NICHOLS CONSULTING ENGINEERS, Chtd.
Engineering and Environmental Services

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TECHNICAL M E M O R A N D U M

NCE Project No. 517.04.20

TO: Mr. Allan Palmer

FROM: J. Ryan Shafer

DATE: December 23, 2009

SUBJECT: Geotechnical Memorandum - Hydrogen Fuel Station Limited Geotechnical Investigation

Nichols Consulting Engineers, Chtd (NCE) is pleased to submit this technical memorandum presenting our geotechnical recommendations for the proposed Hydrogen Fuel Station at the Richmond Field Station (RFS), a satellite research campus for UC Berkeley located northwest of the main campus of the main Campus in Richmond, California, just west of I-580 at the Bayview exit.

BACKGROUND

The proposed site for this fuel station is a mostly undeveloped parcel at the east side of the campus between Egret Way and S. 46th Street, just south of Plover Drive, as shown on the attached Site Plan. We understand that the planned fuel station will require site improvements in support of the following planned facility features:

- Portland Cement Concrete (PCC) pad for parked hydrogen fuel tube trailers (80,000 lb when fully loaded)
- Asphalt concrete (AC) access from S. 46th Street
- PCC supported fuel dispenser
- Light pole foundation and fuel dispenser pad
- Hydrogen gas line from PCC truck pad to fuel dispenser (by others)
- Electrical line for fuel dispenser and light pole
- Bollards for protection of fuel dispenser

FIELD INVESTIGATION

To provide geotechnical foundation recommendations in support of the planned facilities we performed a limited geotechnical investigation at the site that included drilling two borings to a depth of 16.5 feet below existing grade as shown on Figure 1. We generally encountered very stiff to hard clays with varying amounts of sand and gravel contents. Organics and plant roots

were found in both borings primarily in the upper 1 foot of soil, and occasionally small roots observed to an approximate depth of 3 feet. The log of soils encountered is shown on the boring logs B-1 and B-2 in Appendix A. Groundwater was not encountered during drilling, but could be shallower that depths explored during the rainy season. Water conditions were generally observed during or shortly after the time of exploration and may have not had time to achieve equilibrium. Fluctuations in the groundwater level may also occur due to variations in rainfall, subsurface soil layer characteristics, temperature and other factors not evident at the time the measurements were made.

We performed laboratory testing on select soil samples to determine select geotechnical engineering and physical properties, which are summarized on the attached boring logs and in Appendix B. We also performed analytical testing on select soils samples to provide initial waste profiling information of the Investigation Derived Waste (IDW) that was generated during the drilling of geotechnical borings at the site, as presented in Appendix C.

DISCUSSION AND CONCLUSIONS

From a geotechnical and foundation engineering standpoint, it is our opinion that the site is suitable for the proposed facilities. However, all of the conclusions and recommendations presented in this technical memorandum should be incorporated in the design and construction of the project to reduce the possibility of soil and foundation problems.

The main geotechnical concern is the potential for expansive clay (tendency to shrink and swell with changes in moisture content), such as the higher plasticity clay that was encountered in both borings. However, we judge that this concern can be mitigated with careful subgrade soil compaction at above optimum moisture contents at all areas. Higher plasticity clays may also be difficult to compact during site grading and subgrade preparation, and may result in a condition where subgrade is soft and yielding and readily pumps. To address this concern we have provided recommendations for thickening aggregate base thicknesses for AC pavement, using cement treated base (CTB) below PCC pads, and the use of geotextiles in pavement and pad sections as will be discussed further in the recommendations section of this memorandum. In addition, where higher plasticity clays are especially wet and yielding, additional over-excavation and/or use of geotextiles may be necessary to obtain stability and required compaction. This condition will be further worsened if earthwork and grading is performed when soils have become wet during winter rains. Finally, based on our understanding from UC Berkeley Environmental Health and Safety (EH&S), pyrite cinders have been found at locations within the Richmond Field Station soils, and might be encountered during grading and earthwork, and if encountered during construction should be coordinated directly with EH&S.

RECOMMENDATIONS AND FINDINGS

Earthwork and Site Preparation

Subgrade Preparation

Areas to receive slabs, pavements, flatwork or fills should be stripped of any debris, vegetation, and organic topsoil (where present). Subgrade soils exposed by stripping within areas to receive fill or exterior flatwork/slabs, should be scarified to a minimum depth of 6 inches, moisture conditioned to at or above Optimum Moisture Content and re-compacted in place to at

least 90 percent Relative Compaction[1]. Soils exposed by over-excavation should be moisture conditioned to at or above Optimum Moisture Content and compacted in place to at least 90 percent Relative Compaction. Pavement subgrades should be compacted to at least 95 percent Relative Compaction. Depressions or voids created by the removal of existing pavements, slabs, or utilities should be excavated to expose firm soil and backfilled as described later in this section.

Footing Excavations

Footing excavations should be cleared of any loose soil or debris and kept moist before concrete placement. Water should not be allowed to accumulate in footing excavations.

Our field engineer should verify that the exposed surfaces within footing excavations are firm and unyielding prior to any placement of reinforcing steel or concrete. Our field engineer will recommend reworking or over-excavation and replacement of footing subgrades where they are not suitable to bear structural loads.

Fills and Backfills

Non-expansive or import fill should consist of soil that has a Liquid Limit of less than 40 and a Plasticity Index of less than 15 (as determined by ASTM D 4318-98), is free of organic material, and contains no rocks or clods larger than 4 inches in greatest dimension. On-site soils are moderately expansive and occasionally highly expansive and will likely not meet the Liquid Limit and Plasticity Index Criteria. Therefore onsite clay soils may not be used as non-expansive fill, but may be used as general fill provided they meet the other criteria. Moisture conditioning may be necessary to achieve compaction requirements. NCE should confirm the suitability of on-site soils or import material prior to their use as fill or backfill.

Import fill or on-site fill should be moisture conditioned to near Optimum Moisture Content and on-site clayey soil being used as fill should be moisture conditioned to above Optimum Moisture Content. Fill should be placed in uniform horizontal layers not exceeding 8 inches in loose thickness, and compacted to at least 90 percent Relative Compaction. In areas where fill or backfill will underlie flatwork/slabs, the upper 6 inches of fill should be kept moist until flatwork/slabs are placed. Our field engineer or representative should monitor all placement and compaction of fill.

Utility Trenches

All utility trenches should be excavated in accordance with current OSHA excavation and trench safety standards. The contractor should be solely responsible for the design and construction of all excavation and trench safety.

We recommend that utility line bedding material consist of sand with less than 10 percent fines. The bedding should extend from the bottom of the trench to 1 foot above the top of the pipe. Sand bedding should be placed in a trench free of standing water and mechanically compacted to a dense condition (as verified by our field engineer).

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1 Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same soil determined by ASTM D1557 laboratory test procedure. Optimum Moisture Content is the water content that corresponds to the maximum dry density as determined by the same procedure.

Trench backfill above the pipe bedding should meet the criteria for fill as described above. We should evaluate any proposed imported soil sample prior to its use as trench backfill. Trench backfill should be placed in uniform layers not exceeding 6 inches in loose thickness, moisture-conditioned to near-optimum moisture content, and compacted. Backfill should be compacted to at least 90 percent relative compaction, except for the upper 6 inches below pavement subgrade, which should be compacted to at least 95 percent relative compaction. Jetting should not be permitted for any backfill compaction.

Any water in utility trenches should be pumped out prior to backfilling.

Trenches near footings should not extend down below a 2:1 plane extending down and away from the bottom edge of any footing.

Foundation Support

If perimeter strip footings are required for support of the fuel dispenser pad, we recommend that the proposed facilities be supported on continuous strip footings bearing on undisturbed native soils.

In general, all footings should be founded at least 18 inches below the lowest adjacent finished grade. Footings located near other footings or utility trenches should have their bearing surfaces situated below an imaginary 1.5 horizontal to 1 vertical plane projected upward from the bottom of the nearby footing or utility trench.

At the above depths, the footings may be designed for an allowable bearing pressure of 2,800 pounds per square foot (psf) due to dead loads, 3,400 psf due to dead plus live loads and 4,200 psf for all loads including wind or seismic. The bearing values for dead load, dead plus live load, and all loads include a safety factor of approximately 3, 2.5 and 2, respectively. These allowable bearing pressures are net values; therefore, the weight of the footing can be neglected for design purposes. Footings should not, however, have a width of less than 18 inches.

All continuous footings should be designed with adequate top and bottom reinforcement to provide structural continuity and to permit spanning of local irregularities. Any visible cracks in the bottoms of the footing excavations should be closed by wetting prior to construction of the foundations. To assure that footings are founded on appropriate material, we recommend that we observe the footing excavations prior to placing steel or concrete.

Since the fuel dispenser pad is expected to be lightly loaded (less than 1000 psf), footing settlements are expected to be less than one inch. Differential settlements between adjacent footings should not exceed one-half of the total settlement, or approximately one-half inch, during the design lifetimes of the planned structures.

Lateral Load Resistance

Lateral load resistance for the buildings and retaining walls may be developed in friction between the foundation bottom and the supporting subgrade. A friction coefficient of 0.35 is considered applicable. In addition, a passive resistance equal to an equivalent fluid weighing 375 pounds per cubic foot acting against the foundations may be used. The above values for friction and passive resistance do not contain a safety factor. We typically recommend geotechnical safety factors of at least 2 for long-term and 1.5 for short term loads. The upper 12 inches of

embedment can be ignored for passive resistance calculations except where the ground is paved or covered by a slab. Passive and friction resistance can be assumed to act together at the same time.

Flatwork and Slab-on-Grade Floors

Prior to constructing concrete slabs, pads, and other flatwork the subgrade should be prepared in accordance with the previous section on Subgrade Preparation. Due to the moderately expansive nature of some of the surface soil, we recommend that slab-on-grade floors and flatwork be supported on a minimum of 12 inches of imported non-expansive compacted fill. Prior to placement of the non-expansive fill, the subgrade surface should be scarified, moisture conditioned, and compacted to at least 90 percent Relative Compaction. In addition, all visible cracks should be closed by soaking prior to placement of non-expansive fill.

Slab reinforcing should be provided in accordance with the anticipated use and loading of the slab. Structural requirements and/or concentrated loads will require additional reinforcing. Minor movement of the concrete slab with resulting cracking should be expected. The recommendations presented above, if property implemented, should help reduce the magnitude of the cracking.

In areas where floor wetness would be undesirable, 4 inches of free draining gravel should be placed beneath the floor slab to serve as a capillary barrier between the subgrade soil and the slab. In order to minimize vapor transmission, an impermeable membrane should be placed over the gravel. The membrane should be covered with 2 inches of sand to protect it during construction. The sand should be lightly moistened just prior to placing the concrete. If used, the sand, membrane, and gravel may be considered to count as 6 inches of the recommended compacted, non-expansive, import fill.

Pavements

The asphalt concrete pavement improvements to access the fuel dispenser and truck trailer storage pads design section, as calculated per the Caltrans Highway Design Manual, is 4 inches of asphalt concrete (AC) over 7.5 inches of aggregate base (AB) based on a subgrade R-value of 5 and a TI of 5. The subgrade R-value and design TI are based on our previous pavement design experience on the Campus at Jay Way. However, we recommend an additional 6.5 inches of AB in expectation of difficult subgrade conditions, for a total of 14 inches of AB below the 4 inches of AC. To further address the difficult subgrade, we recommend that a Tensar TX160 Geogrid or equivalent be installed below the bottom of the AB layer and eight inches above the bottom of the AB layer in accordance with the specifications and installation guidelines provided by the manufacturer. In addition to placement of geogrid, there may be areas of yielding subgrade that may need to be additionally addressed with a combination of over-excavation of the yielding soils and replacement with aggregate base or crushed rock and the use of supplemental stabilizing geogrids.

For the truck trailer fuel storage pad, we recommend a 9-inch section of Portland concrete cement (PCC) over at least 12 inches of cement treated base (CTB). Directly below the CTB, we recommend that a Tensar TX160 Geogrid or equivalent be installed in accordance with the specifications and installation guidelines provided by the manufacturer. This pavement section recommendation is based on a subgrade R-value of 5 and a design TI of less than 9, per the Caltrans Highway Design Manual.

For the fuel dispenser pad, we recommend the structural slab be underlain by at least 12 inches of CTB. Directly below the CTB, we recommend that a Tensar TX160 Geogrid or equivalent be installed in accordance with the specifications and installation guidelines provided by the manufacturer. The final structural slab concrete thickness should be designed by the Structural Engineer for the project.

The subgrade at asphalt and PCC-paved areas should be smooth and non-yielding. The upper 6 inches should be moisture conditioned (if necessary) to above optimum moisture content and compacted to at least 95 percent relative compaction. The subgrade should not be allowed to dry out prior to pavement construction. If soft, unstable, or saturated soils are encountered, they should be excavated and replaced with aggregate base.

Surface Drainage

Finished grades should be planned to prevent ponding of water and to direct surface water away from foundations, pavements, and slab edges.

Corrosion Potential

Two soil samples were collected during our subsurface investigation and were submitted to a laboratory for a suite of corrosion potential tests including pH, resistivity, sulfate concentration, and chloride concentration tests. The samples were obtained from Boring B-1 from a depth interval of 3.0 to 4.0 feet and Boring B-2 from 2.0 to 2.5 feet. Results of these tests are presented in Appendix C. The laboratory tests for pH indicated that the soils tested are moderately acidic to neutral with saturated resistivity values of 713 and 3,724 ohm-cm, for each location, respectively. This range of resistivity would indicate that the soils tested are fairly corrosive to very corrosive to metal building materials such as steel. Laboratory sulfate and chloride concentration tests indicate negligible corrosivity with respect to buried concrete structures. Because of the lower resistivities, we would recommend appropriate corrosion protection be considered for all corrosion sensitive elements in contact with site soils.

CBC Seismic Design Criteria

For seismic design in accordance with the 2007 California Building Code (CBC), we recommend a soil profile type S_D, which corresponds to a stiff soil profile with estimated average SPT N-Values between 15 and 50 for the upper 100 feet, and estimated average undrained shear strength between 1,000 and 2,000 pounds per square foot (psf). Due to the Hayward Fault, the mapped spectral accelerations for the short periods (0.2 seconds) S_S is 1.74, and the mapped spectral accelerations for a 1-second period S_1 is 0.64.

Soil Analytical Testing and Results

As requested by Mr. Karl Hans with UC Berkeley EH&S, NCE collected soil for testing by an analytical laboratory from the drive samples and the soil cuttings (Investigation Derived Waste [IDW]) produced by the drilling of borings B-1 and B-2. This information will be used by EH&S to facilitate management and disposal of the IDW. We understand that EH&S staff will coordinate and be responsible for identifying an appropriate disposal facility, securing acceptance of the IDW from that facility, and the ultimate disposal of the IDW.

Two representative composite soil samples (one from each boring) were prepared from soils encountered from 0 to 10 feet bgs in the unsaturated zone. Soil collected between this interval was homogenized in a stainless steel mixing bowl to prepare the composite sample. Samples were submitted to Curtis & Thompkins laboratory in Berkeley, California. One composite sample from each boring was submitted and tested for polychlorinated biphenyls (PCBs), CAM17 Metals and total extractable hydrocarbons (TEH). In addition, one discrete soil sample was taken at approximately 10 feet bgs in each boring, from soil near the capillary fringe and tested for volatile organic compounds (VOCs). Soil cuttings from drilling activities were placed in 55-gallon drums and separated by depth: 0 to 10 feet for unsaturated soils and 10 to 15 feet for potentially saturated soils.

In summary, the testing found that the concentration of metals are low and suspected to be in a background range, while no VOCs or PCBs were found in any of the samples submitted. The laboratory reported low concentrations (levels near the method reporting limit of 5.0 milligrams per kilogram) of TEH in sample COMP 1 (composite sample from the upper 10 feet in Boring B-1). No TEH was reported from the sample submitted from Boring B-2. The laboratory reports and chain-of-custody forms are included in Appendix D.

SITE PLAN

LEGEND

TRUCK ROUTE

CALTRANS 2005 SSTA TRUCK TRAILER

44.00' 16.00'

APPROX. NCE EXPLORATORY BORING LOCATION

B-2

BUILDING 420

PLOVER DRIVE

EXISTING FENCE LINE

25.00'

30.00'

ASSUMED PROPERTY LINE

NEW 2-INCH WATERLINE (SEE NOTE)

(TO BE REMOVED BY JANUARY 2010)

BUILDING 190T

STORAGE PAD

54.00'

12.00'

10.00'

134.50'

LIGHT POLE

ADA RAMP (SEE D-03)

DISPENSER PAD

SUPPORT POLE

B-1

EGRET WAY

Project Benchmark 4" Steel Disc N 4772.01 E 4877.36 Elev. 19.03

UPGRADE TO 2-INCH WATERLINE (SEE NOTE)

BUILDING 167

BUILDING 190

BUILDING 194

BUILDING 196

CROW DRIVE

POWER POLE

60D Nail N 4681.10 E 5075.19 Elev. 19.53

CONSTRUCT 2 BOLLARDS

(E) ANTENNA

PVC Stub

S. 46TH STREET

REAL PROPERTY LINE

OVERHEAD POWER LINE

5.00'

Edge of Pavement

4' Chain Link Fence

NOTE: PROPOSED WATER LINE UPGRADE AND EXTENSION DIAMETERS TO BE CONFIRMED.

30 0 30 60

SCALE IN FEET
1" = 30'-0"

PRELIMINARY

DRAWING REDUCED
REFER TO GRAPHIC SCALE

811 Know what's below. Call before you dig.

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HYDROGEN FUEL STATION PAVEMENT AND SITE IMPROVEMENTS

RICHMOND FIELD STATION

OWNER

UNIVERSITY OF CALIFORNIA, BERKELEY
BERKELEY, CA 94720

NO.	DATE	DESCRIPTION

REVISIONS

PROJECT NUMBER: A517.04.20
DATE: 12-15-2009
DESIGNED BY: Franz Haidinger
DRAWN BY: Jason Herberg / Ilin Tsai
CHECKED BY: CHECKED DATE:

SHEET NAME

SITE LAYOUT PLAN

DRAWING C-02

SHEET 4 OF 11

N:\Projects\UC Berkeley\NFS Hydrogen Fuel Station_517.04.20\CAD\Arch\Geotech Report\FIG - SITE LAYOUT PLAN.dwg, 12/22/2009 11:04:58 AM

APPENDIX A – BORING LOGS

RELATIVE DENSITY OF COARSE –GRAINED SOILS

Relative Density	Standard Penetration Test Blow Count (blows per foot)
very loose	<4
loose	4-10
medium dense	10-30
dense	30-50
very dense	>50

CONSISTENCY OF FINE–GRAINED SOILS

Consistency	Approximate Blows/foot (SPT)	Undrained Shear Strength (psf)
very soft	<2	0-250
soft	2-4	250-500
medium stiff	4-8	500-1,000
stiff	8-15	1,000-2,000
very stiff	15-30	2,000-4,000
hard	>30	>4,000

NATURAL MOISTURE CONTENT

Dry	–	Requires additional moisture to obtain optimum moisture content for compaction
Moist	–	Near the optimum moisture content for compaction
Wet	–	Requires drying to obtain optimum moisture content for compaction

Note: Where laboratory data are not available, the field classifications given above provide a general indication of material properties; the classifications may require modification based on judgment or laboratory testing.

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Material Properties for Soil Classification
Hydrogen Fuel Station
UC Berkeley - Richmond Field Station
Richmond, California

FIGURE
A-1

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
YG	A517.04.20		11/09	

MAJOR DIVISIONS			SYMBOLS		TYPICAL NAMES
COARSE-GRAINED SOILS OVER 50%>No. 200 SIEVE SIZE	GRAVELS MORE THAN 1/2 OF COARSE FRACTION> No. 4 SIEVE SIZE	CLEAN GRAVELS WITH LESS THAN 5% FINES	GW		Well-graded gravels or gravel-sand mixtures, little or no fines
			GP		Poorly graded gravels or gravel-sand mixtures, little or no fines
		GRAVELS WITH OVER 15% FINES	GM		Silty gravels, gravel-sand-silt mixtures
			GC		Clayey gravels, gravel-sand-clay mixtures
	SANDS MORE THAN 1/2 OF COARSE FRACTION< No. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 5% FINES	SW		Well-graded sands or gravelly sands, little or no fines
			SP		Poorly graded sands or gravelly sands, little or no fines
		SANDS WITH OVER 15% FINES	SM		Silty sands, sand-silt mixtures
			SC		Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS OVER 50%<No. 200 SIEVE SIZE	SILTS & CLAYS LIQUID LIMIT 50% OR LESS		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL		Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS LIQUID LIMIT GREATER THAN 50%		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH		Inorganic clays of high plasticity, fat clays
			OH		Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT		Peat and other highly organic soils
					Caliche

TEST KEY

- HQ Core Sampler
- SPT Sampler
- Modified California Sampler
- Shelby or Osterberg Sampler
- Pitcher Barrel
- Grab or Bulk Sample
- First-encountered groundwater level
- Static groundwater level

(10YR4/4)	Munsell soil color / 1990 edition
Perm	Permeability
Consol	Consolidation
LL	Liquid Limit (%)
PI	Plasticity Index (%)
EI	Expansion Index (%)
Gs	Specific Gravity
MA	Particle Size Analysis
-200=55%	Percent Passing No. 200 Sieve

Shear Strength (psf) — Cell Pressure

TxUU 3000 (1500) (FM) OR (S)	- Unconsolidated Undrained Triaxial Shear (field moisture or saturated)
TxUU 3000 (1500) (P)	- Consolidated Undrained Triaxial Shear (with or without pore pressure measurement)
TxCD 3000 (1500)	- Consolidated Drained Triaxial Shear
SSCU 3000 (1500) (P)	- Simple Shear Consolidated Undrained (with or without pore pressure measurement)
SSCD 3000 (1500)	- Simple Shear Consolidated Drained
DSCD 3000 (1500)	- Consolidated Drained Direct Shear
UC 500	- Consolidated Compression
LVS 1000	- Laboratory Vane Shear

SOURCE: ASTM D2488-93 and Unified Soil Classification System (D2487-93)

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Soil Classification Chart and Test Key
Hydrogen Fuel Station
UC Berkeley - Richmond Field Station
Richmond, California

FIGURE
A-2

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
YG	A517.04.20		11/09	

Project: Hydrogen Fuel Station / UC Berkeley - Richmond Field Station
Project Location: Richmond, California
Project Number: A517.04.20

Log of Boring B-1

Sheet 1 of 1

Date(s) Drilled **9/24/09**	Logged By **Jenny Crow**	Checked By **Ryan Shafer**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type	Total Depth of Borehole **16.5 feet**
Drill Rig Type **Track Mounted**	Drilling Contractor **WDC**	Approximate Surface Elevation **Ground Surface**
Groundwater Level and Date Measured **Not Encountered ATD**	Sampling Method(s) **Mod Cal, SPT**	Hammer Data **140lb Wireline System with Manual Trip, 30-inch Drop**
Borehole Backfill **Neat Cement Tremie Grout**	Location **(See Site Plan)**	

Depth, feet	Sample Type	Other Tests / Notes	Blows / foot	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf) **	Drilling Rate (min/ft)	USCS Symbol	Graphic Log	LITHOLOGIC DESCRIPTION
0						4.5 4.5		CL		GRAYISH-BROWN LEAN CLAY WITH ANGULAR GRAVEL (CL), hard, dry to moist with some roots
		TxUU = 6050 (150) LL = 47, PI = 32	38 *	16.0	113	4.0				@1 ft.: very dark brown, with some iron oxide staining
			22	15.8						@3 ft.: dark olive-brown, with coarse sand, very stiff, with some manganese staining.
5			31 *			3.0				@ 4ft.: olive-brown, atmospheric PID reading; 0.000 PPM
10			26 *			2.25				@10 ft.: olive mottled with yellowish-brown with sand and occasional gravel, with some manganese staining, iron oxide staining and caliche veinlets
15			20 *			1.75				@15 ft.: light olive mottled with yellowish-brown, moist, atmosphere and soil PID reading: 0.000 PPM
		* Blow counts with and without an * have been converted to approximate SPT N-values using conversion factors of 0.5 and 0.7 respectively ** Approximate unconfined compressive strength *** Approximate undrained shear strength								Terminated Boring at 16.5 feet and backfilled with neat cement tremie grout.
20										
25										
30										

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Figure A-3

Project: Hydrogen Fuel Station / UC Berkeley - Richmond Field Station
Project Location: Richmond, California
Project Number: A517.04.20

Log of Boring B-2

Sheet 1 of 1

Date(s) Drilled **9/24/09**	Logged By **Jenny Crow**	Checked By **Ryan Shafer**
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type **8-inch**	Total Depth of Borehole **16.5 feet**
Drill Rig Type **Track Mounted**	Drilling Contractor **WDC**	Approximate Surface Elevation **Ground Surface**
Groundwater Level and Date Measured **Not Encountered ATD**	Sampling Method(s) **Mod Cal, SPT**	Hammer Data **140lb Wireline System with Manual Trip, 30-inch Drop**
Borehole Backfill **Neat Cement Tremie Grout**	Location **(See Site Plan)**	

Depth, feet	Sample Type	Other Tests / Notes	Blows / foot	Moisture Content (%)	Dry Density (pcf)	Pocket Pen (Tsf) **	Drilling Rate (min/ft)	USCS Symbol	Graphic Log	LITHOLOGIC DESCRIPTION
0						2.5 2.0		CL		YELLOWISH-BROWN LEAN CLAY (CL) hard, moist, with some plant roots
			51 *	8.8		>4.5				@1 ft.: brown, dry to moist, with some manganese staining and some plant roots
		LL = 44, PI = 30	36							@3 ft.: brown, with some manganese staining and some plant roots
5		Consol.	38 *	16.7	113	>4.5				@5 ft.: light brown, Atmosphere and soil PID reading: 0.000 PPM
10		TxUU = 2350 (700)	22 *	22.0	105	2.0				@10 ft.: light olive mottled yellowish-brown, very stiff, moist, with some manganese staining
15			20 *			1.75				@15 ft.: Atmosphere and soil PID reading: 0.000 PPM
20		* Blow counts with and without an * have been converted to approximate SPT N-values using conversion factors of 0.5 and 0.7 respectively ** Approximate unconfined compressive strength *** Approximate undrained shear strength								Terminated Boring at 16.5 feet and backfilled with neat cement tremie grout.
25										
30										

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Figure A-4

APPENDIX B – GEOTECHNICAL LABORATORY TEST RESULTS

Corrosivity Test Summary

CTL # 665-009 **Date:** 10/14/2009 **Tested By:** PJ **Checked:** PJ

Client: Nichols Consulting Eng. **Project:** Hydrogen Fuel Station **Proj. No:** 517.04.20

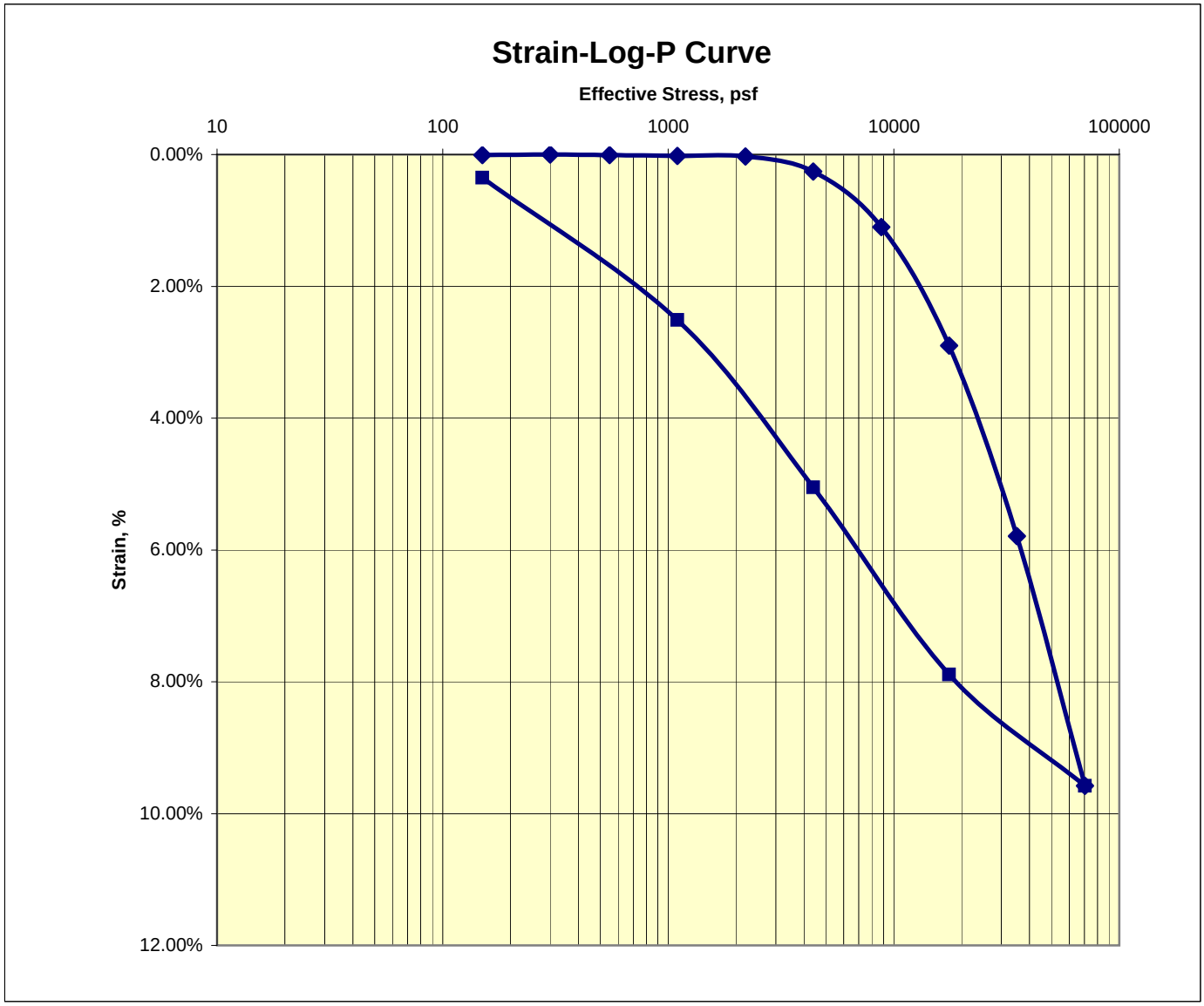
Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate-(water soluble)		pH	ORP	Sulfide	Moisture	Soil Visual Description
Boring	Sample, No.	Depth, ft.	As Rec.	Minimum	Saturated	mg/kg	mg/kg	%		(Redox)	Qualitative	%	
						Dry Wt.	Dry Wt.	Dry Wt.		mv	by Lead	At Test	
			ASTM G57	Cal 643	ASTM G57	Cal 422-mod.	Cal 417-mod.	Cal 417-mod.	ASTM G51	SM 2580B	Acetate Paper	ASTM D2216	
B-1	-	3-4	-	-	713	<2	100	0.0100	6.9	-	-	15.8	Grayish Brown CLAY w/ Sand
B-2	-	2-2.5	-	-	3,724	3	<5	<0.0005	5.1	-	-	8.8	Mottled Grayish Brown CLAY w/ Sand

Consolidation Test

ASTM D2435

Job No.:	665-009	**Boring:**	B-2	**Run By:**	MD
Client:	Nichols Consulting Engine	**Sample:**		**Reduced:**	PJ
Project:	Hydrogen Fuel Station - 517.04.20	**Depth, ft.:**	5-5.5	**Checked:**	PJ/DC
Soil Type:	Olive Gray CLAY w/ Sand			**Date:**	10/19/2009

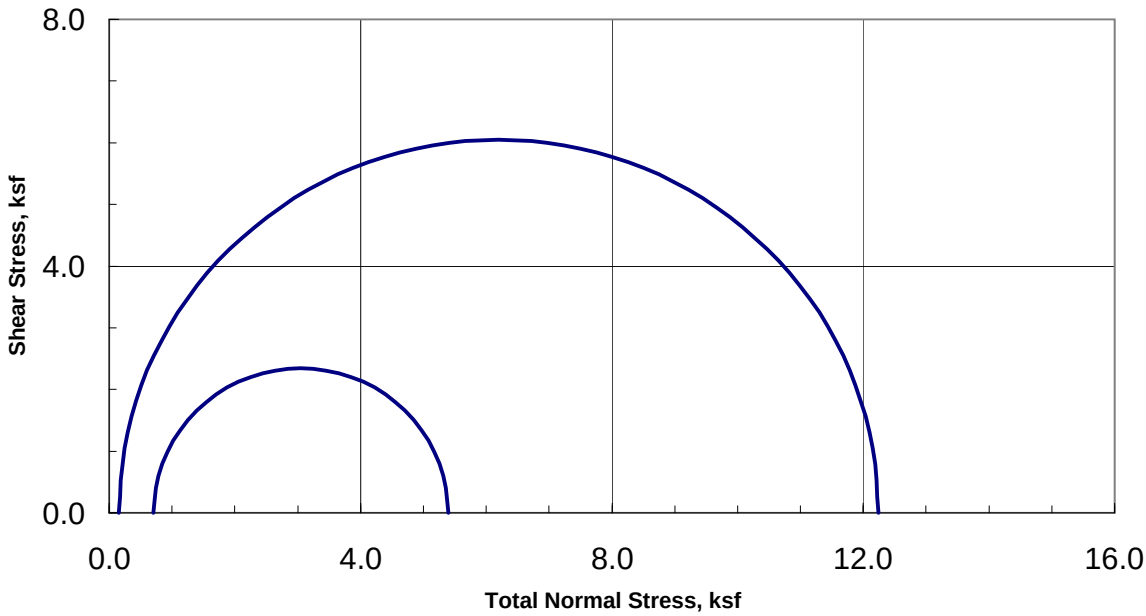


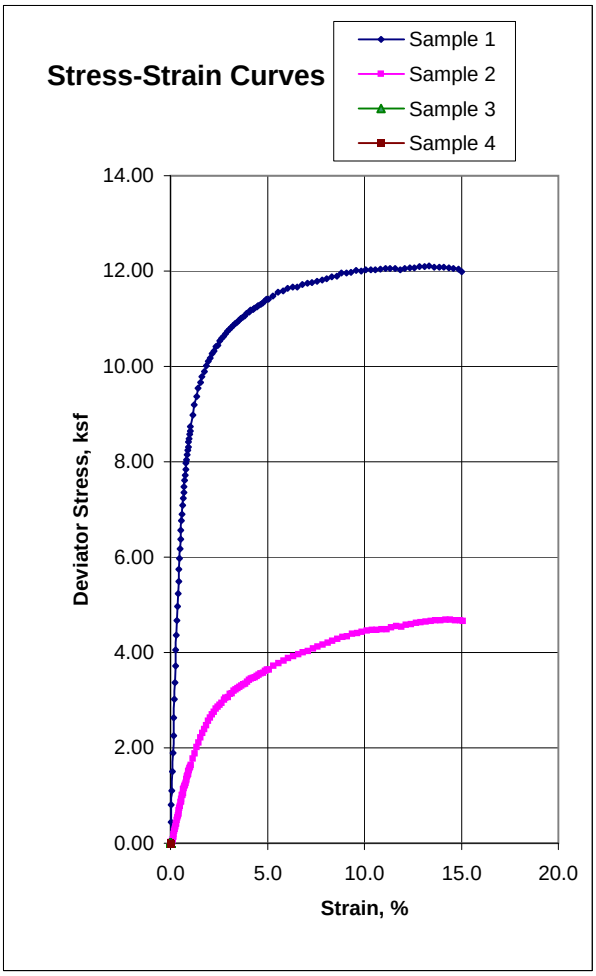
Ass. Gs = 2.8	**Initial**	**Final**
Moisture %:	16.7	20.2
Dry Density, pcf:	113.1	111.7
Void Ratio:	0.545	0.565
% Saturation:	85.9	100

Remarks:

Unconsolidated-Undrained Triaxial Test

ASTM D-2850

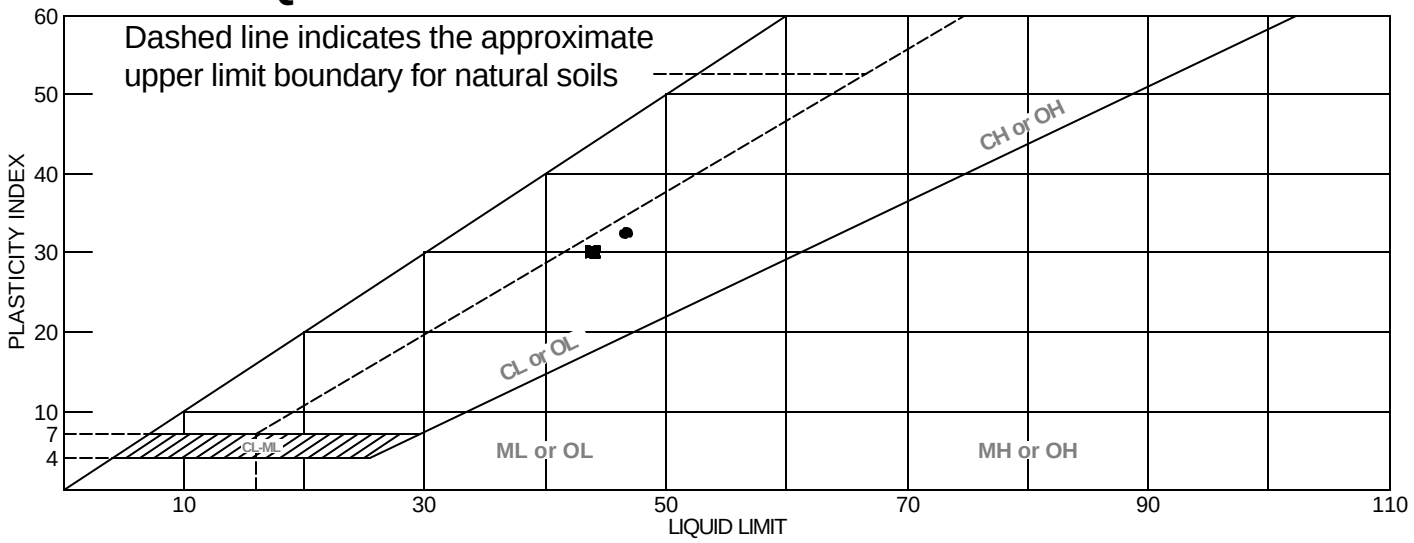


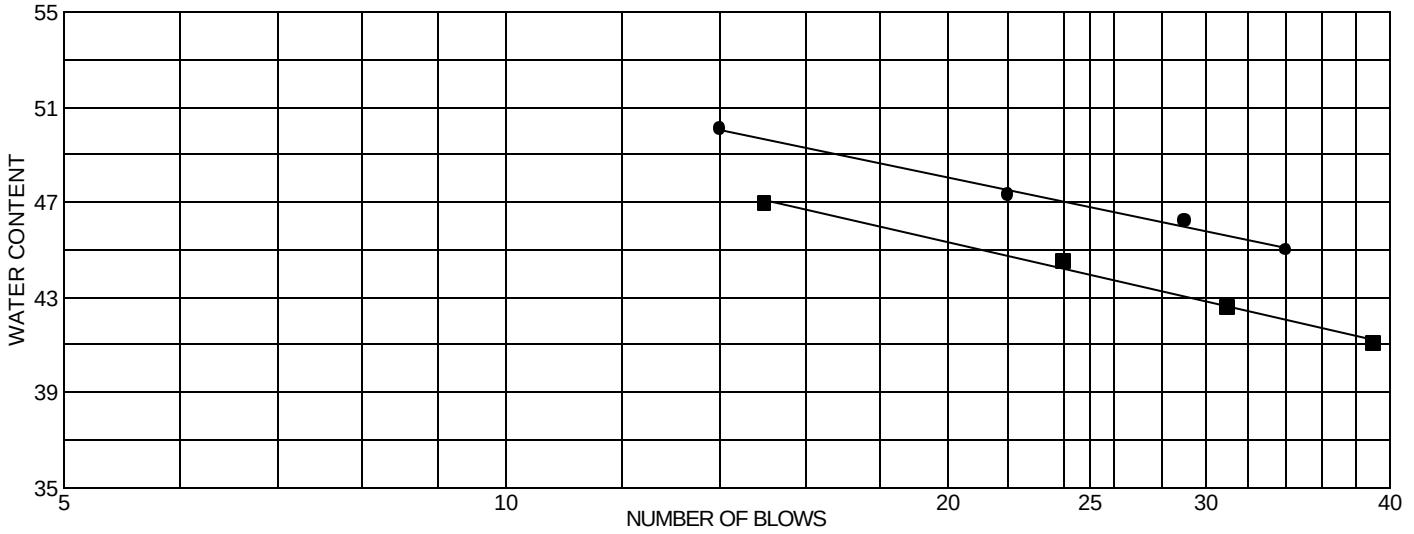


Sample Data				
	1	2	3	4
Moisture %	16.0	22.0		
Dry Den,pcf	112.6	104.7		
Void Ratio	0.497	0.610		
Saturation %	87.0	97.5		
Height in	5.00	4.97		
Diameter in	2.38	2.42		
Cell psi	1.0	4.9		
Strain %	13.10	14.20		
Deviator, ksf	12.102	4.690		
Rate %/min	1.00	1.01		
in/min	0.050	0.050		
Job No.:	665-009			
Client:	Nichols Consulting Engineers			
Project:	Hydrogen Fuel Station - 517.04.20			
Boring:	B-1	B-2		
Sample:				
Depth ft:	2-2.5	11-11.5		

Visual Soil Description	
Sample #	
1	Dark Brown Lean CLAY w/ Sand
2	Olive CLAY w/ Sand
3	
4	
Remarks:	

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Brown Lean CLAY w/ Sand	46.8	14.4	32.4			
■	Brown Sandy Lean CLAY	44.0	13.9	30.1			

Project No. 665-009 **Client:** Nichols Consulting Engineers

Project: Hydrogen Fuel Station - 517.04.20

● **Source:** B-1 **Elev./Depth:** 2-2.5'

■ **Source:** B-2 **Elev./Depth:** 3-4'

Remarks:

●

■

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Figure

APPENDIX C – ENVIRONMENTAL SAMPLING LABORATORY TEST RESULTS


Curtis & Tompkins, Ltd.
Analytical Laboratories, Since 1878

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

Laboratory Job Number 215198
ANALYTICAL REPORT

Nichols Consulting Engineers	Project : 517.04.20
501 Canal Blvd	Location : Hydrogen Fuel Station
Richmond, CA 94804	Level : II

Sample ID	Lab ID
COMP 1	215198-001
COMP 2	215198-002
B-1@	215198-003
B-2@	215198-004

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: _____ Date: 10/02/2009
Project Manager

NELAP # 01107CA

Curtis & Tompkins, Ltd.

CASE NARRATIVE

Laboratory number:	**215198**
Client:	**Nichols Consulting Engineers**
Project:	**517.04.20**
Location:	**Hydrogen Fuel Station**
Request Date:	**09/24/09**
Samples Received:	**09/24/09**

This data package contains sample and QC results for four soil samples, requested for the above referenced project on 09/24/09. The samples were received cold and intact.

TPH-Extractables by GC (EPA 8015B):
No analytical problems were encountered.

Volatile Organics by GC/MS (EPA 8260B):
No analytical problems were encountered.

PCBs (EPA 8082):
All samples underwent sulfuric acid cleanup using EPA Method 3665A. All samples underwent sulfur cleanup using the copper option in EPA Method 3660B. High surrogate recoveries were observed for TCMX in COMP 1 (lab # 215198-001) and the MS of COMP 1 (lab # 215198-001); the corresponding decachlorobiphenyl surrogate recoveries were within limits. No other analytical problems were encountered.

Metals (EPA 6010B and EPA 7471A):
High recovery was observed for barium in the MSD for batch 155409; the parent sample was not a project sample, and the BS/BSD were within limits. High RPD was also observed for barium in the MS/MSD for batch 155409; the RPD was acceptable in the BS/BSD. No other analytical problems were encountered.

Curtis & Tompkins, Ltd.
Analytical Laboratory Since 1878
2323 Fifth Street
Berkeley, CA 94710
(510) 486-0900 Phone
(510) 486-0532 Fax

CHAIN OF CUSTODY

C & T LOGIN #: 21598

Project No.: 517.04.20
Project Name: Hydrogen Fuel Station
Project P.O.:
Turnaround Time: Normal TAT

Sampler:
Report To:
Company: Nichols Consulting Engineers
Telephone: 510-215-3620
Fax: 510-215-2898

Lab No.	Sample ID.	Sampling Date Time	Matrix: Soil	Water	Waste	# of Containers	Preservative: HCL	H_2SO_4	HNO_3	ICE	Encore	Analysis: CAM 17 Metals	PCB's	8015M (Oil)	VOC's (8260B)
1	Comp 1	9-24	X			1						X	X	X	
2	Comp 2		X			1						X	X	X	
3	B-1@		X								3				X
4	B-2@		X								3				X
	LAB - Homogenize Comp 1 Prior to Extraction														
	Homogenize Comp 2 Prior to Extraction														

Notes:
Comp 1 - unsaturated
Comp 2 - saturated
Note - homogenize Comp - samples before testing

SAMPLE RECEIPT
☐ Intact ☐ Cold
☐ On Ice ☐ Ambient
Preservative Correct?
☐ Yes ☐ No ☐ N/A

RELINQUISHED BY:
Jennifer Chan 9-24-09 4:50 DATE / TIME
DATE / TIME
DATE / TIME
SIGNATURE

RECEIVED BY:
9/24/09 16:50 DATE / TIME
DATE / TIME
DATE / TIME

COOLER RECEIPT CHECKLIST

Curtis & Tompkins, Ltd.

Login # _____ Date Received 9/24/09 Number of coolers 1
Client NICHOLS CONSULTING Project HYDROGEN FUEL STATION

Date Opened 9/24/09 By (print) M. VILLANUEVA (sign) _____
Date Logged in _____ By (print) _____ (sign) _____

1. Did cooler come with a shipping slip (airbill, etc) _____ YES ~~NO~~
Shipping info _____

2A. Were custody seals present? ... ☐ YES (circle) on cooler on samples ☐ ~~NO~~
How many _____ Name _____ Date _____
2B. Were custody seals intact upon arrival? _____ YES NO ~~N/A~~
3. Were custody papers dry and intact when received? _____ YES NO
4. Were custody papers filled out properly (ink, signed, etc)? _____ YES NO
5. Is the project identifiable from custody papers? (If so fill out top of form) ___ YES NO
6. Indicate the packing in cooler: (if other, describe) _____

☐ Bubble Wrap ☑ Foam blocks ☑ Bags ☐ None
☐ Cloth material ☐ Cardboard ☐ Styrofoam ☐ Paper towels

7. Temperature documentation:

Type of ice used: ☑ Wet ☐ Blue/Gel ☐ None Temp(°C) 5.7

☐ Samples Received on ice & cold without a temperature blank

☐ Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? _____ YES NO
If YES, what time were they transferred to freezer? 17:23
9. Did all bottles arrive unbroken/unopened? _____ YES NO
10. Are samples in the appropriate containers for indicated tests? _____ YES NO
11. Are sample labels present, in good condition and complete? _____ YES NO
12. Do the sample labels agree with custody papers? _____ YES NO
13. Was sufficient amount of sample sent for tests requested? _____ YES NO
14. Are the samples appropriately preserved? _____ YES NO N/A
15. Are bubbles > 6mm absent in VOA samples? _____ YES NO N/A
16. Was the client contacted concerning this sample delivery? _____ YES NO
If YES, Who was called? _____ By _____ Date: _____

COMMENTS

_____
_____
_____
_____
_____
_____
_____
_____

Curtis & Tompkins, Ltd.

Total Extractable Hydrocarbons

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	SHAKER TABLE
Project#:	517.04.20	Analysis:	EPA 8015B
Matrix:	Soil	Batch#:	155438
Units:	mg/Kg	Sampled:	09/24/09
Basis:	as received	Received:	09/24/09
Diln Fac:	1.000	Prepared:	09/29/09

Field ID: COMP 1 Lab ID: 215198-001
Type: SAMPLE Analyzed: 09/30/09

Analyte	Result	RL
Diesel C10-C24	3.7 Y	0.99
Motor Oil C24-C36	6.5	5.0

Surrogate	%REC	Limits
o-Terphenyl	73	48-137

Field ID: COMP 2 Lab ID: 215198-002
Type: SAMPLE Analyzed: 09/30/09

Analyte	Result	RL
Diesel C10-C24	ND	1.0
Motor Oil C24-C36	ND	5.0

Surrogate	%REC	Limits
o-Terphenyl	67	48-137

Type: BLANK Analyzed: 09/29/09
Lab ID: QC514196

Analyte	Result	RL
Diesel C10-C24	ND	0.99
Motor Oil C24-C36	ND	5.0

Surrogate	%REC	Limits
o-Terphenyl	92	48-137

Y= Sample exhibits chromatographic pattern which does not resemble standard
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Total Extractable Hydrocarbons

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	SHAKER TABLE
Project#:	517.04.20	Analysis:	EPA 8015B
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC514197	Batch#:	155438
Matrix:	Soil	Prepared:	09/29/09
Units:	mg/Kg	Analyzed:	09/29/09

Analyte	Spiked	Result	%REC	Limits
Diesel C10-C24	50.11	47.36	95	53-134

Surrogate	%REC	Limits
o-Terphenyl	101	48-137

Curtis & Tompkins, Ltd.

Batch QC Report

Total Extractable Hydrocarbons

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	SHAKER TABLE
Project#:	517.04.20	Analysis:	EPA 8015B
Field ID:	ZZZZZZZZZZ	Batch#:	155438
MSS Lab ID:	215205-002	Sampled:	09/24/09
Matrix:	Soil	Received:	09/24/09
Units:	mg/Kg	Prepared:	09/29/09
Basis:	as received	Analyzed:	09/30/09
Diln Fac:	10.00		

Type: MS Lab ID: QC514225

Analyte	MSS Result	Spiked	Result	%REC	Limits
Diesel C10-C24	28.40	50.34	70.98	85	28-147

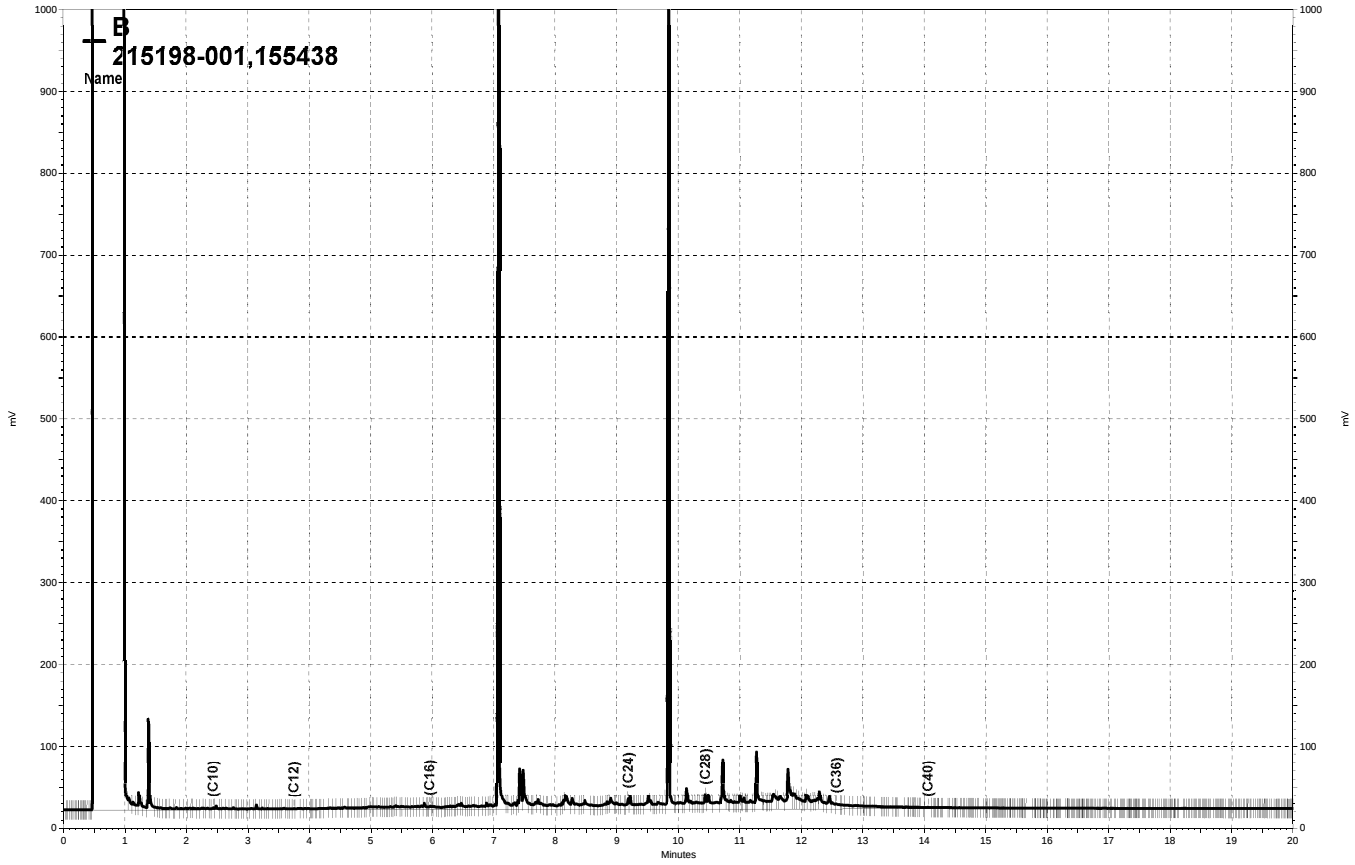
Surrogate	%REC	Limits
o-Terphenyl	DO	48-137

Type: MSD Lab ID: QC514226

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Diesel C10-C24	49.56	56.15	56	28-147	22	44

Surrogate	%REC	Limits
o-Terphenyl	DO	48-137

DO= Diluted Out
RPD= Relative Percent Difference



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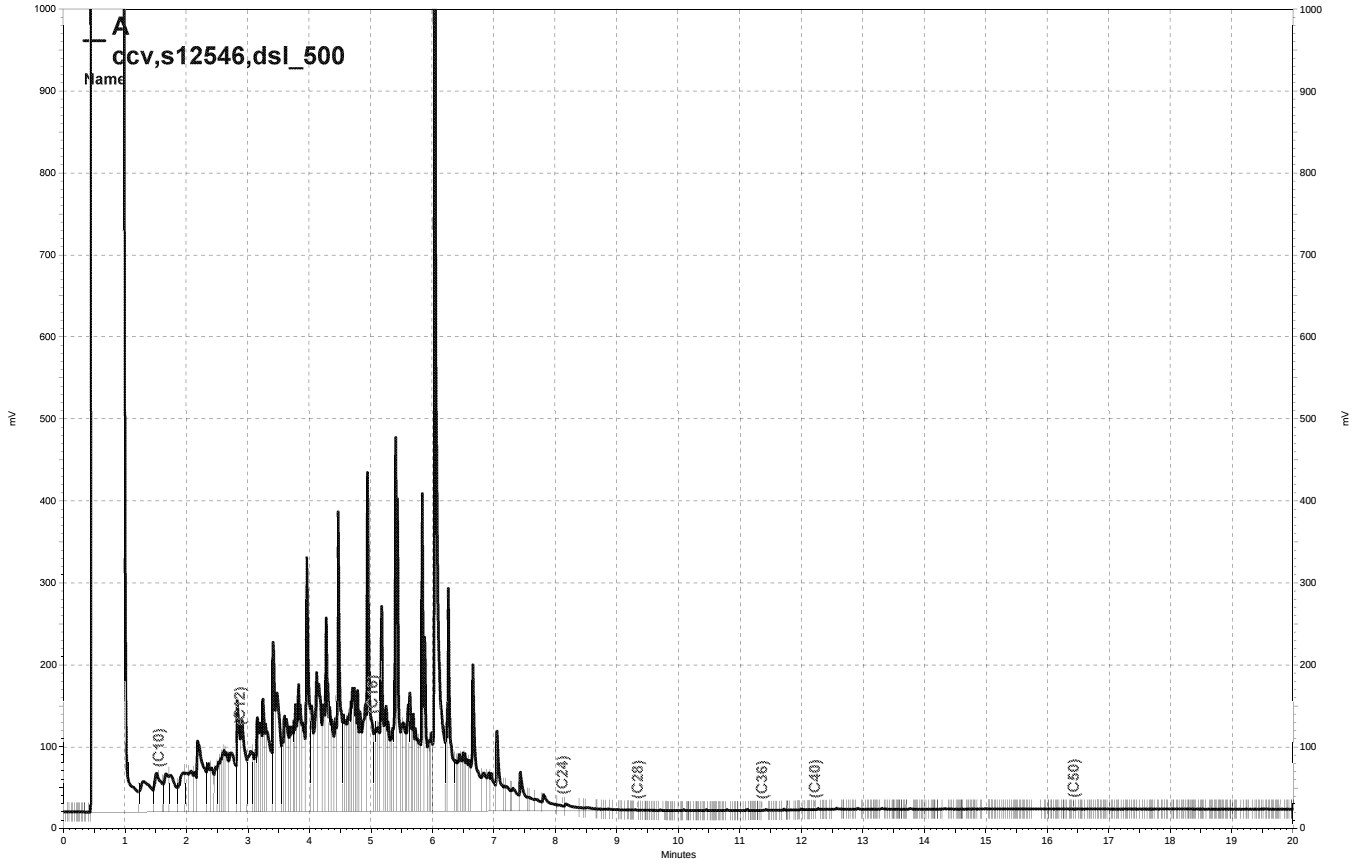

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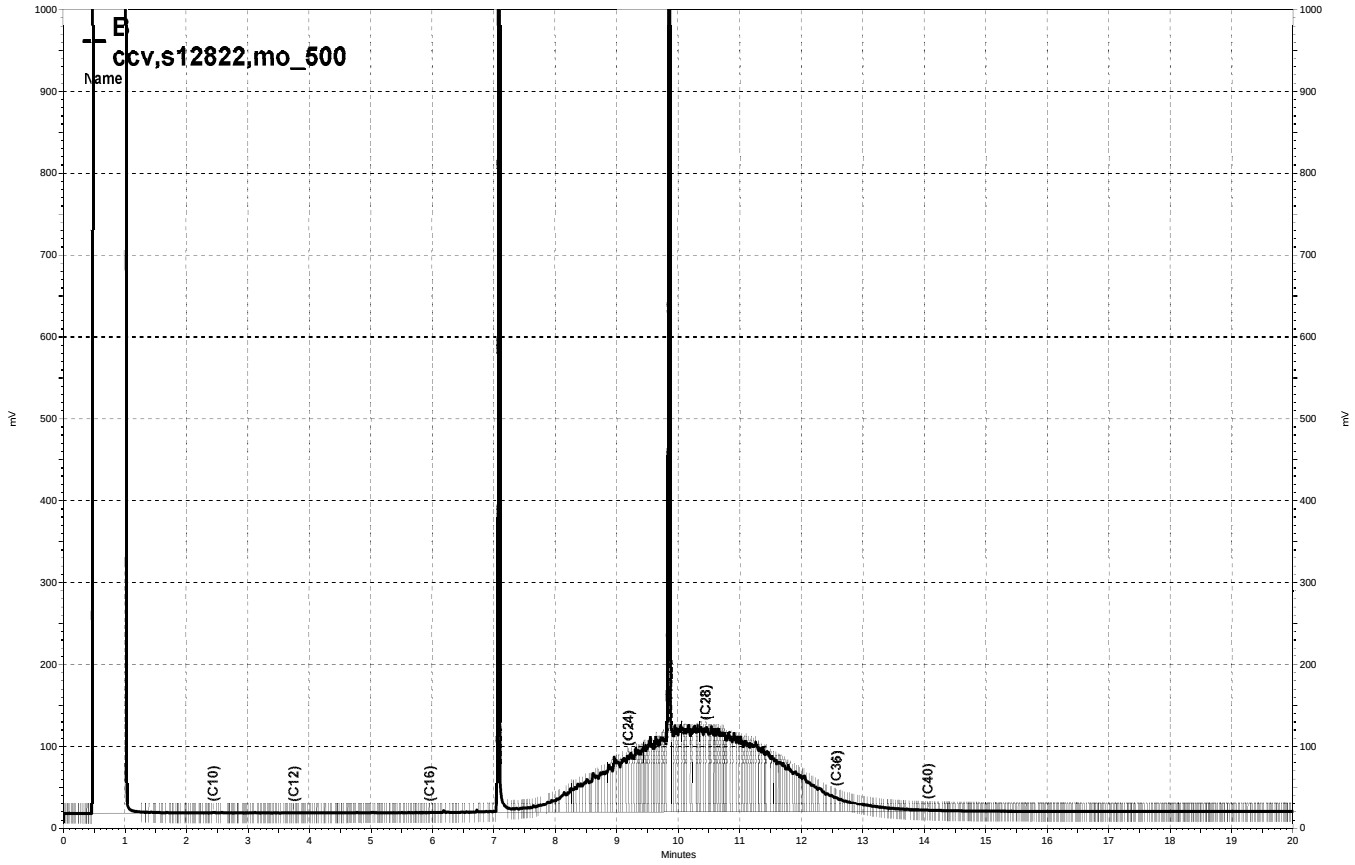

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Curtis & Tompkins, Ltd.

Purgeable Organics by GC/MS

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 5035
Project#:	517.04.20	Analysis:	EPA 8260B
Field ID:	B-1@	Diln Fac:	0.9921
Lab ID:	215198-003	Batch#:	155311
Matrix:	Soil	Sampled:	09/24/09
Units:	ug/Kg	Received:	09/24/09
Basis:	as received	Analyzed:	09/25/09

Analyte	Result	RL
Freon 12	ND	9.9
Chloromethane	ND	9.9
Vinyl Chloride	ND	9.9
Bromomethane	ND	9.9
Chloroethane	ND	9.9
Trichlorofluoromethane	ND	5.0
Acetone	ND	20
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
Carbon Disulfide	ND	5.0
MTBE	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
Vinyl Acetate	ND	50
1,1-Dichloroethane	ND	5.0
2-Butanone	ND	9.9
cis-1,2-Dichloroethene	ND	5.0
2,2-Dichloropropane	ND	5.0
Chloroform	ND	5.0
Bromochloromethane	ND	5.0
1,1,1-Trichloroethane	ND	5.0
1,1-Dichloropropene	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Benzene	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
4-Methyl-2-Pentanone	ND	9.9
cis-1,3-Dichloropropene	ND	5.0
Toluene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
2-Hexanone	ND	9.9
1,3-Dichloropropane	ND	5.0
Tetrachloroethene	ND	5.0

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Purgeable Organics by GC/MS

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 5035
Project#:	517.04.20	Analysis:	EPA 8260B
Field ID:	B-1@	Diln Fac:	0.9921
Lab ID:	215198-003	Batch#:	155311
Matrix:	Soil	Sampled:	09/24/09
Units:	ug/Kg	Received:	09/24/09
Basis:	as received	Analyzed:	09/25/09

Analyte	Result	RL
Dibromochloromethane	ND	5.0
1,2-Dibromoethane	ND	5.0
Chlorobenzene	ND	5.0
1,1,1,2-Tetrachloroethane	ND	5.0
Ethylbenzene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0
Styrene	ND	5.0
Bromoform	ND	5.0
Isopropylbenzene	ND	5.0
1,1,2,2-Tetrachloroethane	ND	5.0
1,2,3-Trichloropropane	ND	5.0
Propylbenzene	ND	5.0
Bromobenzene	ND	5.0
1,3,5-Trimethylbenzene	ND	5.0
2-Chlorotoluene	ND	5.0
4-Chlorotoluene	ND	5.0
tert-Butylbenzene	ND	5.0
1,2,4-Trimethylbenzene	ND	5.0
sec-Butylbenzene	ND	5.0
para-Isopropyl Toluene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
n-Butylbenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,2-Dibromo-3-Chloropropane	ND	5.0
1,2,4-Trichlorobenzene	ND	5.0
Hexachlorobutadiene	ND	5.0
Naphthalene	ND	5.0
1,2,3-Trichlorobenzene	ND	5.0

Surrogate	%REC	Limits
Dibromofluoromethane	113	69-128
1,2-Dichloroethane-d4	128	67-137
Toluene-d8	102	80-120
Bromofluorobenzene	106	75-130

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Purgeable Organics by GC/MS

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 5035
Project#:	517.04.20	Analysis:	EPA 8260B
Field ID:	B-2@	Diln Fac:	0.8818
Lab ID:	215198-004	Batch#:	155311
Matrix:	Soil	Sampled:	09/24/09
Units:	ug/Kg	Received:	09/24/09
Basis:	as received	Analyzed:	09/25/09

Analyte	Result	RL
Freon 12	ND	8.8
Chloromethane	ND	8.8
Vinyl Chloride	ND	8.8
Bromomethane	ND	8.8
Chloroethane	ND	8.8
Trichlorofluoromethane	ND	4.4
Acetone	ND	18
Freon 113	ND	4.4
1,1-Dichloroethene	ND	4.4
Methylene Chloride	ND	18
Carbon Disulfide	ND	4.4
MTBE	ND	4.4
trans-1,2-Dichloroethene	ND	4.4
Vinyl Acetate	ND	44
1,1-Dichloroethane	ND	4.4
2-Butanone	ND	8.8
cis-1,2-Dichloroethene	ND	4.4
2,2-Dichloropropane	ND	4.4
Chloroform	ND	4.4
Bromochloromethane	ND	4.4
1,1,1-Trichloroethane	ND	4.4
1,1-Dichloropropene	ND	4.4
Carbon Tetrachloride	ND	4.4
1,2-Dichloroethane	ND	4.4
Benzene	ND	4.4
Trichloroethene	ND	4.4
1,2-Dichloropropane	ND	4.4
Bromodichloromethane	ND	4.4
Dibromomethane	ND	4.4
4-Methyl-2-Pentanone	ND	8.8
cis-1,3-Dichloropropene	ND	4.4
Toluene	ND	4.4
trans-1,3-Dichloropropene	ND	4.4
1,1,2-Trichloroethane	ND	4.4
2-Hexanone	ND	8.8
1,3-Dichloropropane	ND	4.4
Tetrachloroethene	ND	4.4

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Purgeable Organics by GC/MS

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 5035
Project#:	517.04.20	Analysis:	EPA 8260B
Field ID:	B-2@	Diln Fac:	0.8818
Lab ID:	215198-004	Batch#:	155311
Matrix:	Soil	Sampled:	09/24/09
Units:	ug/Kg	Received:	09/24/09
Basis:	as received	Analyzed:	09/25/09

Analyte	Result	RL
Dibromochloromethane	ND	4.4
1,2-Dibromoethane	ND	4.4
Chlorobenzene	ND	4.4
1,1,1,2-Tetrachloroethane	ND	4.4
Ethylbenzene	ND	4.4
m,p-Xylenes	ND	4.4
o-Xylene	ND	4.4
Styrene	ND	4.4
Bromoform	ND	4.4
Isopropylbenzene	ND	4.4
1,1,2,2-Tetrachloroethane	ND	4.4
1,2,3-Trichloropropane	ND	4.4
Propylbenzene	ND	4.4
Bromobenzene	ND	4.4
1,3,5-Trimethylbenzene	ND	4.4
2-Chlorotoluene	ND	4.4
4-Chlorotoluene	ND	4.4
tert-Butylbenzene	ND	4.4
1,2,4-Trimethylbenzene	ND	4.4
sec-Butylbenzene	ND	4.4
para-Isopropyl Toluene	ND	4.4
1,3-Dichlorobenzene	ND	4.4
1,4-Dichlorobenzene	ND	4.4
n-Butylbenzene	ND	4.4
1,2-Dichlorobenzene	ND	4.4
1,2-Dibromo-3-Chloropropane	ND	4.4
1,2,4-Trichlorobenzene	ND	4.4
Hexachlorobutadiene	ND	4.4
Naphthalene	ND	4.4
1,2,3-Trichlorobenzene	ND	4.4

Surrogate	%REC	Limits
Dibromofluoromethane	112	69-128
1,2-Dichloroethane-d4	133	67-137
Toluene-d8	113	80-120
Bromofluorobenzene	102	75-130

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 5035
Project#:	517.04.20	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC513648	Batch#:	155311
Matrix:	Soil	Analyzed:	09/25/09
Units:	ug/Kg		

Analyte	Result	RL
Freon 12	ND	10
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Acetone	ND	20
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
Carbon Disulfide	ND	5.0
MTBE	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
Vinyl Acetate	ND	50
1,1-Dichloroethane	ND	5.0
2-Butanone	ND	10
cis-1,2-Dichloroethene	ND	5.0
2,2-Dichloropropane	ND	5.0
Chloroform	ND	5.0
Bromochloromethane	ND	5.0
1,1,1-Trichloroethane	ND	5.0
1,1-Dichloropropene	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Benzene	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
Dibromomethane	ND	5.0
4-Methyl-2-Pentanone	ND	10
cis-1,3-Dichloropropene	ND	5.0
Toluene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
2-Hexanone	ND	10
1,3-Dichloropropane	ND	5.0
Tetrachloroethene	ND	5.0

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 5035
Project#:	517.04.20	Analysis:	EPA 8260B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC513648	Batch#:	155311
Matrix:	Soil	Analyzed:	09/25/09
Units:	ug/Kg		

Analyte	Result	RL
Dibromochloromethane	ND	5.0
1,2-Dibromoethane	ND	5.0
Chlorobenzene	ND	5.0
1,1,1,2-Tetrachloroethane	ND	5.0
Ethylbenzene	ND	5.0
m,p-Xylenes	ND	5.0
o-Xylene	ND	5.0
Styrene	ND	5.0
Bromoform	ND	5.0
Isopropylbenzene	ND	5.0
1,1,2,2-Tetrachloroethane	ND	5.0
1,2,3-Trichloropropane	ND	5.0
Propylbenzene	ND	5.0
Bromobenzene	ND	5.0
1,3,5-Trimethylbenzene	ND	5.0
2-Chlorotoluene	ND	5.0
4-Chlorotoluene	ND	5.0
tert-Butylbenzene	ND	5.0
1,2,4-Trimethylbenzene	ND	5.0
sec-Butylbenzene	ND	5.0
para-Isopropyl Toluene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
n-Butylbenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,2-Dibromo-3-Chloropropane	ND	5.0
1,2,4-Trichlorobenzene	ND	5.0
Hexachlorobutadiene	ND	5.0
Naphthalene	ND	5.0
1,2,3-Trichlorobenzene	ND	5.0

Surrogate	%REC	Limits
Dibromofluoromethane	102	69-128
1,2-Dichloroethane-d4	119	67-137
Toluene-d8	105	80-120
Bromofluorobenzene	103	75-130

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 5035
Project#:	517.04.20	Analysis:	EPA 8260B
Matrix:	Soil	Batch#:	155311
Units:	ug/Kg	Analyzed:	09/25/09
Diln Fac:	1.000		

Type: BS Lab ID: QC513649

Analyte	Spiked	Result	%REC	Limits
1,1-Dichloroethene	25.00	25.37	101	70-136
Benzene	25.00	25.25	101	80-126
Trichloroethene	25.00	25.28	101	79-130
Toluene	25.00	27.54	110	79-128
Chlorobenzene	25.00	28.22	113	80-120

Surrogate	%REC	Limits
Dibromofluoromethane	104	69-128
1,2-Dichloroethane-d4	114	67-137
Toluene-d8	110	80-120
Bromofluorobenzene	96	75-130

Type: BSD Lab ID: QC513650

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
1,1-Dichloroethene	25.00	23.78	95	70-136	6	20
Benzene	25.00	25.68	103	80-126	2	20
Trichloroethene	25.00	25.53	102	79-130	1	20
Toluene	25.00	27.93	112	79-128	1	20
Chlorobenzene	25.00	29.67	119	80-120	5	20

Surrogate	%REC	Limits
Dibromofluoromethane	103	69-128
1,2-Dichloroethane-d4	111	67-137
Toluene-d8	111	80-120
Bromofluorobenzene	95	75-130

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

Purgeable Organics by GC/MS

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 5035
Project#:	517.04.20	Analysis:	EPA 8260B
Field ID:	ZZZZZZZZZZ	Batch#:	155311
MSS Lab ID:	215160-003	Sampled:	09/23/09
Matrix:	Soil	Received:	09/23/09
Units:	ug/Kg	Analyzed:	09/25/09
Basis:	as received		

Type: MS Diln Fac: 0.9311
Lab ID: QC513754

Analyte	MSS Result	Spiked	Result	%REC	Limits
1,1-Dichloroethene	<0.9524	46.55	51.89	111	64-146
Benzene	<0.9524	46.55	45.16	97	64-126
Trichloroethene	<0.9524	46.55	49.50	106	61-145
Toluene	<0.9524	46.55	50.55	109	62-125
Chlorobenzene	<0.9524	46.55	49.37	106	56-121

Surrogate	%REC	Limits
Dibromofluoromethane	112	69-128
1,2-Dichloroethane-d4	119	67-137
Toluene-d8	111	80-120
Bromofluorobenzene	96	75-130

Type: MSD Diln Fac: 0.9398
Lab ID: QC513755

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
1,1-Dichloroethene	46.99	44.38	94	64-146	17	28
Benzene	46.99	49.54	105	64-126	8	24
Trichloroethene	46.99	50.74	108	61-145	2	25
Toluene	46.99	47.29	101	62-125	8	25
Chlorobenzene	46.99	49.77	106	56-121	0	26

Surrogate	%REC	Limits
Dibromofluoromethane	109	69-128
1,2-Dichloroethane-d4	122	67-137
Toluene-d8	104	80-120
Bromofluorobenzene	99	75-130

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Polychlorinated Biphenyls (PCBs)

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 3550B
Project#:	517.04.20	Analysis:	EPA 8082
Matrix:	Soil	Sampled:	09/24/09
Units:	ug/Kg	Received:	09/24/09
Basis:	as received	Prepared:	09/30/09
Diln Fac:	1.000	Analyzed:	10/01/09
Batch#:	155505		

Field ID: COMP 1 Lab ID: 215198-001
Type: SAMPLE

Analyte	Result	RL
Aroclor-1016	ND	12
Aroclor-1221	ND	24
Aroclor-1232	ND	12
Aroclor-1242	ND	12
Aroclor-1248	ND	12
Aroclor-1254	ND	12
Aroclor-1260	ND	12

Surrogate	%REC	Limits
TCMX	141 *	68-139
Decachlorobiphenyl	81	46-133

Field ID: COMP 2 Lab ID: 215198-002
Type: SAMPLE

Analyte	Result	RL
Aroclor-1016	ND	12
Aroclor-1221	ND	24
Aroclor-1232	ND	12
Aroclor-1242	ND	12
Aroclor-1248	ND	12
Aroclor-1254	ND	12
Aroclor-1260	ND	12

Surrogate	%REC	Limits
TCMX	128	68-139
Decachlorobiphenyl	70	46-133

Type: BLANK Lab ID: QC514461

Analyte	Result	RL
Aroclor-1016	ND	12
Aroclor-1221	ND	24
Aroclor-1232	ND	12
Aroclor-1242	ND	12
Aroclor-1248	ND	12
Aroclor-1254	ND	12
Aroclor-1260	ND	12

Surrogate	%REC	Limits
TCMX	138	68-139
Decachlorobiphenyl	74	46-133

*= Value outside of QC limits; see narrative
ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Polychlorinated Biphenyls (PCBs)

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 3550B
Project#:	517.04.20	Analysis:	EPA 8082
Type:	LCS	Diln Fac:	1.000
Lab ID:	QC514462	Batch#:	155505
Matrix:	Soil	Prepared:	09/30/09
Units:	ug/Kg	Analyzed:	10/01/09

Analyte	Spiked	Result	%REC	Limits
Aroclor-1016	168.1	172.6	103	78-142
Aroclor-1260	168.1	177.7	106	78-143

Surrogate	%REC	Limits
TCMX	134	68-139
Decachlorobiphenyl	73	46-133

Curtis & Tompkins, Ltd.

Batch QC Report

Polychlorinated Biphenyls (PCBs)

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 3550B
Project#:	517.04.20	Analysis:	EPA 8082
Field ID:	COMP 1	Batch#:	155505
MSS Lab ID:	215198-001	Sampled:	09/24/09
Matrix:	Soil	Received:	09/24/09
Units:	ug/Kg	Prepared:	09/30/09
Basis:	as received	Analyzed:	10/02/09
Diln Fac:	1.000		

Type: MS Lab ID: QC514463

Analyte	MSS Result	Spiked	Result	%REC	Limits
Aroclor-1016	<2.995	166.0	175.0	105	65-155
Aroclor-1260	<0.9815	166.0	155.2	93	48-150

Surrogate	%REC	Limits
TCMX	144 *	68-139
Decachlorobiphenyl	60	46-133

Type: MSD Lab ID: QC514464

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Aroclor-1016	164.6	174.8	106	65-155	1	27
Aroclor-1260	164.6	165.0	100	48-150	7	30

Surrogate	%REC	Limits
TCMX	134	68-139
Decachlorobiphenyl	62	46-133

*= Value outside of QC limits; see narrative
RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

California Title 22 Metals

Lab #:	215198	Project#:	517.04.20
Client:	Nichols Consulting Engineers	Location:	Hydrogen Fuel Station
Field ID:	COMP 1	Diln Fac:	1.000
Lab ID:	215198-001	Sampled:	09/24/09
Matrix:	Soil	Received:	09/24/09
Units:	mg/Kg	Prepared:	09/28/09
Basis:	as received		

Analyte	Result	RL	Batch#	Analyzed	Prep	Analysis
Antimony	0.79	0.50	155409	09/30/09	EPA 3050B	EPA 6010B
Arsenic	8.4	0.25	155409	09/29/09	EPA 3050B	EPA 6010B
Barium	190	0.28	155409	09/29/09	EPA 3050B	EPA 6010B
Beryllium	0.51	0.10	155409	09/29/09	EPA 3050B	EPA 6010B
Cadmium	ND	0.25	155409	09/29/09	EPA 3050B	EPA 6010B
Chromium	63	0.28	155409	09/29/09	EPA 3050B	EPA 6010B
Cobalt	15	0.56	155409	09/29/09	EPA 3050B	EPA 6010B
Copper	25	0.28	155409	09/29/09	EPA 3050B	EPA 6010B
Lead	12	0.25	155409	09/29/09	EPA 3050B	EPA 6010B
Mercury	0.19	0.020	155377	09/28/09	METHOD	EPA 7471A
Molybdenum	ND	0.56	155409	09/29/09	EPA 3050B	EPA 6010B
Nickel	67	0.56	155409	09/29/09	EPA 3050B	EPA 6010B
Selenium	ND	0.50	155409	09/29/09	EPA 3050B	EPA 6010B
Silver	ND	0.25	155409	09/29/09	EPA 3050B	EPA 6010B
Thallium	ND	0.50	155409	09/29/09	EPA 3050B	EPA 6010B
Vanadium	48	0.28	155409	09/29/09	EPA 3050B	EPA 6010B
Zinc	49	1.0	155409	09/29/09	EPA 3050B	EPA 6010B

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

California Title 22 Metals

Lab #:	215198	Project#:	517.04.20
Client:	Nichols Consulting Engineers	Location:	Hydrogen Fuel Station
Field ID:	COMP 2	Diln Fac:	1.000
Lab ID:	215198-002	Sampled:	09/24/09
Matrix:	Soil	Received:	09/24/09
Units:	mg/Kg	Prepared:	09/28/09
Basis:	as received		

Analyte	Result	RL	Batch#	Analyzed	Prep	Analysis
Antimony	ND	0.50	155409	09/30/09	EPA 3050B	EPA 6010B
Arsenic	6.9	0.25	155409	09/29/09	EPA 3050B	EPA 6010B
Barium	160	0.30	155409	09/29/09	EPA 3050B	EPA 6010B
Beryllium	0.51	0.10	155409	09/29/09	EPA 3050B	EPA 6010B
Cadmium	ND	0.25	155409	09/29/09	EPA 3050B	EPA 6010B
Chromium	54	0.30	155409	09/29/09	EPA 3050B	EPA 6010B
Cobalt	12	0.59	155409	09/29/09	EPA 3050B	EPA 6010B
Copper	23	0.30	155409	09/29/09	EPA 3050B	EPA 6010B
Lead	5.9	0.25	155409	09/29/09	EPA 3050B	EPA 6010B
Mercury	0.062	0.020	155377	09/28/09	METHOD	EPA 7471A
Molybdenum	ND	0.59	155409	09/29/09	EPA 3050B	EPA 6010B
Nickel	68	0.59	155409	09/29/09	EPA 3050B	EPA 6010B
Selenium	ND	0.50	155409	09/29/09	EPA 3050B	EPA 6010B
Silver	ND	0.25	155409	09/29/09	EPA 3050B	EPA 6010B
Thallium	ND	0.50	155409	09/29/09	EPA 3050B	EPA 6010B
Vanadium	45	0.30	155409	09/29/09	EPA 3050B	EPA 6010B
Zinc	49	1.0	155409	09/29/09	EPA 3050B	EPA 6010B

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

California Title 22 Metals

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	METHOD
Project#:	517.04.20	Analysis:	EPA 7471A
Analyte:	Mercury	Diln Fac:	1.000
Type:	BLANK	Batch#:	155377
Lab ID:	QC513942	Prepared:	09/28/09
Matrix:	Soil	Analyzed:	09/28/09
Units:	mg/Kg		

Result	RL
ND	0.020

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

California Title 22 Metals

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	METHOD
Project#:	517.04.20	Analysis:	EPA 7471A
Analyte:	Mercury	Batch#:	155377
Matrix:	Soil	Prepared:	09/28/09
Units:	mg/Kg	Analyzed:	09/28/09
Diln Fac:	1.000		

Type	Lab ID	Spiked	Result	%REC	Limits	RPD	Lim
BS	QC513943	0.2500	0.2490	100	80-120		
BSD	QC513944	0.2500	0.2510	100	80-120	1	20

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

California Title 22 Metals

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	METHOD
Project#:	517.04.20	Analysis:	EPA 7471A
Analyte:	Mercury	Diln Fac:	5.000
Field ID:	ZZZZZZZZZZ	Batch#:	155377
MSS Lab ID:	215227-001	Sampled:	09/24/09
Matrix:	Soil	Received:	09/25/09
Units:	mg/Kg	Prepared:	09/28/09
Basis:	as received	Analyzed:	09/28/09

Type	Lab ID	MSS Result	Spiked	Result	%REC	Limits	RPD	Lim
MS	QC513945	0.8364	0.2358	1.094	109	70-133		
MSD	QC513946		0.2273	1.064	100	70-133	2	27

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

California Title 22 Metals

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 3050B
Project#:	517.04.20	Analysis:	EPA 6010B
Type:	BLANK	Diln Fac:	1.000
Lab ID:	QC514065	Batch#:	155409
Matrix:	Soil	Prepared:	09/28/09
Units:	mg/Kg		

Analyte	Result	RL	Analyzed
Antimony	ND	0.50	09/30/09
Arsenic	ND	0.25	09/29/09
Barium	ND	0.30	09/29/09
Beryllium	ND	0.10	09/29/09
Cadmium	ND	0.25	09/29/09
Chromium	ND	0.30	09/29/09
Cobalt	ND	0.60	09/29/09
Copper	ND	0.30	09/29/09
Lead	ND	0.25	09/29/09
Molybdenum	ND	0.60	09/29/09
Nickel	ND	0.60	09/29/09
Selenium	ND	0.50	09/29/09
Silver	ND	0.25	09/29/09
Thallium	ND	0.50	09/29/09
Vanadium	ND	0.30	09/29/09
Zinc	ND	1.0	09/29/09

ND= Not Detected
RL= Reporting Limit

Curtis & Tompkins, Ltd.

Batch QC Report

California Title 22 Metals

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 3050B
Project#:	517.04.20	Analysis:	EPA 6010B
Matrix:	Soil	Batch#:	155409
Units:	mg/Kg	Prepared:	09/28/09
Diln Fac:	1.000		

Type: BS Lab ID: QC514066

Analyte	Spiked	Result	%REC	Limits	Analyzed
Antimony	100.0	97.07	97	80-120	09/30/09
Arsenic	50.00	46.70	93	80-120	09/29/09
Barium	100.0	94.96	95	80-120	09/29/09
Beryllium	2.500	2.386	95	80-120	09/29/09
Cadmium	10.00	9.658	97	80-120	09/29/09
Chromium	100.0	93.10	93	80-120	09/29/09
Cobalt	25.00	22.93	92	80-120	09/29/09
Copper	12.50	11.30	90	80-120	09/29/09
Lead	100.0	91.86	92	80-120	09/29/09
Molybdenum	20.00	19.14	96	80-120	09/29/09
Nickel	25.00	23.56	94	80-120	09/29/09
Selenium	50.00	45.94	92	80-120	09/29/09
Silver	10.00	9.109	91	80-120	09/29/09
Thallium	50.00	45.46	91	80-120	09/29/09
Vanadium	25.00	23.59	94	80-120	09/29/09
Zinc	25.00	23.23	93	80-120	09/29/09

Type: BSD Lab ID: QC514067

Analyte	Spiked	Result	%REC	Limits	RPD	Lim	Analyzed
Antimony	100.0	97.25	97	80-120	0	20	09/30/09
Arsenic	50.00	45.63	91	80-120	2	20	09/29/09
Barium	100.0	92.18	92	80-120	3	20	09/29/09
Beryllium	2.500	2.305	92	80-120	3	20	09/29/09
Cadmium	10.00	9.363	94	80-120	3	20	09/29/09
Chromium	100.0	90.10	90	80-120	3	20	09/29/09
Cobalt	25.00	22.26	89	80-120	3	20	09/29/09
Copper	12.50	10.93	87	80-120	3	20	09/29/09
Lead	100.0	89.60	90	80-120	2	20	09/29/09
Molybdenum	20.00	18.69	93	80-120	2	20	09/29/09
Nickel	25.00	22.91	92	80-120	3	20	09/29/09
Selenium	50.00	44.94	90	80-120	2	20	09/29/09
Silver	10.00	8.839	88	80-120	3	20	09/29/09
Thallium	50.00	44.42	89	80-120	2	20	09/29/09
Vanadium	25.00	22.88	92	80-120	3	20	09/29/09
Zinc	25.00	22.32	89	80-120	4	20	09/29/09

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Batch QC Report

California Title 22 Metals

Lab #:	215198	Location:	Hydrogen Fuel Station
Client:	Nichols Consulting Engineers	Prep:	EPA 3050B
Project#:	517.04.20	Analysis:	EPA 6010B
Field ID:	ZZZZZZZZZZ	Dil'n Fac:	1.000
MSS Lab ID:	215162-001	Batch#:	155409
Matrix:	Soil	Sampled:	09/23/09
Units:	mg/Kg	Received:	09/24/09
Basis:	as received	Prepared:	09/28/09

Type: MS Lab ID: QC514068

Analyte	MSS Result	Spiked	Result	%REC	Limits	Analyzed
Antimony	0.8105	100.0	57.64	57	8-120	09/30/09
Arsenic	5.049	50.00	49.36	89	65-120	09/29/09
Barium	55.30	100.0	141.1	86	38-143	09/29/09
Beryllium	0.1335	2.500	2.551	97	73-120	09/29/09
Cadmium	<0.04902	10.00	9.648	96	63-120	09/29/09
Chromium	6.593	100.0	98.74	92	51-130	09/29/09
Cobalt	1.744	25.00	24.89	93	50-122	09/29/09
Copper	2.667	12.50	14.26	93	37-149	09/29/09
Lead	7.241	100.0	97.50	90	48-127	09/29/09
Molybdenum	0.5151	20.00	18.68	91	61-120	09/29/09
Nickel	3.365	25.00	27.27	96	36-144	09/29/09
Selenium	0.5226	50.00	45.79	91	63-120	09/29/09
Silver	<0.07329	10.00	8.807	88	65-120	09/29/09
Thallium	0.4274	50.00	44.93	89	54-120	09/29/09
Vanadium	14.41	25.00	37.05	91	44-141	09/29/09
Zinc	21.70	25.00	37.95	65	25-153	09/29/09

Type: MSD Lab ID: QC514069

Analyte	Spiked	Result	%REC	Limits	RPD	Lim	Analyzed
Antimony	100.0	55.39	55	8-120	4	31	09/30/09
Arsenic	50.00	47.61	85	65-120	4	24	09/29/09
Barium	100.0	207.6	152 *	38-143	38 *	32	09/29/09
Beryllium	2.500	2.503	95	73-120	2	20	09/29/09
Cadmium	10.00	9.271	93	63-120	4	20	09/29/09
Chromium	100.0	98.34	92	51-130	0	25	09/29/09
Cobalt	25.00	24.36	90	50-122	2	27	09/29/09
Copper	12.50	13.88	90	37-149	3	30	09/29/09
Lead	100.0	94.11	87	48-127	4	33	09/29/09
Molybdenum	20.00	18.27	89	61-120	2	20	09/29/09
Nickel	25.00	26.67	93	36-144	2	31	09/29/09
Selenium	50.00	44.18	87	63-120	4	20	09/29/09
Silver	10.00	8.499	85	65-120	4	20	09/29/09
Thallium	50.00	43.06	85	54-120	4	20	09/29/09
Vanadium	25.00	39.82	102	44-141	7	24	09/29/09
Zinc	25.00	34.61	52	25-153	9	35	09/29/09

*= Value outside of QC limits; see narrative
RPD= Relative Percent Difference