CLIFF KOPPE METALS Inc.
RECYCLING

Tuesday, February 03, 1998

Mike Blum
WASHINGTON STATE DEPARTMENT OF ECOLOGY
Southwest Regional Office
PO Box 47775
Olympia, WA 98504-7600

Dear Mike:

Enclosed is the Groundwater Assessment Report for the Cliff Koppe Metals, Inc. (CKM) Kelso, Washington facility. All activities involved with this assessment are performed or supervised by Maul, Foster, and Alongi, Inc. (MFA), a reputable environmental and engineering service.

CKM is pleased the first samples taken in August of 1997 showed no negative impacts to shallow groundwater by our business activities. CKM intends to sample groundwater again in February 1998 at our three monitoring wells, along with Mr. Dale Cadwell's residential well at 121 Olive St. Mr. Cadwell gave CKM permission to test his well, and MFA will be instructed to notify Mr. Cadwell in advance of when the testing will occur.

CKM will continue to inform Washington Department of Ecology of any future activities, and would appreciate any comments concerning our latest findings. Please call Audrey Koppe or myself at (360) 695-6850 if you have any questions or concerns. Inquiries concerning assessment and testing can be made to Jim Maul at MFA; (360) 694-2691.

Sincerely,

Cliff Koppe
President

File Name Koppe Metals
County Cowlitz
File Type Toxics
Your Name M. Blum

Two Locations to Serve You
P.O. Box 1887 • 1701 W. 4th Plain • Vancouver, WA 98668 • **(206) 695-6850**
P.O. Box 419 • 1610 So. River Rd. • Kelso, WA 98626 • **(206) 425-5050**

Maul Foster & Alongi, Inc.

Environmental & Engineering Services

February 3, 1998
Project 9005-001.001

Mr. Cliff Koppe
Cliff Koppe Metals, Inc.
1701 W.4th Plain
Vancouver, Washington 98668

Re: Kelso Yard Groundwater Assessment

Dear Mr. Koppe:

Maul Foster & Alongi, Inc. (MFA) has prepared this letter report which documents the results of a groundwater assessment performed at Cliff Koppe Metals, Inc. (Koppe Metals), 1610 South River Road, Kelso, Washington. The purpose of the groundwater assessment was to evaluate whether historical site activities have impacted shallow groundwater at the facility. The groundwater assessment included installing three groundwater monitoring wells, logging site soils, collecting groundwater samples, and submitting the groundwater samples to a contract laboratory for analyses. The work was described in the December 31, 1996 draft groundwater assessment workplan submitted to the Washington State Department of Ecology.

SITE BACKGROUND

Koppe Metals occupies an area of approximately 5 acres. The site was purchased in 1982 and is currently used as a scrap metal recycling facility. It is bounded by residential properties on the north, east, and south, and the Cowlitz River to the west (see Figure 1). The site is adjacent to the diked portion of the Cowlitz River's floodplain. South River Road runs along the top of the dike between the site and the Cowlitz River.

PROCEDURES

Groundwater Monitoring Well Installation

On August 20, 1997, Geo-Tech Explorations, Inc. (Geo-Tech) of Tualatin, Oregon, installed three monitoring wells (MW-1 through MW-3) on the Koppe Metals site. An MFA hydrogeologist provided oversight of the monitoring well installations. Monitoring well locations are presented in Figure 2.

7223 NE Hazel Dell Avenue, Suite B • Vancouver, WA 98665 • (360) 694-2691 • Fax: (360) 906-1958

Geo-Tech installed the monitoring wells using a Mobile B-59 drill rig. The borings were advanced with 4.25-inch inside diameter (ID) 8.25-inch outside diameter (OD) hollow-stem augers to a depth of approximately 25 feet below ground surface (bgs). Before advancing each boring, downhole equipment and drilling tools were decontaminated using a high pressure steam cleaner.

Continuous soil samples were collected using a 1.5-foot, 2-inch OD split spoon sampler to a depth of approximately 20 feet. Soil samples were not collected below 20 feet bgs because of the presence of heaving sands. Approximately 20 gallons of potable water was added to each borehole during drilling to reduce heaving.

Attachment A includes a detailed lithologic log for each boring (MW-1 through MW-3). Soil samples were logged according to ASTM standards, D-2487-90, *Standard Practices for Description and Identification of Soils (Visual Manual Procedures)*. The lithologic description provides information on grain size (in terms of percentages), color, consistency, moisture content, and evidence of contamination (visual or olfactory).

The monitoring wells were screened in medium to coarse-grained sands from approximately 15 to 25 feet bgs with 2-inch, flush threaded, Schedule 40 polyvinyl chloride (PVC) well screen with 0.010 inch machine slots. A filter pack composed of 10-20 Colorado silica sand was placed around each well screen as the augers were withdrawn, and extended approximately 2 feet above the top of the screen. The filter pack was surged using a surge-block until the sand pack consolidated around the well screen. A seal consisting of coarse bentonite chips (hydrated with potable water) was placed on top of the filter pack as the augers were withdrawn. Monitoring wells were completed with aboveground steel security casings, cemented in place, and surrounded by three guard posts. Attachment A includes well construction details.

The monitoring wells were developed using a combination of surging, bailing, and pumping techniques. Monitoring wells were developed to remove fluids added during drilling, to remove sediments that may have accumulated during installation, and to improve hydraulic communication with the aquifer.

Attachment B contains well development forms for the monitoring wells. Specific conductance, pH, temperature, and sediment content were measured periodically during development. A minimum of 10 pore volumes of water were removed from each well, or until specific conductance, pH, and temperature measurements stabilized to within 10 percent of the previous readings. Development water was stored in 55-gallon drums. Drums were labeled, describing the source area, matrix, and date of generation. A drum-

tracking information sheet was also developed in the field to document drum number, source, matrix, and date of generation.

The ground surface and the top of the PVC casing (measuring point elevation [MPE]) were surveyed vertically and horizontally (with an accuracy of 0.01 foot) relative to each other. The MPE for monitoring well MW-1 was assigned an elevation of 20.00 feet above mean sea level (MSL), based on the U.S. Geological Survey 7.5-minute topographic quadrangle map; monitoring wells MW-2 and MW-3 were then assigned elevations relative to this datum. Lithologic logs for each monitoring well show the survey data for each monitoring well (see Attachment A).

Groundwater Sampling

Water levels were measured to the nearest 0.01-foot from the MPE of each monitoring well using a decontaminated Slope Indicator electronic sounder on August 28, 1997. Water level measurements were recorded on field sampling data sheets (FSDS) (see Attachment C).

Groundwater samples were collected by purging each well with a peristaltic pump until field parameters (e.g., pH, specific conductance, and temperature) stabilized to within 10 percent of their previous measurements. A minimum of three casing volumes of water was purged from each well prior to sample collection. Water quality measurements were recorded on FSDSs (see Attachment C).

Samples for dissolved metals analyses were collected by filtering groundwater through a 45-micron filter into laboratory-supplied, preserved (with sulfuric acid), one-liter polyethylene bottles. Samples for hydrocarbon analyses were collected by placing groundwater into laboratory-supplied, preserved (with hydrochloric acid), one-liter amber glass bottles. Groundwater samples were stored in iced shipping containers and shipped to Columbia Analytical Services, Inc. in Kelso, Washington for analysis. Chain-of-custody forms documenting the number of samples collected and the analyses requested were included in the shipping containers with the samples.

Groundwater samples were labeled with the monitoring well number, sample matrix description (GW), and sample depth (which is specified as the middle of the sampling interval). Sample collection data was documented on FSDSs (see Attachment C). The containers were sealed with a custody seal.

Groundwater samples were analyzed for petroleum hydrocarbons by U. S. Environmental Protection Agency (USEPA) Method 8015M; for dissolved metals (cadmium, chromium, copper, iron, manganese, silver, and zinc) by USEPA Method 6010/7000; for mercury by USEPA Method 245.1/7470; for lead by USEPA Method 239.1/7421; and for selenium by USEPA Method 270.2/7740.

RESULTS

Hydrogeology

The site is covered by approximately 12 feet of fill material comprised of native alluvium (see Attachment A). The fill is composed of silty sand and may contain scrap metal, tires, and concrete blocks. Groundwater was encountered between 8 and 12 feet bgs.

Hydrology

August 1997 water level elevations (in feet mean sea level [MSL]) for monitoring wells MW-1 through MW-3 are presented in Figure 2. The potentiometric surface is relatively flat and the groundwater gradient could vary seasonally. A hydraulic gradient of approximately 0.0002 feet per foot (ft/ft) was estimated across the site.

Groundwater Quality

Petroleum hydrocarbon data from the groundwater samples collected from monitoring wells MW-1, MW-2, and MW-3 is summarized in Table 1 (see Attachment C). Hydrocarbons were not detected above the method reporting limits (MRLs).

The concentrations of dissolved metals detected in groundwater samples collected from monitoring wells MW-1, MW-2, and MW-3 is summarized in Table 2 (see Appendix C). Detected concentrations were compared to state and federal criteria or standards. Dissolved metals were not detected in concentrations above their respective MRLs, except for iron and manganese. Iron and manganese are commonly elevated in shallow alluvium in the Longview and Kelso areas.

Iron and manganese were detected at concentrations above their respective USEPA established secondary maximum contaminant levels (SMCLs). Iron was detected at concentrations ranging from 0.074 milligrams per liter (mg/L) (MW-1) to 0.315 mg/L (MW-3), and manganese was detected at concentrations ranging from 0.214 mg/L

(MW-1) to 0.696 mg/L (MW-3). The concentrations of iron detected in samples collected from MW-3 are above the USEPA established SMCL of 0.3 mg/L (USEPA, 1996); the concentrations of manganese detected in samples collected from the monitoring wells are above the SMCL of 0.05 mg/L. SMCLs are nonenforceable federal guidelines regarding taste, odor, color and certain other non-aesthetic effects of drinking water.

SUMMARY

- Three monitoring wells were installed in the shallow water-bearing zone on August 20, 1997; the wells are screened in alluvium from approximately 15 to 25 feet bgs.
- The monitoring wells were sampled on August 28, 1997 and analyzed for dissolved metals and petroleum hydrocarbons.
- Petroleum hydrocarbons were not detected above their MRLs.
- Metals were not detected above their MRLs, except for iron and manganese.
- Iron exceeded the SMCL of 0.3 mg/L in the groundwater sample collected from MW-3.
- Manganese exceeded the SMCL of 0.05 mg/L in groundwater samples collected from MW-1, MW-2 and MW-3.
- Scrap metal activities do not appear to be impacting shallow groundwater quality at the site.

RECOMMENDATIONS

- Add a nearby residential well to the next groundwater sampling event.

If you have any questions, please contact us.

Sincerely,

Maul Foster & Alongi, Inc.

Eric Allyn Roth, R.G.
Staff Hydrogeologist

James J. Maul, R.G.
Supervising Hydrogeologist

Attachments: Limitations
Tables 1 and 2
Figures 1 and 2
Attachments A, B, and C

cc: Mike Blum, Washington State Department of Ecology

TABLES

Table 1
Summary of Hydrocarbon Scan in Monitoring Wells MW-1 through MW-3
Cliff Koppe Metals, Inc., Kelso Yard
(mg/L)

Location	Sample	Sampling Date	Lab Code	Diesel	Gasoline	Jet Fuel	Kerosene	Mineral Spirits	Other Petroleum Hydrocarbons
MW-1	CKM 082997001W	8/29/97	K9706290-004	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U
MW-2	CKM 082997002W	8/29/97	K9706290-005	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U
MW-3	CKM 082997003W	8/29/97	K9706290-006	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.2 U

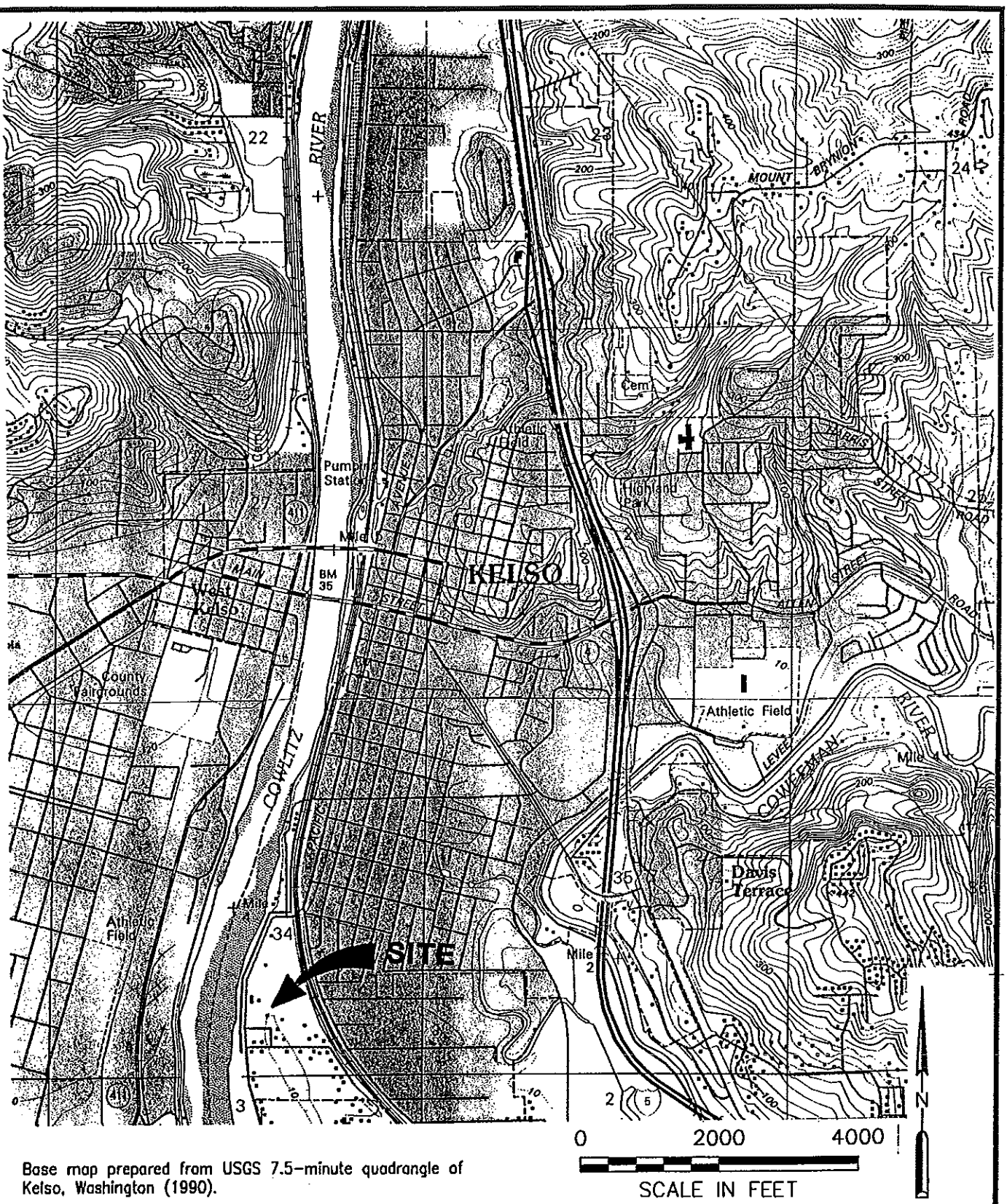
Notes:
U = Analyte was not detected at or above the method reporting limit (MRL).

Table 2
Summay of Dissolved Metals in Monitoring Wells MW-1 through MW-3
Cliff Koppe Metals, Kelso Yard
(mg/L)

Location	Sample	Sampling Date	Lab Code	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Selenium	Silver	Zinc
MW-1	CKM 082997001W	8/29/97	K9706290-004	0.004 U	0.005 U	0.01 U	0.074	0.002 U	0.214	0.0005 U	0.005 U	0.01 U	0.01 U
MW-2	CKM 082997002W	8/29/97	K9706290-005	0.004 U	0.005 U	0.01 U	0.228	0.002 U	0.292	0.0005 U	0.005 U	0.01 U	0.01 U
MW-3	CKM 082997003W	8/29/97	K9706290-006	0.004 U	0.005 U	0.01 U	0.315	0.002 U	0.696	0.0005 U	0.005 U	0.01 U	0.01 U

Notes:
U = Analyte was not detected at or above the method reporting limit (MRL).

FIGURES



Base map prepared from USGS 7.5-minute quadrangle of Kelso, Washington (1990).

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DATE	10/97
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APPR.	
REVIS.	
PROJECT NO.	9005-001.001

Figure 1
Cliff Koppe Metals
Kelso, Washington

SITE LOCATION

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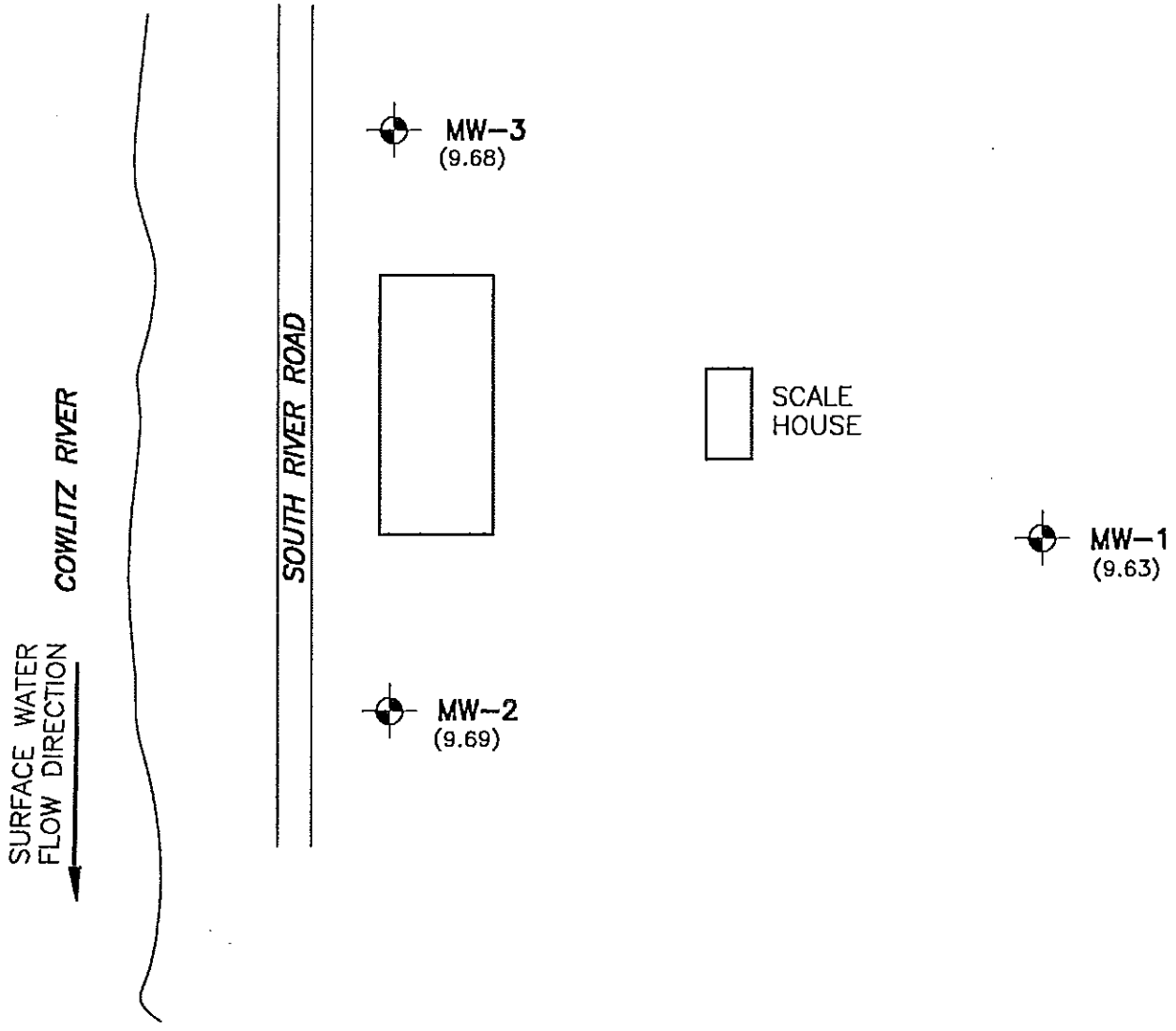
PLOT AT 1 = 1P



EXPLANATION

MW-2 (9.69) MONITORING WELL (WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL)

0 80 1600

SCALE IN FEET

N

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PROJECT NO.
9005-001.001

Figure 2
Cliff Koppe Metals
Kelso, Washington

SITE MAP

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ATTACHMENT A

Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
9005-001.001	MW-1	1 of 2

Project Name	Cliff Koppe Metals	TOC Elevation (feet above MSL)	20.00
Project Location	Kelso, Washington	Surface Elevation (feet above MSL)	<20
Start/End Date	8/20/97 to 8/20/97	Northing	
Driller/Equipment	GeoTech Explorations/Mobile B-59	Easting	
Geologist/Engineer	E. Roth	Hole Depth	25.0-feet
Sample Method	Hollow Stem Auger	Outer Hole Diam	6.25-inch

Depth (feet, BGS)	Well Details	Sample Data: Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column	Soil Description
									0 to 0.5 feet: GRASS AND ROOTS.
1									0.5 to 2.5 feet: SILTY SAND (SM); yellowish tan; 40% fines; 60% fine sand; dry; (observed from cuttings). (FILL)
2									
3			0%	SS	1		35 50/6"		* Hard drilling from 2.5 to 8.0 feet below ground surface. Fill consisted of large ribber tires and metal.
4									
5			0%	SS	2		7 3 4		
6									
7			5%	SS	3		5 5 7		6.5 to 8.0 feet: SAND (SP); tan brown; <10% fines; 90% fine sand; moist. (FILL)
8			40%	SS	4		5 6 8		8.0 to 9.5 feet: SILTY SAND (SP); tan brown with orange mottling; 30% fines; 65% fine sand; <5% root matter; pieces of rubber tires; wet. (FILL)
9									
10			100%	SS	5		9 18 18		9.5 to 11.4 feet: SILTY SAND (SP); gray to gray brown with orange mottling; 20% fines; 75% fine sand; <5% root matter; wet. (FILL)
11			90%	SS	6		2 3 5		11.4 to 17.0 feet: SAND (SP); salt and pepper, white, black, gray and red; 20% fine sand; 75% medium to coarse sand; 5% fine gravel, rounded to subrounded volcanic lithics; wet. (ALLUVIUM)
12									
13			90%	SS	7		2 4 5		
14			90%	SS	8		2 3 6		
15									

NOTES: 1) Soil samples collected continously with a 1.5-foot, 2-inch I.D. split spoon sampler (SS).
2) Borehole drilled with 8-inch (4-1/4-inch I.D.) hollow stem auger.

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Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
9005-001.001	MW- 1	2 of 2

Depth (feet, BGS)	Well Details	Sample Data: Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column	Soil Description
16			90%	SS	9		2 4 4		11.4 to 17.5 feet: SAND (SP); continued from previous page.
17			50%	SS	10		6 5 4		17.4 to 25.0 feet: SAND (SP); salt and pepper, white, red, black, gray; 95% fine to coarse sand; <5% fine gravel; subrounded to rounded; volcanic lithics; wet. (ALLUVIUM)
18									
19			0%	SS	11		3 7 7		*Some heaving sands.
20									Lithology observed by cuttings.
21									
22									
23									
24									
25									TOTAL DEPTH = 25.0 FEET BELOW GROUND SURFACE.

WELL CONSTRUCTION DETAILS

+2.0 to 14.5 feet: 2-inch diameter flush threaded, schedule 40 PVC blank riser pipe.

14.5 to 24.5 feet: 2-inch diameter, flush threaded schedule 40 PVC well screen with 0.010-inch machine slots.

+2.0 to 2.0 feet: above ground monument set in concrete.

2.0 to 13.0 feet: hole plug bentonite chips hydrated with potable water.

13.0 to 25.0 feet: 10-20 Colorado Silica Sand.

NOTES: *1) Soil samples collected continously with a 1.5-foot, 2-inch I.D. split spoon sampler (SS).*
2) Borehole drilled with 8-inch (4-1/4-inch I.D.) hollow stem auger.

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Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
9005-001.001	MW- 2	1 of 2

Project Name	Cliff Koppe Metals	TOC Elevation (feet above MSL)	24.58
Project Location	Kelso, Washington	Surface Elevation (feet above MSL)	<20
Start/End Date	8/20/97 to 8/20/97	Northing	
Driller/Equipment	GeoTech Explorations/Mobile B-59	Easting	
Geologist/Engineer	E. Roth	Hole Depth	25.0-feet
Sample Method	Hollow Stem Auger	Outer Hole Diam	6.25-inch

Depth (feet, BGS)	Well Details	Sample Data: Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column	Soil Description
0									0 to 0.5 feet: GRAVEL FILL; observed from cuttings. (FILL)
3			80%	SS	1		4 2 3		2.5 to 10.7 feet: SAND (SP); white yellowish brown; 100% fine to medium sand; micaceous; dry to damp. (FILL)
4			80%	SS	2		3 2 4		
6			60%	SS	3		2 3 4		
7			90%	SS	4		2 2 2		
9			90%	SS	5		2 3 3		
10			90%	SS	6		2 2 2		
11									10.7 to 12.1 feet: SILTY SAND (SM); tan brown with orange brown mottling; 30% fines, low plasticity; 70% fine sand; moist to damp. (FILL)
12			90%	SS	7		4 7 3		12.1 to 25.0 feet: SAND (SP); salt and pepper, white, black, red, grey; 90% medium to coarse sand; 10% medium gravel, rounded to subrounded; volcanic lithics; wet. (ALLUVIUM)
13			90%	SS	8		3 3 4		
14									
15									

NOTES: 1) Soil samples collected continously with a 1.5-foot, 2-inch I.D. split spoon sampler (SS).
2) Borehole drilled with 8-inch (4-1/4-inch I.D.) hollow stem auger.

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Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
9005-001.001	MW- 2	2 of 2

Depth (feet, BGS)	Well Details	Sample Data: Interval	Sample Data: Percent Recovery	Sample Data: Collection Method	Sample Data: Number	Sample Data: Name (Type)	Sample Data: Blows/6"	Lithologic Column	Soil Description
16									10.7 to 21.1 feet: SILTY SAND (SM); continued from previous page.
17									* Some heaving sands.
18									* Lithology observed from cuttings
19									
20									
21									
22									
23									
24									
25									TOTAL DEPTH = 25.0 FEET BELOW GROUND SURFACE.

WELL CONSTRUCTION DETAILS

+2.0 to 14.5 feet: 2-inch diameter flush threaded, schedule 40 PVC blank riser pipe.
14.5 to 25.0 feet: 2-inch diameter, flush threaded schedule 40 PVC well screen with 0.010-inch machine slots.

+2.0 to 2.0 feet: above ground monument set in concrete.
2.0 to 13.2 feet: hole plug bentonite chips hydrated with potable water.
13.2 to 24.5 feet: 10-20 Coloredo Silica Sand.

NOTES: 1) Soil samples collected continously with a 1.5-foot, 2-inch I.D. split spoon sampler (SS).
2) Borehole drilled with 8-inch (4-1/4-inch I.D.) hollow stem auger.

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Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
9005-001.001	MW-3	1 of 2

Project Name	Cliff Koppe Metals	TOC Elevation (feet above MSL)	22.99
Project Location	Kelso, Washington	Surface Elevation (feet above MSL)	<20
Start/End Date	8/20/97 to 8/20/97	Northing	
Driller/Equipment	GeoTech Explorations/Mobile B-59	Easting	
Geologist/Engineer	E. Roth	Hole Depth	25.0-feet
Sample Method	Hollow Stem Auger	Outer Hole Diam	8-Inch

Depth (feet, BGS)	Well Details	Sample Data: Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column	Soil Description
1									0 to 0.5 feet: GRAVEL FILL; observed from cuttings. (FILL)
2									
3			75%	SS	1		2 2 1		2.5 to 6.8 feet: SAND (SP); white yellowish brown; <5% fines; 95% fine to medium sand; micaceous; dry. (FILL)
4									@3.6 feet: moist.
5			80%	SS	2		2 2 3		
6			90%	SS	3		2 2 2		
7			75%	SS	4		1 2 2		6.8 to 7.0 feet: SILTY SAND (SM); yellowish brown with orange brown mottling; 20% fines; 80% fine sand; moist. (FILL) 7.0 to 8.8 feet: SAND (SP); white yellowish brown; <5% fines; 95% fine to medium sand; moist to dry. (FILL)
8									
9			80%	SS	5		1 3 2		8.8 to 9.0 feet: SILTY SAND (SM); reddish brown; 20% fines; 80% fine sand; moist to wet. (FILL) 9.0 to 11.1 feet: SAND (SP); yellowish orange brown; 100% fine to medium sand; some bedding structures; wet. (FILL)
10			70%	SS	6		3 3 5		
11									
12			100%	SS	7		3 4 4		11.1 to 25.0 feet: SAND (SP); salt and pepper, white, black, gray, red; 90% medium to coarse send; 10% fine to medium gravel, subrounded to rounded; volcanic lithics. (ALLUVIUM)
13									
14									
15									

NOTES: 1) Soil samples collected continously with a 1.5-foot, 2-inch I.D. split spoon sampler (SS).
2) Borehole drilled with 8-inch (4-1/4-inch I.D.) hollow stem auger.

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Maul Foster & Alongi, Inc.

Geologic Borehole Log/Well Construction

Project Number	Well Number	Sheet
9005-001.001	MW-3	2 of 2

Depth (feet, BGS)	Well Details	Sample Data: Interval	Percent Recovery	Collection Method	Number	Name (Type)	Blows/6"	Lithologic Column	Soil Description
16									11.1 to 25.0 feet: SAND (SP); continued from previous page.
17									* Heaving sands at approximately 17.0 feet below ground surface.
18									*Lithology observed from cuttings.
19									
20									
21									
22									
23									
24									
25									TOTAL DEPTH = 25.0 FEET BELOW GROUND SURFACE.

WELL CONSTRUCTION DETAILS

+2.0 to 14.5 feet: 2-inch diameter flush threaded, schedule 40 PVC blank riser pipe.

14.5 to 24.5 feet: 2-inch diameter, flush threaded schedule 40 PVC well screen with 0.010-inch machine slots.

+2.0 to 2.0 feet: above ground monument set in concrete.

2.0 to 5.0 feet: hole plug bentonite chips hydrated with potable water.

5.0 to 25.0 feet: 10-20 Coloredo Silica Sand.

NOTES: *1) Soil samples collected continously with a 1.5-foot, 2-inch I.D. split spoon sampler (SS).*
2) Borehole drilled with 8-inch (4-1/4-inch I.D.) hollow stem auger.

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ATTACHMENT B

Maul, Foster, and Associates

DAVID L. HATHAWAY

Well Development Form

Project No. 9005.001.001	Date 08.25.97
Site Location: KELSO, WA.	Well: MW-3
Name: CLIFF KOPPE METALS	Initial DTB: 26.71 Final DTB 26.75
Development Method: BAILER, P. PUMP	Initial DTW: 13.12 Final DTW 13.15
Total Water Removed 40 gal	Pore Volume: 2.22 gal
Water Contained	Casing Diameter: 2"
Estimated Specific Capacity	Meter No. 20056

Time	Cum. Vol Removed	Sand/Silt	pH	EC (µhos)	°C Temp	DTW DO	Method Eh	Comments
1443	1 L	✓	6.4	171.1	10°	—	BAILER	BROWN - SILTY
1450	2.5 gal	✓	6.4	173.3	10°	13.13		
1500	5 gal	✓	6.2	188.3	10°	13.13		
1511	10 gal	✓	6.2	185.2	10°	13.13		
1524	15	✓	6.2	180.2	10	13.12		
1534	20	✓	6.3	176.5	10	13.13		SLIGHT SHEEN
1553	25	✓	6.2	172.4	10°	13.13	P. Pump*	
1603	30		6.2	170.5	10°	13.14		* LT. BROWN / CLEARING UP
1614	35		6.2	158.7	10°	13.14		* LT. NEARLY CLEAR BROWN / OPAQUE
1623	40		6.3	168.4	10°	13.15		* NEARLY CLEAR VERY SLIGHT SHEEN

* MEASURED WHILE PUMPING

Maul, Foster, and Associates

DAVID L. HATHAWAY

Well Development Form

Project No. 9005001.001	Date 08.28.97
Site Location: KELSO, WA.	Well: MW-2
Name: CLIFF KOPPE METALS	Initial DTB: 26.82 Final DTB 26.79
Development Method: BAILER, P. PUMP	Initial DTW: 14.92 Final DTW 14.88
Total Water Removed 40.0	Pore Volume: 1.94 GAL
Water Contained	Casing Diameter: 2"
Estimated Specific Capacity	Meter No. 20054

Time	Cum. Vol Removed	Sand/Silt	pH	EC (µhos)	~~Temp~~ °C	~~DTW~~ DTB	METHOD Eh	Comments
1145	1 L	✓	6.1	157.5*	10°C		BAILER	GREY BROWN SILT
1153	2.5 GA	✓	6.4	157.9	10°C	14.93		(APPEARS SANDY)
1200	5.0	✓	6.3	158.5	10°	14.95		*
1219	10.0	✓	6.2	155.9	10°	14.93		
1231	15.0	✓	6.2	153.6	10°	14.93		
1244	20.0	✓	6.2	150.3	10°	14.93		
1259	25.0	✓	6.2	149.9	10°	14.93+	P. PUMP	CLEARING
1307	30.0		6.2	152.4	10°	14.93+		LT. GREY / SLIGHT SHEEN OPAQUE
1316	35.0		6.2	153.2	10°	14.91+		
1325	40.0		6.2	154.0	11°	14.88		

* ✓ CALIBRATION / RECALIBRATE

+ WHILE PUMPING

c:\fieldforms\WELLDEV.XLS Sheet1

Maul, Foster, and Associates

DAVID L. HATHAWAY

Well Development Form

Project No. 9005.001.001	Date 08.27.97
Site Location: KELSO, WA	Well: MW1
Name: CLIFF KOPPE METALS	Initial DTB: 25.37 Final DTB 10.34
Development Method: BAILER, P. Pump	Initial DTW: 10.29 Final DTW 10.30
Total Water Removed 40.	Pore Volume: 2.46 GAL
Water Contained	Casing Diameter: 2"
Estimated Specific Capacity	Meter No. 20056

Time	Cum. Vol Removed	Sand/Silt	pH	EC (µhos)	°C Temp	DTW DO	Eh	Comments
1340	1.0	✓	6.3	504	13°C		BAILER	BROWN / SILTY
1354	2.5 GAL	✓	6.2	588	13	10.32		
1406	5.0 GAL	✓	6.2	635	13	10.34		
1419	10.0	✓	6.2	599	13	10.34		
1433	15.0	✓	6.2	539	13	10.31		
1447	20.0	✓	6.2	510	13	10.32		
1505	25.0		6.1	508	13	10.32*	P. Pump	LT. BROWN -
1512	30.0		6.1	476	13	10.32*		
1518	35.0		6.1	471	13	10.33*		
1525	40.0		6.2	465	13	10.32		NEARLY CLEAR

* MEASURED WHILE PUMPING

ATTACHMENT C

Maul Foster & Associates, Inc.

1111 Main Street, Suite 300, Vancouver, Washington 98660 • (360) 694-2691 • Fax: (360) 696-9317

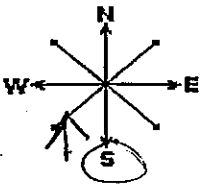
Groundwater Field Sampling Data Sheet

Project Name: CLIFF COPPER METALS Weather (circle): Temperature (°C or °F): 22°

Site Address: KELSO, WA Wind Speed (approx. mph): 5-10

Well I.D.: Wind Direction (Circle):

Label Code: CKM 082997001 Specify Other: PARTLY SUNNY (CLOUDING)



Hydrology/Level Measurements (Nearest 0.01 ft.)

(Product Thickness) (Water Column) (Gallon/ft x Water Column)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW	DTB-DTW	Volume (Gallons)	
08.29.97	1009	25.28		10.37		14.91	1 Pore Vol:	2.43
							3 Pore Vol:	7.29

Gallons of Water/Foot for Various Well Diameters

(1" = 0.041 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (10" = 4.080 gal/ft) (12" = 5.875 gal/ft)

Water Quality Data

Vol. #	Method*	Gallons Purged	pH	E Cond (µS)	°F Temp (°C)	DO (mg/L)	Other	Water Quality
1	2	2.5 GAL	5.9	525	12	-	-	OPAQUE AFTER PURGING CLOUDING
2		5.0	5.9	477	12			
3		7.5	5.9	472	12			
4		10.0	5.9	465	12			NEARLY CLEAR

(Select 1-7) (Running Total) (Circle Units) (Specify) (Color, Clarity, Sheen)

*Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) PVC/Teflon Bailer (5) Dedicated Bailer (6) Dedicated Pump (7) Other (Specify):

Groundwater Sampling Data

Bottle Type	Date	Time	Method *	Num. @ Vol.	Preservative (circle)	Ice	Filtered
VOA Glass				3 @ 40 ml.	HCL	YES	NO
(Amber Glass)	08.29.97	1108	2	1 @ 1L	None/(HCl)/H_2SO_4	(YES)	~~NO~~ NO
White Poly				@	None	YES	NO
Yellow Poly				@	H_2SO_4	YES	NO
Green Poly				@	NaOH	YES	NO
Red Total Poly				@	HNO_3	YES	NO
(Red Diss. Poly)	08.29.97	1108	2	1 @ 1L	HNO_3	(YES)	~~NO~~ YES
				@		YES	YES

(Circle if Used) Total Bottles (Include duplicate count): 2 **Duplicate ID:**

BOTTLE TYPE	Typical Analysis Allowed Per Bottle Type (Circle Applicable or Specify Non-Standard Analysis Below)
VOA-Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR[ ] WA[ ]
AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil&Grease)
WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
YELLOW - Poly	(COD) (TOC) (Total PO4) (Total Keldahl Nitrogen) (NH3) (NO3/NO2)
GREEN - Poly	(Cyanide)
RED TOTAL - Poly	(As) (Sb) (Ba) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
RED DISSOLVED - Poly	(As) (Sb) (Ba) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)
	LEAD SILVER SELENIUM

SAMPLER: DAVID L. HATHAWAY (Printed Name) (Signature)

Maul Foster & Associates, Inc.

1111 Main Street, Suite 300, Vancouver, Washington 98660 • (360) 694-2691 • Fax: (360) 696-9317

Groundwater Field Sampling Data Sheet

Project Name: CLIFF KOPPE METALS Weather (circle):

Site Address: KELSO, WA.

Well I.D.: ?

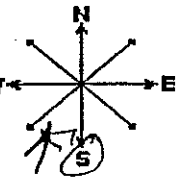
Label Code: CKM 082997003W

Specify Other: PARTLY SUNNY CLOUDINESS

Temperature (°C or °F): ____

Wind Speed (approx. mph): 5-10

Wind Direction (Circle):



Hydrology/Level Measurements (Nearest 0.01 ft.)

(Product Thickness) (Water Column) (Gallon/ft x Water Column)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW	DTB-DTW	Volume (Gallons)	
08.29.97	1017	26.69		13.31		13.38	1 Pore Vol:	2.18
							3 Pore Vol:	6.54

Gallons of Water/Foot for Various Well Diameters

(1" = 0.041 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (10" = 4.080 gal/ft) (12" = 5.875 gal/ft)

Water Quality Data

Vol. #	Method*	Gallons Purged	pH	E Cond (µS)	Temp (°C)	DO (mg/L)	Other	Water Quality
1	2	2.5	5.9	170.8	10°			SLT. TAQUE
2	1	5.0	6.0	170.7	10°			
3	1	7.5	6.2	168.5	10°			
4	1	10.0	6.2	167.9	10°			
	(Select 1-7)	(Running Total)			(Circle Units)		(Specify)	(Color, Clarity, Sheen)

*Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) PVC/Teflon Bailer (5) Dedicated Bailer (6) Dedicated Pump (7) Other (Specify):

Groundwater Sampling Data

Bottle Type	Date	Time	Method *	Num. @ Vol.	Preservative (circle)	Ice	Filtered
VOA Glass				3 @ 40 ml.	HCL	YES	NO
Amber Glass	08.29.97	1239	2	1 @ 1ℓ	None/HCL/H_2SO_4	YES	NO
White Poly				@	None	YES	NO
Yellow Poly				@	H_2SO_4	YES	NO
Green Poly				@	NaOH	YES	NO
Red Total Poly				@	HNO_3	YES	NO
Red Diss. Poly	08.29.97	12 39	2	1 @ 1ℓ	HNO_3	YES	~~NO~~ YES
				@		YES	YES
(Circle if Used)		Total Bottles (Include duplicate count):		2	Duplicate ID:		

BOTTLE TYPE	Typical Analysis Allowed Per Bottle Type (Circle Applicable or Specify Non-Standard Analysis Below)
VOA-Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR[ ] WA[ ]
AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil&Grease)
WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
YELLOW - Poly	(COD) (TOC) (Total PO4) (Total Keldahl Nitrogen) (NH3) (NO3/NO2)
GREEN - Poly	(Cyanide)
RED TOTAL - Poly	(As) (Sb) (Ba) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
RED DISSOLVED - Poly	(As) (Sb) (Ba) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)
	LEAD SILVER, SELENIUM

SAMPLER: DAVID L. HATHAWAY
(Printed Name)

(Signature)

Maul Foster & Associates, Inc.

1111 Main Street, Suite 300, Vancouver, Washington 98660 • (360) 694-2691 • Fax: (360) 696-9317

Groundwater Field Sampling Data Sheet

Project Name: CLIFF KOPPE MONIT **Weather (circle):** Temperature (°C or °F): 22°

Site Address: KELSO, WA Wind Speed (approx. mph): 5-10

Well I.D.: Wind Direction (Circle):

Label Code: MW 082997002W Specify Other: PARTLY SUNNY (CLEARING)

Hydrology/Level Measurements (Nearest 0.01 ft.)

(Product Thickness) (Water Column) (Gallon/ft x Water Column)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW	DTB-DTW	Volume (Gallons)	
08.29.97	1012	26.66		14.69		11.77	1 Pore Vol:	1.92
							3 Pore Vol:	5.76

Gallons of Water/Foot for Various Well Diameters

(1" = 0.041 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (10" = 4.080 gal/ft) (12" = 5.875 gal/ft)

Water Quality Data

Vol. #	Method*	Gallons Purged	pH	E Cond (µS)	~~F~~ Temp °C	DO (mg/L)	Other	Water Quality
1	2	2.5	5.9	137.0	10°			CLEAR
2	1	5.0	5.9	134.7	10°			
3	1	7.5	5.9	134.9	10°			
4								

(Select 1-7) (Running Total) (Circle Units) (Specify) (Color, Clarity, Sheen)

*Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) PVC/Teflon Bailer (5) Dedicated Bailer (6) Dedicated Pump (7) Other (Specify):

Groundwater Sampling Data

Bottle Type	Date	Time	Method *	Num. @ Vol.	Preservative (circle)	Ice	Filtered
VOA Glass				3 @ 40 ml.	HCL	YES	NO
(Amber Glass)	08.29.97	1153	2	1 @ 1l	None/(HCL)/H_2SO_4	(YES)	(NO)
White Poly				@	None	YES	NO
Yellow Poly				@	H_2SO_4	YES	NO
Green Poly				@	NaOH	YES	NO
Red Total Poly				@	HNO_3	YES	NO
(Red Diss. Poly)	08.29.97	1153	2	1 @ 1l	HNO_3	YES	~~NO~~ YES
				@		YES	YES

(Circle if Used) Total Bottles (Include duplicate count): 2 **Duplicate ID:**

BOTTLE TYPE	Typical Analysis Allowed Per Bottle Type (Circle Applicable or Specify Non-Standard Analysis Below)
VOA-Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR[ ] WA[ ]
AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil&Grease)
WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
YELLOW - Poly	(COD) (TOC) (Total PO4) (Total Keldahl Nitrogen) (NH3) (NO3/NO2)
GREEN - Poly	(Cyanide)
RED TOTAL - Poly	(As) (Sb) (Ba) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
RED DISSOLVED - Poly	(As) (Sb) (Ba) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)
	LEAD SILVER SELENIUM THALLIUM

SAMPLER: DAVID L. HATHAWAY (Printed Name) (Signature)

Columbia Analytical Services Inc.

RECEIVED
SEP 26 1997
BY:

September 24, 1997

Service Request No: K9706290

Eric Roth
Maul Foster & Alongi
7223 NE Hazel Dell Avenue, Suite B
Vancouver, WA 98665

Re: Cliff Koppe/9005-001.001

Dear Eric:

Enclosed are the results of the sample(s) submitted to our laboratory on August 29, 1997. For your reference, these analyses have been assigned our service request number K9706290.

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 239.

Respectfully submitted,

Columbia Analytical Services, Inc.

Howard Boorse
Project Chemist

HB/td

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 360/577-7222 • Fax 360/636-1068

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Maul Foster & Alongi, Inc.	**Service Request:**	K9706290
Project:	Cliff Koppe/9005-001.001	**Date Collected:**	8/29/97
Sample Matrix:	Water	**Date Received:**	8/29/97

Dissolved Metals

Sample Name:	CKM-082997-001W	Units:	ug/L (ppb)
Lab Code:	K9706290-004	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Cadmium	CLAA	6010A	4	1	9/12/97	9/15/97	ND	
Chromium	CLAA	6010A	5	1	9/12/97	9/15/97	ND	
Copper	CLAA	6010A	10	1	9/12/97	9/15/97	ND	
Iron	CLAA	6010A	20	1	9/12/97	9/15/97	74	
Lead	CLFAA	7421	2	1	9/12/97	9/12/97	ND	
Manganese	CLAA	6010A	5	1	9/12/97	9/15/97	214	
Mercury	7470A	7470A	0.5	1	9/10/97	9/11/97	ND	
Selenium	CLFAA	7740	5	1	9/12/97	9/13/97	ND	
Silver	CLAA	6010A	10	1	9/12/97	9/15/97	ND	
Zinc	CLAA	6010A	10	1	9/12/97	9/15/97	ND	

Approved By: EMA Date: 9/17/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Maul Foster & Alongi, Inc.	**Service Request:**	K9706290
Project:	Cliff Koppe/9005-001.001	**Date Collected:**	8/29/97
Sample Matrix:	Water	**Date Received:**	8/29/97

Dissolved Metals

Sample Name:	CKM-082997-002W	Units:	ug/L (ppb)
Lab Code:	K9706290-005	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Cadmium	CLAA	6010A	4	1	9/12/97	9/15/97	ND	
Chromium	CLAA	6010A	5	1	9/12/97	9/15/97	ND	
Copper	CLAA	6010A	10	1	9/12/97	9/15/97	ND	
Iron	CLAA	6010A	20	1	9/12/97	9/15/97	228	
Lead	CLFAA	7421	2	1	9/12/97	9/12/97	ND	
Manganese	CLAA	6010A	5	1	9/12/97	9/15/97	292	
Mercury	7470A	7470A	0.5	1	9/10/97	9/11/97	ND	
Selenium	CLFAA	7740	5	1	9/12/97	9/13/97	ND	
Silver	CLAA	6010A	10	1	9/12/97	9/15/97	ND	
Zinc	CLAA	6010A	10	1	9/12/97	9/15/97	ND	

Approved By: PMA Date: 9/17/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Maul Foster & Alongi, Inc.	**Service Request:**	K9706290
Project:	Cliff Koppe/9005-001.001	**Date Collected:**	8/29/97
Sample Matrix:	Water	**Date Received:**	8/29/97

Dissolved Metals

Sample Name:	CKM-082997-003W	Units:	ug/L (ppb)
Lab Code:	K9706290-006	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Cadmium	CLAA	6010A	4	1	9/12/97	9/15/97	ND	
Chromium	CLAA	6010A	5	1	9/12/97	9/15/97	ND	
Copper	CLAA	6010A	10	1	9/12/97	9/15/97	ND	
Iron	CLAA	6010A	20	1	9/12/97	9/15/97	315	
Lead	CLFAA	7421	2	1	9/12/97	9/12/97	ND	
Manganese	CLAA	6010A	5	1	9/12/97	9/15/97	696	
Mercury	7470A	7470A	0.5	1	9/10/97	9/11/97	ND	
Selenium	CLFAA	7740	5	1	9/12/97	9/13/97	ND	
Silver	CLAA	6010A	10	1	9/12/97	9/15/97	ND	
Zinc	CLAA	6010A	10	1	9/12/97	9/15/97	ND	

Approved By: EMA Date: 9/17/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Maul Foster & Alongi, Inc.	**Service Request:**	K9706290
Project:	Cliff Koppe/9005-001.001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Dissolved Metals

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	K9706290-MB	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Cadmium	CLAA	6010A	4	1	9/12/97	9/15/97	ND	
Chromium	CLAA	6010A	5	1	9/12/97	9/15/97	ND	
Copper	CLAA	6010A	10	1	9/12/97	9/15/97	ND	
Iron	CLAA	6010A	20	1	9/12/97	9/15/97	ND	
Lead	CLFAA	7421	2	1	9/12/97	9/12/97	ND	
Manganese	CLAA	6010A	5	1	9/12/97	9/15/97	ND	
Mercury	7470A	7470A	0.5	1	9/10/97	9/11/97	ND	
Selenium	CLFAA	7740	5	1	9/12/97	9/13/97	ND	
Silver	CLAA	6010A	10	1	9/12/97	9/15/97	ND	
Zinc	CLAA	6010A	10	1	9/12/97	9/15/97	ND	

Approved By: EMA Date: 9/17/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Maul Foster & Alongi, Inc.	**Service Request:**	K9706290
Project:	Cliff Koppe/9005-001.001	**Date Collected:**	8/29/97
Sample Matrix:	Water	**Date Received:**	8/29/97

Hydrocarbon Scan

Sample Name:	CKM-082997-001W	Units:	ug/L (ppb)
Lab Code:	K9706290-004	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Gasoline	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Mineral Spirits	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Jet Fuel	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Kerosene	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Diesel	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Other	EPA 3510B	8015M	200	1	9/5/97	9/6/97	ND	

Approved By: _____ Date: 9/22/97

1822/052595

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Maul Foster & Alongi, Inc.	**Service Request:**	K9706290
Project:	Cliff Koppe/9005-001.001	**Date Collected:**	8/29/97
Sample Matrix:	Water	**Date Received:**	8/29/97

Hydrocarbon Scan

Sample Name:	CKM-082997-002W	Units:	ug/L (ppb)
Lab Code:	K9706290-005	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Gasoline	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Mineral Spirits	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Jet Fuel	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Kerosene	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Diesel	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Other	EPA 3510B	8015M	200	1	9/5/97	9/6/97	ND	

Approved By: _____ Date: 9/23/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Maul Foster & Alongi, Inc.	**Service Request:**	K9706290
Project:	Cliff Koppe/9005-001.001	**Date Collected:**	8/29/97
Sample Matrix:	Water	**Date Received:**	8/29/97

Hydrocarbon Scan

Sample Name:	CKM-082997-003W	Units:	ug/L (ppb)
Lab Code:	K9706290-006	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Gasoline	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Mineral Spirits	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Jet Fuel	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Kerosene	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Diesel	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Other	EPA 3510B	8015M	200	1	9/5/97	9/6/97	ND	

Approved By: _____ Date: 9/23/97

1S22/052595

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Maul Foster & Alongi, Inc.	**Service Request:**	K9706290
Project:	Cliff Koppe/9005-001.001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Hydrocarbon Scan

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	K970905-MB	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Gasoline	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Mineral Spirits	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Jet Fuel	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Kerosene	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Diesel	EPA 3510B	8015M	50	1	9/5/97	9/6/97	ND	
Other	EPA 3510B	8015M	200	1	9/5/97	9/6/97	ND	

Approved By: JW Date: 9/23/97

1S22/052595

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Maul Foster & Alongi, Inc.
Project: Cliff Koppe/9005-001.001
Sample Matrix: Water

Service Request: K9706290
Date Collected: 8/29/97
Date Received: 8/29/97
Date Extracted: 9/12/97
Date Analyzed: 9/15/97

Duplicate Summary
Dissolved Metals

Sample Name: CKM-082997-001W
Lab Code: K9706290-004
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Cadmium	CLAA	6010A	4	ND	ND	ND	-	
Chromium	CLAA	6010A	5	ND	ND	ND	-	
Copper	CLAA	6010A	10	ND	ND	ND	-	
Iron	CLAA	6010A	20	74	76	75	3	
Lead	CLFAA	7421	2	ND	ND	ND	-	
Manganese	CLAA	6010A	5	214	215	214	<1	
Mercury	7470A	7470A	0.5	ND	ND	ND	-	
Selenium	CLFAA	7740	5	ND	ND	ND	-	
Silver	CLAA	6010A	10	ND	ND	ND	-	
Zinc	CLAA	6010A	10	ND	ND	ND	-	

Approved By: _____ Date: 9/17/97

DUP/031695

06290ICP.EA1 - DUP 9/17/97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Maul Foster & Alongi, Inc.
Project: Cliff Koppe/9005-001.001
Sample Matrix: Water

Service Request: K9706290
Date Collected: 8/29/97
Date Received: 8/29/97
Date Extracted: 9/12/97
Date Analyzed: 9/15/97

Matrix Spike Summary
Dissolved Metals

Sample Name: CKM-082997-001W
Lab Code: K9706290-004
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Cadmium	CLAA	6010A	4	50	ND	49	98	75-125	
Chromium	CLAA	6010A	5	200	ND	195	98	75-125	
Copper	CLAA	6010A	10	250	ND	248	99	75-125	
Iron	CLAA	6010A	20	1000	74	1080	101	75-125	
Lead	CLFAA	7421	2	20	ND	18	90	75-125	
Manganese	CLAA	6010A	5	500	214	714	100	75-125	
Mercury	7470A	7470A	0.5	1	ND	1.1	110	60-140	
Selenium	CLFAA	7740	5	10	ND	10	100	60-125	
Silver	CLAA	6010A	10	50	ND	52	104	75-125	
Zinc	CLAA	6010A	10	500	ND	507	101	75-125	

Approved By: Emm Date: 9/17/97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Maul Foster & Alongi, Inc.	**Service Request:**	K9706290
Project:	Cliff Koppe/9005-001.001	**Date Collected:**	8/29/97
Sample Matrix:	Water	**Date Received:**	8/29/97
		Date Extracted:	9/5/97
		Date Analyzed:	9/6/97

Surrogate Recovery Summary
Hydrocarbon Scan

Prep Method:	EPA 3510B	Units:	PERCENT
AnalysisMethod:	8015M	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery o-Terphenyl
CKM-082997-001W	K9706290-004		110
CKM-082997-002W	K9706290-005		108
CKM-082997-003W	K9706290-006		101
Batch QC	K9706380-002		101
Batch QC	K9706380-002MS		105
Batch QC	K9706380-002DMS		100
Method Blank	K970905-MB		106

CAS Acceptance Limits: 59-110

Approved By: _____ Date: 9/23/97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Maul Foster & Alongi, Inc.	**Service Request:**	K9706290
Project:	Cliff Koppe/9005-001.001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	9/5/97
		Date Analyzed:	9/6/97

Matrix Spike/Duplicate Matrix Spike Summary
Hydrocarbon Scan

Sample Name:	Batch QC	Units:	ug/L (ppb)
Lab Code:	K9706380-002MS, K9706380-002DMS	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Diesel	EPA 3510B	8015M	50	2000	2000	6120	8130	8350	100	112	39-117	3	

Approved By: _____ Date: 9/23/97

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

Columbia Analytical Services inc.

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

DATE 8/28 PAGE 1 OF 1

PROJECT NAME CLIFF Koppe # 9005.001.001

PROJECT MANAGER Eric R.

COMPANY/ADDRESS MFA 7223 NE Hazel Dell Rd, Vancouver WA 98665

FAX 360-906-1952 PHONE 360-694-2691

SAMPLERS SIGNATURE [signature]

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA418.1 ☐ OR/418.1 ☐ WA/418.1 ☐	TPH/Gas/BTEX 5030/8015/8020 Gas ☐ BTEX ☐	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☐	TPH/HCID ☐ OR/HCID ☐ WA/HCID ☐	TCLP Metals ☐ VOA ☐ Semi Pest/ Metals (total or dissolved) List Below	VOA ☐ Herb ☐	Cyanide	pH, Cond, Cl, SO_4, PO_4, F, Br NO_2, NO_3 (circle)	NH_3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020 ☐ (AOX) 1650A ☐		REMARKS
MW1-082097-SS	8/20/97	12:30	62901	Soil	2																Have
MW2-082097-SS		13:15	2	Soil	2																Have
MW3-082097-SS		14:55	3	Soil	2																Have
CRM 082997001W	08-29-97	1108	4	WATER	2									✓	✓						
CRM 082997002W	1	1153	5	1	2									✓	✓						
CRM 082997003W	1	1239	6	1	2									✓	✓						

RELINQUISHED BY:

Signature [signature]

Printed Name DAVID C. HAWTHORNE

Firm MFA

Date/Time 8/29

RECEIVED BY:

Signature [signature]

Printed Name CAS

Firm 082997 1355

Date/Time

RELINQUISHED BY:

Signature

Printed Name

Firm

Date/Time

RECEIVED BY:

Signature

Printed Name

Firm

Date/Time

TURNAROUND REQUIREMENTS

___ 24 hr ___ 48 hr. ___ 5 day

X Standard (10-15 working days)

___ Provide Verbal Preliminary Results

___ Provide FAX preliminary Results

Requested Report Date ___

REPORT REQUIREMENTS

___ I. Routine Report

X II. Report (includes DUP.MS. MSD, as required, may be charged as samples)

___ III. Data Validation Report (includes All Raw Data)

___ IV. CLP Deliverable Report

INVOICE INFORMATION:

P.O.# ___

Bill To ___

SAMPLE RECEIPT:

Shipping VIA: ___

Shipping #: ___

Condition: ___

Lab No: 970290

SPECIAL INSTRUCTIONS/COMMENTS: Groundwater samples analyzed for WTPH-HCID

Dissolved metals: Cadmium, chromium, copper, iron, manganese, silver, zinc, mercury, lead, selenium

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator