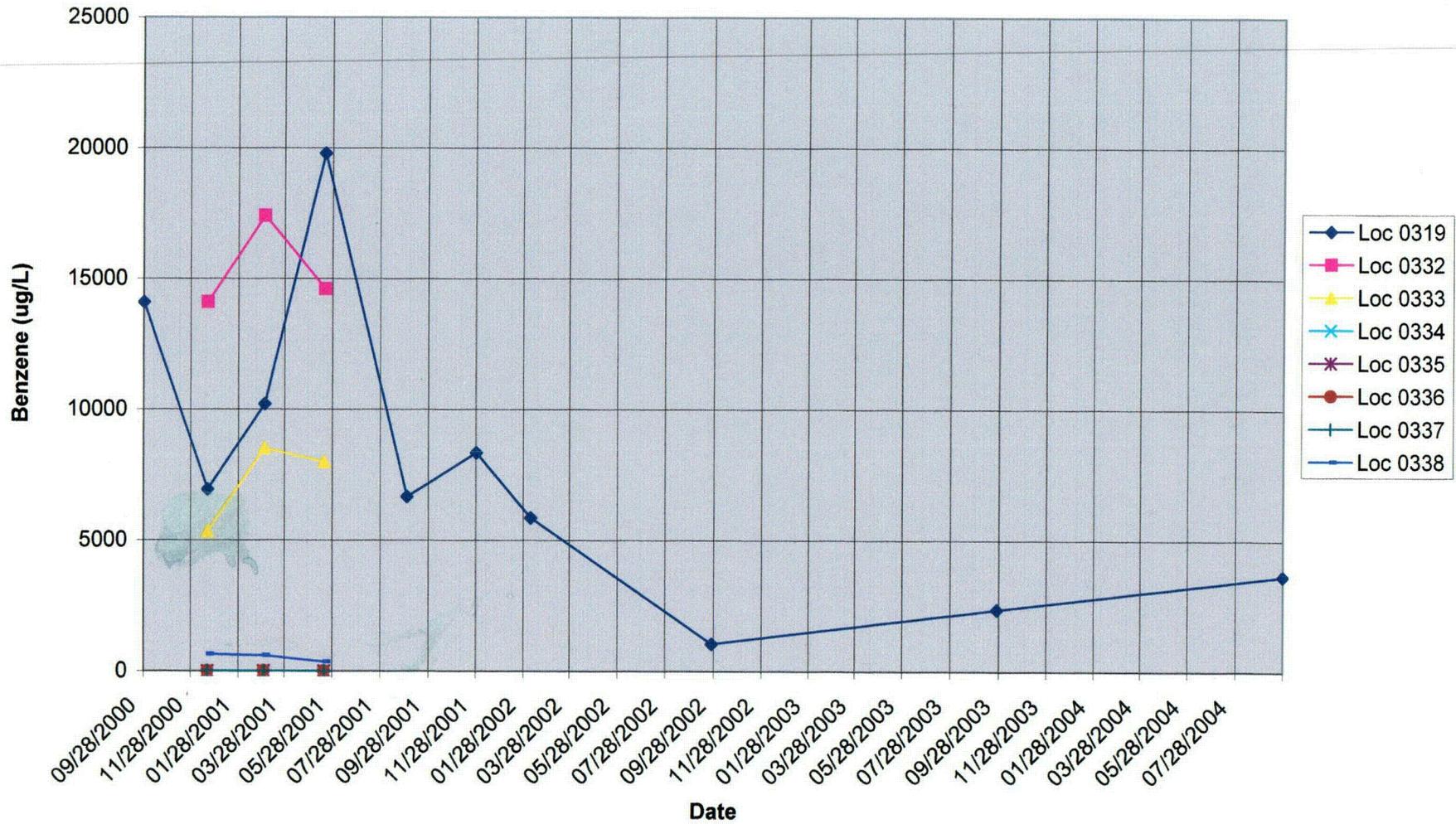
Slick Rock Processing Sites (SRK01)

Toluene Concentration



Slick Rock Processing Sites (SRK01)

Benzene Concentration



Slick Rock Organic Characterization Plan

Introduction

Organic contamination was detected in the shallow alluvial ground water at the Union Carbide (UC) Slick Rock site during the recent field investigation. Samples collected from well 319 had significant concentrations of organic compounds. Contaminants with the highest concentrations included benzene (14,100 µg/L), toluene (11,300 µg/L), and total xylenes (5,230 µg/L). Organic compounds were not detected the sample collected from well 320, which is located approximately 300 feet downgradient of well 319.

Objectives

The purpose of this investigation is to define extent of the organic contamination plume in the alluvial ground water and to install temporary wells to monitor plume movement.

Technical Approach

To accomplish the objectives, a Geoprobe rig will be used to collect soil samples and install temporary well points. A network of temporary wells will be installed, which will consist of one well upgradient of the plume, one well in the most contaminated portion of the plume (source area), two wells downgradient of the source area (within the plume), and two wells downgradient of the plume. Wells will be installed with a 5-foot screen starting at the top of the water table (water table approximately 9 to 10 feet).

To guide the placement of the wells, soil samples will be collected above the water table with the Geoprobe rig and scanned with an organic vapor analyzer (OVA). The relative readings on the OVA will be used to determine the source area, areas within the plume, as well as areas unaffected by the organic contamination.

Once wells are installed, sampling for Target Compound List volatile organic compounds will occur during the regularly scheduled sampling events.

Sample Identification

After each sample location has been sampled, a pin flag will be placed at that location with the sample location written on the flag. The locations will then be surveyed using a global positioning satellite (GPS) unit. Soil sample numbers will start with location 222 and continue through 260 (as needed). Well locations will be labeled as 332 through 337.

Field Documentation

A borehole summary sheet will be completed for each temporary well installed detailing the lithology encountered and well construction. OVA readings of soil samples will be documented at each location.

Investigation Derived Waste

Soil removed from boreholes will be placed back in the order it was removed. Soil from temporary wells will be buried in a hole adjacent to the well a minimum of 6 inches deep.

Slick Rock Organic Characterization Summary

Following is a summary of the organic characterization conducted at the Slick Rock – Union Carbide (UC) site in December of 2000.

Soil borings were drilled at 23 locations (222 to 244) with a Geoprobe rig to delineate the contamination (Figure 1). Each soil boring was scanned with an organic vapor analyzer (OVA) to determine the relative level of contamination in the soil. OVA readings ranged from 0 to > 2,000 ppm, as shown in Table 1.

The OVA readings were used to guide the placement of well points. Seven well points (332 to 338) were installed with the Geoprobe rig in the alluvial aquifer, with depths ranging from 6.5 to 12.5 feet below ground surface. All well points and two monitor wells were sampled for volatile organic compounds.

Preliminary results of the investigation indicate that the contamination is confined to an area approximately 150 feet by 250 feet, and the plume attenuates greater than 100 feet from the Dolores River. The bulk of the contamination appears to be in the interval between 6.5 to 9.5 feet below ground surface. Further analysis of the distribution of organic compounds in the alluvial aquifer will be conducted when analysis of ground water samples is completed.

Table 1. Slick Rock Soil Borings

LOCATION	DEPTH INTERVAL (FEET)	OVA READING (PPM)	COMMENTS
222	0-3.25	0	Reddish sandy soil
	3.25-3.5	93	Black organics
	3.5-6.5	513	Black organics, sand
	6.5-8.5	963	Black organics
	8.5-9.5	5	Cobbles and gravel
223	9.5-12.5	0	Brown cobbles and gravel
	0-3.5	0	Reddish sandy soil
	3.5-6.5	0	Cobbles, gravel, sand
	6.5-9.5	20	Dark brown to black - organics mixed with gravel
	0-3.5	20	Sand stained black at 3.25 - 20 ppm
224	3.5-5.5	244	Sand, stained black
	6.5-9.5	568	Sand /gravel, black, 25 ppm near base of interval
	0-3.5	0	Reddish sandy soil
225	3.5-5	0	Sand mixed with gravel
	5-6.5	645	Sand, black
	6.5-9.5	30	Grey/red sand and gravel, well 338 installed 10 feet to the north
	0-3.5	0	Reddish sandy soil
226	3.5-6.5	0	Sand, gravel
	6.5-9.5	0	Sand, gravel, cobbles
	0-3.5	0	Reddish-brown, fine sand, silt
227	3.5-6.5	791	Brown, fine and medium sand
	6.5-9.5	804	Brown, fine to medium sand
	0-3.5	0	Reddish brown silty sand
228	3.5-5	0	Fine to medium brown sand
	5-6.5	44	Black/ gray sand, petroleum stained
	6.5-9.5	> 2,000	Black medium sand mixed with gravel
	9.5-12.5	1,933	Black stained medium sand, bedrock at 12 feet, installed well 332 between borings 228 and 229
	0-3.5	10	Reddish brown silty sand with gravel
229	3.5-6.5	> 2,000	Brown to gray fine sand grading to clay
	6.5-8.5	> 2,000	Black, clay grading to medium sand mixed with gravel
	0-3.5	67	Reddish brown silty sand
230	3.5-6.5	> 2,000	Clayey silt to black fine/medium sand
	6.5-9.5	722	Black fine/medium sand
	9.5-12.5	317	Bedrock at 12.5 feet
	0-3.5	10	Reddish-brown sandy silt, installed well 333
231	3.5-6.5	1267	Brown fine to medium sand
	6.5-9.5	> 2,000	Brown to gray fine to medium sand with gravel
	9.5-12.5	590	Brown to gray fine to medium sand with gravel
	0-3.5	10	Reddish-brown silty sand
232	3.5-6.5	447	Brown to gray silty sand
	6.5-9.5	> 2,000	Brown to gray silty sand, black stains
	9.5-12.5	272	Brown to gray silty sand, black stains
	0-3.5	0	Reddish-brown silty sand
233	3.5-6.5	257	Brown to gray silty clay, black stained
	6.5-9.5	908	Gray to black stained silty sand with gravel
	9.5-10.5	10	Fine to medium sand mixed with gravel
	0-11.5	0	Well 334 installed at this location
234	0-11.5	0	Well 334 installed at this location
235	3.5-6.5	> 2,000	
236	3.5-6.5	> 2,000	
237	5-6	263	
238	4.5-6.5	> 2,000	
239	3.5-6.5	1,850	Well 337 installed at this location
240	6.5-9.5	> 2,000	
241	7.5-8	367	
242	0-12.5	0	Well 335 installed at this location
243	0-12.5	0	Furthest northwest extent of the plume
244	0-12.5	0	Well 336 installed at this location

Figure 5-18). Downgradient of these wells, molybdenum concentrations at on-site well 0320 are below the UMTRA Project standard of 0.01 mg/L and are near background levels.

Selenium contamination at the UC site is shown in Figure 5-19. Once again, the highest concentrations are in wells 0318, 0508, and 0510. Selenium is typically not as mobile as molybdenum and uranium, and concentrations return to background levels at on-site well 0320. Ammonium is not considered a COPC at the UC site because concentrations do not pose an unacceptable risk, but discussion of the distribution of ammonium in the ground water is warranted because it illustrates plume movement of a mobile constituent. Ammonium is distributed more extensively than other contaminants at the UC site. The location with the highest ammonium concentration is farther downgradient (well 0319) compared to the extent of other contaminants at the UC site. Also, ammonium ion concentrations above background are detected downgradient of the UC site in wells 0321, 0322, 0323, and 0684, as shown in Figure 5-20.

It is possible that the nitrate contamination (Figure 5-21) is related to the ammonium contamination. Ammonia was used on site but there is no evidence for nitrate use. Hence, the nitrate may be present as a biological oxidation product of ammonium. The nitrate contamination coincides with ammonium, and traces are also detected in the Dolores River. Both ammonium and nitrate are large soluble ions that are not significantly attenuated by soil materials. Nonetheless, the concentrations in the river are low, suggesting that dilution and removal by biological processes are sufficient to prevent significant surface water contamination from occurring.

Figure 5-22 shows the location of benzene contamination at the UC site. The actual source of this contamination is unknown. There are no records indicating use of organic chemicals as part of the milling processes at the site. It is likely, therefore, that the benzene is a remnant from spilled gasoline. Although gasoline consists primarily of saturated hydrocarbons (e.g., octane), soil microorganisms under oxidizing conditions can utilize such compounds as a sole carbon source (primary food). Because benzene is not consumed as efficiently, it is not uncommon for an old fuel spill to consist primarily of aromatic organic compounds such as benzene. Aged benzene contaminant plumes are often at steady-state, such that biological removal on the fringe of the plume prevents the plume from significant growth. The pattern shown in Figure 5-22 fits the pattern of a steady-state source because of the high concentration in the middle with much lower concentrations radiating downgradient. Thus, although continued monitoring is required, it is likely that the benzene contamination is not growing and will be consumed by microorganisms over time.

The only other standard exceeded at the UC site was the radium-226+228 standard. The radium-226/228 contamination at the UC site is highly localized. Only concentrations in well 0319 exceed the UMTRA Project standard; concentrations in all other wells are near background levels. Concentrations of radium-226+228 in well 0319 are not highly elevated; the average concentration of 6.2 picocuries per liter (pCi/L) is near the standard of 5 pCi/L. Most of the contribution to the radium concentrations in this well is from radium-228.

Bedrock Aquifers

The Entrada Sandstone underlies the alluvium at the UC site. Four wells were installed in the Entrada Sandstone at the UC site during the recent field investigation (Figure 4-3 and



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Figure 5-22. Benzene Concentrations at the UC Site

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Alkalinity, Total (As CaCO3)	mg/L	02/01/1986	N001		265	#	-	-
	mg/L	07/19/1986	N001		273	#	-	-
	mg/L	04/17/1991	N001		276	#	-	-
	mg/L	02/16/1994	N001		261	#	-	-
	mg/L	02/19/1995	N001		263	#	10	-
	mg/L	03/05/1997	N001		211	#	-	-
	mg/L	09/15/1998	N001		242	#	-	-
	mg/L	02/25/2000	N001	0.00 - 0.00	263	#	-	-
	mg/L	05/15/2000	N001	0.00 - 0.00	244	#	-	-
	mg/L	09/28/2000	N001		270	#	-	-
Aluminum	mg/L	07/19/1986	0001		0.4	#	0.1	-
	mg/L	04/17/1991	N001		0.05	U	0.05	-
Ammonia Total as NH4	mg/L	02/01/1986	0001		0.3	#	0.1	-
	mg/L	02/16/1994	N001		0.1	U	0.1	-
	mg/L	02/19/1995	N001		0.10	U	0.1	-
	mg/L	03/05/1997	N001		0.0388	B	-	-
	mg/L	09/15/1998	N001		0.0144	B U	-	-
	mg/L	02/25/2000	N001	0.00 - 0.00	0.0663	B	-	-
	mg/L	05/15/2000	N001	0.00 - 0.00	0.0159	B	-	-
	mg/L	09/28/2000	N001		0.0047	U	0.0047	-
Antimony	mg/L	04/17/1991	N001		0.01	UI	0.01	-
Arsenic	mg/L	02/01/1986	0001		0.01	U	0.01	-
	mg/L	07/19/1986	0001		0.01	U	0.01	-
	mg/L	04/17/1991	N001		0.01	U	0.01	-
Barium	mg/L	04/17/1991	N001		0.22	#	0.01	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: DETECTION UN-			
		DATE	ID			LAB DATA QA	LIMIT	CERTAINTY	
Barium	mg/L	02/16/1994	N001		0.2		#	0.1	-
	mg/L	03/05/1997	N001		0.264		#	-	-
	mg/L	09/15/1998	N001		0.240		#	-	-
Beryllium	mg/L	04/17/1991	N001		0.005	U	#	0.005	-
Boron	mg/L	04/17/1991	N001		0.16		#	0.05	-
	mg/L	02/16/1994	N001		0.1		#	0.1	-
Bromide	mg/L	04/17/1991	N001		0.2		#	0.1	-
	mg/L	03/05/1997	N001		0.0210	U	#	0.021	-
	mg/L	09/15/1998	N001		0.0220	U	#	0.022	-
	mg/L	02/25/2000	N001	0.00 - 0.00	0.008	U	#	0.008	-
	mg/L	05/15/2000	N001	0.00 - 0.00	0.0665	U	#	0.0665	-
	mg/L	09/28/2000	N001		0.0665	U	#	0.0665	-
Cadmium	mg/L	02/01/1986	0001		0.001	U	#	0.001	-
	mg/L	04/17/1991	N001		0.001	U	#	0.001	-
	mg/L	02/16/1994	N001		0.001	U	#	0.001	-
	mg/L	02/19/1995	0001		0.001	UW	J	0.001	-
	mg/L	02/19/1995	N001		0.001	UW	J	0.001	-
	mg/L	03/05/1997	N001		0.0011	U	#	0.0011	-
	mg/L	09/15/1998	N001		0.0011	U	#	0.0011	-
	mg/L	02/25/2000	N001	0.00 - 0.00	0.00033	U	#	0.00033	-
	mg/L	05/15/2000	N001	0.00 - 0.00	0.0002	U	#	0.0002	-
	mg/L	09/28/2000	N001		0.00033	U	#	0.0003	-
Calcium	mg/L	02/01/1986	0001		21.1		#	0.01	-
	mg/L	07/19/1986	0001		20.8		#	0.01	-
	mg/L	04/17/1991	N001		23.4		#	0.5	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Calcium	mg/L	02/16/1994	N001		21.0	#	0.5	-
	mg/L	02/19/1995	0001		24.5	#	0.1	-
	mg/L	02/19/1995	N001		21.9	#	1	-
	mg/L	03/05/1997	N001		22.500	#	-	-
	mg/L	09/15/1998	N001		22.200	#	-	-
	mg/L	02/25/2000	N001	0.00 - 0.00	21.700	#	-	-
	mg/L	05/15/2000	N001	0.00 - 0.00	21.700	#	-	-
	mg/L	09/28/2000	N001		22.400	#	0.0481	-
Chloride	mg/L	02/01/1986	0001		8	#	1	-
	mg/L	07/19/1986	0001		15	#	1	-
	mg/L	04/17/1991	N001		7.5	#	0.5	-
	mg/L	02/16/1994	N001		8.5	#	0.5	-
	mg/L	02/19/1995	0001		6.7	#	0.5	-
	mg/L	02/19/1995	N001		7.14	#	0.5	-
	mg/L	03/05/1997	N001		6.940	#	-	-
	mg/L	09/15/1998	N001		7.660	#	-	-
	mg/L	02/25/2000	N001	0.00 - 0.00	7.870	#	-	-
	mg/L	05/15/2000	N001	0.00 - 0.00	7.920	#	-	-
	mg/L	09/28/2000	N001		7.750	#	0.024	-
Chromium	mg/L	04/17/1991	N001		0.01	U	#	0.01
	mg/L	02/16/1994	N001		0.01	U	#	0.01
Cobalt	mg/L	04/17/1991	N001		0.03	U	#	0.03
Copper	mg/L	04/17/1991	N001		0.01	U	#	0.01
Dissolved Organic Carbon	mg/L	02/19/1995	0001		9.7	#	1	-
Fluoride	mg/L	04/17/1991	N001		0.4	#	0.1	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:			DETECTION LIMIT	UN- CERTAINTY		
		DATE	ID			LAB	DATA	QA				
Gross Alpha	pCi/L	04/17/1991	N001		9.7				#	1	± 5.40	
	pCi/L	02/16/1994	N001		5.9				#	1.9	± 1.50	
	pCi/L	02/19/1995	0001		3.8	N	J		#	9.2	± 1.00	
	pCi/L	02/19/1995	N001		3.6	N	J		#	0.9	± 0.90	
	pCi/L	03/05/1997	N001		7.05				#	4.05	± 3.24	
	pCi/L	09/15/1998	N001		5.17				#	3.4	± 2.52	
	pCi/L	02/25/2000	N001		0.00 - 0.00	3.61	U	J		#	3.61	± 2.16
	pCi/L	05/15/2000	N001		0.00 - 0.00	3.7	U	J		#	3.7	± 2.40
pCi/L	09/28/2000	N001			5.63	U			#	5.63	± 3.02	
Gross Beta	pCi/L	04/17/1991	N001		12.5				#	0.5	± 3.60	
	pCi/L	03/05/1997	N001		9.04				#	4.66	± 3.19	
	pCi/L	09/15/1998	N001		7.71				#	3.05	± 2.12	
	pCi/L	02/25/2000	N001		0.00 - 0.00	10.93				#	3.14	± 2.34
	pCi/L	05/15/2000	N001		0.00 - 0.00	9.57				#	4.12	± 2.83
	pCi/L	09/28/2000	N001			7.88				#	6.18	± 3.93
Iron	mg/L	02/01/1986	0001		0.03	U			#	0.03	-	
	mg/L	07/19/1986	0001		0.03	U			#	0.03	-	
	mg/L	04/17/1991	N001		0.03	U			#	0.03	-	
	mg/L	02/16/1994	N001		0.03	U			#	0.03	-	
	mg/L	02/19/1995	0001		0.03	UE	J		#	0.03	-	
	mg/L	02/19/1995	N001		0.07		J		#	0.03	-	
	mg/L	03/05/1997	N001		0.0067	U			#	0.0067	-	
	mg/L	09/15/1998	N001		0.0404		U		#	-	-	
	mg/L	02/25/2000	N001		0.00 - 0.00	0.0274	B	U		#	-	-
	mg/L	05/15/2000	N001		0.00 - 0.00	0.0074	U			#	0.0074	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:			DETECTION LIMIT	UN- CERTAINTY
		DATE	ID			LAB	DATA	QA		
Iron	mg/L	09/28/2000	N001		0.0225	B	U	#	0.0117	-
Lead	mg/L	04/17/1991	N001		0.005	U		#	0.005	-
Lead-210	pCi/L	04/17/1991	N001		0.6			#	1.5	± 1.40
	pCi/L	02/16/1994	N001		2.3			#	1.7	± 1.00
	pCi/L	02/19/1995	0001		0.4			#	1.1	± 0.60
	pCi/L	02/19/1995	N001		0.3			#	1.1	± 0.50
	pCi/L	03/05/1997	N001		1.06	U		#	1.06	± 0.63
	pCi/L	09/15/1998	N001		0.98	U		#	0.98	± 0.57
	pCi/L	02/25/2000	N001	0.00 - 0.00	0.93	U		#	0.93	± 0.54
	pCi/L	05/15/2000	N001	0.00 - 0.00	1.37	U		#	1.37	± 0.81
	pCi/L	09/28/2000	N001		1.08	U		#	1.08	± 0.64
Magnesium	mg/L	02/01/1986	0001		43			#	0.001	-
	mg/L	07/19/1986	0001		42.8			#	0.001	-
	mg/L	04/17/1991	N001		43.4			#	0.1	-
	mg/L	02/16/1994	N001		41.4			#	0.1	-
	mg/L	02/19/1995	0001		47.6			#	0.1	-
	mg/L	02/19/1995	N001		42.1			#	0.1	-
	mg/L	03/05/1997	N001		46.400			#	-	-
	mg/L	09/15/1998	N001		42.100			#	-	-
	mg/L	02/25/2000	N001	0.00 - 0.00	40.700			#	-	-
	mg/L	05/15/2000	N001	0.00 - 0.00	42.400			#	-	-
mg/L	09/28/2000	N001		43.100			#	0.0352	-	
Manganese	mg/L	02/01/1986	0001		0.01			#	0.01	-
	mg/L	07/19/1986	0001		0.03			#	0.01	-
	mg/L	04/17/1991	N001		0.01	U		#	0.01	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:			DETECTION LIMIT	UN- CERTAINTY
		DATE	ID			LAB	DATA	QA		
Manganese	mg/L	02/16/1994	N001		0.01	U		#	0.01	-
	mg/L	02/19/1995	0001		0.01	UE	J	#	0.01	-
	mg/L	02/19/1995	N001		0.01	U		#	0.01	-
	mg/L	03/05/1997	N001		0.0011	U		#	0.0011	-
	mg/L	09/15/1998	N001		0.0011	U		#	0.0011	-
	mg/L	02/25/2000	N001		0.001	U	0.00 - 0.00	#	0.001	-
	mg/L	05/15/2000	N001		0.0004	U	0.00 - 0.00	#	0.0004	-
	mg/L	09/28/2000	N001		0.0022	U		#	0.002	-
Molybdenum	mg/L	02/01/1986	0001		0.09			#	0.01	-
	mg/L	07/19/1986	0001		0.14			#	0.01	-
	mg/L	04/17/1991	N001		0.01	U		#	0.01	-
	mg/L	02/16/1994	N001		0.01	U		#	0.01	-
	mg/L	02/19/1995	0001		0.01	U		#	0.01	-
	mg/L	02/19/1995	N001		0.01	U		#	0.01	-
	mg/L	03/05/1997	N001		0.0046	B		#	-	-
	mg/L	09/15/1998	N001		0.0018	B	U	#	-	-
	mg/L	02/25/2000	N001		0.0025	B	U	#	-	-
	mg/L	05/15/2000	N001		0.0011	B	U	#	-	-
	mg/L	09/28/2000	N001		0.00078	B		#	0.0004	-
	Nickel	mg/L	04/17/1991	N001		0.04	U		#	0.04
Nitrate as NO3	mg/L	02/01/1986	0001		1	U		#	1	-
	mg/L	07/19/1986	0001		1	U		#	1	-
	mg/L	02/16/1994	N001		1	U		#	1	-
	mg/L	02/19/1995	N001		2.1			#	1	-
	mg/L	03/05/1997	N001		1.940			#	-	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN-CERTAINTY
Nitrate as NO3	mg/L	09/15/1998	N001		2.580	#	-	-
	mg/L	02/25/2000	N001	0.00 - 0.00	2.760	#	-	-
	mg/L	05/15/2000	N001	0.00 - 0.00	2.080	#	-	-
	mg/L	09/28/2000	N001		2.430	#	0.0314	-
ORP of Zobell Solution	mV	05/15/2000	N001	0.00 - 0.00	243	#	-	-
	mV	09/28/2000	N001		225	#	-	-
Oxidation Reduction Potent	mV	03/05/1997	N001		131	#	-	-
	mV	09/15/1998	N001		150	#	-	-
	mV	02/25/2000	N001	0.00 - 0.00	156	#	-	-
	mV	05/15/2000	N001	0.00 - 0.00	152	#	-	-
	mV	09/28/2000	N001		177	#	-	-
pH	s.u.	02/01/1986	N001		7.7	#	-	-
	s.u.	07/19/1986	N001		7.6	#	-	-
	s.u.	04/17/1991	N001		7.91	#	-	-
	s.u.	02/16/1994	N001		7.75	#	-	-
	s.u.	02/19/1995	N001		7.94	#	0.1	-
	s.u.	03/05/1997	N001		7.78	#	-	-
	s.u.	09/15/1998	N001		7.63	#	-	-
	s.u.	02/25/2000	N001	0.00 - 0.00	7.83	#	-	-
	s.u.	05/15/2000	N001	0.00 - 0.00	7.66	#	-	-
	s.u.	09/28/2000	N001		8.01	#	-	-
Phosphate	mg/L	04/17/1991	N001		0.1	U	0.1	-
	mg/L	03/05/1997	N001		0.0310	U	0.031	-
	mg/L	09/15/1998	N001		0.0430	U	0.043	-
	mg/L	02/25/2000	N001	0.00 - 0.00	0.059	U	0.059	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE	RESULT	QUALIFIERS:		DETECTION	UN-
		DATE	ID	(FT BLS)		LAB	DATA QA	LIMIT	CERTAINTY
Phosphate	mg/L	05/15/2000	N001	0.00 - 0.00	0.0291	U	#	0.0291	-
	mg/L	09/28/2000	N001		0.0321	B	#	0.0291	-
Polonium-210	pCi/L	04/17/1991	N001		0.1		#	1	± 0.40
	pCi/L	02/16/1994	N001		0.1		#	0.1	± 0.10
	pCi/L	03/05/1997	N001		0.23		U	#	0.19 ± 0.25
	pCi/L	09/15/1998	N001		0.07	U	#	0.07	± 0.07
	pCi/L	02/25/2000	N001	0.00 - 0.00	0.08	U	#	0.08	± 0.09
	pCi/L	05/15/2000	N001	0.00 - 0.00	0.10	U	#	0.1	± 0.12
	pCi/L	09/28/2000	N001		0.08	U	#	0.08	± 0.09
Potassium	mg/L	02/01/1986	0001		9.56		#	0.01	-
	mg/L	07/19/1986	0001		9.99		#	0.01	-
	mg/L	04/17/1991	N001		9		#	5	-
	mg/L	02/16/1994	N001		8.8		#	0.1	-
	mg/L	02/19/1995	0001		10.7	E	J	#	0.3
	mg/L	02/19/1995	N001		10.9		#	0.1	-
	mg/L	03/05/1997	N001		9.430		#	-	-
	mg/L	09/15/1998	N001		10.600		#	-	-
	mg/L	02/25/2000	N001	0.00 - 0.00	8.870		#	-	-
	mg/L	05/15/2000	N001	0.00 - 0.00	9.370		#	-	-
	mg/L	09/28/2000	N001		9.160		#	0.0327	-
Radium-226	pCi/L	04/17/1991	N001		0.6		#	1	± 0.30
	pCi/L	02/16/1994	N001		0.6		#	0.1	± 0.20
	pCi/L	02/19/1995	0001		0.7		#	0.1	± 0.20
	pCi/L	02/19/1995	N001		0.0		#	0.1	± 0.20
	pCi/L	03/05/1997	N001		0.83		#	0.02	± 0.18

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:		DETECTION LIMIT	UN- CERTAINTY
		DATE	ID			LAB	DATA QA		
Radium-226	pCi/L	09/15/1998	N001		0.51			# 0.15	± 0.12
	pCi/L	02/25/2000	N001	0.00 - 0.00	0.82			# 0.15	± 0.15
	pCi/L	05/15/2000	N001	0.00 - 0.00	0.85			# 0.14	± 0.15
	pCi/L	09/28/2000	N001		0.81			# 0.17	± 0.15
Radium-228	pCi/L	04/17/1991	N001		2.0			# 1	± 1.40
	pCi/L	02/16/1994	N001		1.2			# 1.9	± 0.90
	pCi/L	02/19/1995	0001		0.5			# 0.7	± 0.30
	pCi/L	02/19/1995	N001		0.9			# 0.7	± 0.40
	pCi/L	03/05/1997	N001		1.3			# 1	± 0.70
	pCi/L	09/15/1998	N001		1.17			# 0.67	± 0.42
	pCi/L	02/25/2000	N001	0.00 - 0.00	0.93	U		# 0.93	± 0.56
	pCi/L	05/15/2000	N001	0.00 - 0.00	0.84			# 0.83	± 0.50
	pCi/L	09/28/2000	N001		0.86			# 0.77	± 0.47
Selenium	mg/L	02/01/1986	0001		0.005	U		# 0.005	-
	mg/L	07/19/1986	0001		0.005	U		# 0.005	-
	mg/L	04/17/1991	N001		0.005	U		# 0.005	-
	mg/L	02/16/1994	N001		0.005	UW	J	# 0.005	-
	mg/L	02/19/1995	0001		0.005	UW	J	# 0.005	-
	mg/L	02/19/1995	N001		0.005	U		# 0.005	-
	mg/L	03/05/1997	N001		0.0018	B		# -	-
	mg/L	09/15/1998	N001		0.0013	B		# -	-
	mg/L	02/25/2000	N001	0.00 - 0.00	0.0014	B		# -	-
	mg/L	05/15/2000	N001	0.00 - 0.00	0.0015	B		# -	-
	mg/L	09/28/2000	N001		0.0017	B		# 0.0001	-
Silica	mg/L	04/17/1991	N001		7.9			# 0.1	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:			DETECTION LIMIT	UN- CERTAINTY	
		DATE	ID			LAB	DATA	QA			
Silica	mg/L	02/16/1994	N001		8.4				#	0.1	-
	mg/L	03/05/1997	N001		8.130				#	-	-
	mg/L	09/15/1998	N001		8.470	N	J		#	-	-
Silver	mg/L	04/17/1991	N001		0.01	U			#	0.01	-
Sodium	mg/L	02/01/1986	0001		16.2				#	0.002	-
	mg/L	07/19/1986	0001		20.5				#	0.002	-
	mg/L	04/17/1991	N001		20				#	1	-
	mg/L	02/16/1994	N001		21				#	1	-
	mg/L	02/19/1995	0001		22.1	E	J		#	1	-
	mg/L	02/19/1995	N001		23.6				#	1	-
	mg/L	03/05/1997	N001		21.400				#	-	-
	mg/L	09/15/1998	N001		28.300				#	-	-
	mg/L	02/25/2000	N001	0.00 - 0.00	20.800				#	-	-
	mg/L	05/15/2000	N001	0.00 - 0.00	20.400				#	-	-
mg/L	09/28/2000	N001		19.700				#	0.302	-	
Specific Conductance	umhos/cm	02/01/1986	N001		350				#	-	-
	umhos/cm	07/19/1986	N001		380				#	-	-
	umhos/cm	04/17/1991	N001		529				#	-	-
	umhos/cm	02/16/1994	N001		339				#	-	-
	umhos/cm	02/19/1995	N001		538		J		#	1	-
	umhos/cm	03/05/1997	N001		531				#	-	-
	umhos/cm	09/15/1998	N001		539				#	-	-
	umhos/cm	02/25/2000	N001	0.00 - 0.00	516				#	-	-
	umhos/cm	05/15/2000	N001	0.00 - 0.00	525				#	-	-
	umhos/cm	09/28/2000	N001		528				#	-	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:		DETECTION LIMIT	UN- CERTAINTY
		DATE	ID			LAB	DATA QA		
Strontium	mg/L	04/17/1991	N001		0.65	#		0.01	-
	mg/L	02/16/1994	N001		0.66	#		0.01	-
	mg/L	03/05/1997	N001		0.708	#		-	-
	mg/L	09/15/1998	N001		0.667	#		-	-
	mg/L	02/25/2000	N001		0.689	#		-	-
	mg/L	05/15/2000	N001		0.667	#		-	-
	mg/L	09/28/2000	N001		0.699	#		0.0002	-
Sulfate	mg/L	02/01/1986	0001		13	#		0.1	-
	mg/L	07/19/1986	0001		9.5	#		0.1	-
	mg/L	04/17/1991	N001		14.9	#		0.1	-
	mg/L	02/16/1994	N001		8	#		1	-
	mg/L	02/19/1995	0001		9.5	#		1	-
	mg/L	02/19/1995	N001		9.5	#		1	-
	mg/L	03/05/1997	N001		9.070	#		-	-
	mg/L	09/15/1998	N001		10.100	#		-	-
	mg/L	02/25/2000	N001		9.500	#		-	-
	mg/L	05/15/2000	N001		9.070	#		-	-
	mg/L	09/28/2000	N001		9.590	#		0.0589	-
Sulfide	mg/L	07/19/1986	0001		0.1	U	#	0.1	-
Temperature	C	02/01/1986	N001		14	#		-	-
	C	07/19/1986	N001		17	#		-	-
	C	04/17/1991	N001		13.6	#		-	-
	C	02/16/1994	N001		6.3	#		-	-
	C	02/19/1995	N001		12.2	#		0.1	-
	C	03/05/1997	N001		13.0	#		-	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:		DETECTION LIMIT	UN- CERTAINTY
		DATE	ID			LAB	DATA QA		
Temperature	C	09/15/1998	N001		15.4		#	-	-
	C	02/25/2000	N001	0.00 - 0.00	12.2		#	-	-
	C	05/15/2000	N001	0.00 - 0.00	15.3		#	-	-
	C	09/28/2000	N001		16.3		#	-	-
Temperature of Zobell Solu	C	05/15/2000	N001	0.00 - 0.00	14.3		#	-	-
	C	09/28/2000	N001		15.9		#	-	-
Thallium	mg/L	04/17/1991	N001		0.01	U	#	0.01	-
Thorium-230	pCi/L	04/17/1991	N001		0.1		#	1	± 0.10
	pCi/L	02/16/1994	N001		0.2		#	0.2	± 0.10
	pCi/L	03/05/1997	N001		0.64	U	#	0.64	-
	pCi/L	09/15/1998	N001		1.6	U	#	1.6	-
	pCi/L	02/25/2000	N001	0.00 - 0.00	2.8		#	-	-
	pCi/L	05/15/2000	N001	0.00 - 0.00	1.5	U	#	1.5	-
	pCi/L	09/28/2000	N001		1.9	U	#	1.9	-
Tin	mg/L	04/17/1991	N001		0.01	UI	#	0.01	-
Total Dissolved Solids	mg/L	02/01/1986	0001		261		#	10	-
	mg/L	07/19/1986	0001		361		#	10	-
	mg/L	02/16/1994	N001		260		#	10	-
	mg/L	02/19/1995	0001		277		#	10	-
	mg/L	03/05/1997	N001		233		#	-	-
	mg/L	09/15/1998	N001		268		#	-	-
	mg/L	02/25/2000	N001	0.00 - 0.00	300		#	-	-
	mg/L	05/15/2000	N001	0.00 - 0.00	317		#	-	-
	mg/L	09/28/2000	N001		333		#	10	-
Total Organic Carbon	mg/L	02/16/1994	N001		1		#	1	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE	RESULT	QUALIFIERS:	DETECTION	UN-
		DATE	ID	(FT BLS)		LAB DATA QA	LIMIT	CERTAINTY
Total Organic Carbon	mg/L	02/19/1995	N001		8.8		# 1	-
Turbidity	NTU	03/05/1997	N001		0.67		# -	-
	NTU	09/15/1998	N001		0.16		# -	-
	NTU	02/25/2000	N001	0.00 - 0.00	3.78		# -	-
	NTU	05/15/2000	N001	0.00 - 0.00	1.47		# -	-
	NTU	09/28/2000	N001		0.7		# -	-
Uranium	mg/L	02/01/1986	0001		0.003		# 0.003	-
	mg/L	07/19/1986	0001		0.0034		# 0.003	-
	mg/L	04/17/1991	N001		0.001	U	# 0.001	-
	mg/L	02/16/1994	N001		0.003		# 0.001	-
	mg/L	02/19/1995	0001		0.003		# 0.001	-
	mg/L	02/19/1995	N001		0.003		# 0.001	-
	mg/L	03/05/1997	N001		0.0031		# -	-
	mg/L	09/15/1998	N001		0.0030		# -	-
	mg/L	02/25/2000	N001	0.00 - 0.00	0.0033		# -	-
	mg/L	05/15/2000	N001	0.00 - 0.00	0.0029		# -	-
	mg/L	09/28/2000	N001		0.0029		# 0.0001	-
Uranium-234	pCi/L	02/25/2000	N001	0.00 - 0.00	3.3		# -	-
Uranium-238	pCi/L	02/25/2000	N001	0.00 - 0.00	1.1	B	# -	-
Vanadium	mg/L	04/17/1991	N001		0.01	U	# 0.01	-
	mg/L	02/16/1994	N001		0.01	U	# 0.01	-
	mg/L	02/19/1995	0001		0.01	U	# 0.01	-
	mg/L	02/19/1995	N001		0.02		# 0.01	-
	mg/L	03/05/1997	N001		0.0044	U	# 0.0044	-
	mg/L	09/15/1998	N001		0.0022	U	# 0.0022	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE:		DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS:			DETECTION LIMIT	UN- CERTAINTY
		DATE	ID			LAB	DATA	QA		
Vanadium	mg/L	02/25/2000	N001	0.00 - 0.00	0.0017	B		#	-	-
	mg/L	05/15/2000	N001	0.00 - 0.00	0.0015	B	U	#	-	-
	mg/L	09/28/2000	N001		0.0021	B		#	0.0013	-
Zinc	mg/L	04/17/1991	N001		0.090			#	0.005	-
	mg/L	02/16/1994	N001		0.20			#	0.05	-

GROUND WATER QUALITY DATA BY LOCATION (USEE100) FOR SITE SRK01, Slick Rock Processing Sites

LOCATION: 0672 <well>

REPORT DATE: 5/10/2005 1:01 pm

PARAMETER	UNITS	SAMPLE: DATE	ID	DEPTH RANGE (FT BLS)	RESULT	QUALIFIERS: LAB DATA QA	DETECTION LIMIT	UN- CERTAINTY
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RECORDS: SELECTED FROM USEE100 WHERE site_code='SRK01' AND location_code in('0672') AND quality_assurance = TRUE AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%')

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- + Correlation coefficient for MSA < 0.995.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- M GFAA duplicate injection precision not met.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Z Laboratory defined (USEPA CLP organic) qualifier, see case narrative.

DATA QUALIFIERS:

- F Low flow sampling method used.
- L Less than 3 bore volumes purged prior to sampling.
- U Parameter analyzed for but was not detected.
- G Possible grout contamination, pH > 9.
- Q Qualitative result due to sampling technique
- X Location is undefined.
- J Estimated value.
- R Unusable result.

QA QUALIFIER: # = validated according to Quality Assurance guidelines.