

TCP/VEP

Report

**Focused Phase II
Environmental Site Assessment
Hydraulic Repair & Design Site
Kent, Washington**

May 1, 1998

Prepared for

**Heritage Bank
1201 Pacific Avenue, Suite C-5
Tacoma, WA 98402**

Prepared by



LANDAU ASSOCIATES, INC.

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TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 BACKGROUND INFORMATION	1
2.1 EPA GROUNDWATER INVESTIGATION	1
2.2 PHASE I AND PHASE II ESAs, 1988 AND 1989	2
2.3 INVESTIGATION/REMEDATION BY HYDRAULIC REPAIR & DESIGN	3
2.4 FOCUSED PHASE II ESA FOR PARCEL C, 1998	3
2.5 PARCEL A PHASE I ESA	4
3.0 SCOPE OF SERVICES	4
4.0 ANALYSIS RESULTS	5
5.0 EVALUATION OF RESULTS	5
5.1 GROUNDWATER ANALYSES	5
5.2 SOIL ANALYSES	5
6.0 CONCLUSIONS AND RECOMMENDATIONS	6
7.0 REFERENCES	7
APPENDIX A - Laboratory Data	

LIST OF FIGURES

<u>Figure</u>	<u>Title</u>
1	Site Plan

LIST OF TABLES

<u>Table</u>	<u>Title</u>
1	Groundwater and Soil Analyses

1.0 INTRODUCTION

This report presents the results of a focused Phase II environmental site assessment (ESA) conducted by Landau Associates, Inc. for Parcels A and B (Figure 1) of the Hydraulic Repair & Design, Inc. (HR&D) site. This ESA included the investigative tasks identified in a proposal to Mr. Mike Hamburg of Heritage Bank dated March 10, 1998.

The subject site is located at 6942 S. 196th Street in Kent, Washington, and has historically been used for repair of hydraulic equipment, which involves metal machining, sand blasting, and chrome plating. The scope of this ESA includes two of three parcels (Parcels A and B) within a property currently owned by HR&D. Parcel A is fully occupied by the HR&D operations. Parcel B is vacant and has not been used for manufacturing. Parcel C is currently leased to and occupied by American Pile Driving Company and Fairway Ornamental Iron.

It is Landau Associates' understanding that HR&D currently owns all three parcels and is in the process of refinancing Parcels A and B (through Heritage Bank) and selling Parcel C to support expansion of its operations onto Parcel B. American Pile Driving Company, one of the current tenants of Parcel C, is contemplating purchase of Parcel C.

2.0 BACKGROUND INFORMATION

Background information exists on each of the three parcels as a result of a Phase I ESA conducted on Parcel A by Landau Associates (1994) and a Phase I ESA conducted on Parcels B and C by Dames & Moore (1988). Site-specific information also exists regarding soil and groundwater conditions as a result of a limited investigation of groundwater conditions at Parcels B and C by the EPA in 1983, the implementation of a groundwater remediation system in Parcel A by HR&D in 1991, a Phase II ESA of Parcels B and C by Dames & Moore (1989), and a focused Phase II ESA of Parcel C by Landau Associates in 1998. Information obtained from these sources is summarized below.

2.1 EPA GROUNDWATER INVESTIGATION, 1983

In late 1983, EPA installed two groundwater monitoring wells: MW-36 on Parcel B and MW-40 on Parcel C (Figure 1), as part of an investigation of groundwater conditions in the vicinity of the Western Processing Superfund site, which lies to the east of Parcels A and B. MW-36 is screened from 74 to 94 ft

below ground surface and MW-40 is screened from about 30 to 40 ft below ground surface (Dames & Moore 1989). Groundwater from these wells in 1984 was reported to contain no significant concentration of metal or organic constituents (Dames & Moore 1988). Both wells still exist at the site.

2.2 PHASE I AND PHASE II ESAs, 1988 AND 1989

Dames & Moore conducted a Phase I ESA on Parcels B and C in 1988 to assess potential environmental risks due to hazardous chemicals and other hazardous materials at the property. The Phase I ESA recommended that the following investigations be conducted as part of a Phase II ESA:

- Sampling and analysis of stained soil in an area of Parcel C where spray painting was conducted
- Sampling and analysis of surface soil samples in areas potentially impacted by wind dispersion of materials from Western Processing and/or the Standard Equipment (now LIDCO) site
- Sampling and analysis of groundwater from MW-36 and MW-40.

In addition, the Phase I ESA recommended that an environmental professional observe the planned removal of two abandoned underground petroleum storage tanks (UST) located at Parcel C to identify potential petroleum contamination and to collect soil samples.

Dames & Moore implemented these recommendations as part of a Phase II ESA conducted in late 1989. The results of the Phase II ESA are summarized below:

- One surface soil sample from the spray painting area was analyzed for total metals and EP toxicity. Based on the results of the EP toxicity tests, the soil was classified by Dames & Moore as nonhazardous under Resource Conservation and Recovery Act (RCRA) regulations. However, total metals concentrations were significantly higher than in other soil samples collected at the site. (It is Landau Associates' understanding that the paint-stained soil in Parcel C was removed prior to the purchase of Parcel C by HR&D in 1989.)
- Two surface soil samples collected near S. 196th Street yielded concentrations of total metals and organics below levels of concern.
- Observations made by Dames & Moore during removal of the two USTs and associated piping, and laboratory results of soil samples from the tank excavation, indicate that the fuel system probably did not release petroleum products to the environment.
- The groundwater sample from MW-40 yielded an elevated concentration of total chromium (190 ppm) and zinc (1.4 ppm). (Note: This contrasted to the "no contamination" finding reported in 1984 by EPA for MW-40.)

At the time of Dames & Moore's Phase II ESA, investigators were unaware of the chromium dip tank located approximately 50 ft northwest of MW-40 (Figure 1) and operated by HR&D.

2.3 INVESTIGATION/REMEDATION BY HYDRAULIC REPAIR & DESIGN

Landau Associates was contracted by HR&D to evaluate the chromium levels identified in MW-40 by Dames & Moore during their 1989 Phase II ESA. A 25-ft deep monitoring well, LMW-1 (Figure 1), was installed in July 1989. Subsequent analysis of soil and groundwater concluded that chromium was present and that pH and conductivity of groundwater were also indicative of contamination. It was later concluded that the HR&D dip tank was the likely source of chromium to the groundwater and that chromic acid was probably released through cracks near the base of the concrete outer walls of the tank following a puncture of the tank liner.

In 1991, in response to the confirmation of elevated chromium levels in groundwater at MW-40, HR&D implemented a groundwater extraction and treatment remedy. That system, which operates currently, extracts groundwater at a rate of 1 to 2 gallons per minute from a recovery well located adjacent to the dip tank inside Building 1 using a pneumatic vacuum pump. Initially, groundwater was pumped from well LMW-1, located approximately 20 ft east of the dip tank (Figure 1). LMW-1 was replaced with the current recovery well in early 1995 after concentrations of chromium in the extracted groundwater from LMW-1 had declined substantially. Groundwater is pretreated onsite using an ion exchange process and then discharged to the sanitary sewer in accordance with a permit from King County.

2.4 FOCUSED PHASE II ESA FOR PARCEL C, 1998

Landau Associates has, concurrent with this ESA, performed a focused ESA for American Pile Driving Company (Landau Associates 1998) for Parcel C. Conclusions from that ESA indicate that chromium levels have not reached the location of Boring B-7 (Figure 1), the likely general direction of groundwater flow.

Determination of groundwater flow direction on the property was beyond the scope of the Phase II ESA, and the extent of chromium contamination of Parcel C cannot be determined precisely based on the data developed. The report suggests that the dip tank chromic acid release may not have spread widely considering.

- The lack of significant chromium concentrations in most other borings on Parcels A, B, and C
- The relatively low permeability of the upper soil unit that occurs beneath the site
- The remedial pumping that has been conducted for several years by HR&D
- The relatively limited mobility of chromium in a reducing environment, known to occur in the upper soil near this local area (Western Processing site).

2.5 PARCEL A PHASE I ESA

Landau Associates conducted a Phase I ESA of the HR&D site of operations (i.e., Parcel A) in 1994.

The Phase I ESA yielded the following major conclusions:

- Operations were well managed, with appropriate onsite construction and standard operating procedures that would minimize risk of a release to or adverse impact on the environment.
- Then existing environmental impacts of site operations appeared to be limited to those associated with a 1989 release to soil and groundwater of chromic acid from the chrome plating operation. Impacted soil is located below Building 1 and the degree and extent of that contamination had not been characterized. However, the release impacts appeared to be localized beneath the building and, therefore, represented a very limited risk. Groundwater impacts had been documented, but the lateral extent of chromium contamination was not fully identified. Groundwater remediation activities were in place and had successfully reduced groundwater chromium concentrations. Ecology had reviewed site conditions and had given the site the lowest risk rating possible for a ranked site. Barring changed conditions, there was no reason to expect additional Ecology requirements, provided groundwater extraction and treatment were continued until such time as appropriate cleanup levels were achieved. Based on previous reporting and site observations, potential soil contamination from onsite or offsite sources was not considered a concern by Ecology.
- Although the HR&D property is located in close proximity to several contaminated sites, most notably the Western Processing site, existing investigation and remediation information indicated that contamination from these sites had a low probability of impacting the HR&D property.

Based on discussions with Mr. Nick Nesland on November 7, 1997, and Landau Associates' continued involvement in the Western Processing remediation project, it appears that these conclusions remain valid regarding current conditions at the property.

3.0 SCOPE OF SERVICES

This Phase II ESA for Parcels A and B is focused on estimating the extent of chromium-contaminated groundwater and soil emanating from the area of the documented past spill. On March 25, 1998, Landau Associates installed, using a direct-push drilling rig, six borings (B-1 through B-6). This method of evaluating groundwater quality, while low-cost and efficient, does not provide information on groundwater flow direction. This was an acceptable limitation, considering the purposes of this investigation and the degree of existing characterization of the site. Due to access restrictions and soft ground conditions, Boring B-1 was placed a few feet onto the western edge of Parcel C, very near the original spill area (Figure 1).

Groundwater was sampled at 15-ft depth in each of the 6 borings. Samples were retained for analysis of dissolved chromium (field filtered) and total chromium (unfiltered). Soil was sampled at Boring B-1 at

three depth intervals; 5 to 7 ft, 10 to 12 ft, and 15 to 17 ft. The soil samples were submitted to the laboratory for chromium analysis.

4.0 ANALYSIS RESULTS

The results of analyses were reported by Analytical Resources, Inc. (ARI). The ARI reports are provided in Appendix A and summarized in Table 1.

5.0 EVALUATION OF RESULTS

5.1 GROUNDWATER ANALYSES

Table 1 presents the groundwater data from the six borings. Data from Borings B-2 through B-6 indicate total chromium below the maximum contaminant level (MCL) of 100 $\mu\text{g/L}$ and the Model Toxics Control Act (MTCA) method A value of 50 $\mu\text{g/L}$. As expected, only Boring B-1, shows a significant impact of the past chromic acid leak. The level of total chromium in the groundwater sample from Boring B-1 was 4,200 $\mu\text{g/L}$, compared to a MTCA method A groundwater level of 50 $\mu\text{g/L}$. This level at Boring B-1 continues to reveal the fairly significant local contamination remaining in the vicinity of the original chromic acid leak.

The groundwater sample from Boring B-1 also had the maximum dissolved chromium level at 27 $\mu\text{g/L}$. This level, however, is below the MTCA method A groundwater cleanup level of 50 $\mu\text{g/L}$ and the MCL of 100 $\mu\text{g/L}$ and may actually be more indicative of the concentration of chromium that is likely to move in the groundwater. A groundwater sample was also obtained from well LMW-1 and analyzed for both total and dissolved chromium. Again, the total chromium concentration was higher than the MTCA method A groundwater cleanup level; 540 $\mu\text{g/L}$ vs the 50 $\mu\text{g/L}$ cleanup level. The conductivity of the samples from this well (140 $\mu\text{mhos/cm}$) is appreciably different from the shallow data from the 'B' borings. This may indicate leakage into the well from the surface or be characteristic water from a deeper zone.

5.2 SOIL ANALYSES

Soil samples were obtained from Boring B-1 at the planned depth intervals and analyzed for chromium. The results are summarized in Table 1. Each of the samples exceed the MTCA method A

residential soil cleanup criterion of 100 mg/kg. Only the 5 to 7 ft depth interval sample exceeds the MTCA method A industrial site soil cleanup level of 500 mg/kg.

6.0 CONCLUSIONS AND RECOMMENDATIONS

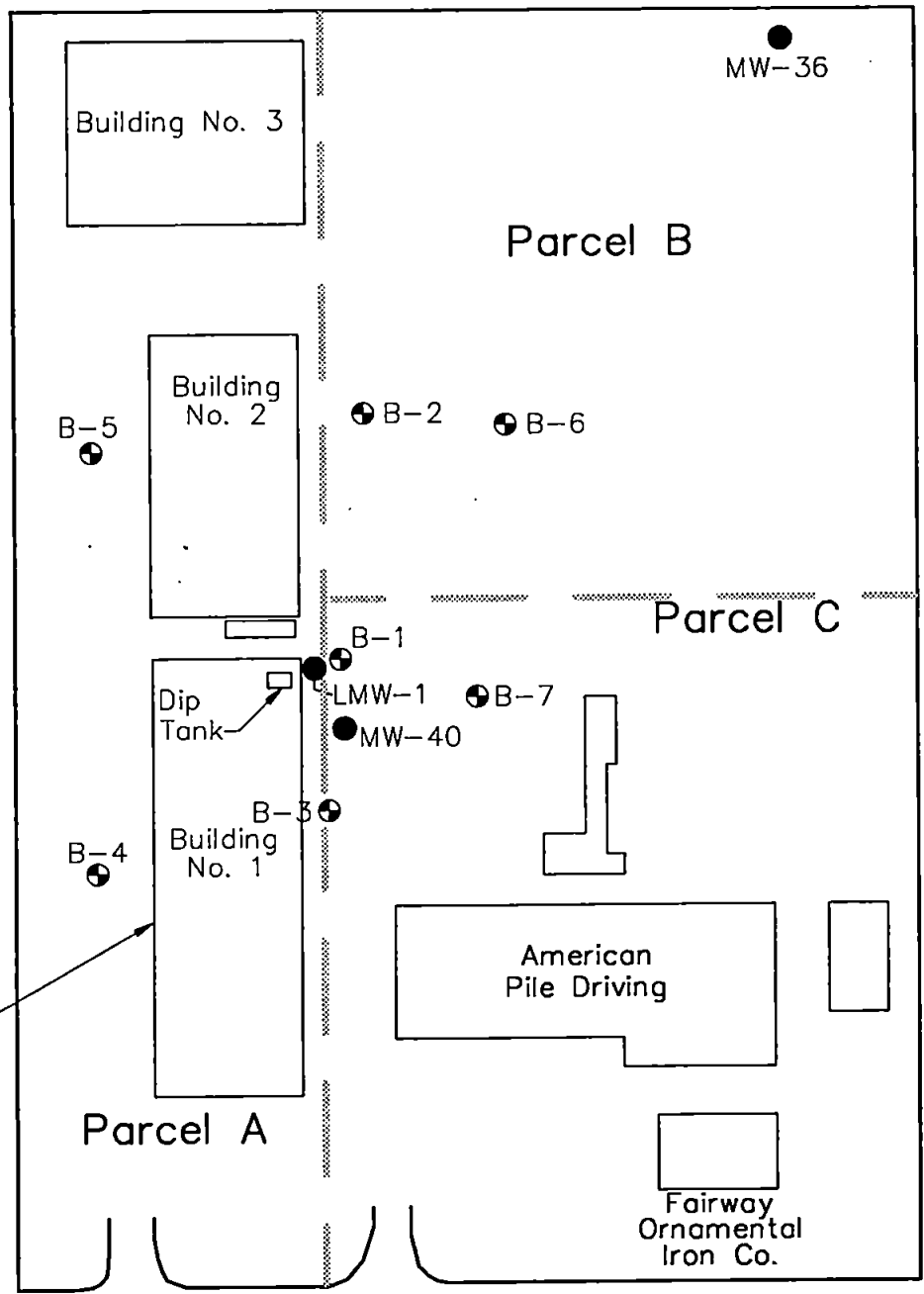
- As expected, the chromium groundwater plume seems to be fairly localized to the site of the original spill; however, it has encroached onto Parcel C at least at Boring B-1, but has not advanced as far as Boring B-7. Groundwater from all of the other borings showed no indication of impact from the chromium spill. Additional investigation would be necessary to more precisely define the extent of groundwater contamination. Given the current site uses, further definition of the limits of contamination are not suggested at this time. Other factors that lead to a conclusion of a limited area of impact are:
 - the relatively low permeability of the upper soil zone
 - the remedial pumping at 1 to 2 gpm over the past several years
 - the lower mobility of chromium in a reducing environment known to occur in the upper soil near this local area (Western Processing site).
- Groundwater impacts near the Parcel A/Parcel C boundary are, however, above MTCA regulatory levels for chromium. Therefore, continued remedial pumping and site monitoring will probably be necessary by the HR&D facility.
- Based on analysis of soil samples from various depths in Boring B-1, impacts of the leak extend to the base of the upper soil zone, the organic silt and sand layer identified on the Western Processing site.
- Well LMW-1 is currently unsealed and not protected from surface water intrusion. It should either be modified and maintained or abandoned according to WAC 173-160 (the Washington State well regulations).
- Well MW-36 may also be appropriate to consider for abandonment according to WAC 173-360 if it is no longer needed as part of an environmental response action.
- Potential offsite sources of contamination include the Standard Equipment or LIDCO site and the Western Processing site. LIDCO is located southeast of Parcels A and B and has significant site contamination, including volatile organics in the upper soil zones. Groundwater flow directions are not well documented for the LIDCO site. While shallow groundwater would be expected to flow towards Mill Creek, some of the shallow LIDCO contamination could have migrated on to Parcels A and B. No evidence for this was found, however, during the 1998 groundwater evaluation on the American Pile Driving Company site (Landau Associates 1998), which lies between LIDCO and Parcels A and B. Contamination from Western Processing probably has not impacted groundwater or soil beneath Parcels A and B. The Zone B plume from Western Processing appears to be confined to the area south of S. 196th Street. The Western Processing monitoring wells located directly east of the site do not indicated significant levels of contaminants of concern.

7.0 REFERENCES

Dames & Moore. 1988. *Phase I Property Transfer Assessment "Great West Steel" Property, Kent, Washington*. Prepared for GWIL Industries. November.

Dames & Moore. 1989. *Phase II Property Transfer Assessment Great West Steel Property, Kent, Washington*. Prepared for GWIL Industries. January.

Landau Associates. 1994. *Report, Phase I Environmental Site Assessment, Hydraulic Repair & Design, Kent, Washington*. April.



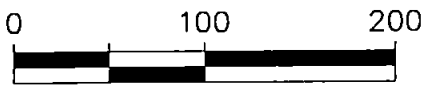
Hydraulic Repair and Design (Main Office)

466001.10 Heritage Bank/Phase II ESA N:\466001\10\Fig1 (A) 4/98

S. 196th Street

Key

- MW-40 Estimated location of Existing Monitoring or Recovery Well
- ⊕ B-7 Boring Location



Scale in Feet



Site Plan

Figure 1

TABLE 1
GROUNDWATER AND SOIL ANALYSES

Analyte (mg/L)	Groundwater Sampling Locations						
	B-1	B-2	B-3	B-4	B-5	B-6	LMW-1
Dissolved Chromium	0.027	ND	ND	ND	ND	ND	0.022
Total Chromium	4.16	0.009	0.014	0.030	ND	0.005	0.541
pH	6.4	6.4	6.6	6.5	6.6	6.3	6.7
Conductivity (µmhos)	390	360	300	450	320	320	140

	Soil (Boring B-1)		
	5 to 7 ft Depth	10 to 12 ft Depth	15 to 17 ft Depth
Chromium (mg/kg-dry)	530	164	298

APPENDIX A

Laboratory Data



Analytical Resources, Incorporated
Analytical Chemists and Consultants

RECEIVED

APR 20 1998

LANDAU ASSOCIATES, INC.

20 April 1998

PROJECT
FILE

Mr. John Baker
Landau Associates, Inc.
P.O. Box 1029
Edmonds, WA 98020 - 9129

RE: Project: 466001.10 – Hydraulic Repair
ARI Job No: V922

Dear John:

Please find the enclosed original Chain of Custody documentation (COC) and analytical results for the project referenced above. Analytical Resources, Inc. (ARI), accepted one water on April 2, 1998. The laboratory received the sample intact with no discrepancies between the COC and the sample labels.

The sample was analyzed for total and dissolved chromium referencing US EPA SW-846 method 6010. Quality control analysis results are included for your review.

No analytical complications were noted for this sample. A copy of these reports and all associated raw data will remain on file with ARI. If you have any questions or require additional information, please contact me at your convenience.

Respectfully,

ANALYTICAL RESOURCES, INC.

Mary Lou Fox

Mary Lou Fox
Project Manager
(206)-389-6155
marylou@arilabs.com

MLF/mlf
Enclosures



ANALYTICAL
RESOURCES
INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: LMW-1

Lab Sample ID: V922A
LIMS ID: 98-6565
Matrix: Water

QC Report No: V922-Landau Associates, Inc.
Project: Hydraulic Repair
466001.10
Date Sampled: 04/02/98
Date Received: 04/02/98

Data Release Authorized: *[Signature]*
Reported: 04/17/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
3010	04/08/98	6010	04/16/98	7440-47-3	Chromium	0.005	0.541

U Analyte undetected at given RL
RL Reporting Limit

FORM-I




ANALYTICAL
RESOURCES
INCORPORATED

INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: LMW-1

Lab Sample ID: V922B
LIMS ID: 98-6566
Matrix: Water

QC Report No: V922-Landau Associates, Inc.
Project: Hydraulic Repair
466001.10
Date Sampled: 04/02/98
Date Received: 04/02/98

Data Release Authorized: 
Reported: 04/17/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
6010	04/10/98	6010	04/16/98	7440-47-3	Chromium	0.005	0.022

U Analyte undetected at given RL
RL Reporting Limit

FORM-I



ANALYTICAL
RESOURCES
INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: Method Blank

Lab Sample ID: V922MB
LIMS ID: 98-6565
Matrix: Water

QC Report No: V922-Landau Associates, Inc.
Project: Hydraulic Repair
466001.10

Date Sampled: NA
Date Received: NA

Data Release Authorized: *[Signature]*

Reported: 04/17/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
3010	04/08/98	6010	04/16/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL

RL Reporting Limit

FORM-I




ANALYTICAL
RESOURCES
INCORPORATED

INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: Method Blank

Lab Sample ID: V922MB
LIMS ID: 98-6566
Matrix: Water

QC Report No: V922-Landau Associates, Inc.
Project: Hydraulic Repair
466001.10
Date Sampled: NA
Date Received: NA

Data Release Authorized: 
Reported: 04/17/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
6010	04/10/98	6010	04/16/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL
RL Reporting Limit

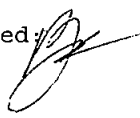
FORM-I



INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Lab Sample ID: V922LCS
LIMS ID: 98-6565
Matrix: Water

QC Report No: V922-Landau Associates, Inc.
Project: Hydraulic Repair
466001.10

Data Release Authorized: 
Reported: 04/17/98

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Spike mg/L	Spike Added	% Recovery	Q
Chromium	0.266	0.250	106%	

'Q' codes: N = control limit not met

Control Limits: 80-120%



Analytical Resources, Incorporated
Analytical Chemists and Consultants

**PROJECT
FILE**

RECEIVED

APR 09 1998

LANDAU ASSOCIATES, INC.

7 April 1998

Mr. John Baker
Landau Associates, Inc.
P.O. Box 1029
Edmonds, WA 98020 - 9129

RE: Project: 466001.10 – Hydraulic Repair and Design
ARI Job No: V822

Dear John:

Please find the enclosed original Chain of Custody documentation (COC) and analytical results for the project referenced above. Analytical Resources, Inc. (ARI), accepted seven water and three soil samples on March 25, 1998. The laboratory received the samples intact with no discrepancies between the COC and the sample labels.

The samples were analyzed for total and dissolved chromium referencing US EPA SW-846 method 6010. Quality control analysis results are included for your review.

No analytical complications were noted for these samples. A copy of these reports and all associated raw data will remain on file with ARI. If you have any questions or require additional information, please contact me at your convenience.

Respectfully,

ANALYTICAL RESOURCES, INC.

Mary Lou Fox
Project Manager
(206)-389-6155
marylou@arilabs.com

MLF/ljr
Enclosures

Chain-of-Custody Record

No 4161

Date 3/25/98
Page 1 of 1

Project HYDRAULIC REPAIR & DESIGN Job No. 466001.10 Testing Parameters 98-5781 to 98-5790

Client HERITAGE BANK Turnaround Time 1822

Project Location KENT, WA Standard Accelerated

Sampler's Name CHRISTY L. BELL TEMP 6.0"

Sample Number	Date	Time	Matrix	No. of Containers	TOTAL C- (ICP)	DISS C- (ICP)	Observations/Comments
B-0	3/25/98	0935	WATER	2	1	1	Dissolved Cr was field filtered. Report to: John Baker per telecom w/Christy Bell m/f 3/26/98
B-3		1055	WATER	2	1	1	
B-1 (5-7')		1130	SOIL	1	1		
B-1 (10-12')		1140	SOIL	1	1		
B-1 (15-17')		1150	SOIL	1	1		
B-1		1220	WATER	2	1	1	
B-2		1300	WATER	2	1	1	
B-4		1400	WATER	2	1	1	
B-5		1450	WATER	2	1	1	
B-7		1425	WATER	1	1		

Special Shipment/Handling or Storage Requirements STORED ON ICE Method of Shipment HAND DELIVER

Relinquished by
Christy Bell
Signature
CHRISTY L. BELL
Printed Name
LANDAU ASSOC
Company
Date 3/25/98 Time 1555

Received by
Carrie McDougall
Signature
carrie mcdougall
Printed Name
ARI
Company
Date 3/25/98 Time 1555

Relinquished by
Signature
Printed Name
Company
Date _____ Time _____

Received by
Signature
Printed Name
Company
Date _____ Time _____



**ANALYTICAL
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INCORPORATED**

**INORGANICS ANALYSIS DATA SHEET
TOTAL METALS**

Sample No: B-6

Lab Sample ID: V822A
LIMS ID: 98-5681
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Date Sampled: 03/25/98
Date Received: 03/25/98


Data Release Authorized
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
3010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.005

U Analyte undetected at given RL
RL Reporting Limit



INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: B-6
Lab Sample ID: V822A QC Report No: V822-Landau Associates, Inc.
LIMS ID: 98-5681 Project: Hydraulic Repair & Design
Matrix: Water 466001.10
Date Received: 03/25/98
Data Release Authorized:  Reported: 04/03/98

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Sample mg/L	Spike mg/L	Spike Added	% Recovery	Q
Chromium	0.005	0.251	0.250	98.4%	

'Q' codes: N = control limit not met
 H = %R not applicable, sample concentration too high
 * = RPD control limit not met
 NA = Not applicable - analyte not spiked

Control Limits: Percent Recovery: 75-125%
 RPD: +/-20%



INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: B-6

Lab Sample ID: V822B
LIMS ID: 98-5682
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
6010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL

RL Reporting Limit



ANALYTICAL
RESOURCES
INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: B-3

Lab Sample ID: V822C
LIMS ID: 98-5683
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
3010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.014

U Analyte undetected at given RL

RL Reporting Limit

FORM-I



INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: B-3

Lab Sample ID: V822D
LIMS ID: 98-5684
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
6010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL

RL Reporting Limit



ANALYTICAL
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INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: B-1(5-7')

Lab Sample ID: V822E

QC Report No: V822-Landau Associates, Inc.

LIMS ID: 98-5685

Project: Hydraulic Repair & Design

Matrix: Soil

466001.10

Date Sampled: 03/25/98

Date Received: 03/25/98

Data Release Authorized:

Reported: 04/03/98

Percent Total Solids: 66.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.7	530

U Analyte undetected at given RL

RL Reporting Limit

FORM-I



INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: B-1(10-12')

Lab Sample ID: V822F
LIMS ID: 98-5686
Matrix: Soil

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10
Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized
Reported: 04/03/98

Percent Total Solids: 71.9%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.6	164

U Analyte undetected at given RL

RL Reporting Limit

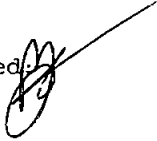


INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: B-1(15-17')

Lab Sample ID: V822G
LIMS ID: 98-5687
Matrix: Soil

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10
Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized: 
Reported: 04/03/98

Percent Total Solids: 73.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.6	298

U Analyte undetected at given RL
RL Reporting Limit




INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: B-1

Lab Sample ID: V822H
LIMS ID: 98-5688
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized: 
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
3010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	4.16

U Analyte undetected at given RL

RL Reporting Limit




INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: B-1

Lab Sample ID: V822I
LIMS ID: 98-5689
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10
Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized 
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
6010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.027

U Analyte undetected at given RL

RL Reporting Limit



ANALYTICAL
RESOURCES
INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: B-2

Lab Sample ID: V822J
LIMS ID: 98-5690
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10
Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized:
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
3010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.009

U Analyte undetected at given RL

RL Reporting Limit

FORM-I




INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: B-2

Lab Sample ID: V822K
LIMS ID: 98-5691
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10
Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized: 
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
6010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL

RL Reporting Limit



**ANALYTICAL
RESOURCES
INCORPORATED**

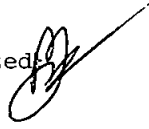
**INORGANICS ANALYSIS DATA SHEET
TOTAL METALS**

Sample No: B-4

Lab Sample ID: V822L
LIMS ID: 98-5692
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized: 
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
3010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.030

U Analyte undetected at given RL

RL Reporting Limit

FORM-I



INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: B-4

Lab Sample ID: V822M
LIMS ID: 98-5693
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10
Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized:
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
6010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL
RL Reporting Limit



INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: B-5

Lab Sample ID: V822N
LIMS ID: 98-5694
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
3010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL
RL Reporting Limit




ANALYTICAL
RESOURCES
INCORPORATED

INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: B-5

Lab Sample ID: V8220
LIMS ID: 98-5695
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10
Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized: 
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
6010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL
RL Reporting Limit

FORM-I



INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: B-7

Lab Sample ID: V822P
LIMS ID: 98-5696
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Date Sampled: 03/25/98
Date Received: 03/25/98

Data Release Authorized
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
6010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL
RL Reporting Limit



INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: Method Blank

Lab Sample ID: V822MB
LIMS ID: 98-5681
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Date Sampled: NA
Date Received: NA

Data Release Authorized:
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
3010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL
RL Reporting Limit



INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Lab Sample ID: V822LCS
LIMS ID: 98-5681
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Data Release Authorized
Reported: 04/03/98

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Spike mg/L	Spike Added	% Recovery	Q
Chromium	0.266	0.250	106%	

'Q' codes: N = control limit not met

Control Limits: 80-120%




INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: Method Blank

Lab Sample ID: V822MB
LIMS ID: 98-5682
Matrix: Water

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Date Sampled: NA
Date Received: NA

Data Release Authorized: 
Reported: 04/03/98

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
6010	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.005	0.005 U

U Analyte undetected at given RL

RL Reporting Limit




INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: Method Blank

Lab Sample ID: V822MB
LIMS ID: 98-5685
Matrix: Soil

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10
Date Sampled: NA
Date Received: NA

Data Release Authorized: 
Reported: 04/03/98

Percent Total Solids: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	03/30/98	6010	04/01/98	7440-47-3	Chromium	0.5	0.5 U


U Analyte undetected at given RL
RL Reporting Limit



INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Lab Sample ID: V822LCS
LIMS ID: 98-5685
Matrix: Soil

QC Report No: V822-Landau Associates, Inc.
Project: Hydraulic Repair & Design
466001.10

Data Release Authorized: 
Reported: 04/03/98

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike mg/kg-dry	Spike Added	% Recovery	Q
Chromium	6010	26.0	25.0	104%	

'Q' codes: N = control limit not met

Control Limits: 80-120%