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24 June 2004

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To: Distribution

Subj: FINAL GROUNDWATER SAMPLING SUMMARY REPORT FOR THE TIDAL AREA LANDFILL (SITE 1) NAVAL WEAPONS STATION SEAL BEACH, DETACHMENT CONCORD, CONCORD, CALIFORNIA

Encl: (1) Final Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), Naval Weapons Station Seal Beach, Detachment Concord, Concord, California, 24 June 2004

1. Enclosure (1) is forwarded for your information and records. A draft version of this report was provided to the regulatory Agencies on 20 January 2004. Comments received have been addressed in the enclosed final document as described in the responses to comments that are included as Appendix F of the report.

2. This supplemental groundwater sampling was conducted, as agreed with the regulatory agencies, in order to acquire current groundwater quality data from the seven monitoring wells around Site 1 since the last round of sampling was conducted in 1997. The results provided in this report, coupled with existing data, served as the basis for the additional groundwater characterization work that the Navy will be proposing in a sampling and analysis plan it anticipates submitting to the Agencies in July 2004.

3. If there are any questions regarding the enclosed report, please contact the undersigned at (650) 746-7451.

STEPHEN F. TYAHLA, P.E., CHMM
By Direction

Distribution:
U.S. Environmental Protection Agency, Region 9 (Attn: Phillip Ramsey)

24 June 2004

Subj: FINAL GROUNDWATER SAMPLING SUMMARY REPORT FOR THE TIDAL AREA LANDFILL (SITE 1) NAVAL WEAPONS STATION SEAL BEACH, DETACHMENT CONCORD, CONCORD, CALIFORNIA

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Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1)

Naval Weapons Station Seal Beach Detachment Concord Concord, California

DS.A045.10440

FINAL

June 24, 2004

NAVFAC Naval Facilities Engineering Command

Engineering Field Activity West
Naval Facilities Engineering Command
Daly City, California

TETRA TECH, INC.

AECRU Contract No. N68711-00-D-0005
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Final

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1)

Naval Weapons Station
Seal Beach Detachment Concord
Concord, California

June 24, 2004

Prepared for

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ACRONYMS AND ABBREVIATIONS

µg/L	Micrograms per liter
AWQC	Ambient water quality criteria
E&E	Ecology and Environment, Inc.
EPA	U.S. Environmental Protection Agency
mg/L	Milligrams per liter
msl	Mean sea level
Navy	U.S. Department of the Navy
NWS SBD	Naval Weapons Station Seal Beach Detachment
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PRC	PRC Environmental Management, Inc.
QA	Quality assurance
QC	Quality control
RI	Remedial investigation
RPD	Relative percent difference
RWQCB	California Regional Water Quality Control Board
SAP	Sampling and analysis plan
SI	Site investigation
SVOC	Semivolatile organic compound
Tetra Tech	Tetra Tech EM Inc.
TPH	Total petroleum hydrocarbons
TSS	Total suspended solids
VOC	Volatile organic compound

EXECUTIVE SUMMARY

The U.S. Department of the Navy, Naval Facilities Engineering Command, Engineering Field Activity West, directed Tetra Tech EM Inc. (Tetra Tech) to collect groundwater samples from seven monitoring wells (wells TLSMW001 through TLSMW007) at the Tidal Area Landfill (Site 1) at Naval Weapons Station, Seal Beach Detachment Concord, Concord, California, between July 22 and 25, 2003. This report summarizes the results of the sampling effort.

Groundwater samples were collected to investigate metal, volatile organic compound (VOC), semivolatile organic compound (SVOC), total petroleum hydrocarbon (TPH), and perchlorate concentrations in groundwater at Site 1. The primary objective of the sampling effort was to confirm that the formation and migration of leachate from the landfill has not occurred since groundwater was last sampled in 1997. Additionally, the investigation should help in providing information about the number and array of new monitoring wells needed for the Site 1 groundwater study.

Sampling was conducted in accordance with the sampling and analysis plan (SAP), which consisted of both the field sampling plan and the quality assurance project plan in an integrated format (Tetra Tech 2003). Groundwater samples were collected using low-flow-rate sampling methodology in accordance with the SAP. Samples were submitted to Curtis and Tompkins, Ltd, for the analysis of analytical constituents.

Aluminum, arsenic, copper, mercury, nickel, and zinc were all detected above groundwater screening criteria at one or more locations. Detected metals were compared with ambient water quality criteria or Bay Basin Plan objectives (California Regional Water Quality Control Board [RWQCB] 1995). A statistical comparison between the 1997 and 2003 groundwater sampling events showed no significant change in the concentrations of arsenic, mercury, and nickel at the Site 1 monitoring wells. A statistically significant difference existed between groundwater concentrations of aluminum, copper, iron, thallium, and zinc in samples collected during 1997 and 2003. However, the higher concentrations of these metals, collected in 2003, are likely an artifact of total suspended solids (TSS) in samples. While groundwater was not analyzed for TSS during the 2003 investigation, elevated aluminum concentrations in the 2003 samples are an indicator that suspended solids may have been present in the samples. In most cases, aluminum was not present above detection limits in the 1997 groundwater samples. Additional groundwater monitoring for metals and TSS in the area around the landfill will be conducted during the groundwater study for Site 1.

VOCs were not detected in groundwater during the July 2003 sampling event, except for carbon disulfide; carbon disulfide is a VOC commonly found in wetland habitat and may be related to the decomposition of plant material. SVOCs were not detected in any groundwater samples collected during this sampling effort. TPH was not detected in groundwater except for one sample with an estimated concentration of 0.03 milligrams per liter of gasoline-range hydrocarbons.

Perchlorate was not detected in any groundwater samples collected from Site 1. However, there is uncertainty associated with these data due to matrix interference from high levels of common anions at the site. The high anion concentrations in groundwater samples interfered with the analytical procedure and resulted in elevated detection limits. Therefore, perchlorate detection limits exceeded established screening criterion for perchlorate at Site 1, and the presence or absence of low concentrations of perchlorate in groundwater at Site 1 could not be sufficiently assessed. The Navy is currently investigating other potential laboratory methods for obtaining acceptable perchlorate detection limits in an anion-rich environment.

In order to further characterize groundwater at the landfill, the Navy will be proposing additional groundwater monitoring wells at the perimeter of the landfill for the Site 1 groundwater study. The plan for that study will propose that samples from the new and existing Site 1 wells be analyzed for a broad range of analytes such as metals (including mercury), total suspended solids, total dissolved solids, volatile organic compounds, semivolatile organic compounds, explosives, pesticides, and total petroleum hydrocarbons, as well as the emergent chemicals perchlorate, N-nitrosodimethylamine, 1,4-dioxane, hexavalent chromium, and 1,2,3-trichloropropane.

1.0 INTRODUCTION

The U.S. Department of the Navy (Navy), Naval Facilities Engineering Command, Engineering Field Activity West, directed Tetra Tech EM Inc. (Tetra Tech) to collect groundwater samples from seven monitoring wells (wells TLSMW001 through TLSMW007) at the Tidal Area Landfill (Site 1) at Naval Weapons Station, Seal Beach Detachment (NWS SBD) Concord, Concord, California, between July 22 and 25, 2003. This sampling effort was conducted under Delivery Order No. 045 for Indefinite Quantity Contract for Architectural-Engineering Services to Provide CERCLA/RCRA/UST Studies No. N68711-00-D-0005. Sampling was conducted in accordance with the sampling and analysis plan (SAP), which consisted of both the field sampling plan and the quality assurance project plan in an integrated format (Tetra Tech 2003). This report summarizes the results of the sampling effort.

This report is organized as follows:

- Section 1.0, Introduction, summarizes the purpose of the investigation and the site description and history.
- Section 2.0, Groundwater Sampling Procedures and Methods, discusses the sampling procedures and laboratory analysis.
- Section 3.0, Groundwater Sampling Results, describes the analytical results, the results of the statistical comparison, and the quality of the data.
- Section 4.0, Conclusions and Recommendations, summarizes the conclusions and recommendations based on the analytical results.
- Section 5.0, References, lists the documents used to prepare this report.

Figures and tables are presented after Section 5.0. Appendices to this report are presented after the figures and tables. Appendix A contains photographs taken during the sampling effort. Appendix B provides the monitoring well sampling sheets. Appendix C contains the chain-of-custody records for samples collected during this effort. Appendix D provides the laboratory results and data validation reports. Appendix E summarizes the statistical comparison of total metal concentrations for samples collected during 1997 and 2003. Responses to agency comments on the draft report are presented in Appendix F.

1.1 PURPOSE OF THE INVESTIGATION

The purpose of the sampling effort at Site 1 was to (1) confirm that the formation and migration of leachate from the landfill has not occurred since groundwater samples were collected in 1997 and (2) provide information about the number and array of new monitoring wells needed for the Site 1 groundwater study.

1.2 SITE DESCRIPTION AND HISTORY

The Tidal Area Landfill is located at NWS SBD, Concord, along the western side of Johnson Road, just north of Froid Road (Figure 1). The landfill covers about 13 acres and contains an estimated 125,000 to 135,000 cubic yards of waste and cover soil (Tetra Tech 2004). The landfill served as the primary disposal area for NWS SBD Concord from about 1944 to 1979. As shown by the growth of the landfill perimeter in historical aerial photographs, most of the waste was deposited in the landfill from 1959 to 1974. Household garbage from NWS SBD Concord and the surrounding communities was disposed of at the landfill. In addition, the landfill reportedly received solvents, acids, paint cans, creosote-treated timbers, asphalt, concrete, asbestos, and ordnance materials, including inert munitions (Ecology and Environment [E&E] 1983). Precise records of the disposed material do not exist. Shipboard wastes and the tritonal filler from one 750-pound general-purpose bomb also were reportedly buried in the landfill (E&E 1983); however, the Navy considers it possible, but highly unlikely, that tritonal filler was disposed of in the landfill (Heller 1998).

Historical photographs indicate that the Tidal Area Landfill was created by the progressive disposal of soil and debris outward from Johnson Road. Additionally, aerial photographs indicate that waste was placed directly on the marsh surface and covered with fill soil; the marsh was not excavated before waste disposal. A total thickness of up to 13 feet of waste and soil cover is estimated from the current topographic elevation of the top of the landfill. The degree of subsidence of native soils beneath the landfill resulting from consolidation or displacement of the underlying Bay Mud is not known. The surface of the landfill has a soil cover. However, metal, concrete, and wood debris protrude from the surface of the landfill, suggesting that a significant proportion of the landfill wastes is construction debris. Animal burrows perforate the soil cover, while differential subsidence has created a highly uneven surface.

The horizontal extent of the landfill has been established with a high degree of certainty based on historical aerial photographs and visual site inspections. The landfill boundary on the east side is defined by a road; on the south, north, and west sides, the boundary is visually apparent due to a sudden change in slope from the flat wetland to the raised mound of the landfill material.

The following sections summarize the geology and topography (Section 1.2.1), hydrogeology (Section 1.2.2), and previous investigations conducted (Section 1.2.3) at Site 1.

1.2.1 Geology and Topography

The Tidal Area of NWS SBD Concord, which includes the Tidal Area Landfill, is characterized by artificial fill material that overlies fine-grained Bay Mud sediments in elevated areas. In some areas, surficial materials were naturally deposited and no filling has occurred. Artificial fill material was used in the Tidal Area to construct road and railroad beds, channel levees, structural pads, and protective revetments. The fill material was used to elevate portions of the base above the marsh plane, which is generally 1 to 2 feet above mean sea level (msl) in the Tidal Area. Artificial fill used outside the landfill area is typically a mixed lithology comprising varying proportions of clay, silt, sand, and gravel. Discontinuous sand lenses are present at some locations. Artificial fill attains a maximum thickness of about 30 feet at the explosion deflection

berms. Refuse that comprises the landfill is also considered artificial fill. Household refuse, facility waste, construction debris, metal debris, and soils were deposited directly on the marsh surface to form the landfill. Aerial photographs show no evidence of excavation at the landfill. Topographic maps indicate that landfill refuse extends 10 to 12 feet above the marsh plane.

Bay Mud underlies the fill material and the landfill and consists of silty clay with local horizons of peat; a sand body is present in the area east of the landfill. Near the Tidal Area Landfill, Bay Mud extends from the ground surface to a total explored depth of at least 20 feet below msl. The Bay Mud is not consolidated; therefore, the weight of the landfill refuse may have compressed the underlying Bay Mud. However, there is no lithologic evidence to indicate that the upper surface of the Bay Mud located underneath the landfill is depressed.

The landfill forms an asymmetric mound that reaches a maximum height of more than 12 feet above msl near its eastern edge along Johnson Road. The western half of the landfill has an elevation of 6 to 8 feet above msl. The area adjacent to the Tidal Area Landfill consists of low-lying wetland areas, including the R Area Disposal site (Site 2), the Froid and Taylor Roads site (Site 9), and the Wood Hogger site (Site 11). The wetlands west of the landfill have an elevation about equal to mean sea level. A man-made drainage channel visible in an aerial photograph taken in 1939 was present along the southeastern edge of the disposal site; this channel was subsequently filled in with low permeability materials (silty clays).

1.2.2 Hydrogeology

Groundwater elevation data obtained from groundwater monitoring wells surrounding the Tidal Area Landfill generally indicate that groundwater elevations in the eastern elevated portion of the landfill are higher than those at the western edge of the landfill and the adjacent R Area Disposal site (Site 2). Additionally, groundwater has historically flowed to the west or southwest across the landfill during both the wet and dry seasons, except in the northern portion of the landfill, where groundwater locally flows northward toward Suisun Bay. Available data do not indicate that groundwater mounds beneath the landfill. Groundwater flow rates in the area are relatively slow because the silty clay that comprises the bulk of the Bay Mud does not readily transmit water. Groundwater flow velocities up to 2.2 feet per year were estimated from hydraulic parameters collected in 1998.

The Bay Basin Plan (California Regional Water Quality Control Board [RWQCB] 1995) specifies that beneficial uses for groundwater in the general area where the landfill is located are municipal and domestic water supply, industrial process supply, agricultural water supply and freshwater replenishment to surface waters. However, groundwater in the Tidal Area is not considered to be potable due to low well yields and high concentrations of total dissolved solids (TDS), and may be a suitable candidate for exemption from consideration as a potentially suitable municipal or domestic water supply on the basis of criteria contained in SWRCB Resolution 88-63 and RWQCB Resolution 89-39. Specific yields of the monitoring wells have not been measured because of the difficulty of performing pumping tests in wells screened in Bay Mud. However, sampling records indicate that the landfill wells typically experienced significant drawdown at pumping rates of 0.1 liter per minute, suggesting that well yields would be below 200 gallons per day. TDS concentrations at the four Tidal Area sites are generally very

high. From 1990 to 1997, an average TDS concentration of more than 23,000 milligrams per liter (mg/L) was detected in samples collected from the 23 Tidal Area wells. TDS concentrations ranged up to 68,000 mg/L. The typical TDS concentration in seawater is 35,000 mg/L. Based on low specific yield and high TDS of the monitoring wells, groundwater is not considered potable at Site 1.

Groundwater elevations measured at the Tidal Area Landfill from December 1989 to January 1998 ranged from 3.2 feet below msl to 3.54 feet above msl. Water levels in the Site 1 wells were highest near the end of the wet season and lowest near the end of the dry season except at a few wells or during certain measurement periods. The response of water levels in the wells to the seasonal rainfall in the area indicates that groundwater is recharged by infiltration of precipitation.

A confined sand body is present in the area east of the landfill. The sand body occurs about 16 feet below grade, is about 3.5 feet thick, and appears to end near the landfill. Groundwater flowed to the northwest within the sand body and was not sampled during the confirmation study because the sand body is not downgradient from the landfill (Tetra Tech 1998).

Permanent surface water is not present at the landfill. The closest body of permanent surface water is Otter Sluice, a manmade drainage canal that runs along the southwestern perimeter of the Tidal Area sites. At its closest point, Otter Sluice is about 750 feet from the Tidal Area Landfill. Tidal fluctuations in Otter Sluice cause localized reversals of groundwater flow direction in the area immediately adjacent to the sluice, but groundwater flow near the landfill is not affected by tidal fluctuations in Otter Sluice.

1.2.3 Summary of Previous Investigations

Previous investigations at the Tidal Area Landfill included environmental assessments conducted before the remedial investigation (RI) and activities conducted as part of the RI. This section briefly describes these investigations.

1.2.3.1 Environmental Assessments Before the RI

A summary of environmental investigations conducted at NWS SBD Concord before the RI is provided below. Although investigations were conducted in all four sites within the Tidal Area of NWS SBD Concord, the information summarized in the following paragraphs only applies to Site 1.

The site was first investigated during an initial assessment study in 1983 (E&E 1983). The initial assessment study consisted of a historical record search, a visual inspection of the site, and interviews with NWS SBD Concord personnel. Based on historical information, the site was recommended for further study. A site investigation (SI) of the Tidal Area Landfill was subsequently conducted from April 1988 to January 1991 (IT 1992). Groundwater, surface water, soil, and sediment samples were collected within the Tidal Area Landfill. The following analytes were detected in groundwater: metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), polycyclic aromatic hydrocarbons (PAH), pesticides (dieldrin),

polychlorinated biphenyls (Aroclor-1260), and nitrobenzene (a nitroaromatic explosive compound). As a result, the Navy, in consultation with the U.S. Environmental Protection Agency (EPA) and the California Department of Toxic Substances Control, determined that the presumptive remedy of capping the landfill should be implemented to eliminate risk to human and ecological receptors.

The boundary of the Tidal Area Landfill, as defined in the SI report, was larger than the current site boundary shown on Figures 1 and 2 (IT 1992). The site boundaries for the Tidal Area Landfill were modified during the RI to include the mudflats and marsh areas within the R Area Disposal site (Site 2) boundaries. As a result, many of the SI sampling locations for the Tidal Area Landfill are now located outside the current landfill boundaries and within the wetland area currently referred to as the R Area Disposal site (Site 2) (Figure 2).

In 1993, a confirmation sampling study was conducted to confirm the results of the quarterly sampling conducted during the SI. Limited soil, sediment, and groundwater samples were analyzed to verify the extent of organic compounds. No organic compounds were detected in these samples (PRC Environmental Management, Inc. [PRC] and Montgomery Watson 1993).

1.2.3.2 RI Activities

From 1993 to 1997, the Navy conducted an RI to evaluate the nature and extent of contamination at the four Tidal Area sites (PRC 1997). The investigation of the landfill during the RI was limited because the contents of the landfill were qualitatively characterized during the SI and because more detailed characterization was not required since the landfill investigation was evaluated for a presumptive remedy of capping. As part of the RI, surface and subsurface soil samples were collected from eight locations around the perimeter of the landfill. Concentrations of copper and lead, PAHs, pesticides, and PCBs were detected in the soil samples. The RI results are documented detailed in the draft RI report (PRC 1997).

In September and October 1997, the Navy conducted a confirmation groundwater sampling study to address outstanding issues about groundwater in the Tidal Area (Tetra Tech 1998). Section 3.0 of this report, in part, summarizes the results of the confirmation study.

2.0 GROUNDWATER SAMPLING PROCEDURES AND METHODS

Groundwater sampling was conducted in accordance with the SAP (Tetra Tech 2003). Between July 22 and 25, 2003, Tetra Tech sampled seven monitoring wells (wells TLSMW001 through TLSMW007) at Site 1. Appendix A contains photographs of the sampling event. One groundwater sample was collected from each of the seven wells. Groundwater samples were analyzed for metals, VOCs, SVOCs, total petroleum hydrocarbons (TPH), and perchlorate. The following sections discuss the sampling procedures and the groundwater level measurements at these wells and the laboratory analyses for each sample.

2.1 SAMPLING PROCEDURES AND GROUNDWATER LEVEL MEASUREMENTS

Before groundwater sampling at Site 1, the breathing zone was monitored with a photoionization detector as each well cap was removed. Photoionization readings were compared with the background readings for the site. Additionally, groundwater levels were measured using an electronic water level indicator. Following these initial procedures, each well was purged using a peristaltic pump and sampled using the low-flow-rate (minimal drawdown) sampling method (Tetra Tech 2003). Purge water stabilization parameters, including temperature, pH, turbidity, specific conductance, dissolved oxygen, and depth to water, were measured at regular 1-liter increments of purge water. Parameters were recorded on monitoring well sampling sheets, which are included in this report as Appendix B. A minimum of 8 liters was purged from each well until the water quality parameters stabilized. In three of the seven wells, (TLSMW001, TLSMW004, and TLSMW007), groundwater recharge rates did not support low-flow-rate sampling. In these cases, wells were purged dry with disposable Teflon bailers, allowed to recharge overnight, and sampled the following day.

Water-level sounders used during water sampling activities were decontaminated before each use by washing the probe and the portion of the cable directly above the probe with deionized water and wiping it clean with a disposable paper towel. New polyethylene tubing for the pumps was used at each well; therefore, decontamination of the tubing was not necessary. Purged water from sampling and decontamination fluids was placed in a 55-gallon drum. The drum is scheduled for removal in December 2003 or January 2004.

Additionally, quality control (QC) samples were collected in the field and analyzed to check sampling and analytical precision, accuracy, and representativeness of the data set. QC samples included one field duplicate, one equipment rinsate, one source water blank, and four trip blanks. Table 1 lists the analytical data for the QC samples, and Section 3.4 summarizes the results of these data.

2.2 LABORATORY ANALYSES

Groundwater samples were analyzed by Curtis and Tompkins, Ltd, of Berkeley, California, a state-certified laboratory. Appendix C presents the chain-of-custody records that accompanied the samples collected from monitoring wells at Site 1 to the laboratory.

Groundwater samples were analyzed using the analytical methods provided in the table below.

Analysis	Method
Metals (except mercury)	EPA 6010B, SW-846
Mercury	EPA 7470A/SW-846
VOCs	EPA 8260B, SW-846
SVOCs	EPA 8270C, SW-846
TPH (diesel- and motor oil-range, and gasoline-range organics)	EPA 8015B, SW-846
Perchlorate	EPA 314

Notes:

EPA U.S. Environmental Protection Agency
SVOC Semivolatile organic compound
TPH Total petroleum hydrocarbon
VOC Volatile organic compound

3.0 GROUNDWATER SAMPLING RESULTS

This section discusses groundwater level measurements (Section 3.1), analytical results (Section 3.2), statistical comparisons of the data (Section 3.3), and data quality (Section 3.4) for samples collected from the seven wells at Site 1.

3.1 GROUNDWATER LEVELS

Table 2 summarizes the groundwater level measurements collected from monitoring wells at Site 1. Figure 3 shows the potentiometric surface for sampling event conducted on July 21, 2003. The potentiometric surface for July 21, 2003, indicates that groundwater flow over most of the landfill is to the south and that a 0.4-foot groundwater mound, which locally affects groundwater flow, is present southeast of the landfill at well TLSMW006. The southward flow and the mound at well TLSMW006 were not observed during previous groundwater surveys conducted on June 11, 1997; October 3, 1997; and January 28, 1998 (Tetra Tech 1998). Results of the earlier surveys indicate that groundwater near the landfill flows to the west or southwest and that no mound is evident at well TLSMW006. The variance in flow directions between southward flow observed in July 2003 and predominantly westward flow observed earlier is not easily explained. Additional groundwater level measurements will be collected as part of the Site 1 groundwater study to confirm results obtained during this round of sampling.

3.2 ANALYTICAL RESULTS

This section summarizes the analytical results for samples collected from groundwater at Site 1. Appendix D presents the complete validated analytical results and data validation reports. The following sections describe the groundwater screening criteria that were used to identify chemicals of potential concern and the evaluation of each analyte group compared with groundwater screening criteria and 1997 groundwater data.

3.2.1 Groundwater Screening Criteria

Groundwater screening criteria selected for use at Site 1 are the same as those used for the Tidal Area and Litigation Area sites at NWS SBD, Concord. These criteria resulted from many discussions with California Regional Water Quality Control Board (RWQCB) project managers and technical staff. For example, the Bay Basin Plan criterion for mercury was selected based on a request by the State Water Resources Control Board (RWQCB 1995). The hardness conversions for selected metals were approved by RWQCB staff for use at the Litigation Area sites.

Groundwater concentrations were compared with ambient water quality criteria (AWQC) or Bay Basin Plan objectives presented in Table 3. AWQCs are set forth by EPA under the Clean Water Act Section 304(a)(1) and described in the National Toxics Rule (EPA 1998). AWQCs are intended to "accurately reflect the latest scientific knowledge" on the effects of these analytes on aquatic life. These criteria can provide guidance for determining acceptable conditions for both marine and freshwater aquatic life. California has adopted statewide water quality criteria for the protection of aquatic life, as described in the California Toxics Rule (EPA 2000). In addition, the Bay Basin Plan water quality objectives for waters upstream of San Pablo Bay identified screening values for the estuary, which are sometimes lower than the National or California AWQCs (RWQCB 1995).

In 1995, EPA amended the regulations to convert many of the metals criteria, which were previously based on total recoverable concentrations, to dissolved concentrations (EPA 1995a, 1995b). Groundwater samples collected for this evaluation were analyzed for total recoverable concentrations of metals. Both the National and California AWQCs are reported as dissolved concentrations; therefore, AWQCs were converted to total recoverable concentrations using conversion factors provided by EPA (EPA 1995a, 1995b, 1998, 2000).

Salinities at the Tidal Area range from 0 to 57 parts per thousand (Western Ecological Services Company [WESCO] 1995); this range is influenced by tidal cycles and precipitation. As a result, both freshwater and marine criteria are considered applicable and relevant. Because of the brackish nature of the site, however, the lower of the freshwater or saltwater criteria was used, as suggested in the Bay Basin Plan (RWQCB 1995).

3.2.2 Metals in Groundwater

In July 2003, groundwater samples were collected from seven monitoring wells around the perimeter of the Tidal Area Landfill and analyzed for total metals. Aluminum, arsenic, copper, mercury, nickel, and zinc were detected at concentrations above groundwater screening criteria at one or more locations (Table 4). The results for each of these metals are discussed below. Additionally, groundwater metal concentrations from the 2003 and 1997 sampling events are compared.

3.2.2.1 Aluminum

In July 2003, aluminum concentrations exceeded the groundwater screening criterion (87 micrograms per liter [µg/L]) in samples from wells TLSMW001, TLSMW002, TLSMW003, and TLSMW007. The maximum concentration (670 µg/L) was detected at monitoring well TLSMW003. In October 1997, the aluminum concentration from monitoring well TLSMW002 exceeded the screening criterion at a concentration of 427 µg/L. While groundwater was not analyzed for total suspended solids (TSS) during the 2003 investigation, the elevated aluminum concentrations observed in the 2003 samples are an indicator that suspended solids were present in the samples. Aluminosilicates are insoluble in water (Conner 1990), and the presence of aluminum in groundwater samples is typically indicative of the presence of suspended solids.

3.2.2.2 Arsenic

In July 2003, arsenic exceeded the groundwater screening criterion (36 µg/L) at well TLSMW002. The detected concentration was 130 µg/L. Similarly, in October 1997, arsenic was detected at a concentration (83.5 µg/L) above the screening criterion at well TLSMW002.

3.2.2.3 Copper

In July 2003, copper concentrations exceeded the groundwater screening criterion (3.1 µg/L) in samples from wells TLSMW003, TLSMW004, and TLSMW005. The maximum concentration (17 µg/L) was detected at wells TLSMW003 and TLSMW004. In October 1997, copper was detected in well TLSMW004 at an estimated concentration of 8.9 µg/L.

3.2.2.4 Mercury

In 1997 and 2003, samples were analyzed for mercury using the cold vapor atomic absorption analytical technique (EPA Method 7470A). This method reduces all species of mercury to the elemental state, and does not distinguish between species of mercury. In July 2003, mercury concentrations exceeded the groundwater screening criterion (0.025 µg/L) in samples from wells TLSMW001, TLSMW002, TLSMW003, and TLSMW004. The maximum concentration (0.24 µg/L) was detected at well TLSMW004. All other mercury concentrations detected in July 2003 were qualified as estimated during data validation. In October 1997, mercury was detected at well TLSMW005 at an estimated concentration of 0.2 µg/L.

3.2.2.5 Nickel

In July 2003, nickel concentrations exceeded the groundwater screening criterion (8.2 µg/L) in samples from wells TLSMW001, TLSMW002, TLSMW003, TLSMW004, TLSMW005, and TLSMW007. The maximum concentration (460 µg/L) was detected at well TLSMW005. In October 1997, nickel concentrations at wells TLSMW001, TLSMW003, TLSMW004, TLSMW005, and TLSMW006 exceeded the screening criterion, with a maximum concentration of 287 µg/L at well TLSMW005.

3.2.2.6 Zinc

In July 2003, zinc concentrations exceeded the groundwater screening criterion (81 µg/L) in samples from wells TLSMW001, TLSMW003, TLSMW005, and TLSMW007. The maximum concentration was detected at TLSMW003 with a concentration of 390 µg/L. Zinc concentrations did not exceed the groundwater screening value at any location in 1997.

3.2.3 SVOCs, VOCs, and TPH in Groundwater

Groundwater samples collected during July 2003 were also analyzed for VOCs, SVOCs, and TPH. No VOCs were detected in groundwater except for carbon disulfide; carbon disulfide is a VOC commonly found in wetland habitat and may be related to decomposition of plant material. Carbon disulfide concentrations only slightly exceeded the detection limit of 0.5 µg/L at wells TLSMW001, TLSMW002, TLSMW003, TLSMW006, and TLSMW007. Additionally, carbon disulfide was detected during the 1997 sampling event at similar concentrations. TPH was not detected in groundwater except for one sample from well TLSMW007, which had an estimated concentration of 0.03 mg/L of gasoline-range hydrocarbons. Table 5 and Appendix D present the complete results for VOCs, SVOCs, and TPH.

3.2.4 Perchlorate in Groundwater

Perchlorate was not detected in any of the groundwater samples collected in July 2003 (Table 5). However, analytical results of the perchlorate analysis were based on elevated sample quantitation limits, resulting from matrix interference due to high levels of common anions.

Common anions, including chloride, sulfate, and carbonate, were present in groundwater samples at high concentrations. These high concentrations of common anions were confirmed by electrical conductivity measurements, which are an indirect indicator of anion concentrations. The high concentrations of common anions likely caused peak interference with perchlorate, distorting the baseline in the retention time window for perchlorate, which negatively affected the quantitation of perchlorate at low concentrations. The samples were diluted to account for the presence of these common anions, which caused elevated sample quantitation limits for perchlorate. The perchlorate screening criterion of 1 µg/L, established by the Remedial Project team, was lower than the detection limit after samples were diluted to decrease the effects of the anions. As a result, the analytical laboratory was unable to analyze for perchlorate at the low detection limits, and the presence or absence of perchlorate at a concentration of 1 µg/L could not be assessed. The Navy is currently investigating other potential laboratory methods for obtaining perchlorate detection limits in an anion-rich environment.

3.3 Statistical Comparison Between 1997 and 2003 Metal Concentrations in Groundwater

An objective of the 2003 groundwater sampling event at Site 1 was to assess whether leachate from the landfill has affected groundwater since groundwater was last sampled in 1997. Table 4 compares metal groundwater concentrations between the 1997 and 2003 sampling events. Concentrations of total metals in groundwater samples collected in 1997 and 2003 were also

compared using graphical and statistical methods (Appendix E). The statistical comparison showed no significant change in the concentrations of arsenic, mercury, and nickel at the Site 1 monitoring wells. A statistically significant difference existed between groundwater concentrations of aluminum, copper, iron, thallium, and zinc in samples collected during 1997 and 2003 (Table 6 and Figure 2). However, the higher concentrations of these metals, collected in 2003, are likely an artifact of TSS in groundwater samples. While groundwater was not analyzed for TSS during the 2003 investigation, elevated aluminum concentrations in the 2003 samples are an indicator that suspended solids were present in the samples. The Navy will conduct additional groundwater monitoring for metals and TSS in the area around the landfill during the groundwater study for Site 1. Table 6 presents the results of the statistical comparison, and Appendix E contains the complete results from the statistical comparison, including box-and-whisker plots and quantile tables.

3.4 DATA QUALITY

Data Validation Group, Inc. validated the analytical data following the guidelines put forth in EPA's "Functional Guidelines for Inorganic Data Review" and "Functional Guidelines for Organic Data Review" (EPA 1994 and 1999). Results are presented in Appendix D. Although some of the groundwater data were flagged as estimated concentrations, the validation report indicates that the data are of high quality and are acceptable for most uses.

Adherence to the standard quality assurance (QA) and QC techniques set forth in the SAP (Tetra Tech 2003) during field and laboratory operations ensured the quality of the data collected during groundwater sampling at Site 1. Field QA/QC consisted of collecting one field duplicate, one equipment rinsate, one source water blank, and four trip blank samples. Table 1 presents the analytical results for the QC samples.

3.4.1 Field Duplicates

As discussed previously, a field duplicate sample was collected from well TLSMW005. The original and duplicate samples contained detected concentrations of barium, calcium, chromium, iron, magnesium, manganese, molybdenum, nickel, potassium, sodium, and zinc. VOCs, SVOCs, and TPH were not detected in the original and duplicate sample. Table 7 shows the concentrations of the detected chemicals and the relative percent difference (RPD) between each detected analyte. All RPDs were below the goal of 50-percent RPD, indicating the acceptable precision of analytical data collected during this investigation. The duplicate sample results suggest that the sample collection procedure did not vary, thereby achieving consistent results.

3.4.2 Equipment Rinsate Samples

An equipment rinsate sample was collected during the sampling event on July 23, 2003. The rinsate was obtained by flushing deionized, organic-free water through the disposable sampling tubing before sample collection. Analysis of the rinsate sample showed detections of calcium, iron, manganese, and zinc (Table 1). No VOCs, SVOCs, or TPH were detected. Of the detected metals, calcium, was the only analyte that was detected in groundwater samples from the same sampling date. Therefore, it is unlikely that the source of elevated analyte concentrations in the

groundwater samples is from the sampling equipment. However, it is possible that concentrations of calcium may be biased high as the result of contamination from the sampling equipment.

3.4.3 Source Water Blank Samples

Iron and zinc were detected in the source water blank sample at concentrations of 720 and 33 µg/L, respectively. The presence of these analytes in both the source blank and equipment rinsate sample suggests possible source water or laboratory-related contamination. No VOCs, SVOCs, or TPH were detected.

3.4.4 Trip Blank Samples

Four trip blank samples were analyzed to assess possible contamination originating from the containers, laboratory, or from cross-contamination of sample containers during sample shipment. No analytes were detected, suggesting that no cross-contamination occurred.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the 2003 groundwater sampling results at Site 1, aluminum, arsenic, copper, mercury, nickel, and zinc were detected above groundwater screening criteria at one or more locations. A statistical comparison between the 1997 and 2003 groundwater sampling events showed no significant change in the concentrations of arsenic, mercury, and nickel at the Site 1 monitoring wells. A statistically significant difference existed between groundwater concentrations of aluminum, copper, iron, thallium, and zinc in samples collected during 1997 and 2003. However, the higher concentrations of these metals, collected in 2003, are likely an artifact of TSS in samples. While groundwater was not analyzed for TSS during the 2003 investigation, elevated aluminum concentrations in the 2003 samples are an indicator that suspended solids may have been present in the samples. In most cases, aluminum was not present above detection limits in the 1997 groundwater samples.

No VOCs were detected in groundwater except for carbon disulfide; carbon disulfide is a VOC commonly found in wetland habitat and may be related to decomposition of plant material. SVOCs were not detected in groundwater samples for this investigation. TPH was not detected in groundwater except for one sample, which had an estimated concentration of 0.03 mg/L of gasoline-range hydrocarbons.

Perchlorate was not detected in any groundwater samples from Site 1. However, there is some uncertainty associated with these data due to the matrix interference from high levels of common anions at the site. The high anion concentrations in groundwater samples interfered with the analytical procedure and resulted in elevated detection limits. Therefore, perchlorate detection limits exceeded the established screening criterion for perchlorate at Site 1, and the presence or absence of low concentrations of perchlorate in groundwater at Site 1 could not be sufficiently assessed. The Navy is currently investigating other potential laboratory methods, such as liquid chromatography with tandem mass spectrometers, for obtaining acceptable perchlorate detection limits in an anion rich-environment.

The data from this 2003 groundwater sampling suggests that leachate from the landfill has not affected the concentration of metals since groundwater was last sampled in 1997. In order to further characterize groundwater at the landfill, additional groundwater monitoring wells at the perimeter of the landfill are being proposed for the Site 1 groundwater study. Groundwater samples from the new and existing Site 1 wells would be analyzed for a broad range of analytes including metals, TSS, TDS, VOCs, SVOCs, explosives, pesticides, and TPH, as well as the emergent chemicals perchlorate, N-nitrosodimethylamine, 1,4-dioxane, hexavalent chromium, and 1,2,3-trichloropropane.

5.0 REFERENCES

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FIGURES

Figures 1 - 3

These detailed station maps have been deleted from the Internet-accessible version of this document as per Department of the Navy Internet security regulations.

TABLES

TABLE 1: ANALYTICAL DATA FOR QUALITY CONTROL SAMPLES

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	TLSMW005
Sample ID Number:	**04501ER001**	**04501SW001**	**04501TB001**	**04501TB002**	**04501TB003**	**04501TB004**	**04051GW008**
Sample Type:	**Equipment Rinsate**	**Source Blank**	**Trip Blank**	**Trip Blank**	**Trip Blank**	**Trip Blank**	**Field Duplicate**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/23/2003**	**7/23/2003**	**7/22/2003**	**7/23/2003**	**7/24/2003**	**7/25/2003**	**7/22/2003**
CLP Metals (µg/L)							
Aluminum	100 U	56.0 UJ	NA	NA	NA	NA	56 UJ
Antimony	60.0 U	34.0 UJ	NA	NA	NA	NA	60 U
Arsenic	5.0 U	5.0 U	NA	NA	NA	NA	8.6 UJ
Barium	10.0 U	10.0 U	NA	NA	NA	NA	21
Beryllium	1.3 UJ	1.4 UJ	NA	NA	NA	NA	2 U
Cadmium	5.0 U	5.0 U	NA	NA	NA	NA	5 U
Calcium	470 J	500 U	NA	NA	NA	NA	8,000
Chromium	7.4 UJ	10.0 U	NA	NA	NA	NA	19
Cobalt	20.0 U	20.0 U	NA	NA	NA	NA	20 U
Copper	10.0 UJ	10.0 U	NA	NA	NA	NA	10 U
Iron	7,300	720	NA	NA	NA	NA	5,000
Lead	3.0 U	3.0 U	NA	NA	NA	NA	3 U
Magnesium	500 U	500 U	NA	NA	NA	NA	16,000
Manganese	32	10.0 U	NA	NA	NA	NA	240
Mercury (total)	0.20 U	0.20 U	NA	NA	NA	NA	0.2 U
Molybdenum	20.0 U	20.0 U	NA	NA	NA	NA	120
Nickel	20.0 U	20.0 U	NA	NA	NA	NA	430
Potassium	500 U	500 U	NA	NA	NA	NA	21,000
Selenium	5.0 U	5.0 U	NA	NA	NA	NA	5 U
Silver	5.0 U	5.0 U	NA	NA	NA	NA	5 U
Sodium	500 U	500 U	NA	NA	NA	NA	790,000
Thallium	5.0 U	5.0 U	NA	NA	NA	NA	5 U
Vanadium	10.0 U	10.0 U	NA	NA	NA	NA	6.1 UJ
Zinc	280	33	NA	NA	NA	NA	180
Volatile Organic Compounds, Method 8260 (µg/L)							
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene (total)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

TABLE 1: ANALYTICAL DATA FOR QUALITY CONTROL SAMPLES

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	TLSMW005
Sample ID Number:	**04501ER001**	**04501SW001**	**04501TB001**	**04501TB002**	**04501TB003**	**04501TB004**	**04051GW008**
Sample Type:	**Equipment Rinsate**	**Source Blank**	**Trip Blank**	**Trip Blank**	**Trip Blank**	**Trip Blank**	**Field Duplicate**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/23/2003**	**7/23/2003**	**7/22/2003**	**7/23/2003**	**7/24/2003**	**7/25/2003**	**7/22/2003**
Volatile Organic Compounds, Method 8260 (µg/L) (continued)							
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 UJ	1 UJ	1 U	1 UJ	1 U	1 U	1 U
Carbon disulfide	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	0.5 U	0.5 U	0.5 U	3	0.5 U	0.5 U	0.5 U
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.5 U	0.5 U	0.5 U	0.4 J	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl acetate	10 UJ	10 UJ	10 U	10 UJ	10 UJ	10 U	10 U
Vinyl chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylene (total)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatile Organic Compounds, Method 8270 (µg/L)							
1,2,4-Trichlorobenzene	9 U	9 U	NA	NA	NA	NA	9 U
1,2-Dichlorobenzene	9 U	9 U	NA	NA	NA	NA	9 U
1,3-Dichlorobenzene	9 U	9 U	NA	NA	NA	NA	9 U
1,4-Dichlorobenzene	9 U	9 U	NA	NA	NA	NA	9 U
2,4,5-Trichlorophenol	9 U	9 U	NA	NA	NA	NA	9 U
2,4,6-Trichlorophenol	9 U	9 U	NA	NA	NA	NA	9 U
2,4-Dichlorophenol	9 U	9 U	NA	NA	NA	NA	9 U
2,4-Dimethylphenol	9 U	9 U	NA	NA	NA	NA	9 U
2,4-Dinitrophenol	47 U	47 U	NA	NA	NA	NA	47 U
2,4-Dinitrotoluene	9 U	9 U	NA	NA	NA	NA	9 U
2,6-Dinitrotoluene	9 U	9 U	NA	NA	NA	NA	9 U
2-Chloronaphthalene	9 U	9 U	NA	NA	NA	NA	9 U
2-Chlorophenol	9 U	9 U	NA	NA	NA	NA	9 U
2-Methylnaphthalene	9 U	9 U	NA	NA	NA	NA	9 U
2-Methylphenol	9 U	9 U	NA	NA	NA	NA	9 U
2-Nitroaniline	19 U	19 U	NA	NA	NA	NA	19 U

TABLE 1: ANALYTICAL DATA FOR QUALITY CONTROL SAMPLES

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	TLSMW005
Sample ID Number:	**04501ER001**	**04501SW001**	**04501TB001**	**04501TB002**	**04501TB003**	**04501TB004**	**04051GW008**
Sample Type:	**Equipment Rinsate**	**Source Blank**	**Trip Blank**	**Trip Blank**	**Trip Blank**	**Trip Blank**	**Field Duplicate**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/23/2003**	**7/23/2003**	**7/22/2003**	**7/23/2003**	**7/24/2003**	**7/25/2003**	**7/22/2003**
Semivolatile Organic Compounds, Method 8270 (µg/L) (continued)							
2-Nitrophenol	19 U	19 U	NA	NA	NA	NA	19 U
3,3'-Dichlorobenzidine	19 U	19 U	NA	NA	NA	NA	19 U
3-Nitroaniline	19 U	19 U	NA	NA	NA	NA	19 U
4,6-Dinitro-2-methylphenol	47 U	47 U	NA	NA	NA	NA	47 U
4-Bromophenyl-phenylether	9 U	9 U	NA	NA	NA	NA	9 U
4-Chloro-3-methylphenol	9 U	9 U	NA	NA	NA	NA	9 U
4-Chloroaniline	9 U	9 U	NA	NA	NA	NA	9 U
4-Chlorophenyl-phenylether	9 U	9 U	NA	NA	NA	NA	9 U
4-Methylphenol	9 U	9 U	NA	NA	NA	NA	9 U
4-Nitroaniline	19 U	19 U	NA	NA	NA	NA	19 U
4-Nitrophenol	19 U	19 U	NA	NA	NA	NA	19 U
Acenaphthene	9 U	9 U	NA	NA	NA	NA	9 U
Acenaphthylene	9 U	9 U	NA	NA	NA	NA	9 U
Anthracene	9 U	9 U	NA	NA	NA	NA	9 U
Benzo(a)anthracene	9 U	9 U	NA	NA	NA	NA	9 U
Benzo(a)pyrene	9 U	9 U	NA	NA	NA	NA	9 U
Benzo(b)fluoranthene	9 U	9 U	NA	NA	NA	NA	9 U
Benzo(g,h,i)perylene	9 U	9 U	NA	NA	NA	NA	9 U
Benzo(k)fluoranthene	9 U	9 U	NA	NA	NA	NA	9 U
Bis(2-chloroethoxy)methane	9 U	9 U	NA	NA	NA	NA	9 U
Bis(2-chloroethyl)ether	9 U	9 U	NA	NA	NA	NA	9 U
Bis(2-chloroisopropyl)ether	9 U	9 U	NA	NA	NA	NA	9 U
Bis(2-ethylhexyl)phthalate	9 U	9 U	NA	NA	NA	NA	9 U
Butylbenzylphthalate	9 U	9 U	NA	NA	NA	NA	9 U
Carbazole	9 U	9 U	NA	NA	NA	NA	9 U
Chrysene	9 U	9 U	NA	NA	NA	NA	9 U
Di-n-butylphthalate	9 U	9 U	NA	NA	NA	NA	9 U
Di-n-octylphthalate	9 U	9 U	NA	NA	NA	NA	9 U
Dibenz(a,h)anthracene	9 U	9 U	NA	NA	NA	NA	9 U
Dibenzofuran	9 U	9 U	NA	NA	NA	NA	9 U
Diethylphthalate	9 U	9 U	NA	NA	NA	NA	9 U
Dimethylphthalate	9 U	9 U	NA	NA	NA	NA	9 U
Fluoranthene	9 U	9 U	NA	NA	NA	NA	9 U
Fluorene	9 U	9 U	NA	NA	NA	NA	9 U
Hexachlorobenzene	9 U	9 U	NA	NA	NA	NA	9 U
Hexachlorobutadiene	9 U	9 U	NA	NA	NA	NA	9 U
Hexachlorocyclopentadiene	47 U	47 U	NA	NA	NA	NA	47 U
Hexachloroethane	9 U	9 U	NA	NA	NA	NA	9 U

TABLE 1: ANALYTICAL DATA FOR QUALITY CONTROL SAMPLES

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	QC SAMPLE	TLSMW005
Sample ID Number:	**04501ER001**	**04501SW001**	**04501TB001**	**04501TB002**	**04501TB003**	**04501TB004**	**04051GW008**
Sample Type:	**Equipment Rinsate**	**Source Blank**	**Trip Blank**	**Trip Blank**	**Trip Blank**	**Trip Blank**	**Field Duplicate**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/23/2003**	**7/23/2003**	**7/22/2003**	**7/23/2003**	**7/24/2003**	**7/25/2003**	**7/22/2003**
Semivolatile Organic Compounds, Method 8270 (µg/L) (continued)							
Indeno(1,2,3-cd)pyrene	9 U	9 U	NA	NA	NA	NA	9 U
Isophorone	9 U	9 U	NA	NA	NA	NA	9 U
N-nitroso-di-n-propylamine	9 U	9 U	NA	NA	NA	NA	9 U
N-nitrosodimethylamine	9 U	9 U	NA	NA	NA	NA	9 U
N-nitrosodiphenylamine (1)	9 U	9 U	NA	NA	NA	NA	9 U
Naphthalene	9 U	9 U	NA	NA	NA	NA	9 U
Nitrobenzene	9 U	9 U	NA	NA	NA	NA	9 U
Pentachlorophenol	19 U	19 U	NA	NA	NA	NA	19 U
Phenanthrene	9 U	9 U	NA	NA	NA	NA	9 U
Phenol	9 U	9 U	NA	NA	NA	NA	9 U
Pyrene	9 U	9 U	NA	NA	NA	NA	9 U
Petroleum Indicators (mg/L)							
Gasoline c7-c12	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Petroleum Indicators - Silica Gel (mg/L)							
Diesel c10-c24(sgcu)	0.05 U	0.05 U	NA	NA	NA	NA	0.05 U
Motor oil c24-c36(sgcu)	0.3 U	0.3 U	NA	NA	NA	NA	0.3 U
Explosives (µg/L)							
Perchlorate	4 U	4 U	NA	NA	NA	NA	8 U

Notes:	Inorganic results less than 10 are reported to two significant figures, and results greater than 10 are reported to three significant figures.
µg/L	Micrograms per liter
CLP	Contract Laboratory Program
ID	Identification
J	Estimated
mg/L	Milligrams per liter
NA	Not analyzed
QC	Quality control
U	Not detected, with detection limit indicated

TABLE 2: TIDAL AREA LANDFILL GROUNDWATER ELEVATIONS, July 21, 2003

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1),
NWS SBD Concord, Concord, California

Monitoring Well	TOC (feet above msl)	Depth to Groundwater July 21, 2003 (feet below TOC)	Groundwater Elevation (feet msl)
TLSMW001	3.05	1.61	1.44
TLSMW002	3.12	1.59	1.53
TLSMW003	3.93	2.02	1.91
TLSMW004	10.18	8.56	1.62
TLSMW005	8.74	7.38	1.36
TLSMW006	9.08	7.37	1.71[a]
TLSMW007	2.98	1.64	1.34

Notes:

a	Datum may be suspect
msl	Mean sea level
NA	Not available
TOC	Top of casing

TABLE 3: CHRONIC AMBIENT WATER QUALITY CRITERIA FOR METALS

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

	EPA State of California Water Quality Criteria (California Toxics Rule)				EPA National Recommended Water Quality Criteria (EPA 1998, 1999)				Bay Basin Plan Objectives Upstream of San Pablo Bay (RWQCB 1995)		Selected Litigation Area Screening Values[a]	
	Saltwater CCC		Freshwater CCC Based on Hardness = 400 mg $CaCO_3$		Saltwater CCC		Freshwater CCC Based on Hardness = 400 mg $CaCO_3$		Totals Concentrations Based on Hardness = 400 mg $CaCO_3$		Lowest of EPA Criteria (2000, 1998)	
Analyte	Dissolved Metals	Total Metals[b]	Dissolved Metals	Total Metals[b]	Dissolved Metals	Total Metals[b]	Dissolved Metals	Total Metals[b]	CCC for Surface Waters with Salinities Less Than 5 ppt	CCC for Surface Waters with Salinities Greater Than 5 ppt	Dissolved Metals	Total Metals
Metals (µg/L)												
Aluminum	NA	NA	NA	NA	NA	NA	NA	87[c]	NA	NA	NA	**87**[c]
Arsenic	36	36	150	150	36	36	150	150	190	36	**36**	36
Cadmium	9.3	9.36	6.2[d]	7.31	9.3	9.36	6.2[d]	7.31	3.4[d]	9.3	**6.2**[d]	7.3
Chromium III	NA	NA	554[d]	644.2	NA	NA	230.7[d]	268.22	NA	NA	**230.7**[d]	268.2
Chromium VI	50	50.35	11	11.43	50	50.35	11	11.43	11.0[f]	50[f]	**11.0**	11.4
Copper	3.1	3.73	29.3[d]	30.5	3.1	3.73	29.3[d]	30.5	38.7[d]	NA	**3.1**	3.7
Lead	8.1	8.52	10.9[d]	18.58	8.1	8.52	10.9[d]	18.58	18.6[d]	5.6	**8.1**	8.5
Mercury (total)	NA	NA	NA	NA	0.94	1.11	0.77	0.91	0.025	0.025	**0.025**[i]	0.025[i]
Nickel	8.2	8.28	168[d]	168.54	8.2	8.28	168[d]	168.54	509.4[d]	7.1[h]	**8.2**	8.3
Selenium	71	71.14	NA	5.0	71	71.14	4.6[j]	5	NA	NA	**4.6**	5
Silver	1.9[e]	NA	37.4[d,e]	44[e]	1.9[e]	NA	37.4[d,e]	44[e]	NA	NA	**1.9**[e]	44[e]
Zinc	81	85.62	382.4[d]	387.83	81	85.62	328.4[d]	387.83	74.8[d]	58[h]	**81**	85.6

Notes:

a Lowest total recoverable concentrations based on either EPA (1998) saltwater or freshwater criteria, EPA (1999) saltwater or freshwater criteria, or California Toxics Rule (Title 40 *Code of Federal Regulations* Part 131).

b Converted from EPA (1998) dissolved metals criterion using conversion factor.

c Criterion valid only for water in the pH range of 6.5 to 9.0. Aluminum may be less toxic at high pH and hardness, but the effects are not well quantified at this time.

d Criterion is hardness dependent. This value corresponds to a total hardness of 400 mg/L as $CaCO_3$ in the water body.

e Because there is no proposed CCC for this chemical, the CMC is shown.

f This limit may be met as total chromium.

g The instantaneous maximum concentration was used because no 4-day average value was available.

h The 24-hour average concentration was used because no 4-day average value was available.

i Bay Basin Plan criterion for mercury was selected as a request from RWQCB.

j Converted from EPA (1999) total metals criterion using conversion factor.

EPA. 1998. "Quality Criteria for Water." Office of Water. Washington, DC.

EPA. 1999. "National Recommended Water Quality Criteria – Correction." EPA 822-Z-99-001. Office of Water. April.

EPA. 2000. "Water Quality Standards: Establishment of Numeric Criteria for Priority Pollutants for the State of California. Final Rule." EPA 823-00-008. Office of Water. April.

Regional Water Quality Control Board (RWQCB). 1995. "San Francisco Bay Basin Plan." San Francisco Bay Region. June 21.

µg/L Micrograms per liter

$CaCO_3$ Calcium Carbonate

CCC Criteria continuous concentration (4-day average concentration chronic limit)

CMC Criteria maximum concentration (short-term concentration acute limit)

CTR California Toxics Rule

EPA U.S. Environmental Protection Agency

NA Not available

RWQCB California Regional Water Quality Control Board

TABLE 4: COMPARISON BETWEEN 1997 AND 2003 TOTAL METAL CONCENTRATIONS IN GROUNDWATER

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW001	TLSMW002	TLSMW002	TLSMW003	TLSMW003	TLSMW004	TLSMW004	TLSMW005	TLSMW005	TLSMW006	TLSMW006	TLSMW007	TLSMW007	AWQC (µg/L)
Sample ID Number:	281TLSGW01	04501GW001	281TLSGW02	04501GW002	281TLSGW03	04501GW003	281TLSGW04	04501GW004	281TLSGW05	04501GW005	281TLSGW06	04501GW006	281TLSGW07	04501GW007	
Matrix:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	
Sample Date:	10/10/1997	7/25/2003	10/10/1997	7/23/2003	10/7/1997	7/25/2003	10/6/1997	7/23/2003	10/7/1997	7/22/2003	10/9/1997	7/22/2003	10/15/1997	7/24/2003	
CLP Metals (µg/L)															
Aluminum	38.1 U	**460**	**427**	**380**	38.1 U	**670**	86.5	210 UJ	38.1 U	51.0 UJ	38.1 U	87.0 UJ	38.1 U	**550**	87
Antimony	1.7 U	60.0 U	1.7 U	60.0 U	1.7 U	60.0 U	1.7 U	60.0 U	1.7 U	60.0 U	2.0 UJ	60.0 U	1.7 U	60.0 U	NA
Arsenic	29.8	29	**83.5**	**130**	3.2 U	12	23.8	21	6.1 J	8.6 UJ	12.7 J	5.0 U	14.4	15	36
Barium	267	350	275	330	52.4 J	140	13.3 J	14	110 J	23	565	480	189 J	240	NA
Beryllium	0.97 J	2.0 U	0.58 U	2.0 U	0.97 J	2.0 U	1.2 J	2.0 U	0.58 U	2.0 U	0.58 U	2.0 U	0.58 U	2.0 U	NA
Cadmium	0.40 U	5.0 U	0.40 U	5.0 U	0.40 U	5.0 U	0.40 U	5.0 U	0.40 U	5.0 U	0.40 U	5.0 U	0.40 U	5.0 U	6.2
Calcium	665,000	750,000	247,000	270,000	557,000	1,000,000	9,310	7,500	49,100	8,300	313,000	290,000	184,000	270,000	NA
Chromium	19.7	11	4.6 U	14.0 UJ	4.6 U	220	20.7	24	4.6 U	21	4.6 UJ	6.4 J	4.6 U	21	230.7
Cobalt	6.0 UJ	20.0 U	6.0 UJ	20.0 U	6.0 UJ	20.0 U	6.0 U	20.0 U	6.0 U	20.0 U	6.0 UJ	20.0 U	6.0 UJ	20.0 U	NA
Copper	5.8 UJ	10.0 U	5.8 UJ	10.0 U	5.8 UJ	**17**	**8.9 J**	**17**	5.8 U	**7.6 J**	5.8 UJ	10.0 U	5.8 UJ	9.7 UJ	3.1
Iron	5,480	10,000	415	69.0 UJ	1,960	15,000	227	7,300 UJ	957	7,100	3,240	1,700	839	7,900	NA
Lead	13.0 U	3.0 U	6.5 U	3.0 U	13.0 U	3.2	1.3 U	3.0 U	1.3 U	2.1 UJ	2.6 UJ	3.0 U	1.3 UJ	3.0 U	8.1
Magnesium	1,750,000	1,800,000	1,320,000	1,400,000	2,680,000	3,700,000	29,000	28,000	90,600	16,000	426,000	400,000	462,000	600,000	NA
Manganese	10,300	10,000	155	130 UJ	2,620	51,000	21.7	61.0 UJ	639	270	3,600	3,800	89.5 J	1,000	NA
Mercury (total)	0.13 U	**0.13 J**	0.13 U	**0.11 J**	0.13 U	**0.11 J**	0.13 U	**0.24**	**0.20 J**	0.20 U	0.13 U	0.20 U	0.12 U	0.20 U	0.025
Molybdenum	76	20.0 U	49.0 J	39.0 UJ	118	20.0 U	118	120	71.5	130	44.0 J	20.0 U	50.9	20.0 U	NA
Nickel	**156**	**15.0 J**	6.3 UJ	**16.0 J**	**147**	**37**	**30.9 J**	**36**	**287**	**460**	**55.2**	20.0 U	6.3 UJ	**22**	8.2
Potassium	247,000	250,000	223,000	250,000	442,000	420,000	39,400	39,000	47,900	21,000	71,000	64,000	103,000	130,000	NA
Selenium	3.3 UJ	5.0 U	3.3 UJ	5.0 U	3.3 UJ	5.0 U	3.3 U	5.0 U	3.3 U	5.0 U	3.3 UJ	5.0 U	3.3 UJ	5.0 U	4.6
Silver	1.1 UJ	5.0 U	1.1 UJ	5.0 U	1.1 UJ	5.0 U	1.1 U	5.0 U	1.1 U	5.0 U	2.2 UJ	5.0 U	1.1 UJ	5.0 U	1.9
Sodium	8,550,000	9,200,000	8,400,000	9,900,000	15,600,000	21,000,000	1,470,000	1,600,000	1,850,000	840,000	2,360,000	2,900,000	3,230,000	4,700,000	NA
Thallium	1.5 UJ	16	1.8 J	5.0 U	1.5 UJ	86	1.5 U	5.0 U	1.7 J	5.0 U	1.5 UJ	5.0 U	1.5 U	5.8 UJ	NA
Vanadium	54.3	36	6.8 U	5.1 J	6.8 U	5.4 J	50.7	54	6.8 U	5.9 UJ	6.8 U	10	68.9 J	22	NA
Zinc	21.5 UJ	**340**	13.9 UJ	16.0 UJ	7.8 UJ	**390**	15.6 UJ	300 UJ	8.8 UJ	**260**	39.2	27.0 UJ	15.1 UJ	**250**	81

Notes:
Results less than 10 are reported to two significant figures, and results greater than 10 are reported to three significant figures.
Bold text indicates that results are above chronic AWQC.

µg/L Micrograms per liter
AWQC Ambient water quality criteria
CLP Contract laboratory program
ID Identification
J Estimated value
NA Not applicable
U Not detected, with detection limit indicated

TABLE 5: COMPARISON BETWEEN 1997 AND 2003 ORGANIC COMPOUND CONCENTRATIONS IN GROUNDWATER

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWSSBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW001	TLSMW002	TLSMW002	TLSMW003	TLSMW003	TLSMW004	TLSMW004	TLSMW005	TLSMW005	TLSMW006	TLSMW006	TLSMW007	TLSMW007
Sample ID Number:	**281TLSGW01**	**04501GW001**	**281TLSGW02**	**04501GW002**	**281TLSGW03**	**04501GW003**	**281TLSGW04**	**04501GW004**	**281TLSGW05**	**04501GW005**	**281TLSGW06**	**04501GW006**	**281TLSGW07**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**10/10/1997**	**7/25/2003**	**10/10/1997**	**7/23/2003**	**10/7/1997**	**7/25/2003**	**10/6/1997**	**7/23/2003**	**10/7/1997**	**7/22/2003**	**10/9/1997**	**7/22/2003**	**10/15/1997**	**7/24/2003**
Low-Level Volatile Organic Compounds (µg/L)														
1,1,1-Trichloroethane	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,1,2,2-Tetrachloroethane	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,1,2-Trichloroethane	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,1-Dichloroethane	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,1-Dichloroethene	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,2-Dichloroethane	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
1,2-Dichloroethene (Total)	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
1,2-Dichloropropane	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
2-Butanone	5 U	NA	5 U	NA	14	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA
2-Hexanone	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA
4-Methyl-2-Pentanone	1 J	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA
Acetone	6 UJ	NA	10 UJ	NA	77 UJ	NA	5 U	NA	5 U	NA	10 UJ	NA	14 UJ	NA
Benzene	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
Bromodichloromethane	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
Bromoform	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
Bromomethane	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 UJ	NA	1 U	NA
Carbon disulfide	2	NA	1 U	NA	10	NA	1 U	NA	1 U	NA	1 UJ	NA	2 J	NA
Carbon tetrachloride	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 UJ	NA	0.5 UJ	NA
Chlorobenzene	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
Chloroethane	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 UJ	NA	1 U	NA
Chloroform	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
Chloromethane	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
cis-1,3-Dichloropropene	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
Dibromochloromethane	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
Ethylbenzene	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
Methylene chloride	2 UJ	NA	2 UJ	NA	2 UJ	NA	2 UJ	NA	2 UJ	NA	2 UJ	NA	3 UJ	NA
Styrene	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
Tetrachloroethene	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
Toluene	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
trans-1,3-Dichloropropene	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
Trichloroethene	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
Vinyl chloride	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
Xylene (total)	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA
Volatile Organic Compounds (in µg/L)														
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (Total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-Pentanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 5: COMPARISON BETWEEN 1997 AND 2003 ORGANIC COMPOUND CONCENTRATIONS IN GROUNDWATER

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWSSBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW001	TLSMW002	TLSMW002	TLSMW003	TLSMW003	TLSMW004	TLSMW004	TLSMW005	TLSMW005	TLSMW006	TLSMW006	TLSMW007	TLSMW007
Sample ID Number:	**281TLSGW01**	**04501GW001**	**281TLSGW02**	**04501GW002**	**281TLSGW03**	**04501GW003**	**281TLSGW04**	**04501GW004**	**281TLSGW05**	**04501GW005**	**281TLSGW06**	**04501GW006**	**281TLSGW07**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**10/10/1997**	**7/25/2003**	**10/10/1997**	**7/23/2003**	**10/7/1997**	**7/25/2003**	**10/6/1997**	**7/23/2003**	**10/7/1997**	**7/22/2003**	**10/9/1997**	**7/22/2003**	**10/15/1997**	**7/24/2003**
Volatile Organic Compounds (in µg/L) (Continued)														
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylene (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds, Method 8260 (µg/L)														
1,1,1-Trichloroethane	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,1,2,2-Tetrachloroethane	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,1,2-Trichloroethane	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,1-Dichloroethane	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,1-Dichloroethene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,2-Dichloroethane	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,2-Dichloroethene (Total)	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,2-Dichloropropane	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
2-Butanone	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U
2-Hexanone	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U
4-Methyl-2-Pentanone	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U
Acetone	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U
Benzene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Bromodichloromethane	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Bromoform	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
Bromomethane	NA	1 U	NA	1 U	NA	1 U	NA	1 UJ	NA	1 U	NA	1 U	NA	1 U
Carbon disulfide	NA	2	NA	3	NA	6	NA	0.5 U	NA	0.5 U	NA	12	NA	12
Carbon tetrachloride	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Chlorobenzene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Chloroethane	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
Chloroform	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Chloromethane	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U
cis-1,3-Dichloropropene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Dibromochloromethane	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Ethylbenzene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Methylene chloride	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U
Styrene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Tetrachloroethene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Toluene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
trans-1,3-Dichloropropene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Trichloroethene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Vinyl acetate	NA	10 U	NA	10 UJ	NA	10 U	NA	10 UJ	NA	10 U	NA	10 U	NA	10 UJ
Vinyl chloride	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Xylene (total)	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Semivolatile Organic Compounds (µg/L)														
1,2,4-Trichlorobenzene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
1,2-Dichlorobenzene	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA	25 U	NA
1,3-Dichlorobenzene	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA	25 U	NA
1,4-Dichlorobenzene	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA	5 U	NA	25 U	NA
2,2'-Oxybis(1-Chloropropane)	10 UJ	NA	10 UJ	NA	10 UJ	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
2,4,5-Trichlorophenol	25 U	NA	25 U	NA	25 U	NA	25 U	NA	25 U	NA	25 U	NA	120 U	NA
2,4,6-Trichlorophenol	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
2,4-Dichlorophenol	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
2,4-Dimethylphenol	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
2,4-Dinitrophenol	25 U	NA	25 U	NA	25 UJ	NA	25 UJ	NA	25 UJ	NA	25 UJ	NA	120 U	NA
2,4-Dinitrotoluene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 UJ	NA
2,6-Dinitrotoluene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 UJ	NA
2-Chloronaphthalene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
2-Chlorophenol	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
2-Methylnaphthalene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
2-Methylphenol	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
2-Nitroaniline	25 U	NA	25 U	NA	25 UJ	NA	25 UJ	NA	25 UJ	NA	25 U	NA	120 U	NA
2-Nitrophenol	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
3,3'-Dichlorobenzidine	10 U	NA	10 U	NA	10 UJ	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
3-Nitroaniline	25 U	NA	25 U	NA	25 UJ	NA	25 U	NA	25 U	NA	25 U	NA	120 U	NA

TABLE 5: COMPARISON BETWEEN 1997 AND 2003 ORGANIC COMPOUND CONCENTRATIONS IN GROUNDWATER

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWSSBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW001	TLSMW002	TLSMW002	TLSMW003	TLSMW003	TLSMW004	TLSMW004	TLSMW005	TLSMW005	TLSMW006	TLSMW006	TLSMW007	TLSMW007
Sample ID Number:	**281TLSGW01**	**04501GW001**	**281TLSGW02**	**04501GW002**	**281TLSGW03**	**04501GW003**	**281TLSGW04**	**04501GW004**	**281TLSGW05**	**04501GW005**	**281TLSGW06**	**04501GW006**	**281TLSGW07**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**10/10/1997**	**7/25/2003**	**10/10/1997**	**7/23/2003**	**10/7/1997**	**7/25/2003**	**10/6/1997**	**7/23/2003**	**10/7/1997**	**7/22/2003**	**10/9/1997**	**7/22/2003**	**10/15/1997**	**7/24/2003**
Semivolatile Organic Compounds (µg/L) (Continued)														
4,6-Dinitro-2-Methylphenol	25 U	NA	25 U	NA	25 UJ	NA	25 U	NA	25 UJ	NA	25 U	NA	120 U	NA
4-Bromophenyl-Phenylether	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
4-Chloro-3-Methylphenol	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
4-Chloroaniline	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
4-Chlorophenyl-Phenylether	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
4-Methylphenol	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
4-Nitroaniline	25 U	NA	25 U	NA	25 U	NA	25 U	NA	25 U	NA	25 U	NA	120 U	NA
4-Nitrophenol	25 U	NA	25 U	NA	25 UJ	NA	25 UJ	NA	25 U	NA	25 UJ	NA	120 U	NA
Acenaphthene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Acenaphthylene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Anthracene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Benzo(a)anthracene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Benzo(a)pyrene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Benzo(b)fluoranthene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Benzo(g,h,i)perylene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Benzo(k)fluoranthene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Bis(2-chloroethoxy)methane	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Bis(2-chloroethyl)ether	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Bis(2-ethylhexyl)phthalate	38	NA	4 U	NA	4 U	NA	4 U	NA	4 U	NA	4 U	NA	20 U	NA
Butylbenzylphthalate	10 UJ	NA	10 UJ	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Carbazole	10 U	NA	10 U	NA	10 U	NA	10 UJ	NA	10 U	NA	10 U	NA	50 U	NA
Chrysene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Di-n-butylphthalate	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Di-n-octylphthalate	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Dibenz(a,h)anthracene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Dibenzofuran	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Diethylphthalate	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Dimethylphthalate	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Fluoranthene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Fluorene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Hexachlorobenzene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Hexachlorobutadiene	10 U	NA	10 U	NA	10 U	NA	10 UJ	NA	10 U	NA	10 U	NA	50 U	NA
Hexachlorocyclopentadiene	10 UJ	NA	10 UJ	NA	10 UJ	NA	10 UJ	NA	10 U	NA	10 U	NA	50 U	NA
Hexachloroethane	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Indeno(1,2,3-cd)pyrene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Isophorone	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
N-nitroso-di-n-propylamine	10 U	NA	10 U	NA	10 UJ	NA	10 U	NA	10 UJ	NA	10 U	NA	50 U	NA
N-nitrosodiphenylamine (1)	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Naphthalene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Nitrobenzene	10 U	NA	10 U	NA	10 UJ	NA	10 UJ	NA	10 U	NA	10 U	NA	50 U	NA
Pentachlorophenol	25 U	NA	25 U	NA	25 U	NA	25 UJ	NA	25 U	NA	25 U	NA	120 U	NA
Phenanthrene	10 U	NA	10 U	NA	10 U	NA	1 J	NA	10 U	NA	10 U	NA	50 U	NA
Phenol	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Pyrene	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	50 U	NA
Semivolatile Organic Compounds, Method 8270 (µg/L)														
1,2,4-Trichlorobenzene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
1,2-Dichlorobenzene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
1,3-Dichlorobenzene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
1,4-Dichlorobenzene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2,4,5-Trichlorophenol	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2,4,6-Trichlorophenol	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2,4-Dichlorophenol	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2,4-Dimethylphenol	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2,4-Dinitrophenol	NA	48 U	NA	47 U	NA	49 U	NA	48 U	NA	47 U	NA	50 U	NA	48 U
2,4-Dinitrotoluene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2,6-Dinitrotoluene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2-Chloronaphthalene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2-Chlorophenol	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2-Methylnaphthalene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2-Methylphenol	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
2-Nitroaniline	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	20 U	NA	19 U
2-Nitrophenol	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	20 U	NA	19 U

TABLE 5: COMPARISON BETWEEN 1997 AND 2003 ORGANIC COMPOUND CONCENTRATIONS IN GROUNDWATER

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWSSBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW001	TLSMW002	TLSMW002	TLSMW003	TLSMW003	TLSMW004	TLSMW004	TLSMW005	TLSMW005	TLSMW006	TLSMW006	TLSMW007	TLSMW007
Sample ID Number:	**281TLSGW01**	**04501GW001**	**281TLSGW02**	**04501GW002**	**281TLSGW03**	**04501GW003**	**281TLSGW04**	**04501GW004**	**281TLSGW05**	**04501GW005**	**281TLSGW06**	**04501GW006**	**281TLSGW07**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**10/10/1997**	**7/25/2003**	**10/10/1997**	**7/23/2003**	**10/7/1997**	**7/25/2003**	**10/6/1997**	**7/23/2003**	**10/7/1997**	**7/22/2003**	**10/9/1997**	**7/22/2003**	**10/15/1997**	**7/24/2003**
Semivolatile Organic Compounds Method 8270 (µg/L) (Continued)														
3,3'-Dichlorobenzidine	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	20 U	NA	19 U
3-Nitroaniline	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	20 U	NA	19 U
4,6-Dinitro-2-Methylphenol	NA	48 U	NA	47 U	NA	49 U	NA	48 U	NA	47 U	NA	50 U	NA	48 U
4-Bromophenyl-Phenylether	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
4-Chloro-3-Methylphenol	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
4-Chloroaniline	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
4-Chlorophenyl-Phenylether	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
4-Methylphenol	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
4-Nitroaniline	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	20 U	NA	19 U
4-Nitrophenol	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	20 U	NA	19 U
Acenaphthene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Acenaphthylene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Anthracene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Benzo(a)anthracene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Benzo(a)pyrene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Benzo(b)fluoranthene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Benzo(g,h,i)perylene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Benzo(k)fluoranthene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Bis(2-chloroethoxy)methane	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Bis(2-chloroethyl)ether	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Bis(2-chloroisopropyl)ether	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Bis(2-ethylhexyl)phthalate	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Butylbenzylphthalate	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Carbazole	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Chrysene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Di-n-butylphthalate	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Di-n-octylphthalate	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Dibenz(a,h)anthracene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Dibenzofuran	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Diethylphthalate	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Dimethylphthalate	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Fluoranthene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Fluorene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Hexachlorobenzene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Hexachlorobutadiene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Hexachlorocyclopentadiene	NA	48 U	NA	47 U	NA	49 U	NA	48 U	NA	47 U	NA	50 U	NA	48 U
Hexachloroethane	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Indeno(1,2,3-cd)pyrene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Isophorone	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
N-nitroso-di-n-propylamine	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
N-nitrosodimethylamine	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
N-nitrosodiphenylamine (1)	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Naphthalene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Nitrobenzene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Pentachlorophenol	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	19 U	NA	20 U	NA	19 U
Phenanthrene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Phenol	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Pyrene	NA	10 U	NA	9 U	NA	10 U	NA	10 U	NA	9 U	NA	10 U	NA	10 U
Petroleum Indicators (mg/L)														
Gasoline c7-c12	NA	0.05 U	NA	0.05 U	NA	0.05 UJ	NA	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.03 J
Petroleum Indicators - Silica Gel (mg/L)														
Diesel c10-c24(sgcu)	NA	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.05 U
Motor oil c24-c36(sgcu)	NA	0.3 U	NA	0.3 U	NA	0.3 U	NA	0.3 U	NA	0.3 U	NA	0.3 U	NA	0.3 U
Explosives (µg/L)														
Perchlorate	NA	100 U	NA	100 U	NA	100 U	NA	20 U	NA	8 U	NA	40 U	NA	100 U

Notes: Results less than 10 are reported to one significant figure and results greater than 10 are reported to two significant figures.

µg/L Micrograms per liter
ID Identification
J Estimated value
mg/L Milligrams per liter
NA Not analyzed
U Not detected, with detection limit indicated

TABLE 6: STATISTICAL COMPARISON OF TOTAL METAL CONCENTRATIONS IN 1997 AND 2003
Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

	1997				2003				Probability that the Average Difference in Concentration Between Years is Zero[1]			
	Sample Size		Detection	Median	Sample Size		Detection	Median				Direction of
Chemical	Detected	Total	Frequency (%)	(µg/L)	Detected	Total	Frequency	(µg/L)	t-Test	Signed-Rank Test	Conclusion	Change
Aluminum	3	7	43	38	4	7	57	380	0.06	0.05	S	2003 > 1997
Antimony	0	7	0	1.7	0	7	0	60	Not Tested	Not Tested	N/A	N/A
Arsenic	6	7	86	14	5	7	71	15	0.37	0.69	NS	N/A
Barium	7	7	100	189	7	7	100	240	0.61	0.69	NS	N/A
Beryllium	3	7	43	0.58	0	7	0	2	Not Tested	Not Tested	N/A	N/A
Cadmium	0	7	0	0.40	0	7	0	5	Not Tested	Not Tested	N/A	N/A
Calcium	7	7	100	247,000	7	7	100	270,000	0.24	0.33	NS	N/A
Chromium	2	7	29	4.6	6	7	86	21	0.27	0.08	NS	N/A
Cobalt	0	7	0	6	0	7	0	20	Not Tested	Not Tested	N/A	N/A
Copper	1	7	14	5.8	3	7	43	10	<0.01	0.02	S	2003 > 1997
Iron	7	7	100	957	5	7	71	7,300	0.03	0.08	S	2003 > 1997
Lead	0	7	0	2.6	1	7	14	3	Not Tested	Not Tested	N/A	N/A
Magnesium	7	7	100	462,000	7	7	100	600,000	0.28	0.30	NS	N/A
Manganese	7	7	100	639	5	7	71	1,000	0.35	0.58	NS	N/A
Mercury[2]	1	7	14	0.13	4	7	57	0.2	0.17	0.31	NS	N/A
Molybdenum	7	7	100	72	2	7	29	20	0.26	0.30	NS	N/A
Nickel	5	7	71	55	6	7	86	22	0.77	0.94	NS	N/A
Potassium	7	7	100	103,000	7	7	100	130,000	0.99	0.89	NS	N/A
Selenium	0	7	0	3.3	0	7	0	5	Not Tested	Not Tested	N/A	N/A
Silver	0	7	0	1.10	0	7	0	5	Not Tested	Not Tested	N/A	N/A
Sodium	7	7	100	3,230,000	7	7	100	4,700,000	0.16	0.11	NS	N/A
Thallium	2	7	29	1.5	2	7	29	5	0.19	0.02	S	2003 > 1997
Vanadium	3	7	43	6.8	6	7	86	10	0.24	0.47	NS	N/A
Zinc	1	7	14	15.1	4	7	57	260	0.01	0.05	S	2003 > 1997

Notes:

1 Probabilities associated with parametric (paired-difference t-test) and nonparametric (signed-rank test) statistical tests that the mean difference in concentration between years is zero.
If the probability of either test is less than or equal to 0.05 (5 percent), then it is concluded that the magnitude of change is significantly different from zero
These are two-sided probabilities for the null hypothesis that the net difference between years is zero.
Statistical tests were not performed for any chemical not detected in at least one year.

2 Total mercury.

µg/L Micrograms per liter

N/A Not applicable

NS Magnitude of change between years is not statistically different

S Magnitude of change between years is statistically different based on the results of at least one test

TABLE 7: COMPARISON OF FIELD DUPLICATE RELATIVE PERCENT DIFFERENCE

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWSSBD Concord, Concord, California

Analyte	TLSMW005 Original (µg/L)	TLSMW005 Field Duplicate (µg/L)	Relative Percent Difference (%)
Barium	21	23	9.1
Calcium	8300	8,000	3.7
Chromium	21	19	10
Iron	7100	5,000	34.7
Magnesium	16000	16,000	0
Manganese	270	240	11.8
Molybdenum	130	120	8
Nickel	460	430	6.7
Potassium	21000	21,000	0
Sodium	840000	790,000	6.1
Zinc	260	180	36.4

Note:

µg/L Micrograms per liter

APPENDIX A
PHOTOGRAPHS

Photograph A-1: View of flooded Site 2 area looking southwest toward TLSMW002 from TLSMW003

Photograph A-2: Monitoring water level during low-flow purge of well TLSMW003

Photograph A-3: Low-flow purging set-up at TLSMW004 showing water level meter, peristaltic pump, and water quality meter / flow cell unit

Photograph A-4: Bailing well TLSMW007 using disposable bailer

Photograph A-5: Setting up for low-flow purging at TLSMW003

APPENDIX B
MONITORING WELL SAMPLING SHEETS

TETRA TECH EM INC.
MONITORING WELL SAMPLING SHEET

Date: 7-23-03

Monitoring Well No.: TLSMW0007 Chain of Custody No.: 4715

Personnel: R. Yerimen, D. Sterling, A. Teo

Organic Vapor Concentration TOC: 0.0 ppm Breathing Zone: 00 ppm

Depth to Well Bottom: 17.7 ft. Well Volume: 2-inch well = water column x 0.163 gal/ft
3-inch well = water column x 0.367 gal/ft
4-inch well = water column x 0.652 gal/ft

Depth to Water: 1.45 ft.

Water Column: 16.25 ft. Well Volume Calculation: 10.60 gal

	Time	Vol. Purged (L)	Flow Rate (L/min)	Water Level (btoc)	pH	Conductivity (mS/cm)	Temperature (°C/°F)	Turbidity (NTU)	D. O. (mg/L)	O. R. P. ( )
	1046.0	0	—	1.45	8.75	0.029	24.61	79.6	8.79	-214.9
	1049.0	0.5	0.17	1.57	8.46	0.032	24.42	4.9	8.40	-204.5
	1052.5	1.0	0.14	1.71	7.45	0.033	24.38	9.9	7.83	-214.2
	1055.5	1.5	0.17	1.81	7.31	0.033	24.26	4.6	7.02	-225.3
→	1059.0	2.0	0.14	1.92	7.27	0.034	24.28	4.9	5.60	-232.8
	1102.5	4.0	0.57	2.41	7.20	0.035	24.65	6.0	3.83	-239.9
	1105.5	6.0	0.67	2.75	7.18	0.036	24.64	98.7	3.11	-244.5
* →	1108.0	7.5	0.60	3.20	7.15	0.036	25.10	4.4	2.41	-248.4
	1112.0	8.0	0.13	3.25	7.18	0.037	25.78	3.6	2.02	-254.7
	1117.0	8.5	0.10	3.27	7.18	0.038	26.64	7.7	1.79	-258.2
	1122.0	9.0	0.10	3.31	7.18	0.037	27.91	58.3	1.59	-261.5
** →	1127.0	9.5	0.10	3.36	7.14	0.037	27.81	45.1	1.41	-268.2
	1240.0	120 L	—	dry	6.96	17.65	16.85	768	1.25	-238.8
7-24-03 Sample	1100	—	—	2.06	7.04	21.32	20.47	60.2	1.15	-319.4
	sampled w/ peristaltic pump									

Begin Purge: 1046.0 Method of Purging: peristaltic pump / disposable bailer Purged Dry? Yes

End Purge: 1240.0 Total Volume Purged: 120 L How Measured? graduated pitcher

QA/QC Sample Collected Here? ☐ Duplicate ☐ Matrix Spike ☐ Equip. Blank ☒ No QA/QC Sample

Date and Time of Sample Collection: 7-24-03 1100 Sample Number (s): 045016W0007

Comments: → initiate modified low-flow * → return to slower pump rate after dropping water level to induce recharge; ** → low-flow purging not feasible due to draw-down of water column

TETRA TECH EM INC.
MONITORING WELL SAMPLING SHEET

Date: 7-23-2003

Monitoring Well No.: TLSMW002 Chain of Custody No.: 4714

Personnel: R. Vernimen, D. Sterling, A. Teo

Organic Vapor Concentration TOC: 0.0 ppm Breathing Zone: 0.0 ppm

Depth to Well Bottom: 17.5 ft.

Depth to Water: 1.41 ft.

Water Column: 16.09 ft.

Well Volume: 2-inch well = water column x 0.163 gal/ft
3-inch well = water column x 0.367 gal/ft
(4)-inch well = water column x 0.652 gal/ft

Well Volume Calculation: 10.49 gal

	Time	Vol. Purged (L)	Flow Rate (L/min)	Water Level (btoc)	pH	Conductivity (mS/cm)	Temperature (°C/°F)	Turbidity (NTU)	D. O. (mg/L)	O. R. P. (mV)
	1330.0	0	—	1.41	8.21	0.066	24.51	0.1	3.83	-148.1
	1333.0	0.5	0.17	1.55	8.12	0.068	24.34	0.2	4.53	-144.2
	1338.0	1.0	0.10	1.65	8.06	0.069	24.53	0.3	5.25	-145.1
	1342.0	1.5	0.13	1.75	8.01	0.069	24.59	0.4	5.61	-147.8
→	1347.0	2.0	0.10	1.92	8.00	0.069	24.70	0.5	5.89	-161.7
	1350.0	4.0	0.67	2.40	7.98	0.069	24.92	11.4	5.94	-190.9
	1352.5	6.0	0.80	2.80	7.86	0.070	25.08	12.5	5.93	-214.8
* →	1355.0	8.0	0.80	3.20	7.77	0.072	25.11	26.2	5.82	-219.6
	1400.0	8.5	0.10	3.06	7.54	0.077	25.23	0.2	5.25	-257.0
	1404.5	9.0	0.11	3.06	7.36	0.081	25.50	0.2	3.51	-295.5
	1409.0	9.5	0.11	3.06	7.23	0.081	25.60	0.3	1.80	-299.0
	1413.5	10.0	0.11	3.06	7.23	0.083	26.00	0.8	0.69	-301.3

Begin Purge: 1330.0 Method of Purging peristaltic pump Purged Dry? no

End Purge: 1413.5 Total Volume Purged: 10.0L How Measured? graduated pitcher

QA/QC Sample Collected Here? ☐ Duplicate ☐ Matrix Spike ☐ Equip. Blank ☒ No QA/QC Sample

Date and Time of Sample Collection: 7-23-03 1420 Sample Number (s): 045016W002

Comments: → initiated modified low-flow * → resumed slower flow rate

well stick up surrounded by ~2ft. water

TETRA TECH EM INC.
MONITORING WELL SAMPLING SHEET

Date: 7-24-03

Monitoring Well No.: TLSMW0001 Chain of Custody No.: 4716

Personnel: D. Sterling, R. Vernimen

Organic Vapor Concentration TOC: 0 ppm Breathing Zone: 0 ppm

Depth to Well Bottom: 17.5 ft. Well Volume: 2-inch well = water column x 0.163 gal/ft
3-inch well = water column x 0.367 gal/ft
4-inch well = water column x 0.652 gal/ft

Depth to Water: 1.14 ft.

Water Column: 16.36 ft. Well Volume Calculation: 10.67 gal

	Time	Vol. Purged (L)	Flow Rate (L/min)	Water Level (btoc)	pH	Conductivity (mS/cm)	Temperature (°C/°F)	Turbidity (NTU)	D. O. (mg/L)	O. R. P. ( )
	0836.0	0	—	1.14	6.57	35.25	19.24	6.2	1.09	-277.2
	0841.0	0.5	0.10	1.41	6.46	35.18	19.36	18.8	0.62	-296.4
	0846.0	1.0	0.10	1.55	6.45	34.85	19.29	12.9	0.20	-309.2
	0851.0	1.5	0.10	1.69	6.45	34.72	19.25	10.9	0.57	-312.1
→	0855.5	2.0	0.11	1.81	6.44	34.69	19.25	7.2	0.74	-312.4
	0858.5	4.0	0.67	2.50	6.45	32.99	18.19	11.5	0.77	-314.8
	0901.0	6.0	0.90	3.05	6.47	31.90	18.36	0.3	0.75	-315.4
* →	0902.0	6.5	0.50	3.20	6.47	31.83	18.58	19.1	0.74	-317.4
	0906.0	7.0	0.13	3.22	6.46	33.02	19.20	19.0	0.71	-316.9
	0912.0	7.5	0.08	3.24	6.46	34.42	19.52	2.8	0.91	-319.6
** →	0918.5	8.0	0.08	3.25	6.46	34.87	19.48	60.0	0.97	-317.2
	0923.0	10.0	0.44	3.87	6.50	29.72	18.43	21.3	0.84	-323.2
*** →	0925.5	11.5	0.60	4.20	6.55	27.71	18.61	5.6	0.71	-324.8
	0931.0	12.0	0.09	4.21	6.48	33.43	19.04	0.5	0.57	-315.7
	0935.5	12.5	0.11	4.22	6.47	33.63	19.21	0.4	0.89	-312.1
☆	0941.0	13.0	0.11	4.23	6.47	33.64	19.59	1.0	0.99	-319.0
	1025.0	72.0	—	dry	6.63	32.32	16.89	240.7	1.56	-312.0
sample 7-25-03 1000	1000.0	—	—	1.38	7.30	40.71	17.85	32.2	4.39	-226.5

w/peristaltic pump

Begin Purge: 0836.0 Method of Purging peri. pump & baiks Purged Dry? yes

End Purge: 1025.0 Total Volume Purged: 72.0 L How Measured? graduated pitcher

QA/QC Sample Collected Here? ☐ Duplicate ☐ Matrix Spike ☐ Equip. Blank ☒ No QA/QC Sample

Date and Time of Sample Collection: 7-25-03 1000 Sample Number (s): 045016W0001

Comments: → modified low-flow method started (increased pump rate to drop water level, to induce recharge) * → resume slower flow rate

** → 2nd try at inducing recharge *** → resume slower flow rate on '3rd try'

☆ low-flow not feasible; will bail well Well stick-up surrounded by ~2ft. of water

TETRA TECH EM INC.
MONITORING WELL SAMPLING SHEET

Date: 7-25-03

Monitoring Well No.: TLSMW0003 Chain of Custody No.: 4716

Personnel: R. Verninen, D. Sterling

Organic Vapor Concentration TOC: 0.0 ppm Breathing Zone: 0.0 ppm

Depth to Well Bottom: 16.9 ft.

Depth to Water: 2.02 ft.

Water Column: 14.88 ft.

Well Volume: 2-inch well = water column x 0.163 gal/ft
3-inch well = water column x 0.367 gal/ft
(4)-inch well = water column x 0.652 gal/ft

Well Volume Calculation: 9.70 gal

Time	Vol. Purged (L)	Flow Rate (L/min)	Water Level (btoc)	pH	Conductivity (mS/cm)	Temperature (C/°F)	Turbidity (NTU)	D. O. (mg/L)	O. R. P. ( )
0854.0	0	—	2.02	6.99	65.65	17.45	4.4	2.73	-348.7
0859.0	0.5	0.10	2.27	6.92	69.14	17.25	13.0	0.83	-361.4
→ 0904.5	1.0	0.09	2.44	6.91	70.46	17.32	102.4	0.67	-363.0
0908.5	3.0	0.50	3.05	6.90	70.63	17.02	4.4	1.00	-362.0
0911.5	5.0	0.67	3.60	6.90	71.37	17.40	86.2	1.09	-364.9
0914.5	7.0	0.67	4.10	6.91	71.82	17.76	5.1	1.22	-367.4
0916.5	9.0	1.0	4.55	6.93	71.24	18.01	4.6	1.29	-368.5
* → 0919.5	11.0	0.67	4.95	6.97	66.61	18.27	4.0	1.23	-369.6
0925.0	11.5	0.09	4.55	6.96	66.76	18.30	2.6	0.98	-366.2
0929.5	12.0	0.11	4.31	6.89	67.43	18.36	2.7	0.86	-364.5
0934.5	12.5	0.10	4.10	6.85	69.43	18.26	4.3	0.73	-362.2
0939.5	13.0	0.10	3.95	6.83	71.36	18.23	4.4	0.66	-365.9

Begin Purge: 0854.0 Method of Purging peristaltic pump Purged Dry? dry

End Purge: 0939.5 Total Volume Purged: 13.0 L How Measured? graduated pitcher

QA/QC Sample Collected Here? ☐ Duplicate ☐ Matrix Spike ☐ Equip. Blank ☒ No QA/QC Sample

Date and Time of Sample Collection: 7-25-03 0945 Sample Number (s): 045016GW0003

Comments: well surrounded by 1.0 ft. of water, well cap corroded on; had to be hammered off. → initiated modified low-flow * → resume slower flow rate

TETRA TECH EM INC.
MONITORING WELL SAMPLING SHEET

Date: 7-22-03

Monitoring Well No.: TLSMW0006 Chain of Custody No.: 4713

Personnel: R. Vernimen, D. Sterling, A. Teo

Organic Vapor Concentration TOC: 0.0 ppm Breathing Zone: 0.0 ppm

Depth to Well Bottom: 20.17 ft.

Depth to Water: 7.27 ft.

Water Column: 12.90 ft.

Well Volume: 2-inch well = water column x 0.163 gal/ft
3-inch well = water column x 0.367 gal/ft
4-inch well = water column x 0.652 gal/ft

Well Volume Calculation: 8.41 gal

	Time	Vol. Purged (L)	Flow Rate (L/min)	Water Level (btoc)	pH	Conductivity (mS/cm)	Temperature (°C °F)	Turbidity (NTU)	D. O. (mg/L)	O. R. P. (mV)
	0903.0	—	—	7.27	6.38	16.65	21.70	0.4	3.59	-25.1
	0906.5	0.5	0.14	7.57	6.32	16.49	20.12	0.3	0.97	-26.1
→	0909.5	1.0	0.17	7.71	6.31	16.43	19.95	0.5	0.75	-24.5
	0912.0	2.0	0.40		6.31	16.09	18.98	392.7	0.56	-25.8
	0914.0	3.0	0.50	8.34	6.30	16.03	18.97	45.3	0.47	-29.5
	0915.0	4.0	1.00	8.59	6.30	16.04	19.06	99.8	0.45	-36.2
	0917.0	5.0	0.50	8.81	6.35	15.89	19.16	15.1	0.41	-58.2
	0919.0	6.0	0.50	~~8.90~~ 8.90	6.47	15.38	19.42	6.9	0.36	-76.0
←	0921.5	6.5	0.20	~~8.95~~ 8.95	6.51	15.34	19.90	10.3	0.37	-79.4
	0924.5	7.0	0.17	8.91	6.55	15.39	19.99	13.0	0.37	-81.5
	0926.5	7.5	0.25	8.88	6.56	15.38	20.09	12.3	0.36	-81.1
	0929.0	8.0	0.20	8.85	6.56	15.38	20.11	18.5	0.36	-83.1
	0933.0	9.0	0.25	8.84	6.55	15.33	20.12	13.6	0.36	-85.3
	0938.0	10.0	0.29	8.71	6.55	15.38	20.35	13.4	0.27	-85.7

Begin Purge: 0903.0 Method of Purging peristaltic pump Purged Dry? NO

End Purge: 0938.0 Total Volume Purged: 10.0L How Measured? graduated pitcher

QA/QC Sample Collected Here? ☐ Duplicate ☑ Matrix Spike & MS/D ☐ Equip. Blank ☐ No QA/QC Sample

Date and Time of Sample Collection: 7-22-03 0945 Sample Number (s): 045016W0006

Comments: → start modified low flow ← lowered flow rate

TETRA TECH EM INC.
MONITORING WELL SAMPLING SHEET

Date: 7-22-03

Monitoring Well No.: TLSMW005 Chain of Custody No.: 4713

Personnel: R. Vernimen, D. Sterling, A. Teo

Organic Vapor Concentration TOC: 0.0 ppm Breathing Zone: 0.0 ppm

Depth to Well Bottom: 20.15 ft.

Depth to Water: 7.37 ft.

Water Column: 12.78 ft.

Well Volume: 2-inch well = water column x 0.163 gal/ft
3-inch well = water column x 0.367 gal/ft
(4)-inch well = water column x 0.652 gal/ft

Well Volume Calculation: 8.33 gal

Time	Vol. Purged (L)	Flow Rate (L/min)	Water Level (btoc)	pH	Conductivity (mS/cm)	Temperature (°C/°F)	Turbidity (NTU)	D. O. (mg/L)	O. R. P. ( )
1114	0	—	7.37	7.99	3.987	24.72	20.5	3.20	135.7
1116.5	0.5	0.20	7.65	7.60	3.486	22.00	354.8	1.14	208.0
1119.5	1.0	0.17	7.78	7.52	3.400	21.78	16.3	0.91	239.3
* 1122.5	1.5	0.17	7.91	7.48	3.374	21.72	17.3	0.76	267.4
→ 1125.0	2.0	0.20	8.06	7.46	3.372	21.87	21.5	0.70	283.7
1130.0	4.0	0.40	8.68	7.33	3.226	19.91	77.5	0.50	310.3
* → 1133.5	~~6.0~~ 5.5 SW	0.43	9.03	7.32	3.216	20.13	39.4	0.47	322.5
1135.5	6.0	0.25	9.11	7.36	3.286	21.16	29.0	0.49	327.5
1139.0	6.5	0.14	9.17	7.42	3.351	22.05	23.0	0.53	331.5
1142.0	7.0	0.17	9.20	7.46	3.366	22.18	21.3	0.54	335.8
1145.0	7.5	0.17	9.20	7.49	3.380	22.54	20.5	0.56	341.3
1149.0	8.0	0.13	9.22	7.52	3.404	22.81	16.7	0.59	347.5
1156.5	~~8.5~~ 9.0 SW	0.13	9.22	7.53	3.388	22.58	13.7	0.63	353.2
1202.0	9.5	0.10	9.20	7.55	3.474	22.60	9.2	0.66	356.9
1206.5	10.0	0.11	9.18	7.57	3.448	22.65	15.6	0.64	357.1
1211.0	10.5	0.11	9.17	7.55	3.457	22.68	7.6	0.64	359.7

Begin Purge: 1114.0 Method of Purging peristaltic pump Purged Dry? no

End Purge: 1211.0 Total Volume Purged: 10.5 L How Measured? graduated pitcher

QA/QC Sample Collected Here? ☑ Duplicate ☐ Matrix Spike ☐ Equip. Blank ☐ No QA/QC Sample

Date and Time of Sample Collection: 7-22-03 / 1220 7-22-03 1230 Sample Number (s): 1220 045016WD005 1230 045016WD006

Comments: → Modified low-flow initiated * → resumed slower flow rate

TETRA TECH EM INC.
MONITORING WELL SAMPLING SHEET

Date: 7-22-03

Monitoring Well No.: TLSMW004 Chain of Custody No.: 4713

Personnel: R. Vermimen, D. Sterling, A. Teo

Organic Vapor Concentration TOC: 0.0 ppm Breathing Zone: 0.0 ppm

Depth to Well Bottom: 20.40 ft.

Depth to Water: 7-22 8.55 / 7-23 @ 8.56 0840 ft.

Water Column: 11.85 ft.

Well Volume: 2-inch well = water column x 0.163 gal/ft
3-inch well = water column x 0.367 gal/ft
(4)-inch well = water column x 0.652 gal/ft

Well Volume Calculation: 7.73 gal

	Time	Vol. Purged (L)	Flow Rate (L/min)	Water Level (btoc)	pH	Conductivity (mS/cm)	Temperature (°C/°F)	Turbidity (NTU)	D. O. (mg/L)	O. R. P. ( )
	1350.5	0	—	8.55	8.67	6.138	21.75	0.3	1.39	147.2
	1352.5	0.5	0.25	8.85	8.49	5.901	21.04	-0.3	0.61	217.1
	1356.5	1.0	0.13	9.00	8.51	6.113	23.29	-0.2	0.66	277.3
→	1401.5	1.5	0.10	9.10	8.47	5.864	20.46	0.2	0.43	314.7
	1405.0	3.5	0.45	9.83	8.29	5.651	19.52	263.5	0.32	331.1
	1407.0	4.5	0.50	10.20	8.29	5.657	19.56	458.5	0.30	337.6
	1410.5	5.0	0.14	10.30	8.44	5.918	21.80	4.1	0.36	337.3
	1414.0	5.5	0.14	10.44	8.48	6.009	22.12	0.2	0.39	338.4
	1417.5	6.0	0.14	10.52	8.49	6.007	22.00	3.0	0.38	339.3
⊠→	1421.0	6.5	0.14	10.60	8.49	6.003	21.99	0.1	0.38	338.7
	1446.0	40L	—	dry	8.70	5.889	21.38	>900	7.69	123.1
7-23-03	0850	sample	—	8.56	8.49	5.147	19.01	13.0	3.26	40.3

sampled using peristaltic pump

Begin Purge: 1350.5 Method of Purging peristaltic pump & disposable bailer Purged Dry? Yes

End Purge: 1446.0 Total Volume Purged: 40L How Measured? graduated pitcher

QA/QC Sample Collected Here? ☐ Duplicate ☐ Matrix Spike ☐ Equip. Blank ☒ No QA/QC Sample

Date and Time of Sample Collection: 7-23-03 0850 Sample Number (s): 045016WD04

Comments: → modified low-flow started ⊠→ low-sampling technically infeasible due to low recharge

APPENDIX C
CHAIN-OF-CUSTODY RECORDS

Tetra Tech EM Inc.
San Francisco Office

135 Main St. Suite 1800
San Francisco. CA 94105
415-543-4880
Fax 415-543-5480

Chain of Custody Record No. 4713

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4713

Project name: Concord NWS Site 1 GW Sampling	**Lab PO#:** 032219	**Lab:** Curtis & Tompkins
Project (CTO) number: G9016-045030202070 09	**TtEMI technical contact:** Nadia Borisova	**Field samplers:** R. Vermeen, A. Teo, D. Sterling
	TtEMI project manager: Cindi Rose	**Field samplers' signatures:** Richard Vermeen

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	No./Container Types: 40 ml VOA w/ HCl	1 liter Amber	500ml Poly (250 mL poly)	Sleeve	Glass Jar	1-L poly (HNO3)	Preservative Added: HCl	HNO3 HCl	Analysis Required: VOA	SVOA	Pest/PCBs	Metals (Hg (7470A))	TPH Purgeables	TPH Extractables	perchlorate
045016W006	TLSMW006	7-22-03	0945	water	X	15	9	3			3			X	X		X	X	X	X
045016W005	TLSMW005	7-22-03	1220	water		5	3	1			1			X	X		X	X	X	X
045016W008	TLSMW005 duplicate	7-22-03	1230	water		5	3	1			1			X	X		X	X	X	X
045016TB001	Trip Blank	7-22-03	1300	water		3								X						

	Name (print)	Company Name	Date	Time
Relinquished by: Richard Vermeen	Richard Vermeen	TtEMI	7-22-03	1600
Received by:	A. Alvarez	C.T	7-22-03	4:00
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #:

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Chain of Custody Record No. 4714

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4714

Project name: Concord NWS Site 1 GW Sampling	**Lab PO#:** 032219	**Lab:** Curtis & Tompkins	
Project (CTO) number: 69016-045030202070 09	**TtEMI technical contact:** Nadia Borisova	**Field samplers:** R. Verninen, D. Sterling, A. Teo	
	TtEMI project manager: Cindi Rose	**Field samplers' signatures:** Richard Verninen	

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	40 ml VOA w/ HCl	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	1-L poly (HNO3)	VOA	SVOA	Pest/PCBs	Metals /Hg (7470A)	TPH Purgeables	TPH Extractables	perchlorate
045 01 GW 004	TLSMW004	7-23-03	0850	WATER		5	3	1			1	X	X		X	X	X	X
045 01 ER 001	Equip. Blank (tubing)	7-23-03	0930	WATER		5	3	1			1	X	X		X	X	X	X
045 01 SW 001	Source Water blank	7-23-03	0945	WATER		5	3	1			1	X	X		X	X	X	X
045 01 GW 002	TLSMW002	7-23-03	1420	WATER		5	3	1			1	X	X		X	X	X	X
045 01 TB 002	Trip Blank	7-23-03	1530	WATER		3						X						

No./Container Types | **Preservative Added**: HCl | HNO3 HCl | **Analysis Required**

	Name (print)	Company Name	Date	Time
Relinquished by: Richard J. Verninen	Richard J. Verninen	TtEMI	7-23-03	1639
Received by:	A. Alvarez	C&T	7-23-03	4:39
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #:

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Chain of Custody Record No. 4715

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4715

Project name: Concord NWS Site 1 GW Sampling	**Lab PO#:** 032219	**Lab:** Curtis & Tompkins	
Project (CTO) number: 69016-045030202070 09	**TtEMI technical contact:** Nadia Borisova	**Field samplers:** R. Verninen D. Sterling	
	TtEMI project manager: Cindi Rose	**Field samplers' signatures:** Richard Verninen	

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	No./Container Types: 40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	1-L poly	Preservative Added: H2SO4	HNO3 HCl	Analysis Required: VOA	SVOA	Pest/PCBs	Metals (6470 A)	TPH Purgeables	TPH Extractables	Perchlorate
045016W007	TLSMW007	7-24-03	1100	water		5	3	1			1			X	X		X	X	X	X
045017D003	Trip Blank	7-24-03	1130	water		3								X				X		

	Name (print)	Company Name	Date	Time
Relinquished by: Richard J. Verninen	Richard Verninen	TtEMI	7-24-03	1428
Received by:	C. Alvarez	C.T	7-24-03	2:28
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #:

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Tetra Tech EM Inc.
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Chain of Custody Record No. 4716

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4716

Project name: Concord NWS Site 1 GW Sampling	**Lab PO#:** 032219	**Lab:** Curtis & Tompkins	
Project (CTO) number: G9016-045030202070 9	**TtEMI technical contact:** Nadia Borisova	**Field samplers:** R. Verniman, D. Sterling	
	TtEMI project manager: Cindi Rose	**Field samplers' signatures:** Richard Verniman	

Preservative Added

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	No./Container Types: 40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	1-L poly	Analysis Required: VOA	SVOA	Pest/PCBs	Metals / Hg (7470A)	TPH Purgeables	TPH Extractables	perchlorate
045 01 GW 003	TLSMW003	7-25-03	0945	water		5	3	1			1	X	X		X	X	X	X
045 01 GW 001	TLSMW001	7-25-03	1000	water		5	3	1			1	X	X		X	X	X	X
045 01 TB 004	Trip Blank	7-25-03	1030	water		6						X				X		

	Name (print)	Company Name	Date	Time
Relinquished by: Richard J. Verniman	Richard J. Verniman	Tt EMI	7-25-03	1453
Received by:	A. Chavez	C.T	7-25-03	2:53
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #:

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APPENDIX D
LABORATORY RESULTS AND DATA VALIDATION REPORTS

TABLE D-1: GROUNDWATER ANALYTICAL DATA

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW002	TLSMW003	TLSMW004	TLSMW005	TLSMW006	TLSMW007
Sample ID Number:	**04501GW001**	**04501GW002**	**04501GW003**	**04501GW004**	**04501GW005**	**04501GW006**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/25/2003**	**7/23/2003**	**7/25/2003**	**7/23/2003**	**7/22/2003**	**7/22/2003**	**7/24/2003**
CLP Metals (µg/L)							
Aluminum	460	380	670	210 UJ	51.0 UJ	87.0 UJ	550
Antimony	60.0 U	60.0 U	60.0 U	60.0 U	60.0 U	60.0 U	60.0 U
Arsenic	29	130	12	21	8.6 UJ	5.0 U	15
Barium	350	330	140	14	23	480	240
Beryllium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Cadmium	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Calcium	750,000	270,000	1,000,000	7,500	8,300	290,000	270,000
Chromium	11	14.0 UJ	220	24	21	6.4 J	21
Cobalt	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U
Copper	10.0 U	10.0 U	17	17	7.6 J	10.0 U	9.7 UJ
Iron	10,000	69.0 UJ	15,000	7,300 UJ	7,100	1,700	7,900
Lead	3.0 U	3.0 U	3.2	3.0 U	2.1 UJ	3.0 U	3.0 U
Magnesium	1,800,000	1,400,000	3,700,000	28,000	16,000	400,000	600,000
Manganese	10,000	130 UJ	51,000	61.0 UJ	270	3,800	1,000
Mercury	0.13 J	0.11 J	0.11 J	0.24	0.20 U	0.20 U	0.20 U
Molybdenum	20.0 U	39.0 UJ	20.0 U	120	130	20.0 U	20.0 U
Nickel	15.0 J	16.0 J	37	36	460	20.0 U	22
Potassium	250,000	250,000	420,000	39,000	21,000	64,000	130,000
Selenium	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Silver	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Sodium	9,200,000	9,900,000	21,000,000	1,600,000	840,000	2,900,000	4,700,000
Thallium	16	5.0 U	86	5.0 U	5.0 U	5.0 U	5.8 UJ
Vanadium	36	5.1 J	5.4 J	54	5.9 UJ	10	22
Zinc	340	16.0 UJ	390	300 UJ	260	27.0 UJ	250
Low-Level Volatile Organic Compounds (µg/L)							
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (Total)	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA

TABLE D-1: GROUNDWATER ANALYTICAL DATA

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW002	TLSMW003	TLSMW004	TLSMW005	TLSMW006	TLSMW007
Sample ID Number:	**04501GW001**	**04501GW002**	**04501GW003**	**04501GW004**	**04501GW005**	**04501GW006**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/25/2003**	**7/23/2003**	**7/25/2003**	**7/23/2003**	**7/22/2003**	**7/22/2003**	**7/24/2003**
Low-Level Volatile Organic Compounds (µg/L) (Continued)							
4-Methyl-2-Pentanone	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA
Cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA
Trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	NA	NA	NA	NA	NA	NA	NA
Xylene (Total)	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds (µg/L)							
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (Total)	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-Pentanone	NA	NA	NA	NA	NA	NA	NA

TABLE D-1: GROUNDWATER ANALYTICAL DATA

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW002	TLSMW003	TLSMW004	TLSMW005	TLSMW006	TLSMW007
Sample ID Number:	**04501GW001**	**04501GW002**	**04501GW003**	**04501GW004**	**04501GW005**	**04501GW006**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/25/2003**	**7/23/2003**	**7/25/2003**	**7/23/2003**	**7/22/2003**	**7/22/2003**	**7/24/2003**
Volatile Organic Compounds (µg/L)							
Acetone	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	NA	NA	NA	NA	NA	NA	NA
Vinyl Acetate	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	NA	NA	NA	NA	NA	NA	NA
Xylene (Total)	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds Method 8260 (µg/L)							
1,1,1-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene (Total)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

TABLE D-1: GROUNDWATER ANALYTICAL DATA

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW002	TLSMW003	TLSMW004	TLSMW005	TLSMW006	TLSMW007
Sample ID Number:	**04501GW001**	**04501GW002**	**04501GW003**	**04501GW004**	**04501GW005**	**04501GW006**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/25/2003**	**7/23/2003**	**7/25/2003**	**7/23/2003**	**7/22/2003**	**7/22/2003**	**7/24/2003**
Volatile Organic Compounds Method 8260 (µg/L) (Continued)							
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U
Carbon Disulfide	2	3	6	0.5 U	0.5 U	12	12
Carbon Tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Acetate	10 U	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ
Vinyl Chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylene (Total)	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-Chloropropane)	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA

TABLE D-1: GROUNDWATER ANALYTICAL DATA

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW002	TLSMW003	TLSMW004	TLSMW005	TLSMW006	TLSMW007
Sample ID Number:	**04501GW001**	**04501GW002**	**04501GW003**	**04501GW004**	**04501GW005**	**04501GW006**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/25/2003**	**7/23/2003**	**7/25/2003**	**7/23/2003**	**7/22/2003**	**7/22/2003**	**7/24/2003**
Semivolatile Organic Compounds (µg/L)							
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-Methylphenol	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-Phenylether	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-Methylphenol	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-Phenylether	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Pyrene	NA	NA	NA	NA	NA	NA	NA
Benzo(b)Fluoranthene	NA	NA	NA	NA	NA	NA	NA
Benzo(g, h, i)Perylene	NA	NA	NA	NA	NA	NA	NA
Benzo(k)Fluoranthene	NA	NA	NA	NA	NA	NA	NA
Bis(2-Chloroethoxy)Methane	NA	NA	NA	NA	NA	NA	NA
Bis(2-Chloroethyl)Ether	NA	NA	NA	NA	NA	NA	NA
Bis(2-Ethylhexyl)Phthalate	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA

TABLE D-1: GROUNDWATER ANALYTICAL DATA

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW002	TLSMW003	TLSMW004	TLSMW005	TLSMW006	TLSMW007
Sample ID Number:	**04501GW001**	**04501GW002**	**04501GW003**	**04501GW004**	**04501GW005**	**04501GW006**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/25/2003**	**7/23/2003**	**7/25/2003**	**7/23/2003**	**7/22/2003**	**7/22/2003**	**7/24/2003**
Semivolatile Organic Compounds (µg/L) (Continued)							
Di-N-Butylphthalate	NA	NA	NA	NA	NA	NA	NA
Di-N-Octylphthalate	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)Anthracene	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA
Dimethylphthalate	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-Cd)Pyrene	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA
N-Nitroso-Di-N-Propylamine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine (1)	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds Method 8270 (µg/L)							
1,2,4-Trichlorobenzene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
1,2-Dichlorobenzene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
1,3-Dichlorobenzene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
1,4-Dichlorobenzene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
2,4,5-Trichlorophenol	10 U	9 U	10 U	10 U	9 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	9 U	10 U	10 U	9 U	10 U	10 U
2,4-Dichlorophenol	10 U	9 U	10 U	10 U	9 U	10 U	10 U
2,4-Dimethylphenol	10 U	9 U	10 U	10 U	9 U	10 U	10 U
2,4-Dinitrophenol	48 U	47 U	49 U	48 U	47 U	50 U	48 U
2,4-Dinitrotoluene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
2,6-Dinitrotoluene	10 U	9 U	10 U	10 U	9 U	10 U	10 U

TABLE D-1: GROUNDWATER ANALYTICAL DATA

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW002	TLSMW003	TLSMW004	TLSMW005	TLSMW006	TLSMW007
Sample ID Number:	04501GW001	04501GW002	04501GW003	04501GW004	04501GW005	04501GW006	04501GW007
Matrix:	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sample Date:	7/25/2003	7/23/2003	7/25/2003	7/23/2003	7/22/2003	7/22/2003	7/24/2003
Semivolatile Organic Compounds Method 8270 (µg/L) (Continued)							
2-Chloronaphthalene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
2-Chlorophenol	10 U	9 U	10 U	10 U	9 U	10 U	10 U
2-Methylnaphthalene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
2-Methylphenol	10 U	9 U	10 U	10 U	9 U	10 U	10 U
2-Nitroaniline	19 U	19 U	19 U	19 U	19 U	20 U	19 U
2-Nitrophenol	19 U	19 U	19 U	19 U	19 U	20 U	19 U
3,3'-Dichlorobenzidine	19 U	19 U	19 U	19 U	19 U	20 U	19 U
3-Nitroaniline	19 U	19 U	19 U	19 U	19 U	20 U	19 U
4,6-Dinitro-2-Methylphenol	48 U	47 U	49 U	48 U	47 U	50 U	48 U
4-Bromophenyl-Phenylether	10 U	9 U	10 U	10 U	9 U	10 U	10 U
4-Chloro-3-Methylphenol	10 U	9 U	10 U	10 U	9 U	10 U	10 U
4-Chloroaniline	10 U	9 U	10 U	10 U	9 U	10 U	10 U
4-Chlorophenyl-Phenylether	10 U	9 U	10 U	10 U	9 U	10 U	10 U
4-Methylphenol	10 U	9 U	10 U	10 U	9 U	10 U	10 U
4-Nitroaniline	19 U	19 U	19 U	19 U	19 U	20 U	19 U
4-Nitrophenol	19 U	19 U	19 U	19 U	19 U	20 U	19 U
Acenaphthene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Acenaphthylene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Anthracene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Benzo(a)anthracene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Benzo(a)pyrene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Benzo(b)fluoranthene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Benzo(k)fluoranthene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Bis(2-Chloroethoxy)Methane	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Bis(2-Chloroethyl)Ether	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Bis(2-Chloroisopropyl)Ether	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Bis(2-Ethylhexyl)Phthalate	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Butylbenzylphthalate	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Carbazole	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Chrysene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Di-N-Butylphthalate	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Di-N-Octylphthalate	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Dibenz(a,h)Anthracene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Dibenzofuran	10 U	9 U	10 U	10 U	9 U	10 U	10 U

TABLE D-1: GROUNDWATER ANALYTICAL DATA

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

Point ID Number:	TLSMW001	TLSMW002	TLSMW003	TLSMW004	TLSMW005	TLSMW006	TLSMW007
Sample ID Number:	**04501GW001**	**04501GW002**	**04501GW003**	**04501GW004**	**04501GW005**	**04501GW006**	**04501GW007**
Matrix:	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**	**WATER**
Sample Date:	**7/25/2003**	**7/23/2003**	**7/25/2003**	**7/23/2003**	**7/22/2003**	**7/22/2003**	**7/24/2003**
Semivolatile Organic Compounds Method 8270 (µg/L) (Continued)							
Diethylphthalate	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Dimethylphthalate	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Fluoranthene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Fluorene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Hexachlorobenzene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Hexachlorobutadiene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Hexachlorocyclopentadiene	48 U	47 U	49 U	48 U	47 U	50 U	48 U
Hexachloroethane	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Isophorone	10 U	9 U	10 U	10 U	9 U	10 U	10 U
N-Nitroso-Di-N-Propylamine	10 U	9 U	10 U	10 U	9 U	10 U	10 U
N-Nitrosodimethylamine	10 U	9 U	10 U	10 U	9 U	10 U	10 U
N-Nitrosodiphenylamine (1)	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Naphthalene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Nitrobenzene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Pentachlorophenol	19 U	19 U	19 U	19 U	19 U	20 U	19 U
Phenanthrene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Phenol	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Pyrene	10 U	9 U	10 U	10 U	9 U	10 U	10 U
Explosives (µg/L)							
Perchlorate	100 U	100 U	100 U	20 U	8 U	40 U	100 U
Petroleum Indicators (mg/L)							
Gasoline C7-C12	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U	0.03 J
Petroleum Indicators - Silica Gel (mg/L)							
Diesel C10-C24(Sgcu)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Motor Oil C24-C36(Sgcu)	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U

Notes: Results less than 10 are reported to one significant figure, and results greater than 10 are reported to two significant figures.

µg/L	Micrograms per liter	mg/L	Milligrams per liter
ID	Identification	NA	Not analyzed
J	Estimated value	U	Not detected, with detection limit indicated

Tetra Tech EM Inc.
DATA VALIDATION REPORT

Site:	Concord
Delivery Order No:	TBB & TAL – DO#045
Laboratory:	Curtis & Tompkins
Data Reviewer:	Sandra Obleas, The DV Group
Review Date:	September 2, 2003
Sample Delivery Group (SDG) No.:	166471
Sample Nos.:	04501GW005 * 04501GW006 04501TB001 * Full Validation Sample
Matrix:	Water
Collection Date(s):	July 22, 2003

The data were qualified according to the U.S. Environmental Protection Agency (EPA) documents "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (October 1999), "USEPA Contract Laboratory National Functional Guidelines for Low Concentration Organic Data" (EPA 2001), and "USEPA Contract Laboratory Program National Functional Guidelines For Inorganic Data Review" (February 1994). In addition, the TtEMI documents "Data Validation Guidelines for CLP Organic Analyses," "Data Validation Guidelines for CLP Inorganic Analyses," "Data Validation Guidelines for Non-CLP Organic Analyses," "Data Validation Guidelines for Non-CLP Inorganic and Physical Analyses" (August 2001), and the document entitled "TtEMI Comprehensive Long-term Environmental Action Navy II Analytical Services Statement of Work" (May 2000) were used along with other specified criteria in EPA methods. Data validation requirements are presented below.

I certify that all data validation criteria outlined in the above referenced documents were assessed, and any qualifications made to the data were in accordance with those documents.

Certified by

DATA VALIDATION REQUIREMENTS

Full validation includes all parameters listed below. An asterisk (*) indicates cursory validation parameters.

CLP Organic Parameters

*	Holding times
	GC/MS instrument performance check
*	Initial and continuing calibrations
*	Blanks
*	Surrogate recovery
*	Matrix spike/matrix spike duplicate
*	Laboratory control sample or blank spike
*	Field duplicates
*	Internal standard performance
	Target compound identification
	Tentatively identified compounds
	Compound quantitation
	Reported detection limits
	System performance
*	Overall assessment of data for the SDG

CLP Inorganic Parameters

*	Holding times
*	Initial and continuing calibrations
*	Blanks
*	Matrix spike
*	Laboratory control sample or blank spike
*	Field duplicates
*	Matrix duplicates
	ICP interference check sample
	GFAA quality control
*	ICP serial dilution
	Sample result verification
	Analyte quantitation
	Reported detection limits
*	Overall assessment of data for the SDG

Non-CLP Organic and Inorganic Parameters

*	Method compliance
*	Holding times
*	Initial and continuing calibrations
*	Blanks
*	Matrix spike/matrix spike duplicate
*	Laboratory control sample or blank spike
*	Field duplicates
*	Matrix duplicates
*	Surrogate recovery
	Analyte quantitation
	Reported detection limits
*	Overall assessment of data for the SDG

TABLE 1
CURSORY DATA VALIDATION SUMMARY

Analysis	Holding Times	Surrogates	MS/MSD	Matrix Duplicates	LCS	Blanks	Calibrations	Internal Standards	Field Duplicates	Other
Metals & Mercury	√	N/A	√	N/A	√	pg. 6	√	N/A	pg. 6	pg. 6
VOA 8260	√	√	√	N/A	√	√	√	√	N/A	√
SVOA 8270	√	√	√	N/A	√	√	√	√	N/A	√
Gasoline 8015	√	√	√	N/A	√	√	√	N/A	N/A	√
Diesel / Motor oil 8015	√	√	√	N/A	√	√	√	N/A	N/A	√
Perchlorate 314.0	√	N/A	√	N/A	√	√	√	N/A	N/A	√

Notes:
√ indicates that all quality control criteria were met for the parameter as specified in the prescribed methods and data validation guidelines.
N/A indicates the parameter is not applicable to an analysis.
If criteria were not met and the data were qualified, a page number is indicated where the qualification is detailed.
The data were evaluated for all validation criteria and were found to be in control except where noted. Any outliers are described in the text.

TABLE 2
FULL DATA VALIDATION SUMMARY
Sample 04501GW005

Analysis	GC/MS Tuning	Target Compound List Identification	Compound or Analyte Quantification	Reported Detection Limits	Tentatively Identified Compounds	System Performance	Interference Check Sample	Graphite Furnace Quality Control
Metals & Mercury	N/A	N/A	N/A	√	N/A	√	√	N/A
VOA 8260	√	√	√	√	N/A	√	N/A	N/A
SVOA 8270	√	√	√	√	N/A	√	N/A	N/A
Gasoline 8015	N/A	N/A	N/A	√	N/A	√	N/A	N/A
Diesel / Motor oil 8015	N/A	N/A	N/A	√	N/A	√	N/A	N/A
Perchlorate 314.0	N/A	N/A	N/A	√	N/A	√	N/A	N/A

Notes:
√ indicates that all quality control criteria were met for the parameter as specified in the prescribed methods and data validation guidelines.
N/A indicates the parameter is not applicable to an analysis.
If criteria were not met and the data were qualified, a page number is indicated where the qualification is detailed.
The data were evaluated for all validation criteria and were found to be in control except where noted. Any outliers found are described below.

DATA ASSESSMENT

CLP METALS ANALYSIS

I. Blank Contamination

A. Due to calibration and method blank contamination, the following results are considered nondetected (UJb).

- Aluminum for samples 04501GW005, 04501GW006, and 04501GW008.
- Arsenic and Vanadium for samples 04501GW005 and 04501GW008.
- Lead for sample 04501GW005.
- Zinc for sample 04501GW006.

The following metals were detected in the associated calibration and method blanks at the concentrations noted below.

Analyte	Blank ID	Concentration, ug/L
Aluminum	CCB6	74.7
Arsenic	CCB5	4.76
Lead	CCB5	2.19
Vanadium	CCB8	1.77
Zinc	CCB4	6.26

Detected results less than 5x the maximum blank contamination were qualified.

II. Field Duplicate

A. The following RPDs were obtained for the field duplicate samples 04501GW005 / 04501GW008:

- 200% for Copper and Lead; 35% for Iron; and 36% for Zinc.

For water samples, the field RPD guideline is $\pm$ 25%. The data are not qualified on the basis of field duplicate results.

III. Other Qualifications

A. The following results are qualified as estimated (Jg).

- Copper detected result was reported above the IDL but below the CRDL for sample 04501GW005.
- Chromium detected result was reported above the IDL but below the CRDL for sample 04501GW006.

Results above the IDL but below the CRDL are considered qualitatively acceptable but quantitatively unreliable due to uncertainties in the analytical precision near the limit of detection.

Full Validation Criteria for Sample 04501GW005

IV. Analyte Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

V. Graphite Furnace Atomic Absorption (GFAA) Analysis

A. GFAA was not performed.

VI. ICP Interference Check Sample

A. ICSAB percent recoveries were acceptable and spectral interference was not found.

VOLATILES 8260B ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW005

II. GC/MS Tuning

A. The ion abundance criteria were met for the bromofluorobenzene (BFB) GC/MS performance check. The samples were analyzed within 12 hours of the associated performance check.

III. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

IV. Tentatively Identified Compounds (TICs)

A. TICs were not performed. TICs should be reported for 8260B

V. System Performance

A. The samples were evaluated for reconstructed ion chromatogram (RIC) baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

SEMIVOLATILES (8270) ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW005

II. GC/MS Tuning

A. The ion abundance criteria were met for the decafluorotriphenylphosphine (DFTPP) GC/MS performance checks. The samples were analyzed within 12 hours of the associated performance check.

III. Target Compound List (TCL) Identification

A. The relative retention times, mass spectra, and peak identifications of the samples were evaluated. Target compound identification was considered to be correct.

IV. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

V. Tentatively Identified Compounds (TICs)

A. TICs not performed. ← TICs should be reported.

VI. System Performance

A. The samples were evaluated for reconstructed ion chromatogram (RIC) baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

GASOLINE 8015 ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW005

II. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

DIESEL / MOTOR OIL 8015 ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW005

II. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

PERCHLORATE 314.0 ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW005

II. Analyte Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

Tetra Tech EM Inc.
DATA VALIDATION REPORT

Site:	Concord
Delivery Order No:	TBB & TAL – DO#045
Laboratory:	Curtis & Tompkins
Data Reviewer:	Sandra Obleas, The DV Group
Review Date:	September 2, 2003
Sample Delivery Group (SDG) No.:	166504
Sample Nos.:	04501ER001 04501GW002 * 04501GW004 04501SW001 04501TB002 * Full Validation Sample
Matrix:	Water
Collection Date(s):	July 23, 2003

The data were qualified according to the U.S. Environmental Protection Agency (EPA) documents "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (October 1999), "USEPA Contract Laboratory National Functional Guidelines for Low Concentration Organic Data" (EPA 2001), and "USEPA Contract Laboratory Program National Functional Guidelines For Inorganic Data Review" (February 1994). In addition, the TtEMI documents "Data Validation Guidelines for CLP Organic Analyses," "Data Validation Guidelines for CLP Inorganic Analyses," "Data Validation Guidelines for Non-CLP Organic Analyses," "Data Validation Guidelines for Non-CLP Inorganic and Physical Analyses" (August 2001), and the document entitled "TtEMI Comprehensive Long-term Environmental Action Navy II Analytical Services Statement of Work" (May 2000) were used along with other specified criteria in EPA methods. Data validation requirements are presented below.

I certify that all data validation criteria outlined in the above referenced documents were assessed, and any qualifications made to the data were in accordance with those documents.

Certified by

DATA VALIDATION REQUIREMENTS

Full validation includes all parameters listed below. An asterisk (*) indicates cursory validation parameters.

CLP Organic Parameters

*	Holding times
	GC/MS instrument performance check
*	Initial and continuing calibrations
*	Blanks
*	Surrogate recovery
*	Matrix spike/matrix spike duplicate
*	Laboratory control sample or blank spike
*	Field duplicates
*	Internal standard performance
	Target compound identification
	Tentatively identified compounds
	Compound quantitation
	Reported detection limits
	System performance
*	Overall assessment of data for the SDG

CLP Inorganic Parameters

*	Holding times
*	Initial and continuing calibrations
*	Blanks
*	Matrix spike
*	Laboratory control sample or blank spike
*	Field duplicates
*	Matrix duplicates
	ICP interference check sample
	GFAA quality control
*	ICP serial dilution
	Sample result verification
	Analyte quantitation
	Reported detection limits
*	Overall assessment of data for the SDG

Non-CLP Organic and Inorganic Parameters

*	Method compliance
*	Holding times
*	Initial and continuing calibrations
*	Blanks
*	Matrix spike/matrix spike duplicate
*	Laboratory control sample or blank spike
*	Field duplicates
*	Matrix duplicates
*	Surrogate recovery
	Analyte quantitation
	Reported detection limits
*	Overall assessment of data for the SDG

DATA VALIDATION QUALIFIERS AND CODES

Data Validation Qualifiers

UJ Estimated nondetected result

J Estimated detected result

R Rejected result

NJ Tentatively Identified Compound (TIC)

Data Validation Qualifier Codes

a Surrogate recovery exceedance

b Laboratory method blank and common blank contamination

c Calibration exceedance

d Duplicate precision exceedance

e Matrix spike/laboratory control sample (LCS) recovery exceedance

f Field blank contamination

g Quantification below reporting limit

h Holding time exceedance

i Internal standard exceedance

j Other qualifications

TABLE 1
CURSORY DATA VALIDATION SUMMARY

Analysis	Holding Times	Surrogates	MS/MSD	Matrix Duplicates	LCS	Blanks	Calibrations	Internal Standards	Field Duplicates	Other
Metals & Mercury	√	N/A	√	N/A	√	pg. 6	√	N/A	N/A	pg. 7
VOA 8260	√	√	N/A	N/A	√	pg. 8	pg. 8	√	N/A	pg. 8
SVOA 8270	√	√	√	N/A	√	√	√	√	N/A	√
Gasoline 8015	√	√	√	N/A	√	√	√	N/A	N/A	√
Diesel / Motor oil 8015	√	√	√	N/A	√	√	√	N/A	N/A	√
Perchlorate 314.0	√	N/A	√	N/A	√	√	√	N/A	N/A	√

Notes:
√ indicates that all quality control criteria were met for the parameter as specified in the prescribed methods and data validation guidelines.
N/A indicates the parameter is not applicable to an analysis.
If criteria were not met and the data were qualified, a page number is indicated where the qualification is detailed.
The data were evaluated for all validation criteria and were found to be in control except where noted. Any outliers are described in the text.

TABLE 2
FULL DATA VALIDATION SUMMARY
Sample 04501GW002

Analysis	GC/MS Tuning	Target Compound List Identification	Compound or Analyte Quantification	Reported Detection Limits	Tentatively Identified Compounds	System Performance	Interference Check Sample	Graphite Furnace Quality Control
Metals & Mercury	N/A	N/A	N/A	√	N/A	√	√	N/A
VOA 8260	√	√	√	√	N/A	√	N/A	N/A
SVOA 8270	√	√	√	√	N/A	√	N/A	N/A
Gasoline 8015	N/A	N/A	N/A	√	N/A	√	N/A	N/A
Diesel / Motor oil 8015	N/A	N/A	N/A	√	N/A	√	N/A	N/A
Perchlorate 314.0	N/A	N/A	N/A	√	N/A	√	N/A	N/A

Notes:
√ indicates that all quality control criteria were met for the parameter as specified in the prescribed methods and data validation guidelines.
N/A indicates the parameter is not applicable to an analysis.
If criteria were not met and the data were qualified, a page number is indicated where the qualification is detailed.
The data were evaluated for all validation criteria and were found to be in control except where noted. Any outliers found are described below.

DATA ASSESSMENT

CLP METALS ANALYSIS

I. Blank Contamination

A. Due to calibration and method blank contamination, the following results are considered nondetected (UJb).

- Aluminum for samples 04501GW004 and 04501SW001.
- Antimony for sample 04501SW001.
- Beryllium for samples 04501ER001 and 04501SW001.
- Chromium for samples 04501ER001and 04501GW002.
- Copper for sample 04501ER001.
- Molybdenum for sample 04501GW002.

The following metals were detected in the associated calibration and method blanks at the concentrations noted below.

Analyte	Blank ID	Concentration, ug/L
Aluminum	PBW	66.0
Antimony	CCB6	24.4
Beryllium	CCB5	1.5
Chromium	CCB2	3.448
Copper	CCB2	2.980
Molybdenum	CCB7	9.41

Detected results less than 5x the maximum blank contamination were qualified.

B. Due to equipment rinsate blank contamination, the following results are considered nondetected (UJf).

- Iron, Manganese, and Zinc for samples 04501GW002 and 04501GW004.

The following analytes were detected in the associated equipment rinsate blanks at the concentrations noted below.

Analyte	Blank ID	Concentration, µg/L
Iron	04501ER001	7300
Manganese		32
Zinc		280

Detected results less than 5x the maximum blank contamination were qualified.

VOLATILES 8260B ANALYSIS

I. Blank Contamination

A. Due to method blank contamination, the following results are considered nondetected (UJb).

- Bromomethane in samples 04501ER001, 04501GW004, 04501SW001, and 04501TB002.

The following compounds were detected in the associated method blanks at the concentrations noted below.

Compound	Blank ID	Concentration, µg/L
Bromomethane	Method blank 7/24/03	1.1

Detected results less than 5x the blank contamination were qualified.

II. Calibrations

A. Due to continuing calibration problems, the following nondetected results are qualified as estimated (UJc).

- Vinyl acetate in samples 04501ER001, 04501GW002, 04501GW004, 04501SW001, and 04501TB002.

The following continuing calibrations had percent differences (%D) of >25%.

Calibration Date	Compound	%D
07/24/03 1058	Vinyl acetate	109

III. Other Qualifications

A. The following results are qualified as estimated (Jg).

- Toluene was reported below the CRQL for sample 04501TB002.

Detected results reported below the CRQL are considered to be qualitatively acceptable, but quantitatively unreliable due to the uncertainty in analytical precision near the limit of detection.

Full Validation Criteria for Sample 04501GW002

IV. GC/MS Tuning

A. The ion abundance criteria were met for the bromofluorobenzene (BFB) GC/MS performance check. The samples were analyzed within 12 hours of the associated performance check.

V. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

VI. Tentatively Identified Compounds (TICs)

A. TICs were not performed.

VII. System Performance

A. The samples were evaluated for reconstructed ion chromatogram (RIC) baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

SEMIVOLATILES (8270) ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW002

II. GC/MS Tuning

A. The ion abundance criteria were met for the decafluorotriphenylphosphine (DFTPP) GC/MS performance checks. The samples were analyzed within 12 hours of the associated performance check.

III. Target Compound List (TCL) Identification

A. The relative retention times, mass spectra, and peak identifications of the samples were evaluated. Target compound identification was considered to be correct.

IV. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

V. Tentatively Identified Compounds (TICs)

A. TICs not performed.

VI. System Performance

A. The samples were evaluated for reconstructed ion chromatogram (RIC) baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

GASOLINE 8015 ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW002

II. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

DIESEL / MOTOR OIL 8015 ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW002

II. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

PERCHLORATE 314.0 ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW002

II. Analyte Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

OVERALL ASSESSMENT OF DATA

I. Method Compliance and Additional Comments

TICs should be reported for both 8260/8270

A. All analyses were conducted within all specifications of the requested methods.

II. Usability

A. Due to calibration blank contamination in the Metals analyses, the following were considered nondetected: Aluminum for two samples; Antimony for one sample; Beryllium for two samples; Chromium for two samples; Copper for one sample; and Molybdenum for one sample. Iron, Manganese, and Zinc were considered nondetected for two samples due to equipment blank contamination. Due to uncertainty in the analytical precision near the limit of detection, the following were qualified as estimated: Calcium for one sample; and Mercury, Nickel and Vanadium for one sample.

B. Due to method blank contamination in the Volatiles 8260 analyses, the following were considered nondetected: Bromomethane for four samples. Vinyl acetate was qualified as estimated for five samples due to continuing calibration problems. Due to uncertainty in the analytical precision near the limit of detection, the following were qualified as estimated: Toluene for one sample.

C. The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Rejected sample results (R) are unusable for all purposes. Estimated sample results (J) are usable only for limited purposes. Based upon the cursory and full data validation all other results are considered valid and usable for all purposes. In general, the absence of rejected data and the small number of qualifiers added to the data indicate high usability.

Tetra Tech EM Inc.
DATA VALIDATION REPORT

Site:	Concord
Delivery Order No:	TBB & TAL – DO#045
Laboratory:	Curtis & Tompkins
Data Reviewer:	Sandra Obleas, The DV Group
Review Date:	September 4, 2003
Sample Delivery Group (SDG) No.:	166539
Sample Nos.:	04501GW007 * 04501TB003
	* Full Validation Sample
Matrix:	Water
Collection Date(s):	July 24, 2003

The data were qualified according to the U.S. Environmental Protection Agency (EPA) documents "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (October 1999), "USEPA Contract Laboratory National Functional Guidelines for Low Concentration Organic Data" (EPA 2001), and "USEPA Contract Laboratory Program National Functional Guidelines For Inorganic Data Review" (February 1994). In addition, the TtEMI documents "Data Validation Guidelines for CLP Organic Analyses," "Data Validation Guidelines for CLP Inorganic Analyses," "Data Validation Guidelines for Non-CLP Organic Analyses," "Data Validation Guidelines for Non-CLP Inorganic and Physical Analyses" (August 2001), and the document entitled "TtEMI Comprehensive Long-term Environmental Action Navy II Analytical Services Statement of Work" (May 2000) were used along with other specified criteria in EPA methods. Data validation requirements are presented below.

I certify that all data validation criteria outlined in the above referenced documents were assessed, and any qualifications made to the data were in accordance with those documents.

President
Certified by

DATA VALIDATION REQUIREMENTS

Full validation includes all parameters listed below. An asterisk (*) indicates cursory validation parameters.

CLP Organic Parameters

*	Holding times
	GC/MS instrument performance check
*	Initial and continuing calibrations
*	Blanks
*	Surrogate recovery
*	Matrix spike/matrix spike duplicate
*	Laboratory control sample or blank spike
*	Field duplicates
*	Internal standard performance
	Target compound identification
	Tentatively identified compounds
	Compound quantitation
	Reported detection limits
	System performance
*	Overall assessment of data for the SDG

CLP Inorganic Parameters

*	Holding times
*	Initial and continuing calibrations
*	Blanks
*	Matrix spike
*	Laboratory control sample or blank spike
*	Field duplicates
*	Matrix duplicates
	ICP interference check sample
	GFAA quality control
*	ICP serial dilution
	Sample result verification
	Analyte quantitation
	Reported detection limits
*	Overall assessment of data for the SDG

Non-CLP Organic and Inorganic Parameters

*	Method compliance
*	Holding times
*	Initial and continuing calibrations
*	Blanks
*	Matrix spike/matrix spike duplicate
*	Laboratory control sample or blank spike
*	Field duplicates
*	Matrix duplicates
*	Surrogate recovery
	Analyte quantitation
	Reported detection limits
*	Overall assessment of data for the SDG

DATA VALIDATION QUALIFIERS AND CODES

Data Validation Qualifiers

UJ Estimated nondetected result

J Estimated detected result

R Rejected result

NJ Tentatively Identified Compound (TIC)

Data Validation Qualifier Codes

a Surrogate recovery exceedance

b Laboratory method blank and common blank contamination

c Calibration exceedance

d Duplicate precision exceedance

e Matrix spike/laboratory control sample (LCS) recovery exceedance

f Field blank contamination

g Quantification below reporting limit

h Holding time exceedance

i Internal standard exceedance

j Other qualifications

TABLE 1
CURSORY DATA VALIDATION SUMMARY

Analysis	Holding Times	Surrogates	MS/MSD	Matrix Duplicates	LCS	Blanks	Calibrations	Internal Standards	Field Duplicates	Other
Metals & Mercury	√	N/A	√	N/A	√	pg. 6	√	N/A	N/A	√
VOA 8260	√	√	N/A	N/A	√	√	pg. 7	√	N/A	√
SVOA 8270	√	√	√	N/A	√	√	√	√	N/A	√
Gasoline 8015	√	√	√	N/A	√	√	√	N/A	N/A	pg. 9
Diesel / Motor oil 8015	√	√	N/A	N/A	√	√	√	N/A	N/A	√
Perchlorate 314.0	√	N/A	√	N/A	√	√	√	N/A	N/A	√

Notes:
√ indicates that all quality control criteria were met for the parameter as specified in the prescribed methods and data validation guidelines.
N/A indicates the parameter is not applicable to an analysis.
If criteria were not met and the data were qualified, a page number is indicated where the qualification is detailed.
The data were evaluated for all validation criteria and were found to be in control except where noted. Any outliers are described in the text.

TABLE 2
FULL DATA VALIDATION SUMMARY
Sample 04501GW007

Analysis	GC/MS Tuning	Target Compound List Identification	Compound or Analyte Quantification	Reported Detection Limits	Tentatively Identified Compounds	System Performance	Interference Check Sample	Graphite Furnace Quality Control
Metals & Mercury	N/A	N/A	N/A	√	N/A	√	√	N/A
VOA 8260	√	√	√	√	N/A	√	N/A	N/A
SVOA 8270	√	√	√	√	N/A	√	N/A	N/A
Gasoline 8015	N/A	N/A	N/A	√	N/A	√	N/A	N/A
Diesel / Motor oil 8015	N/A	N/A	N/A	√	N/A	√	N/A	N/A
Perchlorate 314.0	N/A	N/A	N/A	√	N/A	√	N/A	N/A

Notes:
√ indicates that all quality control criteria were met for the parameter as specified in the prescribed methods and data validation guidelines.
N/A indicates the parameter is not applicable to an analysis.
If criteria were not met and the data were qualified, a page number is indicated where the qualification is detailed.
The data were evaluated for all validation criteria and were found to be in control except where noted. Any outliers found are described below.

DATA ASSESSMENT

CLP METALS ANALYSIS

I. Blank Contamination

A. Due to calibration and method blank contamination, the following results are considered nondetected (UJb).

- Copper and Thallium for sample 04501GW007.

The following metals were detected in the associated calibration and method blanks at the concentrations noted below.

Analyte	Blank ID	Concentration, ug/L
Copper	CCB2	2.98
Thallium	CCB5	4.11

Detected results less than 5x the maximum blank contamination were qualified.

Full Validation Criteria for Sample 04501GW007

II. Analyte Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. Graphite Furnace Atomic Absorption (GFAA) Analysis

A. GFAA was not performed.

IV. ICP Interference Check Sample

A. ICSAB percent recoveries were acceptable and spectral interference was not found.

VOLATILES 8260B ANALYSIS

I. Calibrations

A. Due to continuing calibration problems, the following nondetected results are qualified as estimated (UJc).

- Vinyl acetate in samples 04501GW007 and 04501TB003.

The following continuing calibrations had percent differences (%D) of >25%.

Calibration Date	Compound	%D
07/30/03 1147	Vinyl acetate	48

Full Validation Criteria for Sample 04501GW007

II. GC/MS Tuning

A. The ion abundance criteria were met for the bromofluorobenzene (BFB) GC/MS performance check. The samples were analyzed within 12 hours of the associated performance check.

III. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

IV. Tentatively Identified Compounds (TICs)

A. TICs were not performed.

V. System Performance

A. The samples were evaluated for reconstructed ion chromatogram (RIC) baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

SEMIVOLATILES (8270) ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW007

II. GC/MS Tuning

A. The ion abundance criteria were met for the decafluorotriphenylphosphine (DFTPP) GC/MS performance checks. The samples were analyzed within 12 hours of the associated performance check.

III. Target Compound List (TCL) Identification

A. The relative retention times, mass spectra, and peak identifications of the samples were evaluated. Target compound identification was considered to be correct.

IV. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

V. Tentatively Identified Compounds (TICs)

A. TICs not performed.

VI. System Performance

A. The samples were evaluated for reconstructed ion chromatogram (RIC) baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

GASOLINE 8015 ANALYSIS

I. Other Qualifications

A. The following results are qualified as estimated (Jg).

- Gasoline was reported below the RL for sample 04501GW007.

Detected results reported below the CRQL are considered to be qualitatively acceptable, but quantitatively unreliable due to the uncertainty in analytical precision near the limit of detection.

Full Validation Criteria for Sample 04501GW007

II. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

DIESEL / MOTOR OIL 8015 ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW007

II. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

PERCHLORATE 314.0 ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW007

II. Analyte Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

OVERALL ASSESSMENT OF DATA

I. Method Compliance and Additional Comments

A. All analyses were conducted within all specifications of the requested methods.

II. Usability

A. Due to calibration blank contamination in the Metals analyses, the following were considered nondetected: Copper and Thallium for one sample.

B. Vinyl acetate was qualified as estimated for two samples due to continuing calibration problems in the Volatiles 8260 analyses.

C. Due to uncertainty in the analytical precision near the limit of detection in the Gasoline analysis, the following were qualified as estimated: Gasoline for one sample

D. The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Rejected sample results (R) are unusable for all purposes. Estimated sample results (J) are usable only for limited purposes. Based upon the cursory and full data validation all other results are considered valid and usable for all purposes. In general, the absence of rejected data and the small number of qualifiers added to the data indicate high usability.

Tetra Tech EM Inc.
DATA VALIDATION REPORT

Technical
V Robinson TTEMI
09/22/03

Site:	Concord
Delivery Order No:	TBB & TAL – DO#045
Laboratory:	Curtis & Tompkins
Data Reviewer:	Sandra Obleas, The DV Group
Review Date:	September 4, 2003
Sample Delivery Group (SDG) No.:	166554
Sample Nos.:	04501GW001 04501GW003 * 04501TB004 * Full Validation Sample
Matrix:	Water
Collection Date(s):	July 25, 2003

The data were qualified according to the U.S. Environmental Protection Agency (EPA) documents "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (October 1999), "USEPA Contract Laboratory National Functional Guidelines for Low Concentration Organic Data" (EPA 2001), and "USEPA Contract Laboratory Program National Functional Guidelines For Inorganic Data Review" (February 1994). In addition, the TtEMI documents "Data Validation Guidelines for CLP Organic Analyses," "Data Validation Guidelines for CLP Inorganic Analyses," "Data Validation Guidelines for Non-CLP Organic Analyses," "Data Validation Guidelines for Non-CLP Inorganic and Physical Analyses" (August 2001), and the document entitled "TtEMI Comprehensive Long-term Environmental Action Navy II Analytical Services Statement of Work" (May 2000) were used along with other specified criteria in EPA methods. Data validation requirements are presented below.

I certify that all data validation criteria outlined in the above referenced documents were assessed, and any qualifications made to the data were in accordance with those documents.

President
Certified by

DATA VALIDATION REQUIREMENTS

Full validation includes all parameters listed below. An asterisk (*) indicates cursory validation parameters.

CLP Organic Parameters

*	Holding times
	GC/MS instrument performance check
*	Initial and continuing calibrations
*	Blanks
*	Surrogate recovery
*	Matrix spike/matrix spike duplicate
*	Laboratory control sample or blank spike
*	Field duplicates
*	Internal standard performance
	Target compound identification
	Tentatively identified compounds
	Compound quantitation
	Reported detection limits
	System performance
*	Overall assessment of data for the SDG

CLP Inorganic Parameters

*	Holding times
*	Initial and continuing calibrations
*	Blanks
*	Matrix spike
*	Laboratory control sample or blank spike
*	Field duplicates
*	Matrix duplicates
	ICP interference check sample
	GFAA quality control
*	ICP serial dilution
	Sample result verification
	Analyte quantitation
	Reported detection limits
*	Overall assessment of data for the SDG

Non-CLP Organic and Inorganic Parameters

*	Method compliance
*	Holding times
*	Initial and continuing calibrations
*	Blanks
*	Matrix spike/matrix spike duplicate
*	Laboratory control sample or blank spike
*	Field duplicates
*	Matrix duplicates
*	Surrogate recovery
	Analyte quantitation
	Reported detection limits
*	Overall assessment of data for the SDG

DATA VALIDATION QUALIFIERS AND CODES

Data Validation Qualifiers

UJ Estimated nondetected result

J Estimated detected result

R Rejected result

NJ Tentatively Identified Compound (TIC)

Data Validation Qualifier Codes

a Surrogate recovery exceedance

b Laboratory method blank and common blank contamination

c Calibration exceedance

d Duplicate precision exceedance

e Matrix spike/laboratory control sample (LCS) recovery exceedance

f Field blank contamination

g Quantification below reporting limit

h Holding time exceedance

i Internal standard exceedance

j Other qualifications

TABLE 1
CURSORY DATA VALIDATION SUMMARY

Analysis	Holding Times	Surrogates	MS/MSD	Matrix Duplicates	LCS	Blanks	Calibrations	Internal Standards	Field Duplicates	Other
Metals & Mercury	√	N/A	√	N/A	√	√	√	N/A	N/A	pg. 6
VOA 8260	√	√	N/A	N/A	√	√	√	√	N/A	√
SVOA 8270	pg. 8	√	N/A	N/A	√	√	√	√	N/A	√
Gasoline 8015	√	pg. 9	√	N/A	√	√	√	N/A	N/A	√
Diesel / Motor oil 8015	√	√	N/A	N/A	√	√	√	N/A	N/A	√
Perchlorate 314.0	√	N/A	√	N/A	√	√	√	N/A	N/A	√

Notes:
√ indicates that all quality control criteria were met for the parameter as specified in the prescribed methods and data validation guidelines.
N/A indicates the parameter is not applicable to an analysis.
If criteria were not met and the data were qualified, a page number is indicated where the qualification is detailed.
The data were evaluated for all validation criteria and were found to be in control except where noted. Any outliers are described in the text.

TABLE 2
FULL DATA VALIDATION SUMMARY
Sample 04501GW003

Analysis	GC/MS Tuning	Target Compound List Identification	Compound or Analyte Quantification	Reported Detection Limits	Tentatively Identified Compounds	System Performance	Interference Check Sample	Graphite Furnace Quality Control
Metals & Mercury	N/A	N/A	N/A	√	N/A	√	√	N/A
VOA 8260	√	√	√	√	N/A	√	N/A	N/A
SVOA 8270	√	√	√	√	N/A	√	N/A	N/A
Gasoline 8015	N/A	N/A	N/A	√	N/A	√	N/A	N/A
Diesel / Motor oil 8015	N/A	N/A	N/A	√	N/A	√	N/A	N/A
Perchlorate 314.0	N/A	N/A	N/A	√	N/A	√	N/A	N/A

Notes:
√ indicates that all quality control criteria were met for the parameter as specified in the prescribed methods and data validation guidelines.
N/A indicates the parameter is not applicable to an analysis.
If criteria were not met and the data were qualified, a page number is indicated where the qualification is detailed.
The data were evaluated for all validation criteria and were found to be in control except where noted. Any outliers found are described below.

DATA ASSESSMENT

CLP METALS ANALYSIS

I. Other Qualifications

A. The following results are qualified as estimated (Jg).

- Mercury and Nickel detected results were reported above the IDL but below the CRDL for sample 04501GW001.
- Mercury and Vanadium detected results were reported above the IDL but below the CRDL for sample 04501GW003.

Results above the IDL but below the CRDL are considered qualitatively acceptable but quantitatively unreliable due to uncertainties in the analytical precision near the limit of detection.

Full Validation Criteria for Sample 04501GW003

II. Analyte Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. Graphite Furnace Atomic Absorption (GFAA) Analysis

A. GFAA was not performed.

IV. ICP Interference Check Sample

A. ICSAB percent recoveries were acceptable and spectral interference was not found.

VOLATILES 8260B ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW003

II. GC/MS Tuning

A. The ion abundance criteria were met for the bromofluorobenzene (BFB) GC/MS performance check. The samples were analyzed within 12 hours of the associated performance check.

III. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

IV. Tentatively Identified Compounds (TICs)

A. TICs were not performed.

V. System Performance

A. The samples were evaluated for reconstructed ion chromatogram (RIC) baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

SEMIVOLATILES (8270) ANALYSIS

I. Holding Times

A. Due to holding time problems, the following nondetected results are qualified as estimated (UJh).

- Semivolatiles in sample 04501GW003RE.

The extraction holding time of 7 days was exceeded by 5 days.

Full Validation Criteria for Sample 04501GW003

II. GC/MS Tuning

A. The ion abundance criteria were met for the decafluorotriphenylphosphine (DFTPP) GC/MS performance checks. The samples were analyzed within 12 hours of the associated performance check.

III. Target Compound List (TCL) Identification

A. The relative retention times, mass spectra, and peak identifications of the samples were evaluated. Target compound identification was considered to be correct.

IV. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

V. Tentatively Identified Compounds (TICs)

A. TICs not performed.

VI. System Performance

A. The samples were evaluated for reconstructed ion chromatogram (RIC) baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

GASOLINE 8015 ANALYSIS

I. Surrogate Recovery

A. Due to surrogate recovery problems, the following nondetected results are qualified as estimated (UJa).

- Gasoline in sample 04501GW003.

The surrogates outside of QC limits are listed below.

Sample ID	Surrogate	%R	QC Limits
04501GW003	Trifluorotoluene	73	75 - 125%

Low recoveries indicate that detected and nondetected results may be biased low.

Full Validation Criteria for Sample 04501GW003

II. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

DIESEL / MOTOR OIL 8015 ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW003

II. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

PERCHLORATE 314.0 ANALYSIS

I. Cursory criteria met.

Full Validation Criteria for Sample 04501GW003

II. Analyte Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors, weights, volumes, and percent moisture used to calculate the sample results. The samples were found to be correctly quantitated. The reported detection limits were consistent with the contract required report limits and reflect any dilutions, weights, volumes, and percent moisture.

III. System Performance

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. No system degradation was noted.

OVERALL ASSESSMENT OF DATA

I. Method Compliance and Additional Comments

A. All analyses were conducted within all specifications of the requested methods.

II. Usability

A. Due to uncertainty in the analytical precision near the limit of detection in the Metal analyses, the following were qualified as estimated: Mercury for two samples; Nickel for one sample; and Vanadium for one sample.

B. All Semivolatile analytes were qualified as estimated for one sample due to exceeded extraction holding time in the Semivolatiles 8270 analyses.

C. Semivolatile sample 04501GW003 was re-extracted due to low Terphenyl-d14 recovery. The re-extracted sample was qualified due to exceeded holding time. The original analysis should be used as the final validated result.

D. Due surrogate recovery problems in the Gasoline analysis, the following were qualified as estimated: Gasoline for one sample

E. The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Rejected sample results (R) are unusable for all purposes. Estimated sample results (J) are usable only for limited purposes. Based upon the cursory and full data validation all other results are considered valid and usable for all purposes. In general, the absence of rejected data and the small number of qualifiers added to the data indicate high usability.

APPENDIX E
STATISTICAL COMPARISON OF TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

APPENDIX E
STATISTICAL COMPARISON OF TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

CONTENTS

FIGURES

TABLE

INTRODUCTION

Concentrations of total metals in groundwater samples collected during 1997 and 2003 were compared using graphical and statistical methods. Results of this comparison are provided in Table E-1 and on Figures E-1 through E-4. Each of the approaches for comparing between-year concentrations of total metals is described below.

Side-by-side outlier box-and-whisker plots and quantile tables were prepared for each metal and are presented on Figure E-1. The data plotted for both years represent a single measurement taken from each of seven groundwater monitoring wells (TLSMW001 through TLSMW007). Detected and nondetected concentrations are shown in the plots as solid and open circles, respectively. Box-and-whisker plots (hereinafter referred to as box plots) were developed as a tool within the branch of statistics known as exploratory data analysis. These plots provide an efficient means for visually characterizing a single sample or for comparing data across multiple groups or populations. The boxes represent the quantiles or percentiles of the data, with the lower and upper margins, respectively, showing the 25th and 75th percentiles of the data (that is, 50 percent of the data are contained within the area of the box). The area between the 25th and 75th percentiles is referred to as the interquartile range (IQR). The horizontal lines appearing within the boxes represent the mid-point or median (50th percentile) of the data. In standard box plots, the lower and upper bounds, respectively, of the "whiskers" represent the minimum and maximum values for each sample or population. Box plots are especially effective for visually comparing the "spread" of the data and for identifying outliers or values that are either substantially lower or higher than the bulk or main population of the data. The outlier box plot is a modification to the standard box plot that was developed specifically to emphasize the presence of statistical outliers in a sample. The lower and upper bounds of the whiskers in an outlier box plot represent the lowest and highest values, respectively, that are not considered statistical outliers. Points falling above the whiskers are considered "high outliers," defined as values that are greater than the 75th percentile plus 1.5 times the IQR. "Low outliers" are defined as values that are less than the 25th percentile minus 1.5 times the IQR.

Statistical comparisons of total metal concentrations between years were made using both parametric (paired t-test) and nonparametric (signed-rank test) tests appropriate for comparing paired or dependent measurements. The magnitude of change in chemical concentrations between years (that is, concentration in 2003 minus concentration in 1997) was calculated for each of the seven wells, and the net difference was evaluated statistically using a using a two-sided test of the following null (H_0) and alternative (H_A) hypotheses:

- H_0: the average change in concentrations between years is zero
- H_A: the average change in concentrations between years is not zero

Paired testing is required in this case to assess whether there is a net change in concentration between years for a fixed set of sampling locations. If there is no net change in concentration between years, then the average difference is expected to be zero. If the average difference between years was significantly different from zero, then the relative direction of the change was

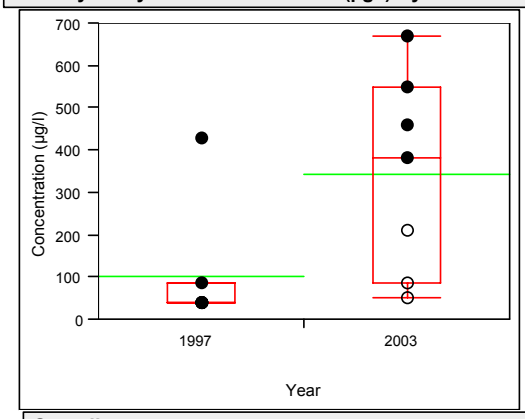
also noted. If the probability associated with either of the test results was less than or equal to 0.05 (that is, no greater than a 5-percent chance that the observed difference between years could have resulted from random chance alone), then it was concluded that concentrations were significantly different between years. Table E-1 summarizes the results of the statistical comparison. A graphical presentation of the statistical comparisons (probability plots, box plots, and frequency histograms), as well as the full details for each test, is provided on Figure E-2. An interpretation of each of graphical elements is provided on Figures E-2, E-3, and E-4.

FIGURES

FIGURE E-1
SIDE-BY-SIDE BOX-PLOT COMPARISONS OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Aluminum

Oneway Analysis of Concentration (µg/l) By Year

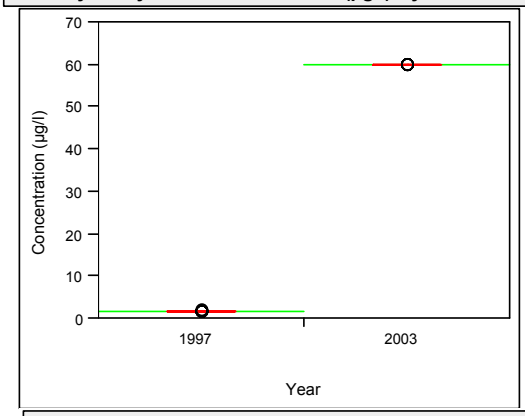


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	38	38	38	38.1	86.5	427	427
2003	51	51	87	380	550	670	670

Chemical=Antimony

Oneway Analysis of Concentration (µg/l) By Year

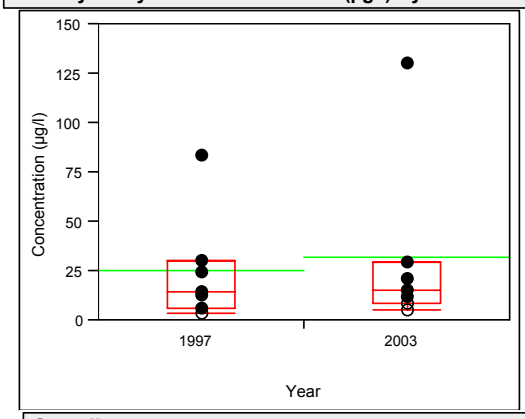


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	1.7	1.7	1.7	1.7	1.7	2	2
2003	60	60	60	60	60	60	60

Chemical=Arsenic

Oneway Analysis of Concentration (µg/l) By Year



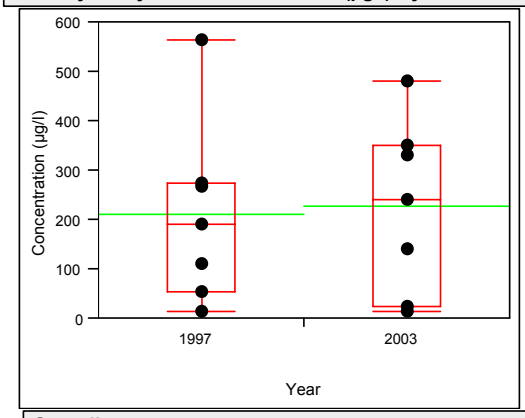
Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	3.2	3.2	6.1	14.4	29.8	83.5	83.5
2003	5	5	8.6	15	29	130	130

FIGURE E-1 (CONTINUED)
SIDE-BY-SIDE BOX-PLOT COMPARISONS OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Barium

Oneway Analysis of Concentration (µg/l) By Year

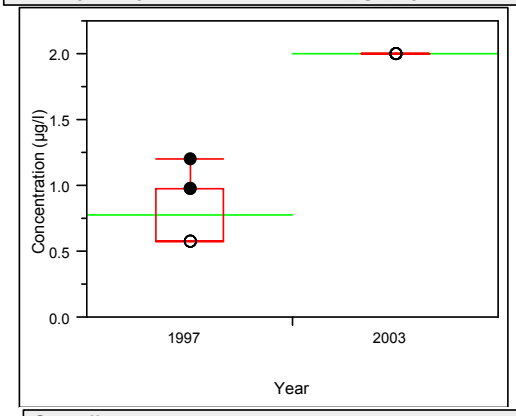


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	13.3	13.3	52.4	189	275	565	565
2003	14	14	23	240	350	480	480

Chemical=Beryllium

Oneway Analysis of Concentration (µg/l) By Year

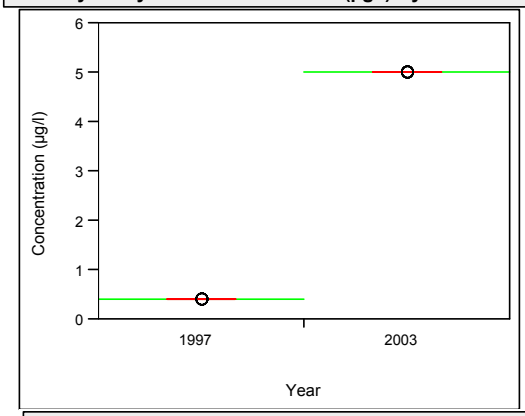


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	0.58	0.58	0.58	0.58	0.97	1.2	1.2
2003	2	2	2	2	2	2	2

Chemical=Cadmium

Oneway Analysis of Concentration (µg/l) By Year



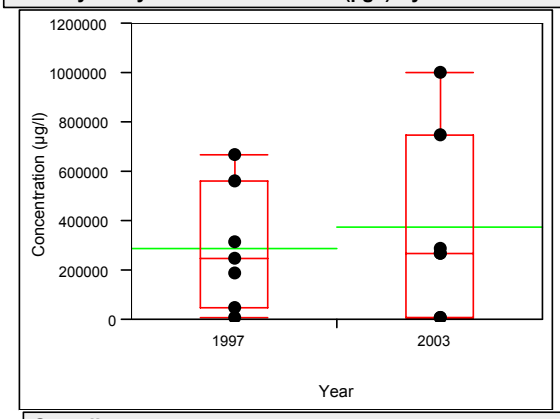
Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	0.4	0.4	0.4	0.4	0.4	0.4	0.4
2003	5	5	5	5	5	5	5

FIGURE E-1 (CONTINUED)
SIDE-BY-SIDE BOX-PLOT COMPARISONS OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Calcium

Oneway Analysis of Concentration (µg/l) By Year

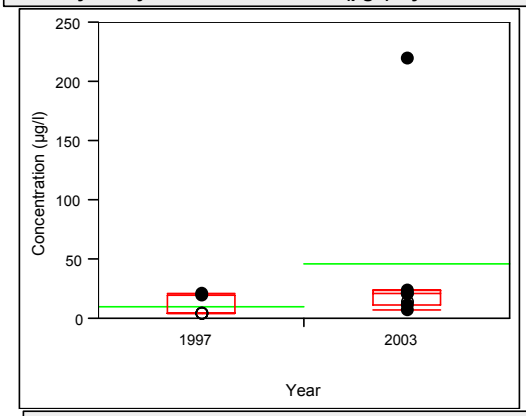


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	9310	9310	49100	247000	557000	665000	665000
2003	7500	7500	8300	270000	750000	1000000	1000000

Chemical=Chromium

Oneway Analysis of Concentration (µg/l) By Year

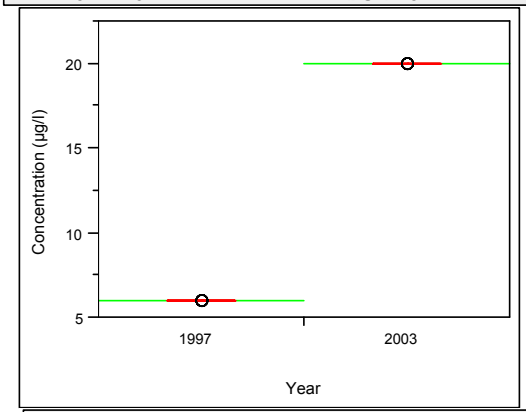


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	4.6	4.6	4.6	4.6	19.7	20.7	20.7
2003	6.4	6.4	11	21	24	220	220

Chemical=Cobalt

Oneway Analysis of Concentration (µg/l) By Year



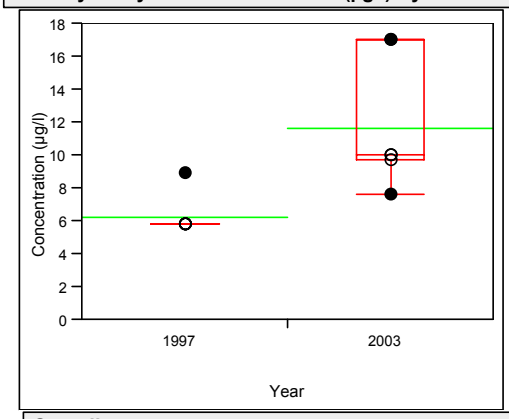
Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	6	6	6	6	6	6	6
2003	20	20	20	20	20	20	20

FIGURE E-1 (CONTINUED)
SIDE-BY-SIDE BOX-PLOT COMPARISONS OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Copper

Oneway Analysis of Concentration (µg/l) By Year

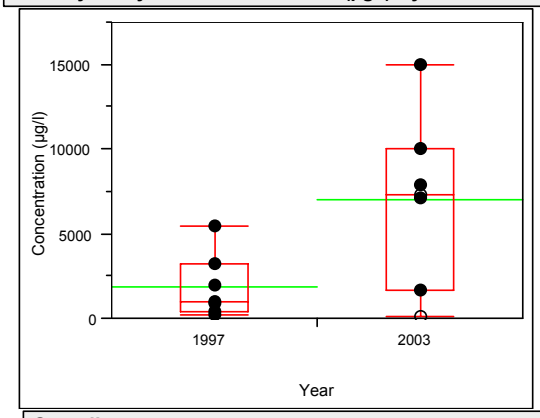


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	5.8	5.8	5.8	5.8	5.8	8.9	8.9
2003	7.6	7.6	9.7	10	17	17	17

Chemical=Iron

Oneway Analysis of Concentration (µg/l) By Year

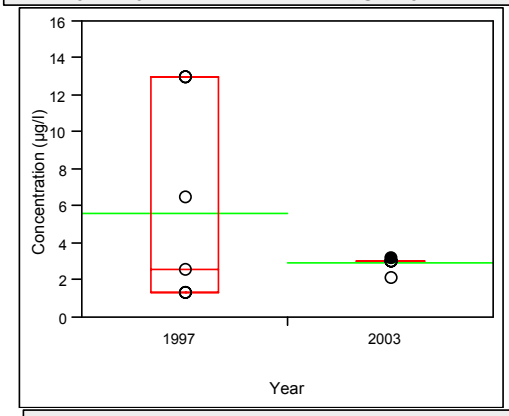


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	227	227	415	957	3240	5480	5480
2003	69	69	1700	7300	10000	15000	15000

Chemical=Lead

Oneway Analysis of Concentration (µg/l) By Year



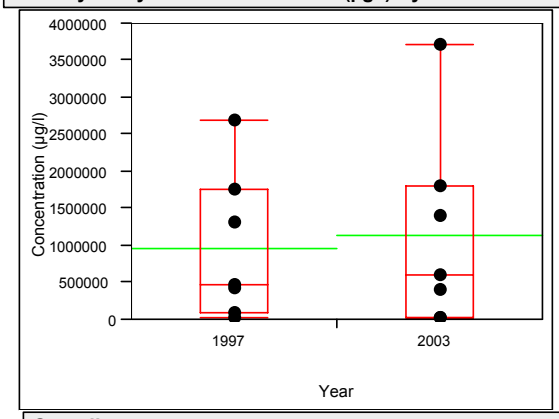
Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	1.3	1.3	1.3	2.6	13	13	13
2003	2.1	2.1	3	3	3	3.2	3.2

FIGURE E-1 (CONTINUED)
SIDE-BY-SIDE BOX-PLOT COMPARISONS OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Magnesium

Oneway Analysis of Concentration (µg/l) By Year

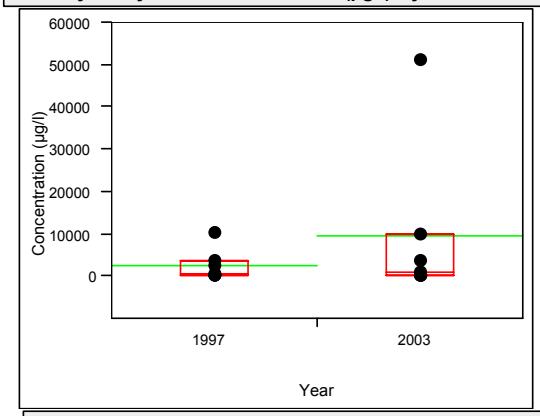


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	29000	29000	90600	462000	1750000	2680000	2680000
2003	16000	16000	28000	600000	1800000	3700000	3700000

Chemical=Manganese

Oneway Analysis of Concentration (µg/l) By Year

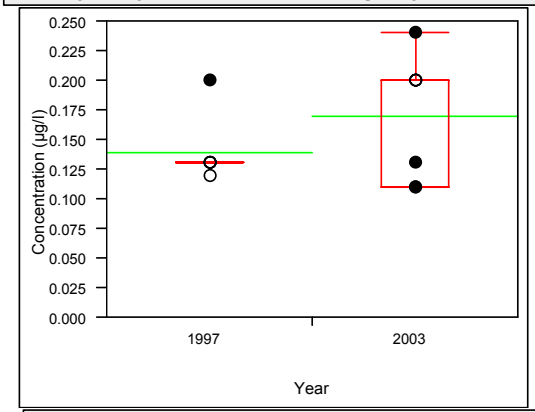


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	21.7	21.7	89.5	639	3600	10300	10300
2003	61	61	130	1000	10000	51000	51000

Chemical=Mercury

Oneway Analysis of Concentration (µg/l) By Year



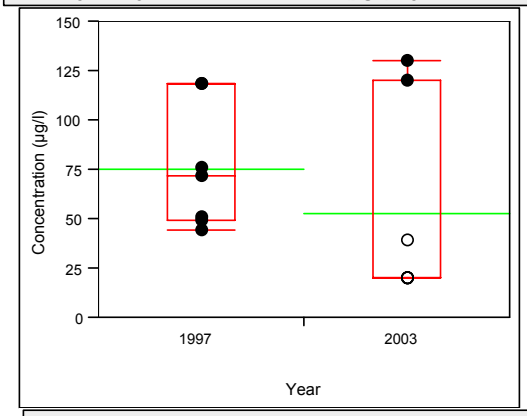
Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	0.12	0.12	0.13	0.13	0.13	0.2	0.2
2003	0.11	0.11	0.11	0.2	0.2	0.24	0.24

FIGURE E-1 (CONTINUED)
SIDE-BY-SIDE BOX-PLOT COMPARISONS OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Molybdenum

Oneway Analysis of Concentration (µg/l) By Year

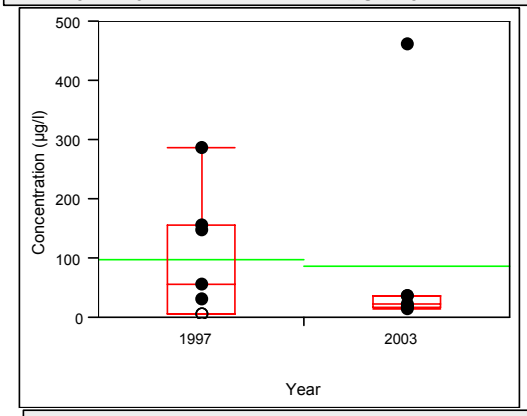


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	44	44	49	71.5	118	118	118
2003	20	20	20	20	120	130	130

Chemical=Nickel

Oneway Analysis of Concentration (µg/l) By Year

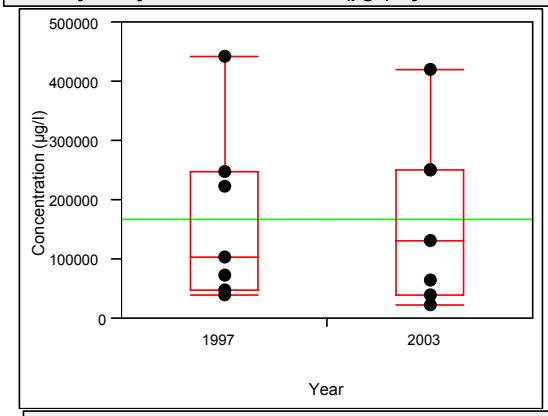


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	6.3	6.3	6.3	55.2	156	287	287
2003	15	15	16	22	37	460	460

Chemical=Potassium

Oneway Analysis of Concentration (µg/l) By Year



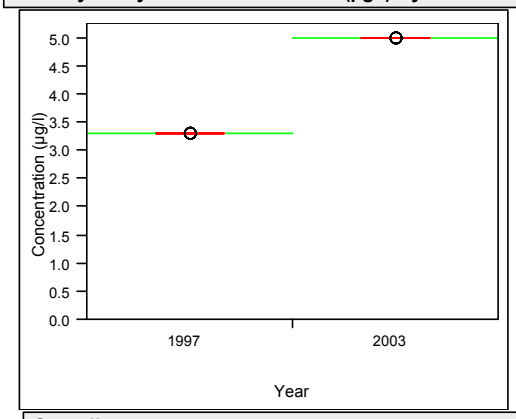
Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	39400	39400	47900	103000	247000	442000	442000
2003	21000	21000	39000	130000	250000	420000	420000

FIGURE E-1 (CONTINUED)
SIDE-BY-SIDE BOX-PLOT COMPARISONS OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Selenium

Oneway Analysis of Concentration (µg/l) By Year

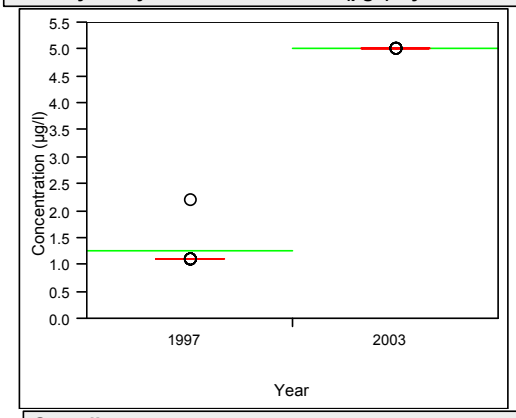


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	3.3	3.3	3.3	3.3	3.3	3.3	3.3
2003	5	5	5	5	5	5	5

Chemical=Silver

Oneway Analysis of Concentration (µg/l) By Year

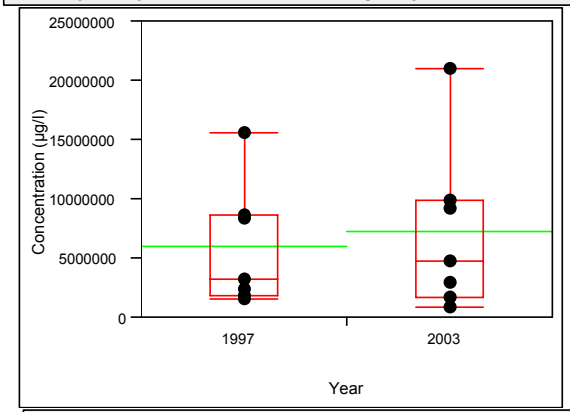


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	1.1	1.1	1.1	1.1	1.1	2.2	2.2
2003	5	5	5	5	5	5	5

Chemical=Sodium

Oneway Analysis of Concentration (µg/l) By Year



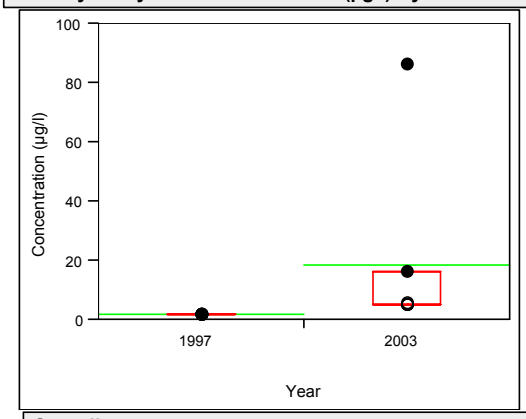
Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	1470000	1470000	1850000	3230000	8550000	15600000	15600000
2003	840000	840000	1600000	4700000	9900000	21000000	21000000

FIGURE E-1 (CONTINUED)
SIDE-BY-SIDE BOX-PLOT COMPARISONS OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Thallium

Oneway Analysis of Concentration (µg/l) By Year

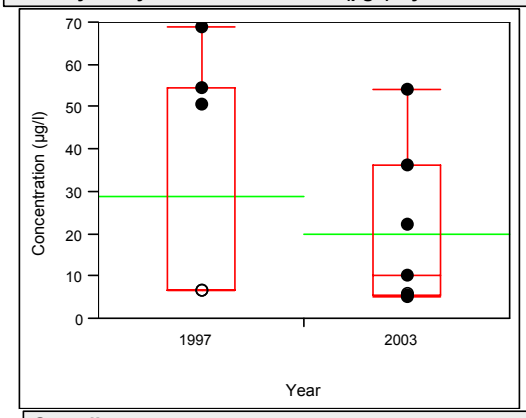


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	1.5	1.5	1.5	1.5	1.7	1.8	1.8
2003	5	5	5	5	16	86	86

Chemical=Vanadium

Oneway Analysis of Concentration (µg/l) By Year

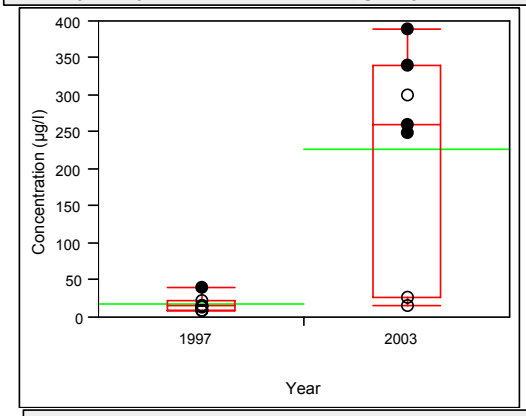


Quantiles

Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	6.8	6.8	6.8	6.8	54.3	68.9	68.9
2003	5.1	5.1	5.4	10	36	54	54

Chemical=Zinc

Oneway Analysis of Concentration (µg/l) By Year



Quantiles

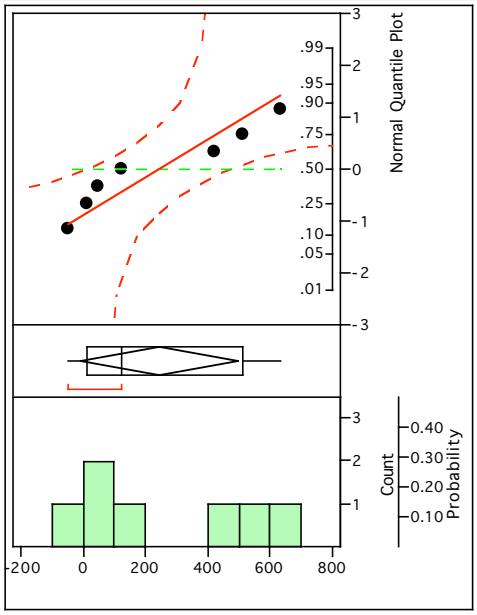
Level	Minimum	10%	25%	Median	75%	90%	Maximum
1997	7.8	7.8	8.8	15.1	21.5	39.2	39.2
2003	16	16	27	260	340	390	390

FIGURE E-2
RESULTS OF STATISTICAL COMPARISON OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Aluminum

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



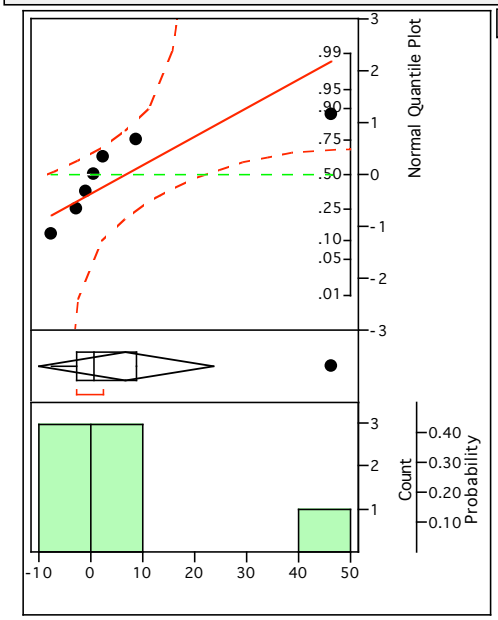
Quantiles		
100.0%	maximum	632.0
99.5%		632.0
97.5%		632.0
90.0%		632.0
75.0%	quartile	511.9
50.0%	median	123.5
25.0%	quartile	12.9
10.0%		-47.0
2.5%		-47.0
0.5%		-47.0
0.0%	minimum	-47.0

Test	Mean=value		
Hypothesized Value		0	
Actual Estimate		243.457	
df		6	
Std Dev		272.234	
		t Test	**Signed-Rank**
Test Statistic		2.3661	12.000
Prob > |t|		0.0558	0.047
Prob > t		0.0279	0.023
Prob < t		0.9721	0.977

Chemical=Arsenic

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



Quantiles		
100.0%	maximum	46.50
99.5%		46.50
97.5%		46.50
90.0%		46.50
75.0%	quartile	8.80
50.0%	median	0.60
25.0%	quartile	-2.80
10.0%		-7.70
2.5%		-7.70
0.5%		-7.70
0.0%	minimum	-7.70

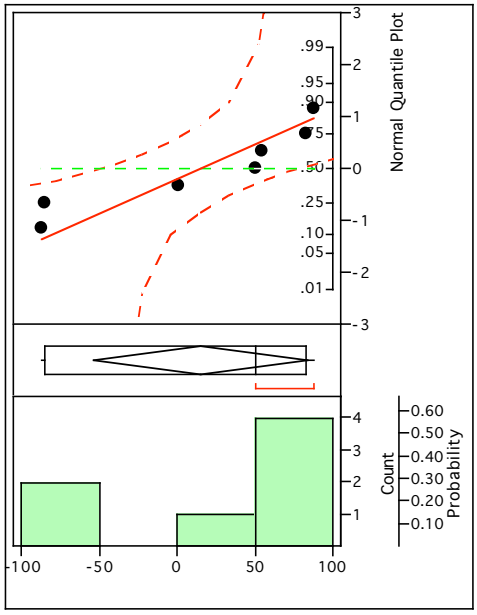
Test	Mean=value		
Hypothesized Value		0	
Actual Estimate		6.72857	
df		6	
Std Dev		18.2444	
		t Test	**Signed-Rank**
Test Statistic		0.9758	3.000
Prob > |t|		0.3669	0.688
Prob > t		0.1834	0.344
Prob < t		0.8166	0.656

FIGURE E-2 (CONTINUED)
RESULTS OF STATISTICAL COMPARISON OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Barium

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



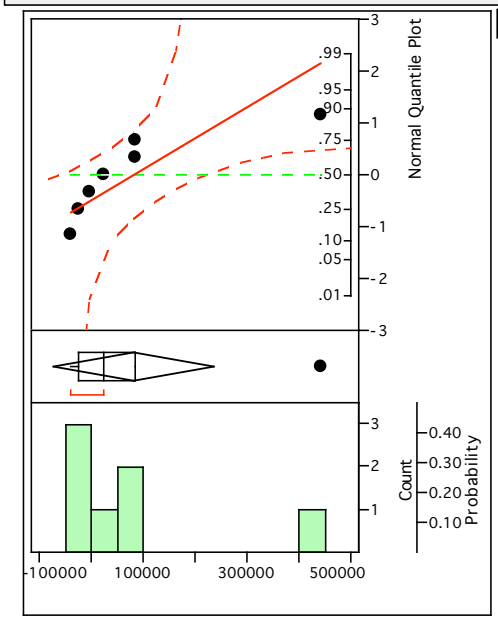
Quantiles		
100.0%	maximum	87.60
99.5%		87.60
97.5%		87.60
90.0%		87.60
75.0%	quartile	83.00
50.0%	median	51.00
25.0%	quartile	-85.00
10.0%		-87.00
2.5%		-87.00
0.5%		-87.00
0.0%	minimum	-87.00

Test Mean=value		
Hypothesized Value	0	
Actual Estimate	15.0429	
df	6	
Std Dev	74.6092	
	t Test	**Signed-Rank**
Test Statistic	0.5334	3.000
Prob > |t|	0.6129	0.688
Prob > t	0.3065	0.344
Prob < t	0.6935	0.656

Chemical=Calcium

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



Quantiles		
100.0%	maximum	443000
99.5%		443000
97.5%		443000
90.0%		443000
75.0%	quartile	86000
50.0%	median	23000
25.0%	quartile	-23000
10.0%		-40800
2.5%		-40800
0.5%		-40800
0.0%	minimum	-40800

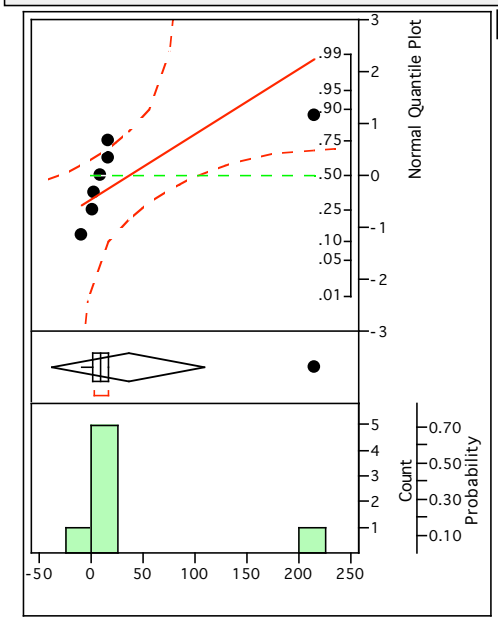
Test Mean=value		
Hypothesized Value	0	
Actual Estimate	81627.1	
df	6	
Std Dev	166811	
	t Test	**Signed-Rank**
Test Statistic	1.2947	6.500
Prob > |t|	0.2430	0.328
Prob > t	0.1215	0.164
Prob < t	0.8785	0.836

FIGURE E-2 (CONTINUED)
RESULTS OF STATISTICAL COMPARISON OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Chromium

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



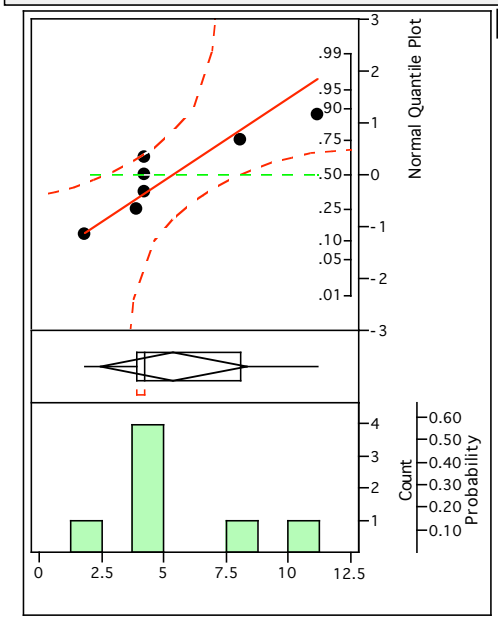
Quantiles		
100.0%	maximum	215.4
99.5%		215.4
97.5%		215.4
90.0%		215.4
75.0%	quartile	16.4
50.0%	median	9.4
25.0%	quartile	1.8
10.0%		-8.7
2.5%		-8.7
0.5%		-8.7
0.0%	minimum	-8.7

Test	Mean=value		
Hypothesized Value		0	
Actual Estimate		36.2857	
df		6	
Std Dev		79.474	
		t Test	Signed-Rank
Test Statistic		1.2080	11.000
Prob > |t|		0.2725	0.078
Prob > t		0.1363	0.039
Prob < t		0.8637	0.961

Chemical=Copper

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



Quantiles		
100.0%	maximum	11.200
99.5%		11.200
97.5%		11.200
90.0%		11.200
75.0%	quartile	8.100
50.0%	median	4.200
25.0%	quartile	3.900
10.0%		1.800
2.5%		1.800
0.5%		1.800
0.0%	minimum	1.800

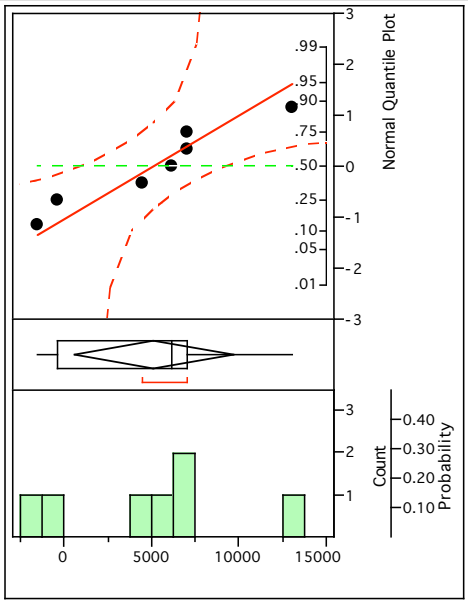
Test	Mean=value		
Hypothesized Value		0	
Actual Estimate		5.37143	
df		6	
Std Dev		3.17423	
		t Test	Signed-Rank
Test Statistic		4.4771	14.000
Prob > |t|		0.0042	0.016
Prob > t		0.0021	0.008
Prob < t		0.9979	0.992

FIGURE E-2 (CONTINUED)
RESULTS OF STATISTICAL COMPARISON OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Iron

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



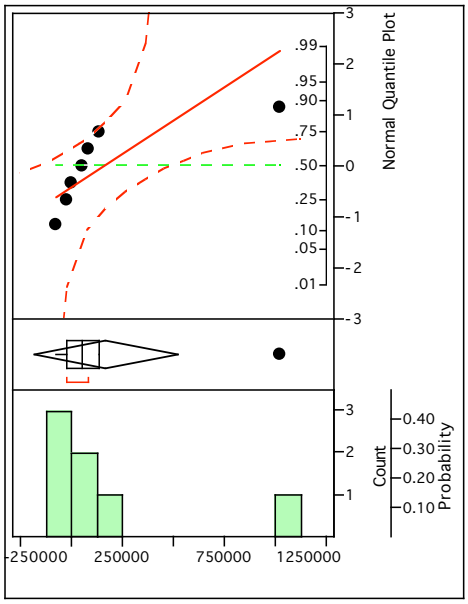
Quantiles		
100.0%	maximum	13040
99.5%		13040
97.5%		13040
90.0%		13040
75.0%	quartile	7073
50.0%	median	6143
25.0%	quartile	-346
10.0%		-1540
2.5%		-1540
0.5%		-1540
0.0%	minimum	-1540

Test	Mean=value		
Hypothesized Value		0	
Actual Estimate		5135.86	
df		6	
Std Dev		4931.96	
		t Test	Signed-Rank
Test Statistic		2.7551	11.000
Prob > |t|		0.0331	0.078
Prob > t		0.0165	0.039
Prob < t		0.9835	0.961

Chemical=Magnesium

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



Quantiles		
100.0%	maximum	1020000
99.5%		1020000
97.5%		1020000
90.0%		1020000
75.0%	quartile	138000
50.0%	median	50000
25.0%	quartile	-26000
10.0%		-74600
2.5%		-74600
0.5%		-74600
0.0%	minimum	-74600

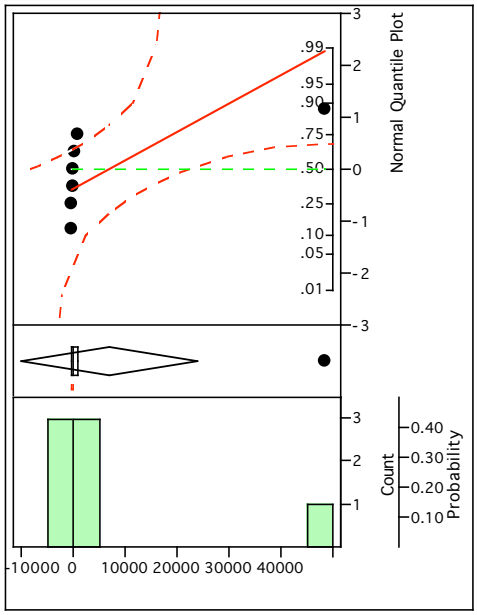
Test	Mean=value		
Hypothesized Value		0	
Actual Estimate		169486	
df		6	
Std Dev		381556	
		t Test	Signed-Rank
Test Statistic		1.1752	7.000
Prob > |t|		0.2844	0.297
Prob > t		0.1422	0.148
Prob < t		0.8578	0.852

FIGURE E-2 (CONTINUED)
RESULTS OF STATISTICAL COMPARISON OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Manganese

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



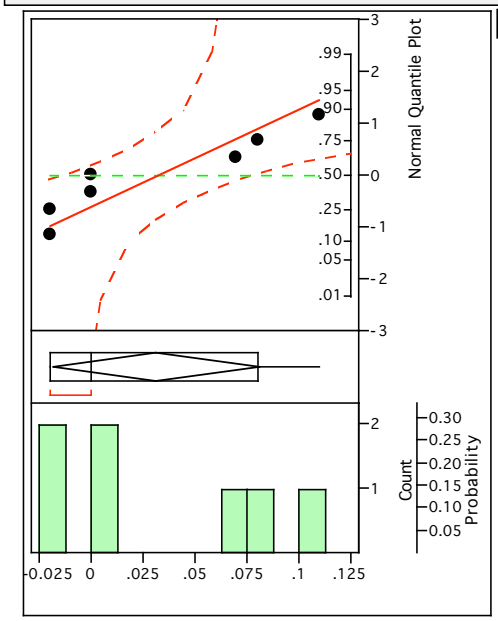
Quantiles		
100.0%	maximum	48380
99.5%		48380
97.5%		48380
90.0%		48380
75.0%	quartile	910
50.0%	median	39
25.0%	quartile	-300
10.0%		-369
2.5%		-369
0.5%		-369
0.0%	minimum	-369

Test	Mean=value	
Hypothesized Value	0	
Actual Estimate	6976.54	
df	6	
Std Dev	18262.1	
	t Test	Signed-Rank
Test Statistic	1.0107	4.000
Prob > |t|	0.3512	0.578
Prob > t	0.1756	0.289
Prob < t	0.8244	0.711

Chemical=Mercury

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



Quantiles		
100.0%	maximum	0.1100
99.5%		0.1100
97.5%		0.1100
90.0%		0.1100
75.0%	quartile	0.0800
50.0%	median	0.0000
25.0%	quartile	-0.0200
10.0%		-0.0200
2.5%		-0.0200
0.5%		-0.0200
0.0%	minimum	-0.0200

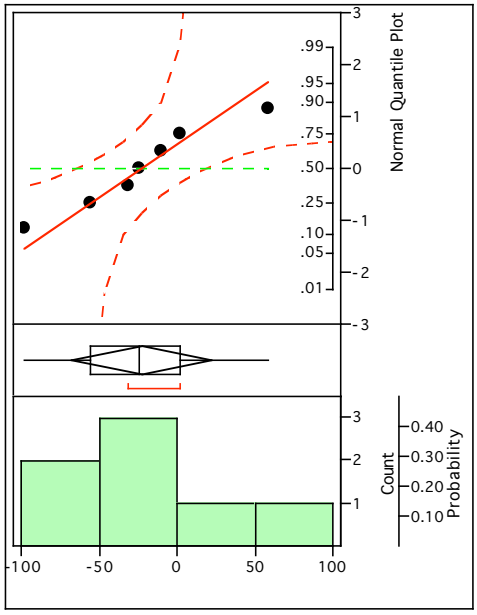
Test	Mean=value	
Hypothesized Value	0	
Actual Estimate	0.03143	
df	6	
Std Dev	0.05367	
	t Test	Signed-Rank
Test Statistic	1.5492	4.500
Prob > |t|	0.1723	0.312
Prob > t	0.0862	0.156
Prob < t	0.9138	0.844

FIGURE E-2 (CONTINUED)
RESULTS OF STATISTICAL COMPARISON OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Molybdenum

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



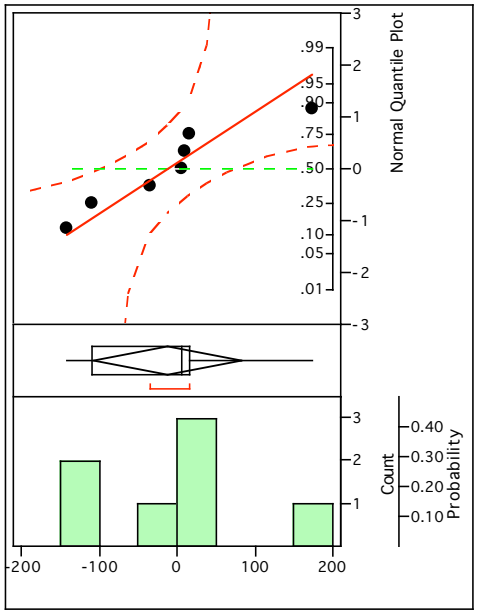
Quantiles		
100.0%	maximum	58.50
99.5%		58.50
97.5%		58.50
90.0%		58.50
75.0%	quartile	2.00
50.0%	median	-24.00
25.0%	quartile	-56.00
10.0%		-98.00
2.5%		-98.00
0.5%		-98.00
0.0%	minimum	-98.00

Test	Mean=value	
Hypothesized Value	0	
Actual Estimate	-22.629	
df	6	
Std Dev	48.6701	
	t Test	**Signed-Rank**
Test Statistic	-1.2301	-7.000
Prob > |t|	0.2647	0.297
Prob > t	0.8677	0.852
Prob < t	0.1323	0.148

Chemical=Nickel

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



Quantiles		
100.0%	maximum	173.0
99.5%		173.0
97.5%		173.0
90.0%		173.0
75.0%	quartile	15.7
50.0%	median	5.1
25.0%	quartile	-110.0
10.0%		-141.0
2.5%		-141.0
0.5%		-141.0
0.0%	minimum	-141.0

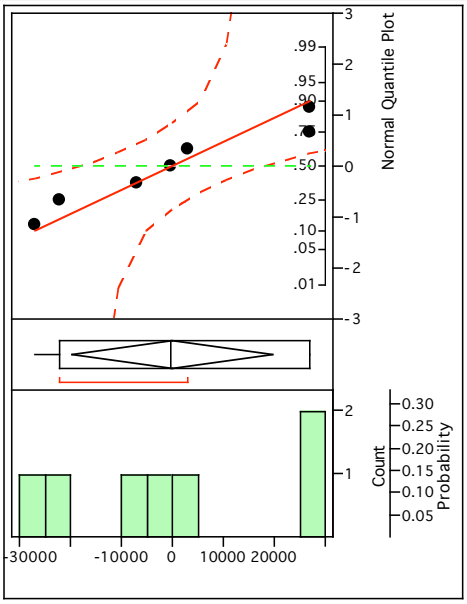
Test	Mean=value	
Hypothesized Value	0	
Actual Estimate	-11.814	
df	6	
Std Dev	102.094	
	t Test	**Signed-Rank**
Test Statistic	-0.3062	-1.000
Prob > |t|	0.7698	0.938
Prob > t	0.6151	0.531
Prob < t	0.3849	0.469

FIGURE E-2 (CONTINUED)
RESULTS OF STATISTICAL COMPARISON OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Potassium

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



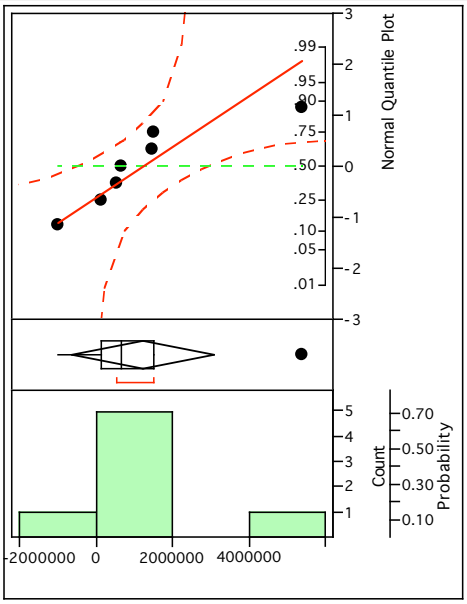
Quantiles		
100.0%	maximum	27000
99.5%		27000
97.5%		27000
90.0%		27000
75.0%	quartile	27000
50.0%	median	-400
25.0%	quartile	-22000
10.0%		-26900
2.5%		-26900
0.5%		-26900
0.0%	minimum	-26900

Test	Mean=value	
Hypothesized Value	0	
Actual Estimate	100	
df	6	
Std Dev	21306.1	
	t Test	Signed-Rank
Test Statistic	0.0124	1.000
Prob > |t|	0.9905	0.891
Prob > t	0.4952	0.445
Prob < t	0.5048	0.555

Chemical=Sodium

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



Quantiles		
100.0%	maximum	5400000
99.5%		5400000
97.5%		5400000
90.0%		5400000
75.0%	quartile	1500000
50.0%	median	650000
25.0%	quartile	130000
10.0%		-1010000
2.5%		-1010000
0.5%		-1010000
0.0%	minimum	-1010000

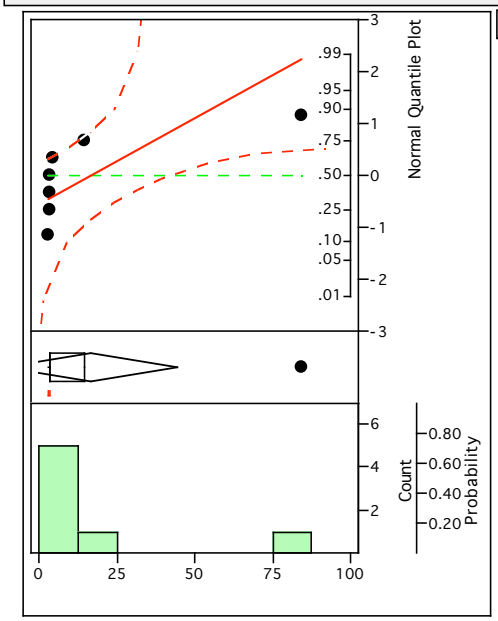
Test	Mean=value	
Hypothesized Value	0	
Actual Estimate	1240000	
df	6	
Std Dev	2023149	
	t Test	Signed-Rank
Test Statistic	1.6216	10.000
Prob > |t|	0.1560	0.109
Prob > t	0.0780	0.055
Prob < t	0.9220	0.945

FIGURE E-2 (CONTINUED)
RESULTS OF STATISTICAL COMPARISON OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Thallium

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



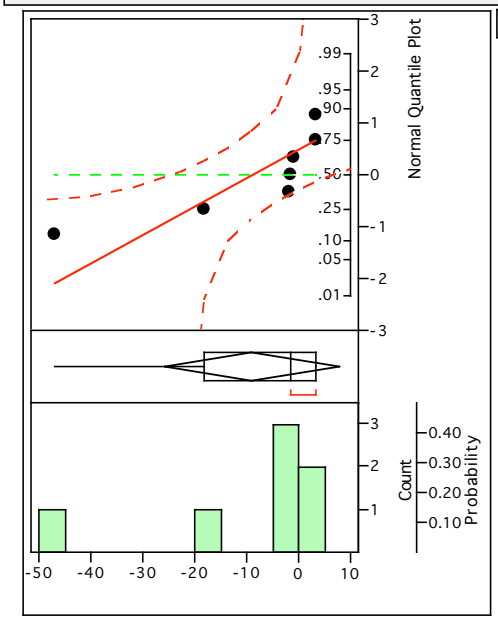
Quantiles		
100.0%	maximum	84.500
99.5%		84.500
97.5%		84.500
90.0%		84.500
75.0%	quartile	14.500
50.0%	median	3.500
25.0%	quartile	3.300
10.0%		3.200
2.5%		3.200
0.5%		3.200
0.0%	minimum	3.200

Test	Mean=value		
Hypothesized Value		0	
Actual Estimate		16.6857	
df		6	
Std Dev		30.182	
		t Test	**Signed-Rank**
Test Statistic		1.4627	14.000
Prob > |t|		0.1939	0.016
Prob > t		0.0969	0.008
Prob < t		0.9031	0.992

Chemical=Vanadium

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



Quantiles		
100.0%	maximum	3.30
99.5%		3.30
97.5%		3.30
90.0%		3.30
75.0%	quartile	3.20
50.0%	median	-1.40
25.0%	quartile	-18.30
10.0%		-46.90
2.5%		-46.90
0.5%		-46.90
0.0%	minimum	-46.90

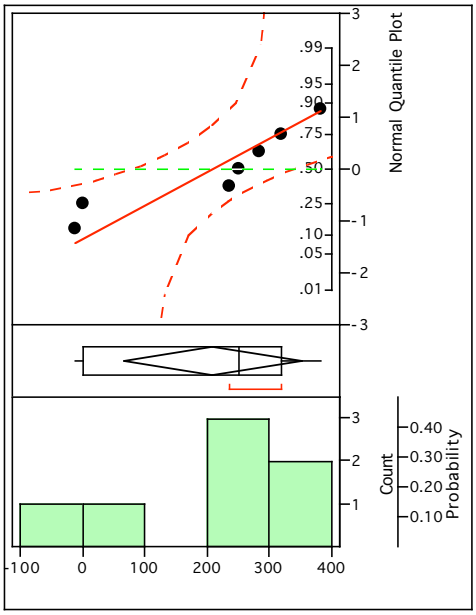
Test	Mean=value		
Hypothesized Value		0	
Actual Estimate		-8.9571	
df		6	
Std Dev		18.2559	
		t Test	**Signed-Rank**
Test Statistic		-1.2981	-5.000
Prob > |t|		0.2419	0.469
Prob > t		0.8790	0.766
Prob < t		0.1210	0.234

FIGURE E-2 (CONTINUED)
RESULTS OF STATISTICAL COMPARISON OF GROUNDWATER TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Chemical=Zinc

Distribution of Between-Year Differences for Seven Monitoring Wells (units in µg/l)

Test that the Mean Difference in Concentration Between Years (2003-1997) is Zero



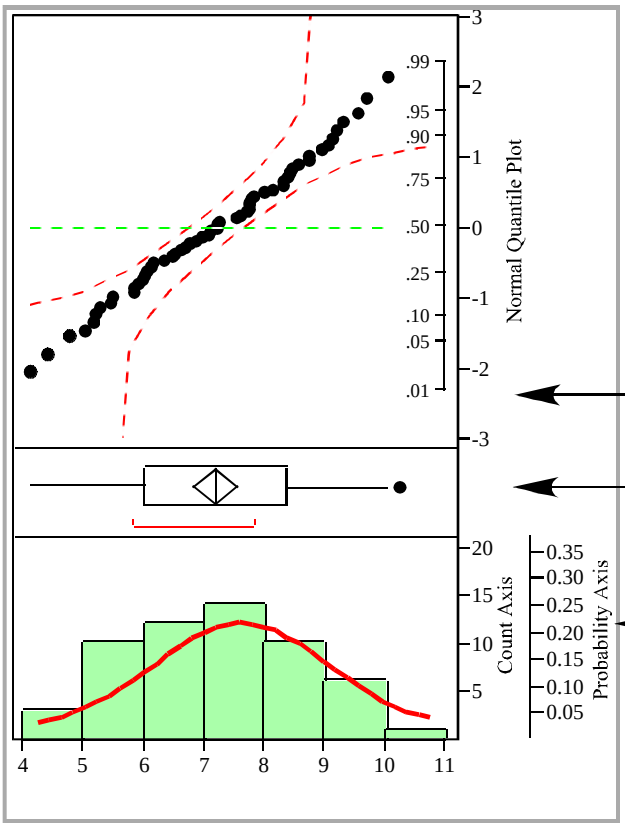
Quantiles		
100.0%	maximum	382.2
99.5%		382.2
97.5%		382.2
90.0%		382.2
75.0%	quartile	318.5
50.0%	median	251.2
25.0%	quartile	2.1
10.0%		-12.2
2.5%		-12.2
0.5%		-12.2
0.0%	minimum	-12.2

Test Mean=value		
Hypothesized Value	0	
Actual Estimate	208.729	
df	6	
Std Dev	153.765	
	t Test	**Signed-Rank**
Test Statistic	3.5915	12.000
Prob > |t|	0.0115	0.047
Prob > t	0.0057	0.023
Prob < t	0.9943	0.977

FIGURE E-3

PART I. EXAMPLE OF FORMAT FOR PRESENTING NORMAL QUANTILE PLOTS, OUTLIER BOX-PLOTS FREQUENCY HISTOGRAMS, AND QUANTILE TABLES

Chemical=X



Quantiles

100.0%	maximum	10.048
99.5%		10.048
97.5%		9.891
90.0%		9.152
75.0%	quartile	8.376
50.0%	median	7.217
25.0%	quartile	6.033
10.0%		5.182
2.5%		4.144
0.5%		4.106
0.0%	minimum	4.106

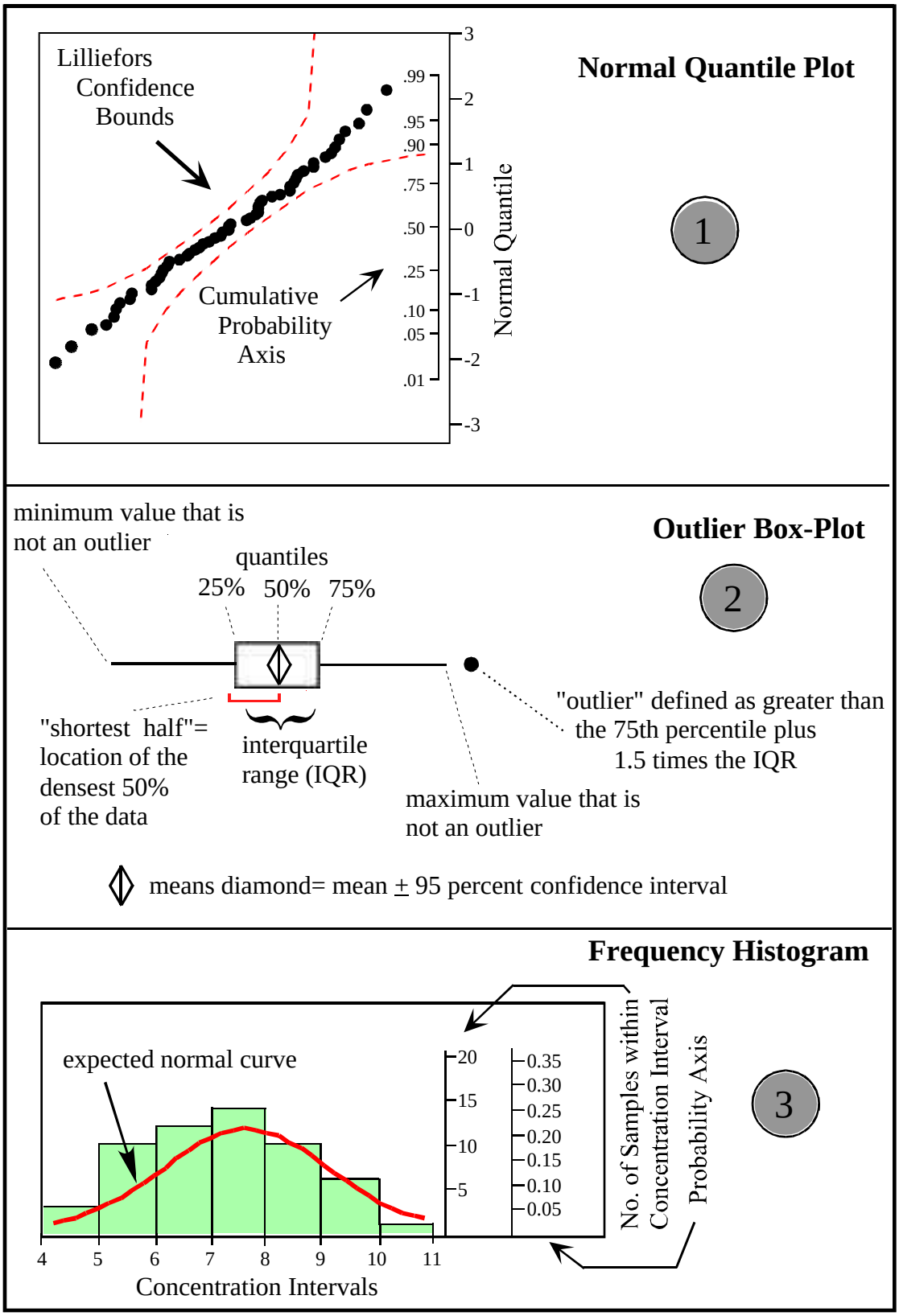
1 Normal Quantile Plot

2 Outlier Box-Plot

3 Frequency Histogram Plot

FIGURE E-4

PART II. GUIDE TO INTERPRETING NORMAL QUANTILE PLOTS, OUTLIER BOX-PLOTS AND FREQUENCY HISTOGRAMS



TABLE

TABLE E-1: STATISTICAL COMPARISON OF TOTAL METAL CONCENTRATIONS IN 1997 AND 2003

Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), NWS SBD Concord, Concord, California

	1997				2003				Probability that the Average Difference in Concentration Between Years is Zero[1]			
	Sample Size		Detection	Median	Sample Size		Detection	Median				Direction o
Chemical	Detected	Total	Frequency (%)	(µg/L)	Detected	Total	Frequency	(µg/L)	t-Test	Signed-Rank Test	Conclusion	Change
Aluminum	3	7	43	38	4	7	57	380	0.06	0.05	S	2003 > 199
Antimony	0	7	0	1.7	0	7	0	60	Not Tested	Not Tested	N/A	N/A
Arsenic	6	7	86	14	5	7	71	15	0.37	0.69	NS	N/A
Barium	7	7	100	189	7	7	100	240	0.61	0.69	NS	N/A
Beryllium	3	7	43	0.58	0	7	0	2	Not Tested	Not Tested	N/A	N/A
Cadmium	0	7	0	0.40	0	7	0	5	Not Tested	Not Tested	N/A	N/A
Calcium	7	7	100	247,000	7	7	100	270,000	0.24	0.33	NS	N/A
Chromium	2	7	29	4.6	6	7	86	21	0.27	0.08	NS	N/A
Cobalt	0	7	0	6	0	7	0	20	Not Tested	Not Tested	N/A	N/A
Copper	1	7	14	5.8	3	7	43	10	<0.01	0.02	S	2003 > 199
Iron	7	7	100	957	5	7	71	7,300	0.03	0.08	S	2003 > 199
Lead	0	7	0	2.6	1	7	14	3	Not Tested	Not Tested	N/A	N/A
Magnesium	7	7	100	462,000	7	7	100	600,000	0.28	0.30	NS	N/A
Manganese	7	7	100	639	5	7	71	1,000	0.35	0.58	NS	N/A
Mercury	1	7	14	0.13	4	7	57	0.2	0.17	0.31	NS	N/A
Molybdenum	7	7	100	72	2	7	29	20	0.26	0.30	NS	N/A
Nickel	5	7	71	55	6	7	86	22	0.77	0.94	NS	N/A
Potassium	7	7	100	103,000	7	7	100	130,000	0.99	0.89	NS	N/A
Selenium	0	7	0	3.3	0	7	0	5	Not Tested	Not Tested	N/A	N/A
Silver	0	7	0	1.10	0	7	0	5	Not Tested	Not Tested	N/A	N/A
Sodium	7	7	100	3,230,000	7	7	100	4,700,000	0.16	0.11	NS	N/A
Thallium	2	7	29	1.5	2	7	29	5	0.19	0.02	S	2003 > 199
Vanadium	3	7	43	6.8	6	7	86	10	0.24	0.47	NS	N/A
Zinc	1	7	14	15.1	4	7	57	260	0.01	0.05	S	2003 > 199

Notes:

µg/L Micrograms per liter

N/A Not applicable

NS Magnitude of change between years is not statistically different

S Magnitude of change between years is statistically different based on the results of at least one test

1 Probabilities associated with parametric (paired-difference t-test) and nonparametric (signed-rank test) statistical tests that the mean difference in concentration between years is zero.
If the probability of either test is less than or equal to 0.05 (5 percent), then it is concluded that the magnitude of change is significantly different from zero
These are two-sided probabilities for the null hypothesis that the net difference between years is zero.
Statistical tests were not performed for any chemical not detected in at least one year.

APPENDIX F
RESPONSES TO SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD COMMENTS ON DRAFT REPORT

RESPONSES TO REGULATORY AGENCY COMMENTS ON DRAFT GROUNDWATER SUMMARY REPORT FOR THE TIDAL AREA LANDFILL (SITE 1) SEAL BEACH DETACHMENT, CONCORD, CALIFORNIA

This document presents the U.S. Department of the Navy's (Navy) responses to comments from staff from the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) on the Draft Groundwater Sampling Summary Report for the Tidal Area Landfill (Site 1), Naval Weapons Station, Seal Beach Detachment, Concord, California, dated January 19, 2004. The comments addressed below were received from SFBRWQCB on March 1, 2003.

RESPONSES TO SFBRWQCB COMMENTS

A. GENERAL COMMENTS

1. Comment: **The Navy needs to sample groundwater within the Site 1 footprint for contaminants of concern to further characterize the leachability of the buried wastes. Furthermore, this characterization should be performed in a spatially and temporally comprehensive manner. For example, the influence of tidal effects upon groundwater gradient at the site is poorly known due to the presence of piezometers outside of the waste disposal perimeter. Additionally, the Navy has not yet provided an evaluation of water quality in the sandy aquifer found below the poorly retentive bay muds. Finally, Board Staff recommends sampling constituents of concern in groundwater reflective of the disposed wastes. As an illustration, it is conceivable that chemical components used in the production, handling and use of ordnance could be detrimentally affecting groundwater use at the site. Chemicals such as:**

- **2,4 dichlorophenoxy acetic acid and 2,4,5 trichlorophenoxy acetic acid (defoliants components).**
- **Dioxin.**
- **SWRCB emergent chemicals as outlined in a communication sent to the Navy on July 3rd 2003.**

Response: The Navy is currently preparing a sampling and analysis plan (SAP) to conduct additional groundwater and surface water investigation at the Tidal Area Landfill (Site 1). Under that SAP, additional groundwater monitoring wells will be installed at the perimeter of the Tidal Area Landfill in order to monitor concentrations and to give an indication of the potential for contaminants from the disposed wastes to migrate to groundwater and be transported off-site. Groundwater samples from the new and existing Tidal Area Landfill monitoring wells would be analyzed for a broad range of analytes that will include volatile organic compounds, semivolatile organic compounds, explosives, pesticides, total petroleum hydrocarbons, metals, and mercury. The analytes will also include the

emergent chemicals perchlorate, N-nitrosodimethylamine, 1,4-dioxane, hexavalent chromium, and 1,2,3-trichloropropane. Analyses for 2,4-dichlorophenoxyacetic acid, 2,4,5-trichlorophenoxyacetic acid, dioxins, and the emergent chemical polybrominated diphenyl ether (PBDE) will not be conducted. 2,4-Dichlorophenoxyacetic acid decomposes in water, and 2,4,5-trichlorophenoxyacetic acid strongly binds to organic matter in soil (UN 1996). Based on the low mobility of these two compounds, they are not expected to be present in groundwater at concentrations that pose a risk to human health. Specific sources of dioxin such as incineration did not occur at the landfill. Also, due to its very low water solubility, dioxin tends to adhere to soil if released to land, and is not likely to leach to groundwater. PBDE also has very low water solubility, and is not likely to leach to groundwater.

Tidal effects on groundwater at Site 1 are minimal to not measurable due to the distance from Site 1 to Suisun Bay and Otter Sluice. A tidal influence study conducted in the Tidal Area in 1994 found that the area where groundwater and surface water interacts during a tidal cycle is limited to a narrow band adjacent to Otter Sluice (Tetra Tech 1998). For example, monitoring well RADMW004, located approximately 60 feet east of Otter Sluice, did not exhibit a tidal response. The Navy does not plan to evaluate water quality in the deep sandy zone beneath the bay mud. The presence of a continuous layer of low permeability bay mud at Site 1 limits potential vertical groundwater migration and makes an evaluation of groundwater beneath the bay mud unwarranted.

2. **Comment:** **The detection limits reported for perchlorate concentrations in groundwater in the perimeter of the Tidal Area Landfill are too high to provide relevant information as to the potential presence of this contaminant in groundwater at the site. Board Staff does understand that nitrate, sulfates, chlorides, carbonates and bacteria interfere with the analysis of this anion. However, the Navy did not report the concentrations of commonly found anions and cations indicative of the geochemical signature of the sampled waters. Hence, it is impossible to determine which anions are causing perchlorate detections problems.**

Board Staff has contacted analytical laboratories to determine how perchlorate concentrations could be analyzed in high anionic strength water samples without dilutions. Anions causing the perchlorate analytical interferences could be selectively removed pre-analysis using ion specific filters. Furthermore, potassium hydroxide gradient could be set up during the elution to provide a better chromatographic separation of polarizable anions.

Response: The most promising method for perchlorate analysis that the Navy has found to date in high anionic strength samples is a method using liquid chromatography (LC) with tandem mass spectrometers (LC/MS/MS). Although this method has not yet been approved for perchlorate by regulatory agencies, the Navy will propose in the Site 1 SAP to analyze groundwater samples collected from the monitoring wells around the landfill for perchlorate by LC/MS/MS.

B. SPECIFIC COMMENTS

1. Comment: **Section 1.2.1, Geology and Topography, p 2:**

- **The Navy needs to specify that the types of wastes disposed at the Site 1 Landfill are circumstantial as no precise records of the material disposed or soil borings data exist.**
- **Indicate the presence of sand lenses in the lithology at the site.**
- **Mention the potential presence of a 1939 man-made drainage channel adjoining the southeastern side of the disposal site.**

Response: Section 1.2 will be revised to state that there are no precise records of material disposed at the Site 1 landfill. Section 1.2.1 will be revised to state that sand lenses are present at the site. Section 1.2.1 will also be revised to note the potential presence of a drainage channel along the southeastern side of the disposal site.

2. Comment: **Section 1.2.2, Hydrogeology, p 3:**

- **Beneficial uses per the 1995 San Francisco Bay Basin Plan have been defined for the region where the Tidal Area Landfill is located. Unless otherwise designated by the Regional Board, all groundwaters are considered suitable, or potentially suitable, for municipal or domestic water supply. In making exceptions, the Regional Board will consider the criterions referenced in Regional Board Resolution No 88-63, "Sources of Drinking Water".**
- **Indicate the following groundwater beneficial uses for the site: municipal and domestic water supplies, industrial process supply, agricultural water supply and freshwater replenishment to surface waters.**
- **The Navy needs to report TDS (Total Dissolved Solids) concentrations and total conductance in groundwater at the site.**

Response: Section 1.2.2 will be revised to state that the Bay Basin Plan specifies the beneficial uses listed above for the Tidal Area Landfill; and also that groundwater in the Tidal Area may be a suitable candidate for a beneficial use exemption due to low well yields and high concentrations of total dissolved solids (TDS). TDS data were not collected during the 2003 round of sampling; however, TDS will be collected and reported in the follow-on investigation. Conductivity values were reported on the monitoring well sampling sheets in Appendix B.

3. Comment: **Section 3.2.2.4, Mercury, p 9:**

- **Specify if the mercury concentrations reported are for the total species of that metal.**
- **Due to exceedances in mercury and the geochemical environment where this contaminant is found, Board Staff recommends reporting concentrations of methyl mercury in water at the site.**

Response: Mercury was analyzed using the cold vapor atomic absorption technique (EPA method 7470A), in which all species of mercury are reduced to the elemental state. Section 3.2.2.4 will be revised to state that the reported concentrations are for unspeciated mercury. There are no plans at present to collect methylmercury data, as it is not considered useful for current site evaluations. ….

4. Comment: **Section 3.3, Statistical Comparison Between 1997 and 2003 Metal Concentrations in Groundwater, p 10:**

- **Provide a summary of the statistical analysis used to determine if there were any significant changes in groundwater contaminants concentrations between 1997 and 2003.**

Response: A summary of the statistical analysis is provided in Appendix E.

5. Comment: **Tables 4 & 5, Comparison Between 1997 and 2003 Total Metal Concentrations in Groundwater:**

- **Graphically compare detectable concentrations of contaminants obtained in groundwater between 1997 and 2003.**
- **Indicate the detection limits for the contaminants detected above screening criteria such as for mercury and zinc.**
- **Specify the mercury speciation (Total Mercury or Methyl Mercury) for the values tabulated.**

Response: A graphic comparison of detectable concentrations of contaminants obtained in groundwater between 1997 and 2003 is provided in Appendix E (Figures E-1 and E-2). The reporting limits for nondetected results are listed on Tables 4 and 5; however, reporting limits for analytes detected above the screening criteria are not shown on the table, as this information is not of practical use in the comparison. Table 4 will be revised to specify that the mercury results are total mercury.

REFERENCES

Tetra Tech EM Inc. (Tetra Tech). 1998. "Technical Memorandum: Confirmation Groundwater Sampling in the Tidal Area Sites, Naval Weapons Station, Concord, California." March 19.

United Nations Environmental Programme. 1996. "Operation of the Prior Informed Consent Procedure for Banned or Severely Restricted Chemicals in International Trade, 2,4,5-T, Decision Guidance Documents." Food and Agriculture Organization of the United Nations. Originally issued in 1991, amended in 1996.