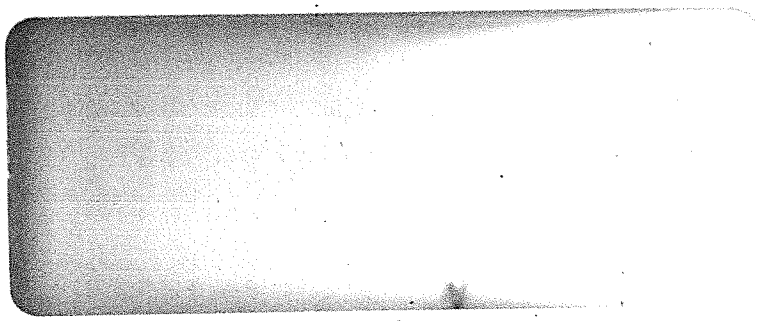

KLEINFELDER

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SITE INVESTIGATION REPORT
GIANT FOREST - LOWER KAWEAH DUMP AREA
SEQUOIA NATIONAL PARK, CALIFORNIA

November 25, 1998

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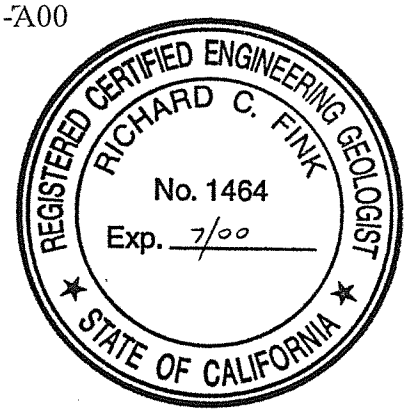
A site investigation report prepared for

National Park Service, Denver Service Center - EN
12795 West Alameda Parkway
Lakewood, Colorado 80228

SITE INVESTIGATION REPORT
GIANT FOREST - LOWER KAWEAH DUMP AREA
SEQUOIA NATIONAL PARK, CALIFORNIA

Kleinfelder Job No.: 21-5102-03-A00

Prepared by:



Richard C. Fink, R.G., C.E.G.
Senior Geologist

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Regional Manager

KLEINFELDER, INC.
1410 F Street
Fresno, California 93706
(209) 486-0750

November 25, 1998

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EXECUTIVE SUMMARY

The National Park Service (NPS) is assisting the Sequoia National Park in the restoration of the Giant Forest area of the Park. The site in question is in the Lower Kaweah area within the Giant Forest and appears to be an old dump site. It is the intent of the NPS to restore the area to a more natural setting, regrading the area and possibly removing some of the material in the dump. The dump is located across the street (south) from an old incinerator and maintenance yard and has a dimension of approximately 80 feet by 100 feet. Materials present on the surface consist of wood chips and debris, concrete and asphalt fragments. The fill is generally less than approximately 10 feet thick. The contents of the fill were unknown prior to this investigation.

The NPS requested Towill, and subsequently Kleinfelder, to assess the materials present in the fill and to provide disposal or closure options for the materials encountered. Kleinfelder assessed the materials present by use of five test pits excavated through the fill. The fill was found to consist of mostly burn material and ash. The NPS will need to evaluate which government agency will be the lead agency approving the remedial or mitigation activities (i.e. federal EPA, state DTSC or county Environmental Health) and obtain their requirements for the NPS selected remedy. Two options considered were hauling the material out of the Park and leaving it in place.

Generally, two types of compounds are of concern in the ash waste, dioxins and metals. Dioxins are commonly present in waste products of burned plastics or chlorinated compounds such as cleaning compounds and pesticides. Metals are commonly present from the burning of cans, batteries, glass and other debris. A composite of the burn material encountered at four locations was submitted for chemical analysis of five metals (cadmium, chromium, lead, zinc and nickel) and dioxins. The sample results for the five total metal and dioxins indicate the concentrations are below Total Threshold Limit Concentrations (TTLC) listed in California Code of Regulations (CCR), Title 22 and are, therefore, not high enough to classify the material as hazardous waste if the material were hauled from the Park. However, solubility testing was also performed for two elevated metals concentrations (lead and zinc). The solubility testing results indicate lead is present above the Soluble Threshold Limit Concentration (STLC) of Title 22. Therefore, based on the STLC results, the material, if hauled away, would be classified as a California hazardous waste.

Due to the high lead solubility results, additional testing would likely be required by most landfills to assess whether the material might also be classified as a RCRA hazardous waste, which would incur greater disposal costs. A California hazardous waste material can be accepted into a Class I landfill. Disposal costs would be in excess of $100,000 for the quantity of material plus excavation, hauling and documentation costs. The costs for disposal might double if the

material classifies as a RCRA hazardous waste which would require pretreatment prior to disposal.

If the site were closed (i.e. the fill left) in place, the material could be managed to have a limited potential exposure to the general population and, therefore, be a low potential human health risk. The fill should be covered with a soil cap consisting of compacted native soil and graded to reduce moisture infiltration. Additionally, the site should be located on an official map of the area and the area posted in some manner to discourage public entrance. Site closure operations and maintenance issues would likely be imposed by the lead oversight agency as well as possible deed restrictions. Prior approval would likely be required to close the site in-place.

This "Executive Summary" is subject to the Limitations described in Chapter 6 of this report.

1 INTRODUCTION

The NPS is in the process of restoring many of the developed areas in the Sequoia National Park, including restoration of the Giant Forest area of the Park. The investigation concerns the Lower Kaweah area within the Giant Forest, west of the Generals Highway (see Plate 1). During past inspections of the area and through topographic review, the NPS believed that this site was an old dump site. The contents of the fill were undocumented and unknown prior to this investigation.

The NPS is pursuing the characterization of the old dump fill in order to assess restoration options. It is uncertain at this time whether the fill will be closed in place or removed from the Park. Kleinfelder, through the NPS contract with Towill, performed site assessment and chemical characterization activities at the dump. The following text provides some alternative mitigation or removal activities. Final mitigation activities will be selected by the NPS.

2 SITE BACKGROUND

2.1 SITE DESCRIPTION

The dump is located across an un-named street (south) from an old incinerator and maintenance yard located approximately 1,900 feet west of the Generals Highway in the Lower Kaweah area of the Giant Forest in the Park (see Plate 2). The site area is at an elevation of approximately 6,400 feet. The history or contents of the dump are reportedly unknown to the present Park staff. However, due to its proximity to the old incinerator, Kleinfelder assumed that burn waste may be present. The fill area is relatively flat and has a gentle slope to the Southwest and a dimension of approximately 80 feet by 100 feet. Materials present on the surface consist of wood chips and debris, concrete and asphalt fragments. The fill is generally less than approximately 10 feet thick, based on its topographic shape. A pine forest surrounds the area with topography sloping gently to the Southwest. Numerous large downed pine trees cross portions of the site and the general vicinity. A large granite slab (bedrock) exists on the north side of the adjacent road and slopes toward the dump.

2.2 GEOLOGIC AND HYDROGEOLOGIC SETTING

The dump site is located in an area of near surface granitic bedrock which is characteristic of the upper elevations of the Sierra Nevada Mountains. Soil accumulations are generally granular in nature and relatively thin. Ground water in this environment is usually present in localized fractures in the bedrock or not at all. Not all fractures' systems are interconnected, although some may be. No surface water or shallow ground water was encountered above the bedrock in the area of the site during our exploration. However, during periods of heavy rain or snow melt in the spring, the ground may become saturated in localized areas.

3 FIELD EXPLORATION AND ANALYSIS PLAN

3.1 OBJECTIVES

The primary objectives of the exploration and chemical analyses were to observe the materials present within selected locations in the fill and characterize representative samples to evaluate closure or disposal options. The NPS is currently evaluating whether to remove the material from the Park or to close it in place. We have also presented a preliminary discussion concerning mitigation options and general cost comparisons. After the NPS selects a preferred option, additional work plans, health and safety plans and mitigation plans will be required.

3.2 FIELD EXPLORATION

Kleinfelder contracted for the use of a track mounted excavator to excavate the test pits. The geologist and excavator operator have received 40-hour health and safety training (Federal 29 CFR 1910.120 and CAL-OSHA 8 CCR 5192, Hazardous Waste Operations and Emergency Response - 40 hours). Five test pits were excavated through the landfill on August 24, 1998. A Kleinfelder geologist observed the excavation activities, logged the materials encountered and collected samples of the burn materials encountered for possible chemical analyses. The logs of the test pits are included in Appendix A of this report.

3.2.1 Field Observations

The five test pits were excavated through the fill and then immediately encountered hard granitic bedrock. The soils observed consisted of mostly burn materials with approximately one and one half feet of soil cover (see Log of Test Pits in Appendix A). The surface soils are granular and contain wood fragments, tree limbs and roots, and gravel. The burn materials observed in the test pits extend to a maximum depth of approximately nine and one half feet and contain ash, metal, broken bottles and glass, sheet metal, porcelain, aluminum pans and pitchers, wire, pipes, paint cans, a portion of a toilet tank, metal can lids, a 55-gallon drum (crushed), wood chips and roots. No groundwater was observed along the bedrock surface below the burn material.

3.2.2 Soil Sampling Procedures

Soil samples were collected from the bucket of the excavator. The soil sample from each pit was placed directly into a clean, one-quart glass jar with a threaded lid. The glass jar containing the sample was capped, labeled, and placed in an ice cooled chest designated specifically for that purpose. Information contained on the sample label included the sampler's identification, date and time collected, and a unique sample identification number. Data pertaining to each sample collected were recorded on a sample log sheet.

The soil samples were recorded on a Kleinfelder chain-of-custody, which accompanied the samples to the laboratory. The laboratory recorded the condition of the samples upon receipt on the chain-of-custody. A copy of the chain-of-custody was returned to Kleinfelder with the laboratory results.

3.3 LABORATORY ANALYSES

Soil samples were analyzed by Quanterra Environmental Services in West Sacramento, California. Quanterra is a State of California-certified laboratory. Copies of the laboratory results and chain-of-custody are in Appendix B.

The soil samples from the four deeper test pits (TP-1 through TP-4) were equally proportioned and composited into one sample by the analytical laboratory then analyzed for polychlorinated dioxins/furans by EPA Method 8290. The composite sample was also analyzed for total cadmium, chromium, lead, zinc and nickel by EPA Method 6010B and for soluble lead and zinc (using both de-ionized water and citric acid). The soluble metals analysis using de-ionized water more closely simulates infiltration rain or snow-melt water infiltrating through the fill material.

Table 1 lists the compound specific toxicity equivalence factors (TEF) that were applied to the various dioxin analytical results. The TEF is used to evaluate risks associated with complex mixtures of dioxins and furans. The concentration of each compound is multiplied by its TEF to express the concentration in terms of its 2,3,7,8-TCDD equivalent. The calculated TCDD equivalents can then be added and used to assess the potential health risk of a mixture.

The specific 2,3,7,8-TCDD concentration on Table 1 was compared to the TTLC hazardous waste criteria listed in the CCR, Title 22. The five metal concentrations were also compared to their respective TTLC values. Since lead and zinc concentrations were less than the TTLC but greater than 20 times the STLC, these metals were also tested for solubility concentrations in order to compare them to their respective CCR, Title 22, STLC. Metal results are summarized on Table 2.

TABLE 1
DIOXIN CONCENTRATIONS INCLUDING 1/2 DETECTION LIMIT FOR NON-DETECTS

pg/g

Chemical	TEF(1)	Concentration	TCDD eqv.
total tetra CDFs	0	430	0
2,3,7,8-TCDF	0.1	24	2.4
total penta CDFs	0	360	0
1,2,3,7,8-PeCDF	0.05	19	0.95
2,3,4,7,8-PeCDF	0.5	23	11.5
total hexa-CDFs	0	210	0
1,2,3,4,7,8-HxCDF	0.1	24	2.4
1,2,3,6,7,8-HxCDF	0.1	18	1.8
2,3,4,6,7,8-HxCDF	0.1	17	1.7
1,2,3,7,8,9-HxCDF	0.1	0.7	0.07
total hepta-CDFs	0	310	0
1,2,3,4,6,7,8-HpCDF	0.01	150	1.5
1,2,3,4,7,8,9-HpCDF	0.01	16	0.16
OCDFs	0.001	490	0.49
total tetra - CDDs	0	170	0
2,3,7,8-TCDD	1	8	8
total penta - CDDs	0	210	0
1,2,3,7,8-PeCDD	0.5	18	9
Total hexa-CDDs	0	560	0
1,2,3,4,7,8-HxCDD	0.1	17	1.7
1,2,3,6,7,8-HxCDD	0.1	59	5.9
1,2,3,7,8,9-HxCDD	0.1	52	5.2
Total hepta-CDDs	0	1800	0
1,2,3,4,6,7,8-HpCdd	0.01	940	9.4
OCDDs	0.001	3500	3.5
Number of composite samples			4
Total TCDD Equivalent			**65.67** pg/g

(1) The TEF (toxicity equivalence factor) was applied to the actual reported concentration in order to normalize concentrations relative to 2,3,7,8-TCDD so that health risk could be assessed; 2,3,7,8-TCDD is the most toxic dioxin of the group.

TABLE 2
COMPOSITE SAMPLE METAL CONCENTRATIONS

METAL	Results, mg/kg	TTLC	Results, mg/l	STLC
Cadmium	4.1	100	NA	1.0
Chromium	69.9	2,500	NA	5
Lead	744	1,000	22.4	5.0
Zinc	4,760	5,000	231	250
Nickel	81.3	2,000	NA	20

NA = Not Analyzed

Citric ~ DI WET ?

4 RESULTS AND DISCUSSION

4.1 LABORATORY RESULTS

The results of the burn material sampling and the laboratory analyses are summarized in the previous chapter on Tables 1 and 2. Dioxins were detected in the composited sample, with 2,3,7,8-TCDD reported at 8 picograms per gram (pg/g, or approximately parts per trillion). The TTLC for dioxin (2,3,7,8-TCDD) is 10,000 pg/g. All five metals were detected with lead and zinc being somewhat elevated. Since the composite sample was made from four individual samples, it is possible (but not likely) that one sample location could have four times the reported compound concentration and the other three samples be non-detected. Such a condition would cause the lead and zinc content at that location to exceed the respective TTLC. Solubility testing of lead and zinc indicated lead at 22 mg/l, which exceeds the CCR, Title 22 STLC for lead of 5 mg/l; thus, the material would be classified as a hazardous waste if removed.

4.2 DISCUSSION

The results of the exploration and assessment indicate that considerable burn material comprises the existing dump. The thickest accumulations were observed in test pits TP-2 and TP-3. A preliminary estimate of the material quantities, based only on the five test pits is approximately 444 cubic yards (cy) (80 feet by 100 feet by average 1.5 feet thick) of cover soil and 1,480 cy (average 4 feet thick by 80 feet by 100 feet) of burn material. The following discussion compares the options of leaving the soil in place versus removal and disposal out of the Park. It is not certain at this time which government agency would oversee site operations. The NPS will need to evaluate which government entity will be the oversight agency for future activities: federal EPA, state Department of Toxic Substances Control (DTSC) or Tulare County Environmental Health Division. That entity will specify their requirements for the desired NPS action.

4.2.1 In-Place Closure

If the NPS decides to leave the existing dump materials in-place without transport, it would not be subject to the classification categories described in CCR, Title 22. Those categories provide the means to classify the material as hazardous or non-hazardous waste for purposes of disposal. For in-place closure, the material must be evaluated on the basis of risk it poses to human health and the environment.

Dioxins and the elevated metal concentrations are substances of potential concern to both human health and the environment at low concentrations. However, risk can only occur if there is an

exposure. Usual exposure pathways include inhalation of effected dust, adsorption through the skin (dermal) and ingestion of contaminated solids or liquids. At the present time, the burn material is covered with approximately one to two feet of soil such that human exposure to dust or contact of the material with the skin is unlikely. In addition, the dioxins and metals have low solubility such that only small concentrations may potentially leach out of the fill. The solubility testing using deionized water (to simulate infiltrating rainfall) indicated non-detectable lead or zinc in the sample leachate, thus little or no metals are expected to leach from the dump. ? No 7 STLC

The limited potential for exposure, coupled with the fact that the area is away from usual public occupancy (i.e. rarely receives day use visitors) and is located on top of granitic bedrock, leads Kleinfelder to believe the materials are not likely to pose a significant risk to the public or environment. This is assuming that the dump material in its current location is closed in-place and the cover is maintained in accordance with current regulatory design criteria. A health-risk screening assessment may be required by the regulatory agency to document potential health risk.

If the NPS chooses to leave the material (i.e. close the site) in-place, they would possibly work with the DTSC (Fresno office, 209-297-3901) who is the regulatory agency likely to oversee the option. Typically, the NPS and DTSC would enter into a "voluntary cleanup agreement" which would specify the requirements to close the site in-place. The project may require implementation of the California Environmental Quality Act (CEQA) process. For other similar sites, DTSC requirements have included placing a clay or other approved cap over the material and then initiating a post-closure operations and maintenance program to document the continued competency of the cap for several years. Deed or land use restrictions have also been used to limit future site development. Ground water monitoring would seem unreasonable due to the presence of near surface bedrock, the low solubility of the compounds and tendency to adsorb to soil. Other actions by the NPS might include surveying the exact location of the dump on specific NPS in-house maps and posting signs around the area to direct the public around the site. Other burn dump owners have performed health-risk assessments in order to show the in-place ash does not exceed the health-based concentrations, thereby reducing the monitoring of post-closure land use.

In summers, steps toward on-site closure may include:

- Site characterization (including testing)
- Health-risk screening assessment
- DTSC agreement (or other agency)
- Design, including drainage control
- Cap construction (with moisture sensors)
- O & M plan
- Consultant oversight

4.2.2 Off-Site Disposal

Kleinfelder's characterization of the burn material indicates the material is non-hazardous by definition in CCR, Title 22 for TTLC, but would be a California hazardous waste because lead exceeds the STLC. Since the STLC was exceeded, most landfills are likely to request additional testing (i.e. TCLP) to assess whether the material would be classified as a RCRA hazardous waste. A RCRA classification will increase the landfill disposal costs. Since the material contains dioxins, it is also designated a "California Restricted Waste" (waste code number 801) and may be restricted from disposal in certain California landfills. If landfill disposal is chosen, more detailed testing of individual samples to better characterize the dump material is appropriate.

Assuming the material can be landfilled for disposal, several steps would likely be involved, including (but not necessarily limited to):

- Preparation of a mitigation work plan for approval by the lead agency;
- Preparation of a Site Health and Safety Plan to deal with the dust generated by the excavation and transportation operations;
- Additional testing of individual samples of burn material to better characterize the materials present for purposes of landfill disposal qualification and disposal costs;
- CEQA negative declaration (assumed) preparation and public notification procedures;
- Obtaining a contractor licensed to handle hazardous conditions;
- Dust abatement control during removal of the burn materials;
- Cost of transport of the material to a landfill willing to accept the materials outside of the Park;
- Confirmation sampling and analysis for dioxins in the old dump location (to document removal to below agreed clean-up levels); and
- Restoration of the former dump site.

Each of the above steps and associated activities would incur costs from the private consultant, contractor and regulatory oversight. Accurate costs of each of these tasks is beyond the scope of work for this phase of the assessment process.

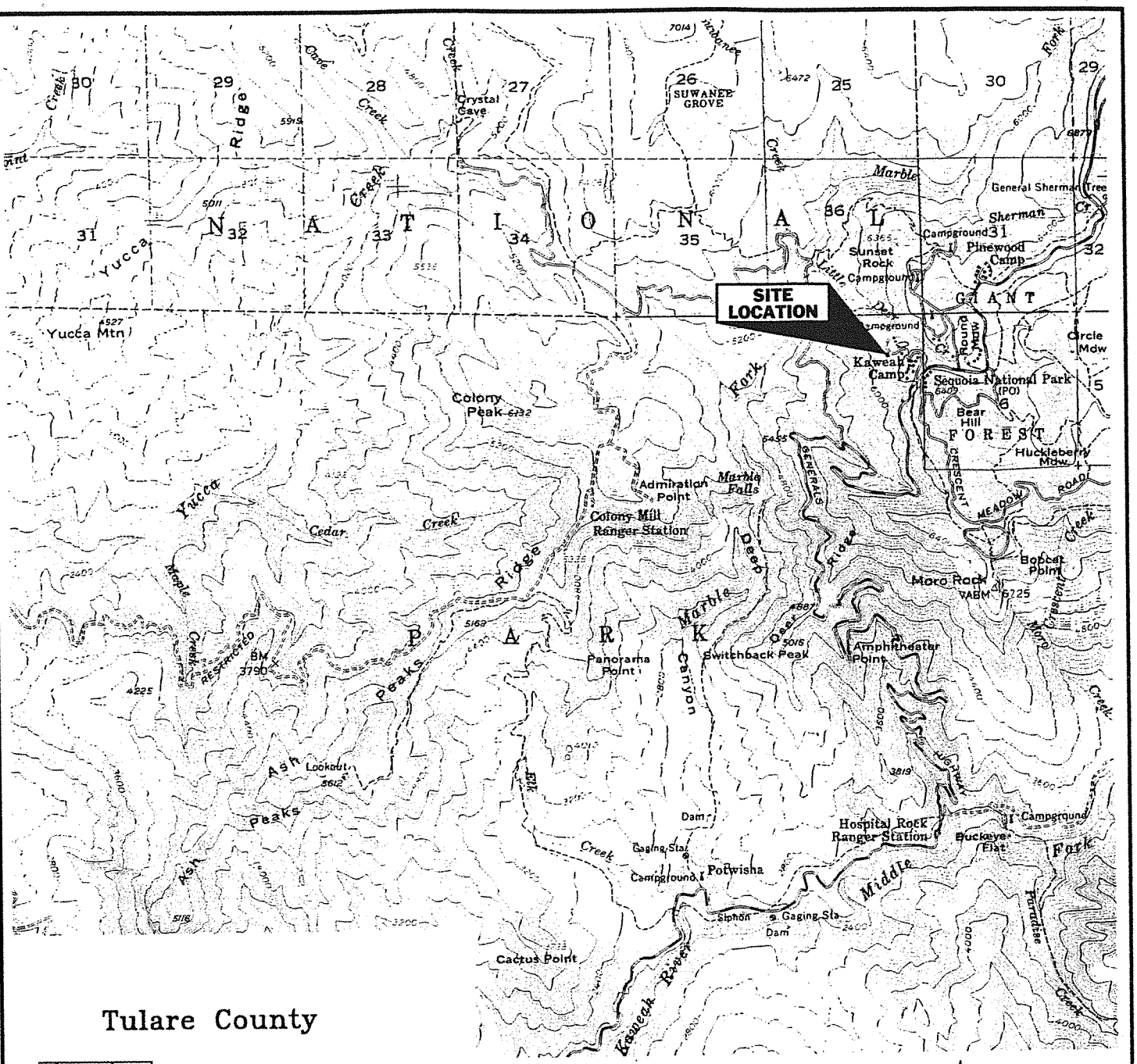
One hazardous waste landfill was contacted for **order of magnitude costs** for disposal in their facility. Assuming the material was only a California hazardous waste, the estimated 1480 cy of soil would cost on the order of $100,000 in disposal fees and taxes. This cost could more than double if the material is classified as a RCRA waste following TCLP testing. Additional costs would include the other items listed above, as well as permitting and oversight fees.

5 RECOMMENDATIONS

Kleinfelder recommends, based on the limited assessment and analyses, closing the site with the material in-place. This would appear to be protective of health and the environment, possibly less costly than the removal from the Park, and consistent with the restoration operations presently under way. If in-place closure is selected by the NPS, Kleinfelder recommends that the DTSC or the lead agency be contacted to discuss potential assessment and closure requirements. Such data could be used in developing a Remedial Action Plan (RAP) to describe details of site closure.

6 LIMITATIONS

Kleinfelder performed this investigation in accordance with the generally accepted standard of care that exists in Tulare County at this time. Order of magnitude costs are included for **preliminary planning purposes only** and should not be considered an actual cost estimate. Conclusions and recommendations are based on a limited number of points and data. No warranty, expressed or implied, is intended.



KLEINFELDER		SITE VICINITY MAP LOWER KAWEAH DUMP AREA	PLATE 1
DRAWN BY: T. NEPHEW PROJECT No. 21-510203	DATE: 09-08-98 DWG No. A389807	SEQUOIA NATIONAL PARK, CALIFORNIA	

Appendix A

Date Completed: 8/24/98

Logged By: B. BRANDL

Total Depth: 6.0 feet

Surface Conditions: SOIL WITH GRAVEL AND TREE ROOTS

Groundwater:

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Approx. Saturation %	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Approximate Surface Elevation (ft):
								COVER MATERIAL soil with gravel and tree roots
								BURN MATERIAL tree limbs, wood chips, metal, glass, aluminum pan, aluminum pitcher, metal tubes, sheet metal, porcelin glass
5								
								BEDROCK dense granitic bedrock

KLEINFELDER

PROJECT NO. 21-510203

LOG OF TEST PIT TP- 1

LOWER KAWEAH DUMP AREA
SEQUOIA NATIONAL PARK, CALIFORNIA

PLATE 1 of 1

A1

Date Completed: 8/24/98

Logged By: B. BRANDLE

Total Depth: 9.0 feet

Surface Conditions: SOIL WITH GRAVEL AND TREE ROOTS

Groundwater:

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Approx. Saturation %	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Approximate Surface Elevation (ft):
								COVER MATERIAL soil with gravel and tree roots
								BURN MATERIAL glass bottles, metal debris, broken glass, pipes, paint cans, porcelin, glass jars
5								
								BEDROCK dense granitic bedrock

KLEINFELDER

PROJECT NO. 21-510203

LOG OF TEST PIT TP- 2

LOWER KAWEAH DUMP AREA
SEQUOIA NATIONAL PARK, CALIFORNIA

PLATE 1 of 1

A2

Date Completed: 8/24/98

Logged By: B. BRANDL

Total Depth: 9.5 feet

Surface Conditions: SOIL WITH GRAVEL AND TREE ROOTS

Groundwater:

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Approx. Saturation %	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Approximate Surface Elevation (ft):
								COVER MATERIAL soil with gravel and tree roots
								BURN MATERIAL brocken glass, wire, toilet, sheet metal containers, aluminum pots and pans, bin covers, metal cans, 55-gallon drum
5								
								BEDROCK dense granitic bedrock

KLEINFELDER

PROJECT NO. 21-510203

LOG OF TEST PIT TP- 3

LOWER KAWEAH DUMP AREA
SEQUOIA NATIONAL PARK, CALIFORNIA

PLATE 1 of 1

A3

Date Completed: 8/24/98

Logged By: B. BRANDL

Total Depth: 5.5 feet

Surface Conditions: SOIL WITH GRAVEL AND TREE ROOTS

Groundwater:

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Approx. Saturation %	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Approximate Surface Elevation (ft):
								COVER MATERIAL soil with gravel and tree roots
								BURN MATERIAL black ash, pipe, tree, cans, porcelin, less broken bottles
5								**BEDROCK** dense granitic bedrock

KLEINFELDER

PROJECT NO. 21-510203

LOG OF TEST PIT TP- 4

LOWER KAWEAH DUMP AREA
SEQUOIA NATIONAL PARK, CALIFORNIA

PLATE 1 of 1

A4

Date Completed: 8/24/98

Logged By: B. BRANDL

Total Depth: 4.0 feet

Surface Conditions: SOIL WITH GRAVEL AND TREE ROOTS

Groundwater:

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Approx. Saturation %	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Approximate Surface Elevation (ft):
								COVER MATERIAL soil with gravel and tree roots
								BURN MATERIAL organic material, wood chips, roots, bottles, broken glass, ceramic pipe, broken porcelin, metal pipes
								BEDROCK dense granitic bedrock
5								

KLEINFELDER

PROJECT NO. 21-510203

LOG OF TEST PIT TP- 5

LOWER KAWEAH DUMP AREA
SEQUOIA NATIONAL PARK, CALIFORNIA

PLATE 1 of 1

A5

Quanterra Incorporated
880 Riverside Parkway
West Sacramento, California 95605

916 373-5600 Telephone
916 372-1059 Fax

September 22, 1998
QUANTERRA INCORPORATED PROJECT NUMBER: **301205**
PO/CONTRACT: **N5082**

Rick Fink
Kleinfelder, Inc.
1410 F. Street
Fresno, CA 93706

Dear Mr. Fink:

This report contains the analytical results for one composite sample of seven soil samples which were received under chain of custody by Quanterra Incorporated on 26 August 1998.

The case narrative is an integral part of this report.

If you have any questions, please feel free to call.

Sincerely,

Terry A. Wilson
Project Manager
Advanced Technology

TW/rr

Quanterra
Environmental Services

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QUANTERRA INCORPORATED PROJECT NUMBER 301205

Quanterra
Environmental Services

CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER 301205

Detection limits for dioxins and furans are reported on a sample specific basis and all results are recovery corrected per the isotope dilution technique.

Samples "20211" and "20216" were placed "On-Hold" per instructions on the chain of custody. The dioxin and metals analyses were performed on a composite of samples "20212", "20213", "20214", and "20215" as requested on the chain of custody.

Quanterra
Environmental Services

QUANTERRA INCORPORATED QUALITY CONTROL PROGRAM

Quanterra has implemented an extensive Quality Control (QC) program to ensure the production of scientifically sound, legally defensible data of known documentable quality. This QC program is based upon requirements in "Test Methods for Evaluating Solid Waste", USEPA SW-846, Third Edition. It applies whenever SW-846 analytical methods are used. It also applies in whole or in part whenever project requirements fail to specify some aspect of QC practices described here. It does not apply when other well defined QC programs (e.g. CLP or CLP-like) are specified. This is Quanterra's base QC program for environmental analysis.

Definitions:

Quality Control Batch. The quality control (QC) batch is a set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.

Surrogate. A surrogate (or internal standard) is an organic compound similar in chemical behavior to the target analyte, but not normally found in environmental samples. Surrogates (or IS) are added to all samples in a batch to monitor the effects of both the matrix and the analytical process on accuracy.

Method Blank. A method blank (MB) is a control sample prepared using the same reagents used for the samples. As part of the QC batch, it accompanies the samples through all steps of the sample extraction and cleanup procedure. The method blank is used to monitor the level of contamination introduced to a batch of samples as a result of processing in the laboratory.

Laboratory Control Sample. A laboratory control sample (LCS) is prepared using a well characterized matrix (e.g., reagent water or Ottawa sand) that is spiked with known amounts of representative analytes. Alternate matrices (e.g., glass beads) may be used for soil analyses when Ottawa sand is not appropriate. As part of a QC batch, it accompanies the samples through all steps of the sample extraction and cleanup process. The LCS is used to monitor the accuracy of the analytical process independent of possible interference effects due to sample matrix.

Duplicate Control Sample. A duplicate laboratory control sample (DCS) consists of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects.

KLEINFELDER

PROJECT NO. 21-510203 A01 | PROJECT NAME Sequoia

L.P. NO. (P.O. NO.) N5082 | SAMPLERS: (Signature/Number) (1725)

RECEIVING LAB: Quanterra

INSTRUCTIONS/REMARKS

	DATE MM/DD/YY	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO. OF CON-TAINERS	TYPE OF CON-TAINERS	ANALYSIS: Dioxins EPA 8290	Cad.	Chrom	Lead	Zinc	Nickel	INSTRUCTIONS/REMARKS
1	8/24/98		20211	Soil	1	Jar	X						Hold
2	↓		20212	↓	↓	↓	✓	✓	✓	✓	✓	✓	Laboratory Composite jars and run one composite sample
3			20213				✓	✓	✓	✓	✓	✓	
4			20214				✓	✓	✓	✓	✓	✓	
5			20215				✓	✓	✓	✓	✓	✓	
6	↓		20216	↓	↓	↓	X						Hold
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

Composite

Test the 1 composite for 8290 and 5 metals

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	8/25/98	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)
	082698 1050	[signature]

Instructions/Remarks: Received in good condition. MCD 082698

Send Results To: Rich Fink
KLEINFELDER
1410 F STREET
FRESNO, CA 93706-1608
(209) 486-0750
Attn:

M-60 White - Sampler Canary - Return Copy To Shipper Pink - Lab Copy

CHAIN OF CUSTODY

No 603

Quanterra
Environmental Services

SAMPLE DESCRIPTION INFORMATION
for
Kleinfelder, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
301205-0001-MB	Method Blank	SOIL	26 AUG 98		26 AUG 98
301205-0001-SA	20211	SOIL	24 AUG 98		26 AUG 98
301205-0002-SA	20212	SOIL	24 AUG 98		26 AUG 98
301205-0003-SA	20213	SOIL	24 AUG 98		26 AUG 98
301205-0004-SA	20214	SOIL	24 AUG 98		26 AUG 98
301205-0005-SA	20215	SOIL	24 AUG 98		26 AUG 98
301205-0006-SA	20216	SOIL	24 AUG 98		26 AUG 98
301205-0007-SA	20212-20215 Composite	SOIL	24 AUG 98		26 AUG 98
301205-0007-MB	Method Blank	SOIL			26 AUG 98

Quanterra
Environmental Services

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: Kleinfelder, Inc.
Client ID: Method Blank
Lab ID: 301205-0007-MB
Matrix: SOIL Sampled: NA Received: NA
Authorized: 26 AUG 98 Prepared: 12 SEP 98 Analyzed: 17 SEP 98

Sample Amount 10.0 G
Column Type DB-5

Parameter	Result	Units	Detection Limit	Data Qualifiers
Furans				
TCDFs (total)	ND	pg/g	0.12	
2,3,7,8-TCDF	ND	pg/g	0.12	
PeCDFs (total)	ND	pg/g	0.10	
1,2,3,7,8-PeCDF	ND	pg/g	0.098	
2,3,4,7,8-PeCDF	ND	pg/g	0.10	
HxCDFs (total)	ND	pg/g	0.21	
1,2,3,4,7,8-HxCDF	ND	pg/g	0.18	
1,2,3,6,7,8-HxCDF	ND	pg/g	0.17	
2,3,4,6,7,8-HxCDF	ND	pg/g	0.19	
1,2,3,7,8,9-HxCDF	ND	pg/g	0.21	
HpCDFs (total)	ND	pg/g	0.10	
1,2,3,4,6,7,8-HpCDF	ND	pg/g	0.10	
1,2,3,4,7,8,9-HpCDF	ND	pg/g	0.073	
OCDF	ND	pg/g	0.30	
Dioxins				
TCDDs (total)	ND	pg/g	0.21	
2,3,7,8-TCDD	ND	pg/g	0.21	
PeCDDs (total)	ND	pg/g	0.37	
1,2,3,7,8-PeCDD	ND	pg/g	0.13	
HxCDDs (total)	ND	pg/g	0.19	
1,2,3,4,7,8-HxCDD	ND	pg/g	0.19	
1,2,3,6,7,8-HxCDD	ND	pg/g	0.16	
1,2,3,7,8,9-HxCDD	ND	pg/g	0.17	
HpCDDs (total)	ND	pg/g	0.29	
1,2,3,4,6,7,8-HpCDD	ND	pg/g	0.29	
OCDD	ND	pg/g	1.9	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Teri Stone Approved By: Eric Redman

The cover letter is an integral part of this report.
Rev 230787

Quanterra
Environmental Services

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS (CONT.)
Method 8290

Client Name: Kleinfelder, Inc.
Client ID: Method Blank
Lab ID: 301205-0007-MB
Matrix: SOIL
Authorized: 26 AUG 98

Sampled: NA
Prepared: 12 SEP 98

Received: NA
Analyzed: 17 SEP 98

Sample Amount 10.0 G
Column Type DB-5

	% Recovery
13C-2,3,7,8-TCDF	70
13C-2,3,7,8-TCDD	76
13C-1,2,3,7,8-PeCDF	88
13C-1,2,3,7,8-PeCDD	85
13C-1,2,3,4,7,8-HxCDF	109
13C-1,2,3,6,7,8-HxCDD	81
13C-1,2,3,4,6,7,8-HpCDF	98
13C-1,2,3,4,6,7,8-HpCDD	86
13C-OCDD	78

ND = Not detected
NA = Not applicable

Reported By: Teri Stone

Approved By: Eric Redman

Quanterra
Environmental Services

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: Kleinfelder, Inc.
Client ID: 20212-20215 Composite
Lab ID: 301205-0007-SA
Matrix: SOIL Sampled: 24 AUG 98 Received: 26 AUG 98
Authorized: 26 AUG 98 Prepared: 12 SEP 98 Analyzed: 17 SEP 98

Sample Amount 10.0 G
Column Type DB-5

Parameter	Result	Units	Detection Limit	Data Qualifiers
Furans				
TCDFs (total)	430	pg/g	--	
2,3,7,8-TCDF	24	pg/g	--	g
PeCDFs (total)	360	pg/g	--	
1,2,3,7,8-PeCDF	19	pg/g	--	
2,3,4,7,8-PeCDF	23	pg/g	--	
HxCDFs (total)	210	pg/g	--	
1,2,3,4,7,8-HxCDF	24	pg/g	--	
1,2,3,6,7,8-HxCDF	18	pg/g	--	
2,3,4,6,7,8-HxCDF	17	pg/g	--	
1,2,3,7,8,9-HxCDF	ND	pg/g	1.4	
HpCDFs (total)	310	pg/g	--	
1,2,3,4,6,7,8-HpCDF	150	pg/g	--	
1,2,3,4,7,8,9-HpCDF	16	pg/g	--	
OCDF	490	pg/g	--	
Dioxins				
TCDDs (total)	170	pg/g	--	
2,3,7,8-TCDD	8.0	pg/g	--	
PeCDDs (total)	210	pg/g	--	
1,2,3,7,8-PeCDD	18	pg/g	--	
HxCDDs (total)	560	pg/g	--	
1,2,3,4,7,8-HxCDD	17	pg/g	--	
1,2,3,6,7,8-HxCDD	59	pg/g	--	
1,2,3,7,8,9-HxCDD	52	pg/g	--	
HpCDDs (total)	1800	pg/g	--	
1,2,3,4,6,7,8-HpCDD	940	pg/g	--	
OCDD	3500	pg/g	--	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Teri Stone Approved By: Eric Redman

The cover letter is an integral part of this report.
Rev 230787

Quanterra
Environmental Services

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS (CONT.)
Method 8290

Client Name: Kleinfelder, Inc.
Client ID: 20212-20215 Composite
Lab ID: 301205-0007-SA
Matrix: SOIL Sampled: 24 AUG 98 Received: 26 AUG 98
Authorized: 26 AUG 98 Prepared: 12 SEP 98 Analyzed: 17 SEP 98

Sample Amount 10.0 G
Column Type DB-5

	% Recovery
13C-2,3,7,8-TCDF	77
13C-2,3,7,8-TCDD	83
13C-1,2,3,7,8-PeCDF	76
13C-1,2,3,7,8-PeCDD	74
13C-1,2,3,4,7,8-HxCDF	104
13C-1,2,3,6,7,8-HxCDD	83
13C-1,2,3,4,6,7,8-HpCDF	103
13C-1,2,3,4,6,7,8-HpCDD	97
13C-OCDD	103

Note g : 2,3,7,8-TCDF results have been confirmed on a DB-225 column.

ND = Not detected
NA = Not applicable

Reported By: Teri Stone Approved By: Eric Redman

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Rev 230787

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE REPORT
Advanced Technology Group - High Resolution
Project: 301205

Category: 8290-HR-S C14-C18 D/F plus 2378-substituted isomers by Method 8290
Test: 8290-SW-S
Matrix: SOLID
QC Lot: 12 SEP 98-A QC Run: 17 SEP 98-A
Concentration Units: pg/g

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
2,3,7,8-TCDF	20.0	25.5	128	48-152
1,2,3,7,8-PeCDF	100	124	124	44-158
2,3,4,7,8-PeCDF	100	121	121	43-162
1,2,3,4,7,8-HxCDF	100	99.1	99	56-141
1,2,3,6,7,8-HxCDF	100	110	110	49-137
2,3,4,6,7,8-HxCDF	100	96.4	96	60-120
1,2,3,7,8,9-HxCDF	100	102	102	63-123
1,2,3,4,6,7,8-HpCDF	100	110	110	42-155
1,2,3,4,7,8,9-HpCDF	100	104	104	70-130
OCDF	200	253	126	26-169
2,3,7,8-TCDD	20.0	20.2	101	49-150
1,2,3,7,8-PeCDD	100	117	117	54-147
1,2,3,4,7,8-HxCDD	100	119	119	75-135
1,2,3,6,7,8-HxCDD	100	124	124	70-130
1,2,3,7,8,9-HxCDD	100	123	123	44-168
1,2,3,4,6,7,8-HpCDD	100	130	130	50-146
OCDD	200	258	129	52-146
13C-2,3,7,8-TCDF	200	152	76	40-135
13C-2,3,7,8-TCDD	200	172	86	40-135
13C-1,2,3,7,8-PeCDF	200	168	84	40-135
13C-1,2,3,7,8-PeCDD	200	169	84	40-135
13C-1,2,3,4,7,8-HxCDF	200	212	106	40-135
13C-1,2,3,6,7,8-HxCDD	200	173	87	40-135
13C-1,2,3,4,6,7,8-HpCDF	200	198	99	40-135
13C-1,2,3,4,6,7,8-HpCDD	200	179	89	40-135
13C-OCDD	400	323	81	40-135

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

ICP Scan

(soil)

Client Name: Kleinfelder, Inc.
Client ID: 20212-20215 Composite
Lab ID: 301205-0007-SA
Matrix: SOIL Sampled: 24 AUG 98 Received: 26 AUG 98
Authorized: 26 AUG 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	4.1	mg/kg	1.0	6010B	01 SEP 98	02 SEP 98 G
Chromium	69.9	mg/kg	2.0	6010B	01 SEP 98	02 SEP 98 G
Lead	744	mg/kg	20.0	6010B	01 SEP 98	02 SEP 98 G
Nickel	81.3	mg/kg	8.0	6010B	01 SEP 98	02 SEP 98 G
Zinc	4760	mg/kg	4.0	6010B	01 SEP 98	02 SEP 98 G

Note G : Reporting limit(s) raised due to matrix interference.

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: Mei Lai

The cover letter is an integral part of this report.
Rev 230787

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
301205-0007-SA	SOIL	ICP-S	-	01 SEP 98-R	01 SEP 98-R

Quanterra
Environmental Services

METHOD BLANK REPORT
Metals Analysis and Preparation
Project: 301205

Test: 6010B-WSAC-S ICP Quantitative Scan (Update 3)
Method: 6010B
Matrix: SOIL
QC Lot: 01 SEP 98-RX QC Run: 01 SEP 98-R
Analyzed: 02 SEP 98 Time: 10:32

Analyte	Result	Units	Reporting Limit	Qualifier
Cadmium	ND	mg/kg	0.50	
Chromium	ND	mg/kg	1.0	
Lead	ND	mg/kg	10.0	
Nickel	ND	mg/kg	4.0	
Zinc	ND	mg/kg	2.0	

ND = Not Detected

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 301205

Category: ICP-S ICP Metals-Ottawa Sand LCS
Test: 6010B-WSAC-S
Matrix: SOIL
QC Lot: 01 SEP 98-RX QC Run: 01 SEP 98-R
Concentration Units: mg/kg

Analyte	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
Aluminum	200	188	94	80-120
Antimony	50.0	45.3	91	80-120
Arsenic	200	176	88	80-120
Barium	200	187	93	80-120
Beryllium	5.00	4.61	92	80-120
Boron	100	91.5	92	80-120
Cadmium	5.00	4.52	90	80-120
Calcium	5000	4650	93	80-120
Chromium	20.0	19.1	96	80-120
Cobalt	50.0	46.9	94	80-120
Copper	25.0	23.2	93	80-120
Iron	100	96.7	97	80-120
Lead	50.0	44.6	89	80-120
Lithium	100	93.3	93	80-120
Magnesium	5000	4630	93	80-120
Manganese	50.0	47.0	94	80-120
Molybdenum	100	92.2	92	80-120
Nickel	50.0	47.9	96	80-120
Phosphorus	1000	911	91	80-120
Potassium	5000	4570	91	80-120
Selenium	200	176	88	80-120
Silver	5.00	4.36	87	80-120
Sodium	5000	4620	92	80-120
Thallium	200	182	91	80-120
Tin	200	185	93	80-120
Titanium	100	92.8	93	80-120
Vanadium	50.0	46.4	93	80-120
Zinc	50.0	45.2	90	80-120

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Metals Analysis and Preparation
Project: 301205

Category: ICP-S ICP Metals-Ottawa Sand LCS
Test : 6010B-WSAC-S Method: 6010B
Matrix : SOIL
Sample : 301224-0016
MS Run : 01 SEP 98-R
Units : mg/kg

Analyte	Sample Result	MS Result	MSD Result	Amount Spiked MS	Amount Spiked MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Aluminum	9700	13200	11800	200	200	NC	NC	NC	80-120	50
Antimony	ND	11.5	13.8	50.0	50.0	23	28	18	80-120	50
Arsenic	10.4	185	183	200	200	87	86	1.4	80-120	50
Barium	113	301	288	200	200	94	88	4.3	80-120	50
Beryllium	0.35	5.12	5.03	5.00	5.00	95	94	1.8	80-120	50
Boron	5.8	88.3	84.5	100	100	82	79	4.4	80-120	50
Cadmium	ND	4.56	4.35	5.00	5.00	91	87	4.8	80-120	50
Calcium	3320	8000	7770	5000	5000	94	89	2.9	80-120	50
Chromium	56.7	81.6	78.3	20.0	20.0	125	108	4.1	80-120	50
Cobalt	13.7	59.7	58.8	50.0	50.0	92	90	1.5	80-120	50
Copper	17.9	41.0	40.1	25.0	25.0	92	89	2.1	80-120	50
Iron	18400	19900	18600	100	100	NC	NC	NC	80-120	50
Lead	10.3	53.0	54.8	50.0	50.0	85	89	3.4	80-120	50
Lithium	12.0	111	108	100	100	99	96	2.3	80-120	50
Magnesium	9760	14900	14500	5000	5000	104	96	2.8	80-120	50
Manganese	445	468	462	50.0	50.0	NC	NC	NC	80-120	50
Molybdenum	0.51	85.8	85.3	100	100	85	85	0.57	80-120	50
Nickel	106	150	149	50.0	50.0	87	86	0.31	80-120	50
Phosphorus	530	1480	1390	1000	1000	95	86	6.2	80-120	50
Potassium	1310	5960	5700	5000	5000	93	88	4.5	80-120	50
Selenium	9.3	190	185	200	200	90	88	2.8	80-120	50
Silicon	311	383	319			NC	NC	NC	80-120	50
Silver	0.30	4.86	4.84	5.00	5.00	91	91	0.35	80-120	50
Sodium	552	5320	5250	5000	5000	95	94	1.5	80-120	50
Thallium	ND	188	181	200	200	94	91	3.4	80-120	50
Tin	2.5	171	172	200	200	84	85	0.24	80-120	50
Titanium	199	301	266	100	100	102	67	12	80-120	50
Vanadium	28.7	81.5	76.8	50.0	50.0	105	96	5.9	80-120	50
Zinc	46.8	92.5	90.0	50.0	50.0	92	86	2.8	80-120	50

NC = Not Calculated, calculation not applicable.
ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra Incorporated
880 Riverside Parkway
West Sacramento, California 95605

916 373-5600 Telephone
916 372-1059 Fax

November 2, 1998
QUANTERRA INCORPORATED PROJECT NUMBER: **302024**

Rich Fink
Kleinfelder Incorporated
1410 F Street
Fresno, CA 93706

Dear Mr. Fink:

This report contains the analytical results for the one soil sample which was received under chain of custody by Quanterra Incorporated on 26 August 1998. This sample set is associated with your "21-510203" project.

The case narrative is an integral part of this report.

If you have any questions, please feel free to call.

Sincerely,

Terry A. Wilson

Terry A. Wilson
Project Manager
Advanced Technology

TW/rrl

Quanterra

TABLE OF CONTENTS

QUANTERRA INCORPORATED PROJECT NUMBER 302024

Quanterra

CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER 302024

There were no anomalies associated with this report.

Quanterra

QUANTERRA INCORPORATED QUALITY CONTROL PROGRAM

Quanterra has implemented an extensive Quality Control (QC) program to ensure the production of scientifically sound, legally defensible data of known documentable quality. This QC program is based upon requirements in "Test Methods for Evaluating Solid Waste", USEPA SW-846, Third Edition. It applies whenever SW-846 analytical methods are used. It also applies in whole or in part whenever project requirements fail to specify some aspect of QC practices described here. It does not apply when other well defined QC programs (e.g. CLP or CLP-like) are specified. This is Quanterra's base QC program for environmental analysis.

Definitions:

Quality Control Batch. The quality control (QC) batch is a set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.

Surrogate. A surrogate (or internal standard) is an organic compound similar in chemical behavior to the target analyte, but not normally found in environmental samples. Surrogates (or IS) are added to all samples in a batch to monitor the effects of both the matrix and the analytical process on accuracy.

Method Blank. A method blank (MB) is a control sample prepared using the same reagents used for the samples. As part of the QC batch, it accompanies the samples through all steps of the sample extraction and cleanup procedure. The method blank is used to monitor the level of contamination introduced to a batch of samples as a result of processing in the laboratory.

Laboratory Control Sample. A laboratory control sample (LCS) is prepared using a well characterized matrix (e.g., reagent water or Ottawa sand) that is spiked with known amounts of representative analytes. Alternate matrices (e.g., glass beads) may be used for soil analyses when Ottawa sand is not appropriate. As part of a QC batch, it accompanies the samples through all steps of the sample extraction and cleanup process. The LCS is used to monitor the accuracy of the analytical process independent of possible interference effects due to sample matrix.

Duplicate Control Sample. A duplicate laboratory control sample (DCS) consists of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects.

Quanterra

SAMPLE DESCRIPTION INFORMATION
for
Kleinfelder, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
302024-0001-SA	20212-20215 Composite	SOIL	24 AUG 98		26 AUG 98

KLEINFELDER

PROJECT NO.	PROJECT NAME	RECEIVING LAB:
A01 21-510203	Sequoia	Quanterra
L.P. NO. (P.O. NO.) N5082	SAMPLERS: (Signature/Number) (1475)	

ANALYSIS: Dioxins EPA 8290; Cad.; Chroma; Lead; Zinc; Nickel

	DATE MM/DD/YY	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO. OF CON-TAINERS	TYPE OF CON-TAINERS	Dioxins EPA 8290	Cad.	Chroma	Lead	Zinc	Nickel						INSTRUCTIONS/REMARKS
1	8/24/98		20211	Soil	1	Jar	HOLD											Hold
2	↓		20212	↓	↓	↓	✓	✓	✓	✓	✓	✓						Laboratory Composite into and run one composite sample
3	↓		20213	↓	↓	↓	✓	✓	✓	✓	✓	✓	Composite					
4	↓		20214	↓	↓	↓	✓	✓	✓	✓	✓	✓						
5	↓		20215	↓	↓	↓	✓	✓	✓	✓	✓	✓						
6	↓		20216	↓	↓	↓	HOLD											Hold
7																		
8																		
9																		
10																		
11																		
12																		
13																		Test the 1 composite
14																		for 8290 and 5 metals
15																		
16																		
17																		
18																		
19																		
20																		

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks:	Send Results To:
[signature]	8/25/98		Received in good condition. Intact 0126?	Rich Fink KLEINFELDER 1410 F STREET FRESNO, CA 93706-1608 (209) 486-0750
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		
Relinquished by: (Signature)	Date/Time 8/26/98 1050	Received for Laboratory by: (Signature) [signature]		Attn:

M-60 White – Sampler Canary – Return Copy To Shipper Pink – Lab Copy

CHAIN OF CUSTODY

Quanterra

C.C.R. METALS
California Title 22 (Title 26) Protocol
STLC Data Sheet (Citrate Buffer Leachate)

Client Name: Kleinfelder, Inc.
Client ID: 20212-20215 Composite
Lab ID: 302024-0001-SA
Matrix: SOIL Sampled: 24 AUG 98 Received: 26 AUG 98
Authorized: 09 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	22.4	mg/L	0.50	6010B	23 OCT 98	26 OCT 98
Zinc	231	mg/L	20.0	6010B	23 OCT 98	26 OCT 98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: Mei Lai

The cover letter is an integral part of this report.
Rev 230787

Quanterra

C.C.R. METALS
California Title 22 (Title 26) Protocol
STLC Data Sheet (Deionized Water Leachate)

Client Name: Kleinfelder, Inc.
Client ID: 20212-20215 Composite
Lab ID: 302024-0001-SA
Matrix: SOIL Sampled: 24 AUG 98 Received: 26 AUG 98
Authorized: 09 OCT 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	ND	mg/L	0.50	6010B	23 OCT 98	26 OCT 98
Zinc	ND	mg/L	20.0	6010B	23 OCT 98	26 OCT 98

ND = Not detected
NA = Not applicable

Reported By: Wennilyn Fua Approved By: Mei Lai

The cover letter is an integral part of this report.
Rev 230787

Quanterra

QC LOT ASSIGNMENT REPORT - MS QC
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
302024-0001-SA	LEACHATE	ICP-STLC-L		23 OCT 98-D	23 OCT 98-D
302024-0001-SA	LEACHATE	ICP-STLCBL		23 OCT 98-D	23 OCT 98-D

Quanterra

METHOD BLANK REPORT
Metals Analysis and Preparation
Project: 302024

Test: 6010B-CAMS-D-S-L CAM STLC Metals by ICP (Deionized Water)
Method: 6010B
Matrix: LEACHATE
QC Lot: 23 OCT 98-DX QC Run: 23 OCT 98-D
Analyzed: 26 OCT 98 Time: 10:22

Analyte	Result	Units	Reporting Limit	Qualifier
Lead	ND	mg/L	0.50	
Zinc	ND	mg/L	20.0	

Test: 6010B-CAMS-B-S-L CAM STLC Metals done by ICP (Citrate Buffer)
Method: 6010B
Matrix: LEACHATE
QC Lot: 23 OCT 98-DX QC Run: 23 OCT 98-D
Analyzed: 26 OCT 98 Time: 10:59

Analyte	Result	Units	Reporting Limit	Qualifier
Lead	ND	mg/L	0.50	
Zinc	ND	mg/L	20.0	

ND = Not Detected

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LABORATORY CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 302024

Category: ICP-STLC-L STLC Metals by ICP (Deionized Water Leach)
Test: 6010B-CAMS-D-S-L
Matrix: LEACHATE
QC Lot: 23 OCT 98-DX QC Run: 23 OCT 98-D
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Antimony	0.500	0.495	99	75-125
Arsenic	2.00	2.13	106	75-125
Barium	2.00	1.90	95	75-125
Beryllium	0.0500	0.0510	102	75-125
Cadmium	0.0500	0.0551	110	75-125
Chromium	0.200	0.219	109	75-125
Cobalt	0.500	0.558	112	75-125
Copper	0.250	0.262	105	75-125
Lead	0.500	0.553	111	75-125
Manganese	0.500	0.547	109	75-125
Molybdenum	1.00	1.03	103	75-125
Nickel	0.500	0.556	111	75-125
Selenium	2.00	2.09	104	75-125
Silver	0.0500	0.0540	108	75-125
Thallium	2.00	2.22	111	75-125
Tin	2.00	2.19	109	75-125
Vanadium	0.500	0.531	106	75-125
Zinc	0.500	0.550	110	75-125

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE REPORT
Metals Analysis and Preparation (cont.)
Project: 302024

Category: ICP-STLCBL STLC Metals by ICP (Citrus Buffer Leach)
Test: 6010B-CAMS-B-S-L
Matrix: LEACHATE
QC Lot: 23 OCT 98-DX QC Run: 23 OCT 98-D
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Antimony	2.50	2.46	98	75-125
Arsenic	10.0	9.88	99	75-125
Barium	10.0	8.75	88	75-125
Beryllium	0.250	0.242	97	75-125
Cadmium	0.250	0.249	100	75-125
Chromium	1.00	0.992	99	75-125
Cobalt	2.50	2.50	100	75-125
Copper	1.25	1.18	94	75-125
Lead	2.50	2.50	100	75-125
Molybdenum	5.00	4.89	98	75-125
Nickel	2.50	2.41	96	75-125
Silver	0.250	0.234	94	75-125
Thallium	10.0	9.75	97	75-125
Vanadium	2.50	2.42	97	75-125
Zinc	2.50	2.39	96	75-125

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra

TRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Metals Analysis and Preparation
Project: 302024

tegory: ICP-STLC-L STLC Metals by ICP (Deionized Water Leach)
Test : 6010B-CAMS-D-S-L
Matrix : LEACHATE
mple : 302024-0001
Run : 23 OCT 98-D
Units : mg/L
Method: 6010B

Analyte	Sample Result	MS Result	MSD Result	Amount Spiked MS	Amount Spiked MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Antimony	0.017	0.521	0.515	0.500	0.500	101	100	1.2	75-125	35
rsenic	0.030	2.18	2.12	2.00	2.00	107	104	2.8	75-125	35
rium	0.14	2.04	2.03	2.00	2.00	95	95	0.55	75-125	35
ryllium	0.00001	0.0513	0.0512	0.0500	0.0500	103	102	0.33	75-125	35
admium	ND	0.0536	0.0548	0.0500	0.0500	107	110	2.2	75-125	35
romium	0.017	0.232	0.231	0.200	0.200	108	107	0.41	75-125	35
balt	0.015	0.566	0.565	0.500	0.500	110	110	0.22	75-125	35
opper	0.0052	0.269	0.264	0.250	0.250	106	103	2.0	75-125	35
ead	ND	0.546	0.567	0.500	0.500	109	113	3.7	75-125	35
nganese	0.059	0.600	0.597	0.500	0.500	108	107	0.48	75-125	35
lybdenum	0.0052	1.04	1.04	1.00	1.00	104	104	0.0	75-125	35
ickel	0.015	0.549	0.544	0.500	0.500	107	106	0.88	75-125	35
ilver	ND	0.0534	0.0526	0.0500	0.0500	107	105	1.3	75-125	35
allium	ND	2.21	2.17	2.00	2.00	110	109	1.7	75-125	35
n	0.0050	2.15	2.14	2.00	2.00	107	107	0.34	75-125	35
anadium	ND	0.530	0.527	0.500	0.500	106	105	0.65	75-125	35
inc	ND	0.617	0.614	0.500	0.500	123	123	0.38	75-125	35

tegory: ICP-STLCBL STLC Metals by ICP (Citrus Buffer Leach)
st : 6010B-CAMS-B-S-L
trix : LEACHATE
mple : 302024-0001
Run : 23 OCT 98-D
its : mg/L
Method: 6010B

Analyte	Sample Result	MS Result	MSD Result	Amount Spiked MS	Amount Spiked MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
timony	0.82	3.19	3.21	2.50	2.50	95	96	0.74	75-125	35
senic	0.35	10.6	10.4	10.0	10.0	103	101	1.8	75-125	35
rium	13.5	20.9	21.2	10.0	10.0	74	77	1.3	75-125	35
ryllium	0.0064	0.242	0.248	0.250	0.250	94	97	2.4	75-125	35
dmium	0.20	0.409	0.421	0.250	0.250	84	89	2.7	75-125	35
romium	1.0	1.82	1.85	1.00	1.00	83	85	1.3	75-125	35

= Not Detected

lculations are performed before rounding to avoid round-off errors in calculated results.

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TRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
etals Analysis and Preparation
roject: 302024 (cont.)

tegory: ICP-STLCBL STLC Metals by ICP (Citrus Buffer Leach) (cont.)
est : 6010B-CAMS-B-S-L Method: 6010B
latrix : LEACHATE
mple : 302024-0001
Run : 23 OCT 98-D (cont.)
nits : mg/L

Analyte	Sample Result	MS Result	MSD Result	Amount Spiked MS	Amount Spiked MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
obalt	0.52	2.84	2.89	2.50	2.50	93	95	1.7	75-125	35
opper	20.2	19.4	19.6	1.25	1.25	NC	NC	NC	75-125	35
ad	22.4	22.5	22.7	2.50	2.50	NC	NC	NC	75-125	35
lybdenum	0.051	4.78	4.85	5.00	5.00	95	96	1.4	75-125	35
ickel	3.2	5.16	5.26	2.50	2.50	79	82	1.8	75-125	35
ilver	0.0074	0.242	0.242	0.250	0.250	94	94	0.21	75-125	35
allium	ND	9.93	10.0	10.0	10.0	99	100	1.0	75-125	35
nadium	0.13	2.48	2.52	2.50	2.50	94	96	1.8	75-125	35
inc	231	210	211	2.50	2.50	NC	NC	NC	75-125	35

IC = Not Calculated, calculation not applicable.
= Not Detected

alculations are performed before rounding to avoid round-off errors in calculated results.