LANDSBURG/SIT 6

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
1511 Third Ave., Suite 719 • Seattle, Washington 98101-1632

February 11, 1992

TO: Interested Parties

FROM: Steve Hulsman Steve H
Northwest Drinking Water Operations

RE: Report on Sampling Activities in the Vicinity of the Landsburg Mine

Please find attached a copy of the report addressing the sampling activities of drinking water wells in the vicinity of the Landsburg Mine in early 1990 by the Washington State Department of Health. In summary, no organic compounds of any significance were detected in any of the samples collected from drinking water wells in the vicinity of the Landsburg Mine. The levels of inorganic compounds found were consistent with those of general groundwater quality for the area. The results indicate that the water quality of drinking water wells in the area appeared not to be impacted at the time of sampling.

If you have any questions or wish additional information regarding this project, please contact me at (206)464-7962. Thank you for your interest in this project.

AN EVALUATION OF DRINKING WATER QUALITY IN THE VICINITY OF THE LANDSBURG MINE RAVENSDALE, WASHINGTON

SUMMARY REPORT

by

Steve Hulsman

Northwest Drinking Water Operations
Division of Drinking Water
Office of Environmental Health Programs
Washington State Department of Health

February 1992

AN EVALUATION OF DRINKING WATER QUALITY
IN THE VICINITY OF THE
LANDSBURG MINE, RAVENSDALE, WASHINGTON

SUMMARY REPORT

SUMMARY:

The Department of Health investigated the water quality of drinking water wells in the vicinity of the Landsburg Mine. Samples were collected on February 28 and March 1, 1990 from ten drinking water wells in the vicinity of the mine and were analyzed for volatile and semivolatile organic compounds, polynuclear aromatic hydrocarbons, organochlorine pesticides and polychlorinated biphenyls, EPA Target Compound List total metals, and cyanide.

No compounds were detected above primary Maximum Contaminant Levels for drinking water. The levels of metals detected appear to be consistent with those for background groundwater quality. With the exception of low levels of bis(2-ethylhexyl)phthalate, no organic compounds were detected in any samples. These results indicate that the water quality of the drinking water wells sampled appeared not to be adversely affected at the time of sampling.

INTRODUCTION:

The Landsburg Mine is a near vertical seam of coal about eleven feet wide and three quarters of a mile long bounded on each side by sandstone walls. It is oriented in a north easterly by south westerly direction through a hill occupying the northwest quarter of section 25 and the south half of the south half of section 24 of Township 22 North, Range 6 East (see Figure 1). Coal was extracted to depths of 750 feet, creating a deep, narrow, vertical void. The site is characterized by a deep trench formed by the subsidence of overburden into the mined-out area directly beneath.

Industrial materials, construction materials and land-clearing debris were dumped into the trench in the 1970s and early 1980s. Materials dumped into the trench were periodically covered with native soils from alongside the trench. The industrial materials dumped into the trench are thought to include oily sludges, paints, solvents, and other chemical wastes. Some loads of these wastes were dumped directly into the trench from tanker trucks. Other loads of the wastes were contained in at least several hundred drums, some of which are visible in the bottom of the north end of the trench. Some of the visible drums have liquids and/or solids in them and some have bullet holes (Ecology and Environment, 1991).

Since the mine is cut through a hill, it is topographically higher than the surrounding area and its former portals (at each end) are lower than the main portion of the mine. A substantial seep flows from the south portal area along the western boundary of the mine property and dissipates into the ground near some adjacent houses. The flow from the south portal is occasionally substantial enough to reach the storm ditch along the north side of Kent Kangley Road (Mr. Lorang, personal communication). The seep from the north portal area forms a pond at the very north end of the subsidence trench and rapidly dissipates into the soils to the northeast of the trench.

Because of the potential for contamination of groundwater by the industrial and chemical wastes which had been dumped into the mine and the fact that the Cedar River Aquifer area has been designated as a sole source aquifer, the Department of Health conducted an investigation of the water quality of drinking water wells in the vicinity of the Landsburg Mine. The purpose of the sampling activity was to monitor for the presence of chemical compounds in drinking water wells which may have originated from the mine. The results were used to determine if there are any concentrations of contaminants in the drinking water which pose a threat to public health.

The geology of the area is quite variable and complex. The mine itself is characterized by a near vertical seam of coal with walls of sandstone on each side. Drinking water wells south of the mine tend to be shallow (20 to 50 feet deep) with static water levels between 5 and 25 feet below the top of the casing. These wells are completed in a thin layer of sand and gravel which is overlain by a till layer often about 20 feet thick, and the water is generally plentiful.

Wells adjacent to the eastern side of the mine are moderately deep to deep (150 to 400 feet deep) with highly variable static water levels. These wells are drilled through layers of sandstone with or without layers of coal, or through interbedded layers of till, clay and/or sandstone, and water is not abundant.

Drinking water wells around the north end of the mine are shallow to moderately deep (40 to 170 feet deep) with static water levels at 20 to 30 feet for shallow wells and 130 to 150 for the deeper wells. The wells around the north end of the mine generally draw from thin sand and gravel lenses overlain by till and/or clay layers with or without imbedded sand and gravel, and water quantity is adequate.

SAMPLING METHODOLOGY:

Information on the location of drinking water wells in the vicinity of the mine was obtained from well logs (WDOE, 1990) and from discussions with local health department personnel (Cox, 1990). Field investigations were conducted to locate and observe the characteristics of many wells to determine which would be the best for sampling based on the following criteria:

1) proximity to the mine, especially to the north and south ends of the subsidence trench (Figure 1)
2) depth of the well (Table 1)
3) suspected direction of ground water flow
4) the aquifer from which the well draws
5) the population served by the well
6) availability of a suitable sampling tap

Nine wells and the City of Kent's Clark Springs Well and Infiltration Gallery Complex were selected for sampling based on these criteria. In addition, the seep near the southern portal of the mine was also selected for sampling to determine if any contaminants which might be found in well water might also be present in groundwater thought to be coming from the mine.

Sampling was conducted on February 28 and March 1, 1990. Sampling protocol and quality control and assurance were conducted according to the Drinking Water Hazardous Waste Program (DWHWP) Field Protocol. Before sampling the wells were purged for at least ten minutes and usually until constant temperature, pH and conductivity were achieved. Samples were collected from a suitable sampling taps as close to the well head as possible. Samples for analysis for volatile organic compounds (VOCs) were preserved with 1:1 hydrochloric acid, and all samples were stored at four degrees centigrade until delivered to the laboratory.

Samples from all locations except the Sherrard well were analyzed for the presence of EPA Target Compound List total metals, cyanide and the organic compounds listed in Table 2, including VOCs, semivolatile organic compounds, polynuclear aromatic hydrocarbons (PAHs), and organochlorine pesticides and PCBs. Just after the purging process at Sherrard's well, the well pumped dry and the water was murky; so samples were collected for VOCs only.

RESULTS AND DISCUSSION:

No VOCs, PAHs, organochlorine pesticides or PCBs were detected in any of the samples (Table 3). The semivolatile samples from five wells and the trip and transfer blanks contained levels of bis(2-ethylhexyl)phthalate ranging from 2 to 21 parts per billion (Table 3). Phthalates are ubiquitous compounds used in the manufacture of plastics and rubber. Because phthalates were found in the trip and transfer blanks, which are quality control samples, the presence of phthalates in the samples may be due to contamination introduced during processing in the laboratory or from the latex gloves worn during sample collection. Or the phthalates in the well samples may have originated from the piping materials used in the well.

All of the drinking water samples analyzed for metals contained low levels of calcium, magnesium and sodium (Table 3). A few of the samples contained levels of iron and/or manganese which approached or exceeded the secondary maximum contaminant levels (SMCLs) for those metals. The SMCLs are set primarily for aesthetic reasons and do not normally adversely affect the consumer's health. Elevated levels of iron and manganese occur occasionally and naturally in the Cedar River Aquifer area. All other levels of other metals detected in the well samples were well below any established health standards. In general, the levels of metals detected in the wells were consistent with those for drinking water wells in the area.

Cyanide was detected in only one well at 0.009 milligrams per liter (ppm), which is well below a proposed standard of 0.20 ppm. Three wells and the south portal were not sampled for cyanide because field tests indicated that compounds which would interfere with the detection of cyanide were present.

Relative to the well samples, the metals sample from the south portal seep contained elevated levels of barium, boron, calcium, chromium, cobalt, iron, magnesium, manganese (exceeded the SMCL), potassium and sodium (Table 3). These levels may be due to the high amount of suspended particulates which were present in the sample as a result of collecting it from an active seep.

The specific conductance measurements ranged from 40 to 270 micromhos per centimeter (umho/cm) for the wells and were 620 umho/cm for the south portal seep (Table 3). These measurements reflected the inorganic composition of the water; that is, source waters with elevated levels of metals such as sodium, iron and manganese tended to have elevated conductivity. With regard to temperature, deeper wells tended to have slightly warmer water than shallow wells (Table 3).

CONCLUSIONS AND RECOMMENDATIONS:

No organic compounds of any significance were detected in any of the samples collected from drinking water wells in the vicinity of the Landsburg Mine. The levels of inorganic compounds found were consistent with those of general groundwater quality for the area. The results indicate that the water quality of drinking water wells in the area appeared not to be impacted at the time of sampling.

Since the Cedar River Aquifer is a sole source aquifer, releases of contaminants to that aquifer may have significant impacts on water quality and subsequently on the health of the people who use the aquifer as a source of drinking water. Thus continued monitoring of the wells in the vicinity of the Landsburg Mine should occur. Furthermore, since this sampling episode occurred during the wet season, some future sampling should be conducted during a dryer time of the year in order to determine any seasonal changes in the quality of groundwater. In addition, a thorough hydrogeological assessment of the vicinity of the Landsburg Mine should be conducted to determine likely groundwater flow characteristics. This information will aid in better selection of wells to monitor which will be most representative of groundwater quality in the area.

REFERENCES:

Cox, Jerry (King County Health Department, Environmental Health Division). January and February, 1990. Personal communication regarding the location of drinking water wells in the vicinity of the Landsburg Mine.

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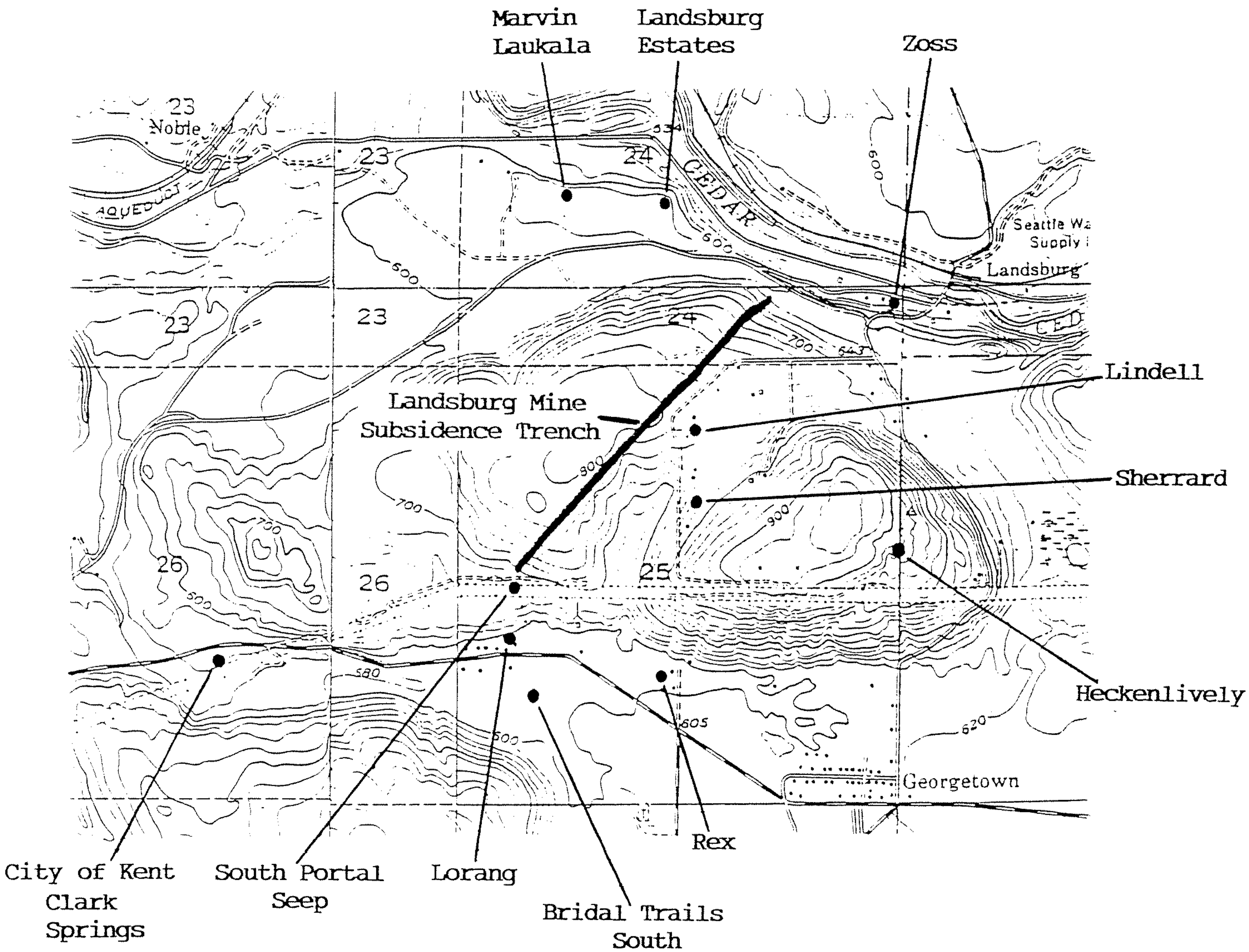

Figure 1:
Approximate locations of drinking water wells in the vacinity of the Landsburg Mine which were sampled on February 28, and March 1, 1990, by the Washington State Department of Health. Samples were also collected from a seep near the south portal of the mine.

Scale: 1 inch = 2000 feet

Table 1: Information and statistics for the wells in the vicinity of the Landsburg Coal Mine (Township 22 N, Range 6 E) which were sampled February 28 and March 1, 1990 by the Washington State Department of Health.

Distance from mine	Water System Name and Address	Public Water System ID No.	Public Water System Group	Services/ Pop.	Section and qtr/qtr	WELL Elev	WELL Depth	WELL SWL	WELL Casing	WELL Log	ELEVATION OF: bottom of well	ELEVATION OF: water level
within 0.25 mi.	Lorang 26128 SE Knt Kngly Rd	-	-	1/2	25 M	590	29	9	6	N	561	581
	Lindell 25714 268th SE	-	-	1/4	25 B	770	400	231.5	8	Y	370	538.5
	Sherrard 26004 268th SE	-	-	1/4	25 G	760	160	3	6	Y	600	757
within 0.5 mi.	Bridal Trails South 26726 262nd SE	122327	A	12/36	25 N	590	51	6	8	Y	539	584
	Rex 26708 SE 268th	-	-	1/4	25 L	595	18	N/A	6	N	577	N/A
	Landsburg Estates 25014 267th SE	64841	B	8/24	24 L	620	167	127.5	8	Y	453	492.5
	Marvin Laukala 25005 265th SE	429641	B	5/15	24 L	625	51	26.5	6	Y	574	598.5
	Zoss 27515 SE 253rd	-	-	1/3	24 R	550	25	11	6	Y	525	539
within 0.75 mi.	City of Kent Clark Springs	381501	A	7850/ 27000	26 L	560	45	6	16	N	515	554
	Heckenlively 27680 SE 264th	-	-	1/2	25 H	880	320	35 *	6	Y	560	845

Elevations (measured in feet mean sea level) are estimates based on the location of the wells as plotted on USGS maps.
SWL = Static Water Level
* This is the static water level as reported on the well log.

Table 2: List of organic compounds for which the samples collected by the Dept. of Health for the Landsburg Mine project were analyzed. All detection limits are measured in micrograms per liter (ug/l), i.e. parts per billion.

Compound	Detection Limit	Compound	Detection Limit
VOLATILE ORGANIC COMPOUNDS (VOCs) (EPA Method 524.2)			
Vinyl Chloride	0.5	Benzene	0.5
1,1-Dichloroethylene	0.5	1,2-Dichloroethane	0.5
1,1,1-Trichloroethane	0.5	Trichloroethylene	0.5
Carbon tetrachloride	0.5	p-Dichlorobenzene	0.5
Chloromethane	0.5	1,2,3-Trichloropropane	0.5
Bromomethane	0.5	1,1,2,2-Tetrachloroethane	0.5
Chloroethane	0.5	2-Chlorotoluene	0.5
Methylene Chloride	0.5	4-Chlorotoluene	0.5
trans-1,2-Dichloroethylene	0.5	1,3-Dichlorobenzene	0.5
1,1-Dichloroethane	0.5	1,2-Dichlorobenzene	0.5
2,2-Dichloropropane	0.5	Dichlorodifluoromethane	0.5
cis-1,2-Dichloroethylene	0.5	Trichlorofluoromethane	0.5
Chloroform	0.5	Bromochloromethane	0.5
1,1-Dichloropropylene	0.5	Isopropylbenzene	0.5
1,2-Dichloropropane	0.5	n-Propylbenzene	0.5
Dibromomethane	0.5	1,3,5-Trimethylbenzene	0.5
Bromodichloromethane	0.5	tert-Butylbenzene	0.5
Toluene	0.5	1,2,4-Trimethylbenzene	0.5
1,1,2-Trichloroethane	0.5	sec-Butylbenzene	0.5
Tetrachloroethylene	0.5	Isopropyltoluene	0.5
1,3-Dichloropropane	0.5	1,2,4-Trichlorobenzene	0.5
Chlorodibromomethane	0.5	Naphthalene	0.5
Chlorobenzene	0.5	Hexachlorobutadiene	0.5
1,1,1,2-Tetrachloroethane	0.5	1,2,3-Trichlorobenzene	0.5
Ethylbenzene	0.5	Ethylene dibromide	0.5
m+p-Xylenes	0.5	1,2-Dibromo-3-Chloropropane	0.5
o-Xylene	0.5	n-Butylbenzene	0.5
Styrene	0.5	cis-1,3-Dichloropropene	0.5
Bromoform	0.5	trans-1,3-Dichloropropene	0.5
Bromobenzene	0.5		
ORGANOCHLORINE PESTICIDES AND PCBs (EPA Method 8080)			
Alpha-BHC	0.04	Endrin	0.08
Beta-BHC	0.04	Endosulfan II	0.08
Delta-BHC	0.06	4,4'-DDD	0.08
Gamma-BHC (Lindane)	0.04	Endosulfan Sulfate	0.20
Heptachlor	0.04	4,4'-DDT	0.08
Aldrin	0.04	Methoxychlor	0.20
Heptachlor Epoxide	0.04	Endrin Ketone	0.10
Endosulfan I	0.04	Gamma-Chlordane	0.06
Dieldrin	0.08	Alpha-Chlordane	0.06
4,4'-DDE	0.08	Toxaphene	60.0
Aroclor-1242/1016	0.08	Aroclor-1221	0.08
Aroclor-1248	0.08	Aroclor-1232	0.08
Aroclor-1254	0.08	Aroclor-1262	0.08
Aroclor-1260	0.08	Aroclor-1268	0.08

Table 2: (continued) List of organic compounds for which the samples collected by the Dept. of Health for the Landsburg Mine project were anlyzed. All detection limits are measured in micrograms per liter (ug/l), i.e. parts per billion.

Compound	Detection Limit	Compound	Detection Limit
SEMIVOLATILE COMPOUNDS (EPA Method SW8270)			
Phenol	2.0	3-Nitroaniline	10.0
Aniline	10.0	Acenaphthene	2.0
Bis(2-Chloroethyl)Ether	2.0	2,4-Dinitrophenol	20.0
2-Chlorophenol	2.0	4-Nitrophenol	20.0
1,3-Dichlorobenzene	2.0	Dibenzofuran	2.0
1,4-Dichlorobenzene	2.0	2,4-Dinitrotoluene	4.0
Benzyl Alcohol	2.0	Diethyl Phthalate	2.0
1,2-Dichlorobenzene	2.0	4-Chlorophenyl-Phenylether	2.0
2-Methylphenol	2.0	Fluorene	2.0
Bis(2-Chloroisopropyl)Ether	2.0	4-Nitroaniline	4.0
4-Methylphenol	2.0	4,6-Dinitro-2-Methylphenol	20.0
N-Nitroso-Di-n-Propylamine	2.0	N-Nitrosodiphenylamine	2.0
Hexachloroethane	4.0	1,2-Diphenylhydrazine	4.0
Nitrobenzene	2.0	4-Bromophenyl-Phenylether	4.0
Isophorone	2.0	Hexachlorobenzene	4.0
2-Nitrophenol	4.0	Pentachlorophenol	20.0
2,4-Dimethylphenol	2.0	Phenanthrene	2.0
Benzoic Acid	50.0	Anthracene	2.0
Bis(2-Chloroethoxy)Methane	2.0	Di-n-Butyl Phthalate	2.0
2,4-Dichlorophenol	4.0	Fluoranthene	2.0
1,2,4-Trichlorobenzene	2.0	Pyrene	2.0
Naphthalene	4.0	Benzidine	50.0
4-Chloroaniline	2.0	Butylbenzylphthalate	2.0
Hexachlorobutadine	2.0	3,3'-Dichlorobenzidine	20.0
4-Chloro-3-Methylphenol	4.0	Benzo(a)Anthtracene	2.0
2-Methylnaphthalene	2.0	Chrysene	2.0
Hexachlorocyclopentadiene	4.0	Bis(2-Ethylhexyl)Phthalate	2.0
2,4,6-Trichlorophenol	4.0	Di-n-Octyl Phthalate	2.0
2,4,5-Trichlorophenol	4.0	Benzo(b)Fluoranthene	4.0
2-Chloronaphthalene	2.0	Benzo(k)Fluoranthene	4.0
2-Nitroaniline	4.0	Benzo(a)Pyrene	4.0
Dimethyl Phthalate	2.0	Indeno(1,2,3-cd)Pyrene	4.0
Acenaphthylene	2.0	Dibenzo(a,h)Anthracene	4.0
2,6-Dinitrotoluene	4.0	Benzo(g,h,i)Perylene	4.0
POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs) (EPA Method 610)			
Naphthalene	1.0	Benzo(a)anthracene	0.02
Acenaphthylene	1.5	Benzo(b)fluoranthene	0.10
Acenaphthene + Fluorene	2.0	Benzo(k)fluoranthene	0.05
Phenanthrene	0.10	Benzo(a)pyrene	0.05
Anthracene	0.10	Dibenzo(a,h)anthracene	0.03
Fluoranthene	0.25	Benzo(ghi)perylene	0.10
Pyrene	0.20	Indeno(1,2,3-cd)pyrene	0.10
Chrysene	0.15		

Table 3: Summary of analytical results for the samples collected in the vicinity of the Landsburg Mine on February 28 and March 1, 1990 by the Washington State Department of Health. N/S indicates that a sample for that compound or analytical method was not collected. ND indicates that no compounds were detected above the sample detection limit for that analytical method.

	TRIP BLANK	CITY OF KENT CLARK SPRINGS	ZOSS	SOUTH PORTAL SEEP	LAUKALA	LANDSBURG ESTATES	REX	HECKEN-LIVELY	LINDELL	LORANG	BRIDAL TRAILS SOUTH	SHERRARD	TRANSFER BLANK	DRINKING WATER STANDARD
METALS - measured in parts per million (mg/l)														
Aluminum	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	N/S	<0.20	-
Antimonoy	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	N/S	<0.02	-
Arsenic	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	N/S	<0.001	0.05
Barium	<0.003	<0.003	0.009	0.178	<0.003	0.004	0.004	0.232	0.072	<0.003	0.003	N/S	<0.003	1.0
Beryllium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	N/S	<0.005	-
Boron	<0.10	<0.10	<0.10	0.66	<0.10	0.12	<0.10	<0.10	<0.10	<0.10	<0.10	N/S	<0.10	-
Cadmium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N/S	<0.002	0.01
Calcium	<0.5	8.5	5.3	91.0	4.6	39.0	8.7	26.0	14.0	7.0	12.0	N/S	<0.5	-
Chromium	<0.006	<0.006	<0.006	0.039	<0.006	0.017	<0.006	0.012	0.007	<0.006	0.009	N/S	<0.006	0.05
Hexavalent Chromium	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	N/S	<0.025	-
Cobalt	<0.003	<0.003	<0.003	0.008	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	N/S	<0.003	-
Copper	<0.002	0.016	0.024	<0.002	<0.002	0.011	<0.002	<0.002	<0.002	0.003	<0.002	N/S	<0.002	1.0*
Iron	<0.10	0.10	<0.10	0.30	<0.10	<0.10	<0.10	0.29	0.22	<0.10	<0.10	N/S	<0.10	0.3*
Lead	<0.001	0.004	0.001	<0.001	0.003	0.002	0.001	<0.001	<0.001	<0.001	<0.001	N/S	<0.001	0.05
Magnesium	<0.01	1.8	1.6	54.0	0.82	13.0	1.7	12.0	5.0	2.2	2.6	N/S	<0.01	-
Manganese	<0.002	<0.002	0.010	0.282	0.004	0.057	<0.002	0.024	0.041	<0.002	<0.002	N/S	<0.002	0.05*
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	N/S	<0.0002	0.002
Molybdenum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/S	<0.01	-
Nickel	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/S	<0.01	-
Potassium	<1.0	<1.0	<1.0	3.4	<1.0	1.4	1.0	1.5	1.7	<1.0	<1.0	N/S	<1.0	-
Selenium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N/S	<0.002	0.01
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/S	<0.01	0.05
Silicon	0.21	8.3	6.6	12.0	8.3	16.0	8.8	16.0	9.8	9.0	10.0	N/S	<0.08	-
Sodium	<0.5	3.3	4.3	24.0	3.1	11.0	3.2	26.0	44.0	3.2	3.9	N/S	<0.5	-
Thallium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	N/S	<0.001	-
Vanadium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	N/S	<0.002	-
Zinc	<0.020	<0.020	<0.020	<0.020	0.205	0.062	<0.020	<0.020	0.098	<0.020	<0.020	N/S	<0.020	5.0*
CYANIDE (parts per million	<0.005	<0.005	0.009	N/S	<0.005	<0.005	<0.005	N/S	N/S	<0.005	<0.005	N/S	<0.005	-
PHYSICAL MEASUREMENTS														
Temperature (in degrees C)	---	8.3	7.6	11.3	9.2	9.9	8.5	9.5	10.6	8.1	9.3	9.7	---	-
pH (a measure of acidity)	---	6.38	5.70	6.88	6.22	6.78	6.08	7.42	7.90	6.60	6.80	7.72	---	-
Conductivity (umhos/cm)	---	60	70	620	40	220	60	270	190	60	80	250	---	700*

* This level is a secondary standard set for aesthetic reasons and does not normally adversely affect the consumer's health.

Table 3: (continued) Summary of analytical results for the samples collected in the vicinity of the Landsburg Mine on February 28 and March 1, 1990 by the Washington State Department of Health. N/S indicates that a sample for that compound or analytical method was not collected. ND indicates that no compounds were detected above the sample detection limit for that analytical method.

	TRIP BLANK	CITY OF KENT CLARK SPRINGS	ZOSS	SOUTH PORTAL SEEP	LAUKALA	LANDSBURG ESTATES	REX	HECKEN-LIVELY	LINDELL	LORANG	BRIDAL TRAILS SOUTH	SHERRARD	TRANSFER BLANK	DRINKING WATER STANDARD
VOLATILE ORGANIC COMPOUNDS (VOCs) - measured in parts per billion (ug/l)														
REGULATED VOCs (with an established Maximum Contaminant Level (MCL))														
Vinyl Chloride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.0
1,1-Dichloroethylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7.0
1,1,1-Trichloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	200.0
Carbon tetrachloride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.0
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.0
1,2-Dichloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.0
Trichloroethylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.0
p-Dichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	75.0
UNREGULATED VOCs (with no established MCL)														
Methylene Chloride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8.0	<0.5	<0.5	<0.5	-
Tetrachloroethylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
Other Unregulated VOCs (See Table 2 for list)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SEMIVOLATILE COMPOUNDS - measured in parts per billion														
Bis(2-Ethylhexyl)Phthalate	2.0	3.0	<2.0	<2.0	<2.0	<2.0	3.0	<2.0	4.0	21.0	5.0	N/S	11.0	-
Other Semivolatiles (See Table 2 for list)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/S	ND	
ORGANOCHLORINE PESTICIDES														
REGULATED PESTICIDES (with an established Maximum Contaminant Level (MCL))														
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/S	ND	0.2
Lindane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/S	ND	4.0
Methoxychlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/S	ND	100.
Toxaphene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/S	ND	5.0
UNREGULATED PESTICIDES (See Table 2 for list)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/S	ND	
POLYCHLORINATED BIPHENYLS (PCBs) (See Table 2 for list)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/S	ND	
POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs) (See Table 2 for list)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/S	ND	