Appendix J.
Quality Control Summary Report

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Abbreviations and Acronyms

APHA	American Public Health Association
APPL	Agriculture & Priority Pollutants Laboratories, Inc.
BGMP	Basewide Groundwater Monitoring Program
CAS	Columbia Analytical Services
CLP	Contract Laboratory Program
CVAFS	cold vapor atomic fluorescence spectrometry
DOE	Department of Energy
DQA	data quality assessment
DQO	Data Quality Objectives
EDD	electronic data deliverable
GC/MS	gas chromatography/mass spectrometry
HPS	Hunters Point Shipyard
LCS	laboratory control sample
LDC	Laboratory Data Consultants
LUFT	leaking underground fuel tank
min	minute
mL	milliliter
MS	matrix spike
MSD	matrix spike duplicate
NAVFAC	Naval Facilities Engineering Command
NEDD	Navy Electronic Data Deliverable
NFESC	Naval Facilities Engineering Service Center
NIRIS	Naval Installation Restoration Information Solution
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
PCBs	polychlorinated biphenyls
pH	hydrogen ion concentration
QC	quality control
QCSR	Quality Control Summary Report
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SDG	sample delivery group
SMEWW	Standard Methods for the Examination of Water and Wastewater
SOP	Standard Operating Procedure
SVOCs	semivolatile organic compounds
TPH	total petroleum hydrocarbons
TtEMI	Tetra Tech EM, Inc.
U.S. EPA	United Stated Environmental Protection Agency
VOCs	volatile organic compounds

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1.0 Introduction

This Semiannual Quality Control Summary Report (QCSR) summarizes the quality control (QC) activities associated with two individual groundwater sampling events conducted at the Hunters Point Shipyard (HPS) in San Francisco, California as part of the Basewide Groundwater Monitoring Program (BGMP). The semiannual period consisted of two basewide, quarterly groundwater sampling events (April-June 2008 and July-September 2008).

The two sampling events utilized different sampling plans. Groundwater sampling procedures, analytical methods, analytical results, project objectives and data quality objectives (DQOs) from the April-June 2008 sampling event are described in the BGMP Sampling and Analysis Plan (SAP) (Tetra Tech EM, Inc. [TtEMI], 2004). The July-September 2008 sampling event followed procedures and protocols as described in the BGMP Draft Final SAP (CE2-Kleinfelder Joint Venture, June 2008).

This QCSR consists of eight sections. Section 2.0 provides an overview of the groundwater sampling procedures. Section 3.0 provides an overview of the decontamination procedures. Section 4.0 provides a summary of the QC samples collected and their associated analytical results. Section 5.0 identifies the analytical methods implemented in the previous year of sampling. Section 6.0 summarizes the findings of the data quality assessment (DQA) process, which includes a review, verification, validation, and usability assessment of the data generated during the two quarterly groundwater sampling events. Section 7.0 provides an overview of the data storage process. Section 8.0 provides references.

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2.0 Groundwater Sampling Procedure

Low-flow sampling procedures were used to obtain groundwater samples from the monitoring wells at HPS. Dedicated bladder pumps or submersible bladder pumps were used in combination with new or well-dedicated Teflon-lined polyethylene tubing to purge wells and collect groundwater samples. During purging, flow rates were monitored and controlled using a QED MP-10 MicoPurge Basics Controller and water quality parameters were monitored using QED MP20-DT Water Quality Meter and flow-through cell. The water quality meters measured groundwater temperature, dissolved oxygen, hydrogen ion concentration (pH), oxidation-reduction potential, specific conductance and turbidity. The groundwater flow rates were monitored in order to remain at or below 500 milliliters per minute (mL/min), and to minimize drawdown to less than 25 percent of the distance between the initial depth to water and the pump intake.

Field personnel monitored depth to water using electronic water level indicators. The water quality parameters were recorded at a minimum frequency of once per liter of groundwater purged. The wells were purged until the stabilization of specific conductance, pH, and dissolved oxygen parameters, and a minimum of eight liters of groundwater were removed in accordance with the BGMP SAP (TtEMI, 2004) and the Draft Final BGMP SAP (CE2-Kleinfelder Joint Venture, 2008). If the water quality parameters did not stabilize as specified in the SAPs, then a maximum of fourteen liters were purged prior to sampling.

Field personnel recorded flow rates, purge volumes, and water quality parameters on monitoring well sampling sheets, which are included in Appendix C of this semiannual groundwater monitoring report. After purging was completed, field personnel collected groundwater samples. The flow rate was reduced to 100 mL/min to collect samples for volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH) - gasoline analyses. After collecting samples for VOCs and TPH-gasoline analyses, the flow rate was returned to the original purge rate to fill the remaining sample containers. Samples collected for dissolved metals, radionuclides, and perchlorate analyses were field-filtered or laboratory-filtered using a disposable 0.45 micron (µm) filter prior to analysis. Sample containers were filled in the order as specified in the BGMP SAP (TtEMI, 2004) and Draft Final BGMP SAP (CE2-Kleinfelder Joint Venture, 2008).

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3.0 Decontamination Procedure

Test equipment that contacted groundwater was decontaminated after the completion of sampling at each well. The electronic water level indicators and submersible bladder pumps were decontaminated after the sampling of each well using a three-stage decontamination procedure. The first stage consisted of washing the sampling equipment with a mixture of tap water and Liquinox™ soap. The second stage consisted of rinsing the sampling equipment with tap water. The third and final stage consisted of rinsing the sampling equipment with deionized water. The submersible pumps were decontaminated by circulating water from each decontamination stage through the pump for a minimum of five minutes. New or well-dedicated polyethylene tubing was used for pumping each well; therefore, tubing decontamination was not necessary.

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4.0 Quality Control Samples

Field and laboratory QC samples were collected in the field or prepared in the laboratory to evaluate and monitor the quality of both field and laboratory procedures. Table J-1 summarizes the field and laboratory QC samples and the frequency of collection or preparation during the semiannual period.

Field samples, including field QC samples, were preserved (if method required), stored, and transported in coolers with sufficient "wet" ice to maintain sample temperatures at less than six degrees Celsius. Upon receipt, the laboratory measured the cooler interior temperatures using temperature blanks. The laboratory did not report temperatures exceeding 6 degrees Celsius in any of the sample coolers submitted to the analytical laboratory during the semiannual reporting period.

During the DQA, organic and inorganic contaminants reported in samples with less than five times the concentrations detected in blanks (or 10 times for common laboratory contaminants) were qualified as not detected and assigned a "U" qualifier. A low percentage of sample results (approximately 0.78 percent) were affected by possible laboratory contamination, increasing some of the quantitation limits for these analytes.

Contaminants reported in field samples with less than five times the concentrations detected in field blanks were qualified as not detected and assigned a "U" qualifier. Of the 940 equipment rinsate results generated, there were 57 detected results (approximately 6.1 percent). Several of these analytes are typically present at low concentrations in the source water used in the equipment decontamination process, including the trihalomethanes (i.e. chloroform, dibromochloromethane, and bromodichloromethane), and several metals (i.e. aluminum, calcium, and magnesium). Seventeen field sample results (bromodichloromethane, cadmium, chloroform, chloromethane, diesel, manganese, methyl-tert butyl ether, motor oil, and silver) were qualified as not detected due to equipment rinsate contamination, affecting the quantitation limits of these results.

During sampling of well IR14MW13A, the field sampling team observed residual non-aqueous phase product (NAPL). After decontaminating the sampling equipment, the field sampling team collected an equipment rinsate sample. Diesel and motor oil were detected in both the field sample and the equipment rinsate sample from well IR14MW13A. Although the diesel and motor oil results from the field sample were qualified as not detected due to the equipment rinsate concentration, it is likely that diesel and motor oil are present in the groundwater from well IR14MW13A. This well will be sampled in the future using the sampling protocol described in Worksheet #17 of the Draft Final SAP (subsection entitled "Purging and Sampling Groundwater Monitoring Wells Containing Residual NAPL") to minimize the potential for equipment contamination.

Four analytes (acetone, chloroform, methylene chloride, and methyl-tertiary butyl ether [MTBE]) were detected in a select number of trip blank samples. Of the 6,231 trip blank results, there were 16 detected results (approximately 0.26 percent). Eighteen results (consisting of either chloroform, methylene chloride, or MTBE) were qualified as not detected due to trip blank contamination. With the exception of these 18 sample results, the overall data quality was deemed unaffected, and thus unqualified during the data validation process since the analytes were either not detected in the associated field samples or were detected at above 5 times the concentration in the trip blanks.

One field blank sample was analyzed for low-level mercury and methyl mercury to meet the method-driven requirements. Mercury and methyl mercury were not detected in the field blank sample.

Field duplicate pairs were collected at a total of 47 wells out of 412 wells sampled, meeting the criteria of 10 percent as specified in the BGMP SAP (TtEMI, 2004) and the Draft Final BGMP SAP (CE2-Kleinfelder Joint Venture, 2008). Relative percent differences (RPDs) were calculated using the field duplicate pair results, then evaluated against a RPD criterion of 30 percent. Of the 2,171 total field duplicate pair results, 60 results (approximately 2.8 percent) exceeded the 30 percent RPD criterion. Qualifiers were not assigned to the analytical data for the field duplicate pair results.

Field QC samples were collected and submitted in accordance with the frequency specified in the BGMP SAP (TtEMI, 2004) and the Draft Final BGMP SAP (CE2-Kleinfelder Joint Venture, 2008), and in Table J-1.

Table J-1. Types of quality control samples per quarterly sampling event

Field QC Samples		
Sample Type	**Purpose**	**Frequency**
Source water blank	Measures background levels in source water (used for decontamination).	One per quarterly sampling event per type of water used for final equipment decontamination
Equipment blank	Measures adequacy of the equipment decontamination process, as well as contaminant effects from handling, storage, shipment, and analysis.	One per sampling team per day per set of portable sampling equipment
Field blank	Measures contamination occurring from field conditions during sampling	One per 10 field samples collected per day for low-level mercury and methyl mercury analyses
Trip blank	Measures VOC background levels from sample handling, shipping and transport.	One per cooler containing samples analyzed for VOCs and TPH-gasoline per day
Field duplicate	Measures variability in results from sampling procedures.	One per 20 field samples collected
Temperature blank	Measures temperature of samples upon arrival to laboratory.	One per cooler
Laboratory QC Samples		
Sample Type	**Purpose**	**Frequency**
Calibration blank	Sets baseline or instrument zero.	Start of calibration process and per method
Preparation blank	Measures laboratory contamination during sample preparation process.	One per batch
Method blank	Measures laboratory contamination during method analysis.	One per batch or method
Matrix spikes	Measures matrix effect and accuracy of analytical process.	One per 20 samples or batch
Laboratory duplicate	Measures variability of results within the laboratory.	One per 20 samples or batch
Laboratory Control Sample	Measures accuracy of analytical process and calibration.	One per 20 samples or batch

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5.0 Laboratory Analyses

A total of 412 groundwater samples, with 247 accompanying field QC samples, were collected during the semiannual period consisting of the April-June 2008 and July-September 2008 quarterly sampling events conducted at HPS. Table J-2 summarizes the analytical parameters and methods performed during each quarterly sampling event.

Table J-2. Analytical parameters and methods

Analytical Parameter	Analytical Method
Ammonia Nitrogen	U.S. EPA Method 350.1
Anions	U.S. EPA Method 300.0
Cesium-137	U.S. EPA Method 901.0
Cyanide	U.S. EPA Method 9014
Dissolved Mercury	U.S. EPA 7470A U.S. EPA Method 1631E U.S. EPA CLP Method ILM05.3
Dissolved Metals	U.S. EPA Method 6010B U.S. EPA Method 6020A U.S. EPA CLP Method ILM05.3
Dissolved Methyl Mercury	CAS SOP Methyl Mercury by CVAFS
Extractable Oil and Grease	U.S. EPA Method 1664A
Hexavalent Chromium	U.S. EPA Method 7199
Organochlorine pesticides	U.S. EPA Method 8081A
Organophosphorous Pesticides	U.S. EPA Method 8141A
Organotins	APPL SOP Tributyltin by GC/MS
PCBs	U.S. EPA Method 8082
Perchlorate	U.S. EPA Method 6850
Pesticides and PCBs	U.S. EPA CLP Method OLC03.2
Plutonium	HASL 300 Method PU-10
Radium-226	U.S. EPA Method 903.1
Salinity	SMEWW Method SM2520
Strontium-90	U.S. EPA Method 905.0
Sulfide	U.S. EPA Method 376.1
SVOCs + 1,4-Dioxane	U.S. EPA Method 8270C U.S. EPA CLP Method OLM04.3
Thorium-232	U.S. EPA Method 520 00-07
Total Dissolved Solids	U.S. EPA Method 160.1
Total Kjeldhal Nitrogen	U.S. EPA Method 351.2
Total Suspended Solids	U.S. EPA Method 160.2
TPH-extractables	U.S. EPA Method 8015B
TPH-gasoline	U.S. EPA Method 8015B
VOCs	U.S. EPA Method 8260B U.S. EPA CLP Method OLC03.2

Table J-2 Notes, Acronyms/Abbreviations:

APPL: Agriculture & Priority Pollutants Laboratories, Inc.
CAS: Columbia Analytical Services
CLP: Contract Laboratory Program
CVAFS: cold-vapor atomic fluorescence spectrometry
DOE: Department of Energy
GC/MS: gas chromatography/mass spectrometry
PCBs: polychlorinated biphenyls
SOP: standard operating procedure
SMEWW: Standard Methods for the Examination of Water and Wastewater
SVOCs: semivolatile organic compounds
TPH: total petroleum hydrocarbons
U.S. EPA: United States Environmental Protection Agency, *Test Methods for Evaluating Solid Wastes Physical/Chemical Methods* (SW-846, 3rd Edition, Update IV)
VOCs: volatile organic compounds

Samples collected during the semiannual period were submitted and analyzed by Agriculture & Priority Pollutants Laboratories, Inc. (APPL), located in Fresno, California; Eberline Services Inc. (Eberline) of Richmond, California for radiochemical analysis; and Columbia Analytical Services (CAS) in Kelso, Washington for mercury speciation, chemical oxygen demand, and flashpoint analyses. Analytical laboratories used for the BGMP are California-State and Naval Facilities Engineering Service Center (NFESC)-accredited laboratories

6.0 Data Quality Assessment

The DQA process consists of a systematic review, verification, validation, and usability assessment of the data generated during the two quarterly groundwater sampling events. The purpose of the DQA is to evaluate and monitor the performance of the field sampling and analytical procedures and assess the quality of the data. Data review and verification were performed under the direction of the BGMP Project Chemist on 100 percent of the analyses. Laboratory Data Consultants, Inc. (LDC), located in Carlsbad, California, was selected to perform the independent, third-party data validation. The data were reviewed, verified and validated consistent with procedures, presented in the following documents:

- *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (U.S. EPA 1999)*
- *U.S. EPA Contract Laboratory National Functional Guidelines for Inorganic Data Review (U.S. EPA 2004).*
- *U.S. EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Third Edition. Updates I, II, IIA, IIB, III, IIIA, IIIB, and IV (U.S. EPA 2007).*
- *BGMP Sampling and Analysis Plan (TtEMI 2004).*
- *Draft Final Sampling and Analysis Plan (CE2-Kleinfelder Joint Venture 2008).*

Data validation was performed on 100 percent of the data, with approximately 80 percent undergoing a Level III data validation and 20 percent undergoing a Level IV validation in accordance with the BGMP SAP (TtEMI, 2004) and Draft Final BGMP SAP (CE2-Kleinfelder Joint Venture, 2008).

Data validation was performed on 100 percent of the data consistent with the BGMP SAP (TtEMI, 2004) and Draft Final BGMP SAP (CE2-Kleinfelder Joint Venture, 2008). Approximately 80% of the Level III (cursory review) and 20% of the Level IV (full review) laboratory data quality reports were validated by LDC for these two quarterly groundwater monitoring events.

A total of 32,864 analytical results were evaluated by LDC during the data validation process.

The analytical results (qualified and unqualified data) and the data validation reports are provided as Appendix F in the attached semiannual groundwater monitoring report.

As a result of the data validation process, some analytical results were qualified as estimated (i.e., “J”), or estimated at an elevated quantitation limit (i.e., “UJ”). However, these qualified results are still considered usable. Results were qualified as estimated for one or more of the following reasons:

- Laboratory blank contamination;
- Serial dilution criteria exceeded;
- Relative retention factors outside the acceptable criteria;

- Surrogates, laboratory control sample (LCS), matrix spike (MS), or matrix spike duplicate (MSD) samples percent recoveries outside the acceptable criteria;
- Equipment rinsate contamination;
- Technical holding times exceeded; or
- Calibration with percent differences outside the acceptable criteria.

Table J-3 summarizes the data qualified as estimated ("J" qualified") or rejected ("R" qualified) along with the percent of qualified data, generated during the April-June 2008 and July-September 2008 quarterly sampling events conducted at HPS. During the data quality assessment process, it was deemed that the results are of good quality and are acceptable for use during the decision-making process.

Table J-3. Summary of qualified analytical data by analytical method

Analytical Parameter	Analytical Method	Total Estimated, Usable ("J" or "UJ" Qualified) Data	Total Unusable ("R") Qualified Data
Ammonia Nitrogen	U.S. EPA Method 350.1	7	0
Anions	U.S. EPA Method 300.0	18	0
Cesium-137	U.S. EPA Method 901.0	3	0
Cyanide	U.S. EPA Method 9014	7	0
Dissolved Mercury	U.S. EPA Method 7470A	1	0
	U.S. EPA Method 1631E	0	0
	U.S. EPA CLP Method ILM05.3	4	0
Dissolved Methyl Mercury	CAS SOP Methyl Mercury by CVAFS	0	0
Dissolved Metals	U.S. EPA Method 6010B	678	14
	U.S. EPA Method 6020A	38	0
	U.S. EPA CLP Method ILM05.3	171	0
Extractable Oil and Grease	U.S. EPA Method 1664	1	0
Hexavalent Chromium	U.S. EPA Method 7199	19	0
Organochlorine Pesticides	U.S. EPA Method 8081A	64	0
Organophosphorous Compounds	U.S. EPA Method 8141A	416	0
Organotins	APPL SOP Tributyltin by GC/MS	7	0
PCBs	U.S. EPA Method 8082	56	0
Perchlorate	U.S. EPA Method 6850	0	0
Pesticides and PCBs	U.S. EPA CLP Method OLC03.2	3	0
Plutonium-239	DOE HASL Method 300 PU-10	0	0
Radium-226	U.S. EPA Method 903.0	0	0
Salinity	SMEWW Method SM2520	6	0
Sulfide	U.S. EPA Method 376.1	16	0

Table J-3. Summary of qualified analytical data by analytical method

Analytical Parameter	Analytical Method	Total Estimated, Usable ("J" or "UJ" Qualified) Data	Total Unusable ("R") Qualified Data
Strontium-90	U.S. EPA Method 905.0	0	0
SVOCs + 1,4-Dioxane	U.S. EPA Method 8270C	30	0
	U.S. EPA CLP Method OLM04.3	4	0
Thorium-232	U.S. EPA Method 520 00-07	0	0
Total Dissolved Solids	U.S. EPA Method 160.1	0	0
Total Kjeldhal Nitrogen	U.S. EPA Method 351.2	1	0
Total Suspended Solids	U.S. EPA Method 160.2	0	0
TPH-extractables	U.S. EPA Method 8015B	47	0
TPH-gasoline	U.S. EPA Method 8015B	10	0
VOCs	U.S. EPA Method 8260B	621	0
	U.S. EPA CLP Method OLC03.2	113	0
Total results		2,341	14
Percent of total results		7.1 %	0.04 %

Table J-3 Notes:
The percent of data qualified by category was calculated using the total number of analytical results (including QC samples) generated by the April-June 2008 and July-September 2008 sampling events (i.e., total of 32,864 results) at HPS.

The data quality indicators, otherwise known as precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS), were evaluated in accordance with the PARCCS parameters defined in the BGMP SAP (TtEMI, 2004) and Draft Final BGMP SAP (CE2-Kleinfelder Joint Venture, 2008). The PARCCS parameters were met for the semiannual period at HPS, and were assessed as follows:

- **Precision** was assessed by evaluating the RPDs of the MS/MSD samples and duplicates for each applicable analytical method. The low percentage (approximately 0.25 percent) of precision exceedances indicates that the analytical methods were consistently precise.
- **Accuracy** was assessed by evaluating percent recoveries of MS samples, LCS, and surrogate recoveries for each applicable analytical method. A low percentage of sample results (approximately 1.7 percent) were qualified due to MS, LCS, or surrogate recoveries, indicating that the methods were consistently accurate.
- **Representativeness** was assessed by the use of established field and laboratory procedures, and their consistent application. Representativeness was maintained by using standard operating procedures (SOPs), including chain-of-custody protocol and documentation, groundwater sampling, sample labeling, sample packaging and transport, as well as the condition of the samples upon receipt at the laboratory.

- **Comparability** was assessed by evaluating the use of well-documented analytical methods and SOPs, standard reference materials, QC samples, and reporting each data type in consistent units. The use of EPA analytical methods, specified and well-documented analyses, California State- and NFESC-accredited laboratories, and a standardized data quality assessment process give the data a high degree of analytical comparability.
- **Completeness** was assessed by evaluating the validity of data obtained as a result of the data quality assessment process (i.e. amount of valid data obtained as compared to the amount that was expected to be obtained under normal conditions). Estimated data ("J" or "UJ" qualified) are considered valid and usable; however, rejected data ("R" qualified) and missing analyses are considered unusable and incomplete. Fourteen analytical results for selenium were rejected due to poor matrix spike recovery. Of the 32,864 analytical results generated during the semiannual period, 99.96 percent are considered usable, which meets the completeness goals of 95 percent for the April-June 2008 sampling event per the BGMP SAP (TtEMI, 2004) and 90 percent for the July-September 2008 sampling event per the Draft Final BGMP SAP (CE2-Kleinfelder Joint Venture, 2008)
- **Sensitivity** was assessed by evaluating the use of project quantitation limits. In general, project quantitation limits were low enough to satisfy the BGMP action levels being applied and used to evaluate the project data.

As a result of the DQA process, it has been concluded that the data quality indicators (i.e., PARCCS) either met or exceeded the parameters, as defined in the BGMP SAP (TtEMI, 2004) and Draft Final BGMP SAP (CE2-Kleinfelder Joint Venture, 2008).

7.0 Data Storage

Data collected during the semiannual period at HPS were recorded on field and laboratory forms, including but not limited to field notes or logbooks, chain-of-custody forms, field calibration logs, audit forms, laboratory raw data, hard copy analytical reports, electronic data deliverables (EDDs), and data validation reports. Field notes or logbooks, chain-of-custody forms, and field calibration logs were peer-reviewed and are securely stored in the CE2-Kleinfelder Joint Venture field trailer, located on HPS.

Laboratory analytical results were provided by APPL, CAS, and Eberline to the Kleinfelder-Oakland office in hard copy and EDD format, as sample delivery groups (SDGs), to undergo data quality assessment procedures. The hard copy SDGs were retained in a secured location until final submittal to the Naval Facilities Engineering Command (NAVFAC) Southwest Administrative Record along with the attached semiannual groundwater monitoring report. The SDGs include the laboratory data deliverables defined in the BGMP SAP (TtEMI, 2004) and Draft Final BGMP SAP (CE2-Kleinfelder Joint Venture, 2008).

The EDDs were provided by APPL via electronic mail and contain the laboratory analytical results organized by SDG. The EDDs were screened through a data checker to evaluate accuracy and completeness of information, and were then uploaded into the CE2-Kleinfelder Joint Venture HPS database. Upon completion of the data quality assessment process, the validated data were finalized. Once finalized, the data were electronically submitted to the Department of the Navy's data repository, Naval Installation Restoration Information Solution (NIRIS), in the Navy Electronic Data Deliverable (NEDD) format.

Copies of the field forms, electronic laboratory analytical reports, and EDDs are retained in the Kleinfelder-Oakland office.

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