Golder Associates Inc.

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September 27, 2004

Our Ref.: 923-1000-002.R280

Landsburg Mine Site PLP Group
P.O. Box 10
31407 Highway 169
Black Diamond, Washington 98010

Attention: Bill Kombol, Project Coordinator

RE: LANDSBURG MINE SITE HYDROGEOLOGIC INVESTIGATION AND WELL INSTALLATION SUMMARY

Dear Mr. Kombol:

Introduction:

Golder Associates Inc. (Golder) completed a Hydrogeologic Investigation at the Landsburg Mine Site from April 7th through May 14th of 2004 to determine the geologic conditions, groundwater occurrence, groundwater elevations and hydraulic gradients in the Rogers Coal Seam. This letter describes work completed at the south end of the Landsburg Mine Site during the Landsburg Mine site hydrogeologic evaluation, as well as additional work completed at the north end of the site during the installation of monitoring well LMW-10. Work at the north and south ends of the Landsburg Mine Site included: a piezometer installation (south) and multiple monitoring well installations; geodetic surveying; and water level measurements at the north and south ends of the mine site. Work on the south side of the mine site was completed in accordance with the Work Plan for *Landsburg Mine Site Hydrogeologic Investigation at the South Portal #3* (Golder Associates April 15, 2004). The additional installation of LMW-10 on the north side of the site was conducted with approval from the Landsburg Mine Site PLP Group and State of Washington, Department of Ecology (Ecology). Figure 1 presents the location of the piezometer and all monitoring wells located at the Landsburg Mine Site.

Field Investigation:

Based on past geodetic surveys of the underground mine workings, a surficial projection of the Rogers coal seam was established prior to drilling at each drill site. Using these surface projections and recorded information on the dip of the coal seam and tunnel depth, drilling locations and estimated depths were then established for each monitoring well. Layne Christensen Drilling Inc., from Tacoma Washington, was contracted by Golder Associates (acting on behalf of the Landsburg Mine Site PLP Group) to complete all on site drilling activities.

Generally, boreholes were drilled using Becker Hammer drilling methods for the shallow boreholes (P-2 and LMW-8), and a combination of Becker Hammer and air rotary drilling methods when ground conditions were not favorable (LMW-9 and LMW-10). The boreholes were drilled at a 9-inch diameter, and each borehole was completed as a single-completion well or piezometer with 2.0-inch diameter PVC screens and risers except for LMW-10, which was completed with a 4.0-inch diameter PVC screen and riser. The screen length for each piezometer was 5-20 feet dependant on the depth and size of the encountered coal seam. The screened intervals were packed with silica sand and the borehole annulus above each screen section was sealed with bentonitic grout to land surface. A protective lockable steel monument was installed for secured access at each well port. Soil and rock chip samples were collected at 10-foot intervals and at lithology changes during drilling and described in the borehole log. Following installation, each piezometer was developed using airlift pumping to remove rock fragments entrained within the piezometer casing. A well installation summary is presented in Table 1, and boring log records are presented in Appendix A.

Monitoring well LMW-8 was installed at the south end of the mine site in the approximate location of Portal #3. The location of LMW-8 at Portal #3 was selected based on historical aerial photographs, historical mine maps and subsequent discussions about the location of Portal #3 with Mr. Bill Kombol. LMW-8 was completed in the outwash gravels to a depth of 13 feet below ground surface (bgs) with a screened interval of 8 to 13 feet bgs. This shallow well was strategically placed in Portal #3 to monitor the Rogers Portal #3 discharge, and is a replacement for sampling the surface water discharge from the spring at Portal #3. LMW-8 will provide a more representative water quality sample of the Rogers Portal #3 discharge than a sample of the surface water.

Piezometer P-2 was targeted to intercept the Rogers Coal seam, to better understand groundwater occurrence, groundwater elevations and hydraulic gradients at the south end of the mine site. P-2 was completed in the underlying Rogers Coal Seam to a depth of 49 feet bgs with a screened interval of 39 to 44 feet bgs. During the installation of piezometer P-2, a void was encountered at 39 feet bgs. Within this void a large amount of water was noted indicating a probable hydraulic connection to the mine workings in the Rogers Coal Seam. Approximately 10 yards of pea gravel was lost in this void while placing a filter pack around the well screen. The level of pea gravel never rose after adding the 10 yards of material. Due to the loss of material, and large volumes of water encountered in the void, it was assumed that the void represented the inclined mine shaft that was used to remove coal via rail car from the bottom of the third and forth mine levels in the Rogers Coal Mine.

Monitoring well LMW-9 was installed approximately 600 feet north of Portal #3 during the hydrogeologic evaluation of the south end of the mine site. This well was completed in the Rogers Coal seam to a depth of 159 feet bgs with a screened interval of 149 to 159 feet bgs. The location of this well was selected based on surficial extrapolations calculated by Golder personnel from historical survey data of the underlying Rogers Coal Seam. During the installation of the well, formations of hard siltstone were encountered at approximately 100 feet bgs. This hard siltstone material prevented the Becker Hammer from advancing at an acceptable rate, so a pilot hole was drilled to 159 feet bgs using a 4 inch air rotary drill. This method allowed the 9 inch Becker Hammer to advance through the siltstone to the target depth. As the 4 inch air rotary was advanced to 149 feet bgs, a void was encountered. Within this void a large amount of water was noted, indicating a probable hydraulic connection to the mine workings in the Rogers Coal Seam.

At completion of the work on the south side of the mine site, additional work on the north side of the mine site was completed to further determine the hydrogeologic conditions in the Rogers Coal Seam. A first exploratory borehole was drilled into the mine workings of the Rogers Coal Seam based on underground estimates of the mine and coal seam. The exploratory borehole hit the coal mine at

55 foot depth. The drill location for LMW-10 was extrapolated on the surface from the exploratory borehole and the dip of the coal seam from borehole logs of LMW-4 and LMW-5. A location approximately 56 feet west of the exploratory well proved successful. Monitoring well LMW-10 was installed to a depth of 287 feet bgs with a screened interval of 267 to 287 feet bgs.

During the installation of monitoring well LMW-10, formations of hard siltstone were encountered at approximately 80 feet bgs. This siltstone material was consistent from 80 feet to a depth of 267 feet bgs. These unfavorable drilling conditions were countered by drilling a pilot hole with a 4 inch air rotary tool to create a pilot hole for the Becker Hammer to follow. The air rotary pilot hole method was used to a maximum of 125 feet in advance of the 9 inch Becker Hammer. Once the 4 inch pilot hole was completed, the Becker Hammer was advanced to this depth. This method allowed the 9 inch Becker Hammer to advance through the siltstone to reach the target depth. Unlike wells on the south side of the site, a void was not encountered during drilling activities. A wet zone of rubble material beginning at 267 feet bgs was believed to be representative of the collapsed mine workings in the Rogers Coal Seam. The screened interval of the well was installed in this zone.

Upon completion of the piezometer and well installations, a geodetic survey was completed. A Washington State licensed land surveyor, Triad Associates, Inc., conducted the geodetic survey. All existing and newly installed wells on the south end of the mine were surveyed for horizontal position (x- and y- coordinates) and elevation (z- coordinate) to the same benchmark established for the Landsburg Mine Site topographic mapping.

Once the geodetic survey was completed, groundwater levels were measured weekly during the month of May for all wells and piezometers in the south end of the Landsburg Mine. Groundwater levels were measured using an electric water level tape. Groundwater levels were obtained in triplicate for precision evaluations and were converted to groundwater elevation based on the surveyed wellhead elevations. Water level measurements were obtained in accordance with Golder Technical Procedure TP-1.4-6a Manual Groundwater Level Measurement. Water level measurement data are presented in Table 2 for the south end of the mine. LMW-10 was not surveyed but was estimated from a survey stake by land measurements. The groundwater from well LMW-10 is flowing artesian and its static water level is above the top of the well. A pressure cap was placed on the well to contain water.

The water quality analyses to be conducted as part of the hydrogeologic investigation was conducted and reported as part of the Quarterly Interim Groundwater Monitoring being conducted at the Landsburg site. Golder completed an interim groundwater monitoring event at the mine site during May, 2003 that coincided with the completion of all well installations. Groundwater samples were collected from previously installed monitoring wells LMW-2, LMW-3, LMW-4, LMW-5, LMW-6, and LMW-7, as well as newly installed monitoring wells LMW-8, LMW-9, and LMW-10. The newly installed piezometer P-2 was sampled for cations/anions only. Results from this sampling event were previously presented in the report titled *Landsburg Mine Site Interim Groundwater Monitoring Results-April/May, 2004* (Golder Associates Inc., July 1, 2004).

Groundwater Movement:

Based on the static water level elevations at the south end of the mine, groundwater from the Rogers Coal Mine is discharging at Portal #3. The hydraulic heads in LMW-3, LMW-5 LMW-9 and P-2 are all approximately the same, but the hydraulic head in the Portal #3 spring represented by LMW-8 is definitely lower than the other wells on the south end of the mine. Therefore, Portal #3 is a discharge area for the south end of the mine. Since the mine access shaft is open in part and may be open all the

way to the south sump on the mine forth level (lowest level), the discharge of mine water at Portal #3 will contain groundwater from all levels within the mine at the south end.

The groundwater elevations measured among LMW-9, LMW-3 and LMW-5 indicate that the groundwater divide may be near the south end of the Rogers Coal Mine. The differences in hydraulic heads are very small and may be within measurement accuracy and precision, but indicate the groundwater divide may be between LMW-3 and LMW-9. The results of the hydrogeologic investigation are consistent with the hydrogeologic model presented in the Remedial Investigation (RI) Report (Golder, 1996); except that the groundwater divide may be further south (at least during the spring of 2004) than envisioned earlier.

At the north end of the mine, well LMW-10 has flowing artesian groundwater conditions. This condition is consistent with the hydrogeologic model in the RI Report (Golder 1996). The hydraulic head in LMW-10 is greater than LMW-2 and LMW-4, which also increases with depth at the north end. These results indicate that groundwater is flowing upward from deeper sections of the Rogers Coal Mine and within the coal seam. Since the Cedar River (a major regional drainage system) exists several hundred feet further north, the upward hydraulic gradient indicates that groundwater is flowing upward and toward the Cedar River for eventual discharge.

Sincerely,

GOLDER ASSOCIATES INC.

Joseph Kennedy
Project Scientist

Douglas J. Morell, Ph.D.; L.Hy.
Principal

DJM/DJK/se

Attachments: Tables 1, Table 2
Figure 1
Appendix A

cc: Bill Joyce - Salter Joyce Ziker, PLLC
Rod Brown/Josh Lipsky – Brown Reavis & Manning
Pete Haller – Atter Wynne, LLP
Richard Gordon – Time Oil
Russell Light – Burlington Northern Santa Fe
Bruce Shepard – Burlington Northern Railroad
Fred Benz – PACCAR
Martin J. McTigue – Morgan, Lewis & Bockius LLP
Barbara Smith – Harris & Smith
Mark Allendorf
Jerome Cruz – Department of Ecology

TABLES

Landsburg Mine Site Hydrogeologic Investigation
Well Installation Summary

Wrong

Well ID	Coordinates		Installation Date	Measuring Point Elevation (ft)	Borehole Depth (ft)	Borehole Diameter (inches)	Well Casing Diameter (inches)	Well Materials	Depth to Top of Screen (ft)	Depth to Bottom of Screen (ft)	Screen Slot Size (inches)	Depth to Top of Filter Pack (ft)
	Northing	Easting										
LMW-3	7484.859	3148.7435	11/22/2004	656.74	76	8	4	PVC/Stainless	49.8	64.8	0.02	47.1
LMW-5	7498.545	3069.6336	12/8/2004	658.26	247	8	4	PVC/Stainless	231.8	241.8	0.02	231.8
LMW-8	135074.9	1353229.4	4/7/2004	646.97	15	9	2	PVC	7.5	13	0.02	6
LMW-9	135727.3	1353324	4/14/2004	743.81	160	9	2	PVC	149	159	0.02	143.5
P-2	135117.6	1353212.7	4/16/2004	651.34	70	9	2	PVC	39	44	0.02	*n/a
LMW-10	139032.1	1355792.5	5/11/2004	615.5	450	9	4	PVC	267	287	0.02	258

Note
* No filter pack was installed in P-2 due to the open mine shaft at 39 feet to 44 feet. The casing was removed, and the native material collapsed around the well to 15 feet below ground surface.
-Elevation data for LMW-10 was estimated.
-Coordinate data for LMW-10 was measured manually in the field by Golder personnel

TABLE 2

Landsburg Mine Site Water Level Elevations

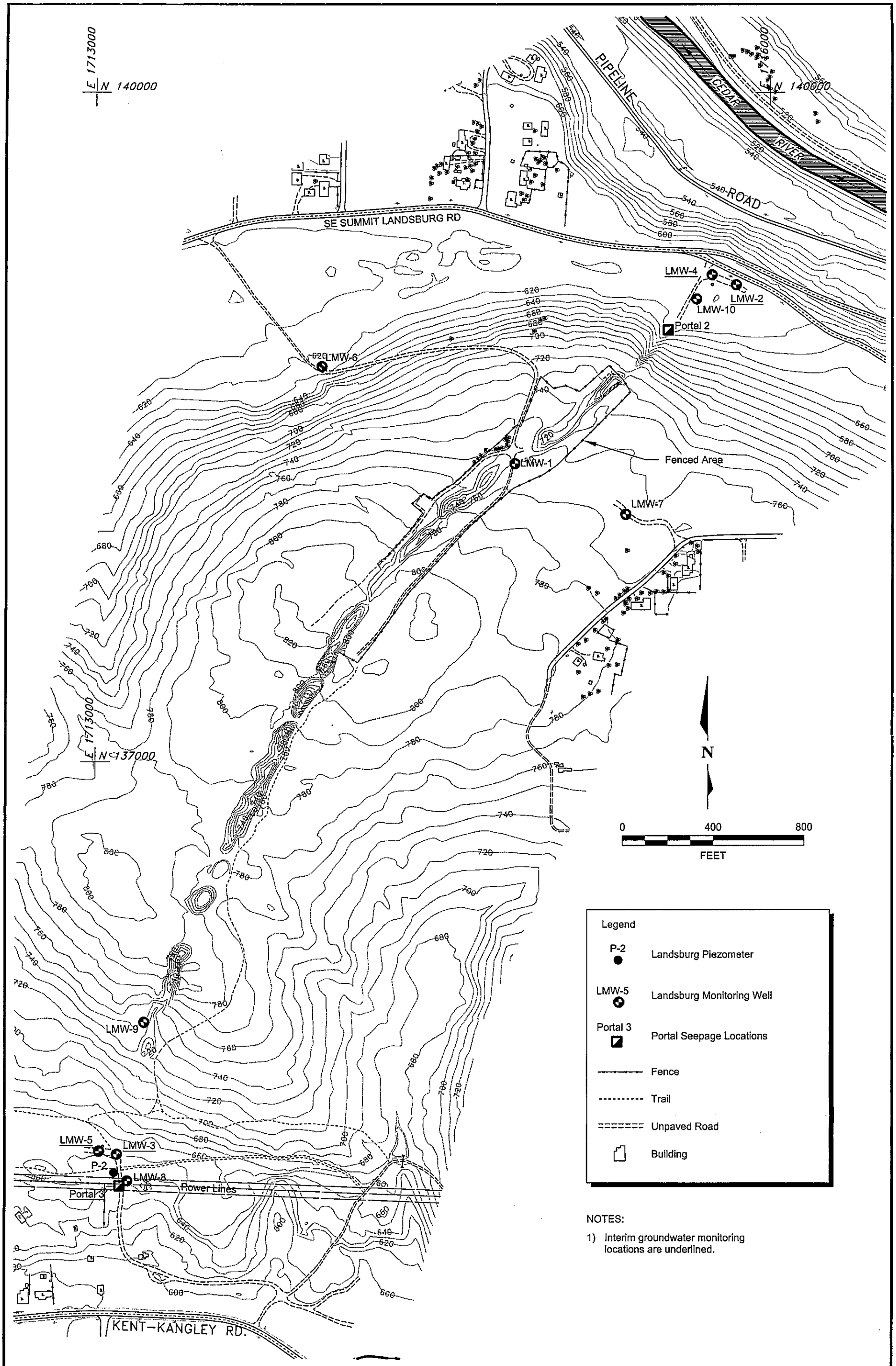
Well ID	Depth to Water Level Below Measuring Point (bmp)			Measuring Point Elevation	Water Level elevations		
	5/7/04 (feet bmp)	5/10-12/04 (feet bmp)	5/17/04 (feet bmp)		5/7/04 (feet)	5/10-12/04 (feet)	5/17/04 (feet)
LMW-3	13.95	13.05	13.07	656.74	642.79	643.69	643.67
LMW-5	14.55	14.60	14.62	658.26	643.71	643.66	643.64
LMW-8	4.82	4.77	4.82	646.97	642.15	642.20	642.15
LMW-9	100.58	100.39	100.41	743.81	643.23	643.42	643.40
P-2	7.71	7.69	7.68	651.34	643.63	643.65	643.66
LMW-10	Well not Completed	Flowing Artesian	Flowing Artesian	615.5	Well not Completed	>615.5	>615.5

Note:

-Elevation data for LMW-10 was estimated.

-BMP = Below Measuring Point (The measuring point is typically the top of casing)

FIGURE



NOTES:

1) Interim groundwater monitoring locations are underlined.

FIGURE **1**

GROUNDWATER MONITORING LOCATIONS

PALMER/LANDSBURG MINE/WA

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APPENDIX A

BOREHOLE LOGS AND WELL COMPLETION DIAGRAMS

RECORD OF BOREHOLE P-2

SHEET 1 of 1

PROJECT: Landsburg Mine Site
PROJECT NUMBER: 923-1000.002.R280
LOCATION: Ravensdale, Washington
DRILLING METHOD: Becker Hammer
DRILLING DATE: 4-16-04
DRILL RIG: Foremost AP-1000
DATUM:
AZIMUTH: N/A
COORDINATES: N: 135,118.35 E: 1,353,212.70
ELEVATION: 648.7
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p — W — W_l	NOTES WATER LEVELS PIEZOMETER GRAPHIC
0	Becker Hammer	0.0 - 19.0 GM-Silty Gravels-GRAVEL-Sand-Silt Mixtures, Light to Dark Brown, Loose, Moist	GM		629.7	1	GRAB					Portland Cement Type I-II (0-2'bgs) Grout Bentonite Seal (2-15'bgs)
5												
10						1	GRAB					
15						2	GRAB					
20		19.0 - 39.0 GP-Poorly Graded Gravels-GRAVEL-Sand Mixtures with Silt, Light to Dark Brown, Loose, Moist	GP-GM		19.0	3	GRAB					Collapse Zone. Well was installed and casing was pulled back to allow borehole to collapse around the well to create seal above open mine shaft (15-39'bgs).
25						4	GRAB					
30						5	GRAB					
35						6	GRAB					
40		39.0 - 44.0 Void	void		609.7 39.0	7	GRAB					Well Screen (39-44'bgs)
45		44.0 - 68.0 CL-Inorganic Silty Clay of Medium Plasticity	CL		604.7 44.0	8	GRAB					
50						9	GRAB					
55						10	GRAB					Bentonite Chips (44-70'bgs)
60						11	GRAB					
65						12	GRAB					
70		68.0 - 70.0 Sandstone-Dark to Light Yellowish Brown, Stiff, Dry Boring completed at 70.0 ft.			580.7 68.0 578.7 70.0	13	GRAB					
75												
80												

Static Water Level

1 in to 10 ft
DRILLING CONTRACTOR: Layne Christensen
DRILLER: Joe Macke

LOGGED: J. Kennedy
CHECKED: D. Morell
DATE: 6/21/2004

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BOREHOLE RECORD LANDSBURG MINE SITE.GPJ GLDR_WA.GDT 9/21/04

RECORD OF BOREHOLE LMW-8

SHEET 1 of 1

PROJECT: Landsburg Mine Site
PROJECT NUMBER: 923-1000.002.R280
LOCATION: Ravensdale, Washington

DRILLING METHOD: Becker Hammer
DRILLING DATE: 4-07-04
DRILL RIG: Foremost AP-1000

DATUM:
AZIMUTH: N/A
COORDINATES: N: 135,074.90 E: 1,353,229.41

ELEVATION: 645.1
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l	NOTES WATER LEVELS WELL GRAPHIC
0	Becker Hammer	0.0 - 15.0 GM-Silty Gravels, Gravel-Sand-Silt Mixtures, Yellowish Brown, Some Sub-angular Sand, Loose, Wet at 9.0 feet.	GM			1	GRAB					Portland Cement Type I-II (0-1'bgs) Bentonite Grout Seal (1-6'bgs) 20/40 Silica Sand (6-7.5'bgs) 10/20 Silica Filter Sand (7.5-13'bgs), Well Screen (8-13'bgs) Static Water Level
5						2	GRAB					
10						3	GRAB					
15		Boring completed at 15.0 ft.			630.1 15.0							
20												

1 in to 3 ft
DRILLING CONTRACTOR: Layne Christensen
DRILLER: Joe Macke

LOGGED: J. Kennedy
CHECKED: D. Morell
DATE: 6/21/2004

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BOREHOLE RECORD LANDSBURG MINE SITE.GPJ GLDR_WA.GDT 9/21/04

RECORD OF BOREHOLE LMW-9

SHEET 1 of 2

PROJECT: Landsburg Mine Site
PROJECT NUMBER: 923-1000.002.R280
LOCATION: Ravensdale, Washington

DRILLING METHOD: Becker Hammer
DRILLING DATE: 4-07-04 to 4-14-04
DRILL RIG: Foremost AP-1000

DATUM:
AZIMUTH: N/A
COORDINATES: N: 135,727.33 E: 1,353,324.04

ELEVATION: 741.17
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p — W — W_l	NOTES WATER LEVELS WELL GRAPHIC
0	Becker Hammer/Air Rotary	0.0 - 44.0 GP-GM-Poorly Graded Gravels with Silt, Dark Yellowish Brown, Some Medium Sub-angular Sand, Loose, Dry	GP-GM			1	GRAB					Portland Cement (0-10'bgs)
5						1	GRAB					
10						2	GRAB					
15						3	GRAB					
20						4	GRAB					
25						5	GRAB					
30						6	GRAB					
35						7	GRAB					
40						8	GRAB					
					697.2							
45		44.0 - 84.0 Sandy Siltstone-Gray to Dark Brown, Hard, Dry. Sample was breakable with fingers.			44.0	9	GRAB					
50						10	GRAB					
55						11	GRAB					
60						12	GRAB					
65						13	GRAB					
70						14	GRAB					
75						15	GRAB					Grout Seal (10-143.5'bgs)
80						16	GRAB					
					657.2							
85		84.0 - 111.0 Sandy Siltstone-Gray to Dark Brown, Colors Mottled Throughout Sample, Hard, Dry. Sample was breakable with fingers.			84.0	17	GRAB					
90						18	GRAB					
95						19	GRAB					
100		Log continued on next page										Static Water Level

1 in to 13 ft
DRILLING CONTRACTOR: Layne Christensen
DRILLER: Joe Macke

LOGGED: J. Kennedy
CHECKED: D. Morell
DATE: 6/21/2004

Golder Associates

BOREHOLE RECORD LANDSBURG MINE SITE.GPJ GLDR_WA.GDT 9/21/04

RECORD OF BOREHOLE LMW-9

SHEET 2 of 2

PROJECT: Landsburg Mine Site
PROJECT NUMBER: 923-1000.002.R280
LOCATION: Ravensdale, Washington
DRILLING METHOD: Becker Hammer
DRILLING DATE: 4-07-04 to 4-14-04
DRILL RIG: Foremost AP-1000
DATUM:
AZIMUTH: N/A
COORDINATES: N: 135,727.33 E: 1,353,324.04
ELEVATION: 741.17
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) WATER CONTENT (PERCENT) W_p — W — W_l	NOTES WATER LEVELS WELL GRAPHIC
100	Becker Hammer/Air Rotary	84.0 - 111.0 Sandy Siltstone-Gray to Dark Brown, Colors Mottled Throughout Sample, Hard, Dry. Sample was breakable with fingers. *(Continued)*				20	GRAB					
105						21	GRAB					
110					630.2	22	GRAB					
		111.0 - 113.0 Sandy Siltstone-Gray to Dark Brown, Colors Mottled Throughout Sample, Small Flecks of coal in Sample, Very Hard, Wet. Sample was breakable with fingers.			111.0 628.2 113.0	23	GRAB					
115		113.0 - 118.0 Sandy Siltstone-Gray to Dark Brown, Colors Mottled Throughout Sample, Hard, Dry. Sample was breakable with fingers.			623.2 118.0							
120		118.0 - 150.0 Sandy Siltstone-Gray to Dark Brown, Colors Mottled Throughout Sample, Hard, Wet. Sample was breakable with fingers.				24	GRAB					
125						25	GRAB					
130						26	GRAB					
135						27	GRAB					
140						28	GRAB					
145						29	GRAB					20/40 Silica Sand (143-146'bgs)
					591.2	30	GRAB					
150		150.0 - 160.0 Sandy Siltstone-Gray to Dark Brown, Colors Mottled Throughout Sample, Laminations Apparent in Sample, Small Flecks of coal in Samples, Very Hard, Very Wet. Sample was breakable with fingers. Possible Rubble Zone of old Mine Workings.			150.0	31	GRAB					
						32	GRAB					10/20 Silica Sand (146-159'bgs)
155						33	GRAB					Well Screen (149-159'bgs)
160		Boring completed at 159.0 ft.			581.2 160.0	34	GRAB					
165												
170												
175												
180												
185												
190												
195												
200												

1 in to 13 ft
DRILLING CONTRACTOR: Layne Christensen
DRILLER: Joe Macke

LOGGED: J. Kennedy
CHECKED: D. Morell
DATE: 6/21/2004

Golder Associates

BOREHOLE RECORD LANDSBURG MINE SITE.GPJ GLDR_WA.GDT 9/21/04

RECORD OF BOREHOLE LMW-10

SHEET 1 of 5

PROJECT: Landsburg Mine Site
PROJECT NUMBER: 923-1000.002.R280
LOCATION: Ravensdale, Washington

DRILLING METHOD: Becker Hammer
DRILLING DATE: 4-23-04 to 5-11-04
DRILL RIG: Foremost AP-1000

DATUM:
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION: N/A
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l	NOTES WATER LEVELS WELL GRAPHIC
0	Becker Hammer/Air Rotary	0.0 - 6.5 Gm-Silty Gravels- Gravel-Sand-Silt Mixtures, Dark Yellowish Brown, Medium to Coarse Sub-angular sand, Loose, Damp	GM									Portland Cement Type I-II (0-2'bgs)
5												
		6.5 - 15.0 Sandy-Siltstone-Yellowish Brown, Fine, Stiff, Dry			6.5	1	GRAB					
10												
15		15.0 - 79.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Dry			15.0							
20						2	GRAB					
25												
30						3	GRAB					
35												
40						4	GRAB					
45												
50						5	GRAB					
55												
60						6	GRAB					
65												
70						7	GRAB					
75												
80		79.0 - 80.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Small Fracture Zone of Clayey Material, Wet			80.0	8	GRAB					
		80.0 - 105.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Dry										
85												
90						9	GRAB					
95												
100		Log continued on next page										

Static Water Level

1 in to 13 ft
DRILLING CONTRACTOR: Layne Christensen
DRILLER: Joe Macke

LOGGED: J. Kennedy
CHECKED: D. Morell
DATE: 6/21/2004

Golder Associates

BOREHOLE RECORD LANDSBURG MINE SITE.GPJ GLDR_WA.GDT 9/21/04

RECORD OF BOREHOLE LMW-10

SHEET 2 of 5

PROJECT: Landsburg Mine Site
PROJECT NUMBER: 923-1000.002.R280
LOCATION: Ravensdale, Washington

DRILLING METHOD: Becker Hammer
DRILLING DATE: 4-23-04 to 5-11-04
DRILL RIG: Foremost AP-1000

DATUM:
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION: N/A
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p — W — W_l	NOTES WATER LEVELS WELL GRAPHIC
100	Becker Hammer/Air Rotary	80.0 - 105.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Dry *(Continued)*				10	GRAB					
105		105.0 - 106.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Small Fracture Zone of Clayey Material, Wet			106.0							
110		106.0 - 153.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Dry				11	GRAB					
115												
120						12	GRAB					
125												
130						13	GRAB					Grout Bentonite Seal (2-258'bgs)
135												
140						14	GRAB					
145												
150						15	GRAB					
155		153.0 - 170.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Some Metallic Flecks in Sample, Dry			153.0							
160						16	GRAB					
165												
170		170.0 - 181.0 Siltstone-Dark Brown/Gray, Hard(Not Breakable w/ Fingers), Dry			170.0	17	GRAB					
175												
180		181.0 - 189.0 Siltstone-Mottled Dark Brown/Gray, Hard(Breakable w/ Fingers), Dry			181.0	18	GRAB					
185												
190		189.0 - 199.0 Siltstone-Mottled Dark Brown/Gray, Hard(Breakable w/ Fingers),Small Flecks of Coal in Sample, Dry			189.0	19	GRAB					
195												
200		Log continued on next page			199.0							

1 in to 13 ft
DRILLING CONTRACTOR: Layne Christensen
DRILLER: Joe Macke

LOGGED: J. Kennedy
CHECKED: D. Morell
DATE: 6/21/2004

Golder Associates

BOREHOLE RECORD LANDSBURG MINE SITE.GPJ GLDR_WA.GDT 9/21/04

RECORD OF BOREHOLE LMW-10

SHEET 3 of 5

PROJECT: Landsburg Mine Site
PROJECT NUMBER: 923-1000.002.R280
LOCATION: Ravensdale, Washington

DRILLING METHOD: Becker Hammer
DRILLING DATE: 4-23-04 to 5-11-04
DRILL RIG: Foremost AP-1000

DATUM:
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION: N/A
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40); WATER CONTENT (PERCENT) W_p — W — W_l	NOTES WATER LEVELS WELL GRAPHIC
200	Becker Hammer/Air Rotary	199.0 - 211.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Dry *(Continued)*				20	GRAB					
205												
210						21	GRAB					
		211.0 - 259.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Dry			211.0							
215												
220						22	GRAB					
225												
230						23	GRAB					
235												
240						24	GRAB					
245												
250						25	GRAB					
255												
260		259.0 - 265.0 Siltstone-Light Brown/Gray, Hard(Not Breakable w/ Fingers), Dry			259.0	26	GRAB					20/40 Silica Sand (258-260'bgs)
265		265.0 - 266.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Fracture Zone of Clayey Material, Wet			266.0							
270		266.0 - 283.0 Siltstone- Dark Brown/Gray, Hard(Breakable w/ Fingers),Small Pieces of Coal in Sample, Wet				27	GRAB					10/20 Silica Sand (260-287'bgs)
275												Well Screen (267-287'bgs)
280						28	GRAB					
285		283.0 - 289.0 Siltstone- Dark Brown/Gray, Hard(Breakable w/ Fingers), Small Pieces of Coal in Sample, Wet. NOTE-Small to Medium (3" to 4" Diameter) Rounded Cobbles. (Possible Rubble Zone of old Mine Workings.)			283.0							20/40 Silica Sand (287-289'bgs)
290		289.0 - 450.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Dry			289.0	29	GRAB					
295												
300		Log continued on next page										

1 in to 13 ft
DRILLING CONTRACTOR: Layne Christensen
DRILLER: Joe Macke

LOGGED: J. Kennedy
CHECKED: D. Morell
DATE: 6/21/2004

Golder Associates

BOREHOLE RECORD LANDSBURG MINE SITE.GPJ GLDR_WA.GDT 9/21/04

RECORD OF BOREHOLE LMW-10

SHEET 4 of 5

PROJECT: Landsburg Mine Site
PROJECT NUMBER: 923-1000.002.R280
LOCATION: Ravensdale, Washington

DRILLING METHOD: Becker Hammer
DRILLING DATE: 4-23-04 to 5-11-04
DRILL RIG: Foremost AP-1000

DATUM:
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION: N/A
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p — W — W_l	NOTES WATER LEVELS WELL GRAPHIC
300	Becker Hammer/Air Rotary	289.0 - 450.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Dry *(Continued)*				30	GRAB					
305												
310						31	GRAB					
315												
320						32	GRAB					
325												
330						33	GRAB					
335												
340						34	GRAB					
345												
350						35	GRAB					
355												
360						36	GRAB					
365												
370						37	GRAB					Portland Cement Type I-II (289-450'bgs) →
375												
380						38	GRAB					
385												
390						39	GRAB					
395												
400		Log continued on next page										

1 in to 13 ft
DRILLING CONTRACTOR: Layne Christensen
DRILLER: Joe Macke

LOGGED: J. Kennedy
CHECKED: D. Morell
DATE: 6/21/2004

Golder Associates

BOREHOLE RECORD LANDSBURG MINE SITE.GPJ GLDR_WA.GDT 9/21/04

RECORD OF BOREHOLE LMW-10

SHEET 5 of 5

PROJECT: Landsburg Mine Site
PROJECT NUMBER: 923-1000.002.R280
LOCATION: Ravensdale, Washington

DRILLING METHOD: Becker Hammer
DRILLING DATE: 4-23-04 to 5-11-04
DRILL RIG: Foremost AP-1000

DATUM:
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION: N/A
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p — W — W_l	NOTES WATER LEVELS WELL GRAPHIC
400	Becker Hammer/Air Rotary	289.0 - 450.0 Siltstone-Dark Brown/Gray, Hard(Breakable w/ Fingers), Dry *(Continued)*				40	GRAB					
405												
410						41	GRAB					
415												
420						42	GRAB					
425												
430						43	GRAB					
435												
440						44	GRAB					
445												
450						45	GRAB					
		Boring completed at 450.0 ft.			450.0							
455												
460												
465												
470												
475												
480												
485												
490												
495												
500												

1 in to 13 ft
DRILLING CONTRACTOR: Layne Christensen
DRILLER: Joe Macke

LOGGED: J. Kennedy
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DATE: 6/21/2004

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BOREHOLE RECORD LANDSBURG MINE SITE.GPJ GLDR_WA.GDT 9/21/04