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July 19, 2005

5113.00

California Regional Water Quality Control Board
North Coast Region
5550 Skylane Boulevard, Suite A
Santa Rosa, California, 954031

Attention: Mr. Cody Walker

Subject: Groundwater Monitoring Report; Second 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) is pleased to present to the California Regional Water Quality Control Board (CRWQCB) the results of groundwater monitoring for the second quarter of 2005, data supporting natural attenuation closure, and a request to pursue a closure report for the site. A copy of e-mail correspondence between LACO and the CRWQCB regarding a request that information pursuant to closure be included in this report is also attached (see Attachment 6 of the following report). This report has been prepared for Mr. Darryl Lovaas.

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

Sincerely,
LACO ASSOCIATES

Brian Hodgson
Junior Engineer

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

PROFESSIONAL GEOLOGIST
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BRH:cs

Attachments

cc: Mr. Darryl Lovaas

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GROUNDWATER MONITORING REPORT
SECOND 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 April 11, 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 and site map are provided 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 ten 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, MW2, MW3, MW4, and 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 second 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 for April 11, 2005							
MONITORING WELL ID	SCREENED INTERVAL (feet)	DTW (feet)	PURGE METHOD	WATER QUALITY PARAMETER	ANALYTICALS		SAMPLING SCHEDULE
					ORGANICS	INORGANICS	
MW1	3-8	3.83	DHP	pH, Temp, Ecw, ORP, DO	TPHg, TPHd, TPHmo, BTEX, MTBE, TBA, DIPE, ETBE, TAME, BOD, COD	Dissolved Iron, Dissolved Manganese	Quarterly
MW2		4.01					
MW3		3.83					
MW4		3.99					
MW5		3.88					

HYDRAULIC GRADIENT

The hydraulic gradient for the April 11, 2005, sampling period was essentially flat at the time of measuring (Figure 3). The hydraulic heads at monitoring wells MW1 and MW4, which are approximately 70 feet apart, are nearly equal and portray a very mild gradient. Additionally, monitoring well MW5, located between monitoring wells MW2 and MW4, exhibited a hydraulic head higher that either of these two monitoring wells. This is most likely due to the location of monitoring well MW5 within the previously excavated area. The tank cavity may be acting as a "bathtub" or "sump" during periods of high hydraulic head when the homogeneous material in the cavity is artificially recharged, and as a result, groundwater mounding is noted in monitoring well MW5. Based on the known distribution of the contaminants across the site, the predominant hydraulic gradient appears to be to the northeast. Historic hydraulic gradients are included in Table 1 and historic groundwater elevation data are included in Table 2.

QUARTERLY LABORATORY ANALYTICAL RESULTS

Groundwater analytical data from quarterly sampling are included in Figure 4 and below in Table B. Current and historic groundwater analytical data are included in Table 2, and copies of the laboratory analytical reports for this reporting period are included as Attachment 3.

Table B: Analytical Results for 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	1,500	200	ND<170	1.4	0.59	36	8.11	ND<1.0	All ND<1.0-10
MW2	1,400	120		3.1	2.4	5.6	7.7		
MW3	ND<50	ND<50		ND<0.50	ND<0.50	ND<0.50	ND<0.50		
MW4									
MW5	300					8.0	18		

For consistency of data evaluation, laboratory results from the current sampling event will be compared with historic sampling events of similar hydraulic conditions. North Coast Laboratories' (NCL's) case narrative (Attachment 3) reports that the samples from monitoring wells MW1 and MW2 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. These comments are typical at sites that exhibit weathered or degraded petroleum constituents. Additionally, at sites with mixtures of petroleum products, some overlap in sample chromatograms may occur.

SUPPORTING DATA FOR PURSUIT OF CLOSURE

Degradation Rates, Water Quality Objectives, and Natural Attenuation

Time-series plots of exponential trendlines for the contaminants of concern in monitoring wells MW1, MW2, and MW5 are included in Charts 1 through 6. The calculation of total petroleum hydrocarbons as gasoline (TPHg) degradation rates with the subsequent estimation of the achievement of North Coast Regional Water Quality Control Board (NCRWQCB) Water Quality Objectives (WQOs) is difficult 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). As a comparison, Attachment 4 presents a laboratory report from Agricultural and Priority Pollutants Laboratories, Inc (APPL)

illustrating the relative concentrations of separate analytes making up degraded and dissolved TPHg. Based on data presented in Attachment 4, cyclohexanes comprise approximately 36 percent of the TPHg from the sample. This supports Nyer's estimate; therefore, we conclude that cyclohexane is a representative proxy when calculating a decay rate for TPHg. Howard and Nyer references regarding cyclohexane are presented as Attachment 5.

Diesel fuel contains numerous polycyclic aromatic hydrocarbon (PAH) constituents that may pose a threat to human health or the environment. Of all the PAHs in diesel fuel, naphthalene was selected as the baseline component of analysis for the most conservative estimate of degradation based on its high solubility. Naphthalene exhibits the highest solubility of all the PAH constituents in diesel fuel at approximately 30,000 µg/L to 34,000 µg/L (Heath *et al*, 1993). Assuming the highest concentrations of diesel were released as free product (100 percent diesel or 1 billion ppb), the solubility of naphthalene at the soil/groundwater interface was expected to be approximately 30,000 µg/L to 34,000 µg/L. In this scenario, TPHd concentrations would have decreased from free product concentrations, to its maximum solubility concentration of 34,000 µg/L, to the detected concentrations presently reported.

Decay rate constants (k) for TPHg and benzene concentrations were derived from three sources to compare and contrast:

- Trendlines in time-series plots (Charts 1 through 6, using Water Quality Objectives as final concentration, Worksheet 1)
- Analytical results (using initial/final concentrations, Worksheet 2)
- Published half-lives ([Howard *et al.*, 1991] Worksheet 3)

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 *Handbook of Environmental Degradation Rates* (Howard *et al.*, 1991). Averages of the fast and slow half-

lives were calculated but not used. The more conservative slow degradation rates were used for our estimations. Tables 3 and 4 present TPHg and total petroleum hydrocarbons as diesel (TPHd) degradation rates, respectively, using published decay rate constant data.

Worksheet 4 presents a comparison of the above three 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 WQO for TPHg and benzene for monitoring wells MW1, MW2, and MW5.

Monitoring Well MW1

In monitoring well MW1, concentrations of toluene and total xylenes are reported below the WQOs of 42 µg/L, and concentrations of total petroleum hydrocarbons as motor oil (TPHmo) and methyl tertiary butyl ether (MTBE) continue to be reported as non-detect (ND). The concentration of total petroleum hydrocarbons as gasoline (TPHg) in monitoring well MW1 exhibits a decreasing concentration trend. Using the published decay rate of cyclohexane as a surrogate for TPHg [decay rate of -0.00095/day (d)], a conservative estimate is that the concentration of TPHg in monitoring well MW1 will reach the WQO of 50 µg/L within 11.9 years (Table 3).

However, using the decay rate information from Worksheets 1 and 2, the concentration of TPHg in monitoring well MW1 exhibits an observed decay rate of -0.0015/d and suggests that the concentration of TPHg will reach the WQO within 6 years (Charts 1 and 2). The concentration of benzene in monitoring well MW1 exhibits an observed decay rate of -0.0015/d and suggests that the concentration of benzene will reach the WQO of 1 µg/L within 1 year (Chart 3). Using the decay rate derived from analytical data (Worksheet 2), the decay rate of -0.0010 also suggests achievement of WQOs in 1 year. The concentration of ethylbenzene in monitoring well MW1 exhibits an observed decay rate of -0.0009/d, and suggests that the concentration of ethylbenzene

will reach the WQO of 29 μg/L within 1 year (Chart 3).

Based on the data summarized in Table 2, the concentration of TPHd in monitoring well MW1 has remained steady within the same order of magnitude (140 μg/L to 200 μg/L). The exponential trendline in Chart 1 for TPHd in monitoring well MW1 appears to be essentially flat, but also exhibits a slightly increasing trend. Because the location of monitoring well MW1 is directly downgradient of monitoring well MW5 (installed in former tank cavity), we expect the behavior of TPHd in monitoring well MW1 to follow the same or a similar pattern of degradation as exhibited in monitoring well MW5. The last detection of TPHd in monitoring well MW5 was reported in October 2004 and was slightly over the WQO (57 μg/L). The steady detection of TPHd in monitoring well MW1 may be attributed to sorbed contamination that was left in place under the footer of the wall that divides the two rooms. As a result, the degradation of TPHd in monitoring well MW1 may take longer than exhibited in monitoring well MW5 (non-detect since January 2005). However, because of TPHd's physical and chemical characteristics (high sorption potential and low solubility), it appears that the low concentrations of TPHd detected in monitoring well MW1 will not adversely impact ecological receptors (Elk Creek Slough and Crescent City Bay). It appears that TPHd detected in monitoring well MW2 also follows a similar pattern as that exhibited in monitoring well MW1.

Monitoring Well MW2

In monitoring well MW2, concentrations of toluene, ethylbenzene, and total xylenes are reported below WQOs and concentrations of TPHmo and MTBE are reported as ND. The concentrations of TPHg and TPHd in monitoring well MW2 exhibit decreasing concentration trends. Again, using cyclohexane as a surrogate for TPHg, it is estimated that the concentration of TPHg in monitoring well MW2 will reach the WQO within 12.3 years (Table 3). However, the observed decay rate of -0.0034/d suggests that the concentration of TPHg will reach the WQO within 2 years (Charts 4 and 5). Using naphthalene as a surrogate for TPHd, (decay rate of -0.00269/d in Table 4), it is estimated that the concentration of TPHd in monitoring well MW2 will reach the WQO of 50 μg/L within 12.3 years. However, the observed decay rate of -0.0035/d suggests that the concentration of TPHd will reach the WQO within 1 year (Chart 4). The concentration of

benzene in monitoring well MW2 exhibits an observed decay rate of -0.0048/d, and suggests that the concentration of benzene will reach the WQO within 1 year (Chart 4).

Monitoring Wells MW3 and MW4

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

Monitoring Well MW5

In monitoring well MW5, concentrations of ethylbenzene and total xylenes are reported below WQOs and concentrations of TPHd, TPHmo, benzene, toluene, and MTBE are reported as ND. The concentrations of TPHd and toluene have been reported as ND for the previous two sampling periods, the concentration of benzene has been reported as ND for the previous three sampling periods, and concentrations of TPHmo and MTBE have been reported as ND since sampling was initiated in April 2004. The concentration of TPHg in monitoring well MW5 exhibits a decreasing concentration trend. Using cyclohexane as a surrogate for TPHg, it is estimated that the concentration of TPHg in monitoring well MW5 will reach the WQO within 11.6 years (Table 3). However, the observed decay rate of -0.0069/d suggests that the concentration of TPHg will reach the WQO within 1 year (Chart 6). Concentrations of TPHd and benzene in monitoring well MW5 exhibit observed decay rates of -0.0032/d and -0.0005/d, respectfully. Current concentrations of these analytes and their respective decay rates suggest that concentrations of TPHd and benzene are likely to remain below WQOs (Chart 6).

Water Quality Objectives and Natural Attenuation

Groundwater sampling in all monitoring wells indicates that all WQOs will be achieved within a 13 year time frame, which is the most conservative estimate. In monitoring well MW1, concentrations of TPHmo, toluene, total xylenes, and MTBE are currently reported below WQOs. Concentrations of TPHg, benzene, and ethylbenzene in MW1 exhibit decreasing concentration trends. Published decay rates suggest that WQOs will be achieved within 12 years; observed data suggests that WQOs will be achieved within 6 years. Based on observed decay

rates of TPHd at monitoring wells MW2 and MW5, (-0.0035/day and -0.0032/d, respectively) and the low reported concentrations of TPHd in monitoring well MW1, it is our opinion that the concentration of TPHd in monitoring well MW1 will reach WQOs within a similar timeframe as in monitoring wells MW2 and MW5.

In monitoring well MW2, concentrations of TPHmo, toluene, ethylbenzene, total xylenes, and MTBE are currently reported below WQOs. Concentrations of TPHg, TPHd, and benzene exhibit decreasing concentration trends. Published decay rates suggest that WQOs will be achieved within 13 years; observed data suggests that WQOs will be achieved within 2 years.

In monitoring wells MW3 and MW4, all analytes have been reported as ND since April 2004, when sampling was initiated in these wells. It is our opinion that analyte concentrations in monitoring wells MW3 and MW4 will likely remain below WQOs.

In monitoring well MW5, concentrations of ethylbenzene and total xylenes are reported below WQOs and concentrations of TPHd, TPHmo, benzene, and toluene are reported as ND. Data suggests that the concentrations of TPHd and benzene will likely remain below WQOs. The decreasing concentration trend of TPHg indicates that the WQO for TPHg will be achieved within 12 years using published data or 1 year using observed data.

Fate and Transport

Each contaminant exhibits a different behavior in the environment based on their physical and chemical properties, and is also influenced by the hydrogeologic, microbial, and geo-chemical conditions of the site. The physical and chemical properties that govern each chemical's behavior include: 1) water solubility, vapor pressure, Henry's Law constant, adsorption coefficient, molecular weight, and specific gravity. TPHd has a low solubility and a greater tendency to remain adsorbed to soil, and, therefore, tends to form smaller groundwater plumes than those of TPHg. The solubility of most TPHd constituents is quite low and adsorption to soil particles is high, so that generally there is limited dissolution in, and transport by, groundwater flow.

Natural attenuation mechanisms include sorption, dilution, dispersion, biodegradation, and volatilization. Additionally, organic material can act as a barrier to the underlying strata. It contains a large bacterial population, which can aid in the degradation of contamination. The organic matter and large surface areas can retain the compounds significantly by sorption and surface tension. This retention enhances the time available for biodegradation to occur, decreasing the overall impact to the aquifer.

Groundwater contaminant plumes will persist as long as dissolution from secondary sources occurs. There is no primary source and only a limited remaining secondary source (under footer of wall dividing two rooms). Because only a limited secondary source exists, the groundwater plume at the site appears to be stable and should continue to recede.

The laboratory noted that the detected TPHg and TPHd "appear to be similar to gasoline but certain peak ratios are not that of a fresh gasoline standard" and "does not exhibit the peak pattern typical of diesel", respectively. It appears that some of the mechanisms noted above are actively degrading the contamination, but no evidence exists to determine which ones may be predominant. However, the degradation of the remaining contaminants should continue by natural attenuation in a reasonable amount of time.

EVALUATION OF INTRINSIC RESULTS

Field intrinsic indicators are routinely monitored and recorded during sample 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 5). 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 monitoring wells MW1, MW2, and MW3 exhibited DO and ORP recordings below these thresholds and suggest anaerobic conditions exist at these locations. Groundwater samples from monitoring wells MW4 and MW5 exhibited DO above 2.0 mg/L and ORP below 50 mV

suggesting that marginal aerobic conditions exist at these locations.

Charts 7 through 11 are time-series plots of dissolved oxygen concentrations with respect to depth-to-water (DTW) data in monitoring wells MW1 through MW5. Charts 7 and 8 for monitoring wells MW1 and MW2, respectively, show similar DO concentrations with respect to DTW. Concentrations are low, under 1 milligram per liter (mg/L), in both wells. These wells are located within the downgradient core of the plume where any DO is rapidly being respired by native microorganisms to degrade the petroleum hydrocarbons. At DO levels below 1 to 2 mg/L in the groundwater, aerobic biodegradation rates are very slow and as a result, anaerobic respiration would dominate. In monitoring well MW3, located out of the gasoline plume at the site (Chart 9), it appears that DO concentrations were initially high, decreased during the summer months, and then increased with rising groundwater elevations. In monitoring well MW4 (Chart 10) background DO levels upgradient of the contaminant source exceed 1 to 2 mg/L, and the flow of groundwater supplies DO to the contaminated area, increasing aerobic biodegradation. Chart 11 illustrates an increase in DO concentrations in monitoring well MW5 as groundwater elevations increased. The highest DO concentrations were recorded in monitoring wells MW4 and MW5, which likely reflects upgradient recharge of oxygenated water into the contaminated zone and the activation of Oxygen Release Compound® (ORC) that was added to the three cavities during the March 2004 excavation activities. ORC was added to the excavation cavities to increase the dissolved oxygen concentration and enhance microbial biodegradation.

It appears that the ORC was activated and that DO concentrations remained high after April 2004, as DO concentrations were elevated until July 2004. After July 2004 (with the exception of monitoring wells MW4 and MW5) DO concentrations exhibit a sharp decline. As the groundwater elevation increased during the winter wet season (October 2004 to April 2005), it appears that the ORC was activated and DO concentrations increased in all the monitoring wells at the site. The increase of DO concentrations in monitoring wells MW1 and MW2 (Charts 7 and 8) was not pronounced, as any available DO was quickly used through microbial respiration within the core of the plume.

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 5. BOD is an indicator of microbial activity; COD is an indicator total oxidizable material; and dissolved iron and manganese are indicators of both aerobic/anaerobic conditions and the levels of microbial activity. Sampling indicates 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. These differences are most likely due to the locations of the monitoring wells. Monitoring wells MW1 and MW2 are located nearby and downgradient of the former UST within the core of the groundwater plume. Sampling for the water quality parameters has indicated that fuel-range material exists near monitoring wells MW1 and MW2. Fuel-range material is an organic source of nutrients which increases both microbial activity and total oxidizable material.

Under anaerobic conditions, biodegradation of hydrocarbons typically causes reduction of Fe^{3+} (insoluble) to Fe^{2+} (soluble), because iron is commonly used as an electron acceptor under anaerobic conditions. Thus, soluble iron concentrations in the groundwater tend to increase immediately downgradient of a petroleum source as the DO is depleted, and conditions change to become anaerobic. Because fuel-range material is oxidizable, environments in which it occupies have decreased concentrations of dissolved oxygen (anaerobic). At monitoring wells MW1 and MW2, this is reflected in the elevated concentrations of dissolved iron and manganese. Like fuel-range material, dissolved iron and manganese are oxidizable and elevated concentrations of these chemicals indicate that there is a lack of available oxidizers, like dissolved oxygen. Monitoring well MW2 exhibits dissolved iron concentrations an order of magnitude higher than monitoring well MW1, and monitoring well MW1 exhibits dissolved iron concentrations an order of magnitude higher than monitoring wells MW3 and MW5. As monitoring well MW4 is located upgradient of the contaminant source, dissolved iron and manganese concentrations are reported as ND, indicating no oxidizing activity by aerobic or anaerobic respiration in that area. Monitoring well MW5 exhibits low concentrations of dissolved iron and manganese, and correlates well with lower contaminant concentrations than reported in monitoring wells MW1

and MW2. Monitoring wells MW4 and MW5 exhibited low concentrations of dissolved iron and manganese, which correlates well with higher DO in those wells.

Plume Stability

Groundwater monitoring and soil sampling have indicated that fuel range material at this site is stable. Concentrations of TPHg, TPHd, and benzene in monitoring wells MW1 and MW2 have generally remained within the same order of magnitude, but have decreased in concentration from the initial sampling results performed in April 2004. In monitoring well MW5, located within the source area, concentrations of TPHg, ethylbenzene, and xylenes have decreased by one order of magnitude, and concentrations of TPHd, benzene, and toluene have decreased to non-detect. Historic monitoring well and boring data (Tables 2, 6, and 7) indicate that fuel range material is not migrating off-site from the former UST. However, it should be noted that the former UST (Caltrans) located off-site along the northeastern boundary of the site has not been investigated for possible release of fuel range material (Figure 2).

Excavation Activities (March 2004)

Recent excavation activities removed approximately 167 kg of sorbed-phase TPHg, and 10 kg sorbed-phase TPHd (Table 8). LACO estimates that excavation activities removed all sorbed-phase TPHg greater than 100 μg/g and all sorbed-phase TPHd greater than 10 μg/g (Figures 5 and 6). The exception to this statement is that low to moderate concentrations of TPHg were left in place (as documented by verification samples in Table 9) along the northern and eastern cavity sidewalls of the main cavity, located adjacent to the building footings. This material was not removed to protect the integrity of the site building. This mass estimate removal is based on excavation limits which encompass the sorbed analyte isoconcentration contours shown in Figures 4 and 5 of the *Subsurface Investigation Status Report; Report of Findings; Boring Installation*, submitted by LACO on November 20, 2003. Removal of sorbed-phase fuel range material limits the amount of material which is able to go into solution. This results in decreased concentrations within the analyte plume and increases likelihood that the analyte plume will stabilize and recede. Analytical results for soil and groundwater verification samples collected during excavation activities can be reviewed in Tables 9 and 10, respectively. Verification

sample locations can be reviewed in *Report of Findings: Excavation and Monitoring Well Installation*, submitted by LACO on June 14, 2004.

Sensitive Receptor Survey

There does not appear to be any potential impact to sensitive receptors from the former UST. Potential sensitive receptors at greatest risk are ecological receptors located downgradient of the contaminant plume area such as the Elk Creek Slough, the Crescent City Bay, and the well at the city park. It is unlikely that petroleum hydrocarbon contamination will impact these receptors due to topography and to the distance from the site. There was one identified domestic well located within the survey radius; however, it is not in use. Given the standard practice of installing surface sanitary seals to depths of 30 feet or more in water supply wells, the residual, detectable concentrations of weathered gasoline or diesel fuel does not pose a threat to human health and safety, or the environment, and will not adversely affect current or probable future beneficial uses of water. Locations of potential sensitive receptors can be seen in *Results of Sensitive Receptor Survey*, submitted by LACO on February 3, 2004.

CONCLUSIONS

The primary source has been removed and only a limited remaining secondary source has been identified at the site. Groundwater WQOs have been met at the site for MTBE. Concentrations of TPHg and TPHd exhibit declining trends. Although the time required to attain WQOs may be lengthy, it is a reasonable period of time considering that there are no drinking wells near the site, and it is unlikely that the TPHg and TPHd detected in localized areas in the immediate vicinity of the building footers will migrate substantially beyond the current limited spatial extent. It is also unlikely that this particular limited pocket of groundwater will be directly used as a source of drinking water. The adverse effect on groundwater will be minimal and localized, and there will be no adverse effect on the groundwater contained in deeper water-bearing zones, given the physical and chemical characteristics of the site and surrounding land, the quantity of the contaminated groundwater and the direction of groundwater flow. The placement of an asphalt parking lot in the area south of the site, and the site structure itself will further reduce the potential for the flushing by rainwater of the remaining TPHg and TPHd into waters of the State.

The potential for advese effects on beneficail uses of groundwater appears low, based on the current and potential future uses of groundwater in the area, the existing quality of groundwater in the area, the patterns of precipitation, the potential health risks caused by human exposure, the potential damage to wildlife, and the persistence and permanence of potential effects.

Additional soil and groundwater investigation is not necessary and the site should be closed because the limited, localized impacts of residual weathered petorleum constituents do not threaten human health, safety, and the environment, and pose a very low risk to current or probable future beneficail uses of water. In addition, the site will meet aplicable objectives in the NCRWQCB Basin Plan within a reasonable time frame. The only anlayte exhibting a steady or a slightly increaseing trend are limited to the heavier moecular weight, low solubility, non-volatile, highly adsorbent TPHd range of constituents. These residual TPHd constituents are essentially immobile and will not migrate beyond their present limited, localized extent.

RECOMMENDATIONS AND FUTURE WORK

- LACO will continue with the current quarterly sampling protocol. The next sampling event is scheduled for July 2005.
- Remove monitoring wells MW3 and MW4 from the sampling protocol. No analyte detections have been reported in these monitoring wells since sampling was initiated in April 2004. LACO will continue with DTW and intrinsic bioremediation indicator measurements.
- Remove TPHmo sampling from the sampling protocol for all sampled monitoring wells. No detections of TPHmo have been reported in any monitoring wells since sampling was initiated in April 2004.
- In our opinion, the site has been monitored sufficiently and it is apparent that natural attenuation and bioremediation will be effective in reducing contaminant concentrations to WQOs within a reasonable time frame. We request to submit a closure report for this site and the CRWQCB issue a "No Further Action" status.

REFERENCES

Internet: Heath, J.S., Koblis, K., Sager, S.L., and Day, C. (1993). *Risk Assessment for Total Petroleum Hydrocarbons.* Calabrese, E.J., and Kostecki, P.T. (eds). *Hydrocarbon Contaminated Soils – Volume III.* Lewis Publishers, Chelsea, MI. pp. 267-301.

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.* Pg 10. CRC Press, Inc., Lewis Publishers, Boca Raton, FL.

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Chart 9: Concentrations of Dissolved Oxygen Vs Depth to Water Monitoring Well MW3

Chart 10: Concentrations of Dissolved Oxygen Vs Depth to Water Monitoring Well MW4

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Worksheet 2: Decay Rates in MW1, MW2, and MW5, Derived from Analytical Results

Worksheet 3: Decay Rates in MW1, MW2, and MW5, Derived from Published Half-Lives

Worksheet 4: Comparisons of Decay Rate Constants

Worksheet 5: Comparative Decay Rates and Estimated WQO Achievement Dates

Attachment 1: Key to Abbreviations

Attachment 2: Groundwater Sampling Field Data Sheets

Attachment 3: Laboratory Analytical Reports

Attachment 4: APPL Inc. - Cyclohexane reference

Attachment 5: Howard and Nyer References

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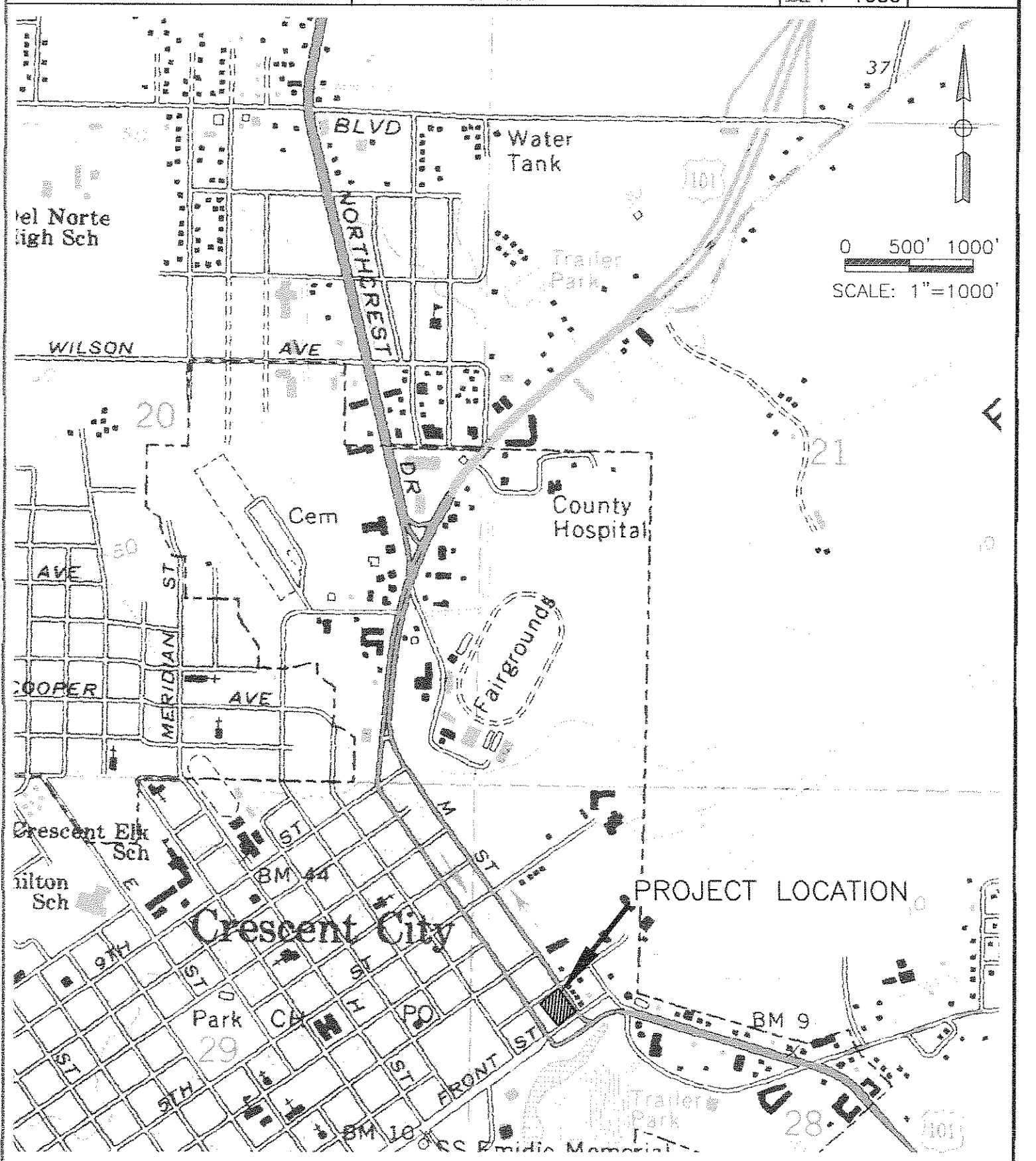
LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT GROUNDWATER MONITORING REPORT	BY RJM	FIGURE 1
	CLIENT DARRYL LOVAAS	DATE 5/02/05	
	LOCATION 1265 SECOND STREET, CRESCENT CITY, CA	CHECK	JOB NO. 5113.00
	LOCATION MAP	SCALE 1"=1000'	



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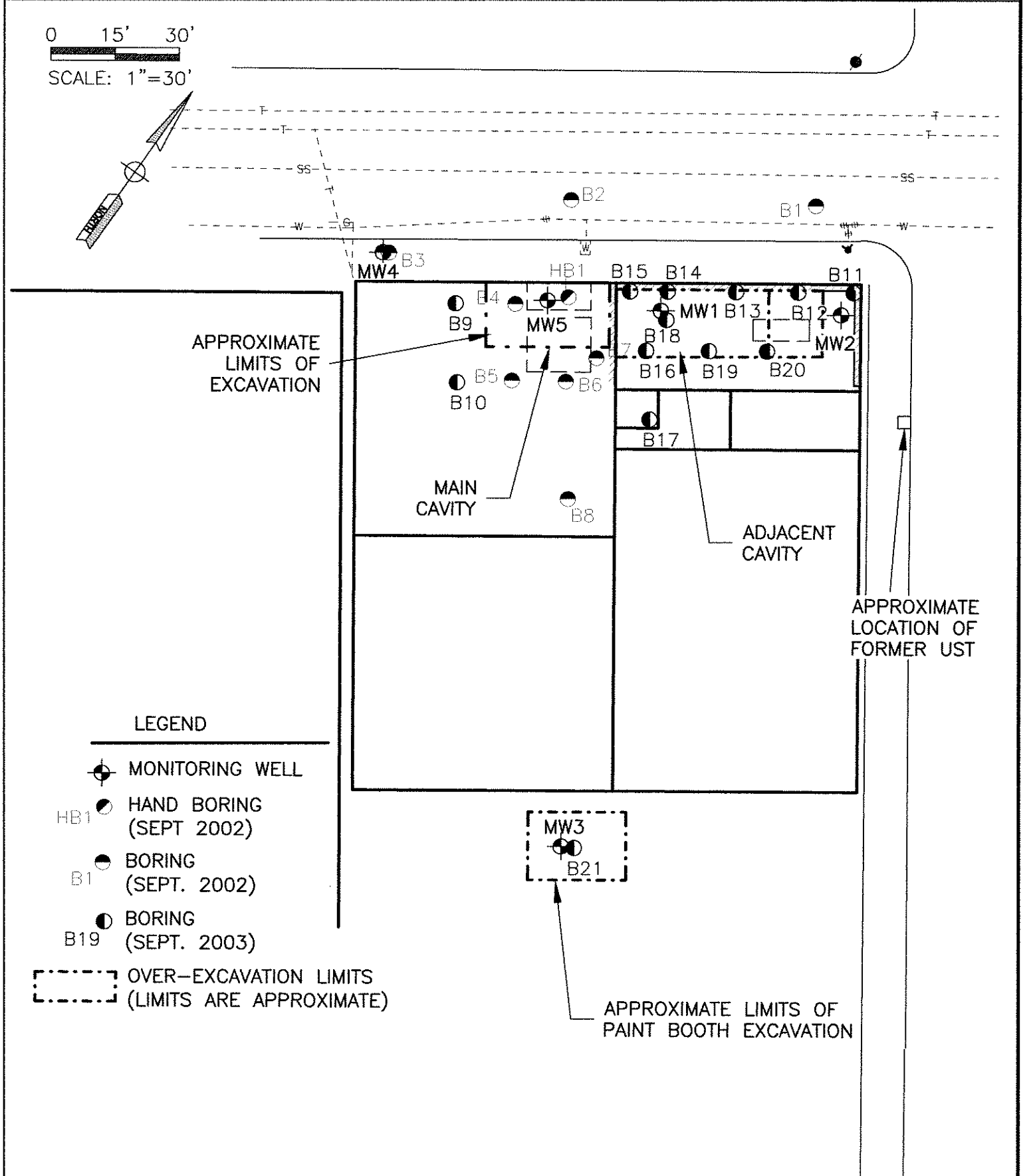
LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT GROUNDWATER MONITORING REPORT	BY RJM	FIGURE 2
	CLIENT DARRYL LOVAAS	DATE 5/13/05	
	LOCATION 1265 SECOND STREET CRESCENT CITY, CA	CHECK	JOB NO. 5113.00
	SITE MAP	SCALE 1"=30'	



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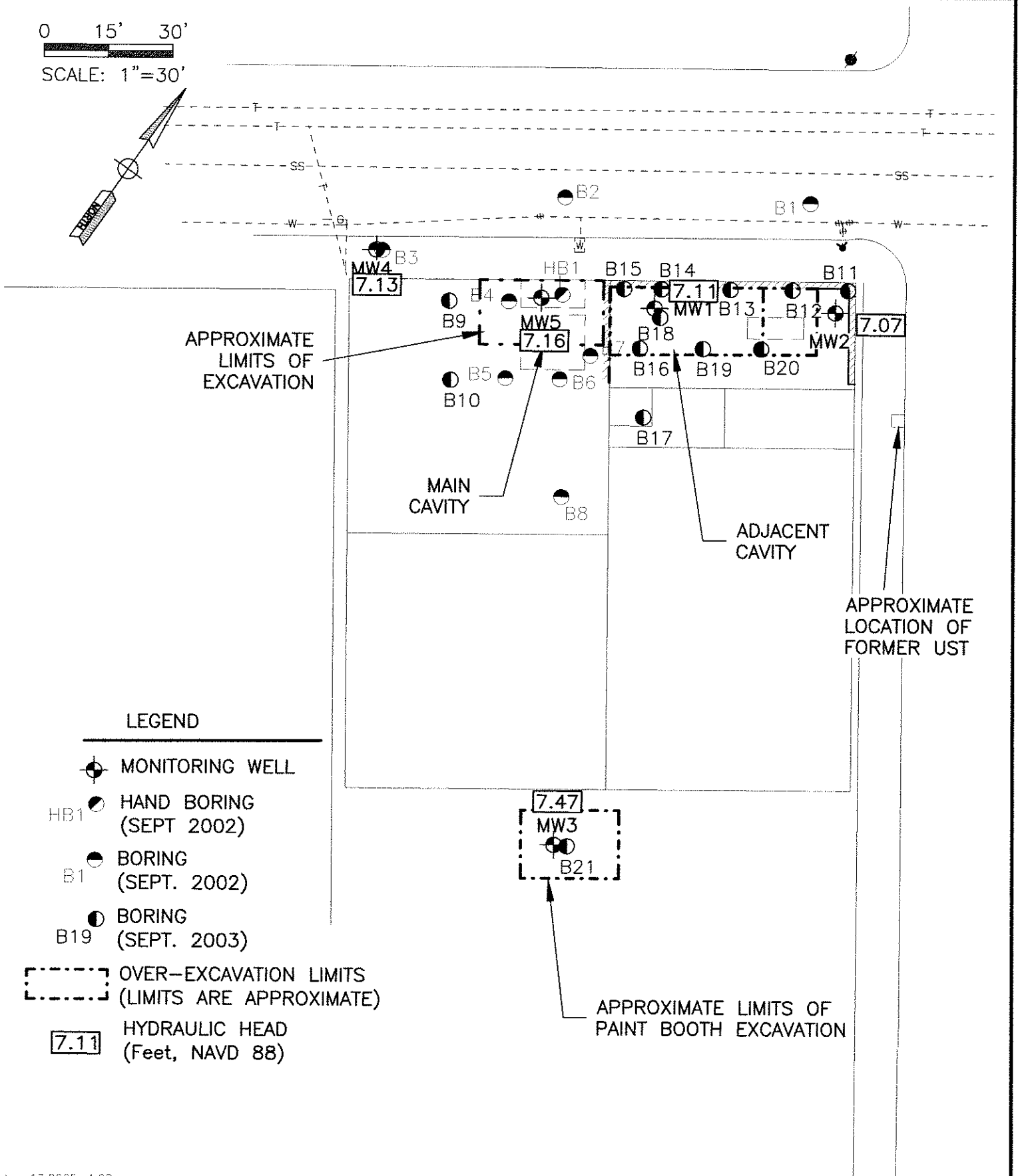
LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT GROUNDWATER MONITORING REPORT	BY RJM	FIGURE 3
	CLIENT DARRYL LOVAAS	DATE 6/13/05	
	LOCATION 1265 SECOND STREET CRESCENT CITY, CA	CHECK	JOB NO. 5113.00
	HYDRAULIC HEAD MAP (4/11/05)	SCALE 1"=30'	



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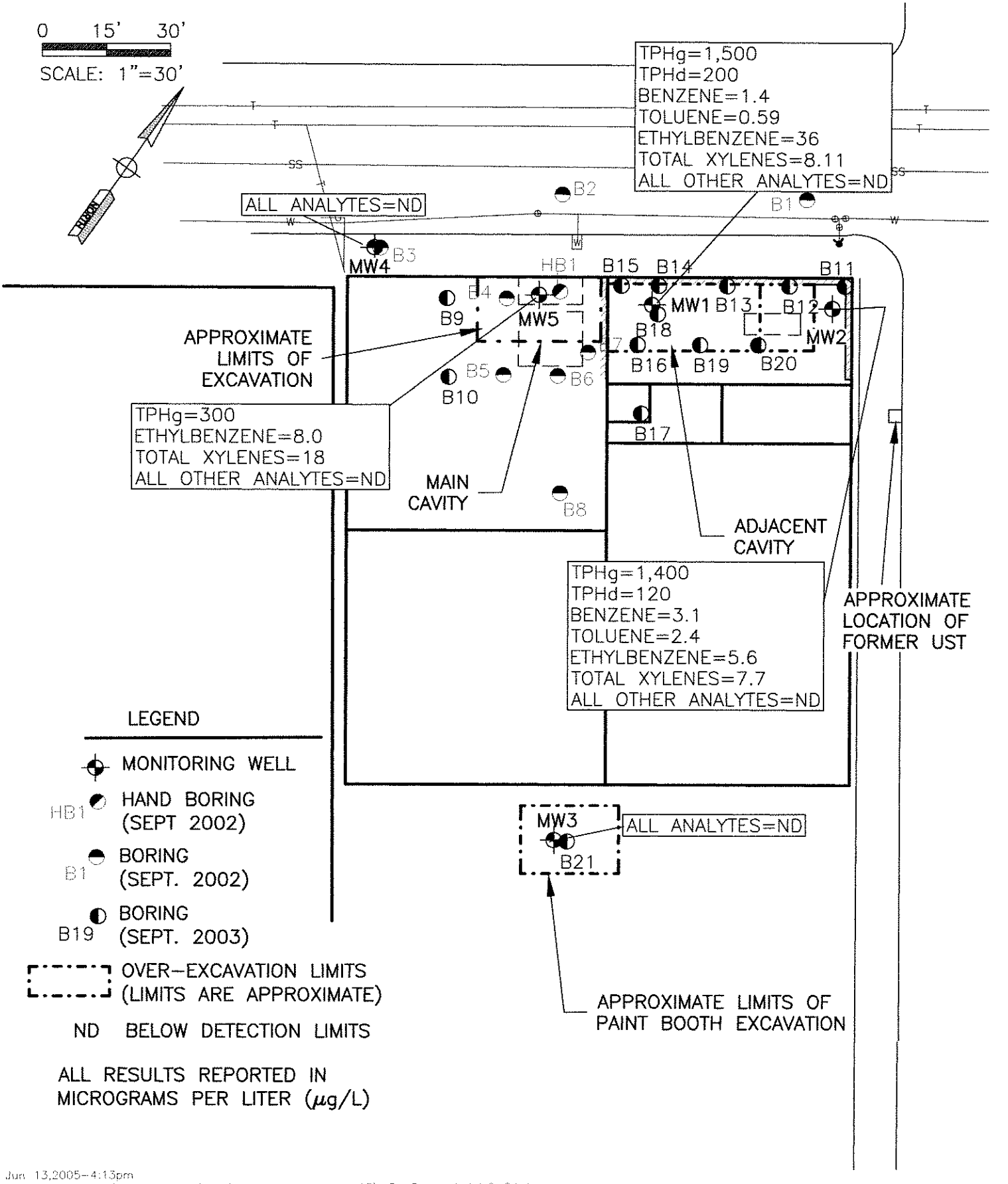
LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT GROUNDWATER MONITORING REPORT	BY RJM	FIGURE 4
	CLIENT DARRYL LOVAAS	DATE 6/13/05	
	LOCATION 1265 SECOND STREET CRESCENT CITY, CA	CHECK	JOB NO. 5113.00
	ANALYTE CONCENTRATION IN GROUNDWATER (4/11/05)	SCALE 1"=30'	



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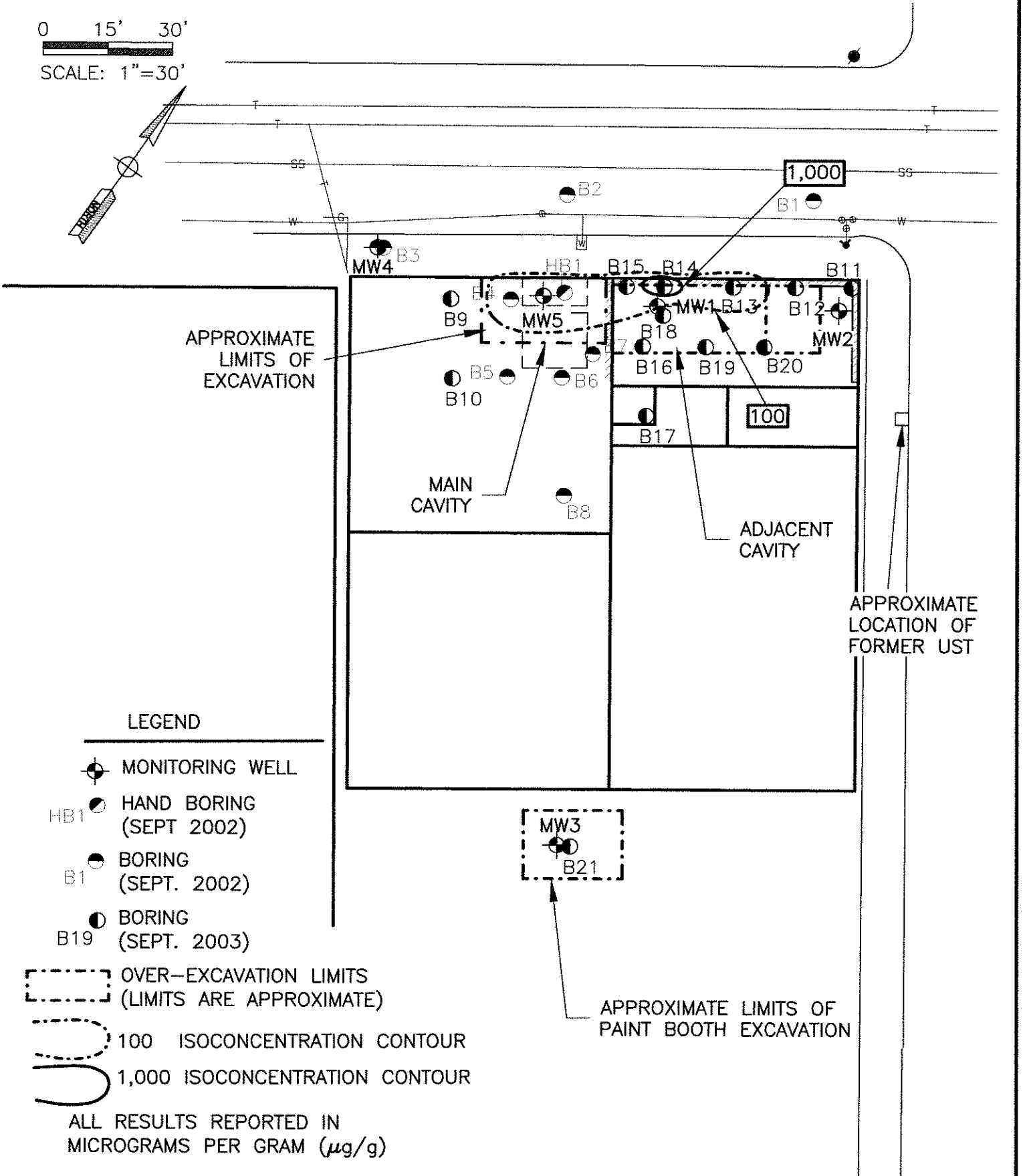
LACO ASSOCIATES CONSULTING ENGINEERS 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054	PROJECT GROUNDWATER MONITORING REPORT	BY RJM	FIGURE 5
	CLIENT DARRYL LOVAAS	DATE 6/14/05	
	LOCATION 1265 SECOND STREET CRESCENT CITY, CA	CHECK	JOB NO. 5113.00
	OVER-EXCAVATION LIMITS AND TPHg IN SOIL	SCALE 1"=30'	



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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 6
	CLIENT DARRYL LOVAAS	DATE 6/14/05	
	LOCATION 1265 SECOND STREET CRESCENT CITY, CA	CHECK	JOB NO. 5113.00
	OVER-EXCAVATION LIMITS AND TPHd IN SOIL	SCALE 1"=30'	

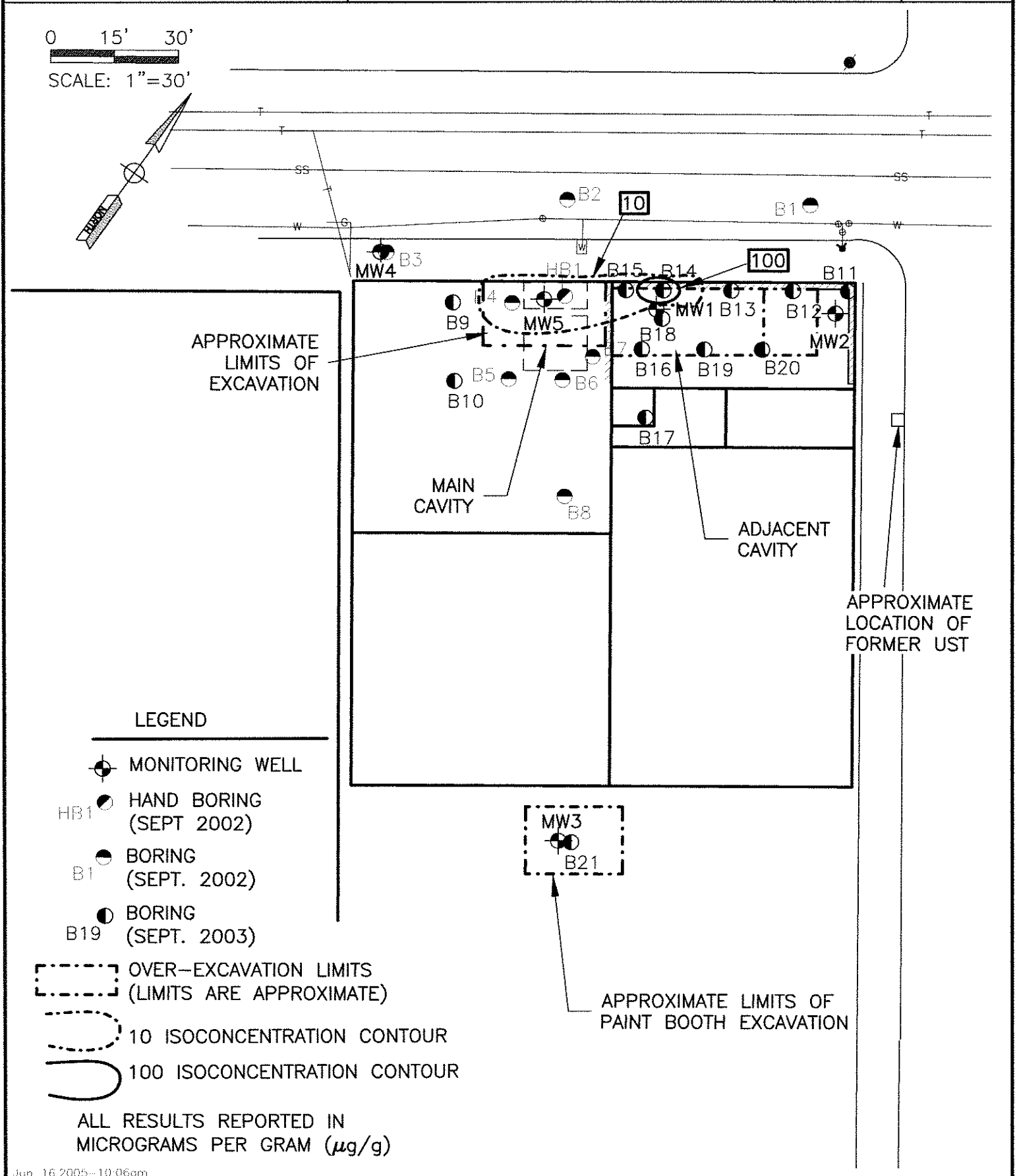

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TABLE 1: HISTORIC HYDRAULIC GRADIENT DATA
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

	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	---	---	---	---

TABLE 2: 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
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

TABLE 2: 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
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

TABLE 2: 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

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 3: TPHg DEGRADATION ESTIMATES
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

Calculation of First Order Rate Constant

Assume cyclohexane is representative of TPHg degradation
First order rate constant will be determined using cyclohexane half-life
Half-life of cyclohexane under anaerobic aqueous biodegradation (most conservative published value) = 24 months or 730 days (Howard, 1991)
First order rate constant (k) will be calculated from the first order equation $C_f = C_o e^{(kt)}$
First order equation, $C_f = C_o e^{(kt)}$, re-arranged to calculate for first order rate constant, $k = \ln(C_f/C_o)/t$

where:
k is the first order rate constant ($days^{-1}$)
C_f is the final concentration (µg/L)
C_o is the initial concentration (µg/L)
t is time (days)

First order rate constant is: -0.00095 $days^{-1}$

Calculation of time to reach the NCRWQCB WQO for TPHg at monitoring wells MW1, MW2, and MW5

Time to reach the NCRWQCB WQO for TPHg at monitoring wells MW1, MW2, and MW5 using cyclohexane as a first order rate constant and highest reported concentrations of TPHg (Table 2).
First order equation, $C_f = C_o e^{(kt)}$, re-arranged to calculate for time, $t = \ln(C_f/C_o)/k$

where:
t = time (days)
C_f = NCRWQCB WQO for TPHg = 50 µg/L
C_o = Initial TPHg concentration
k = -0.00095 ($days^{-1}$)

Monitoring Well	Highest Reported Concentration of TPHg (µg/L)	Time to Reach NCRWQCB WQO (days)	Time to Reach NCRWQCB WQO (years)
1	3,100 (7/26/04)	4,347	11.9
2	3,500 (4/20/04)	4,474	12.3
5	2,800 (4/20/04)	4,239	11.6

TABLE 4: TPHd DEGRADATION ESTIMATES
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

Calculation of First Order Rate Constant

Assume naphthalene is representative of TPHd degradation

First order rate constant will be determined using naphthalene half-life

Half-life of naphthalene under anaerobic aqueous biodegradation (most conservative published value) = 258 days (Howard, 1991)

First order rate constant (k) will be calculated from the first order equation $C_f = C_o e^{(kt)}$

First order equation, $C_f = C_o e^{(kt)}$, re-arranged to calculate for first order rate constant, $k = \ln(C_f/C_o)/t$

where:

k is the first order rate constant ($days^{-1}$)

C_f is the final concentration (µg/L)

C_o is the initial concentration (µg/L)

t is time (days)

First order rate constant is: -0.00269 $days^{-1}$

Calculation of time to reach the NCRWQCB WQO for TPHd at monitoring wells MW1, MW2, and MW5

Time to reach the NCRWQCB WQO for TPHd at monitoring wells MW1, MW2, and MW5 using naphthalene as a first order rate constant and highest reported concentrations of TPHd (Table 2).

First order equation, $C_f = C_o e^{(kt)}$, re-arranged to calculate for time, $t = \ln(C_f/C_o)/k$

where:

t = time (days)

C_o = Initial TPHd concentration

C_f = NCRWQCB WQO for TPHd = 50 µg/L

k = -0.00269 ($days^{-1}$)

Monitoring Well	Highest Reported Concentration of TPHd (µg/L)	Time to Reach NCRWQCB WQO (days)	Time to Reach NCRWQCB WQO (years)
1	200 (4/11/05)	516	1.4
2	340 (4/20/04)	714	2.0
5	150 (4/20/04)	409	1.1

TABLE 5: 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
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

TABLE 5: 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
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

TABLE 5: 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

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

TABLE 6: TANK CLOSURE AND HISTORIC BORING SOIL ANALYTICAL RESULTS
Former Lovass Property; 1265 Second St., Crescent City, CA
LACO Project No. 5113.00; CRWQCB Case No. 1TDN153

Sample ID	Sample Date	TPHg (µg/g)	TPHd (µg/g)	TPHmo (µg/g)	Benzene (µg/g)	Toluene (µg/g)	Ethylbenzene (µg/g)	Total Xylenes (µg/g)	MTBE (µg/g)	Other Analytes (µg/g)	Total Metals (µg/g)
UST TANK CLOSURE											
East #1	7/24/01	**24**	<1.0	---	<0.050	**0.83**	**0.40**	**2.5**	---	<0.1-2.0	---
West #2	7/24/01	**260**	<5.0	---	<0.050	<0.050	<0.050	**1.1**	---	<0.1-2.0	---
2002 INVESTIGATION											
B1-S4	9/18/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B1-S8	9/18/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B2-S4	9/18/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B2-S8	9/18/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B3-S4	9/18/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B3-S8	9/18/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B4-S3.5	9/18/02	**1.1**	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B4-S5.5	9/18/02	**220**	**20**	**38**	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B4-S8	9/18/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B5-S4	9/19/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B5-S5.5	9/19/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B5S-6.5	9/19/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B6-S4	9/19/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B6-S5	9/19/02	**1.1**	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B6-S6	9/19/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B7-S5	9/19/02	**2.4**	**3.1**	**74**	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B7-S6	9/19/02	**1.1**	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B8-S2	9/19/02	**9.9**	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B8-S5	9/19/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B8-S8	9/19/02	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
HB1-S6	9/19/2002	**330**	**12**	**230**	ND<0.50	ND<3.0	**1.9**	**10.9**	ND<0.050	**Naphthalene - 1,200** **Grease & Oil - 0.14**	**Cr-110, Pb-54** **Ni-120, Zn-56**
Stockpile 1	9/19/2002	**1.6**	**4.7**	**120**	ND<0.0050	ND<0.010	ND<0.0050	**0.0092**	ND<0.050	All Analytes ND	**Cr-130, Pb-37** **Ni-140, Zn-57**
2003 INVESTIGATION											
B9-S4	9/3/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B9-S8	9/3/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B9-S12	9/3/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B10-S4	9/3/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B10-S8	9/3/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B10-S12	9/3/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B11-S5	9/3/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.012	ND<0.0050	ND<0.0050	ND<0.050	---	---
B12-S5	9/3/03	**7.3**	ND<1.0	ND<10	ND<0.0050	ND<0.12	ND<0.015	ND<0.018	ND<0.050	---	---

TABLE 6: TANK CLOSURE AND HISTORIC BORING SOIL ANALYTICAL RESULTS
Former Lovass Property; 1265 Second St., Crescent City, CA
LACO Project No. 5113.00; CRWQCB Case No. 1TDN153

Sample ID	Sample Date	TPHg (µg/g)	TPHd (µg/g)	TPHmo (µg/g)	Benzene (µg/g)	Toluene (µg/g)	Ethylbenzene (µg/g)	Total Xylenes (µg/g)	MTBE (µg/g)	Other Analytes (µg/g)	Total Metals (µg/g)
2003 INVESTIGATION Continued											
B13-S4	9/4/03	**110**	**5.9**	ND<10	ND<0.017	ND<0.80	ND<0.40	ND<0.30	ND<0.050	---	---
B13-S6	9/4/03	**4.7**	ND<1.0	ND<10	ND<0.0050	ND<0.080	**0.023**	**0.0071**	ND<0.050	---	---
B14-S5	9/4/03	**1,500**	**110**	**31**	ND<0.50	ND<2.0	**9.0**	**3.1**	ND<5.0	---	---
B15-S5	9/4/03	**220**	**7.4**	ND<10	ND<0.050	ND<1.0	ND<0.40	ND<0.40	ND<0.50	**Oil and Grease = 23**	**Chromium=120 Nickel=120 Zinc=22**
B16-S5	9/4/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.010	ND<0.0050	**0.0053**	ND<0.050	---	---
B17-S4	9/4/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B18-S4	9/4/03	**9.5**	**8.5**	ND<10	**0.0097**	ND<0.060	**0.29**	ND<0.020		**Oil and Grease = 23 Naphthalene - 1.5**	**Chromium=120 Nickel=120 Zinc=25**
B19-S5	9/4/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.030	ND<0.0050	ND<0.0050	ND<0.050	---	---
B20-S5	9/4/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B21-S4	9/4/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---
B21-S5	9/4/03	**4.5**	**180**	**1,900**	ND<0.0050	ND<0.015	ND<0.018	ND<0.015	ND<0.050	**Oil and Grease = 79**	**Chromium=120 Nickel=110 Zinc=21**
B21-S8	9/4/03	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	---	---

NOTES:
Bold results indicate analayte detection
TPHg-Total Petroleum Hydrocarbons as gasoline
TPHd-Total Petroleum Hydrocarbons as diesel
TPHmo-Total Petroleum Hydrocarbons as motor oil
MTBE - methyl tertiary butyl ether
Total xylenes includes m,p-xylene and o-xylene
B1-S5 - Geoprobe boring one, with a soil sample collected with the macrocore sampling tubes at 5 feet bgs.
HB1-S6 - Hand auger boring one, with a soil sample collected at 6 feet bgs.
All results reported in micrograms per gram (µg/g)
--- = sample not analyzed for parameter
Other Analytes include:
EPA Method 8270 semi-volatile organics sampling suite
EPA Method 8260 volatile organics sampling suite
EPA Method 608 Organochlorine pesticides and PCBs
EPA Method 1664 Hexane extractable oil and grease.
EPA Method 200.7 for ICAP Metals with acid digestion (total)

TABLE 7: HISTORIC BORING GROUNDWATER ANALYTICAL RESULTS
Former Lovass Property; 1265 Second St., Crescent City, CA
LACO Project No. 5113.00; CRWQCB Case No. 1TDN153

Sample ID	Sample Date	Boring Elevation (100 feet assummed datum)	Groundwater Elevation	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)	Fuel Oxygenates (µg/L)	Other Analytes (µg/L)	Total Metals (µg/L)	Dissolved Metals (µg/L)
2002 INVESTIGATION															
B1-W4-8	9/18/02	100.35	95.16	5.19	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1-20	---	---	---
B2-W4-8	9/18/02	100.44	95.3	5.14	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1-20	---	---	---
B3-W4-8	9/18/02	100.56	95.45	5.11	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1-20	---	---	---
B4-W4-8	9/18/02	100.48	95.34	5.14	**93**	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1-20	---	---	---
B5-W4-8	9/19/02	100.46	95.28	5.18	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1-20	---	---	---
B6-W4-8	9/19/02	100.62	---	---	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1-20	All Analytes ND	Ca - ND **Cr-660, Pb-ND** **Ni-690, Zn-150**	Ca - ND **Cr-16, Pb-ND** **Ni-23, Zn-ND**
B7-W4-8	9/19/02	100.63	95.24	5.395	ND<50	ND<50	ND<170	ND<0.50	**0.53**	ND<0.50	ND<0.50	ND<1-20	---	---	---
B8-W4-8	9/19/02	100.34	95.22	5.12	**73**	ND<50	**200**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1-20	---	---	---
HB1-W5-7	9/19/02	---	---	---	**2,600**	**300**	**3,500**	**1.9**	**24**	**150**	**440**	ND<0.5-5.0	**Naphthlene - 28** **Grease & Oil - 98** Other Analytes ND	Ca - ND **Cr-270, Pb-1,600** **Ni-430, Zn-590**	Ca - ND **Cr-24, Pb-29** **Ni-51, Zn-ND**
2003 INVESTIGATION															
B9-W8-12	9/4/03	---	---	---	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0-20	---	---	---
B10W-4-8	9/4/03	---	---	5.96	ND<50	**77**	**1,600**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0-20	---	---	---
B11-WGRAB	9/4/03	---	---	---	**67**	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0-20	---	---	---
B12-WGRAB	9/4/03	---	---	5.58	**1,300**	ND<50	ND<170	**2.7**	**1.2**	**1.4**	**4.18**	ND<1.0-20	---	---	---
B13-WGRAB	9/4/03	---	---	---	**4,800**	**660**	ND<170	**3.7**	**2.1**	**61**	**6.2**	ND<1.0-20	---	---	---
B14-WGRAB	9/4/03	---	---	5.48	**19,000**	ND<50	ND<170	**1.7**	**2.1**	**330**	**105**	ND<1.0-20	---	---	---
B15-WGRAB	9/4/03	---	---	5.47	**3,800**	**1,700**	ND<170	**0.73**	**1.6**	**12**	**10.9**	ND<1.0-20	**Oil and Grease = 41** **Naphthalene = 69** **Chloromethane = 6.2** **Chloroethane = 3.5** **Chloroform = 3.2** All others = ND	**Chromium = 630** **Nickel = 2,000** **Zinc = 310** **Lead = 14**	All ND<10-20
B16-WGRAB	9/4/03	---	---	5.36	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0-20	---	---	---
B17-WGRAB	9/4/03	---	---	5.35	ND<50	ND<50	**500**	ND<0.50	ND<0.50	ND<0.50	**2.03**	ND<1.0-20	---	---	---
B18-WGRAB	9/4/03	---	---	5.44	**1,100**	**290**	ND<170	**5.8**	**1.0**	**44**	**3.27**	ND<1.0-20	**Oil and Grease = 6.3** **Naphthalene = 17** **Chloroform = 1.9** All others = ND	**Chromium = 610** **Nickel = 2,400** **Zinc = 300**	All ND<10-20
B19-WGRAB	9/4/03	---	---	5.64	ND<50	ND<50	ND<170	**0.82**	ND<0.50	ND<0.50	**0.58**	ND<1.0-20	---	---	---
B20-WGRAB	9/4/03	---	---	5.40	ND<50	ND<50	ND<170	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0-20	---	---	---
B21-WGRAB	9/4/03	---	---	5.40	ND<50	ND<50	ND<170	**2.2**	ND<0.50	ND<0.50	ND<0.50	ND<1.0-20	**Oil and Grease = 6.4** Other analytes = ND	**Chromium = 550** **Nickel = 1,100** **Zinc = 260** **Lead = 20**	All ND<10-20

NOTES:
Depth-to-water measurements for borings installed during 2003 investigation are erroneous, because ground surface has not been surveyed and is uneven. No gradient calculated.
TPHg-Total Petroleum Hydrocarbons as gasoline
TPHd-Total Petroleum Hydrocarbons as diesel
TPHmo-Total Petroleum Hydrocarbons as motor oil
Total xylenes includes m,p-xylene and o-xylene
B1-W4-8 - Geoprobe boring one, with a groundwater sample collected with the screen point sampler from 4-8 feet bgs.
HB1-W5-7 - Hand auger boring one, with a groundwater sample collected from 5-7 feet bgs.
All results reported in micrograms per liter (µg/L)
Bold results indicate analayte detection
--- = sample not analyzed for parameter
Other Analytes include:
EPA Method 8270 semi-volatile organics sampling suite
EPA Method 8260 volatile organics sampling suite
EPA Method 608 Organochlorine pesticides and PCBs
EPA Method 1664 Hexane extractable oil and grease.
EPA Method 200.7 for ICAP Metals with acid digestion (total and dissolved)

TABLE 8: ESTIMATE OF REMAINING SORBED PHASE TPHG AND TPHD
Former Lovass Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

Define areas of contamination by concentration	MASS OF SORBED PHASE TPHg		MASS OF SORBED PHASE TPHd	
Average Analyte Concentration[1]:	1,500 µg/g	220 µg/g	110 µg/g	12 µg/g
Area of contamination[2] (A):	141 ft^2	2608 ft^2	220 ft^2	2061 ft^2
Depth of contamination[1] (B):	5 ft	5 ft	5 ft	5 ft
Volume of contamination (A*B=C):	705 ft^3	13,040 ft^3	1100 ft^3	10,305 ft^3
Convert ft^3 to cm^3; multiply 28316.8:	1.996E+07 cm^3	3.693E+08 cm^3	3.115E+07 cm^3	2.918E+08 cm^3
Multiply density of soil (1.5 g/cm^3) to get the weight of the contaminated soil:	2.995E+07 g	5.539E+08 g	4.672E+07 g	4.377E+08 g
Multiply by contaminant concentration (µg/g):	4.492E+10 µg	1.219E+11 µg	5.139E+09 µg	5.252E+09 µg
Convert to kilograms:	45 kg	122 kg	5 kg	5 kg

TOTAL SORBED ANALYTE MASS PRIOR TO EXCAVATION:	**167 kg**	**10 kg**
TOTAL SORBED ANALYTE MASS REMOVED DURING EXCAVATION[3]:	**167 kg**	**10 kg**
TOTAL SORBED ANALYTE MASS REMAINING[4]:	**0 kg**	**0 kg**

FOOTNOTES:

[1] Estimated values determined from analyte concentrations at depth, determined from area historic borings, Table 4

[2] Estimated values taken from Figures 4 and 5; *Subsurface Investigation Status Report; Report of Findings; Boring Installation;* Submitted by LACO on November 20, 2003

[3] Sorbed analyte mass removed based on excavation limits which encompass sorbed analyte isoconcentration contours, Figures 5 and 6

[4] The exception is that low to moderate concentrations of TPHg were left in place at the northern and eastern cavity sidewalls of the main cavity, adjacent to the building footings (Table 9)

TABLE 9: EXCAVATION SOIL VERIFICATION ANALYTICAL RESULTS
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO Project No. 5113.00; CRWQCB Case No. 1TDN153

Sample ID	Sample Date	Depth (ft bgs)	TPHg (µg/g)	TPHd (µg/g)	TPHmo (µg/g)	Benzene (µg/g)	Toluene (µg/g)	Ethylbenzene (µg/g)	Total Xylenes (µg/g)	MTBE (µg/g)	Other Analytes (µg/g)	Metals (µg/g)
MAIN UST CAVITY												
Cavity North1	3/3/04	5.0	**7.8**	**2.0**	**33**	ND<0.0050	ND<0.10	**0.029**	**0.136**	ND<0.050	---	---
Cavity North2	3/3/04	5.0	**190**	**1.3**	ND<10	ND<0.0050	ND<1.0	ND<0.80	ND<1.2-1.6	ND<0.050	ND	---
Cavity East	3/3/04	5.0	**340**	**3.9**	ND<10	ND<0.10	ND<2.5	**0.94**	**4.51**	ND<1.0	---	---
Cavity South1	3/3/04	5.0	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.020	ND<0.0050	**0.0159**	ND<0.050	**oil and grease=86**	Ba=13; Ca=8,500; Cr=150; Co=14; Cu=8.5; Fe=22,000; Mn=260; Ni=170; K=400; Na=160; V=47; Zn=45; As=4.5
Cavity South2	3/3/04	5.0	**12**	ND<1.0	ND<10	ND<0.0050	ND<0.15	ND<0.0600	ND<0.060	ND<0.050	ND	Ba=9.4; Ca=5,300; Cr=120; Co=11; Cu=5.8; Fe=18,000; Mn=200; Ni=130; K=360; Na=110; V=38; Zn=24; As=3.9
Cavity West	3/3/04	5.0	**6.5**	ND<1.0	ND<10	ND<0.0050	ND<0.12	**0.030**	**0.055**	ND<0.050	ND	---
Cavity Bottom	3/3/04	7.0	**2.4**	ND<1.0	ND<10	ND<0.0050	ND<0.050	ND<0.15	ND<0.15	ND<0.050	ND	---
ADJACENT CAVITY												
Adjcavity North1	3/3/04	5.0	**4.1**	ND<1.0	ND<10	ND<0.0050	ND<0.050	**0.042**	**0.0474**	ND<0.050	---	---
Adjcavity North2	3/3/04	5.0	**3.2**	ND<1.0	ND<10	ND<0.016	ND<0.060	**0.021**	**0.0356**	ND<0.050	---	---
Adjcavity East	3/3/04	5.0	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	**0.0091**	ND<0.050	---	---
Adjcavity South1	3/3/04	5.0	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.020	ND<0.0050	**0.0165**	ND<0.050	ND	Ba=11; Ca=7,600; Cr=160; Co=13; Cu=7.3; Fe=22,000; Mn=260; Ni=160; K=420; Na=210; V=48; Zn=50; As=4.4
Adjcavity South2	3/3/04	5.0	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.020	ND<0.0050	**0.0191**	ND<0.050	**oil and grease=13**	Ba=13; Ca=5,900; Cr=130; Co=11; Cu=6.9; Fe=20,000; Mn=220; Ni=130; K=380; Na=160; V=41; Zn=55; As=2.9
Adjcavity West	3/3/04	7.0	**9.6**	**3.8**	ND<10	ND<0.0050	ND<0.040	**0.038**	**0.063**	ND<0.050	---	---
Adjcavity Bottom	3/3/04	7.0	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.020	ND<0.0050	**0.0161**	ND<0.050	---	---
PAINT BOOTH												
Paint Booth North	3/2/04	5.0	**2.0**	**2.5**	**27**	ND<0.0050	**0.0050**	ND<0.0050	**0.0080**	ND<0.050	**oil and grease=1,700**	Ba=29; Ca=6,100; Cr=120; Co=11; Cu=29; Fe=17,000; Pb=79; Mn=200; Ni=130; K=320; Na=100; V=38; Zn=100; As=5.1
Paint Booth South	3/2/04	5.0	**8.3**	**13**	**73**	**0.0059**	ND<0.0050	ND<0.0050	**0.0056**	ND<0.050	**oil and grease=45**	Ba=11; Ca=4,900; Cr=130; Co=9.6; Cu=5.7; Fe=17,000; Mn=180; Ni=110; K=260; Na=100; V=43; Zn=24; As=2.9
Paint Booth East	3/2/04	5.0	ND<1.0	**4.8**	**12**	**0.0081**	ND<0.0050	ND<0.0050	**0.0061**	ND<0.050	**oil and grease=60**	Ba=6.9; Ca=5,800; Cr=130; Co=9.7; Cu=5.2; Fe=17,000; Mn=180; Ni=110; K=270; Na=100; V=46; Zn=22; As=2.5
Paint Booth West	3/2/04	5.0	ND<1.0	ND<1.0	ND<10	**0.0069**	**0.0058**	ND<0.0050	**0.0166**	ND<0.050	ND<10	Ba=11; Ca=4700; Cr=120; Co=12; Cu=7.0; Fe=18,000; Mn=210; Ni=140; K=420; Na=130; V=36; Zn=31; As=6.0
Paint Booth Bottom	3/2/04	7.0	ND<1.0	ND<1.0	ND<10	**0.022**	ND<0.0050	ND<0.0050	ND<0.050	ND<0.050	ND<10	Ba=7.8; Ca=5,000; Cr=140; Co=10; Cu=5.6; Fe=18,000; Mn=180; Ni=110; K=320; Na=130; V=47; Zn=23; As=4.2

TABLE 9: EXCAVATION SOIL VERIFICATION ANALYTICAL RESULTS
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO Project No. 5113.00; CRWQCB Case No. 1TDN153

UNKNOWN UST CAVITY

Unknown Cavity North	3/4/04	5.0	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.016	ND<0.0050	**0.0066**	ND<0.050	ND	Ba=9.2; Ca=4,600; Cr=110; Co=9.8; Cu=6.2; Fe=16,000; Mn=180; Ni=120; K=360; Na=120; V=36; Zn=30; As=1.9
Unknown Cavity East	3/4/04	5.0	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.0050	ND<0.050	ND	Ba=10; Ca=4,900; Cr=110; Co=9.4; Cu=5.6; Fe=17,000; Mn=190; Ni=120; K=360; Na=140; V=34; Zn=27; As=3.6
Unknown Cavity South	3/4/04	5.0	ND<1.0	ND<1.0	ND<10	ND<0.0050	ND<0.010	ND<0.0050	ND<0.0050	ND<0.050	ND	Ba=8.7; Ca=5,100; Cr=120; Co=11; Cu=6.3; Fe=19,000; Mn=210; Ni=140; K=380; Na=130; V=40; Zn=32; As=4.5
Unknown Cavity Bottom	3/4/04	5.0	**1.4**	ND<1.0	ND<10	ND<0.0050	ND<0.015	ND<0.0050	ND<0.0050	ND<0.050	ND	Ba=7.7; Ca=4,800; Cr=120; Co=11; Cu=5.9; Fe=18,000; Mn=190; Ni=130; K=330; Na=120; V=38; Zn=71; As=3.6

NOTES:

Unknown Cavity North =Unknown Cavity North Wall Sample
ft bgs=feet below ground surface
Bold results indicate analyte detection
All results reported in micrograms per gram (µg/g)
ND<1.0 - non-detect at reporting limits shown
--- = not analyzed for parameter or unavailable
BTEX by EPA 5035/EPA 8012B
TPHg - total petroleum hydrocarbons as gasoline by EPA 5035/GCFID(LUFT)8015B with silica gel cleanup
TPHd - total petroleum hydrocarbons as diesel by EPA 3550/3630/GCFID(LUFT)8015B with silica gel cleanup
TPHmo - total petroleum hydrocarbons as motor oil by EPA 3550/3630/GCFID(LUFT)8015B with silica gel cleanup
MTBE - methyl tertiary butyl ether
Other analytes include:
oil and grease TPHIR by EPA 418.1/Soil
Chlorinated Hydrocarbons and Lead Scavengers EPA 8260 and EPA 5030B/8260B
Polychlorinated Biphenyls (PCBs) by EPA SW8082
Semivolatile Oraganics by GC/MS EPA SW8270C
Penta- and Tetrachlorophenol by Canadian Pulp Report Modified -all report as ND
DBCP=1,2-Dibromo-3-chloroproprane
Total Metals:
ICAP Metals by EPA 6010B, EPA SW6020
Mercury by EPA 7471A
Ba=Barium; Ca=Calcium; Cr=Chromium; Co=Cobalt; Cu=Copper; Fe=Iron; Mg=Magnesium; Mn=Manganese; Ni=Nickel; K=Potassium; Na=Sodium; V= Vanadium; Zn=Zinc; As=Arsenic
ICAP Metals by EPA 6010B, EPA SW6020
Mercury by EPA 7471A
Ba=Barium; Ca=Calcium; Cr=Chromium; Co=Cobalt; Cu=Copper; Fe=Iron; Mg=Magnesium; Mn=Manganese; Ni=Nickel; K=Potassium; Na=Sodium; V= Vanadium; Zn=Zinc; As=Arsenic

TABLE 10: EXCAVATION GROUNDWATER VERIFICATION ANALYTICAL RESULTS
Former Lovaas Property; 1265 Second St., Crescent City, CA
LACO Project No. 5113.00; CRWQCB Case No. 1TDN153

Sample ID	Sample Date	Depth (ft bgs)	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)	Dissolved Metals (µg/L)
Main UST Cavity	3/3/04	5.0-7.0	**9,200**	**1,100**	**1,000**	ND<0.50	**5.6**	**120**	**410**	ND<1.0	**1,1-Dichloroethane=1.9; 1,1,2-Trichloroethane=9.4; Isopropylbenzene=37; n-Propylbenzene=130; 2-Chlorotoluene=65; 1,3,5-Trimethylbenzene=300; tert-Butylbenzene=1.2; 1,2,4-Trimethylbenzene=1,100; 4-Isopropyltoluene=15; DBCP=50; Napthalene=120;**	**Ba=19; Ca=58,000; Fe=210; Mg=54,000; Mn=190; K=8,600; Na=49,000**
Adjacent Cavity	3/3/04	5.0-7.0	**4,800**	**270**	ND<170	**2.2**	**1.1**	**96**	**166**	ND<1.0	**1,3,2-Trichloroethane=1.2; Isopropylbenzene=24; n-Propylbenzene=86; 2-Chlorotoluene=30; 1,3,5-Trimethylbenzene=130; 1,2,4-Trimethylbenzene=510; sec-Butylbenzene=5.6; 4-Isopropyltoluene=4.7; DBCP=38; Napthalene=110;**	**Ba=11; Ca=46,000; Mg=49,000; Mn=94; K=10,000; Na=33,000**
Paint Booth	3/2/04	7.0	ND<50	**4,800**	**25,000**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	**All=ND**	**Ba=41; Ca=25,000; Fe=360; Mg=15,000; Mn=210; Na=13,000**

NOTES:
ft bgs- feet below ground surface
Bold results indicate analyte detection
All results reported in micrograms per liter (µg/L)
ND<1.0 - non-detect at reporting limits shown
--- = not analyzed for parameter or unavailable
TPHg - total petroleum hydrocarbons as gasoline with silica gel cleanup
TPHd - total petroleum hydrocarbons as diesel silica gel cleanup
TPHmo - total petroleum hydrocarbons as motor oil with silica gel cleanup
MTBE - methyl tertiary butyl ether
Other analytes include:
oil and grease (TPH fraction) EPA 1664 reported as NQ (non-quantifiable) in lab notes
Penta- and Tetrachlorophenol by Canadian Pulp method -all report as ND
Chlorinated Hydrocarbons and Lead Scavengers EPA 8260 and EPA 5030B/8260B
Semivolatile Oraganics by GC/MS EPA SW8270C
DBCP=1,2-Dibromo-3-chloroproprane
Dissolved Metals:
ICAP metals with Acid Digestion by EPA 200.7
Ba=Barium; Ca=Calcium; Fe=Iron; Mg=Magnesium; Mn=Manganese; K=Potassium; Na=Sodium

CHART 1: CONCENTRATIONS OF TPHg AND TPHd IN MONITORING WELL MW1

Former Lovass Property; 1265 Second St., Crescent City, CA

LACO No. 5113.00; CRWQCB Case No. 1TDN153

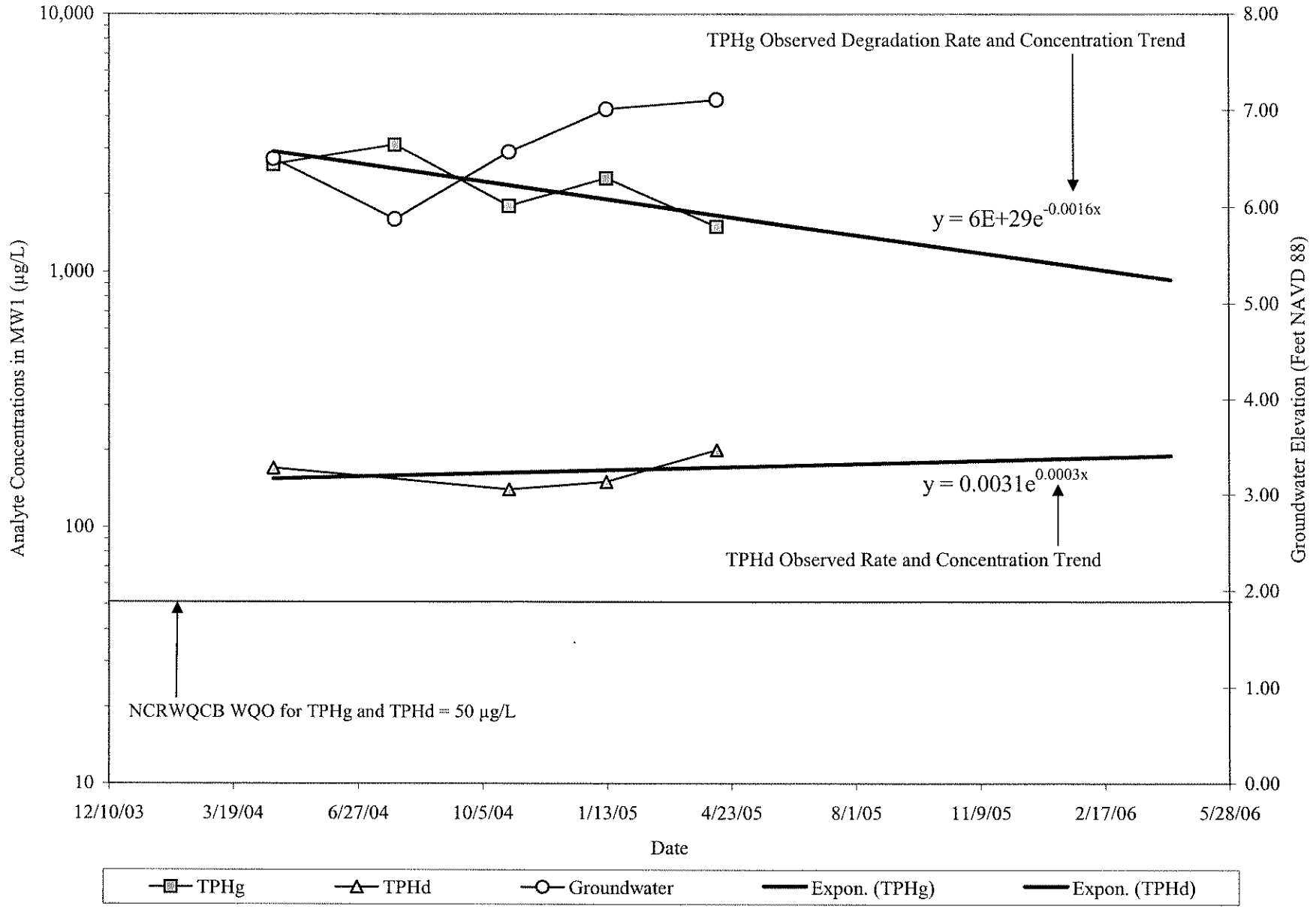

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CHART 2: CONCENTRATION TREND OF TPHg IN MONITORING WELL MW1
Former Lovass Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

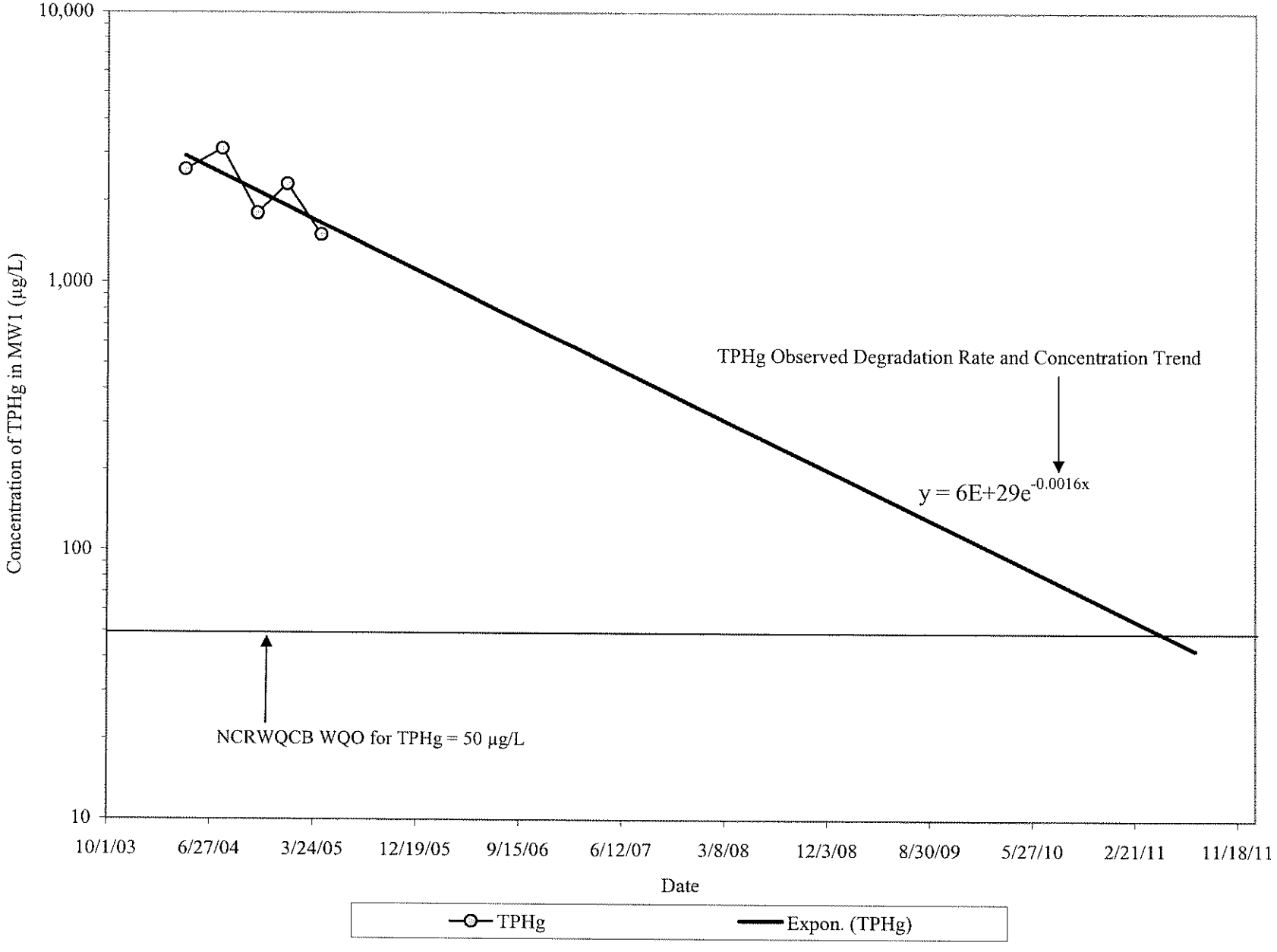

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CHART 3: CONCENTRATIONS OF BENZENE AND ETHYLBENZENE IN MONITORING WELL MW1

Former Lovass Property; 1265 Second St., Crescent City, CA

LACO No. 5113.00; CRWQCB Case No. 1TDN153

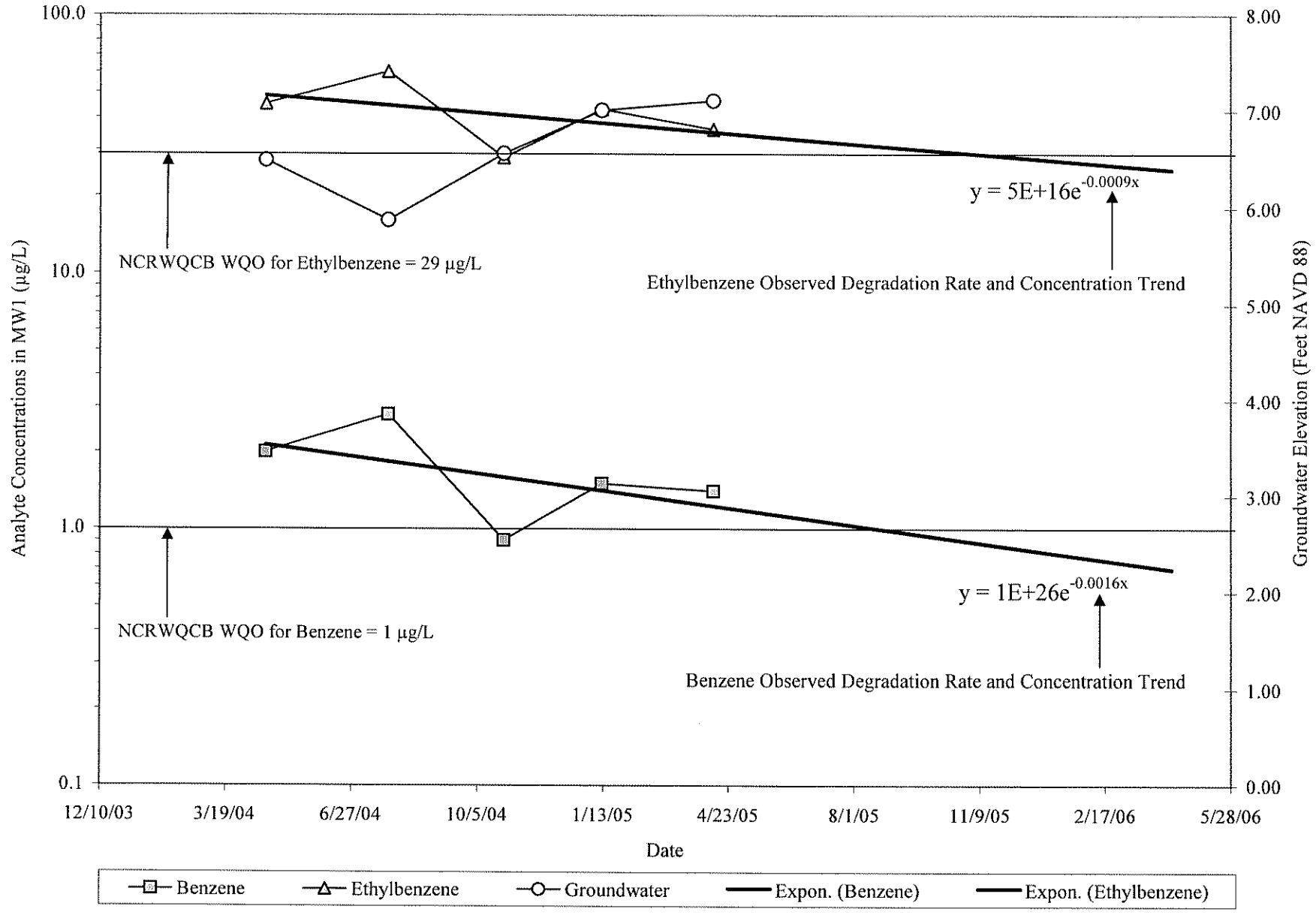

CHART 4: CONCENTRATIONS OF TPHg, TPHd, AND BENZENE IN MONITORING WELL MW2

Former Lovass Property; 1265 Second St., Crescent City, CA

LACO No. 5113.00; CRWQCB Case No. 1TDN153

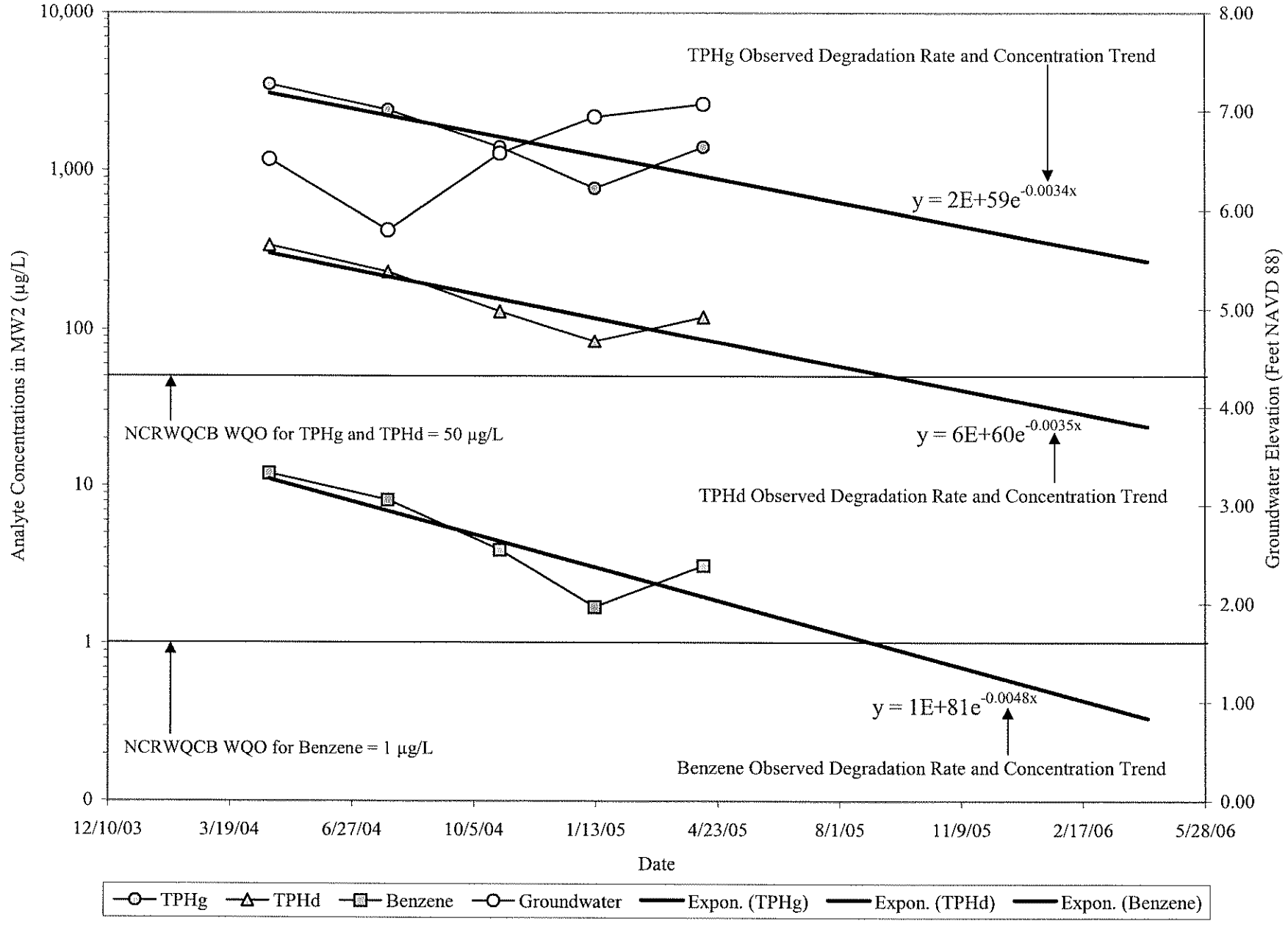

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CHART 5: CONCENTRATION TREND OF TPHg IN MONITORING WELL MW2
Former Lovass Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

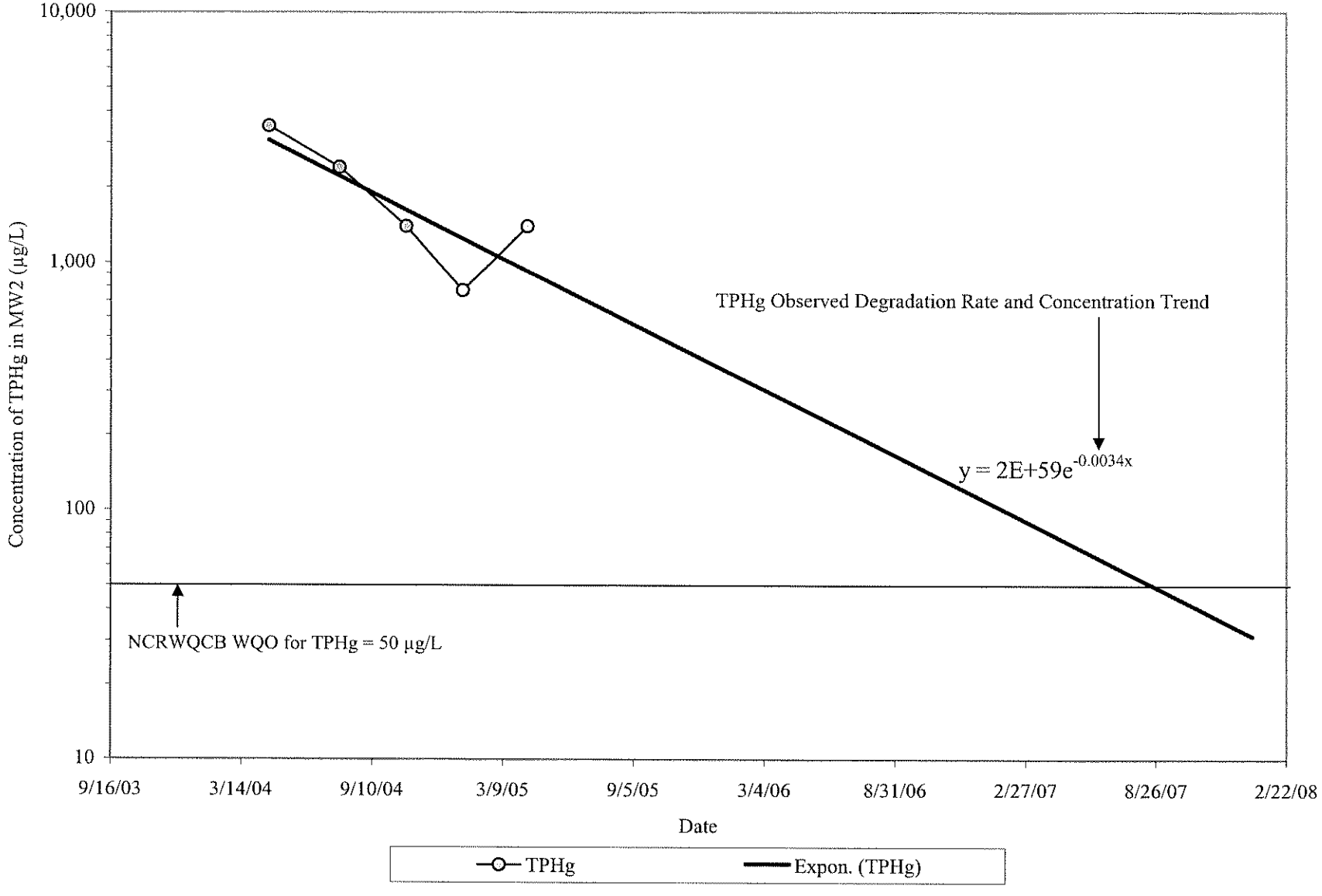

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CHART 6: CONCENTRATIONS OF TPHg, TPHd, AND BENZENE IN MONITORING WELL MW5
Former Lovass Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

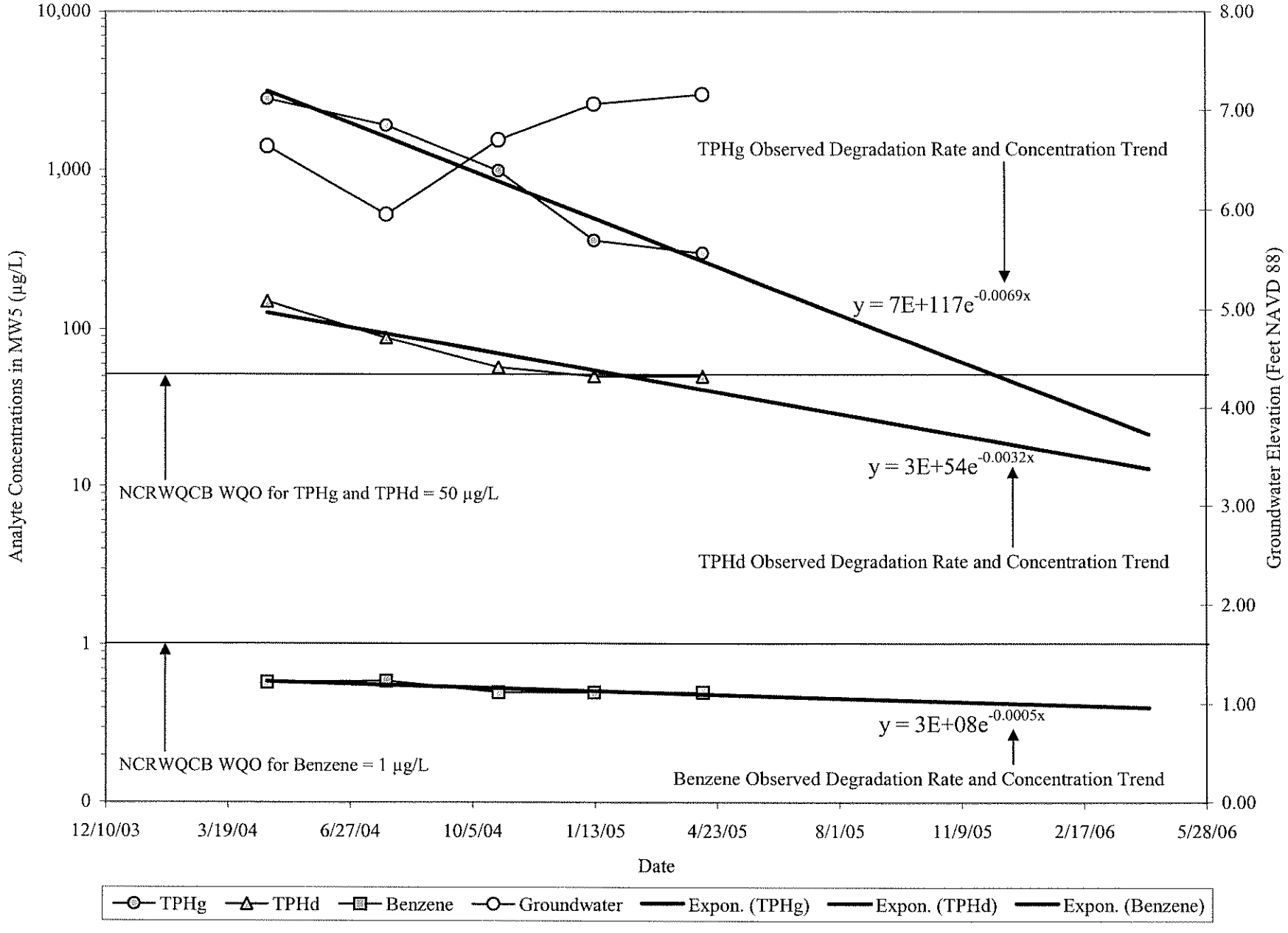

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CHART 7: CONCENTRATIONS OF DISSOLVED OXYGEN VS. DEPTH TO WATER IN MONITORING WELL MW1
Former Lovass Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

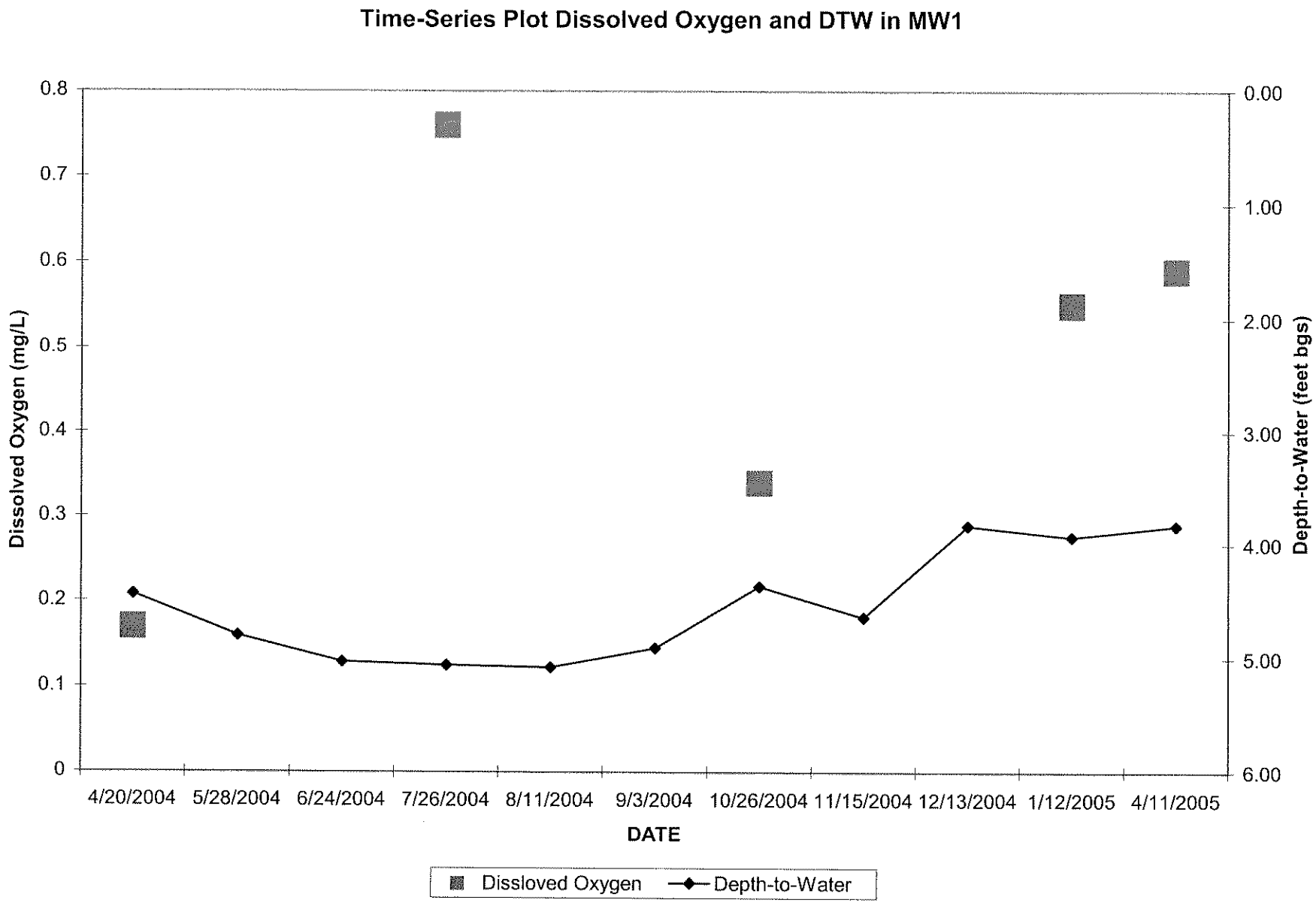


CHART 8: CONCENTRATIONS OF DISSOLVED OXYGEN VS. DEPTH TO WATER IN MONITORING WELL MW2

Former Lovass Property; 1265 Second St., Crescent City, CA

LACO No. 5113.00; CRWQCB Case No. 1TDN153

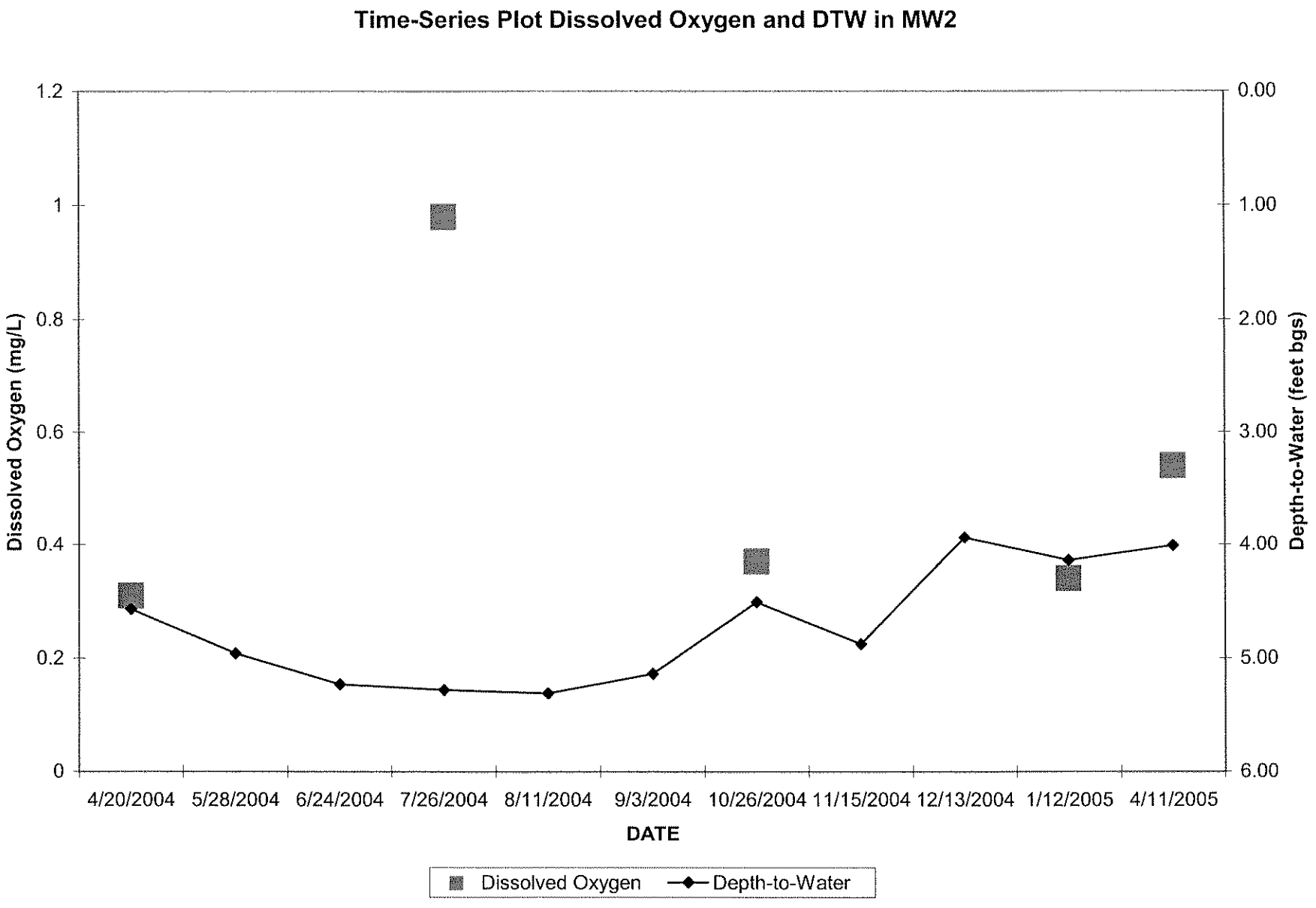


CHART 9: CONCENTRATIONS OF DISSOLVED OXYGEN VS. DEPTH TO WATER IN MONITORING WELL MW3
Former Lovass Property; 1265 Second St., Crescent City, CA
LACO No. 5113.00; CRWQCB Case No. 1TDN153

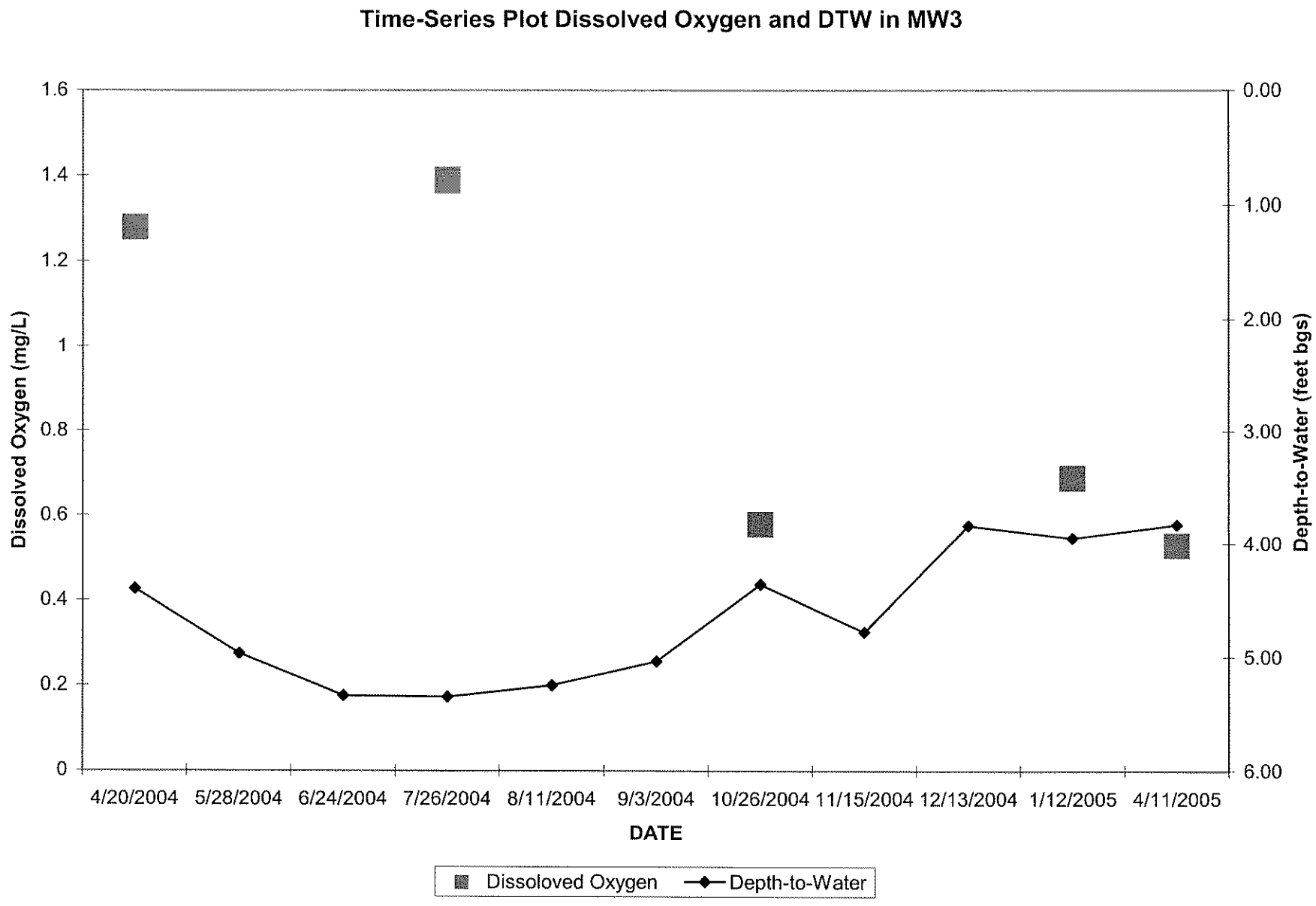


CHART 10: CONCENTRATIONS OF DISSOLVED OXYGEN VS. DEPTH TO WATER IN MONITORING WELL MW4

Former Lovass Property; 1265 Second St., Crescent City, CA

LACO No. 5113.00; CRWQCB Case No. 1TDN153

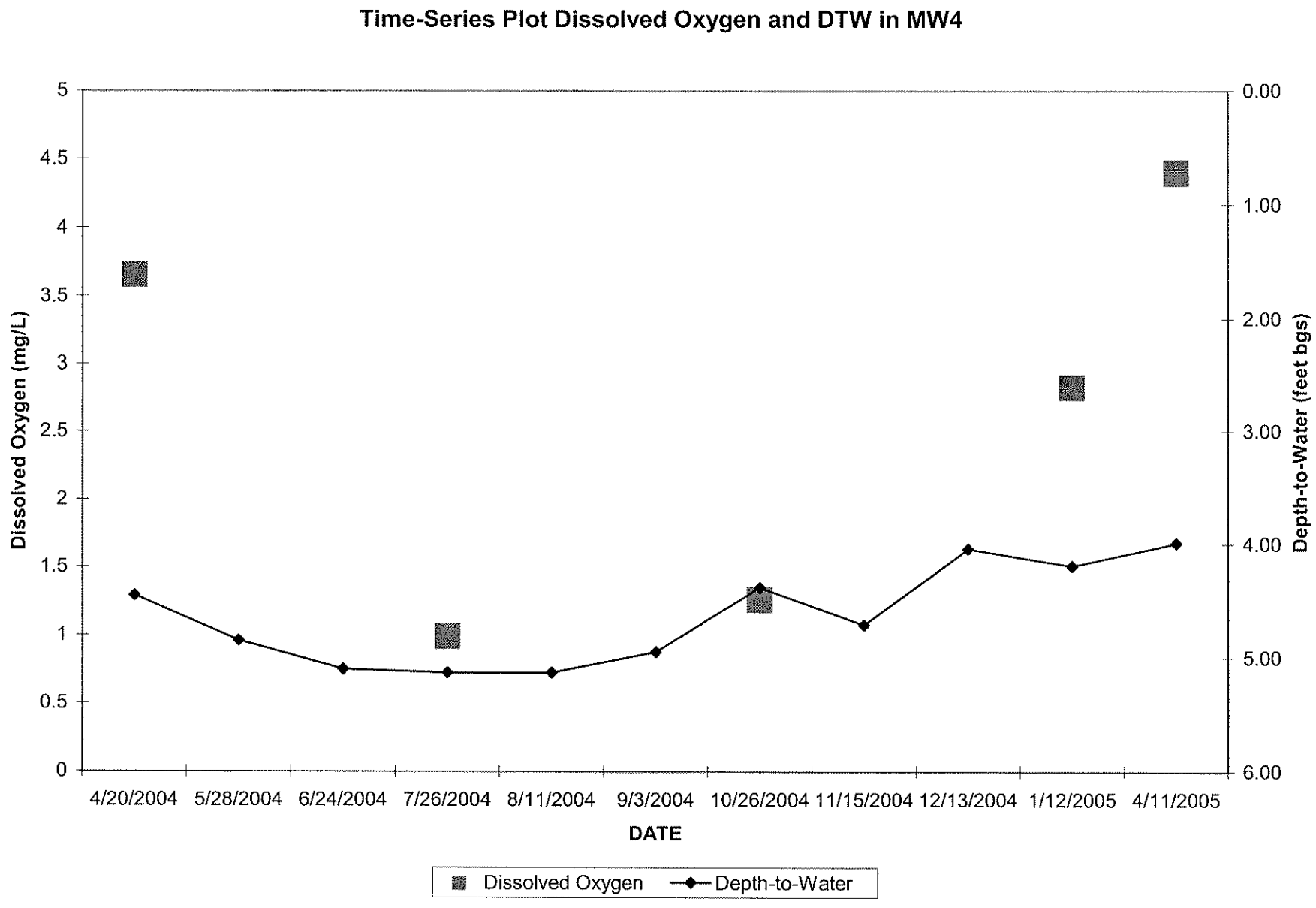
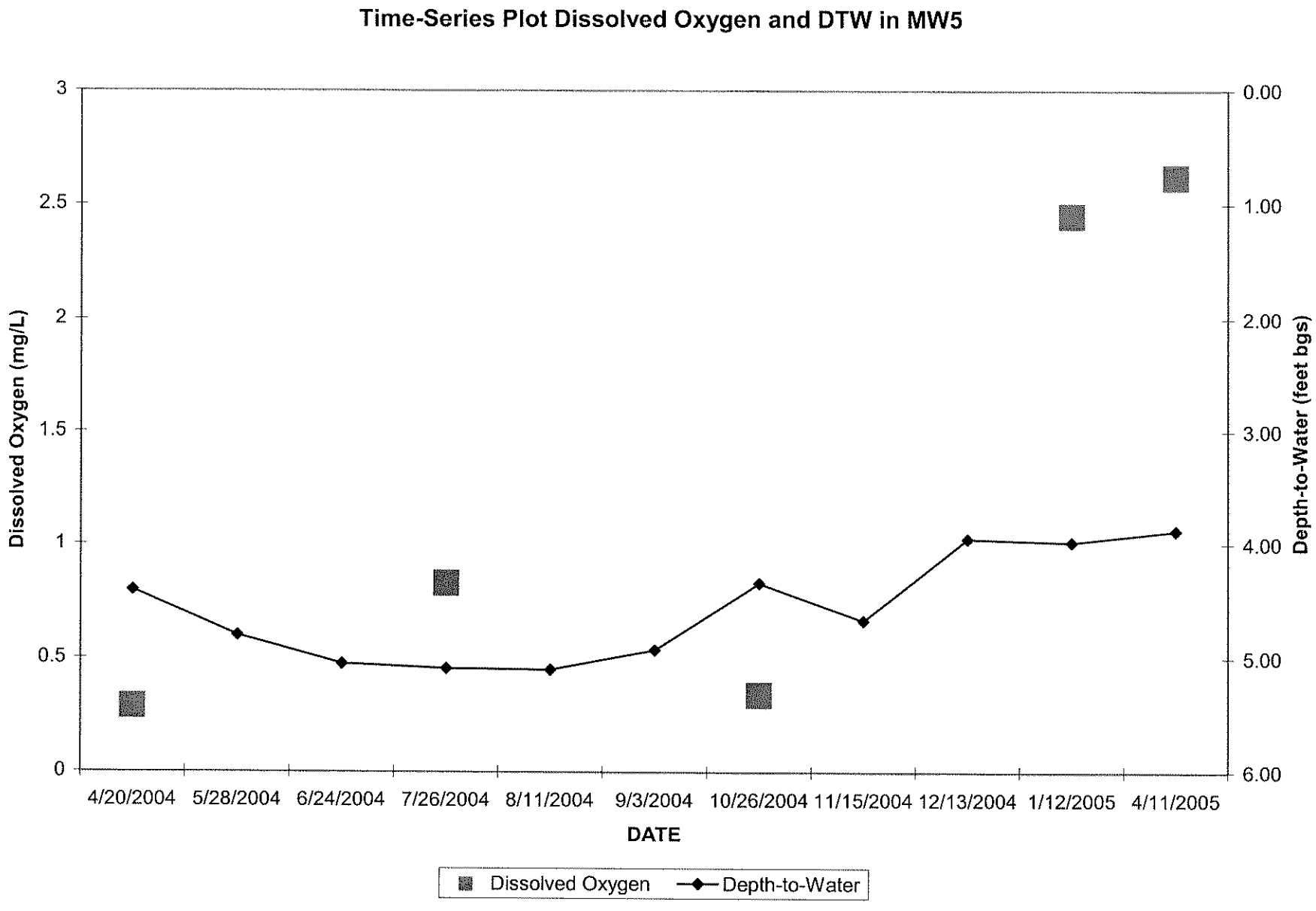


CHART 11: CONCENTRATIONS OF DISSOLVED OXYGEN VS. DEPTH TO WATER IN MONITORING WELL MW5

Former Lovass Property; 1265 Second St., Crescent City, CA

LACO No. 5113.00; CRWQCB Case 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 6
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 → 50 (µg/L)	WQO Benzene → 1.0 (µg/L)	year WQO reached
TPHg										
MW1	50	3/15/2011	2600	4/20/2004	2520	0.00157	0			2005
MW2	50	8/26/2007	3500	4/20/2004	1223	0.00347	0			2005
MW5	50	1/15/2006	2800	4/20/2004	635	0.00634	0			2005
BENZENE										
MW1	1.0	8/1/2005	2.0	4/20/2004	468	0.00148	0			2005
MW2	1.0	9/1/2005	12	4/20/2004	499	0.00498	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 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 50 (µg/L)	WQO → Benzene 1.0 (µg/L)	year WQO reached
TPHg												
MW 1	1500	4/11/2005		2600	4/20/2004	356	0.00155		2201			2011
MW 2	1400	4/11/2005		3500	4/20/2004	356	0.0026		1295			2009
MW 5	300	4/11/2005		2800	4/20/2004	356	0.0063		286			2006
BENZENE												
MW1	1.4	4/11/2005		2	4/20/2004	356	0.00100		336			2006
MW2	3.1	4/11/2005		12	4/20/2004	356	0.00380		298			2006

Worksheet 3: Decay Rates Derived from Published Half-Lives
LACO Project No. 5113.00 CRWQCB Case No. 1TDN153

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	0.00157	0.00155	0.001031	0.0062
MW2	0.00347	0.0026	0.00095	0.0062
MW5	0.00634	0.00630	0.00095	0.0062
Benzene				
MW1	0.00148	0.00100	0.00095	0.0062
MW2	0.00498	0.0038	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 6	Estimates from sampling results	*Estimates from Published Decay Rates
TPHg*			
DECAY RATE (k in days)	0.00157	0.00155	0.00095
Year of WQO Achievement (TPHg: 50 µg/L)	2005	2011	2017
Benzene			
DECAY RATE (k in days)	0.00148	0.00100	0.00270
Year of WQO Achievement (benzene: 1.0 µg/L)	2005	2009	2007

MW2	Trend line estimates from Chart	Estimates from sampling results	Estimates from sampling results
TPHg*			
DECAY RATE (k in days)	0.00347	0.00260	0.00095
Year of WQO Achievement (TPHg: 50 µg/L)	2005	2009	2017
Benzene			
DECAY RATE (k in days)	0.00498	0.00380	0.00270
Year of WQO Achievement (benzene: 1.0 µg/L)	2005	2006	2007

MW5	Trend line estimates from Chart	Estimates from sampling results	Estimates from sampling results
TPHg*			
DECAY RATE (k in days)	0.00634	0.00630	0.00095
Year of WQO Achievement (TPHg: 50 µg/L)	2005	2006	2017

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

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
Date: 4-11-05
Golbal ID No.: T0601593553
PM: TDN

Tech: SJD
Mobe/Demobe time: .25/.25
Travel time: 1.75
Time on site: 8:30
Time off site: 1:25
Mileage: 76

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)	3.83		4.21		3.83		3.99		3.88	
	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
FIELD INTRINSICS: pH	7.3	7.0	7.3	6.7	7.4	7.3	7.5	7.1	7.1	7.1
TEMP (°C)	14.1	14.8	13.9	16.4	14.2	15.9	12.3	12.8	12.5	13.7
Ecw (µmohs)	250	259	481	328	271	264	188	192	268	266
ORP (mV)	Ur	Ur	-87	Ur	-56	-82	-35	15	23	-14
DO (mg/L)	1.26	0.59	1.54	0.54	1.07	0.53	6.07	4.40	1.49	2.62
OTHER (units)										
PURGE: TIME	10:27	10:35	9:39	9:55	12:40	12:48	11:05	11:17	11:46	11:56
METHOD (DHP/CB/B)	DHP		DHP		DHP		DHP		DHP	
RATE (Lpm)	0.19		0.18		0.19		0.17		0.20	
VOLUME (L)	1.50		2.50		1.50		2.0		2.0	
COLOR	CLEAR	YELLOW TINT	LT. GREY TINT	LT. BROWN CLOUDY	CLEAR	CLOUDY	CLEAR	YELLOW TINT	LT. GREY TINT	CLEAR
ODOR	LIGHT RUBBER/SULFUR		LIGHT RUBBER/SULFUR/ORGANIC		SLIGHT SULFUR		NONE		SLIGHT SULFUR	
INTAKE DEPTH (FEET)	7.0		7.0		7.0		7.0		7.0	
SAMPLE: TIME	10:40		9:59		12:53		11:23		12:02	
METHOD (DHP/CB/B)	DHP		DHP		DHP		DHP		DHP	
ANALYTES	8260 List 1; BOD; COD; TPHd/mo w/SGC; Diss. Fe; Diss. Manganese		8260 List 1; BOD; COD; TPHd/mo w/SGC; Diss. Fe; Diss. Manganese		8260 List 1; BOD; COD; TPHd/mo w/SGC; Diss. Fe; Diss. Manganese		8260 List 1; BOD; COD; TPHd/mo w/SGC; Diss. Fe; Diss. Manganese		8260 List 1; BOD; COD; TPHd/mo w/SGC; Diss. Fe; Diss. Manganese	
TOTAL DRAWDOWN (FEET)	0.00		0.08		0.00		0.12		0.02	
REMARKS	DISS. Fe + MANGANESE FF		DISS. Fe + MANGANESE FF		DISS. Fe + MANGANESE FF		DISS. Fe + MANGANESE FF		DISS. Fe + MANGANESE FF	
WELL CONDITION	good		good		good		good		good	
WASTE DRUMS	NO DOT DRUMS ONSITE									

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: 4-11-05

METER ACCURACY RANGE

	+/- 0.2 pH	+/- 0.5 °C	+/- 20 µmohs	+/- 2 mv	+/- 0.3 mg/L

WELL ID: MW2

TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)
9:41	6.9	15.1	432	Ur	1.12
9:43	6.8	15.6	400	Ur	1.12
9:45	6.8	15.9	381	Ur	1.84
9:47	6.8	16.2	365	Ur	1.68
9:49	6.7	16.3	353	Ur	0.99
9:51	6.8	16.4	343	Ur	0.70
9:53	6.7	16.4	334	Ur	0.59
9:55	6.7	16.4	328	Ur	0.54

WELL ID: MW1

TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)
~~10:29~~	~~7.2~~	~~14.3~~	~~248~~	~~Ur~~	~~1.07~~
10:31	7.1	14.6	248	Ur	0.73
10:33	7.0	14.8	256	Ur	0.58
10:35	7.0	14.8	259	Ur	0.59

WELL ID: MW4

TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)
11:07	7.4	12.4	185	-13	5.45
11:09	7.2	12.3	189	-2	5.17
11:11	7.1	12.5	190	4	5.02
11:13	7.1	12.7	191	9	4.81
11:15	7.1	12.7	191	15	4.56
11:17	7.1	12.8	192	15	4.40

WELL ID: MW5

TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)
11:48	7.1	13.2	264	8	1.24
11:50	7.1	13.4	263	1	1.76
11:52	7.1	13.6	263	-7	2.10
11:54	7.1	13.7	262	-13	2.55
11:56	7.1	13.7	266	-14	2.62

WELL ID: MW3

TIME	pH	TEMP (°C)	Ecw (µmohs)	ORP (mV)	DO (mg/L)
12:42	7.3	15.1	264	-69	1.04
12:44	7.3	15.7	264	-75	0.58
12:46	7.2	15.9	263	-82	0.52
12:48	7.3	15.9	264	-82	0.53

WELL ID:

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

LACO ASSOCIATES
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Project Name: DARRYL LOVAAS
Project No.: 5113.00
Tech: SJD
Date: 4-11-05

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)
:52	3.84	8:54	4.04	9:04	3.84	8:57	4.03	8:59	3.88		
:08	3.83	9:10	4.02	9:18	3.83	9:12	4.01	9:14	3.88		
:23	3.85	9:25	4.01	9:32	3.83	9:27	3.99				
		9:31	4.01			9:33	3.99				

WELL ID:		WELL ID:		WELL ID:		WELL ID:		WELL ID:		WELL ID:	
ME	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:	
ME	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

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 ~~3025~~ 30293

LAB ID	SAMPLE ID	DATE	TIME	MATRIX*	8260 List 1	TPHd/mo SGC	BOD	COD	Dissolved Iron	Manganese (Dissolved)
					PRESERVATIVE	b	—	—	c	—
					CONTAINER	9	7	1	10	2	2
	5113-MW1-W	4-11-05	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					

SAMPLE CONDITION/SPECIAL INSTRUCTIONS
Geotracker T0601539553

Cold in fact

RELINQUISHED BY (Sign & Print)	DATE/TIME	RECEIVED BY (Sign)	DATE/TIME
STEVE DAVIS	4-11-05 1600		4/11/05 1600

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.

April 22, 2005

Pvt. cust. paying on pickup

,

Attn: Mr. Darryl Lovaas

RE: 5113.00, Lovaas Property

Order No.: 0504231
Invoice No.: 49586
PO No.: TASK 3025
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.

RECEIVED
LACO ASSOCIATES
APR 26 2005
BY:

DBG
TDN

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

CLIENT: Pvt. cust. paying on pickup
Project: 5113.00, Lovaas Property
Lab Order: 0504231

CASE NARRATIVE

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

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 results reported represent the amount of material in the gasoline range.

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries associated with sample 5113-QCTB-W were above the upper acceptance limit for ETBE. These recoveries indicate that the sample results may be erroneously high. There were no detectable levels of the analyte in the sample; therefore, the data were accepted.

Due to instrument contamination from a previous sample, the method blank associated with sample 5113-QCTB-W and the sample itself have toluene present at a value above the reporting limit. All of the other samples were re-analyzed once the analytical instrument was de-contaminated. The method blank associated with the re-analysis has no values above the reporting limits. Due to insufficient sample volume, sample 5113-QCTB-W could not be re-analyzed.

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Date: 22-Apr-05
WorkOrder: 0504231

ANALYTICAL REPORT

Client Sample ID: 5113-MW1-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-01A

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		4/19/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		4/19/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		4/19/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		4/19/05
Benzene	1.4	0.50	µg/L	1.0		4/19/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		4/19/05
Toluene	0.59	0.50	µg/L	1.0		4/19/05
Ethylbenzene	36	0.50	µg/L	1.0		4/19/05
m,p-Xylene	7.2	0.50	µg/L	1.0		4/19/05
o-Xylene	0.91	0.50	µg/L	1.0		4/19/05
Surrogate: 1,4-Dichlorobenzene-d4	87.8	80.8-139	% Rec	1.0		4/19/05

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gasoline	1,500	50	µg/L	1.0		4/16/05

Client Sample ID: 5113-MW1-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-01D

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)	200	50	µg/L	1.0	4/15/05	4/20/05
TPHC Motor Oil	ND	170	µg/L	1.0	4/15/05	4/20/05

Client Sample ID: 5113-MW1-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-01E

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Biochemical Oxygen Demand	7.6	2.0	mg/L	1.0		4/13/05

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Date: 22-Apr-05
WorkOrder: 0504231

ANALYTICAL REPORT

Client Sample ID: 5113-MW1-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-01F

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Chemical Oxygen Demand	57	5.0	mg/L	1.0	4/12/05	4/12/05

Client Sample ID: 5113-MW1-W (Dissolved) **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-01G

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Iron	9,600	100	µg/L	1.0	4/12/05	4/19/05
Manganese	1,400	2.0	µg/L	1.0	4/12/05	4/19/05

Client Sample ID: 5113-MW2-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-02A

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		4/19/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		4/19/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		4/19/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		4/19/05
Benzene	3.1	0.50	µg/L	1.0		4/19/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		4/19/05
Toluene	2.4	0.50	µg/L	1.0		4/19/05
Ethylbenzene	5.6	0.50	µg/L	1.0		4/19/05
m,p-Xylene	6.2	0.50	µg/L	1.0		4/19/05
o-Xylene	1.5	0.50	µg/L	1.0		4/19/05
Surrogate: 1,4-Dichlorobenzene-d4	86.9	80.8-139	% Rec	1.0		4/19/05

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gasoline	1,400	50	µg/L	1.0		4/16/05

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Date: 22-Apr-05
WorkOrder: 0504231

ANALYTICAL REPORT

Client Sample ID: 5113-MW2-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-02D

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)	120	50	µg/L	1.0	4/15/05	4/20/05
TPHC Motor Oil	ND	170	µg/L	1.0	4/15/05	4/20/05

Client Sample ID: 5113-MW2-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-02E

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Biochemical Oxygen Demand	6.8	2.0	mg/L	1.0		4/13/05

Client Sample ID: 5113-MW2-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-02F

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Chemical Oxygen Demand	63	5.0	mg/L	1.0	4/12/05	4/12/05

Client Sample ID: 5113-MW2-W (Dissolved) **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-02G

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Iron	45,000	100	µg/L	1.0	4/12/05	4/19/05
Manganese	690	2.0	µg/L	1.0	4/12/05	4/19/05

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Date: 22-Apr-05
WorkOrder: 0504231

ANALYTICAL REPORT

Client Sample ID: 5113-MW3-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-03A

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		4/19/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		4/19/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		4/19/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		4/19/05
Benzene	ND	0.50	µg/L	1.0		4/19/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		4/19/05
Toluene	ND	0.50	µg/L	1.0		4/19/05
Ethylbenzene	ND	0.50	µg/L	1.0		4/19/05
m,p-Xylene	ND	0.50	µg/L	1.0		4/19/05
o-Xylene	ND	0.50	µg/L	1.0		4/19/05
Surrogate: 1,4-Dichlorobenzene-d4	86.5	80.8-139	% Rec	1.0		4/19/05

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		4/15/05

Client Sample ID: 5113-MW3-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-03D

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	4/12/05	4/13/05
TPHC Motor Oil	ND	170	µg/L	1.0	4/12/05	4/13/05

Client Sample ID: 5113-MW3-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-03E

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		4/13/05

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ANALYTICAL REPORT

Client Sample ID: 5113-MW3-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-03F

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Chemical Oxygen Demand	30	5.0	mg/L	1.0	4/12/05	4/12/05

Client Sample ID: 5113-MW3-W (Dissolved) **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-03G

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Iron	210	100	µg/L	1.0	4/12/05	4/19/05
Manganese	290	2.0	µg/L	1.0	4/12/05	4/19/05

Client Sample ID: 5113-MW4-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-04A

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		4/19/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		4/19/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		4/19/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		4/19/05
Benzene	ND	0.50	µg/L	1.0		4/19/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		4/19/05
Toluene	ND	0.50	µg/L	1.0		4/19/05
Ethylbenzene	ND	0.50	µg/L	1.0		4/19/05
m,p-Xylene	ND	0.50	µg/L	1.0		4/19/05
o-Xylene	ND	0.50	µg/L	1.0		4/19/05
Surrogate: 1,4-Dichlorobenzene-d4	86.7	80.8-139	% Rec	1.0		4/19/05

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		4/16/05

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ANALYTICAL REPORT

Client Sample ID: 5113-MW4-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-04D

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	4/12/05	4/13/05
TPHC Motor Oil	ND	170	µg/L	1.0	4/12/05	4/13/05

Client Sample ID: 5113-MW4-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-04E

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		4/13/05

Client Sample ID: 5113-MW4-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-04F

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Chemical Oxygen Demand	10	5.0	mg/L	1.0	4/12/05	4/12/05

Client Sample ID: 5113-MW4-W (Dissolved) **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-04G

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	4/12/05	4/19/05
Manganese	ND	2.0	µg/L	1.0	4/12/05	4/19/05

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ANALYTICAL REPORT

Client Sample ID: 5113-MW5-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-05A

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		4/19/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		4/19/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		4/19/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		4/19/05
Benzene	ND	0.50	µg/L	1.0		4/19/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		4/19/05
Toluene	ND	0.50	µg/L	1.0		4/19/05
Ethylbenzene	8.0	0.50	µg/L	1.0		4/19/05
m,p-Xylene	13	0.50	µg/L	1.0		4/19/05
o-Xylene	5.0	0.50	µg/L	1.0		4/19/05
Surrogate: 1,4-Dichlorobenzene-d4	86.8	80.8-139	% Rec	1.0		4/19/05

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gasoline	300	50	µg/L	1.0		4/16/05

Client Sample ID: 5113-MW5-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-05D

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	4/12/05	4/13/05
TPHC Motor Oil	ND	170	µg/L	1.0	4/12/05	4/13/05

Client Sample ID: 5113-MW5-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-05E

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		4/13/05

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ANALYTICAL REPORT

Client Sample ID: 5113-MW5-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-05F

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Chemical Oxygen Demand	21	5.0	mg/L	1.0	4/12/05	4/12/05

Client Sample ID: 5113-MW5-W (Dissolved) **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-05G

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

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Iron	540	100	µg/L	1.0	4/12/05	4/19/05
Manganese	36	2.0	µg/L	1.0	4/12/05	4/19/05

Client Sample ID: 5113-QCTB-W **Received:** 4/11/05 **Collected:** 4/11/05 0:00
Lab ID: 0504231-06A

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		4/15/05
Tert-butyl alcohol (TBA)	ND	10	µg/L	1.0		4/15/05
Di-isopropyl ether (DIPE)	ND	1.0	µg/L	1.0		4/15/05
Ethyl tert-butyl ether (ETBE)	ND	1.0	µg/L	1.0		4/15/05
Benzene	ND	0.50	µg/L	1.0		4/15/05
Tert-amyl methyl ether (TAME)	ND	1.0	µg/L	1.0		4/15/05
Toluene	1.1	0.50	µg/L	1.0		4/15/05
Ethylbenzene	ND	0.50	µg/L	1.0		4/15/05
m,p-Xylene	ND	0.50	µg/L	1.0		4/15/05
o-Xylene	ND	0.50	µg/L	1.0		4/15/05
Surrogate: 1,4-Dichlorobenzene-d4	89.4	80.8-139	% Rec	1.0		4/15/05

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		4/15/05

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QC SUMMARY REPORT

Method Blank

Sample ID **MB 041505** Batch ID: **R34477** Test Code: **8260OXYW** Units: **µg/L** Analysis Date **4/15/05 7:02:00 AM** Prep Date
Client ID: Run ID: **ORGCMS3_050415B** SeqNo: **499907**

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	0.1047	0.50									J
Tert-amyl methyl ether (TAME)	ND	1.0									
Toluene	1.185	0.50									
Ethylbenzene	0.2341	0.50									J
m,p-Xylene	0.2227	0.50									J
o-Xylene	0.1282	0.50									J
1,4-Dichlorobenzene-d4	0.893	0.10	1.00	0	89.3%	81	139	0			

Sample ID **MB 041905** Batch ID: **R34481** Test Code: **8260OXYW** Units: **µg/L** Analysis Date **4/19/05 7:17:00 AM** Prep Date
Client ID: Run ID: **ORGCMS3_050419A** SeqNo: **499924**

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	0.2877	0.50									J
Ethylbenzene	0.1859	0.50									J
m,p-Xylene	0.2245	0.50									J
o-Xylene	0.1313	0.50									J
1,4-Dichlorobenzene-d4	0.860	0.10	1.00	0	86.0%	81	139	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

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QC SUMMARY REPORT

Method Blank

Sample ID **MBLK** Batch ID: **R34358** Test Code: **CODW** Units: **mg/L** Analysis Date **4/12/05** Prep Date **4/12/05**
Client ID: Run ID: **WC_050412G** SeqNo: **498057**

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 041505** Batch ID: **R34398** Test Code: **GASW-MS** Units: **µg/L** Analysis Date **4/15/05 7:02:00 AM** Prep Date
Client ID: Run ID: **ORGCMS3_050415A** SeqNo: **498720**

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

Sample ID **MB-13315P** Batch ID: **13315** Test Code: **ICPX** Units: **µg/L** Analysis Date **4/14/05 4:32:00 PM** Prep Date **4/12/05**
Client ID: Run ID: **INICP1_050414B** SeqNo: **498498**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	ND	100									
Manganese	0.3900	2.0									J

Sample ID **MB-13315P** Batch ID: **13315** Test Code: **ICPX** Units: **µg/L** Analysis Date **4/19/05 1:22:00 PM** Prep Date **4/12/05**
Client ID: Run ID: **INICP1_050419A** SeqNo: **499341**

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-13345** Batch ID: **13345** Test Code: **SGTPDMW** Units: **µg/L** Analysis Date **4/20/05 8:21:02 PM** Prep Date **4/15/05**
Client ID: Run ID: **ORGC5_050420B** SeqNo: **499937**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	39.72	50									J
TPHC Motor Oil	ND	170									

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

Method Blank

Sample ID **MB-13320** Batch ID: **13320** Test Code: **TPHDMW** Units: **µg/L** Analysis Date **4/13/05 1:36:44 PM** Prep Date **4/12/05**

Client ID: Run ID: **ORGC7_050413A** SeqNo: **498187**

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									

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-05261** Batch ID: **R34477** Test Code: **8260OXYW** Units: **µg/L** Analysis Date **4/15/05 3:38:00 AM** Prep Date

Client ID: Run ID: **ORGCMS3_050415B** SeqNo: **499905**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	23.37	1.0	20.0	0	117%	80	120	0			
Tert-butyl alcohol (TBA)	372.2	10	400	0	93.1%	25	162	0			
Di-isopropyl ether (DIPE)	22.07	1.0	20.0	0	110%	80	120	0			
Ethyl tert-butyl ether (ETBE)	24.54	1.0	20.0	0	123%	77	120	0			S
Benzene	21.86	0.50	20.0	0	109%	78	117	0			
Tert-amyl methyl ether (TAME)	23.68	1.0	20.0	0	118%	64	136	0			
Toluene	22.03	0.50	20.0	0	110%	80	120	0			B
Ethylbenzene	19.12	0.50	20.0	0	95.6%	80	120	0			
m,p-Xylene	40.00	0.50	40.0	0	100%	80	120	0			
o-Xylene	21.36	0.50	20.0	0	107%	80	120	0			
1,4-Dichlorobenzene-d4	0.950	0.10	1.00	0	95.0%	81	139	0			

Sample ID **LCSD-05261** Batch ID: **R34477** Test Code: **8260OXYW** Units: **µg/L** Analysis Date **4/15/05 4:04:00 AM** Prep Date

Client ID: Run ID: **ORGCMS3_050415B** SeqNo: **499906**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	23.40	1.0	20.0	0	117%	80	120	23.4	0.127%	20	
Tert-butyl alcohol (TBA)	360.1	10	400	0	90.0%	25	162	372	3.31%	20	
Di-isopropyl ether (DIPE)	22.05	1.0	20.0	0	110%	80	120	22.1	0.114%	20	
Ethyl tert-butyl ether (ETBE)	24.43	1.0	20.0	0	122%	77	120	24.5	0.439%	20	S
Benzene	21.91	0.50	20.0	0	110%	78	117	21.9	0.224%	20	
Tert-amyl methyl ether (TAME)	23.88	1.0	20.0	0	119%	64	136	23.7	0.858%	20	
Toluene	21.28	0.50	20.0	0	106%	80	120	22.0	3.46%	20	B
Ethylbenzene	18.82	0.50	20.0	0	94.1%	80	120	19.1	1.56%	20	
m,p-Xylene	39.53	0.50	40.0	0	98.8%	80	120	40.0	1.20%	20	
o-Xylene	21.09	0.50	20.0	0	105%	80	120	21.4	1.31%	20	
1,4-Dichlorobenzene-d4	0.940	0.10	1.00	0	94.0%	81	139	0.950	1.10%	20	

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-05267** Batch ID: **R34481** Test Code: **8260OXYW** Units: **µg/L** Analysis Date **4/19/05 3:53:00 AM** Prep Date

Client ID: Run ID: **ORGCMS3_050419A** SeqNo: **499921**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	20.45	1.0	20.0	0	102%	80	120	0			
Tert-butyl alcohol (TBA)	283.5	10	400	0	70.9%	25	162	0			
Di-isopropyl ether (DIPE)	19.25	1.0	20.0	0	96.2%	80	120	0			
Ethyl tert-butyl ether (ETBE)	21.52	1.0	20.0	0	108%	77	120	0			
Benzene	19.26	0.50	20.0	0	96.3%	78	117	0			
Tert-amyl methyl ether (TAME)	20.84	1.0	20.0	0	104%	64	136	0			
Toluene	18.81	0.50	20.0	0	94.0%	80	120	0			
Ethylbenzene	18.53	0.50	20.0	0	92.6%	80	120	0			
m,p-Xylene	39.66	0.50	40.0	0	99.2%	80	120	0			
o-Xylene	21.86	0.50	20.0	0	109%	80	120	0			
1,4-Dichlorobenzene-d4	0.929	0.10	1.00	0	92.9%	81	139	0			

Sample ID **LCSD-05267** Batch ID: **R34481** Test Code: **8260OXYW** Units: **µg/L** Analysis Date **4/19/05 4:18:00 AM** Prep Date

Client ID: Run ID: **ORGCMS3_050419A** SeqNo: **499922**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	20.35	1.0	20.0	0	102%	80	120	20.4	0.515%	20	
Tert-butyl alcohol (TBA)	278.6	10	400	0	69.6%	25	162	284	1.77%	20	
Di-isopropyl ether (DIPE)	19.49	1.0	20.0	0	97.5%	80	120	19.2	1.28%	20	
Ethyl tert-butyl ether (ETBE)	21.57	1.0	20.0	0	108%	77	120	21.5	0.211%	20	
Benzene	19.09	0.50	20.0	0	95.5%	78	117	19.3	0.873%	20	
Tert-amyl methyl ether (TAME)	20.86	1.0	20.0	0	104%	64	136	20.8	0.0998%	20	
Toluene	18.71	0.50	20.0	0	93.6%	80	120	18.8	0.512%	20	
Ethylbenzene	18.50	0.50	20.0	0	92.5%	80	120	18.5	0.139%	20	
m,p-Xylene	39.41	0.50	40.0	0	98.5%	80	120	39.7	0.637%	20	
o-Xylene	21.92	0.50	20.0	0	110%	80	120	21.9	0.273%	20	
1,4-Dichlorobenzene-d4	0.928	0.10	1.00	0	92.8%	81	139	0.929	0.0955%	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: **R34358** Test Code: **CODW** Units: **mg/L** Analysis Date **4/12/05** Prep Date **4/12/05**
Client ID: Run ID: **WC_050412G** SeqNo: **498058**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	54.44	5.0	50.0	0	109%	85	117	0			

Sample ID **LCSD** Batch ID: **R34358** Test Code: **CODW** Units: **mg/L** Analysis Date **4/12/05** Prep Date **4/12/05**
Client ID: Run ID: **WC_050412G** SeqNo: **498059**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	50.03	5.0	50.0	0	100%	85	117	54.4	8.44%	10	

Sample ID **LCS-05262** Batch ID: **R34398** Test Code: **GASW-MS** Units: **µg/L** Analysis Date **4/15/05 5:20:00 AM** Prep Date
Client ID: Run ID: **ORGCMS3_050415A** SeqNo: **498717**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Gasoline	1,022	50	1,000	0	102%	80	120	0			

Sample ID **LCSD-05262** Batch ID: **R34398** Test Code: **GASW-MS** Units: **µg/L** Analysis Date **4/15/05 5:45:00 AM** Prep Date
Client ID: Run ID: **ORGCMS3_050415A** SeqNo: **498718**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Gasoline	998.5	50	1,000	0	99.9%	80	120	1,020	2.36%	20	

Sample ID **LCS-13315P** Batch ID: **13315** Test Code: **ICPX** Units: **µg/L** Analysis Date **4/14/05 4:36:00 PM** Prep Date **4/12/05**
Client ID: Run ID: **INICP1_050414B** SeqNo: **498499**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	468.5	100	500	0	93.7%	85	115	0			
Manganese	465.6	2.0	500	0.390	93.0%	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
Work Order: 0504231
Project: 5113.00, Lovaas Property

QC SUMMARY REPORT

Laboratory Control Spike

Sample ID **LCS-13315P** Batch ID: **13315** Test Code: **ICPX** Units: **µg/L** Analysis Date **4/19/05 1:25:00 PM** Prep Date **4/12/05**
Client ID: Run ID: **INICP1_050419A** SeqNo: **499342**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	472.4	100	500	0	94.5%	85	115	0			
Manganese	470.6	2.0	500	0	94.1%	85	115	0			

Sample ID **LCS-13345** Batch ID: **13345** Test Code: **SGTPDMW** Units: **µg/L** Analysis Date **4/20/05 6:09:24 PM** Prep Date **4/15/05**
Client ID: Run ID: **ORGC5_050420B** SeqNo: **499930**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	413.7	50	500	0	82.7%	42	96	0			
TPHC Motor Oil	812.5	170	1,000	0	81.2%	52	103	0			

Sample ID **LCSD-13345** Batch ID: **13345** Test Code: **SGTPDMW** Units: **µg/L** Analysis Date **4/20/05 6:42:25 PM** Prep Date **4/15/05**
Client ID: Run ID: **ORGC5_050420B** SeqNo: **499934**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	386.8	50	500	0	77.4%	42	96	414	6.70%	15	
TPHC Motor Oil	842.7	170	1,000	0	84.3%	52	103	812	3.65%	15	

Sample ID **LCS-13320** Batch ID: **13320** Test Code: **TPHDMW** Units: **µg/L** Analysis Date **4/13/05 11:45:59 AM** Prep Date **4/12/05**
Client ID: Run ID: **ORGC7_050413A** SeqNo: **498184**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	436.7	50	500	0	87.3%	72	124	0			
TPHC Motor Oil	919.4	170	1,000	0	91.9%	71	139	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
Work Order: 0504231
Project: 5113.00, Lovaas Property

QC SUMMARY REPORT

Laboratory Control Spike Duplicate

Sample ID **LCSD-13320** Batch ID: **13320** Test Code: **TPHDMW** Units: **µg/L** Analysis Date **4/13/05 12:04:23 PM** Prep Date **4/12/05**

Client ID: Run ID: **ORGC7_050413A** SeqNo: **498185**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	436.3	50	500	0	87.3%	72	124	437	0.0838%	15	
TPHC Motor Oil	951.2	170	1,000	0	95.1%	71	139	919	3.41%	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

0504231

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 3025

LAB ID	SAMPLE ID	DATE	TIME	MATRIX*	8260 List 1	TPHd/mo SGC	BOD	COD	Dissolved Iron	Manganese (Dissolved)	CONTAINER	PRESERVATIVE
	5113-MW1-W	4-11-05	Am	GW	3	1	1	1	1	1	9	b
	5113-MW2-W	↓	↓	↓	3	1	1	1	1	1	7	—
	5113-MW3-W				3	1	1	1	1	1	1	—
	5113-MW4-W				3	1	1	1	1	1	10	c
	5113-MW5-W				3	1	1	1	1	1	2	—
	5113-QCTB-W	↓	PM	↓	1						2	—

SAMPLE CONDITION/SPECIAL INSTRUCTIONS
Geotracker T0601539553

Cold in fact

RELINQUISHED BY (Sign & Print)	DATE/TIME	RECEIVED BY (Sign)	DATE/TIME
STEVE DAVIS	4-11-05 1600		4/4/05 1600

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 4

appl
AGRICULTURE & PRIORITY POLLUTANTS LABORATORIES, INC.
4203 West Swift ▼ Fresno, California 93722 ▼ Phone 559.275-2175 ▼ Fax 559.275-4422

RECEIVED
JUL 13 2001
BY: AB

June 20, 2001

LMO
DRG
DNL
HWG
FRB
CWG
CSW
FILE 3422-05
Fork

North Coast Laboratories Ltd.
5680 West End Road
Arcata, California 95521

Attn: Loretta Tomlin

Subject: Report of Data: Case 35576

Results in this report apply to the sample analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Dear Ms. Tomlin:

One water sample for job # 0106100-1A was received June 06, 2001, in good condition. Written results are being provided on this June 20, 2001, for the requested analysis.

For the EPA 8260 analysis, the sample was extracted according to EPA method 5030. The sample was taken off hold June 12, 2001 and purged. The pH of the sample was 4. The tentatively identified peaks are reported. The results are based on a one to one response ratio to the nearest internal standard. The results are estimated values.

No unusual problems or complications were encountered with this sample set.

If you have any questions or require further information, please contact us at your convenience. Thank you for choosing APPL, Inc.

Sincerely,

Paula Young by DA

Paula Young, Laboratory Director
APPL, Inc.

PY/rp
Enclosure
cc: File

Number of pages in this report 7

EPA 8260B

rth Coast Laboratories Ltd.
80 W. End Road
cata, CA 95521

n: Loretta Tomlin
oject: 0106100-1A
mple ID: 3472 MW1
mple Collection Date: 6/1/01

APPL Inc.
4203 West Swift Avenue
Fresno, CA 93722

ARF: 35576
APPL ID AP17625
QCG: $8260-010614AH-36588

ethod	Analyte	Result	PQL	Units	Extraction Date	Analysis Date
A 8260B	1,1,1,2-Tetrachloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1,1,1-Trichloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1,1,2,2-Tetrachloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1,1,2-Trichloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1,1-Dichloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1,1-Dichloroethene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1,2-Dichlorobenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1,2-Dichloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1,2-Dichloropropane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1,3-Dichlorobenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1,4-Dichlorobenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	1H-Indene, 2,3-dihydro-1-methyl-	65	TIC	ug/L	6/14/01	6/14/01
A 8260B	1H-Indene, 2,3-dihydro-4-methyl-	60	TIC	ug/L	6/14/01	6/14/01
A 8260B	1H-Indene, 2,3-dihydro-5-methyl-	23	TIC	ug/L	6/14/01	6/14/01
A 8260B	Benzene	12	0.5	ug/L	6/14/01	6/14/01
A 8260B	Benzene, (2-methyl-1-propenyl)-	26	TIC	ug/L	6/14/01	6/14/01
A 8260B	Benzene, propyl-	30	TIC	ug/L	6/14/01	6/14/01
A 8260B	Bromobenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Bromodichloromethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Bromoform	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Bromomethane	Not detected	1	ug/L	6/14/01	6/14/01
A 8260B	Carbon tetrachloride	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Chlorobenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Chloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Chloroform	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Chloromethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	cis-1,2-Dichloroethene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	cis-1,3-Dichloropropene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Cyclohexane	130	TIC	ug/L	6/14/01	6/14/01
A 8260B	Cyclohexane, 1-methyl	58	TIC	ug/L	6/14/01	6/14/01
A 8260B	Cyclohexane, methyl	180	TIC	ug/L	6/14/01	6/14/01
A 8260B	Cyclohexene, 4-methyl	22	TIC	ug/L	6/14/01	6/14/01
A 8260B	Cyclopentane	43	TIC	ug/L	6/14/01	6/14/01
A 8260B	Cyclopentane, 1,2,3	21	TIC	ug/L	6/14/01	6/14/01
A 8260B	Cyclopentane, 1,2-di	76	TIC	ug/L	6/14/01	6/14/01

Run #: 0614H10
Instrument: HEWEY
Sequence: H010608
Dilution Factor: 1
Initials: RP

Printed: 6/18/01 1:57:45 PM

EPA 8260B

orth Coast Laboratories Ltd.
80 W. End Road
cata, CA 95521

tn: Loretta Tomlin
oject: 0106100-1A
ample ID: 3472 MW1
ample Collection Date: 6/1/01

APPL Inc.
4203 West Swift Avenue
Fresno, CA 93722

ARF: 35576
APPL ID AP17625
QCG: $8260-010614AH-36588

ethod	Analyte	Result	PQL	Units	Extraction Date	Analysis Date
A 8260B	Cyclopentane, 1,3-di	50	TIC	ug/L	6/14/01	6/14/01
A 8260B	Cyclopentane, ethyl	38	TIC	ug/L	6/14/01	6/14/01
A 8260B	Cyclopentane, methyl	170	TIC	ug/L	6/14/01	6/14/01
A 8260B	Dibromochloromethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Dibromomethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Dichlorodifluoromethane	Not detected	1	ug/L	6/14/01	6/14/01
A 8260B	Ethylbenzene	25	0.5	ug/L	6/14/01	6/14/01
A 8260B	Freon 113	Not detected	1	ug/L	6/14/01	6/14/01
A 8260B	Methylene chloride	Not detected	5	ug/L	6/14/01	6/14/01
A 8260B	Tetrachloroethene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Toluene	0.57	0.5	ug/L	6/14/01	6/14/01
A 8260B	trans-1,2-Dichloroethene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	trans-1,3-Dichloropropene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Trichloroethene	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Trichlorofluoromethane	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Vinyl chloride	Not detected	0.5	ug/L	6/14/01	6/14/01
A 8260B	Xylenes	45	0.5	ug/L	6/14/01	6/14/01
A 8260B	Surrogate recovery (BFB)	105	75-125	%	6/14/01	6/14/01
A 8260B	Surrogate recovery (DBFM)	99.9	75-125	%	6/14/01	6/14/01
A 8260B	Surrogate recovery (DCA)	102	75-125	%	6/14/01	6/14/01
A 8260B	Surrogate recovery (TOL)	92.3	75-125	%	6/14/01	6/14/01

Run #: 0614H10
Instrument: HEWEY
Sequence: H010608
Dilution Factor: 1
Initials: RP

Printed: 6/18/01 1:57:45 PM

Method Blank
EPA 8260B

APPL Inc.
4203 West Swift Avenue
Fresno, CA 93722

lank Name/QCG: **010614W - 36588**
atch ID: $8260-010614AH

le Type	Analyte	Result	PQL	Units	Extraction Date	Analysis Date
K	1,1,1,2-Tetrachloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	1,1,1-Trichloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	1,1,2,2-Tetrachloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	1,1,2-Trichloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	1,1-Dichloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	1,1-Dichloroethene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	1,2-Dichlorobenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	1,2-Dichloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	1,2-Dichloropropane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	1,3-Dichlorobenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	1,4-Dichlorobenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Benzene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Bromobenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Bromodichloromethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Bromoform	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Bromomethane	Not detected	1	ug/L	6/14/01	6/14/01
K	Carbon tetrachloride	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Chlorobenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Chloroethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Chloroform	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Chloromethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	cis-1,2-Dichloroethene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	cis-1,3-Dichloropropene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Dibromochloromethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Dibromomethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Dichlorodifluoromethane	Not detected	1	ug/L	6/14/01	6/14/01
K	Ethylbenzene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Freon 113	Not detected	1	ug/L	6/14/01	6/14/01
K	Methylene chloride	Not detected	5	ug/L	6/14/01	6/14/01
K	Tetrachloroethene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Toluene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	trans-1,2-Dichloroethene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	trans-1,3-Dichloropropene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Trichloroethene	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Trichlorofluoromethane	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Vinyl chloride	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Xylenes	Not detected	0.5	ug/L	6/14/01	6/14/01
K	Surrogate recovery (BFB)	100	75-125	%	6/14/01	6/14/01
K	Surrogate recovery (DBFM)	97.5	75-125	%	6/14/01	6/14/01

Run #: 0614H04
Instrument: HEWEY
Sequence: H010608
Initials: RP

Printed: 6/18/01 1:58:47 PM

Method Blank
EPA 8260B

APPL Inc.
4203 West Swift Avenue
Fresno, CA 93722

Blank Name/QCG: **010614W - 36588**
Batch ID: $8260-010614AH

ple Type	Analyte	Result	PQL	Units	Extraction Date	Analysis Date
K	Surrogate recovery (DCA)	98.2	75-125	%	6/14/01	6/14/01
K	Surrogate recovery (TOL)	93.1	75-125	%	6/14/01	6/14/01

Run #: 0614H04
Instrument: HEWEY
Sequence: H010608
Initials: RP

Printed: 6/18/01 1:58:47 PM

Laboratory Control Spike Recoveries

EPA 8260B

PL ID: **010614W-17625 LCS - 36588**
tch ID: $8260-010614AH

APPL Inc.
4203 West Swift Avenue
Fresno, CA 93722

ompound Name	Spike Lvl ug/L	SPK Result ug/L	DUP Result ug/L	SPK % Recovery	DUP % Recovery	Recovery Limits	RPD %	RPD Limits
2-Tetrachloroethane	10.00	9.96	9.68	99.6	96.8	75-125	2.9	25
Trichloroethane	10.00	10.0	10.2	100	102	75-125	2.0	25
2-Tetrachloroethane	10.00	9.50	9.20	95.0	92.0	75-125	3.2	25
Trichloroethane	10.00	9.85	10.1	98.5	101	75-125	2.5	25
chloroethane	10.00	10.7	10.6	107	106	75-125	0.94	25
chloroethene	10.00	10.0	10.3	100	103	75-125	3.0	25
chlorobenzene	10.00	9.97	9.57	99.7	95.7	75-125	4.1	25
chloroethane	10.00	10.0	9.82	100	98.2	75-125	1.8	25
chloropropane	10.00	10.2	10.1	102	101	75-125	0.99	25
chlorobenzene	10.00	9.95	9.74	99.5	97.4	75-125	2.1	25
chlorobenzene	10.00	9.79	9.60	97.9	96.0	75-125	2.0	25
ene	10.00	10.0	9.84	100	98.4	75-125	1.6	25
obenzene	10.00	10.1	9.66	101	96.6	75-125	4.5	25
odichloromethane	10.00	10.2	10.0	102	100	75-125	2.0	25
oform	10.00	9.72	9.55	97.2	95.5	75-125	1.8	25
omethane	10.00	8.63	7.81	86.3	78.1	75-125	10.0	25
n tetrachloride	10.00	10.1	10.2	101	102	75-125	0.99	25
obenzene	10.00	9.90	9.68	99.0	96.8	75-125	2.2	25
oethane	10.00	9.40	9.35	94.0	93.5	75-125	0.53	25
oform	10.00	10.7	10.4	107	104	75-125	2.8	25
omethane	10.00	7.86	7.97	78.6	79.7	75-125	1.4	25
2-Dichloroethene	10.00	10.1	9.81	101	98.1	75-125	2.9	25
3-Dichloropropene	10.00	10.2	10.1	102	101	75-125	0.99	25
mochloromethane	10.00	9.82	9.61	98.2	96.1	75-125	2.2	25
momethane	10.00	10.0	9.92	100	99.2	75-125	0.80	25

mments:

Primary	SPK	DUP
Extraction Date :	6/14/01	6/14/01
Analysis Date :	6/14/01	6/14/01
Instrument :	HEWEY	HEWEY
Run :	0614H02	0614H03
Analyst :	RP	

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Laboratory Control Spike Recoveries

EPA 8260B

PL ID: 010614W-17625 LCS - 36588
ch ID: $8260-010614AH

APPL Inc.
4203 West Swift Avenue
Fresno, CA 93722

mpound Name	Spike Lvl ug/L	SPK Result ug/L	DUP Result ug/L	SPK % Recovery	DUP % Recovery	Recovery Limits	RPD %	RPD Limits
odifluoromethane	10.00	8.27	8.01	82.7	80.1	75-125	3.2	25
enzene	10.00	9.92	9.72	99.2	97.2	75-125	2.0	25
113	10.00	10.0	10.3	100	103	75-125	3.0	25
ene chloride	10.00	9.80	9.78	98.0	97.8	75-125	0.20	25
hloroethene	10.00	9.48	9.55	94.8	95.5	75-125	0.74	25
e	10.00	10.2	10.1	102	101	75-125	0.99	25
,2-Dichloroethene	10.00	9.62	9.48	96.2	94.8	75-125	1.5	25
,3-Dichloropropene	10.00	10.1	9.97	101	99.7	75-125	1.3	25
roethene	10.00	9.78	9.80	97.8	98.0	75-125	0.20	25
rofluoromethane	10.00	9.78	9.71	97.8	97.1	75-125	0.72	25
hloride	10.00	9.17	9.12	91.7	91.2	75-125	0.55	25
s	30.00	30.1	29.5	100	98.3	75-125	2.0	25
ate recovery (BFB)	30.888	30.8	31.1	99.7	101	75-125		
ate recovery (DBFM)	31.249	30.3	30.6	97.0	97.9	75-125		
ate recovery (DCA)	29.710	28.2	28.1	94.9	94.6	75-125		
ate recovery (TOL)	31.754	30.3	29.9	95.4	94.2	75-125		

mments:

Primary	SPK	DUP
Extraction Date :	6/14/01	6/14/01
Analysis Date :	6/14/01	6/14/01
Instrument :	HEWEY	HEWEY
Run :	0614H02	0614H03
Analyst :	RP	

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Attachment 5

Cyclohexane

CAS Registry Number: 110-82-7

Half-lives:

· **Soil:** High: 4320 hours (6 months)
Low: 672 hours (4 weeks)

Comment: Scientific judgement based upon unacclimated grab sample of aerobic soil (high $t_{1/2}$: Haider, K et al. (1974)) and aerobic aqueous screening test data (Kawasaki, M (1980)).

· **Air:** High: 87 hours (3.6 days)
Low: 8.7 hours

Comment: Based upon photooxidation half-life in air.

· **Surface Water:** High: 4320 hours (6 months)
Low: 672 hours (4 weeks)

Comment: Scientific judgement based upon estimated unacclimated aqueous aerobic biodegradation half-life.

· **Ground Water:** High: 8640 hours (12 months)
Low: 1344 hours (8 weeks)

Comment: Scientific judgement based upon estimated unacclimated aqueous aerobic biodegradation half-life.

Aqueous Biodegradation (unacclimated):

· **Aerobic half-life:** High: 4032 hours (6 months)
Low: 672 hours (4 weeks)

Comment: Scientific judgement based upon unacclimated grab sample of aerobic soil (high $t_{1/2}$: Haider, K et al. (1974)) and aerobic aqueous screening test data (Kawasaki, M (1980)).

· **Anaerobic half-life:** High: 16128 hours (24 months)
Low: 2688 hours (16 weeks)

Comment: Scientific judgement based upon estimated unacclimated aqueous aerobic biodegradation half-life.

· **Removal/secondary treatment:** High: No data
Low:

Comment:

Photolysis:

· **Atmos photol half-life:** High:
Low:

Comment:

Benzene

CAS Registry Number: 71-43-2

Half-lives:

· **Soil:**	High:	384 hours	(16 days)
	Low:	120 hours	(5 days)

Comment: Scientific judgement based upon unacclimated aqueous aerobic biodegradation half-life.

· **Air:**	High:	501 hours	(20.9 days)
	Low:	50.1 hours	(2.09 days)

Comment: Based upon photooxidation half-life in air.

· **Surface Water:**	High:	384 hours	(16 days)
	Low:	120 hours	(5 days)

Comment: Scientific judgement based upon unacclimated aqueous aerobic biodegradation half-life.

· **Ground Water:**	High:	17280 hours	(24 months)
	Low:	240 hours	(10 days)

Comment: Scientific judgement based upon unacclimated aqueous aerobic (low $t_{1/2}$) and anaerobic (high $t_{1/2}$) biodegradation half-life.

Aqueous Biodegradation (unacclimated):

· **Aerobic half-life:**	High:	384 hours	(16 days)
	Low:	120 hours	(5 days)

Comment: Based upon river die-away data (high $t_{1/2}$) (Vaishnav, DD and Babeu, L (1987)) and upon sea water die-away test data (low $t_{1/2}$) (Van der Linden, AC (1978)).

· **Anaerobic half-life:**	High:	17280 hours	(24 months)
	Low:	2688 hours	(16 weeks)

Comment: Scientific judgement based upon unacclimated aqueous anaerobic biodegradation screening test data (Horowitz, A et al. (1982)).

· **Removal/secondary treatment:**	High:	100%
	Low:	44%

Comment: Removal percentages based upon data from continuous activated sludge biological treatment simulators (Stover, EL and Kincannon, DF (1983); Feiler, HD et al. (1979)).

Photolysis:

· **Atmos photol half-life:**	High:	16152 hours	(673 days)
	Low:	2808 hours	(117 days)

Table 4 Some of the Major Constituents of the Gasoline Fraction (b.p. 36 to 117°C) in Selected Petroleums

Constituent	Volume (%)		
	Conroe, TX	Colinga, CA	Jennings, LA
Alkanes			
n-Pentane	0.33	0.44	1.12
n-Hexane	6.44	7.75	9.15
n-Heptane	6.90	5.94	8.42
2-Methylpentane	2.89	2.56	3.47
2,3-Dimethylhexane	0.22	1.30	2.39
Cycloalkanes			
Cyclopentane	0.96	1.76	0.67
Methylcyclopentane	6.51	10.29	5.01
Cyclohexane	10.40	7.63	7.13
Methylcyclohexane	22.00	14.55	18.07
Ethylcyclopentane	2.03	4.38	2.34
Trimethylcyclopentane	3.64	8.12	4.18
Aromatics			
Benzene	3.27	2.22	3.61
Toluene	16.19	7.94	12.02

Source: Adapted from Perry, J. J. *Petroleum Microbiology,* R. M. Atlas, Ed., New York: Macmillan, 1984.

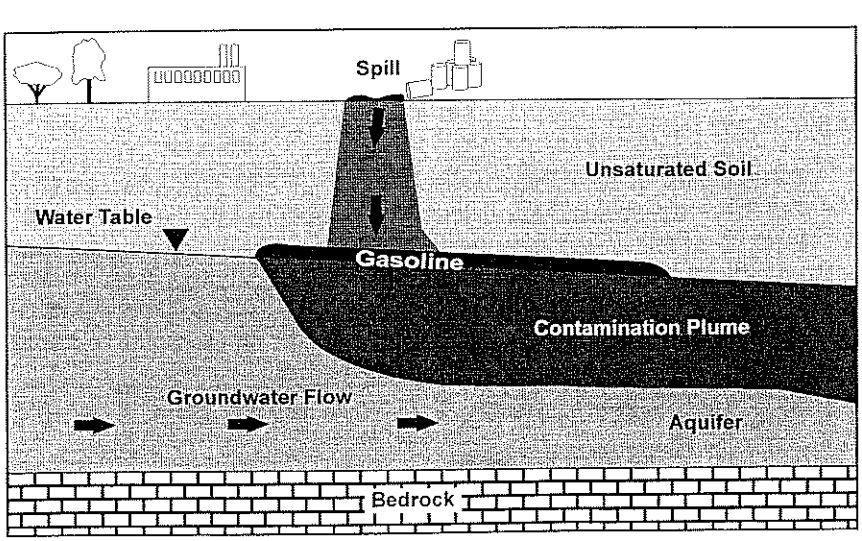

Figure 4 Contamination plume resulting from gasoline spill.

To determine the direction and velocity of flow, three or more wells may be drilled into the aquifer and the heads or water levels measured from a datum (typically mean sea level). Ground water will flow from high head to low head (the negative sign in Darcy's Law keeps the velocity positive as the gradient is always negative). The hydraulic conductivity (K) is a function of

Attachment 6

51/3.00

Brian Hodgson

From: Cody Walker [CWalker@waterboards.ca.gov]
Sent: Wednesday, June 08, 2005 3:47 PM
To: Brian Hodgson
Cc: David Gervan; Tim Nelson
Subject: Re:

Brian,
I have not heard of experiences where the fund has not reimbursed interpretation of site data for a case closure request. Also, sending out letters requiring closure evaluation by the RP is unusual, if done at all. Certainly there are usually conversations about it, then a closure request can be written and submitted. I have other sites where additional information as described in your last paragraph is submitted and did not hear of any issues with the fund. If your office has had past experience getting reimbursed for this work, let me know and we'll take care of the issue.

Cody Walker
Engineering Geologist
North Coast Regional Water Quality Control Board
(707) 576-2642

My email address has changed.
Please update your email address book to:
cwalker@waterboards.ca.gov

>>> "Brian Hodgson" <hodgsonb@lacoassociates.us> 06/07/05 04:20PM >>>

Hi Cody,

My name is Brian Hodgson and I wanted to introduce myself as I will be working with Tim Nelson on the Former Lovaas Property project (CRWQCB Case No. 1TDN153). Currently, I have been assigned to write the Second Quarter 2005 (2Q05) Groundwater Monitoring (GMR) with a request for the Pursuit of Closure Report. I understand that Tim Nelson and yourself discussed permission to include information relevant to the pursuit of closure within the 2Q05 GMR. Since information relevant to the pursuit of closure is outside the regular scope of a GMR, I would like to verify that the included information will be reimbursable to the underground storage tank clean-up fund (Fund). Tim asked me to ask you if you could send me a letter (email) and a copy to the Fund regarding the research/evaluation of information pertinent to closure. This would be information pursuant to closure, but not a closure report. Recent experience with the Fund indicates that the Fund prefers to see approval of work pursuant to closure by the regulatory agencies before the work is performed.

The additional information would include: contaminant mass calculations, before and after excavation activities; trend analysis in the MWs, and an estimation of the achievement of cleanup goals using a 20-year declining trend to water quality objectives; brief re-iteration of the SRS; estimate of mass remaining in groundwater; intrinsic bioremediation indicator summary table and discussion; and potentially other information.

Thank you,
Brian Hodgson

==========

Brian Hodgson
Junior Engineer

LACO Associates Consulting Engineers, Inc.
21 West 4th Street, Eureka, CA 95501
Phone (707) 443-5054, Fax (707) 443-0553

http://www.lacoassociates.us