LACO ASSOCIATES
CONSULTING ENGINEERS

LEONARD M. OSBORNE • CE 38573
DAVID R. GERVAN • CE 57282
DAVID N. LINDBERG • RG 5581/CEG 1895
FRANK R. BICKNER • RG 7428
RONALD C. CHANEY, Ph.D • GE 000934

October 17, 2005

5113.00

California Regional Water Quality Control Board
North Coast Region
5550 Skylane Boulevard, Suite A
Santa Rosa, California 95401

Attention: Mr. Cody Walker

Subject: Groundwater Monitoring Report; Third Quarter 2005
Supporting Data for Pursuit of Closure
Former Lovaas Property, 1265 Second Street, Crescent City, California
CRWQCB Case No. 1TDN153

Dear Mr. Walker:

LACO ASSOCIATES (LACO) presents to the California Regional Water Quality Control Board (CRWQCB) the results of groundwater monitoring for the third quarter of 2005. This report has been prepared for Mr. Darryl Lovaas.

Please call (707) 443-5054 if you have any questions or concerns.

Sincerely,
LACO ASSOCIATES

Amy M. Thomson
Staff Geologist

Timothy D. Nelson
PG 7579, Exp. 5/31/07

PROFESSIONAL GEOLOGIST
TIMOTHY DOUGLAS NELSON
No. 7579
Exp. 05/31/07
STATE OF CALIFORNIA

AMT:jg

Attachments

cc: Mr. Darryl Lovaas

P:\5100\5113 Darryl Lovaas\Submittals\GMRs\2005\3Q 05\5113 3 Q 05 GMR.doc

21 W. 4th Street • P.O. Box 1023 • Eureka, California 95502 • 707-443-5054 • 1-800-515-5054 • FAX 707-443-0553
www.lacoassociates.us

GROUNDWATER MONITORING REPORT; THIRD QUARTER 2005

Former Lovaas Property; 1265 Second Street, Crescent City, California

CRWQCB Case No. 1TDN153; LACO ASSOCIATES Project No. 5113.00

INTRODUCTION

Field activities were conducted in accordance with generally accepted practices and standard operating procedures on July 19, 2005. Please refer to Table A below for the current groundwater monitoring sampling regime, and LACO ASSOCIATES' (LACO's) *Standard Operating Procedures,* on file at your office, for sampling details. A location map and site map are included as Figures 1 and 2, respectively.

SITE CHRONOLOGY

2001: One 550-gallon gasoline underground storage tank (UST) was removed.

2002: Eight direct push, and one hand-augured, temporary borings were installed.

2003: Three direct-push, and 10 hand-augured, temporary borings were installed.

2004: Approximately 220 cubic yards of contaminated soil was excavated from four areas of the site; monitoring wells MW1 through MW5 were installed.

2004 through Present: Groundwater sampling for petroleum hydrocarbons in the monitoring wells has been performed since their installation to the present.

GROUNDWATER SAMPLING

Details regarding quarterly groundwater monitoring performed during the third quarter of 2005 are included below in Table A. A key to abbreviations for tabular information is included as Attachment 1; field sampling data sheets are included as Attachment 2.

Table A: Sampling Details, July, 19, 2005

MONITORING WELL ID	SCREENED INTERVAL (feet)	DTW (feet)	PURGE METHOD	WATER QUALITY PARAMETER	ANALYTICALS		SAMPLING SCHEDULE
					ORGANICS	INORGANICS	
MW1	3-8	4.93	DHP	pH, Temp, Ecw, ORP, DO	TPHg, TPHd, TPHmo, BTEX, MTBE, TBA, DIPE, ETBE, TAME, BOD, COD	Dissolved Iron, Dissolved Manganese	Quarterly
MW2		5.11					
MW3		5.31					
MW4		5.05					
MW5		4.98					

HYDRAULIC GRADIENT

The hydraulic gradient for the July 19, 2005, sampling event was essentially flat at the time of measuring (Figure 3). The highest and lowest hydraulic heads (monitoring well MW4 – 6.07, monitoring well MW2 – 5.97, respectively) in the monitoring wells differ by only 0.1 feet. Based on the distribution of petroleum hydrocarbons across the site over time (Table 1), it is evident that the dominant hydraulic flow appears to be in the northeast direction. Historic hydraulic gradient data is included in Table 2.

QUARTERLY LABORATORY ANALYTICAL RESULTS

Groundwater analytical data from this quarterly sampling event are included below in Table B. Current and historic groundwater analytical data are included in Table 1, and copies of the laboratory analytical reports for this period are included as Attachment 3. The analyte concentrations in groundwater for this sampling event are presented in Figure 4.

Table B: Analytical Results, April 11, 2005

WELL	TPHg (µg/L)	TPHd (µg/L)	TPHmo (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Other Analytes (µg/L)
MW1	2,000	240	ND<170	0.7	ND<0.50	60	27	ND<1.0	All ND<1.0-10
MW2	1,600	170		4.0	3.7	9.5	14.7		
MW3	ND<50	ND<50		ND<0.50	ND<0.50	ND<0.50	ND<0.50		
MW4									
MW5	1,000	89			0.78	26.0	81.3		

Laboratory results from the current sampling event were compared with historic sampling events of similar hydraulic conditions in order to maintain consistency in data evaluation. North Coast Laboratories' (NCL's) case narrative (Attachment 3) reports that the samples from monitoring wells MW1, MW2, and MW5 contain some material lighter than diesel and also contain material in the diesel range of molecular weights, but the material does not exhibit the peak pattern typical of diesel oil. NCL's case narrative also reports that samples from monitoring wells MW1, MW2, and MW5 appear to be similar to gasoline but certain peak ratios are not that of a fresh gasoline standard and the results reported represent the amount of material in the gasoline range. At sites with mixtures of petroleum products that exhibit weathered or degraded petroleum constituents, some overlap in the chromatogram signatures may occur. NCL's comments indicated degraded petroleum constituents.

DISCUSSION

Time series plots of exponential trendlines for the constituents of concern in monitoring wells MW1, MW2, and MW5 are included in Charts 1 through 5. The charts have been updated with the current laboratory data from LACO's previously submitted *Groundwater Monitoring Report, Second Quarter 2005; Supporting Data for Pursuit of Closure,* dated July 19, 2005. As stated in in the *Groundwater Monitoring Report; Second Quarter 2005,* decay rate constants (k) for total petroleum hydrocarbons as gasoline (TPHg) and benzene concentrations were derived from three sources to compare and contrast:

- Trendlines in time-series plots (Charts 1 through 5, using Water Quality Objectives [WQOs] as final concentration, Worksheet 1)
- Analytical results (using highest/final concentrations, Worksheet 2)
- Published half-lives ([Howard *et al.*, 1991] Worksheet 3)

Determining the degradation rate of TPHg is difficult to obtain due to the complex formulation of gasoline blend(s). The consequence of these complex blends is that published half-lives of TPHg are unavailable. However, cyclohexane is a major component in standard gasoline blends, comprising up to approximately 32 percent by volume (Nyer *et al.,* 1996), therefore it is concluded that cyclohexane is a representative proxy when calculating a decay rate for TPHg.

Worksheet 3 also presents low "fast" and high "slow" degradation rates, based on published cyclohexane half-life data. Published cyclohexane fast and slow half-lives for aqueous biodegradation under anaerobic and aerobic conditions, were obtained from the *Handbook of Environmental Degradation Rates* (Howard *et al.*, 1991). The more conservative slow degradation rates were for our estimations.

Worksheet 4 represents a comparison of the above decay rate constant derivations. The degradation rates of TPHg and benzene were determined using derivatives of the first order decay equation presented below:

Concentration Final (C_f) = Concentration Initial (C_i)*e^[-decay constant (-k) * time (t)]

Worksheet 5 presents a comparison of the decay rate constants with the estimated date of achievement for the WQOs for TPHg and benzene for monitoring wells MW1, MW2, MW5.

Monitoring Well MW1

For the current sampling event in monitoring well MW1, concentrations of total xylenes and benzene were reported below the WQOs of 42 µg/L and 1 µg/L, respectively, and concentrations of total petroleum hydrocarbons as motor oil (TPHmo), methyl tertiary butyl ether (MTBE), and toluene were reported as non-detect (ND) (Table 1). The concentrations of TPHg, total petroleum hydrocarbons as diesel (TPHd), and ethylbenzene, in monitoring well MW1, slightly increased in concentration from the previous monitoring event, but remained within the same order of magnitude. This slight increase in analyte detection is directly related to groundwater elevation and aquifer volume. As the water table lowers in the summer months due to lack of recharge, the analytes in the groundwater become more concentrated. It appears that for the current sampling event, concentrations of the more volatile benzene and toluene have diminished, while the heavier-ended carbon chain and less volatile ethylbenzene and xylenes became more concentrated.

Using the published decay rate of cyclohexane as a surrogate for TPHg (decay rate of -0.0095/ day), it is estimated that the concentration of TPHg in monitoring well MW1 will reach the WQO of 50 µg/L within 10 years (Worksheet 5). Using the highest concentration of TPHg detected in monitoring well MW1 (3,100 µg/L), the concentration of TPHg in monitoring well MW1 exhibits an observed decay rate of -0.00122/day and suggests that the WQO will be reached within 8 years (Worksheet 2). The concentration of benzene in monitoring well MW1 exhibits an observed decay rate of -0.0023/day and suggests that the concentration of benzene has already reached the WQO within the year of 2005 (Worksheet 2). The timeline for the achievement of the WQO for TPHg in monitoring well MW1 appears to be within approximately 8 to 10 years, which supports the data presented in *Groundwater Monitoring Report; Second Quarter 2005*.

Monitoring Well MW2

In monitoring well MW2, concentrations of toluene, ethylbenzene, and total xylenes were reported below the WQOs, and concentrations of TPHmo and MTBE were reported as ND. The concentrations of TPHg and TPHd increased slightly in concentrations but within the same order of magnitude. Again, this slight increase in analyte concentration is related to decreased aquifer volume.

Using the published decay rate of cyclohexane as a surrogate for TPHg (decay rate of -0.0095/

day), it is estimated that the concentration of TPHg in monitoring well MW2 will reach the WQO of 50 μg/L within 10 years (Worksheet 5). However, using the decay rate information from Worksheet 2, the concentration of TPHg in monitoring well MW2 exhibits an observed decay rate of -0.0017/day and suggests that the WQO will be reached within 6 years. The concentration of benzene in monitoring well MW2 exhibits an observed decay rate of -0.0024/day and suggests that the concentration of benzene will reach the WQO within 2 years (Worksheet 2). The timeline for the achievement of the WQO for TPHg in monitoring well MW2 appears to be within approximately 10 years.

Monitoring Wells MW3 and MW4

For the current sampling period, all analytes in monitoring wells MW3 and MW4 were reported as ND. Since April 2004, when sampling was initiated, all analytes in monitoring wells MW3 and MW4 have consistently been reported as ND (Table 1).

Monitoring Well MW5

In monitoring well MW5, concentrations of toluene and ethylbenzene have been reported below the WQOs, and concentrations of TPHmo, benzene, and MTBE were reported as ND. The concentrations of TPHg, TPHd, and total xylenes increased slightly in concentration, but within the same order of magnitude, and are also attributed to decreased aquifer volume. Using cyclohexane as a surrogate for TPHg, it is estimated that the concentration of TPHg in monitoring well MW5, will reach the WQO within 10 years. However the observed decay rate of -0.0023/day suggests that the concentration of TPHg will reach the WQO within 4 years. The timeline for the achievement of the WQO for TPHg in monitoring well MW5 appears to be within approximately 4 to 10 years. Benzene has been below its WQO since sampling was initiated in monitoring well MW5.

EVALUATION OF INTRINSIC RESULTS

Field intrinsic indicators are routinely monitored and recorded during sampling collection to evaluate the degree of bioremediation and the potential of natural attenuation closure for the site. Field intrinsic indicators potential of hydrogen (pH), temperature, conductivity (Ecw), oxygen-reduction potential (ORP), and dissolved oxygen (DO) are monitored during sampling of the monitoring wells (Table 3). A concentration of DO greater than 2.0 mg/L, and an ORP voltage of 50 mV or greater, is an indication of aerobic conditions, while values less than these are an indication of anaerobic conditions. For the current sampling event, groundwater samples from all

the monitoring wells exhibited DO and ORP readings below these thresholds, suggesting anaerobic conditions exist at these locations.

Chart 6 is a time-series plot of DO concentrations with respect to depth-to-water (DTW) data in monitoring wells MW1 through MW5. Monitoring wells MW1 and MW2 show similar DO concentrations with respect to DTW. These wells are located within the down gradient core of the contaminant plume where any DO is rapidly being respired by native micro-organisms to degrade the petroleum hydrocarbons. In monitoring well MW3, located out of the gasoline plume, it appears that the DO concentrations were initially high, and decreased during the summer months. The highest DO concentrations were recorded in monitoring wells MW4 and MW5. Monitoring well MW4 is located up gradient of the hydrocarbon plume, has had no detectable amounts of hydrocarbons, and is flushed with oxygenated water naturally and frequently. Monitoring well MW5 has high DO readings which likely reflect the activation of the Oxygen Release Compound® (ORC) that was added to the three cavities during the March 2004 excavation activities. The ORC was added to the excavation cavities to increase the DO concentration and enhance microbial biodegradation. Since the last monitoring event, the DO levels for all the monitoring wells have decreased, likely a result of the decreasing aquifer volume.

As required by the Monitoring and Reporting Program (MARP) No. R1-2004-0026, results of sampling for water quality parameters biological oxygen demand (BOD), chemical oxygen demand (COD), dissolved iron, and dissolved manganese can be seen in Table 3. BOD is an indicator of microbial activity; COD is an indicator of total oxidizable material; and dissolved iron and manganese are indicators of aerobic and anaerobic conditions and the levels of microbial activity. It appears that monitoring wells MW1 and MW2 have higher microbial activity, higher total oxidizable material, and are more anaerobic than monitoring wells MW3, MW4, and MW5. Since the previous monitoring event, BOD and COD levels have decreased in monitoring wells MW1 and MW2 (Charts 7 & 8). This is an indication of increasing DTW, which in turn decreases the oxygen demand. In monitoring well MW5, BOD and COD appear to have increased due to the activation of the ORC.

The high concentrations of dissolved iron and manganese in monitoring wells MW1 and MW2 indicate anaerobic conditions exist at these locations. The dissolved iron concentration in monitoring well MW3 is one order of magnitude less than that of monitoring wells MW1 and MW2, which corresponds to the ND contaminant concentrations reported in monitoring well

MW3 (Charts 9 & 10). Samples collected from monitoring wells MW4 and MW5, both reported ND for dissolved iron. Monitoring wells MW4 and MW5 exhibited low concentrations of dissolved manganese, which correlates well with higher DO in those wells.

CONCLUSION

The primary source of hydrocarbon contaminated material was removed from the site in March 2004, and only a limited amount of secondary source has been identified at the site. The concentration of MTBE has been ND in all wells since sampling began in April 2004. TPHg and TPHd concentrations increased slightly this sampling period, due to the decrease of the saturated portion of the aquifer, however, they exhibit declining trends, with contaminants degrading to the WQOs within the next 10 to 13 years (Worksheet 2), using the most conservative estimates presented in this report and in *Groundwater Monitoring Report, Second Quarter 2005*.

RECCOMENDATIONS AND FUTURE WORK

- LACO recommends that a site summary and request for closure report be prepared for this site, and the CRWQCB issue a *No Further Action* status, so Mr. Darryl Lovaas can receive regulatory closure.
- In a discussion with the CRWQCB on September 19, 2005, the fourth quarter groundwater sampling event at the site has been terminated.

LIMITATIONS

LACO ASSOCIATES has exercised a standard of care equal to that generated for this industry to ensure that the information contained in this report is current and accurate. LACO ASSOCIATES disclaims any and all liability for any errors, omissions, or inaccuracies in the information and data presented in this report and/or any consequences arising there from, whether attributable to inadvertence or otherwise. LACO ASSOCIATES makes no representations or warranties of any kind, including but not limited to any implied warranties with respect to the accuracy or interpretations of the data furnished. LACO ASSOCIATES assumes no responsibility of any third party reliance on the data presented and that data generated for this report represents information gathered at that time and at the indicated locations. It should not be utilized by any third party to represent data for any other time or location. The report is valid solely for the purpose, site, and project described in this document. Any alteration, unauthorized distribution, or deviation from this description will invalidate this report.

REFERENCES

Howard, Philip H. et al., 1991. *Handbook of Environmental Degradation Rates*. Pages 111, 260 and 422. CRC Press, Inc., Lewis Publishers, Boca Raton, Fl.

Nyer, Evan K., et al., 1996. *In-Situ Treatment Technology*. P. 10. CRC Press, Inc., Lewis Publishers, Boca Raton, Fl.

LIST OF FIGURES, TABLES, CHARTS, WORKSHEETS, AND ATTACHMENTS

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Figure 2: Site Map
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Worksheet 2: Decay Rates for TPHg and Benzene in Monitoring Wells MW1, MW2, and MW5, Derived from Analytical Results

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Worksheet 4: Comparison of Decay Rate Constants

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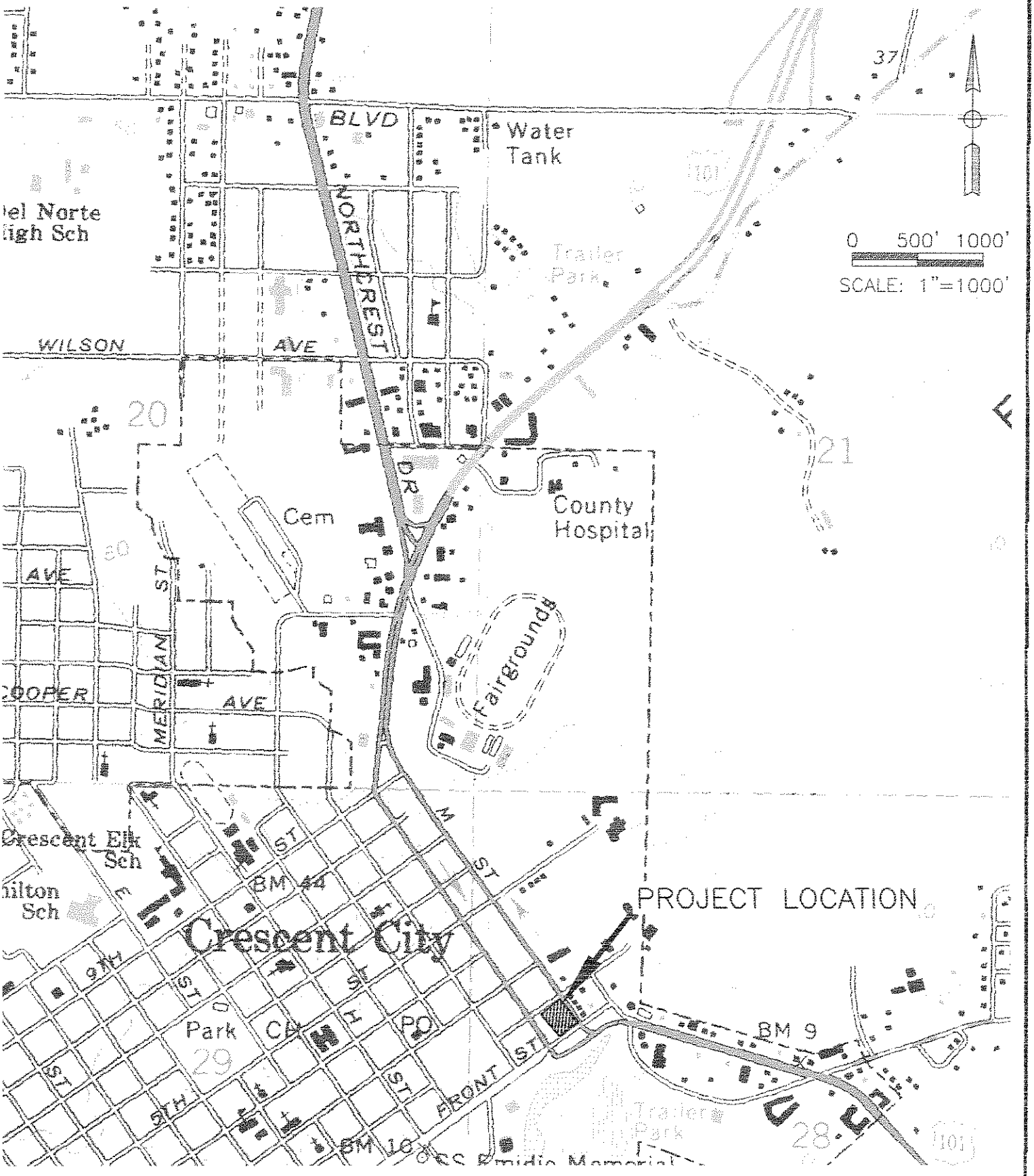
Attachment 1: Key to Abbreviations

Attachment 2: Groundwater Sampling Field Data Sheets

Attachment 3: Laboratory Analytical Results

LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT GROUNDWATER MONITORING REPORT	BY RJM	FIGURE 1
	CLIENT DARRYL LOVAAS	DATE 8/19/05	
	LOCATION 1265 SECOND STREET, CRESCENT CITY, CA	CHECK	JOB NO. 5113.00
	LOCATION MAP	SCALE 1"=1000'	



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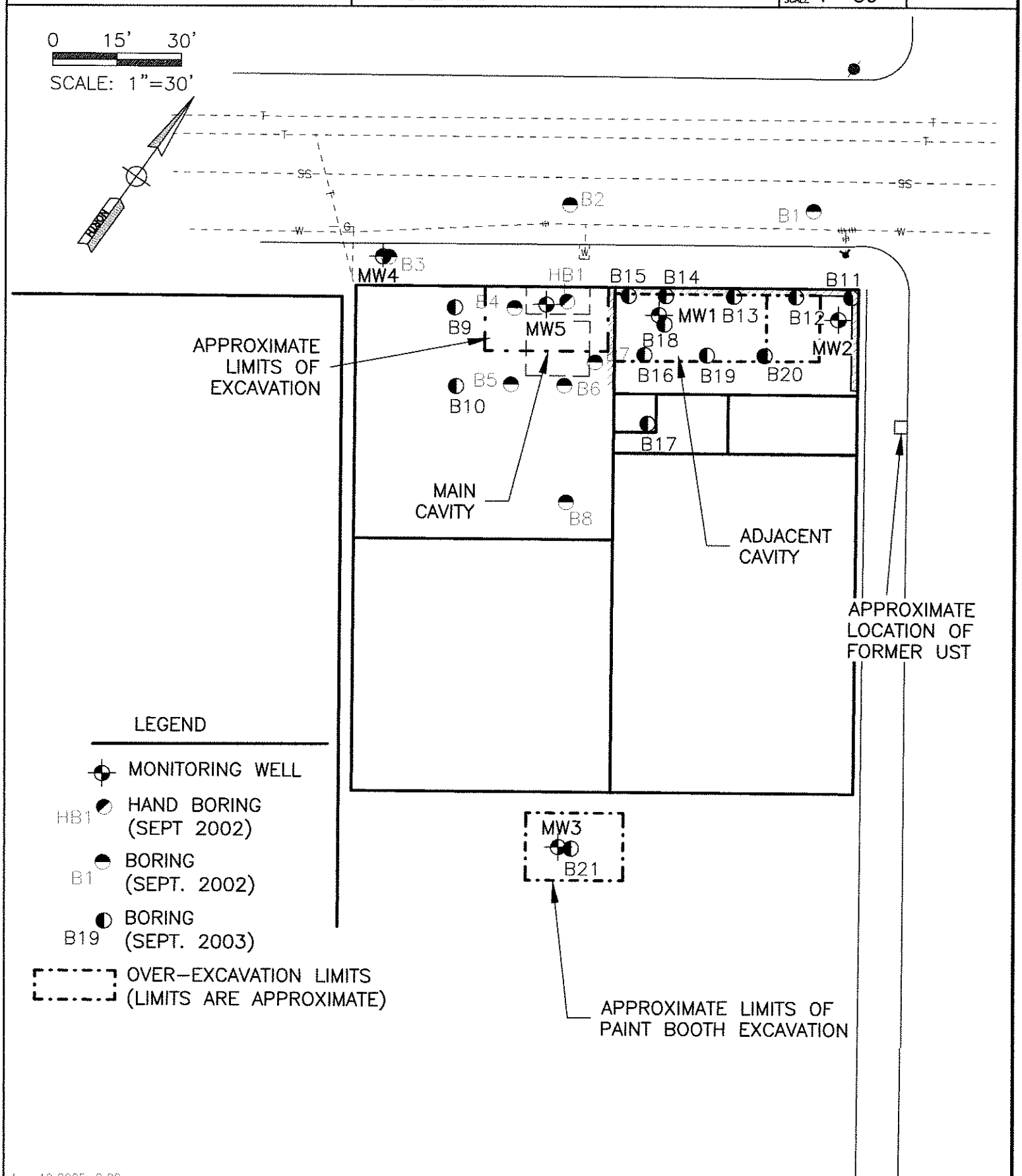
LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT GROUNDWATER MONITORING REPORT	BY RJM	FIGURE 2
	CLIENT DARRYL LOVAAS	DATE 8/19/05	
	LOCATION 1265 SECOND STREET CRESCENT CITY, CA	CHECK	JOB NO. 5113.00
	SITE MAP	SCALE 1"=30'	



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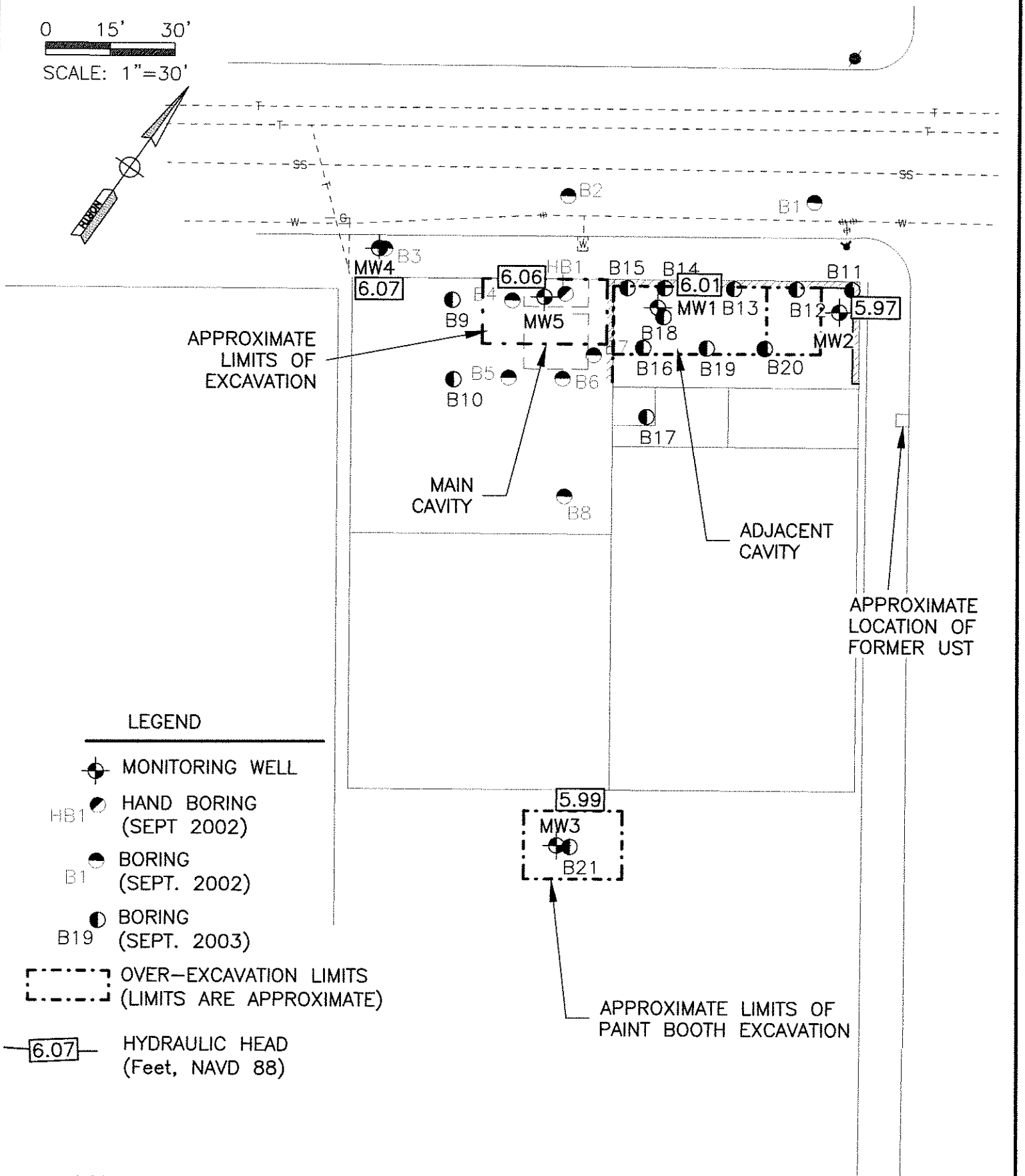
LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT GROUNDWATER MONITORING REPORT	BY RJM	FIGURE 3
	CLIENT DARRYL LOVAAS	DATE 8/22/05	
	LOCATION 1265 SECOND STREET CRESCENT CITY, CA	CHECK	JOB NO. 5113.00
	HYDRAULIC HEAD MAP (7/19/05)	SCALE 1"=30'	



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LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT GROUNDWATER MONITORING REPORT	BY RJM	FIGURE 4
	CLIENT DARRYL LOVAAS	DATE 8/22/05	
	LOCATION 1265 SECOND STREET CRESCENT CITY, CA	CHECK	JOB NO. 5113.00
	ANALYTE CONCENTRATION IN GROUNDWATER (7/19/05)	SCALE 1"=30'	

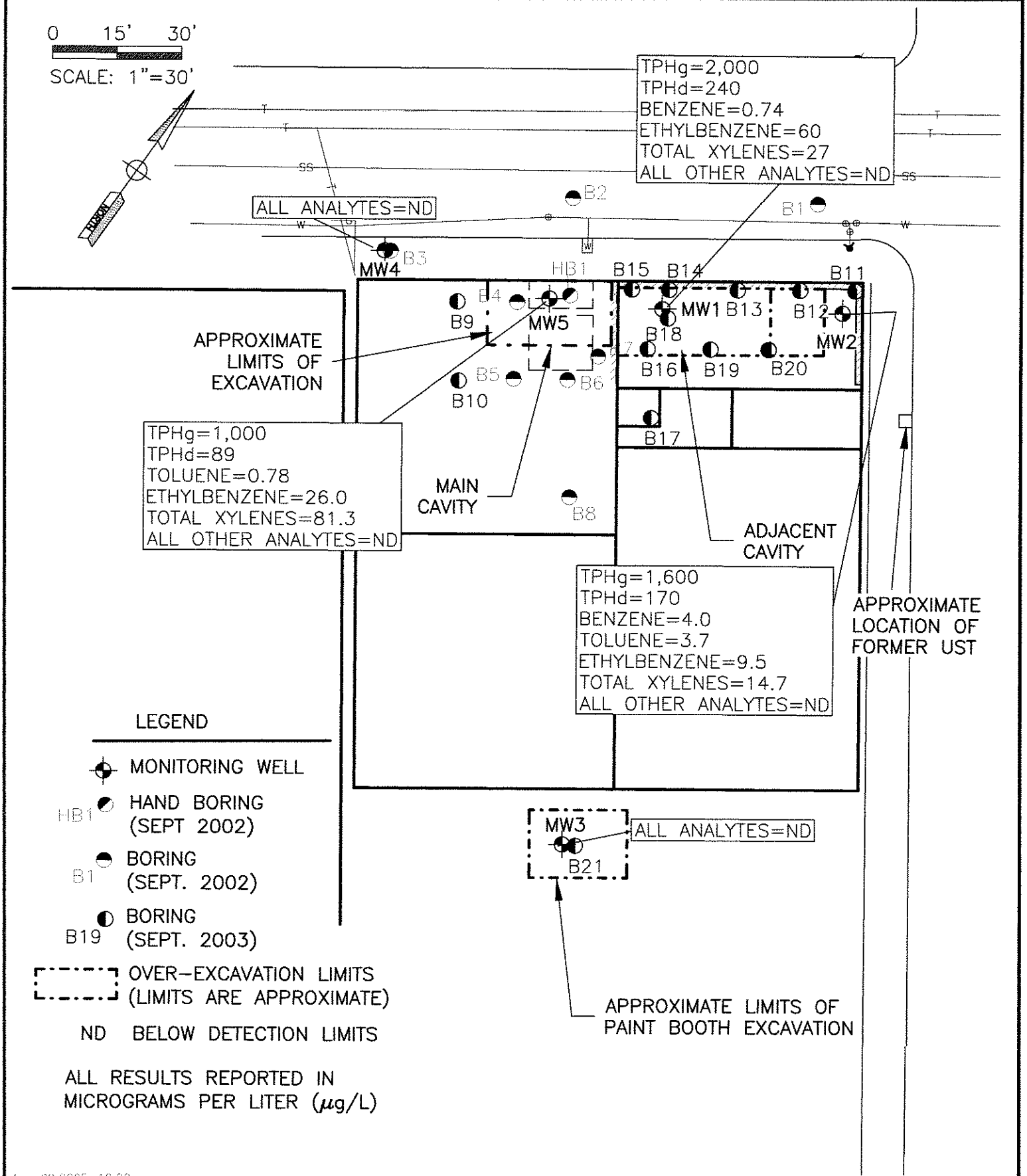

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TABLE 1: HISTORIC ANALYTICAL RESULTS AND GROUNDWATER DATA
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

WELL/ID	Well Head Elevation (feet NAVD-88)	Groundwater Elevation (feet NAVD-88)	Depth to Water (feet)	TPHg (µg/L)	TPHd (µg/L)	TPHmo (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Other Analytes (µg/L)
MW1												
4/20/2004	**10.94**	6.50	4.44	**2,600**	**170**	ND<170	**2.0**	ND<0.50	**45**	**110**	ND<1.0	All ND<1.0-10
5/28/2004		6.14	4.80	---	---	---	---	---	---	---	---	---
6/24/2004		5.91	5.03	---	---	---	---	---	---	---	---	---
7/26/2004		5.88	5.06	**3,100**	---	---	**2.8**	**2.9**	**60**	**93.7**	ND<1.0	All ND<1.0-10
8/11/2004		5.86	5.08	---	---	---	---	---	---	---	---	---
9/3/2004		6.03	4.91	---	---	---	---	---	---	---	---	---
10/26/2004		6.57	4.37	**1,800**	**140**	ND<170	**0.90**	**0.69**	**28**	**30**	ND<1.0	All ND<1.0-10
11/15/2004		6.30	4.64	---	---	---	---	---	---	---	---	---
12/13/2004		7.11	3.83	---	---	---	---	---	---	---	---	---
1/12/2005		7.01	3.93	**2,300**	**150**	ND<170	**1.5**	**0.70**	**43**	**6.5**	ND<1.0	All ND<1.0-10
4/11/2005		7.11	3.83	**1,500**	**200**	ND<170	**1.4**	**0.59**	**36**	**8.11**	ND<1.0	All ND<1.0-10
7/19/2005		6.01	4.93	**2,000**	**240**	ND<170	**0.74**	ND<0.50	**60**	**27**	ND<1.0	All ND<1.0-10
MW2												
4/20/2004	**11.08**	6.51	4.57	**3,500**	**340**	ND<170	**12**	**6.8**	**17**	**36.6**	ND<1.0	All ND<1.0-10
5/28/2004		6.12	4.96	---	---	---	---	---	---	---	---	---
6/24/2004		5.85	5.23	---	---	---	---	---	---	---	---	---
7/26/2004		5.80	5.28	**2,400**	**230**	ND<170	**8.1**	**4.5**	**8.6**	**16.8**	ND<1.0	All ND<1.0-10
8/11/2004		5.77	5.31	---	---	---	---	---	---	---	---	---
9/3/2004		5.94	5.14	---	---	---	---	---	---	---	---	---
10/26/2004		6.57	4.51	**1,400**	**130**	ND<170	**3.9**	**2.6**	**5.4**	**10.3**	ND<1.0	All ND<1.0-10
11/15/2004		6.20	4.88	---	---	---	---	---	---	---	---	---
12/13/2004		7.14	3.94	---	---	---	---	---	---	---	---	---
1/12/2005		6.94	4.14	**770**	**84**	ND<170	**1.7**	**1.5**	**2.3**	**2.8**	ND<1.0	All ND<1.0-10
4/11/2005		7.07	4.01	**1,400**	**120**	ND<170	**3.1**	**2.4**	**5.6**	**7.7**	ND<1.0	All ND<1.0-10
7/19/2005		5.97	5.11	**1,600**	**170**	ND<170	**4.0**	**3.7**	**9.5**	**14.7**	ND<1.0	All ND<1.0-10

TABLE 1: HISTORIC ANALYTICAL RESULTS AND GROUNDWATER DATA
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

WELL/ID	Well Head Elevation (feet NAVD-88)	Groundwater Elevation (feet NAVD-88)	Depth to Water (feet)	TPHg (µg/L)	TPHd (µg/L)	TPHmo (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Other Analytes (µg/L)
MW3												
4/20/2004	**11.20**	6.80	4.40	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
5/28/2004		6.23	4.97	---	---	---	---	---	---	---	---	---
6/24/2004		5.86	5.34	---	---	---	---	---	---	---	---	---
7/26/2004		5.85	5.35	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
8/11/2004		5.95	5.25	---	---	---	---	---	---	---	---	---
8/12/2004	**11.30**	Well top of casing resurveyed										
9/3/2004		6.26	5.04	---	---	---	---	---	---	---	---	---
10/26/2004		6.94	4.36	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
11/15/2004		6.52	4.78	---	---	---	---	---	---	---	---	---
12/13/2004		7.46	3.84	---	---	---	---	---	---	---	---	---
1/12/2005		7.35	3.95	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
4/11/2005		7.47	3.83	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
7/19/2005		5.99	5.31	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
MW4												
4/20/2004	**11.12**	6.67	4.45	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
5/28/2004		6.27	4.85	---	---	---	---	---	---	---	---	---
6/24/2004		6.02	5.10	---	---	---	---	---	---	---	---	---
7/26/2004		5.99	5.13	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
8/11/2004		5.99	5.13	---	---	---	---	---	---	---	---	---
9/3/2004		6.17	4.95	---	---	---	---	---	---	---	---	---
10/26/2004		6.74	4.38	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
11/15/2004		6.41	4.71	---	---	---	---	---	---	---	---	---
12/13/2004		7.08	4.04	---	---	---	---	---	---	---	---	---
1/12/2005		6.93	4.19	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
4/11/2005		7.13	3.99	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10
7/19/2005		6.07	5.05	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	All ND<1.0-10

TABLE 1: HISTORIC ANALYTICAL RESULTS AND GROUNDWATER DATA
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

WELL/ID	Well Head Elevation (feet NAVD-88)	Groundwater Elevation (feet NAVD-88)	Depth to Water (feet)	TPHg (µg/L)	TPHd (µg/L)	TPHmo (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Other Analytes (µg/L)
MW5												
4/20/2004	**11.04**	6.64	4.40	**2,800**	**150**	ND<170	**0.58**	**3.3**	**35**	**182**	ND<1.0	All ND<1.0-10
5/28/2004		6.24	4.80	---	---	---	---	---	---	---	---	---
6/24/2004		5.99	5.05	---	---	---	---	---	---	---	---	---
7/26/2004		5.95	5.09	**1,900**	**88**	ND<170	**0.59**	**1.2**	**38**	**106**	ND<1.0	All ND<1.0-10
8/11/2004		5.94	5.10	---	---	---	---	---	---	---	---	---
9/3/2004		6.11	4.93	---	---	---	---	---	---	---	---	---
10/26/2004		6.70	4.34	**990**	**57**	ND<170	ND<0.50	**0.86**	**21**	**66**	ND<1.0	All ND<1.0-10
11/15/2004		6.37	4.67	---	---	---	---	---	---	---	---	---
12/13/2004		7.09	3.95	---	---	---	---	---	---	---	---	---
1/12/2005		7.06	3.98	**360**	ND<50	ND<170	ND<0.50	ND<0.50	**3.6**	**12.3**	ND<1.0	All ND<1.0-10
4/11/2005		7.16	3.88	**300**	ND<50	ND<170	ND<0.50	ND<0.50	**8.0**	**18**	ND<1.0	All ND<1.0-10
7/19/2005		6.06	4.98	**1,000**	**89**	ND<170	ND<0.50	**0.78**	**26**	**81.3**	ND<1.0	All ND<1.0-10

NOTES:

Elevations were surveyed on 7/21/03 according to GeoTracker protocol by Charles Gallaty, LS. Benchmark designated NAVD-88.
Bold results indicate analyte detection
Groundwater elevation calculated by: Well elevation - Depth to groundwater.
ND = Not detected at or above the method detection limit shown.
--- = Not analyzed or available.
ug/L = micrograms per liter
TPHg = total petroleum hydrocarbons as gasoline
TPHd = total petroleum hydrocarbons as diesel
TPHmo = total petroleum hydrocarbons as motor oil
Additional Analytes:methyl tertiary butyl ether (MTBE), di-isopropyl ether (DIPE), ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME) and tert-butanol (TBA)

TABLE 2: HISTORIC HYDRAULIC GRADIENT DATA
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

	Based on MW2, MW3, & MW4		Based on MW1, MW2, MW4, & MW5	
Date	**Gradient Bearing**	**Gradient Slope**	**Gradient Bearing**	**Gradient Slope**
4/20/2004	N12°E	0.22%	N63°E	0.17%
5/28/2004	N47°E	0.13%	N63°E	0.14%
6/24/2004	N81°E	0.16%	N63°E	0.16%
7/26/2004	N70°E	0.17%	N62°E	0.18%
8/11/2004	---	---	N63°E	0.17%
9/3/2004	---	---	N63°E	0.21%
10/26/2004	---	---	N63°E	0.16%
11/15/2004	---	---	N63°E	0.19%
12/13/2004	---	---	---	---
1/12/2005	---	---	---	---
4/11/2005	---	---	---	---
7/19/2005	---	---	---	---

TABLE 3: HISTORIC GROUNDWATER INTRINSIC INDICATOR RESULTS
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

WELL/ID	pH	Temperature (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)
MW1									
4/20/2004	7.64	14.1	300	-65	0.17	---	---	---	---
5/28/2004	---	---	---	---	---	---	---	---	---
6/24/2004	---	---	---	---	---	---	---	---	---
7/26/2004	7.6	17.9	220	ND<-100	0.76	---	---	---	---
8/11/2004	---	---	---	---	---	---	---	---	---
9/3/2004	---	---	---	---	---	---	---	---	---
10/26/2004	7.42	17.1	208	ND<-100	0.34	---	---	---	---
11/15/2004	---	---	---	---	---	---	---	---	---
12/13/2004	---	---	---	---	---	---	---	---	---
1/12/2005	7.1	13.6	289	ND<-100	0.55	---	---	---	---
4/11/2005	7.0	14.8	259	ND<-100	0.59	7.6	57	9,600	1,400
7/19/2005	7.1	18.8	246	-116	0.44	2.4	41	4,200	870
MW2									
4/20/2004	7.8	14.3	441	-65	0.31	---	---	---	---
5/28/2004	---	---	---	---	---	---	---	---	---
6/24/2004	---	---	---	---	---	---	---	---	---
7/26/2004	7.4	17.6	359	ND<-100	0.98	---	---	---	---
8/11/2004	---	---	---	---	---	---	---	---	---
9/3/2004	---	---	---	---	---	---	---	---	---
10/26/2004	6.99	17.8	222	ND<-100	0.37	---	---	---	---
11/15/2004	---	---	---	---	---	---	---	---	---
12/13/2004	---	---	---	---	---	---	---	---	---
1/12/2005	6.8	16.1	267	ND<-100	0.34	---	---	---	---
4/11/2005	6.7	16.4	328	ND<-100	0.54	6.8	63	45,000	690
7/19/2005	6.9	18.8	393	-144	0.46	3	41	5,800	540

TABLE 3: HISTORIC GROUNDWATER INTRINSIC INDICATOR RESULTS
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

WELL/ID	pH	Temperature (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)
MW3									
4/20/2004	7.78	14.7	253	224	1.28	---	---	---	---
5/28/2004	---	---	---	---	---	---	---	---	---
6/24/2004	---	---	---	---	---	---	---	---	---
7/26/2004	7.8	17.7	327	-88	1.39	---	---	---	---
8/11/2004	---	---	---	---	---	---	---	---	---
9/3/2004	---	---	---	---	---	---	---	---	---
10/26/2004	7.35	17.2	253	ND<-100	0.58	---	---	---	---
11/15/2004	---	---	---	---	---	---	---	---	---
12/13/2004	---	---	---	---	---	---	---	---	---
1/12/2005	7.4	12.7	235	ND<-100	0.69	---	---	---	---
4/11/2005	7.3	15.9	264	-82	0.53	ND<2.0	30	210	290
7/19/2005	7.1	19.6	308	-90	0.42	ND<2.0	41	230	560
MW4									
4/20/2004	7.44	13.9	162	193	3.66	---	---	---	---
5/28/2004	---	---	---	---	---	---	---	---	---
6/24/2004	---	---	---	---	---	---	---	---	---
7/26/2004	7.8	18.7	118	-73	0.99	---	---	---	---
8/11/2004	---	---	---	---	---	---	---	---	---
9/3/2004	---	---	---	---	---	---	---	---	---
10/26/2004	7.14	16.3	257	-14	1.26	---	---	---	---
11/15/2004	---	---	---	---	---	---	---	---	---
12/13/2004	---	---	---	---	---	---	---	---	---
1/12/2005	7.2	12.2	165	-40	2.83	---	---	---	---
4/11/2005	7.1	12.8	192	15	4.40	ND<2.0	10	ND<100	ND<2.0
7/19/2005	7.4	17.9	159	-54	0.55	ND<2.0	ND<25	ND<100	5.7

TABLE 3: HISTORIC GROUNDWATER INTRINSIC INDICATOR RESULTS
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

WELL/ID	pH	Temperature (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)
MW5									
4/20/2004	7.69	13.7	345	-75	0.29	---	---	---	---
5/28/2004	---	---	---	---	---	---	---	---	---
6/24/2004	---	---	---	---	---	---	---	---	---
7/26/2004	7.8	17.1	291	ND<-100	0.83	---	---	---	---
8/11/2004	---	---	---	---	---	---	---	---	---
9/3/2004	---	---	---	---	---	---	---	---	---
10/26/2004	7.52	16.4	221	ND<-100	0.34	---	---	---	---
11/15/2004	---	---	---	---	---	---	---	---	---
12/13/2004	---	---	---	---	---	---	---	---	---
1/12/2005	7.2	12.4	228	-44	2.45	---	---	---	---
4/11/2005	7.1	13.7	266	-14	2.62	ND<2.0	21	540	36
7/19/2005	7.4	17	225	-114	0.44	2.8	ND<25	ND<100	61

NOTES:
Elevations were surveyed on 7/21/03 according to GeoTracker protocol by
Charles Gallaty, LS. Benchmark designated NAVD-88.
ND = Not detected at or above the method detection limit shown.
--- = Not analyzed or available.
Ecw=Conductivity
ORP=Oxidation-Reduction Potential
DO=Dissolved Oxygen
BOD=Biological Oxygen Damand
COD=Carbonacious Oxygen Demand
µmohs=micromhos
mV=millivolts
mg/L=milligrams per Liter
µg/L=micrograms per Liter

CHART 1: CONCENTRATION TREND OF TPHg IN MONITORING WELL MW1
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

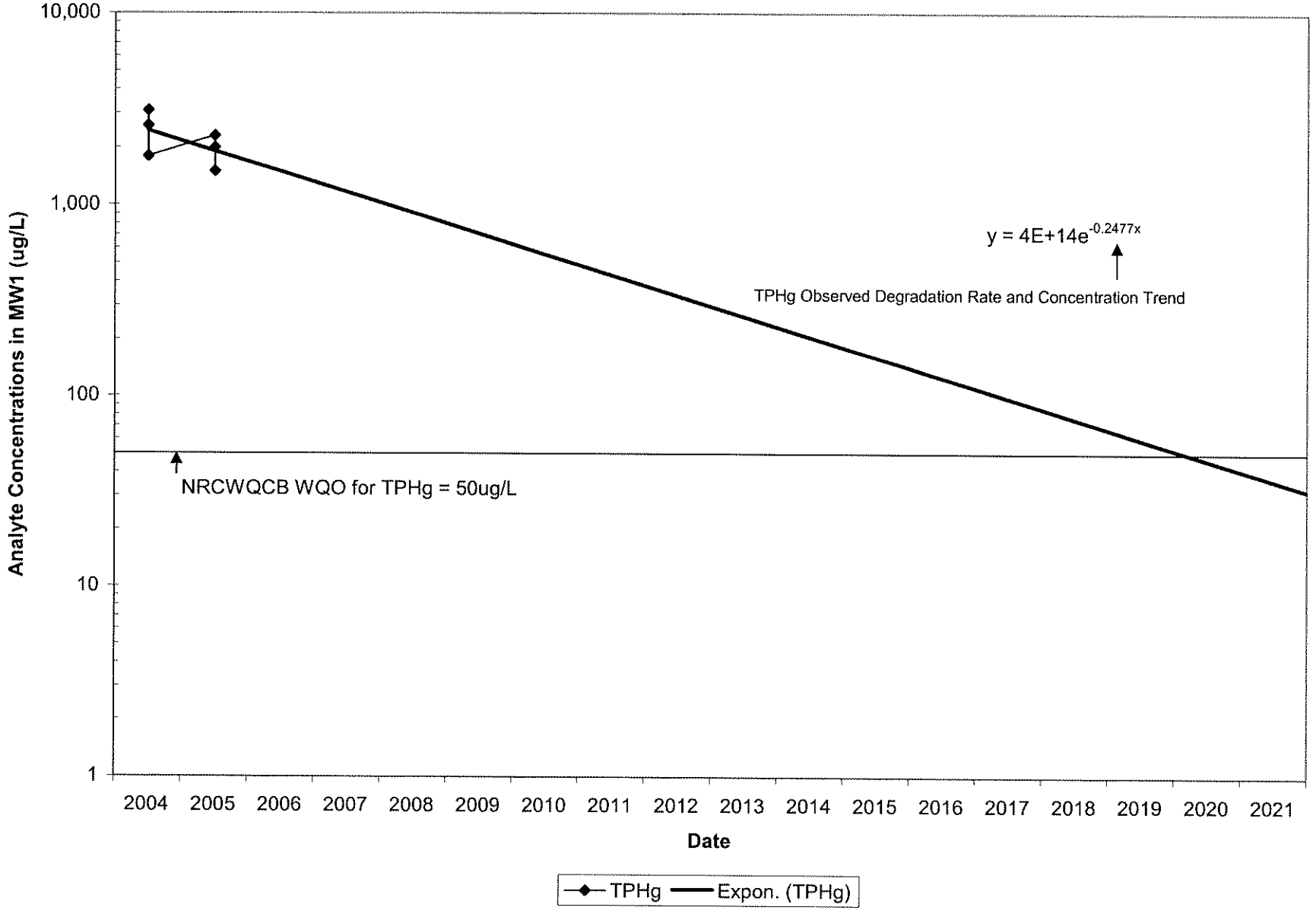


CHART 2: CONCENTRATION OF TPHg IN MONITORING WELL MW2
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

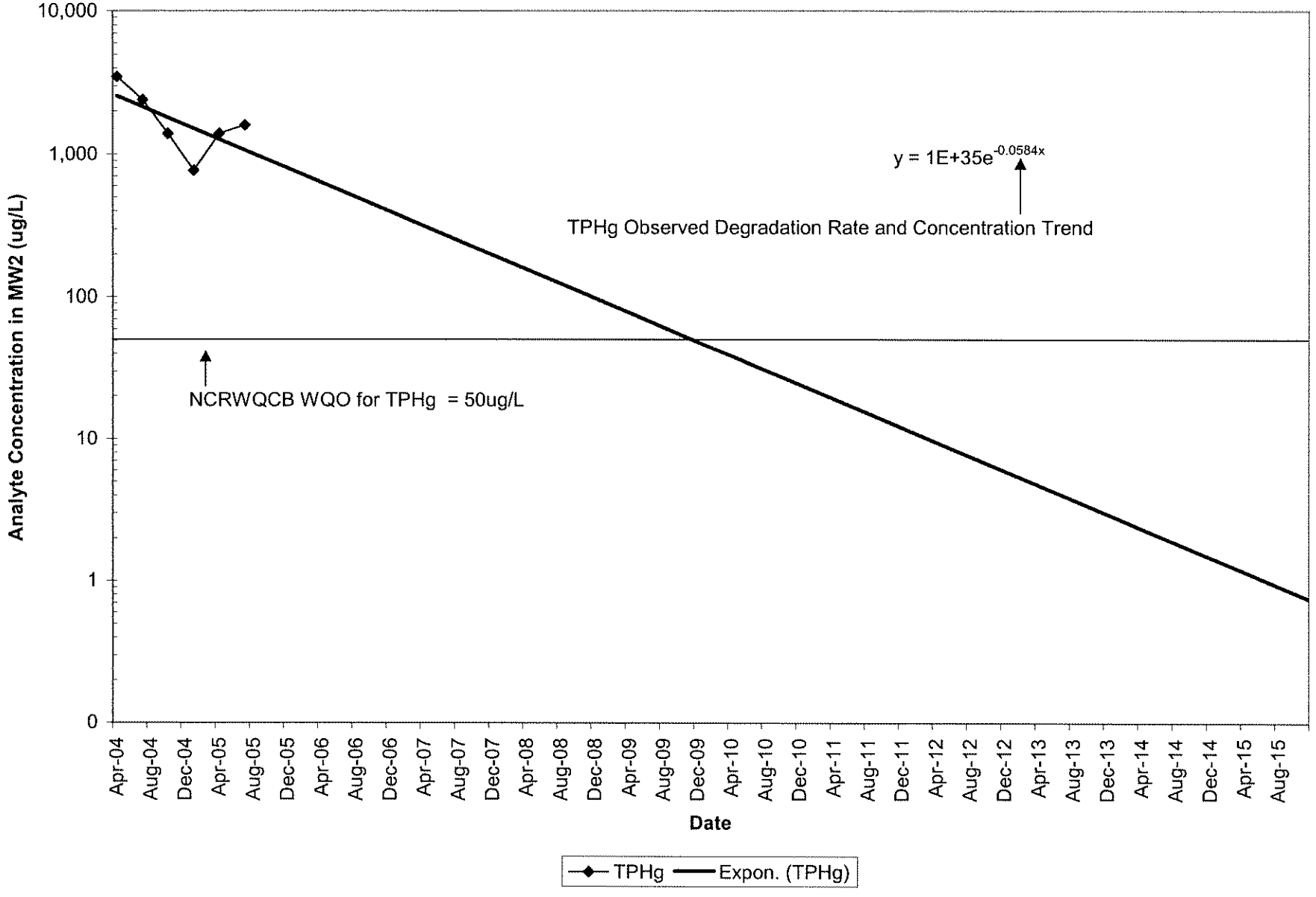


CHART 3: CONCENTRATION OF TPHg IN MONITORING WELL MW5
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No., 5113.00; CRWQCB Case No. 1TDN153

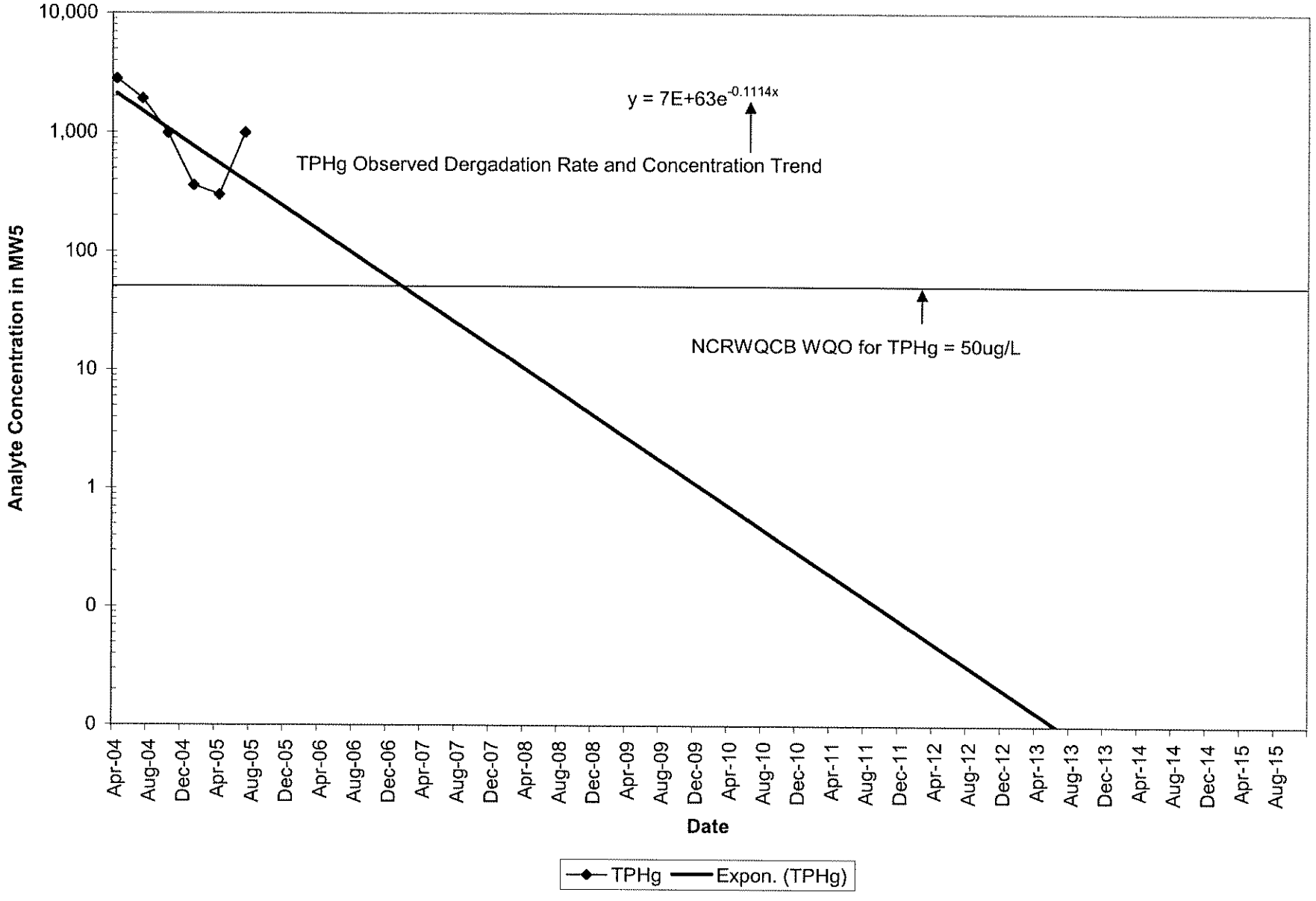


CHART 4: CONCENTRATION OF BENZENE IN MONITORING WELL MW1
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

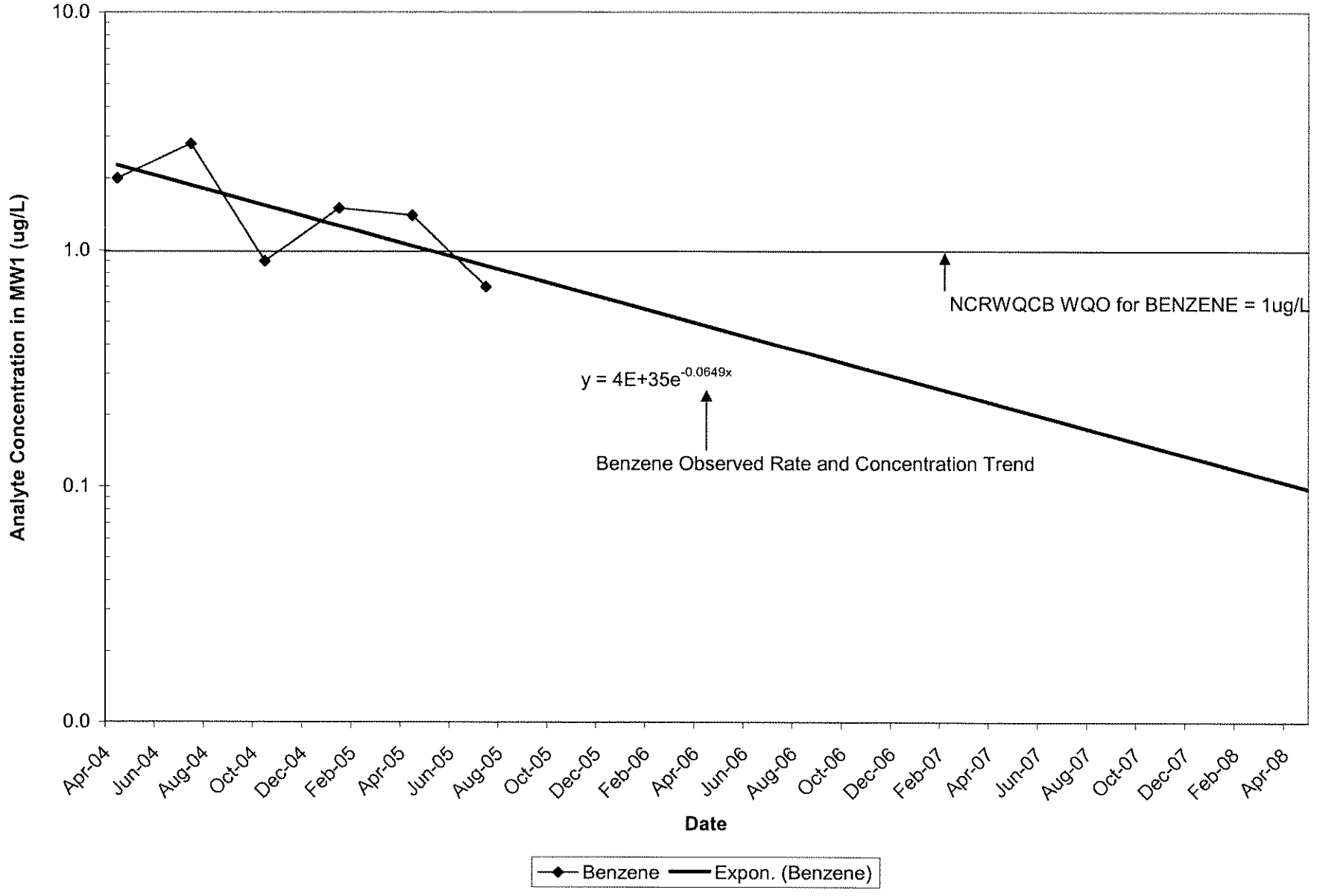


CHART 5: CONCENTRATION OF BENZENE IN MONITORING WELL MW2
Formwe Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB No. 1TDN153

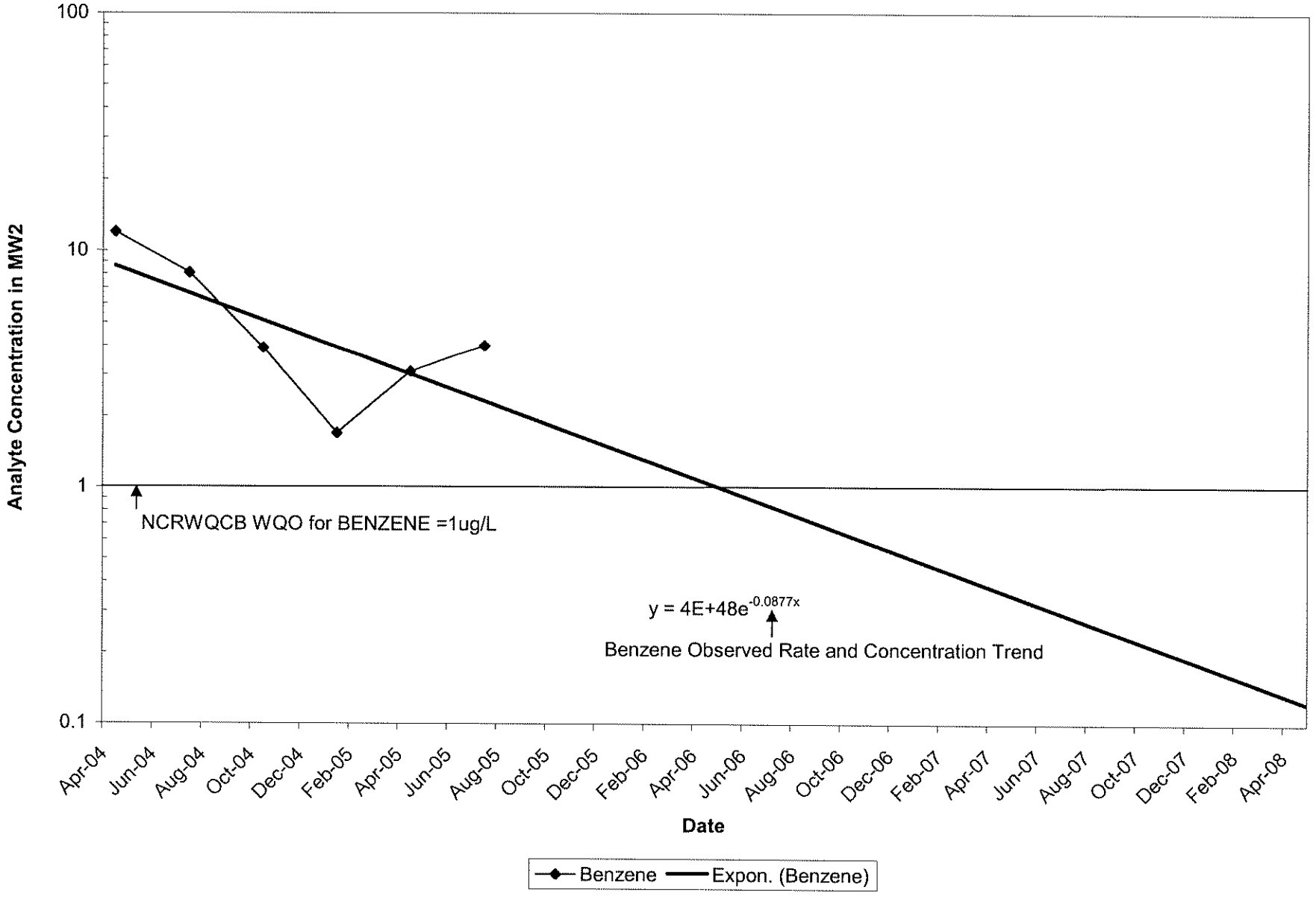


CHART 6: CONCENTRATIONS OF DISSOLVED OXYGEN VS. DEPTH TO WATER IN MONITORING WELLS MW1-MW5
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB No. 1TDN153

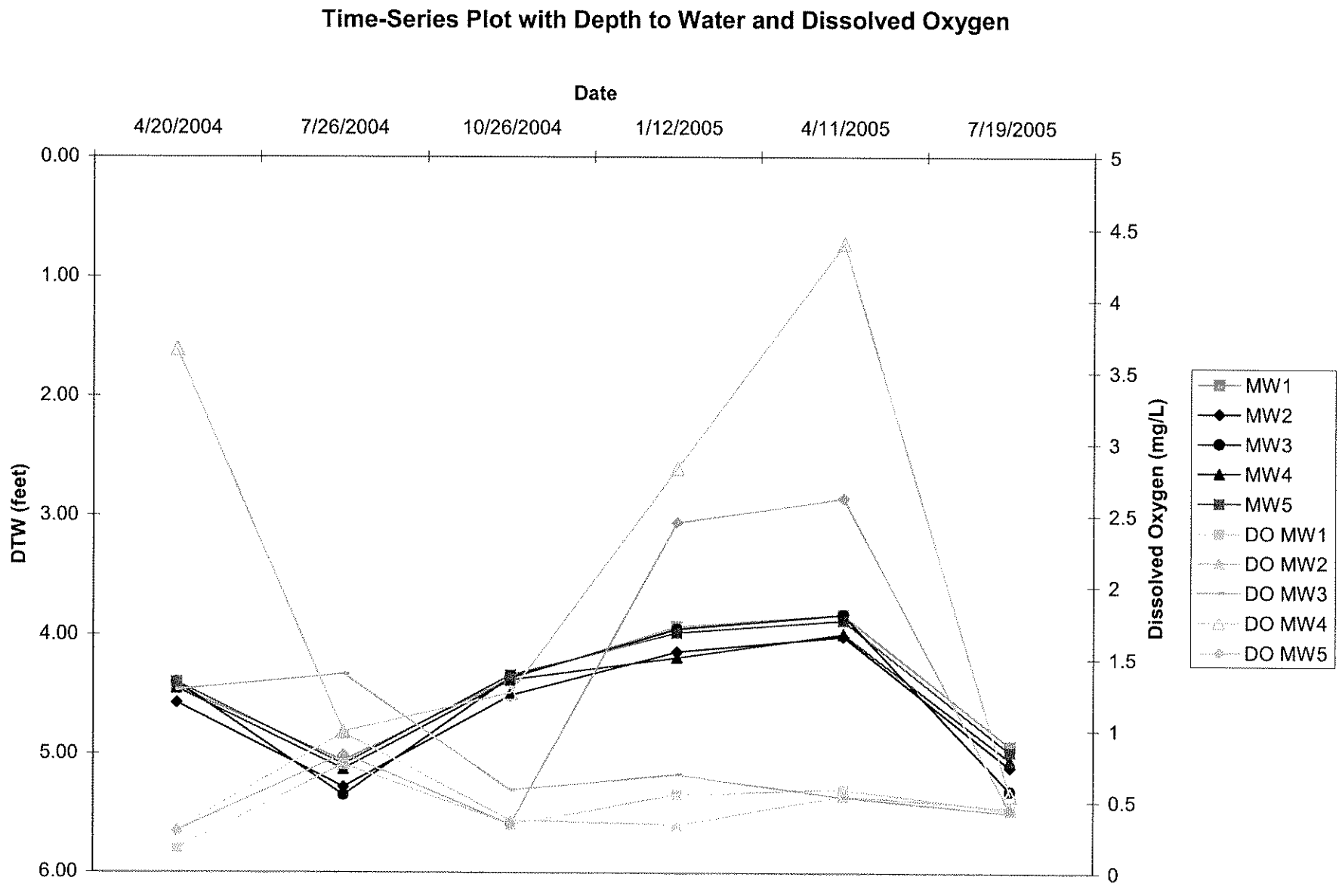


CHART 7: CONCENTRATIONS OF BIOLOGICAL OXYGEN DEMAND VS. DEPTH TO WATER IN MONITORING WELLS MW1-MW5
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB No. 1TDN153

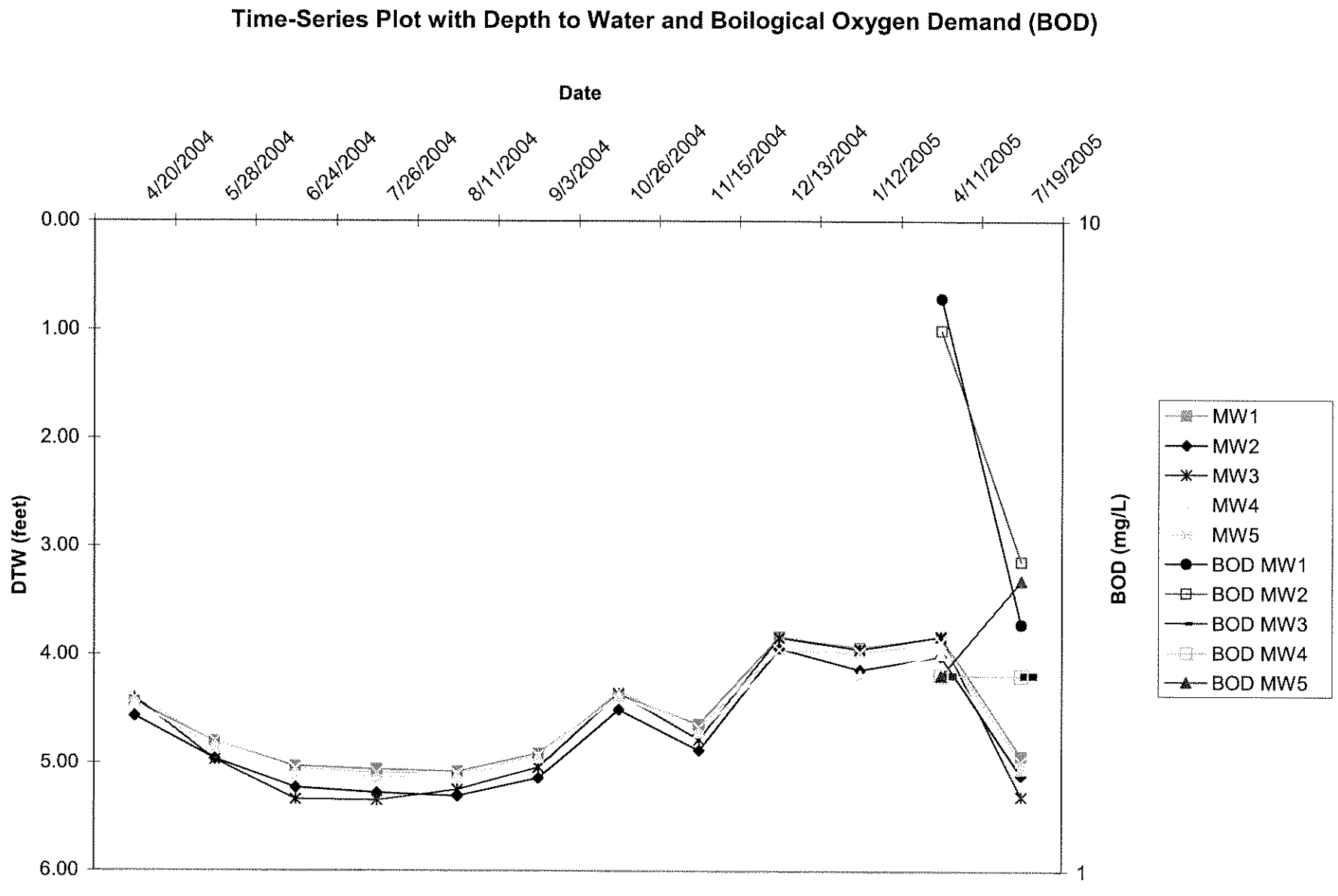


CHART 8: CONCENTRATIONS OF CHEMICAL OXYGEN DEMAND VS. DEPTH TO WATER IN MONITORING WELLS MW1-MW5
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB No. 1TDN153

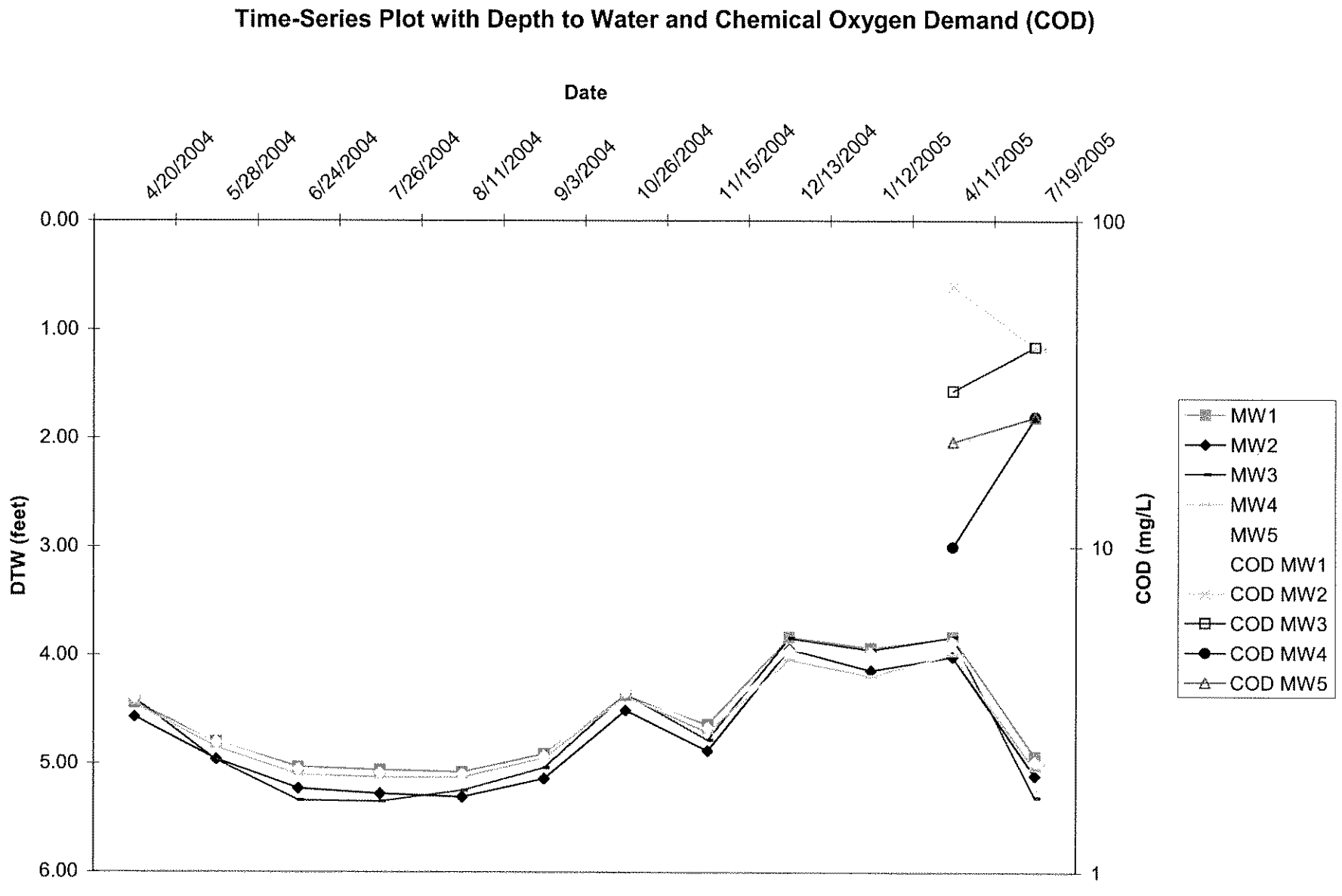


CHART 9: CONCENTRATIONS OF DISSOLVED IRON VS. DEPTH TO WATER IN MONITORING WELLS MW1-MW5
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB No. 1TDN153

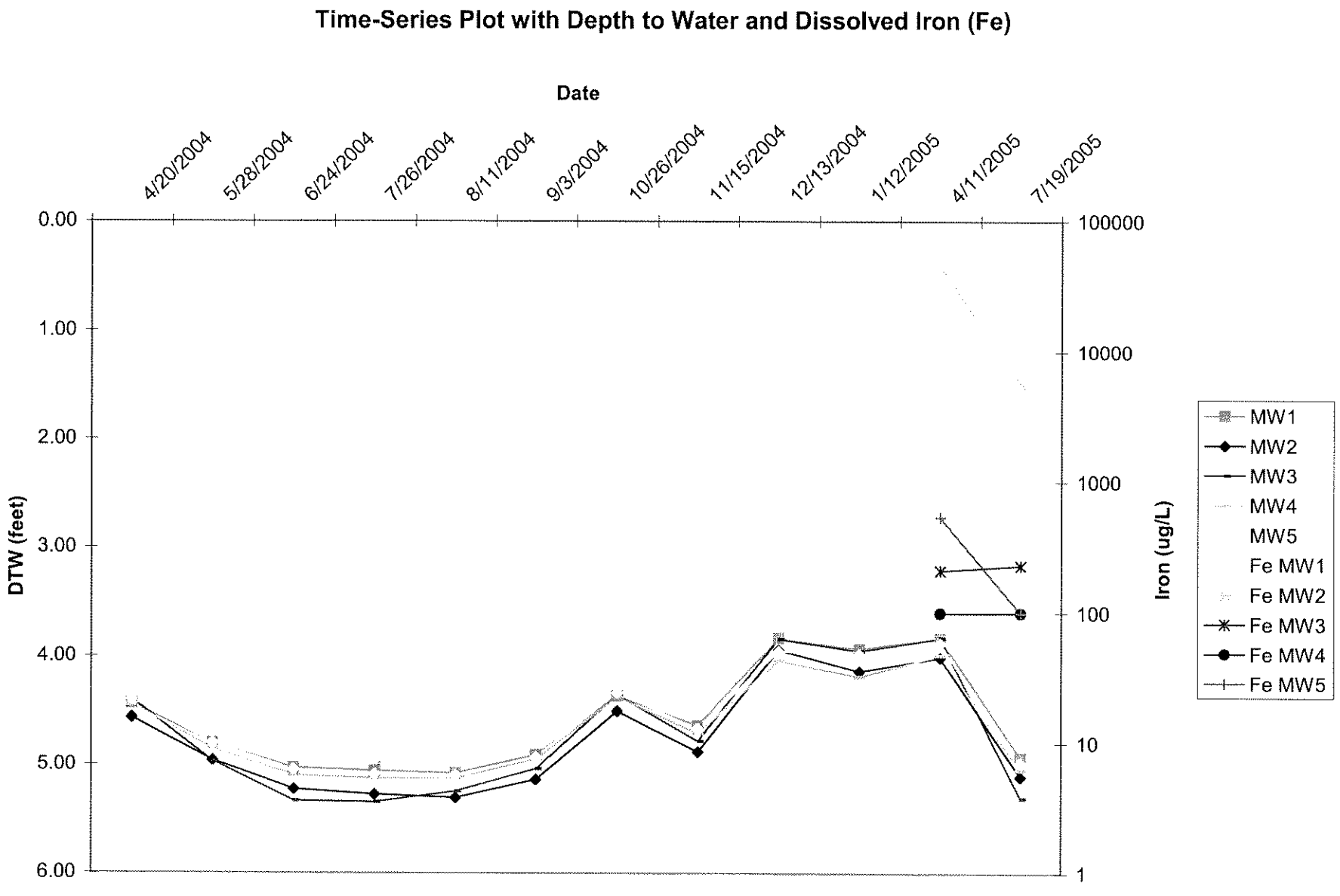
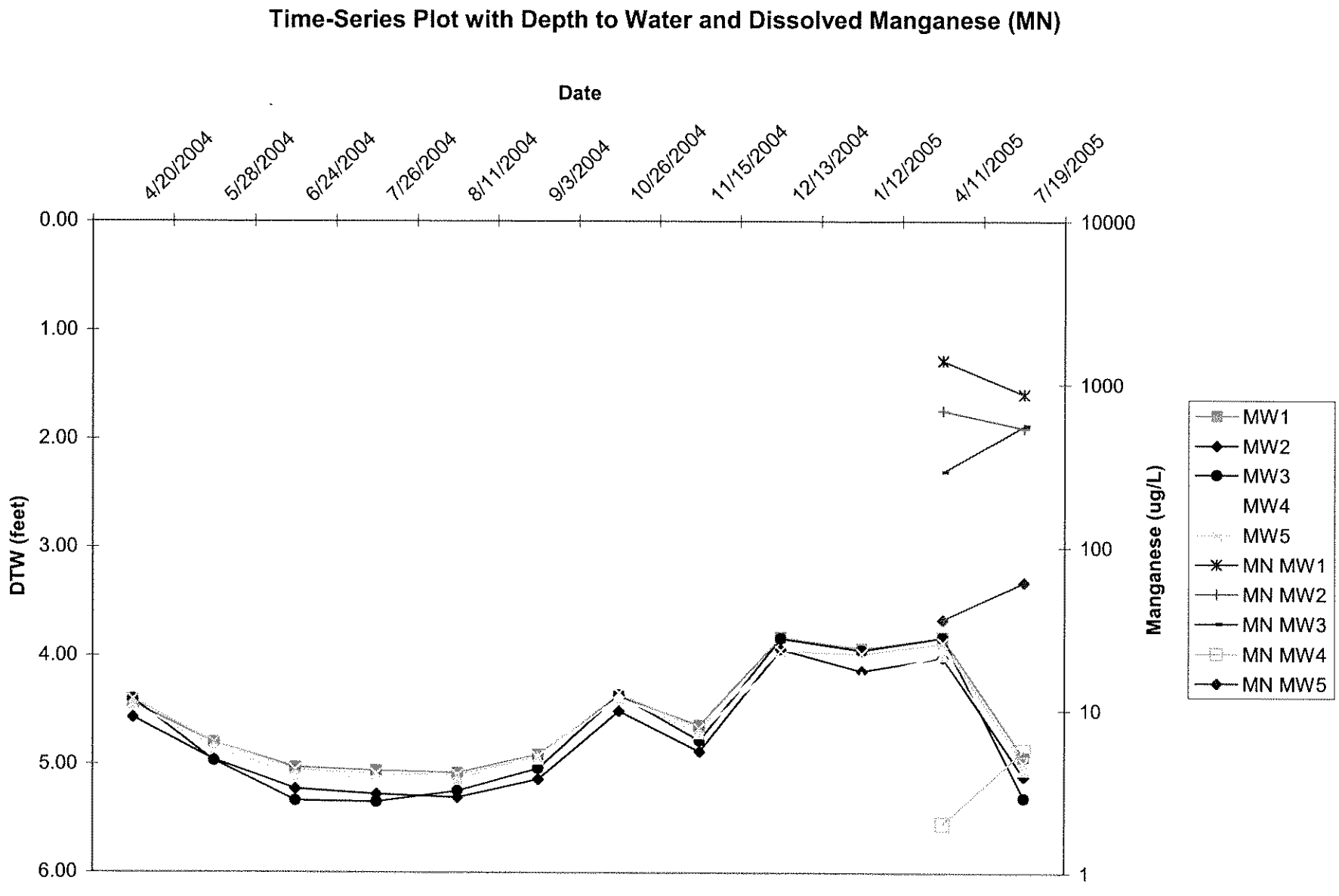


CHART 10: CONCENTRATIONS OF DISSOLVED MANGANESE VS. DEPTH TO WATER IN MONITORING WELLS MW1-MW5
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB No. 1TDN153



Worksheet 1: Decay Rates for TPHg and Benzene in Monitoring Wells MW1, MW2, and MW5, Derived from Trend Lines in Charts 1 through 5
Former Lovaas Property
LACO Project No. 5113.00 CRWQCB Case No. 1TDN153

Monitoring Well ID / Constituent	Concentration Final (CF) (µg/L)	(CF) Date	Concentration Initial (µg/L)	(CI) Date	time (t) days between CF and CI	k = decay rate constant (days)	Using Decay rate (k). Obtain (t in days) to reach WQO	WQO TPHg (µg/L) → 50	WQO Benzene (µg/L) → 1.0	year WQO reached
TPHg										
MW1	50	3/15/2020	2600	4/20/2004	5808	0.00068	0			2005
MW2	50	11/30/2009	3500	4/20/2004	2050	0.00207	0			2005
MW5	50	1/15/2007	2800	4/20/2004	1000	0.00403	0			2005
BENZENE										
MW1	1.0	5/30/2005	2.0	4/20/2004	405	0.00171	0			2005
MW2	1.0	5/1/2006	12	4/20/2004	741	0.00335	0			2005

Worksheet 2: Decay Rates for TPHg and Benzene in Monitoring Wells MW1, MW2, and MW5, Derived from Analytical Results
Former Lovaas Property
LACO Project No. 5113.00 CRWQCB Case No. 1TDN153

Monitoring Well ID / Constituent	Concentration Final (CF) (µg/L)	(CF) Date		Concentration Highest (µg/L)	(CI) Date		time (t) days between CF and CI	k = decay rate constant (days)		Using Decay rate (k). Obtain (t in days) to reach WQO	WQO → TPHg 50 (µg/L)	WQO → Benzene 1.0 (µg/L)	year WQO reached
TPHg													
MW 1	2000	7/19/2005		3100	7/26/2004		358	0.00122		3013			2013
MW 2	1600	7/19/2005		3500	4/20/2004		455	0.0017		2015			2011
MW 5	1000	7/19/2005		2800	4/20/2004		455	0.0023		1324			2009
BENZENE													
MW1	0.7	7/19/2005		2	4/20/2004		455	0.00231		NA			2005 already reached
MW2	4	7/19/2005		12	4/20/2004		455	0.00241		574			2007

Decay Constants Derived from Half-Life Data

Handbook of Environmental Degradation Rates (Howard, 1991)

Benzene
Using Aqueous Anaerobic Half-Lives (pg.111)

1/2 life	days	(k) decay rates (days)	(k) avg
High/Slow	730	0.0009495	0.003569
Low/Fast	112	0.0062	

Benzene
Using Aqueous Aerobic Half-Lives (pg.111)

1/2 life	days	(k) decay rates (days)	(k) avg
high	16	0.0433217	0.090976
low	5	0.1386294	

Cyclohexane
Using Aqueous Anaerobic Half-Lives (pg.422)

1/2 life	days	(k) decay rates (days)	(k) avg
High/Slow	730	0.0009495	0.003569
Low/Fast	112	0.0062	

Cyclohexane
Using Aqueous Aerobic Half-Lives (pg.422)

1/2 life	days	(k) decay rates (days)	(k) avg
high	168	0.0041259	0.014441
low	28	0.0247553	

Worksheet 4: Comparison of Decay Rate Constants
Former Lovaas Property
LACO No. 5113.00 CRWQCB Case No. 1TDN153

Comparisons of Decay Rates (k) days				
	Derived from			
MW ID	Chart	Analyticals	Literature**	
			slow	fast
TPHg*				
MW1	0.00068	0.00058	0.001031	0.0062
MW2	0.00207	0.0017	0.00095	0.0062
MW5	0.00403	0.00230	0.00095	0.0062
Benzene				
MW1	0.00171	0.00231	0.00095	0.0062
MW2	0.00335	0.00241	0.00095	0.0062

* TPHg literature decay rates are based on cyclohexane decay rates.
**Values for decay rates taken from "Handbook of Environmental Degradation Rates", Howard, P.H.; Boethling, R.S.; et al.

Worksheet 5: MW1, MW2, and MW5 Comparative Decay Rates with Estimated WQO achievement dates for TPHg and Benzene

Former Lovaas Property

LACO Project No. 5113.00; CRWQCB Case No. 1TDN153

MW1	Trend line estimates from Charts 1 through 5	Estimates from sampling results	*Estimates from Published Decay Rates
TPHg*			
DECAY RATE (k in days)	0.00068	0.00058	0.00095
Year of WQO Achievement (TPHg: 50 µg/L)	2005	2023	2015
Benzene			
DECAY RATE (k in days)	0.00171	0.00231	0.00270
Year of WQO Achievement (benzene: 1.0 µg/L)	2005	2005	2005

MW2	Trend line estimates from Chart	Estimates from sampling results	Estimates from sampling results
TPHg*			
DECAY RATE (k in days)	0.00207	0.00170	0.00095
Year of WQO Achievement (TPHg: 50 µg/L)	2005	2011	2015
Benzene			
DECAY RATE (k in days)	0.00335	0.00241	0.00270
Year of WQO Achievement (benzene: 1.0 µg/L)	2005	2007	2005

MW5	Trend line estimates from Chart	Estimates from sampling results	Estimates from sampling results
TPHg*			
DECAY RATE (k in days)	0.00403	0.00230	0.00095
Year of WQO Achievement (TPHg: 50 µg/L)	2005	2009	2015

NOTES:

* Use of most conservative (slow-anaerobic) Published Decay Rates

Attachment 1

KEY TO ABBREVIATIONS
Former Lovass Property; 1265 2nd St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

KEY TO ABBREVIATIONS	
Alk	-- Alkalinity
BTEX	-- Benzene; Toluene; Ethylbenzene; m,p- and o- Xylenes
BOD	-- Biological Oxygen Demand
CO_2	-- Carbon dioxide
COC	-- Chain of Custody or Contaminants of Concern
COD	-- Carbonacious Oxygen Demand
CRWQCB	-- California Regional Water Quality Control Board
Cr	-- Chromium
DHP	-- Down-hole-pump (submersible pump)
DIPE	-- Di-isopropyl Ether
Dis	-- Dissolved
DO	-- Dissolved Oxygen
DTW	-- Depth-to-Water
ECw	-- Electrical Conductivity in water
ETBE	-- Ethyl Tertiary Butyl Ether
Fe	-- Iron
FP	-- Free Product
Mn	-- Manganese
MTBE	-- Methyl Tertiary Butyl Ether
N	-- Nitrogen
N/A	-- Not Applicable
ND<50	-- non-detect at reporting limits shown
NS	-- Not Sampled
NO_3	-- Nitrate
NOT ACTIVE	-- Sample not analyzed for parameter during current sampling event
ORP	-- Oxidation Reduction Potential
P	-- Phosphorous
PCP/TCP	-- penta- tetra- tri- chlorophenols
pH	-- Potential of hydrogen
SGC	-- Silica gel cleanup
SO_4	-- Sulfate
T	-- Temperature
T&P	-- Tape and Paste
TAME	-- Tertiary Amyl Methyl Ether
TBA	-- Tetiary Butyl Alcohol
TBF	-- Tertiary Butyl Formate
TIC	-- Total Inorganic Carbon
TOC	-- Total Organic Carbon
Tot	-- Total
TPHd	-- Total Petroluem Hydrocarbons as Diesel
TPHg	-- Total Petroluem Hydrocarbons as Gasoline
TPHk	-- Total Petroluem Hydrocarbons as Kerosene
TPHmo	-- Total Petroluem Hydrocarbons as Motor Oil
TPHs	-- Total Petroluem Hydrocarbons as Solvent
WQO	-- Wate Quality Objective
µg/L	-- Micrograms per liter (parts per billion)

Attachment 2

LAGO ASSOCIATES
CONSULTING ENGINEERS
21 West Fourth Street, Eureka, CA 95501
TEL 707.443.5054
FAX 707.443.0553

Project Name: Darryl Lovaas
Project No.: 5113.00
Date: 7-19-05
Golbal ID No.: T0601593553
PM: TDN

Tech: SJD
Mobe/Demobe time: .25/.25
Travel time: 3.50
Time on site: 9:15
Time off site: 2:20
Mileage: 185

WELL No.:	MW1		MW2		MW3		MW4		MW5	
DIAMETER (in)	1.50		1.50		1.50		1.50		1.50	
SCREENED INTERVAL (ft)	3-8		3-8		3-8		3-8		3-8	
DEPTH TO WATER (ft)	4.93		5.11		5.31		5.05		4.98	
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
FIELD INTRINSICS: pH	8.0	7.1	7.5	6.9	7.3	7.1	7.6	7.4	7.4	7.4
TEMP (°C)	18.5	18.8	19.0	18.8	18.1	19.6	17.9	17.9	17.8	17.0
Ecw (µmohs)	222	246	468	393	306	308	178	159	301	225
ORP (mV)	-137	-116	-124	-144	-93	-90	-79	-54	-78	-114
DO (mg/L)	0.90	0.44	1.11	0.46	1.16	0.42	1.15	0.55	0.93	0.44
OTHER (units)	—		—		—		—		—	
PURGE: TIME	11:31	11:43	10:45	10:55	1:44	1:54	12:20	12:34	1:02	1:16
METHOD (DHP/CB/B)	DHP		DHP		DHP		DHP		DHP	
RATE (Lpm)	0.18		0.18		0.20		0.18		0.18	
VOLUME (L)	2.00		1.75		2.0		2.50		2.50	
COLOR	CLEAR	LT. YELLOW TINT	MED. GREY TINT	MED. GREY TINT w/ SHEEN	LT. GREY TINT	LT. YELLOW TINT	CLEAR	CLEAR	DK. GREY TINT	MED. GREY TINT
ODOR	MED. RUBBER / SLIGHT SULFUR		MED. RUBBER / LIGHT SULFUR		LIGHT SULFUR / MO		LIGHT SULFUR		MED. RUBBER / SULFUR	
INTAKE DEPTH (FEET)	7.0		7.0		7.0		7.0		7.0	
SAMPLE: TIME	11:49		10:59		2:02		12:40		1:24	
METHOD (DHP/CB/B)	DHP		DHP		DHP		DHP		DHP	
ANALYTES	8260 list 1; TPHd/mo w/ SGC; Diss. Iron; Diss. Manganese; BOD; COD		8260 list 1; TPHd/mo w/ SGC; Diss. Iron; Diss. Manganese; BOD; COD		8260 list 1; TPHd/mo w/ SGC; Diss. Iron; Diss. Manganese; BOD; COD		8260 list 1; TPHd/mo w/ SGC; Diss. Iron; Diss. Manganese; BOD; COD		8260 list 1; TPHd/mo w/ SGC; Diss. Iron; Diss. Manganese; BOD; COD	
TOTAL DRAWDOWN (FEET)	0.07		0.22		0.00		0.17		0.40	
REMARKS	—		—		—		—		—	
WELL CONDITION	good		good		good		good		good	
WASTE DRUMS										

DEPTH MEASUREMENTS ARE REFERENCED TO TOP OF CASING

DHP=DOWN HOLE PUMP CB=CHECK BALL B=BAILER FD=FIELD DUPLICATE MB=METHOD BLANK FF=FIELD FILTERED

LACO ASSOCIATES
CONSULTING ENGINEERS
21 West Fourth Street, Eureka, CA 95501
TEL 707.443.5054
FAX 707.443.0553

Project Name: DARRYL LOVAAS
Project No.: 5113.00
Tech: SJD
Date: 7-19-05

METER ACCURACY RANGE

WELL ID: MW2	+/- 0.2 pH	+/- 0.5 °C	+/- 20 µmohs	+/- 2 mv	+/- 0.3 mg/L
TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)
10:47	7.1	19.0	435	-130	0.90
10:49	7.0	19.0	422	-136	0.87
10:51	7.0	18.9	409	-141	0.56
10:53	6.9	18.8	401	-144	0.48
10:55	6.9	18.8	393	-144	0.46

WELL ID: MW1

TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)
~~11:33~~	~~7.6~~	~~18.4~~	~~217~~	~~-135~~	~~1.10~~
11:35	7.5	18.4	213	-127	0.73
11:37	7.4	18.6	232	-123	0.66
11:39	7.2	18.8	239	-121	0.53
11:41	7.1	18.8	243	-117	0.47
11:43	7.1	18.8	246	-116	0.44

WELL ID: MW4

TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)
12:22	7.5	17.6	165	-80	0.88
12:24	7.5	17.6	163	-71	0.65
12:26	7.5	17.7	161	-67	0.56
12:28	7.4	17.8	160	-63	0.44
12:30	7.4	17.8	161	-58	0.42
12:32	7.4	17.8	160	-55	0.53
12:34	7.4	17.9	159	-54	0.55

WELL ID: MW5

TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)
1:04	7.3	17.3	266	-94	0.81
1:06	7.4	17.1	230	-101	0.62
1:08	7.4	17.1	233	-102	0.60
1:10	7.4	17.1	236	-105	0.72
1:12	7.4	17.1	228	-110	0.51
1:14	7.4	17.0	227	-113	0.46
1:16	7.4	17.0	225	-114	0.44

WELL ID: MW3

TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)
1:46	7.2	19.0	310	-103	0.75
1:48	7.1	19.3	311	-99	0.59
1:50	7.1	19.5	310	-93	0.57
1:52	7.1	19.6	310	-90	0.47
1:54	7.1	19.6	308	-90	0.42

WELL ID:

TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)

LACO ASSOCIATES
CONSULTING ENGINEERS
21 West Fourth Street, Eureka, CA 95501
TEL 707.443.5054
FAX 707.443.0553

Project Name: DARRYL LOVAAS
Project No.: 513.00
Tech: SJB
Date: 7-19-05

WELL ID: MW1		WELL ID: MW2		WELL ID: MW3		WELL ID: MW4		WELL ID: MW5		WELL ID:	
TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)
9:32	4.91	9:34	5.16	9:43	5.34	9:36	5.10	9:39	4.99		
9:46	4.93	9:48	5.13	9:55	5.32	9:50	5.08	9:52	4.98		
9:58	4.93	10:00	5.12	10:08	5.31	10:02	5.06	10:05	4.98		
		10:11	5.11	10:16	5.31	10:13	5.05				
		10:21	5.11			10:23	5.05				

WELL ID:		WELL ID:		WELL ID:		WELL ID:		WELL ID:		WELL ID:	
TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)

WELL ID:		WELL ID:		WELL ID:		WELL ID:		WELL ID:		WELL ID:	
TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)	TIME	DTW (ft)

NORTH COAST LABORATORIES LTD.
5680 West End Road • Arcata • CA 95521-9202
707-822-4649 Fax 707-822-6831

Rotate Back

Chain of Custody

LABORATORY NUMBER:

Attention: Mr. Darryl Lovaas
Results & Invoice to: Mr. Darryl Lovaas
Address: 2259 Parkway Drive
Crescent City, CA 95531
Phone: (707) 464-6371
Copies of Report to: 1)Laco Associates - Tim Nelson
2). Leon Perault - Del Norte County Health
Sampler (Sign & Print): SJD

TAT: [ ] 24 Hr [ ] 48 Hr [ ] 5 Day [ ] 5–7 Day
[✓] STD (2–3 Wk) [ ] Other:
PRIOR AUTHORIZATION IS REQUIRED FOR RUSHES

REPORTING REQUIREMENTS: State Forms [ ]
Preliminary: FAX [✓] Verbal [ ] By:
Final Report: FAX [ ] Verbal [ ] By:

CONTAINER CODES: 1—½ gal. pl; 2—250 ml pl; 3—500 ml pl; 4—1 L Nalgene; 5—250 ml BG; 6—500 ml BG; 7—1 L BG; 8—1 L cg; 9—40 ml VOA; 10—125 ml VOA; 11—4 oz glass jar; 12—8 oz glass jar; 13—brass tube; 14—other

PRESERVATIVE CODES: a—HNO_3; b—HCl; c—H_2SO_4; d—$Na_2S_2O_3$; e—NaOH; f—$C_2H_3O_2Cl$; g—other

PROJECT INFORMATION

Project Number: 5113.00
Project Name: Lovaas Property
Purchase Order Number: Task 3027

LAB ID	SAMPLE ID	DATE	TIME	MATRIX*	8260 List 1	TPHd/mo SGC	Dissolved Iron	Dissolved Manganese	BOD	COD	SAMPLE CONDITION/SPECIAL INSTRUCTIONS
					CONTAINER	9	7	2	2	1	10	PRESERVATIVE: b, ---, ---, ---, ---, ---
	5113-MW1-W	7-19-05	am	GW	3	1	1	1	1	1	Geotracker T0601539553
	5113-MW2-W	↓	↓	↓	3	1	1	1	1	1	DISSOLVED METALS - FF
	5113-MW3-W				3	1	1	1	1	1	
	5113-MW4-W				3	1	1	1	1	1	Intact
	5113-MW5-W				3	1	1	1	1	1	S.8
	5113-QCTB-W	↓	pm	↓	1						S.6

RELINQUISHED BY (Sign & Print)	DATE/TIME	RECEIVED BY (Sign)	DATE/TIME
STEVE DAVIS	7-19-05 4:13 pm	Humberto Farin	7/19/05 4:15 pm

SAMPLE DISPOSAL
[✓] NCL Disposal of Non-Contaminated
[ ] Return [ ] Pickup

CHAIN OF CUSTODY SEALS Y/N/NA
SHIPPED VIA: UPS Air-Ex Fed-Ex Bus Hand

*MATRIX: DW=Drinking Water; Eff=Effluent; Inf=Influent; SW=Surface Water; GW=Ground Water; S=Soil; O=Other.

ALL CONTAMINATED NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT

Attachment 3

NORTH COAST LABORATORIES LTD.

August 02, 2005

RECEIVED
LACO ASSOCIATES
AUG 03 2005
BY: JG

Pvt. cust. paying on pickup

,

Attn: Mr. Darryl Lovaas

RE: 5113.00, Lovaas Property

DRG
TDN
BRH

Order No.: 0507342
Invoice No.: 51773
PO No.: TASK 3027
ELAP No. 1247-Expires July 2006

SAMPLE IDENTIFICATION

Fraction	Client Sample Description
01A	5113-MW1-W
01D	5113-MW1-W
01E	5113-MW1-W
01F	5113-MW1-W
01G	5113-MW1-W (Dissolved)
02A	5113-MW2-W
02D	5113-MW2-W
02E	5113-MW2-W
02F	5113-MW2-W
02G	5113-MW2-W (Dissolved)
03A	5113-MW3-W
03D	5113-MW3-W
03E	5113-MW3-W
03F	5113-MW3-W
03G	5113-MW3-W (Dissolved)
04A	5113-MW4-W
04D	5113-MW4-W
04E	5113-MW4-W
04F	5113-MW4-W
04G	5113-MW4-W (Dissolved)
05A	5113-MW5-W
05D	5113-MW5-W
05E	5113-MW5-W
05F	5113-MW5-W
05G	5113-MW5-W (Dissolved)
06A	5113-QCTB-W

ND = Not Detected at the Reporting Limit

Limit = Reporting Limit

All solid results are expressed on a wet-weight basis unless otherwise noted.

REPORT CERTIFIED BY

Laboratory Supervisor(s) | QA Unit | Jesse G. Chaney, Jr. Laboratory Director

5680 West End Road • Arcata California 95521-9202 • 707-822-4649 • FAX 707-822-6831

Printed on Recycled Paper

North Coast Laboratories, Ltd. **Date:** *02-Aug-05*

CLIENT: Pvt. cust. paying on pickup
Project: 5113.00, Lovaas Property
Lab Order: 0507342

CASE NARRATIVE

All samples submitted for a silica gel cleanup were initially analyzed for diesel/motor oil. The samples showing no detectable levels of the analytes were not subjected to the cleanup procedure.

TPH as Diesel/Motor Oil w/ Silica Gel Cleanup:
Samples 5113-MW1-W, 5113-MW2-W and 5113-MW5-W contain some material lighter than diesel. However, some of this material extends into the diesel range of molecular weights. These samples also contain material in the diesel range of molecular weights, but the material does not exhibit the peak pattern typical of diesel oil.

The relative percent difference (RPD) for the laboratory control samples was above the upper acceptance limit for diesel and motor oil. This indicates that the results could be variable.

Gasoline Components/Additives:
Samples 5113-MW1-W, 5113-MW2-W and 5113-MW5-W appear to be similar to gasoline but certain peak ratios are not that of a fresh gasoline standard. The reported results represent the amount of material in the gasoline range.

BOD:
All samples were reanalyzed past the official holding time due to insufficient oxygen depletion during the initial analyses.

COD:
All the samples were diluted and the reporting limits were raised due to matrix interference.

Date: 02-Aug-05
WorkOrder: 0507342

ANALYTICAL REPORT

Client Sample ID: 5113-MW1-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-01A

Test Name: Gasoline Components/Additives **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Methyl tert-butyl ether (MTBE)	ND	1.0	µg/L	1.0		7/22/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		7/22/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		7/22/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		7/22/05
Benzene	0.74	0.50	µg/L	1.0		7/22/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		7/22/05
Toluene	ND	0.50	µg/L	1.0		7/22/05
Ethylbenzene	60	0.50	µg/L	1.0		7/22/05
m,p-Xylene	27	0.50	µg/L	1.0		7/22/05
o-Xylene	ND	0.50	µg/L	1.0		7/22/05
Surrogate: 1,4-Dichlorobenzene-d4	102	80.8-139	% Rec	1.0		7/22/05

Test Name: TPH as Gasoline **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gasoline	2,000	50	µg/L	1.0		7/22/05

Client Sample ID: 5113-MW1-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-01D

Test Name: TPH as Diesel/Motor Oil w/ Silica Gel Cleanup **Reference:** EPA 3510/3630/GCFID(LUFT)/8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Diesel (C12-C22)	240	50	µg/L	1.0	7/26/05	7/28/05
TPHC Motor Oil	ND	170	µg/L	1.0	7/26/05	7/28/05

Client Sample ID: 5113-MW1-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-01E

Test Name: Chemical Oxygen Demand **Reference:** EPA 410.4

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Chemical Oxygen Demand	41	25	mg/L	5.0	7/31/05	7/31/05

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Date: 02-Aug-05
WorkOrder: 0507342

ANALYTICAL REPORT

Client Sample ID: 5113-MW1-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-01F

Test Name: Biochemical Oxygen Demand **Reference:** Std. Meth. 19th Ed. 5210 B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Biochemical Oxygen Demand	2.4	2.0	mg/L	1.0		7/25/05

Client Sample ID: 5113-MW1-W (Dissolved) **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-01G

Test Name: ICAP Metals with Acid Digestion **Reference:** EPA 200.7

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Iron	4,200	100	µg/L	1.0	7/19/05	7/21/05
Manganese	870	2.0	µg/L	1.0	7/19/05	7/21/05

Client Sample ID: 5113-MW2-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-02A

Test Name: Gasoline Components/Additives **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Methyl tert-butyl ether (MTBE)	ND	1.0	µg/L	1.0		7/22/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		7/22/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		7/22/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		7/22/05
Benzene	4.0	0.50	µg/L	1.0		7/22/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		7/22/05
Toluene	3.7	0.50	µg/L	1.0		7/22/05
Ethylbenzene	9.5	0.50	µg/L	1.0		7/22/05
m,p-Xylene	13	0.50	µg/L	1.0		7/22/05
o-Xylene	1.7	0.50	µg/L	1.0		7/22/05
Surrogate: 1,4-Dichlorobenzene-d4	102	80.8-139	% Rec	1.0		7/22/05

Test Name: TPH as Gasoline **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gasoline	1,600	50	µg/L	1.0		7/22/05

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Date: 02-Aug-05
WorkOrder: 0507342

ANALYTICAL REPORT

Client Sample ID: 5113-MW2-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-02D

Test Name: TPH as Diesel/Motor Oil w/ Silica Gel Cleanup **Reference:** EPA 3510/3630/GCFID(LUFT)/8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Diesel (C12-C22)	170	50	µg/L	1.0	7/26/05	7/28/05
TPHC Motor Oil	ND	170	µg/L	1.0	7/26/05	7/28/05

Client Sample ID: 5113-MW2-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-02E

Test Name: Chemical Oxygen Demand **Reference:** EPA 410.4

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Chemical Oxygen Demand	41	25	mg/L	5.0	7/31/05	7/31/05

Client Sample ID: 5113-MW2-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-02F

Test Name: Biochemical Oxygen Demand **Reference:** Std. Meth. 19th Ed. 5210 B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Biochemical Oxygen Demand	3.0	2.0	mg/L	1.0		7/25/05

Client Sample ID: 5113-MW2-W (Dissolved) **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-02G

Test Name: ICAP Metals with Acid Digestion **Reference:** EPA 200.7

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Iron	5,800	100	µg/L	1.0	7/19/05	7/21/05
Manganese	540	2.0	µg/L	1.0	7/19/05	7/21/05

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Date: 02-Aug-05
WorkOrder: 0507342

ANALYTICAL REPORT

Client Sample ID: 5113-MW3-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-03A

Test Name: Gasoline Components/Additives **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Methyl tert-butyl ether (MTBE)	ND	1.0	µg/L	1.0		7/22/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		7/22/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		7/22/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		7/22/05
Benzene	ND	0.50	µg/L	1.0		7/22/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		7/22/05
Toluene	ND	0.50	µg/L	1.0		7/22/05
Ethylbenzene	ND	0.50	µg/L	1.0		7/22/05
m,p-Xylene	ND	0.50	µg/L	1.0		7/22/05
o-Xylene	ND	0.50	µg/L	1.0		7/22/05
Surrogate: 1,4-Dichlorobenzene-d4	99.5	80.8-139	% Rec	1.0		7/22/05

Test Name: TPH as Gasoline **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gasoline	ND	50	µg/L	1.0		7/22/05

Client Sample ID: 5113-MW3-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-03D

Test Name: TPH as Diesel/Motor Oil w/ Silica Gel Cleanup **Reference:** EPA 3510/3630/GCFID(LUFT)/8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Diesel (C12-C22)	ND	50	µg/L	1.0	7/26/05	7/28/05
TPHC Motor Oil	ND	170	µg/L	1.0	7/26/05	7/28/05

Client Sample ID: 5113-MW3-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-03E

Test Name: Chemical Oxygen Demand **Reference:** EPA 410.4

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Chemical Oxygen Demand	41	25	mg/L	5.0	7/31/05	7/31/05

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ANALYTICAL REPORT

Client Sample ID: 5113-MW3-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-03F

Test Name: Biochemical Oxygen Demand **Reference:** Std. Meth. 19th Ed. 5210 B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Biochemical Oxygen Demand	ND	2.0	mg/L	1.0		7/25/05

Client Sample ID: 5113-MW3-W (Dissolved) **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-03G

Test Name: ICAP Metals with Acid Digestion **Reference:** EPA 200.7

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Iron	230	100	µg/L	1.0	7/19/05	7/21/05
Manganese	560	2.0	µg/L	1.0	7/19/05	7/21/05

Client Sample ID: 5113-MW4-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-04A

Test Name: Gasoline Components/Additives **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Methyl tert-butyl ether (MTBE)	ND	1.0	µg/L	1.0		7/22/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		7/22/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		7/22/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		7/22/05
Benzene	ND	0.50	µg/L	1.0		7/22/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		7/22/05
Toluene	ND	0.50	µg/L	1.0		7/22/05
Ethylbenzene	ND	0.50	µg/L	1.0		7/22/05
m,p-Xylene	ND	0.50	µg/L	1.0		7/22/05
o-Xylene	ND	0.50	µg/L	1.0		7/22/05
Surrogate: 1,4-Dichlorobenzene-d4	97.8	80.8-139	% Rec	1.0		7/22/05

Test Name: TPH as Gasoline **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gasoline	ND	50	µg/L	1.0		7/22/05

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ANALYTICAL REPORT

Client Sample ID: 5113-MW4-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-04D

Test Name: TPH as Diesel/Motor Oil **Reference:** EPA 3510/GCFID(LUFT)/EPA 8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Diesel (C12-C22)	ND	50	µg/L	1.0	7/20/05	7/20/05
TPHC Motor Oil	ND	170	µg/L	1.0	7/20/05	7/20/05

Client Sample ID: 5113-MW4-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-04E

Test Name: Chemical Oxygen Demand **Reference:** EPA 410.4

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Chemical Oxygen Demand	ND	25	mg/L	5.0	7/31/05	7/31/05

Client Sample ID: 5113-MW4-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-04F

Test Name: Biochemical Oxygen Demand **Reference:** Std. Meth. 19th Ed. 5210 B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Biochemical Oxygen Demand	ND	2.0	mg/L	1.0		7/25/05

Client Sample ID: 5113-MW4-W (Dissolved) **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-04G

Test Name: ICAP Metals with Acid Digestion **Reference:** EPA 200.7

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Iron	ND	100	µg/L	1.0	7/19/05	7/21/05
Manganese	5.7	2.0	µg/L	1.0	7/19/05	7/21/05

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ANALYTICAL REPORT

Client Sample ID: 5113-MW5-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-05A

Test Name: Gasoline Components/Additives **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Methyl tert-butyl ether (MTBE)	ND	1.0	µg/L	1.0		7/22/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		7/22/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		7/22/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		7/22/05
Benzene	ND	0.50	µg/L	1.0		7/22/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		7/22/05
Toluene	0.78	0.50	µg/L	1.0		7/22/05
Ethylbenzene	26	0.50	µg/L	1.0		7/22/05
m,p-Xylene	74	0.50	µg/L	1.0		7/22/05
o-Xylene	7.3	0.50	µg/L	1.0		7/22/05
Surrogate: 1,4-Dichlorobenzene-d4	105	80.8-139	% Rec	1.0		7/22/05

Test Name: TPH as Gasoline **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gasoline	1,000	50	µg/L	1.0		7/22/05

Client Sample ID: 5113-MW5-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-05D

Test Name: TPH as Diesel/Motor Oil w/ Silica Gel Cleanup **Reference:** EPA 3510/3630/GCFID(LUFT)/8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Diesel (C12-C22)	89	50	µg/L	1.0	7/26/05	7/28/05
TPHC Motor Oil	ND	170	µg/L	1.0	7/26/05	7/28/05

Client Sample ID: 5113-MW5-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-05E

Test Name: Chemical Oxygen Demand **Reference:** EPA 410.4

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Chemical Oxygen Demand	ND	25	mg/L	5.0	7/31/05	7/31/05

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ANALYTICAL REPORT

Client Sample ID: 5113-MW5-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-05F

Test Name: Biochemical Oxygen Demand **Reference:** Std. Meth. 19th Ed. 5210 B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Biochemical Oxygen Demand	2.8	2.0	mg/L	1.0		7/25/05

Client Sample ID: 5113-MW5-W (Dissolved) **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-05G

Test Name: ICAP Metals with Acid Digestion **Reference:** EPA 200.7

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Iron	ND	100	µg/L	1.0	7/19/05	7/21/05
Manganese	61	2.0	µg/L	1.0	7/19/05	7/21/05

Client Sample ID: 5113-QCTB-W **Received:** 7/19/05 **Collected:** 7/19/05 0:00
Lab ID: 0507342-06A

Test Name: Gasoline Components/Additives **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Methyl tert-butyl ether (MTBE)	ND	1.0	µg/L	1.0		7/22/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		7/22/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		7/22/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		7/22/05
Benzene	ND	0.50	µg/L	1.0		7/22/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		7/22/05
Toluene	ND	0.50	µg/L	1.0		7/22/05
Ethylbenzene	ND	0.50	µg/L	1.0		7/22/05
m,p-Xylene	ND	0.50	µg/L	1.0		7/22/05
o-Xylene	ND	0.50	µg/L	1.0		7/22/05
Surrogate: 1,4-Dichlorobenzene-d4	98.1	80.8-139	% Rec	1.0		7/22/05

Test Name: TPH as Gasoline **Reference:** LUFT/EPA 8260B Modified

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gasoline	ND	50	µg/L	1.0		7/22/05

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QC SUMMARY REPORT

Method Blank

Sample ID: **MB 072205** Batch ID: **R36061** Test Code: **8260OXYW** Units: **µg/L** Analysis Date: **7/22/05 5:09:00 AM** Prep Date:
Client ID: Run ID: **ORGCMS3_050722B** SeqNo: **519238**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	ND	1.0									
Tert-butyl alcohol (TBA)	ND	10									
Di-isopropyl ether (DIPE)	ND	1.0									
Ethyl tert-butyl ether (ETBE)	ND	1.0									
Benzene	ND	0.50									
Tert-amyl methyl ether (TAME)	ND	1.0									
Toluene	ND	0.50									
Ethylbenzene	0.09846	0.50									J
m,p-Xylene	0.1881	0.50									J
o-Xylene	ND	0.50									
1,4-Dichlorobenzene-d4	0.986	0.10	1.00	0	98.6%	81	139	0			

Sample ID: **MBLK** Batch ID: **R36147** Test Code: **CODW** Units: **mg/L** Analysis Date: **7/31/05** Prep Date: **7/31/05**
Client ID: Run ID: **WC_050731A** SeqNo: **520307**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	ND	5.0									

Sample ID: **MB 072205** Batch ID: **R36057** Test Code: **GASW-MS** Units: **µg/L** Analysis Date: **7/22/05 5:09:00 AM** Prep Date:
Client ID: Run ID: **ORGCMS3_050722A** SeqNo: **519218**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Gasoline	22.85	50									J

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

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QC SUMMARY REPORT

Method Blank

Sample ID: **MB-13856P** Batch ID: **13856** Test Code: **ICPX** Units: **µg/L** Analysis Date: **7/21/05 1:59:00 PM** Prep Date: **7/19/05**
Client ID: Run ID: **INICP1_050721A** SeqNo: **518217**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	ND	100									
Manganese	ND	2.0									

Sample ID: **MB-13888** Batch ID: **13888** Test Code: **SGTPDMW** Units: **µg/L** Analysis Date: **7/28/05 6:58:41 PM** Prep Date: **7/26/05**
Client ID: Run ID: **ORGC5_050728A** SeqNo: **519614**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	ND	50									
TPHC Motor Oil	ND	170									

Sample ID: **MB-13862** Batch ID: **13862** Test Code: **TPHDMW** Units: **µg/L** Analysis Date: **7/20/05 7:51:30 PM** Prep Date: **7/20/05**
Client ID: Run ID: **ORGC7_050720B** SeqNo: **517940**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	ND	50									
TPHC Motor Oil	89.58	170									J

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

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QC SUMMARY REPORT

Laboratory Control Spike

Sample ID: **LCS-05470** Batch ID: **R36061** Test Code: **8260OXYW** Units: **µg/L** Analysis Date: **7/22/05 1:45:00 AM** Prep Date:

Client ID: Run ID: **ORGCMS3_050722B** SeqNo: **519235**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	20.55	1.0	20.0	0	103%	80	120	0			
Tert-butyl alcohol (TBA)	383.4	10	400	0	95.8%	25	162	0			
Di-isopropyl ether (DIPE)	21.05	1.0	20.0	0	105%	80	120	0			
Ethyl tert-butyl ether (ETBE)	20.64	1.0	20.0	0	103%	77	120	0			
Benzene	21.85	0.50	20.0	0	109%	78	117	0			
Tert-amyl methyl ether (TAME)	19.99	1.0	20.0	0	99.9%	64	136	0			
Toluene	19.79	0.50	20.0	0	98.9%	80	120	0			
Ethylbenzene	19.25	0.50	20.0	0	96.3%	80	120	0			
m,p-Xylene	38.96	0.50	40.0	0	97.4%	80	120	0			
o-Xylene	18.50	0.50	20.0	0	92.5%	80	120	0			
1,4-Dichlorobenzene-d4	1.07	0.10	1.00	0	107%	81	139	0			

Sample ID: **LCSD-05470** Batch ID: **R36061** Test Code: **8260OXYW** Units: **µg/L** Analysis Date: **7/22/05 2:10:00 AM** Prep Date:

Client ID: Run ID: **ORGCMS3_050722B** SeqNo: **519236**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	20.72	1.0	20.0	0	104%	80	120	20.6	0.821%	20	
Tert-butyl alcohol (TBA)	393.0	10	400	0	98.3%	25	162	383	2.48%	20	
Di-isopropyl ether (DIPE)	20.80	1.0	20.0	0	104%	80	120	21.0	1.20%	20	
Ethyl tert-butyl ether (ETBE)	20.71	1.0	20.0	0	104%	77	120	20.6	0.334%	20	
Benzene	21.66	0.50	20.0	0	108%	78	117	21.8	0.889%	20	
Tert-amyl methyl ether (TAME)	20.17	1.0	20.0	0	101%	64	136	20.0	0.895%	20	
Toluene	19.87	0.50	20.0	0	99.4%	80	120	19.8	0.411%	20	
Ethylbenzene	19.23	0.50	20.0	0	96.1%	80	120	19.2	0.126%	20	
m,p-Xylene	39.20	0.50	40.0	0	98.0%	80	120	39.0	0.630%	20	
o-Xylene	18.24	0.50	20.0	0	91.2%	80	120	18.5	1.43%	20	
1,4-Dichlorobenzene-d4	1.08	0.10	1.00	0	108%	81	139	1.07	0.405%	20	

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blank; J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

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QC SUMMARY REPORT

Laboratory Control Spike

Sample ID: **LCS** Batch ID: **R36147** Test Code: **CODW** Units: **mg/L** Analysis Date: **7/31/05** Prep Date: **7/31/05**
Client ID: Run ID: **WC_050731A** SeqNo: **520308**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	45.62	5.0	50.0	0	91.2%	85	117	0			

Sample ID: **LCSD** Batch ID: **R36147** Test Code: **CODW** Units: **mg/L** Analysis Date: **7/31/05** Prep Date: **7/31/05**
Client ID: Run ID: **WC_050731A** SeqNo: **520309**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	43.42	5.0	50.0	0	86.8%	85	117	45.6	4.95%	10	

Sample ID: **LCS-05471** Batch ID: **R36057** Test Code: **GASW-MS** Units: **µg/L** Analysis Date: **7/22/05 3:27:00 AM** Prep Date:
Client ID: Run ID: **ORGCMS3_050722A** SeqNo: **519215**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Gasoline	950.3	50	1,000	0	95.0%	80	120	0			

Sample ID: **LCSD-05471** Batch ID: **R36057** Test Code: **GASW-MS** Units: **µg/L** Analysis Date: **7/22/05 3:52:00 AM** Prep Date:
Client ID: Run ID: **ORGCMS3_050722A** SeqNo: **519216**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Gasoline	954.0	50	1,000	0	95.4%	80	120	950	0.385%	20	

Sample ID: **LCS-13856P** Batch ID: **13856** Test Code: **ICPX** Units: **µg/L** Analysis Date: **7/21/05 2:03:00 PM** Prep Date: **7/19/05**
Client ID: Run ID: **INICP1_050721A** SeqNo: **518218**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	478.0	100	500	0	95.6%	85	115	0			
Manganese	461.4	2.0	500	0	92.3%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pvt. cust. paying on pickup
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Project: 5113.00, Lovaas Property

QC SUMMARY REPORT

Laboratory Control Spike

Sample ID: **LCS-13888** Batch ID: **13888** Test Code: **SGTPDMW** Units: **µg/L** Analysis Date: **7/28/05 4:42:20 PM** Prep Date: **7/26/05**
Client ID: Run ID: **ORGC5_050728A** SeqNo: **519612**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	375.8	50	500	0	75.2%	42	96	0			
TPHC Motor Oil	879.2	170	1,000	0	87.9%	52	103	0			

Sample ID: **LCSD-13888** Batch ID: **13888** Test Code: **SGTPDMW** Units: **µg/L** Analysis Date: **7/28/05 5:16:25 PM** Prep Date: **7/26/05**
Client ID: Run ID: **ORGC5_050728A** SeqNo: **519613**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	293.6	50	500	0	58.7%	42	96	376	24.5%	15	R
TPHC Motor Oil	676.2	170	1,000	0	67.6%	52	103	879	26.1%	15	R

Sample ID: **LCS-13862** Batch ID: **13862** Test Code: **TPHDMW** Units: **µg/L** Analysis Date: **7/20/05 5:46:32 PM** Prep Date: **7/20/05**
Client ID: Run ID: **ORGC7_050720B** SeqNo: **517938**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	502.6	50	500	0	101%	72	124	0			
TPHC Motor Oil	1,130	170	1,000	0	113%	71	139	0			

Sample ID: **LCSD-13862** Batch ID: **13862** Test Code: **TPHDMW** Units: **µg/L** Analysis Date: **7/20/05 6:07:53 PM** Prep Date: **7/20/05**
Client ID: Run ID: **ORGC7_050720B** SeqNo: **517939**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	520.5	50	500	0	104%	72	124	503	3.50%	15	
TPHC Motor Oil	1,131	170	1,000	0	113%	71	139	1,130	0.145%	15	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

NORTH COAST LABORATORIES LTD.
5680 West End Road • Arcata • CA 95521-9202
707-822-4649 Fax 707-822-6831

Rotate Back

Chain of Custody

LABORATORY NUMBER: 0507342

Attention: Mr. Darryl Lovaas
Results & Invoice to: Mr. Darryl Lovaas
Address: 2259 Parkway Drive
Crescent City, CA 95531
Phone: (707) 464-6371
Copies of Report to: 1)Laco Associates - Tim Nelson
2). Leon Perault - Del Norte County Health
Sampler (Sign & Print): SJD

TAT: ☐ 24 Hr ☐ 48 Hr ☐ 5 Day ☐ 5–7 Day
☑ STD (2–3 Wk) ☐ Other:
PRIOR AUTHORIZATION IS REQUIRED FOR RUSHES

REPORTING REQUIREMENTS: State Forms ☐
Preliminary: FAX ☑ Verbal ☐ By:
Final Report: FAX ☐ Verbal ☐ By:

PROJECT INFORMATION
Project Number: 5113.00
Project Name: Lovaas Property
Purchase Order Number: Task 3027

LAB ID	SAMPLE ID	DATE	TIME	MATRIX*	8260 List 1 (ANALYSIS)	TPHd/mo SGC	Dissolved Iron	Dissolved Manganese	BOD	COD	
					b (PRESERVATIVE)	—	—	—	—	—	
					9 (CONTAINER)	7	2	2	1	10	
	5113-MW1-W	7-19-05	am	GW	3	1	1	1	1	1	
	5113-MW2-W	↓	↓	↓	3	1	1	1	1	1	
	5113-MW3-W				3	1	1	1	1	1	
	5113-MW4-W				3	1	1	1	1	1	
	5113-MW5-W				3	1	1	1	1	1	
	5113-QCTB-W	↓	pm	↓	1						

CONTAINER CODES: 1—½ gal. pl; 2—250 ml pl; 3—500 ml pl; 4—1 L Nalgene; 5—250 ml BG; 6—500 ml BG; 7—1 L BG; 8—1 L cg; 9—40 ml VOA; 10—125 ml VOA; 11—4 oz glass jar; 12—8 oz glass jar; 13—brass tube; 14—other

PRESERVATIVE CODES: a—HNO_3; b—HCl; c—H_2SO_4; d—$Na_2S_2O_3$; e—NaOH; f—$C_2H_3O_2Cl$; g—other

SAMPLE CONDITION/SPECIAL INSTRUCTIONS
Geotracker T0601539553
DISSOLVED METALS - FF
Intact
5.8
5.6

RELINQUISHED BY (Sign & Print)	DATE/TIME	RECEIVED BY (Sign)	DATE/TIME
STEVE DAVIS	7-19-05 4:13pm	Elizabeth Farin	7/19/05 4:15pm

SAMPLE DISPOSAL
☑ NCL Disposal of Non-Contaminated
☐ Return ☐ Pickup

CHAIN OF CUSTODY SEALS Y/N/NA
SHIPPED VIA: UPS Air-Ex Fed-Ex Bus Hand

*MATRIX: DW=Drinking Water; Eff=Effluent; Inf=Influent; SW=Surface Water; GW=Ground Water; S=Soil; O=Other.

ALL CONTAMINATED NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT