SITE HAZARD ASSESSMENT

WORKSHEET 1

Summary Score Sheet

SITE INFORMATION:

Site Name: Shelton C Street Landfill
Address: C Street, Shelton
Ecology Facility Site ID No.: 1186
Section/Township/Range: 24/20N/4W WM
Latitude: 47.21470 Longitude: -123.13356

Site scored/ranked for the August 2014 update
Today's date: June 5, 2014

SITE DESCRIPTION:

The subject site occupies a 16.7 acre parcel west of Shelton designated undeveloped land. The undisturbed perimeter of the site is approximately 200 feet above sea level, while the former disposal area occupies a scalloped depression some 50 feet lower. West C Street and US Highway 101 provide the northern and general eastern boundaries for the site, respectively. South and west of the site, terrain drops steeply to the incised drainage of Goldsborough Creek. Currently the site is undeveloped and houses no structures. Access is limited through C Street, a gated road that bridges US Highway 101.

Originally in private ownership, the property was mined in the past for sand and gravel. Those operations created a characteristic bowl-shaped depression in the middle of the site. The property was acquired by the City of Shelton (City) in 1928 for use as a municipal landfill. In 1931 the City sold the property to Rayonier Pulp and Paper with stipulation that municipal landfilling could continue. This arrangement concluded in 1949 when the site was quit-claimed back to the City. As was typical for the time, landfill operations consisted of in-filling the topographic depression with minimal controls or management. A new City wastewater treatment plant, in operation about this time, periodically co-disposed wastewater treatment sludge with other municipal wastes. A simple incinerator operated at the site from the mid 1950s to reduce waste volume, with ash disposal in the main pit of the landfill. The incinerator structure was later removed and subsequent waste management included simple open burning.

In October 1972, the first state solid waste regulation was promulgated as Chapter 173-301 WAC, with requirements including daily cover, access restrictions, and vector control for landfills. Landfill inspections at the time documented infractions of these new requirements. A year later, the Olympic Air Pollution Authority and Mason County Regional Planning established a scheduled target date of August 1974 for the cessation of all open burning at the site.

Resolutions[1] of the Mason County Board of Commissioners, and the Mayor and Commissioners of the City of Shelton state that the Shelton Disposal Site – that is, the subject landfill – ceased operations on

[1] *Mason County No. 388*, March 25, 1974; *City of Shelton No. 307*, March 26, 1974

January 31, 1974. The following year, Washington State Department of Ecology (Ecology) completed a Land Disposal Site Modification Report for the site noting rats had been eradicated, burning stopped, water pollution corrected, the site covered, and a lockable bar gate installed across the entrance to the site. The process to achieve these actions is not documented.

A City wastewater treatment plant upgrade in 1979 resulted in a significant increase in the volume of dilute (~2% solids) wastewater sludge disposed in the landfill. Between July of 1979 and November of 1981 approximately 4.5 million gallons of wastewater was disposed, forming a shallow, half-acre lagoon. During this time, Mason County Health Department (MCHD) issued a specified waste permit allowing the placement of dredged material from Oakland Bay in the City landfill.

MCHD expressed concerns for the wastewater ponding that included potential infiltration, vector control, and public access for reasons of possible groundwater impact, and lack of vector prevention measures and access restrictions. In December of 1981, MCDH decided unpermitted sludge disposal created an emergency situation requiring immediate cessation of the practice. Future disposal was directed to a permitted facility and access to the sludge lagoon on site restricted. The City's Department of Community Development informed MCHD that granular material from the site would be used to cover the sludge lagoon.

The Simpson Timber Company (STC) long operated a wood-burning, boiler power plant at the Shelton mill site on Oakland Bay. Stack air emission controls were first imposed in 1976 and the light, fly-ash fraction was collected in so-called baghouses. This waste was then mixed with water and slurried to the City's wastewater treatment plant where the material typically settled out with other solids as treatment sludge. This waste stream containing STC ash was collected and disposed in the landfill between 1976 and 1981.

Between 1984 and 1986, the Environmental Protection Agency (EPA) conducted a National Dioxin Study to determine the extent of dioxin contamination in the United States and possible associated risks to human health and the environment. EPA established seven categories of sites for investigation. One of those categories (or "tiers" in the study) examined air emissions and ash from various combustion sources, including industrial incinerators and boilers. STC volunteered its wood-fired boiler power plant as part of the study. Subsequent work[2] found levels of dioxin and furan congeners concentrated in fly-ash captured in the baghouse emission control system. The principal congener of concern, 2,3,7,8-tetrachlorodibenzodioxin (TCDD), was found to range from non-detect to 4.2 parts per billion (ppb) in baghouse ash. Additional study work in Mason County included ash disposal areas. Ten samples of wastewater treatment sludge containing STC ash were taken from the sludge disposal area in the City landfill. These were composited and found TCDD at a concentration of 0.17 ppb. However, using toxic equivalency factors summed for combined dioxin / furan congeners produced a total concentration of 3.1 ppb. At the time of the study, EPA compared this to a 1 ppb level of concern for *residential* soils from the National Center for Disease Control. EPA also concluded that, while not actually characterized, risk to groundwater was extremely unlikely given the tendencies of dioxin compounds to bind strongly to organic and fine earth material, and exhibit very low aqueous solubility.[3]

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[2] *Simpson Timber Company Dioxin Study Final Report*; CH2M Hill, March 1987

[3] *Report of Dioxin Study Findings and Announcement of Public Meeting*,; EPA, April 1987

A joint Ecology and MCHD inspection in July of 1986 found the landfill in limited use at the time as evidenced by recent – albeit minor – public dumping and disposal of wastewater treatment sludge. In addition, the inspection noted a general lack of site access control and signage. A subsequent Ecology letter details these deficiencies, as well as other general closure and environmental monitoring requirements now in place for solid waste facilities from the 1985 state regulation, Chapter 173-304 WAC (replacing Chapter 173-301 WAC).

The City retained the environmental consulting firm Brown and Caldwell in 1987 to provide guidance and alternatives for closure of the landfill. A subsequent draft report[4] concluded with "site correction and closure recommendations" that evaluated site access controls, soil cover improvements over the waste disposal areas, and the possible need for groundwater monitoring.

Additional site access restrictions are deemed unnecessary with adequate protection being provided through isolating cover. Soil cover recommendations were made for two identified disposal areas; general "residue", and sludge deposition. Respectively, these consisted of: 1) 9-12 inches of fine, clay soil for reduced infiltration, covered with 6-9 inches of gravelly, silty sands as top barrier, and; 2) approximately 24 inches of "native gravelly soils". Both cover types would be graded to promote runoff. The recommendations do not include permeability specifications for either cover scheme. The report does not believe groundwater monitoring is necessary and suggests obtaining a variance from those requirements in the solid waste regulation (Chapter 173-304 WAC). There is no record of the City accepting or acting on any of the report's conclusions or recommendations.

In June of 2012, a large, mixed-use property scheme was proposed for development west of Shelton. Part of the proposal's southern property boundary adjoins the landfill. The redevelopment would potentially include 1,750 residential units, raising public concerns for potential hazardous exposure and groundwater quality at the site.

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):

There is currently no documentation confirming the presence of the substances of concern in surface water, air, or groundwater. The presence of dioxins in surface soils, however, has been confirmed. The presence of used oil, and its likely associated compounds, is suspected due to the historical use of the property as a landfill, but due to the documented process of incineration only the substances not subject to combustion would likely remain.

ROUTE SCORES:

Surface Water/Human Health:	Surface Water/Environmental.:
Air/Human Health:	Air/Environmental:
Groundwater/Human Health: **49.4 => 4**	

OVERALL RANK: 3

[4] *Correction and Closure Plan: Shelton Landfill Disposal Facility, Administrative Draft*; Brown and Caldwell, January 1988

WORKSHEET 2
Route Documentation

1. **SURFACE WATER ROUTE**
   a. List those substances to be considered for scoring: Source:

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

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

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

2. **AIR ROUTE**
   a. List those substances to be considered for scoring: Source:

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

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

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

3. **GROUNDWATER ROUTE**
   a. List those substances to be considered for scoring: Source: 1,2,3,11

      TPH as diesel (from naphthalene), benzene, toluene, ethyl benzene, xylenes, dibromoethane 1-2, dichloroethane 1-2, methyl tertiary-butyl ether, lead, cPAHs (using benzo(a)pyrene as an example), polychlorinated biphenyls (PCBs), and halogenated volatile organic compounds.

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

      The refuse disposed at the located was documented to have been burned; lead and cPAHs are likely to still be present in the burnt remains, where as potential volatile components of the waste oil are more likely to have been burned.

   c. List those management units to be considered for scoring: Source: 1,2

      Landfills

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

      Historically this site was used as a landfill.

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	Benzo(a)pyrene	0.2	10	50	10	--	ND	B2	12	7
2	Lead	5	8	--	ND	--	ND	--	--	ND
3										
4										
5										
6										

* *Potency Factor*

Source: 1,2,3,11

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 [Coefficient of Aqueous Migration (K)] OR	Solubility (mg/L)
1=	1= 1.2E-03 = 0
2=	2= -- = 2
3=	3 =
4=	4=
5=	5=
6=	6=

Source: 2,3

Value: 2
(Max = 3)

1.3 Substance Quantity:

Explain basis: Estimated using aerial photography of the potential area of impact. Approximately 240,835.6 square feet.	Source:1,2,7 **Value: 7** (Max=10)

2.0 MIGRATION POTENTIAL

		Source	Value
2.1	**Containment (explain basis):** Landfill with no liner, no documented cover, current vegetative cover, no collection system, possible free liquids in landfill	1,2	**7** (Max = 10)
2.2	**Net precipitation:** 60.1-70	2,4	**5** (Max = 5)
2.3	**Subsurface hydraulic conductivity:** Grove gravelly sandy loam	2,8	**4** (Max = 4)
2.4	**Vertical depth to groundwater:** average of 49 feet	1,2,12	**6** (Max = 8)

1.0 TARGETS

		Source	Value
3.1	**Groundwater usage:** public supply	2,5,6	**9** (Max = 10)
3.2	**Distance to nearest drinking water well:** 1377	2,5,7	**3** (Max = 5)
3.3	**Population served within 2 miles:** 25,146 connections, approximately 75,438 people served	2,5,6	**100** (Max = 100)
3.4	**Area irrigated by (groundwater) wells within 2 miles:(0.75)*√** Approximately 31 acres irrigated by groundwater within two miles	2,9,10	**4** (Max = 50)

2.0 RELEASE

	Source	Value
Explain basis for scoring a release to groundwater: The substances of concern were suspected to have been released to surface soil which makes the substances of concern available to the groundwater route, however, no release to groundwater was documented	1,2	**0** (Max = 5)

SOURCES USED IN SCORING

1. Washington State Department of Ecology Site Hazard Assessment File/TCP file
2. Washington State Department of Ecology, WARM Scoring Manual, April 1992
3. Washington State Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January 1992
4. U.S. Department of Interior Geological Survey Topographical Map
5. Washington State Department of Health, Public Water System Database
6. Washington State Department of Ecology, Water Resources Explorer
7. Mason County GIS map
8. Washington State Department of Agriculture, soil maps
9. Washington State Department of Ecology Water Rights Tracking System
10. GeoCommunicator, Land Survey Information System
11. Model Toxics Control Act, Statue and Regulation, November 2007
12. Washington State Department of Ecology Well Log Viewer
13. Washington State Department of Ecology, Washington State Costal Atlas Map
14. Washington State Department of Ecology, Costal Atlas, Flood Hazard Maps
15. NOAA Atlas 2 Precipitation Frequency Estimates
16. Daft Logic, Google Maps Find Altitude