CS # 1135

SITE HAZARD ASSESSMENT

WORKSHEET 1

Summary Score Sheet

SITE INFORMATION:

Heglar Kronquist
Heglar Road & Kroquist Road
Spokane, Spokane County, WA 99021

Section/Township/Range: Sec 3/T26N/R44E
Latitude: 47° 46' 49"
Longitude: 117° 14' 14"
Ecology Facility Site ID No.: 645

Site scored/ranked for the August 23, 2006 update

SITE DESCRIPTION (management areas, substances of concern, and quantities):

The Heglar Kronquist site, east of the intersection of Heglar and Kronquist Roads in a rural area approximately 10 miles northeast of Spokane, Washington, was a gravel pit that closed in 1969. Between 1969 – 1974, the nearly four acre pit was used for disposal of aluminum dross waste from a Kaiser Aluminum and Chemical Corporation (Kaiser) Trentwood plant in Spokane.

According to Kaiser's analytical data, the dross was composed of 39% sodium chloride, 35% aluminum oxide, 19% potassium chloride, 4% free aluminum, 2% cryolite, and 1% carbides and nitrides. Up to 30 cubic yards of dross were disposed at the site up until 1974, when chloride salts were detected in significantly high concentrations in adjacent, downgradient shallow water supplies (wells and springs). Up to 55,000 cubic yards of dross total is believed to have been disposed.

Chronology

September 1969 – The Washington Department of Ecology (Ecology) approved the original request to dispose dross at the site provided that run-on be controlled and prevented from entering the pit area and impervious material would be used as an interim cover.

1971 – Ecology determined that the above conditions had not been met, and noted an ammonia-like odor emanating from the dross pile.

1973 to 1980 – The Spokane County Health Department (SCHD) sampled groundwater and springs on nine occasions and concluded the disposed dross was a source of high levels of chloride and sodium in shallow groundwater wells and springs used for drinking water purposes and recommended an alternative source of drinking water supply.

1979 – Ecology inspection noted sink holes and pressure mounds four to five feet in diameter at the site. In September of that year, groundwater samples were taken from nine locations, including background wells. Downgradient wells had elevated (greater than three times background) levels of several metals as well as chloride, however the validity of the background wells were questioned. An Ecology evaluation of the analytical results concluded that arsenic, cadmium, lead, mercury, and nitrate, although present at slightly elevated levels, were not attributable to the dross landfill. It was also concluded that fluoride and iron, while present in the waste pile, were not migrating significantly.

Air was also sampled in September 1979, with ammonia being detected far in excess of its acceptable source impact level (ASIL) (230 mg/m^3 compared to the ASIL for ammonia of 59.9 ug/m^3).

1980 to 1983 – Robert Lamon, who had apparently bought the site property at some unknown time in the past, tried to get out of the real estate deal saying he was not aware of all the environmental concerns at the time of purchase, as he was being directed, as property owner, to cover and secure the site. While this proved to be unsuccessful for Mr. Lamon, he did reach an agreement with Kaiser whereby they would cover the site and protect it from corrosion, construct a gas venting system, construct a security fence and monitor the site to assess the effectiveness of the cover.

1984/85 – Kaiser constructed a two-foot interim clay layer cover over the landfill to prevent infiltration of precipitation and performing the necessary grading to divert surface water run-on from penetrating the landfill.

1987 – Ecology staff conducted site inspection which noted the entire surface of the site had been capped and was covered with weeds and grasses, with no evidence of sink holes or heaving. There were 17 10-foot high gas vents spaced throughout the site, and the perimeter was secured by a fence and locked gate.

November 1993 – Site Inspection Prioritization Level I report prepared for the U.S. Environmental Protection Agency Region 10 (EPA) recommended no further action under the federal Superfund program at that time. It was noted that additional groundwater and spring water samples were to be collected by Kaiser.

October 2004 – Ecology received a report from a citizen that someone had cut into the chain link fence surrounding Kaiser's former dross waste landfill, drove in a backhoe and dug a series of test holes through the protective clay cap. It was determined from Kaiser that two men had tried to excavate dross out of the landfill in order to recover the aluminum.

February 15, 2006 – Ecology notifies Kaiser that a site hazard assessment (SHA) of the Heglar Kronquist site will be conducted by Michael Spencer, Toxics Cleanup Program-Headquarters.

May 10, 2006 – SHA site drive-by visit by Michael Spencer and Sherman Spencer (TCP-ERO). Both the fencing and the vegetated cover appeared to be fully intact.

June 13, 2006 – Kaiser supplies Ecology with the following materials specific to the Heglar Kronquist site: i) Drawing showing the site and cross section of the cap; ii) All known groundwater data that

WORKSHEET 2
Route Documentation

1. **SURFACE WATER ROUTE**

   a. List those substances to be considered for scoring: Source: 1,2,4

      Ammonia, chloride, fluoride, nitrate

   b. Explain basis for choice of substance(s) to be used in scoring.

      These substances were detected in either surface/subsurface soil and/or groundwater samples associated with the site in significant concentrations compared to their acceptable regulatory levels.

   c. List those management units to be considered for scoring: Source 1-3

      Surface/subsurface soils and groundwater.

   d. Explain basis for choice of unit to be used in scoring:

      The contaminating substances were detected on-site in either surface soil, subsurface soil and groundwater samples in significant concentrations compared to their acceptable regulatory levels.

2. **AIR ROUTE**

   a. List those substances to be considered for scoring: Source: 1,2,4

      Ammonia, chloride, fluoride, nitrate

   b. Explain basis for choice of substance(s) to be used in scoring:

      These substances were detected in either surface/subsurface soil and/or groundwater samples associated with the site in significant concentrations compared to their acceptable regulatory levels. There is no air toxicity for chloride and nitrate, so these won't be scored in this route.)

   c. List those management units to be considered for scoring: Source: 1-3

      Surface/subsurface soils and groundwater.

   d. Explain basis for choice of unit to be used in scoring:

      The contaminating substances were detected on-site in either surface soil, subsurface soil and groundwater samples in significant concentrations compared to their acceptable regulatory levels.

Kaiser has collected at the site since 1983 for chlorides, nitrate, sodium, potassium and conductivity; and iii) A sketch of the site showing the location where samples have historically been collected.

SPECIAL CONSIDERATIONS (include limitations in site file data or data which cannot be accommodated in the model, but which are important in evaluating the risk associated with the site, or any other factor(s) over-riding a decision of no further action for the site):

ROUTE SCORES:

Surface Water/Human Health:	**16.8**	Surface Water/Environmental.:	**42.8**
Air/Human Health:	**9.5**	Air/Environmental:	**39.2**
Groundwater/Human Health:	**13.6**		

OVERALL RANK: 2

3. **GROUNDWATER ROUTE**

a. List those substances to be considered for scoring: Source: 1,2,4

Ammonia, chloride, fluoride, nitrate

b. Explain basis for choice of substance(s) to be used in scoring:

These substances were detected in either surface/subsurface soil and/or groundwater samples associated with the site in significant concentrations compared to their regulatory acceptable levels.

c. List those management units to be considered for scoring: Source: 1-3

Surface and subsurface soils and groundwater.

d. Explain basis for choice of unit to be used in scoring:

The contaminating substances were detected on-site in either surface soil, subsurface soil and groundwater samples in significant concentrations compared to their acceptable regulatory levels.

WORKSHEET 4
Surface Water Route

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

	Substance	Drinking Water Standard (µg/L)	Value	Acute Toxicity (mg/ kg-bw)	Value	Chronic Toxicity (mg/kg/day)	Value	Carcinogenicity		Value
								WOE	PF*	
1	Ammonia	30,000	2	350 (rat)	5	0.97	1	ND	ND	-
2	Chloride	250,000	2	ND	-	0.02	5	ND	ND	-
3	Fluoride	4000	2	ND	-	0.06	5	ND	ND	-
4	Nitrate	10,000	2	ND	-	ND	-	ND	ND	-

* *Potency Factor*

Source: 1,2,4,5
Highest Value: 5
(Max = 10)
Plus 2 Bonus Points? 0
Final Toxicity Value: 5
(Max = 12)

1.2 Environmental Toxicity (X) Freshwater ( ) Marine

	Substance	Acute Water Quality Criteria		Non-Human Mammalian Acute Toxicity	
		(µg/L)	Value	(mg/kg)	Value
1	Ammonia	ND	-	350	5
2	Chloride	ND	-	ND	-
3	Fluoride	ND	-	ND	-
4	Nitrate	ND	-	ND	-

Source: 1,2,4,5
Highest Value: 5
(Max = 10)

1.3 Substance Quantity

Explain Basis: Approx. 55,000 cubic yards

Source: 1,2
Value: 10
(Max = 10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment:** Maximum value of 10 points scored. **Explain basis:** Management unit scored as a landfill: Although the site has what could be described as an engineered, maintained cover, there is sufficient documentation to show contaminated groundwater from the landfill impacting adjacent surface water to give a containment value of 10.	1-3, 6	**10** (Max = 10)
2.2	**Surface Soil Permeability:** Surface cover is two feet topsoil, likely medium permeability	1,2	**3** (Max = 7)
2.3	**Total Annual Precipitation:** the average total precipitation for the Spokane area is 16 – 17"	7	**2** (Max = 5)
2.4	**Max 2yr/24hr Precipitation:** 1.4 inches	6	**2** (Max = 5)
2.5	**Flood Plain:** Not in flood plain	3, 10	**0** (Max = 2)
2.6	**Terrain Slope:** Piped/culverted = 3	1-3	**3** (Max = 5)

3.0 TARGETS

		Source	Value
3.1	**Distance to Surface Water:** <1000' feet	1-3, 10	**10** (Max = 10)
3.2	**Population Served within 2 miles (see WARM Scoring Manual Regarding Direction):** 0	8	**0** (Max = 75)
3.3	**Area Irrigated by surface water within 2 miles : (0.75)*√ # acres =** 0.75 * √0 = 0	8	**0** (Max = 30)
3.4	**Distance to Nearest Fishery Resource:** 1250 feet	3, 10	**9** (Max = 12)
3.5	**Distance to, and Name(s) of, Nearest Sensitive Environment(s):** fishery resource 1250 feet	3,10	**9** (Max = 12)

4.0 RELEASE

Explain Basis: Documented by analytical data over many years of sampling	Source: 1,2,4 **Value: 5** (Max = 5)

WORKSHEET 5
Air Route

1.0 SUBSTANCE CHARACTERISTICS

1.1. Introduction (WARM Scoring Manual) – Please review before scoring

1.2 Human Toxicity

	Substance	Air Standard ($\mu g/m^3$)	Value	Acute Toxicity (mg/m^3)	Value	Chronic Toxicity (mg/kg/day)	Value	Carcinogenicity		Value
								WOE	PF*	
1	Ammonia	59.9	7	1394 (rat)	5	0.2	1	ND	ND	-
2	Fluoride	5.3	9	ND	-	ND	-	ND	ND	-

* *Potency Factor*

Source: 1,2,4
Highest Value: 7/9
(Max = 10)
Plus 2 Bonus Points? NA
Final Toxicity Value: 7/9
(Max = 12)

1.3 Mobility (Use numbers to refer to above listed substances)

	1.3.1 Gaseous Mobility	1.3.2 Particulate Mobility		
	Vapor Pressure(s) (mmHg)	Soil Type	Erodibility	Climatic Factor
1	7600 = 4	Silty clay loan	>30 – 80	1-10
2				
3				

Source: 2
Value: 4
(Max = 4)

Source: 1-2,3,5,6
Value: 1
(Max = 4)

(Compare 7/4 = 14; or 9/1 = 5; use the highest)

1.4 Highest Human Health Toxicity/ Mobility Matrix Value (from Table A-7)

Final Matrix Value: 14
(Max = 24)

1.5 Environmental Toxicity/Mobility						
	Substance	**Non-human Mammalian Inhalation Toxicity (mg/m^3)**	**Acute Value**	**Mobility (mmHg)**	**Value**	**Matrix Value**
1	Ammonia	.1394	5	7600	4	10
2						

Highest Environmental Toxicity/Mobility Matrix Value (Table A-7) = **Final Matrix Value: 10**
(Max = 24)

1.6 Substance Quantity	
Explain Basis: 2 – 3 acres	Source: 1,2 **Value: 7** (Max = 10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment:** Cover greater than 2' thick, no vapor collection system, ammonia released through 17 vents distributed throughout the landfill.	1-3	**10** (Max = 10)

3.0 TARGETS

		Source	Value
3.1	**Nearest Population:** < 1000'	1-3	**10** (Max = 10)
3.2	**Distance to [and name(s) of] nearest sensitive environment(s):** Freshwater wetlands at 1000' – 2000'	1-3, 10	**6** (Max = 7)
3.3	**Population within 0.5 miles:** $\sqrt{18} = 4.2$	1-3, 10	**4** (Max = 75)

4.0 RELEASE

Explain Basis for scoring a release to air:	Source: 1-3 **Value: 0** (Max = 5)
Detectable odors with supporting analytical data for attribution have been documented in years past, but not more recently, nor during the SHA.	

WORKSHEET 6
Groundwater Route

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

	Substance	Drinking Water Standard (µg/L)	Value	Acute Toxicity (mg/ kg-bw)	Value	Chronic Toxicity (mg/kg/day)	Value	Carcinogenicity		Value
								WOE	PF*	
1	Ammonia	30,000	2	350 (rat)	5	0.97	1	ND	ND	-
2	Chloride	250,000	2	ND	-	0.02	5	ND	ND	-
3	Fluoride	4000	2	ND	-	0.06	5	ND	ND	-
4	Nitrate	10,000	2	ND	-	ND	-	ND	ND	-

* *Potency Factor*

Source: 1,2,4
Highest Value: 5
(Max = 10)
Plus 2 Bonus Points? -
Final Toxicity Value: 5
(Max = 12)

1.2 Mobility (use numbers to refer to above listed substances)

Cations/Anions	OR	Solubility (mg/L)
1=		1= $5.3 \times 10^5 = 3$
2=		2= $5.4 \times 10^2 = 2$
3=		3= $1.5 \times 10^2 = 2$
4 =		4 = $2.0 \times 10^2 = 2$

Source: 5
Value: 3
(Max = 3)

1.3 Substance Quantity:

Explain basis: 55, 000 cubic yards	Source: 1,2 **Value: 6** (Max=10)

5.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment (explain basis):** Contaminated area scored as a landfill: 1) No liner = 3; 2) Maintained, engineered cover without ponding = 0; 3) No leachate collection system = 2; 4) No liquids = 0.	1-3	5 (Max = 10)
2.2	**Net precipitation:** 9.6" – 2.4" = 7.2"	7	1 (Max = 5)
2.3	**Subsurface hydraulic conductivity:** Silty clay	1,2	1 (Max = 4)
2.4	**Vertical depth to groundwater:** Obs. release to groundwater = 0'	1,2	8 (Max = 8)

6.0 TARGETS

		Source	Value
3.1	**Groundwater usage:** Public supply, unthreatened alts. avail.	8	4 (Max = 10)
3.2	**Distance to nearest drinking water well:** <1300 feet	8	4 (Max = 5)
3.3	**Population served within 2 miles:** $\sqrt{}$ 174 = 13.2	8	13 (Max = 100)
3.4	**Area irrigated by (groundwater) wells within 2 miles:** **(0.75)*$\sqrt{}$0 acres** = 0	8	0 (Max = 50)

7.0 RELEASE

	Source	Value
Explain basis for scoring a release to groundwater: Confirmed by presence of many contaminants in groundwater.	1,2,4	5 (Max = 5)

SOURCES USED IN SCORING

1. Site Inspection Report, Heglar Kronquist Site, Spokane, Spokane County, Washington, Washington Department of Ecology, 1987.
2. Site Inspection Prioritization, Heglar Kronquist Site, Spokane, Washington, for U.S. Environmental Protection Agency Region 10, PRC Environmental Management, Inc., November 8, 1993. September 8, 2005.
3. Site Hazard Assessment Drive-by by Michael Spencer, Washington Department of Ecology Toxics Cleanup Program Headquarters, and Sherman Spencer, Washington Department of Ecology Toxics Cleanup Program, Eastern Regional Office, May 10, 2006.
4. Site map, sampling locations and groundwater monitoring data collected by Kaiser since 1983, supplied to Michael Spencer by B.P. Leber, Jr., Kaiser in June 13, 2006, transmittal.
5. Washington Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992
6. Washington State Department of Ecology, WARM Scoring Manual, April 1992.
7. Washington Climate – Net Rainfall Table – See Attachment 6.
8. Washington Department of Ecology, Water Rights Application System (WRATS) printout for two-mile radius of site.
9. Washington Department of Health, Sentry Internet Database printout for public water supplies
10. USGS Topo map for site area.