

SITE HAZARD ASSESSMENT

WORKSHEET 1

Summary Score Sheet

Site Name/Location (Street, City, County, Section/Township/Range, TCP ID Number):**Site Name:** Alger Dump **FSID:** 8079357

Location: 1434 Alger Cain Lake Road
Alger, WA
Skagit County Parcels: P49105, P49116
NWSW Section 8, Township 36 North, Range 4 East
Latitude 48 37 18.6 DMS, Longitude -122 19 48.5 DMS (WGS 1984)

Owners:	P49105	P49116
	Skagit County	State of Washington
	700 South 2 nd Street	Dept. of Transportation
	Mt. Vernon, WA 98273	3920 Airport Way
		Bellingham, WA 98226

Site scored/ranked for the February 21, 2007 update of the Site Register by Polly Dubbel, Skagit County Health Department

Site Description (Include management areas, substances of concern, and quantities):

The Alger Dump is located just east of the town of Alger on the north side of Alger Cain Lake Road in Skagit County. The landfill is located in an old Washington Department of Transportation gravel pit and was operated by the county from the late 1950's to 1975. Serving a rural area, it reportedly accepted only household garbage and had an attendant on site. Garbage was burned at the site until 1969 and then it was landfilled until 1975 when compacters were installed and the dump was no longer used. Closure of the dump was limited to placing approximately two feet of soil (probably native) over the surface of the garbage.

The dump covers approximately seven acres and is about twenty feet deep. It is bordered by Alger Cain Lake Road to the south, open field and a residence to the north, open field to the east and Silver Creek to the west. Debris from the dump continues down the slope toward Silver Creek with a shallow covering of forest duff and some soil. The west edge of the dump is the bank to Silver Creek, an approximately 60 foot elevation drop at a 40-50% grade. At the base of the grade there is a wet boggy transition zone of about 30 feet to the creek itself.

There is a well serving a Group A public water system, the Alger Community Club system, located approximately 720 feet from the western boundary of the dump and separated from the dump by Silver Creek. There are five private drinking water wells known to be located near the dump, between 400 and 2000 feet away.

The landfill was inspected by Polly Dubbel and Britt Pfaff-Dunton of Skagit County Health Department (Health Department) on April 11 and August 14, 2003 for the Initial Investigation of the site under the Model Toxics Control Act (MTCA). The surface of the landfill is covered with 20-30 year old alder trees and grasses. In past years rusty seeps have been apparent in low areas on the surface of the dump during the rainy season. Seeps have also been evident at the base of the bank to Silver Creek coming into the boggy area.

Data from sample events in the area of the Alger Dump are on file at the Health Department. All past sampling in the area of the dump was conducted by the Health Department, sometimes in conjunction with Skagit County Public Works. The first sample data on file is from July of 1991 with follow up in January 1992. Unfortunately, sample locations were not detailed in a log or on a map from this event so the data is not very useful. In May of 1992 water from the well serving the Alger Community Club Public Water System was analyzed for landfill contamination indicators and volatile organic compounds. The next sampling effort was in October of 1992 and focused on private drinking water wells available for sampling near the landfill and two samples from Silver Creek, upstream from the landfill and downstream from the landfill. Soil from the bank of Silver Creek was also sampled near the creek water sample locations. Static water level was measured in four of the wells in September of 1992 to determine a direction of groundwater flow. Groundwater was estimated to flow due west to Silver Creek. In 1996 an additional private well was sampled again for landfill contamination indicators, metals, and volatile organic compounds. More recently sampling was performed in April of

2003 on two private wells previously sampled, surface water from an area of pooled water on the surface of the dump, and water from a rust stained pool at the western base of the landfill in the boggy area leading up to Silver Creek.

No parameters analyzed from the historical sampling came close to exceeding a MTCA standard. Volatile organic compounds were detected at low levels in three parameters. These parameters were chloroform in the Hayes Well (Well #5) detected at 5.6 ug/L, and xylenes in the soil samples from the bank of Silver Creek, detected at 7 ug/kg upstream and 5 ug/kg downstream. The xylene contamination in the stream bank was thought to be related to heavy equipment in use on the property to the north of the dump at the time of sampling. Typical landfill contaminant indicators in the inorganics and metals did not show impact to the drinking water wells from landfill contamination. No dedicated sampling wells have ever been drilled in the area. Tables 1 and 2 provide summaries of available Alger Dump well data and historical sample data. Figure 1 provides the USGS map of the dump area. Figure 2 shows the dump boundary with historical sample locations indicated.

The Health Department submitted the above data to the Washington Department of Ecology (Ecology) under an Initial Investigation for the Alger Dump in March 2004. In September 2005 the Health Department received feedback from Ecology (Jing Liu) that the site would be placed on the Confirmed and Suspected Hazardous Sites list for further evaluation through a Site Hazard Assessment (SHA). Ecology requested that sampling be conducted at the landfill to evaluate contamination in the creek sediments and contamination in groundwater under the dump.

The Health Department is currently conducting the SHA on the Alger Dump site to assess the risk of contamination from the site to human health and the environment. The Health Department requested a review of the groundwater data on the site and recommendations for groundwater evaluation from county hydrogeologist Gary Stoyka. From the hydrogeology review of the area, there are thought to be two aquifers underlying the dump. One is a confined aquifer running between 30 and 60 below ground surface with artesian flow at some locations. Stoyka believes that the private domestic wells known in the immediate vicinity of the dump are drilled into this aquifer. The confined aquifer had been estimated to flow to the south according to a regional assessment of groundwater by GeoEngineers in 2001. However, elevations taken by the Health Department from four domestic wells nearest the dump in 1992 showed the groundwater flowing to the west toward Silver Creek. In addition to the confined regional aquifer, a shallow, perched aquifer is thought to exist under the dump, flowing to the west and surfacing in the bank to Silver Creek or in the wetland buffer adjacent to the creek.

Sampling at Alger Dump for the SHA was discussed with Louise Bardy and Ron Timm of Ecology. Based on available information, the area of most likely impact from the dump was deemed to be the buffer wetland on the west side of the dump and Silver Creek. Sample locations for the SHA were selected to evaluate sediments and seep water in these areas. A one time sample event was conducted on June 23, 2006 for the SHA. Figure 3 shows the June 23, 2006 sample locations. At the time of this sample event the conditions at the dump remained largely unchanged from the 2003 Health Department site visits.

Sediments from Silver Creek were sampled in two locations, from the northern border of the dump property with Anderson property (ADS2) and from a location due west of the south portion of the dump (ADS3). Sediment samples were taken over surface water samples as contaminants of concern were thought to be more likely to be detected in the sediment than the surface water. Creek water was sampled in one location only in order to compare physical parameters to seep water samples (ADS3-water). The creek sediment samples were analyzed for volatile organic compounds, total petroleum hydrocarbons, poly-aromatic hydrocarbons, and total metals. No parameters were detected exceeding MTCA Method A unlimited land use or Method B direct contact. Cadmium was detected in ADS2 at 1.35 mg/kg, below the MTCA standard. It is possible that landfill debris could be impacting this area of the creek from the scattering of landfill waste outside of the main boundaries of the dump. Mr. Anderson (owner of the property to the north) reported that he found landfill debris on the southern portion of his property. ADS3 had no significant detections of any parameters. The surface water sample from the creek was analyzed for pH, temperature, sulfate, chloride, and ammonia. All parameters were as expected for a healthy stream. Caddis fly larvae and salmonids were seen in abundance in Silver Creek at both of the creek sediment sample locations.

Seep sample locations were chosen by searching the base of the bank along the west border of the dump for evidence of staining and pooling of water. No stained areas were found so two areas with evidence of surfacing water were chosen, one (ADS4, 5 and ADW1) from the base of the bank on the northern portion of the dump and one (ADS6, 7 and ADW2) from the boggy area adjacent to the base of the bank on the southern portion of the dump. Sediment was collected from 0-2 inches in depth and 12 - 18 inches in depth at both locations. Seep water was collected by digging a small pit at each location and letting it fill with water. The water was allowed to settle prior to filling containers, however, the samples from ADW1 were quite full of sediment. Conductivity in ADW1 was measured at 467 uS, twice the conductivity measured in ADW2 at 232 uS. For comparison the conductivity in the creek water sample (ADS3-water) was 138.2 uS. The pH for ADW1 was 7.19 and for ADW2 was 7.38, the same as for the Silver Creek sample. The seep sediment and water samples were analyzed for volatile organic compounds, total petroleum hydrocarbons, poly-aromatic hydrocarbons, and total metals. In addition, both sediment samples from 12-18" in depth were also analyzed for low level vinyl chloride. ADS6 0-

2" was analyzed for pesticides (EPA 8081 and 8141A). Significant detections were found in the surface sediment and seep water from the ADS4 location. The MTCA soil standards for unrestricted land use were exceeded in the surface sediment sample for manganese and cadmium. The seep water contained cadmium, arsenic, lead, and benzo(b)fluoranthene at levels exceeding the applicable MTCA standards for groundwater used for ingestion. Both seep water samples contained low levels of chlorodifluoromethane (freon-22) for which no applicable standard was found. A summary of the June 23, 2006 sample event and significant results is presented in Table 3 and original laboratory data is attached.

While historical sampling has not shown landfill impact to area drinking water wells or surface water in Silver Creek the 2006 sampling performed for this SHA indicates that contaminants of concern are present in sediment and seep water at the western base of the landfill.

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). Air route not scored because constituents found in seep sediment were deemed unlikely to become available to the air route through the particulate migration pathway of the air route.

ROUTE SCORES:

Surface Water/Human Health: 18.1

Surface Water/Environ.: 34.7

Air/Human Health: NS

Air/Environmental: NS

Ground Water/Human Health: 40.3

OVERALL RANK: 3

TABLE 1 - ALGER LANDFILL AREA WELL DATA

WELL #	HISTORICAL NAME	PARCEL	WELL LOG	TYPE	DEPTH	STATIC WATER	DATE MEASURED
1	Alger Community Club PWS	P49105	YES	DRILLED	51'	ARTESIAN	9/15/1960
2	Anderson	P49097	YES	DRILLED	45'	21.885'	9/3/1992
3	Schulte	P49093	YES	DRILLED	78'	45.32'	9/3/1992
4	Seafeldt	P49168	YES	DRILLED	53'	36.25'	9/3/1992
5	Hayes	P49096	NO	DRILLED			
6	Sigfusson	P49111	YES	DRILLED	55'	17.195'	9/3/1992

TABLE 2 - ALGER LANDFILL HISTORICAL WATER SAMPLE RECORD (Refer to Figure 2 for sample locations)

LOCATION ID	DESCRIPTION	SAMPLE DATES	PARAMETERS	Dissolved Metals	Inorganics	TOX	VOC
			Fe, Mn, Zn				
WELL #1	ALGER COMMUNITY CLUB PWS	5/7/1992	X		X	X	X
WELL #2	ANDERSON PRIVATE WELL	10/13/1992	X		X	X	X
		4/11/2003		X	X		X
WELL #3	SCHULTE PRIVATE WELL	10/13/1992	X		X	X	X
WELL #4	SEAFELDT PRIVATE WELL	10/13/1992	X		X	X	X
WELL #5	HAYES PRIVATE WELL	4/16/1996	X		X		X
WELL #6	SIGFUSSON PRIVATE WELL	10/13/1992	X		X	X	X
		4/11/2003		X	X		X
SC #1	SILVER CREEK UPGRADIENT	10/13/1992	X		X	X	X
SC #2	SILVER CREEK DOWNGRADIENT	10/13/1992	X		X	X	X
SW #1	STAINED SURFACE WATER AT BASE OF LANDFILL	4/11/2003		X	X		X
SW #2	PONDED WATER ON SURFACE OF LANDFILL	4/11/2003		X	X		X

TABLE 2 - ALGER DUMP SHA SAMPLING JUNE 23, 2006 – Skagit County Health Department					
Sample ID	Location	Matrix	Depth BGS	Analyses Requested	Significant Detections (bold indicates exceeds MTCA standard)
ADS2	Silver Creek Surface Sediment - North border of dump with Anderson	creek sediment	0-2"	VOA, NWTPH-HCID, PAH, Metals	Cadmium 1.35 mg/kg
ADS3	Silver Creek Surface Sediment - Due west of south portion of dump	creek sediment	0-2"	VOA, NWTPH-HCID, PAH, Metals	No significant detections
ADS3-Water	Surface water from Silver Creek at location of ADS3 sediment sample	surface water		Sulfate, Chloride, Ammonia	Sulfate 9 mg/kg Chloride 4 mg/kg Ammonia 0.06 mg/kg
ADS4	Seep sediment from bank base at west edge of north portion of dump	wetland sediment	0-2"	VOA, NWTPH-HCID, PAH, Metals	Cadmium 17.0 mg/kg Manganese 152,000 mg/kg
ADS5	Seep sediment from bank base at west edge of north portion of dump	wetland sediment	12-18"	VOA, Low level vinyl chloride, PAH, Metals	No significant detections
ADW1	Seep water from location of sediment samples ADS4 and ADS5	seep water		Chloride, Sulfate, Ammonia, VOA, NWTPH-HCID, PAH, Metals	Sulfate 48 mg/L Chloride 10 mg/L Ammonia 9.85 mg/L Cadmium 33 ug/L Arsenic 122 ug/L Lead 705 ug/L Benzo(b)fluoranthene 0.1 ug/L Chlorodifluoromethane (freon-22) 2.1 ug/L
ADS6	Sediment from wetland at base of dump bank on south central dump	wetland sediment	0-2"	VOA, NWTPH-HCID, PAH, Metals, Pesticides (8081, 8141A)	No significant detections
ADS7	Sediment from wetland at base of dump bank on south central dump	wetland sediment	12-18"	VOA, Low level vinyl chloride, PAH, Metals	Tetrahydrofuran 3.1 mg/kg
ADW2	Seep water from location of sediment samples ADS6 and ADS7	seep water		Chloride, Sulfate, Ammonia, VOA, NWTPH-HCID, PAH, Metals	Sulfate 4 mg/L Chloride 4 mg/L Ammonia 0.18 mg/L Chlorodifluoromethane (freon-22) 9.1 ug/L

WORKSHEET 2

ROUTE DOCUMENTATION

1. SURFACE WATER ROUTE

List those substances to be considered for scoring:

Source: 1, 2, 4

Cadmium, Arsenic, Lead, Benzo(b)fluoranthene

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

Substance present in surface soil samples, and shallow groundwater samples (drains to wetland) over MTCA clean up standards for unrestricted land use.

List those management units to be considered for scoring:

Source: 1, 2, 4

Contaminated surface soil and contaminated seeps

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

Documented contamination in surface soil and seeps releasing to surface water

2. AIR ROUTE

List those substances to be considered for scoring:

Source:

Not scored

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

Not scored

List those management units to be considered for scoring:

Source:

Not scored

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

Not scored

3. GROUND WATER ROUTE

List those substances to be considered for scoring:

Source: 1, 2, 4

Cadmium, Arsenic, Lead, Benzo(b)fluoranthene

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

Substances present in shallow groundwater at levels exceeding MTCA standards for groundwater used as drinking water

List those management units to be considered for scoring:

Source: 1, 2, 4

Contaminated groundwater

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

Documented groundwater contamination above MTCA Method A Clean up Standards

WORKSHEET 4
Surface Water Route

1.0 SUBSTANCE CHARACTERISTICS

1.2 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	Cadmium	5.0	8	225	5	0.0005	5	ND	ND	-
2	Arsenic	10.0	8	763	5	0.001	5	A	1.75	7
3	Lead	5	8	ND	ND	<0.01	10	ND	ND	-
4	Benzo(b)fluorant hene	0.2	10	ND	ND	ND	ND	B2	11.5	7
5										
6										

* Potency Factor

Source: 2,4,5

Highest Value: 10

(Max = 10)

Plus 2 Bonus Points2

Final Toxicity Value: 12

(Max = 12)

1.2 Environmental Toxicity – Fresh Water					
Substance		Acute Water Quality Criteria		Non-Human Mammalian Acute Toxicity	
		(µg/L)	Value	(mg/kg)	Value
1	Cadmium	3.9	8		
2	Arsenic	360	4		
3	Lead	82	6		
4	Benzo(b)fluoranthene	ND	ND	ND	ND

Source: 2,4,5

Highest Value: 8

(Max = 10)

1.3 Substance Quantity	
Explain Basis: Unknown quantity, default to 1.	Source: <u>1,3,4</u> Value: 1 (Max = 10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	Containment: Un-maintained cover. Explain basis: Landfill with un-maintained cover, no other run off control.	1, 3, 4	5 (Max = 10)
2.2	Surface Soil Permeability: Gravelly loam	3, 4, 12	1 (Max = 7)
2.3	Total Annual Precipitation: Sedro Woolley, 45.2	4, 8	3 (Max = 5)
2.4	Max 2yr/24hr Precipitation: three inches	4	3 (Max = 2)
2.5	Flood Plain: Not in the flood plain	4, 9	0 (Max = 2)
2.6	Terrain Slope: $690/40 = 17.3$	4, 9	5 (Max = 5)

3.0 TARGETS

		Source	Value
3.1	Distance to Surface Water: 690 feet	1, 4, 9	10 (Max = 10)
3.2	Population Served within 2 miles (see WARM Scoring Manual Regarding Direction): No intakes downgradient, no lakes used	4, 6, 9	0 (Max = 75)
3.3	Area Irrigated by surface water within 2 miles : $(0.75)*\sqrt{16} = 3$	4, 6, 9	3 (Max = 30)
3.4	Distance to Nearest Fishery Resource: 690 feet	1, 4, 9, 10	12 (Max = 12)
3.5	Distance to, and Name(s) of, Nearest Sensitive Environment(s): 690 feet, Silver Creek	1, 4, 9, 10	12 (Max = 12)

4.0 RELEASE

Explain Basis: Analytical results confirm release to seep. Seep drains to surface water.	Source: <u>1, 2, 3, 4</u> Value: <u>5</u> (Max = 5)
---	---

WORKSHEET 6
Groundwater Route

1.0 SUBSTANCE CHARACTERISTICS

1.2 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	Cadmium	5.0	8	225	5	0.0005	5	ND	ND	-
2	Arsenic	10.0	8	763	5	0.001	5	A	1.75	7
3	Lead	5	8	ND	ND	<0.01	10	ND	ND	-
4	Benzo(b)fluorothene	0.2	10	ND	ND	ND	ND	B2	11.5	7
5										
6										

* Potency Factor

Source: 2,4,5

Highest Value: 10

(Max = 10)

Plus 2 Bonus Points? +2

Final Toxicity Value: 12

(Max = 12)

1.2 Mobility (use numbers to refer to above listed substances)		
Cations/Anions	OR	Solubility (mg/L)
1= >1 = 3	1=	
2= >1 = 3	2=	
3= 0.1 – 1.0 = 2	3=	
4= 0 = 0	4=	
5=	5=	
6=		

Source: 2,4,5

Value: 3

(Max = 3)

1.3 Substance Quantity:	
Explain basis: Unknown, use default = 1	Source: <u>1,2,3,4</u> Value: <u>1</u> (Max=10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	Containment (explain basis): Landfill 1) No liner = 3, 2) Cover but ponding of water observed = 2 3) No leachate collection = 2 4) Possible free liquids in landfill = 1	1,2,3,4	<u>8</u> (Max = 10)
2.2	Net precipitation: Sedro Woolley = $29.6 - 5.7 = 23.9$	4,8	<u>3</u> (Max = 5)
2.3	Subsurface hydraulic conductivity: clay	3,4,7	<u>1</u> (Max = 4)
2.4	Vertical depth to groundwater: confirmed release to shallow groundwater = 8	3,4,7	<u>8</u> (Max = 8)

3.0 TARGETS

		Source	Value
3.1	Groundwater usage: Public supplies, no other unthreatened sources near	4,9,11	<u>9</u> (Max = 10)
3.2	Distance to nearest drinking water well: <600 feet	1,3,4,9	<u>5</u> (Max = 5)
3.3	Population served within 2 miles: = $\sqrt{973} = 31$	4,7,9,11	<u>31</u> (Max = 100)
3.4	Area irrigated by (groundwater) wells within 2 miles: (0.75)*√0 acres = 0	4,6,9	<u>0</u> (Max = 50)

4.0 RELEASE

		Source	Value
	Explain basis for scoring a release to groundwater: Base of dump below level Of shallow aquifer, analytical results from seep showing contamination	1,2,3,4	<u>5</u> (Max = 5)

SOURCES USED IN SCORING

1. Skagit County Health Department, Initial Investigation Field Report - Alger Dump, April 2004.
2. Skagit County Health Department and Edge Analytical, Sample Data from Alger Dump, July 2006.
3. Skagit County Health Department, Alger Dump Historical files, 1990-present.
4. Washington Department of Ecology, WARM Scoring Manual, April, 1992.
5. Washington Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January, 1992.
6. Washington Department of Ecology, Water Rights Information System (WRIS), 1997.
7. Washington Department of Ecology, Well Logs.
8. National Weather Service, Washington Climate Data.
9. Skagit County Mapping and Health Departments, USGS, FEMA, Digital Ortho photographs, Parcel and Public Water System Source Data, December 2006.
10. Skagit County Public Works, Surface Water Management (Rick Haley), Conversation, July 2006.
11. Washington Department of Health, Public Water System Data from Sentry Internet, December 2006.
12. United States Department of Agriculture, Soil Conservation Service, Soil Survey of Skagit County Area, Washington, September 1989.
13. United States Fish and Wildlife Service, National Wetlands Inventory, Wetlands Mapper, December 2006.



⊕ = Well or surface
Water sample location

All sample locations
approximate

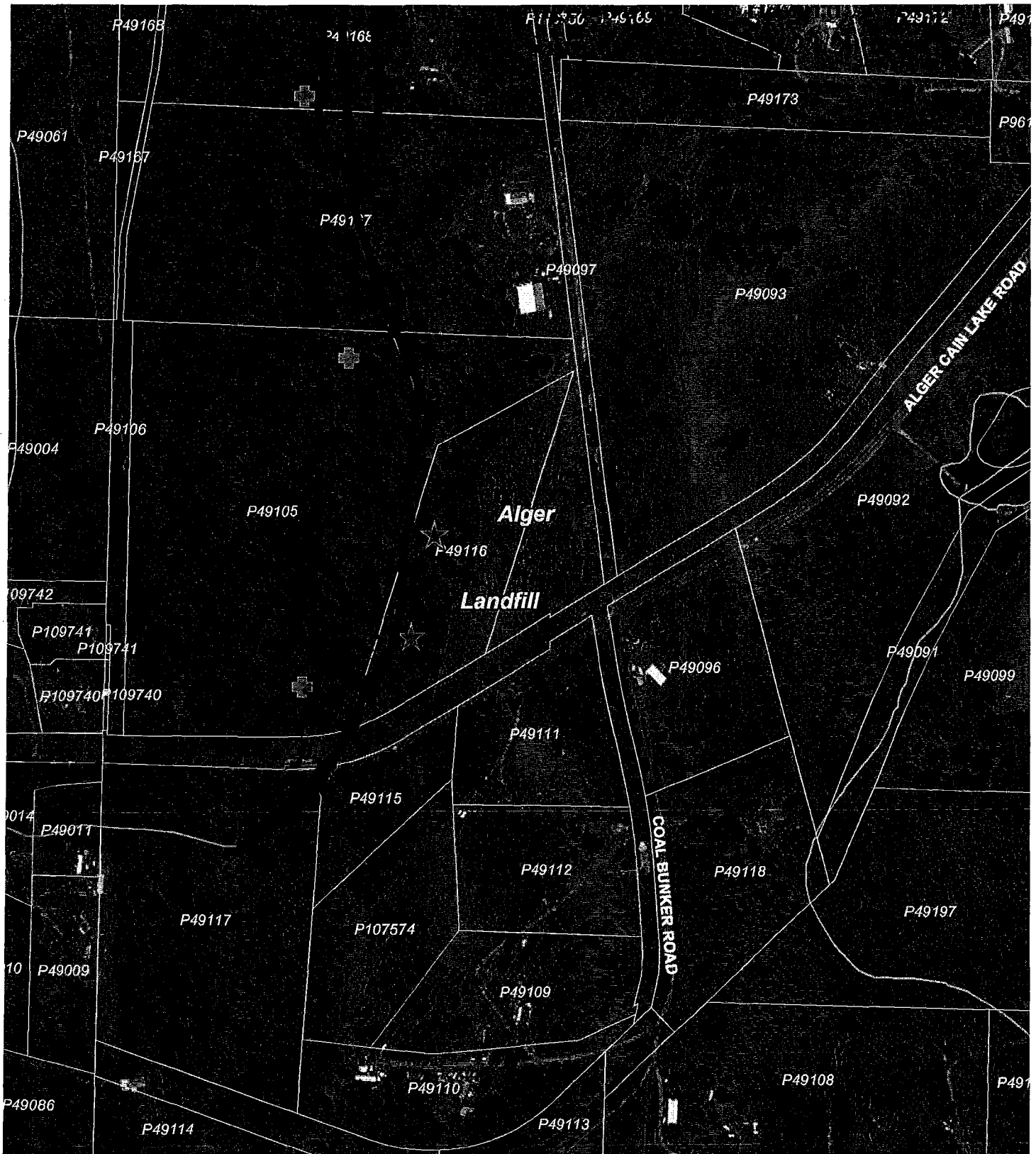
Skagit County disclaims any warranty of merchantability or warranty of fitness of this map for any particular purpose, either expressed or implied. No representation or warranty is made concerning the accuracy, currency, completeness or quality of data depicted on this map. Any user of this map assumes all responsibility for use thereof, and further agrees to hold Skagit County harmless from and against any damage, loss, or liability arising from use of this map.



Alger Landfill

400 200 0 400 Feet

1 inch equals 400 feet



- ★ Seep water and sediment sample location
- ✚ Creek sediment sample location
- All sample locations approximate

Skagit County disclaims any warranty of merchantability or warranty of fitness of this map for any particular purpose, either expressed or implied. No representation or warranty is made concerning the accuracy, currency, completeness or quality of data depicted on this map. Any user of this map assumes all responsibility for use thereof, and further agrees to hold Skagit County harmless from and against any damage, loss, or liability arising from use of this map.



Alger Landfill

400 200 0 400 Feet

1 inch equals 400 feet

Figure 1 - Alger Landfill Area Topography

