



SITE HAZARD ASSESSMENT

Worksheet 1: Summary Score Sheet

SITE NAME: Albert Jensen & Sons, Inc.

Rank: 1

Cleanup Site ID: 14759

Completed on 8/7/2019 for inclusion

Facility/Site ID: 42226979

on the August 2019 Hazardous Sites List.

LOCATION OF SITE

1293 Turn Point Road

Township 35N, Range 3W, Section 13

Friday Harbor, San Juan County, WA 98250

Latitude, Longitude: 48.52543, -122.99927

Tax Parcel ID: 351341005000

SITE DESCRIPTION

Within Currently Defined Site Boundaries

The Albert Jensen & Sons, Inc. site (Site) is a four-acre shipyard currently operating as Jensen's Shipyard and Marina. It has been operating since about 1910 when it was used to build wooden boats. Its activities transitioned to boat repair, storage and maintenance when wooden boats were phased out. Ecology staff visited the site in 2018 and found property consisted of several derelict buildings, pier, a large over-water floating moorage structure in various states of repair, and a derelict railway. The owner reported to Ecology that an underground storage tank (UST) had been installed southwest of the oil storage building but was removed in the 1980s; Ecology has no information about this tank in its database of regulated underground storage tanks.

The aquatic portion of the Site consists of five acres leased from Washington Department of Natural Resources.

Historical Owners and Operators

<u>From</u>	<u>To</u>	<u>Owner/Operator</u>	<u>Site Uses</u>
~1910	mid-1900s	Albert Jensen & Sons, Inc.	shipyard and wooden boat manufacturing
mid-1900s	current	since 2018, owned by Port of Friday Harbor	shipyard with boat repair and maintenance

Area Surrounding the Site

The Site lies within Shipyard Cove on the north side of a narrow isthmus between North Bay and Friday Harbor (Figures 1, 2 and 3). Most of this parcel is relatively flat, but it does drop about 50 feet in elevation from the road to the shore, a distance of less than 280 feet (Figure 3), from the furthest inland portion of the property. The waterfront is about 677 feet in length; the beach profile suggests a low energy environment with little evidence of erosion or deposition, according to the Ecology Initial Investigation Field Report. The report also documents eelgrass beds (a critical habitat) in the sub-tidal areas close to the floating moorage structures. During low tide, groundwater can be observed from seeps.

One contaminated site (Big Store) is located within a mile of the Albert Jensen & Sons Site. It is listed on Ecology's Confirmed and Suspected Contaminated Sites List as awaiting cleanup.

SITE CHARACTERIZATION AND/OR REMEDIATION

Sediment sampling at the marina began in 1997 when Ecology collected six samples from Shipyard Cove for a broader study of four San Juan Island marinas. These samples were analyzed for total organic carbon,



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chromium, copper, lead, zinc, semivolatile organic compounds (SVOCs) and butyltins. The study found that of the four harbors, Shipyard Cove exhibited the highest concentrations of SVOCs and had polycyclic aromatic hydrocarbons (PAHs) in exceedance of Ecology's Marine Sediment Quality Standards (now known as Sediment Quality Objectives). Tributyltin and metals were also present.

The Phase I environmental site assessment (ESA) completed in 2017 identified several conditions that may impact the environment. As such, a Phase II ESA (termed an Initial Investigation by Whatcom Environmental) was conducted to evaluate soil and sediment conditions. Samples were collected throughout the Site's upland and sediment areas, including the former USTs area, former dumping area, shop floor drain, shipyard rail work area, OPALCO (Orcas Power & Light Cooperative) pad, stormwater pond, boat lift and work area, and around the floating dock (Figure 6, 7, and 8). For the purposes of this Site Hazard Assessment, these distinct areas were used to define management units within the Site, as described in the Special Considerations section.

Samples collected during the Phase II ESA were analyzed for NWTPH-Dx; NWTPH-Gx; benzene, toluene, ethylbenzene, toluene (collectively, BTEX); arsenic; cadmium; chromium; copper; lead; zinc; mercury; volatile (VOCs) and SVOCs; carcinogenic PAHs (cPAHs); naphthalenes, and polychlorinated biphenyls (PCBs). The soil sample results indicated that portions of the Site's upland area are contaminated with metals (primarily copper and lead), diesel- and oil-range petroleum hydrocarbons, and cPAHs. The report states that sediment sample results "indicated that marine sediments (particularly near the shore) are contaminated with metals (primarily copper, zinc, and mercury), PAHs, PCBs, phthalates, pesticides, and tributyltin."

In August 2018, Whatcom Environmental completed additional investigations which focused on better characterizing the upland area and analyzing groundwater conditions. The study included drilling 25 soil borings, six of which were completed as groundwater monitoring wells (MW1 - 6). At that time, the static water levels in MW-1 through MW-5 ranged in depth from 5 - 10 feet bgs and was measured at 37 feet bgs in MW-6.

From the soil borings, one or more soil samples were collected (totaling 56 soil samples) and one sample was collected from the base of a stormwater pond. These samples were analyzed for NWTPH-Dx, NWTPH-Gx, BTEX, naphthalenes, cPAHs, lead, arsenic, cadmium, chromium, copper, zinc, mercury, PCBs, dioxins, and furans. The stormwater pond sediment sample was also analysed for metals by TCLP (toxicity characteristic leaching procedure) to determine if it met the criteria for dangerous waste. Following installation of monitoring wells, six groundwater samples were collected and analyzed for NWTPH-Dx, NWTPH-Gx, BTEX, naphthalenes, cPAHs, lead, arsenic, cadmium, chromium, copper, zinc, and mercury.

The remedial investigation determined that primary contaminant impacts exceeding Model Toxics Control Act (MTCA) Method A cleanup standards in the Site's upland area were made to shallow, 2 - 6 inch deep soils (Figure 9). Diesel- and oil-range petroleum hydrocarbons, metals, dioxins, and cPAHs exceeded standards in a number of locations throughout the study site. Petroleum hydrocarbons, metals and cPAHs were also found in a few deeper samples collected from 2 feet, 3 feet and 5 feet bgs. Just two shallow samples were analyzed for cPAHs so its vertical and horizontal extent was not determined.

The sample collected from the stormwater pond confirmed the presence of copper and lead at levels exceeding Method A. The six groundwater samples revealed one exceedance for arsenic in MW-1, although low levels of gas- and diesel-range petroleum hydrocarbons were also detected in MW-1 and MW-2.

ADDITIONAL INFORMATION COLLECTED BY THE SITE HAZARD ASSESSOR

The site assessor requested results of an investigation conducted in 2018, which had not previously been reported to Ecology. Port of Friday Harbor complied with this request by providing a draft copy of a "Remedial Investigation/Feasibility Study" report. This report does not demonstrate the results of a remedial investigation overseen or reviewed by Ecology; it also did not include a feasibility study. Ecology is in the process of finalizing an Agreed Order with the Port of Friday Harbor, which will include further soil, sediment and groundwater investigations and the completion of a full Remedial Investigation/Feasibility Study report.

Based on the sampling previously conducted and a previous site visit by Ecology, additional site visits and data collection were deemed unnecessary for the purposes of this site assessment. Therefore, the information used

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to score this site is based solely on the soil, sediment and groundwater investigation and sampling reports submitted to Ecology.

SPECIAL CONSIDERATIONS

Checked boxes indicate routes applicable for Washington Ranking Method (WARM) scoring

Surface Water

Based on copper, cPAHs, mercury and PCBs present in sediment samples collected from the DIY Repairs & Maintenance area, these substances have the potential to directly discharge to Friday Harbor. Tributyltin, pesticides and phthalates were also confirmed in sediments but were not included in scoring since the maximum toxicity score was achieved without them.

Air

Arsenic, cadmium, cPAHs (as benzo(a)pyrene), diesel-range petroleum hydrocarbons, dioxins, lead, and mercury are present in shallow soils in the Shipyard Railways and Work Area which may pose a risk to human health and the environment through the air pathway.

Groundwater

A sample collected from MW-1 (in the Shop Floor Drain Area) confirmed arsenic is present in groundwater.

During soil, groundwater and sediment sampling events, the site was confirmed to be impacted with a number of contaminants of concern. To simplify scoring and determine which contaminants to use for each potential exposure pathway, a combination of toxicity values and discrete areas of use were evaluated (Table 1). First, contaminants used for scoring were limited to those with the highest toxicity values (i.e. 8-10), according to the Washington Ranking Method manual. Second, for each route, the area with the greatest number of high toxicity substances was identified. Using this approach, the DIY Repairs & Maintenance area was determined as most impactful to the surface water route; the Shipyard Railways & Work area for the air route; and monitoring well MW-1, the only well to exhibit groundwater contamination, for the groundwater route.

The contaminants listed above is not intended to represent the complete list of substances present at the Site. Other discrete management units investigated on the Site also demonstrate contamination present at levels exceeding MTCA cleanup standards, including the Boat Lift & Work Areas, OPALCO Pad, Shop Floor Drains, and former Aboveground Storage Tank (AST) areas. To develop a better understanding of conditions at the site, Ecology recommends reviewing Ecology records, which describe investigations conducted on the Albert Jensen & Sons Site over a 21-year span.

The presence of a domestic well on the property is documented in a water right claim filed in 1974. Port of Friday Harbor confirms this well is used for irrigation in the property but not a source of drinking water. According to Dept. of Health, the Town of Friday Harbor provides drinking water (sourced from Trout Lake) to the entire Friday Harbor area. Trout Lake is located more than five miles west of the Site (Figure 4). Prior to completion of this Site Hazard Assessment, Ecology could not confirm with Port of Friday Harbor if the onsite well was still in use. The nearest drinking water well outside this area is about two miles away and upgradient. The Site is not hooked up to municipal sewer or stormwater systems, according to Town of Friday Harbor.

Ecology records also include four water rights documenting irrigation use from groundwater wells installed within a two-mile radius of the Site. Based on the topography of the area (Figure 5), the location of irrigation wells, the limited area with confirmed groundwater contamination and the proximity of contamination to sea level, it was determined that contaminated groundwater would likely not be used for irrigation in areas other than the Site.

ROUTE SCORES

Surface Water/ Human Health: 42.9

Surface Water/ Environment: 74.4



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Air/ Human Health:	19.9	Air/ Environment:	4.9
Groundwater/ Human Health:	32.8		

Overall Rank: 1



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REFERENCES

- 1 Concentrations of Selected Chemicals in Sediments from Harbors in the San Juan Islands, Dept. of Ecology, March 2001
- 2 Dept. of Ecology Water Rights Explorer - <https://fortress.wa.gov/ecy/waterresources/map/WaterResourcesExplorer.aspx>
- 3 Dept. of Ecology Well Log database
- 4 Dept. of Health Office of Drinking Water website - <https://fortress.wa.gov/doh/eh/portal/odw/si/Intro.aspx>
- 5 Dept. of Health Source Water Assessment Program Mapping Application - <https://fortress.wa.gov/doh/swap/index.html>
- 6 Draft Remedial Investigation Report, Whatcom Environmental Services, October 15, 2018
- 7 GWIS application using aerial photography
- 8 Initial Investigation Field Report, Dept. of Ecology, July 9, 2018
- 9 Initial Investigation Report, Whatcom Environmental Services, April 2, 2018
- 10 Rain Master Control Systems website - <http://www.rainmaster.com/>
- 11 San Juan County Polaris Property Search - <https://sjcgis.maps.arcgis.com/apps/webappviewer/index.html?id=39b87792947e40a5aa0fcb8af5910bd1>
- 12 Toxicology Database for Use in Washington Ranking Method Scoring, Dept. of Ecology, January 1992 (including updates)
- 13 US Climate Data website - <https://www.usclimatedata.com>
- 14 Washington Dept. of Fish & Wildlife Priority Habitat and Species Map - <http://apps.wdfw.wa.gov/phsontheweb/>
- 15 Washington Ranking Method (WARM), Dept. of Ecology, April 1992



SITE HAZARD ASSESSMENT Worksheet 2: Route Documentation

SITE NAME: Albert Jensen & Sons, Inc.

Cleanup Site ID: 14759

Facility/Site ID: 42226979

1. SURFACE WATER ROUTE

List those substances to be considered for scoring:

copper, cPAHs (benzo(a)pyrene), mercury and PCBs

Explain the basis for choice of substances to be used in scoring:

Substances confirmed in shallow and/or deep sediment samples

List those management units to be considered for scoring:

sediments

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

Intertidal and subtidal sediments are documented to be contaminated

2. AIR ROUTE

List those substances to be considered for scoring:

arsenic, cPAHs (benzo(a)pyrene), cadmium, diesel (naphthalenes), lead, mercury, and dioxins (TCDD)

Explain the basis for choice of substances to be used in scoring:

Substances confirmed in shallow soil samples collected from the upland area.

List those management units to be considered for scoring:

surface soils

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

Shallow soils contain substances that may become resuspended as particulates and volatile contaminants.

3. GROUNDWATER ROUTE

List those substances to be considered for scoring:

arsenic

Explain the basis for choice of substances to be used in scoring:

Arsenic is confirmed present in MW-1.

List those management units to be considered for scoring:

groundwater

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

Groundwater is documented to be contaminated.

Figure 1: Albert Jensen & Sons Site Location (source: Bing)

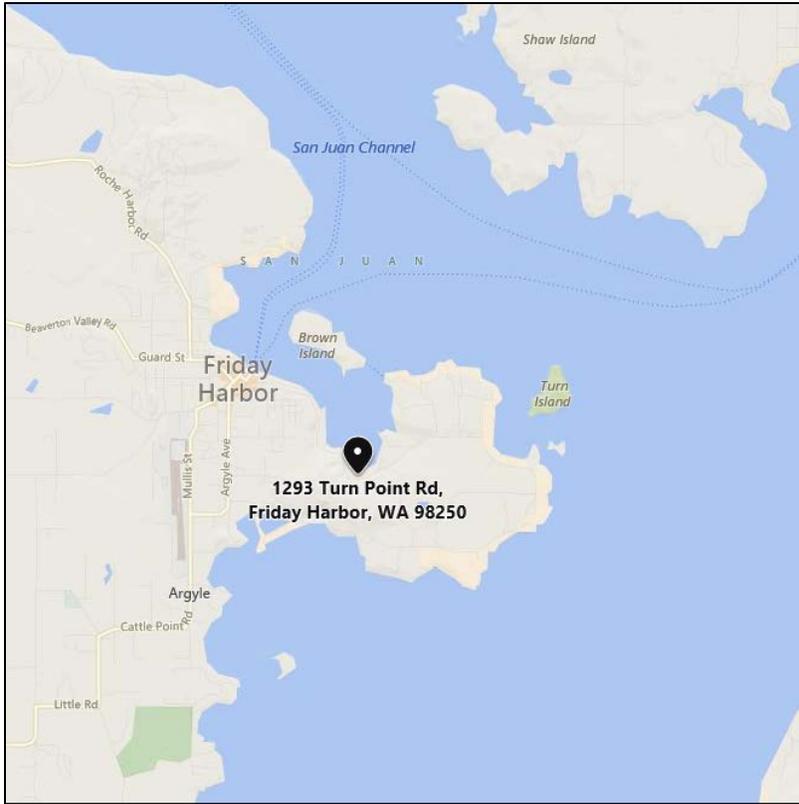


Figure 2: Albert Jensen & Sons Site Vicinity (source: Bing)

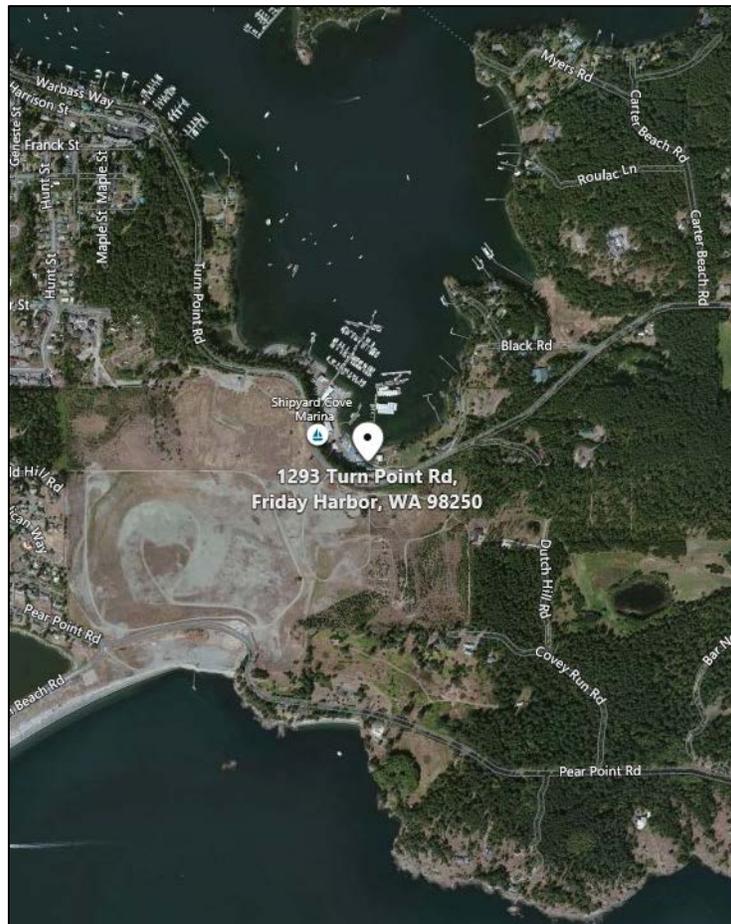


Figure 3: Albert Jensen & Sons Parcel Boundary (source: San Juan County Polaris Property Search)



Figure 3: LIDAR imagery of Albert Jensen & Sons Site demonstrating 50 feet elevation difference from road to water (source: San Juan County)

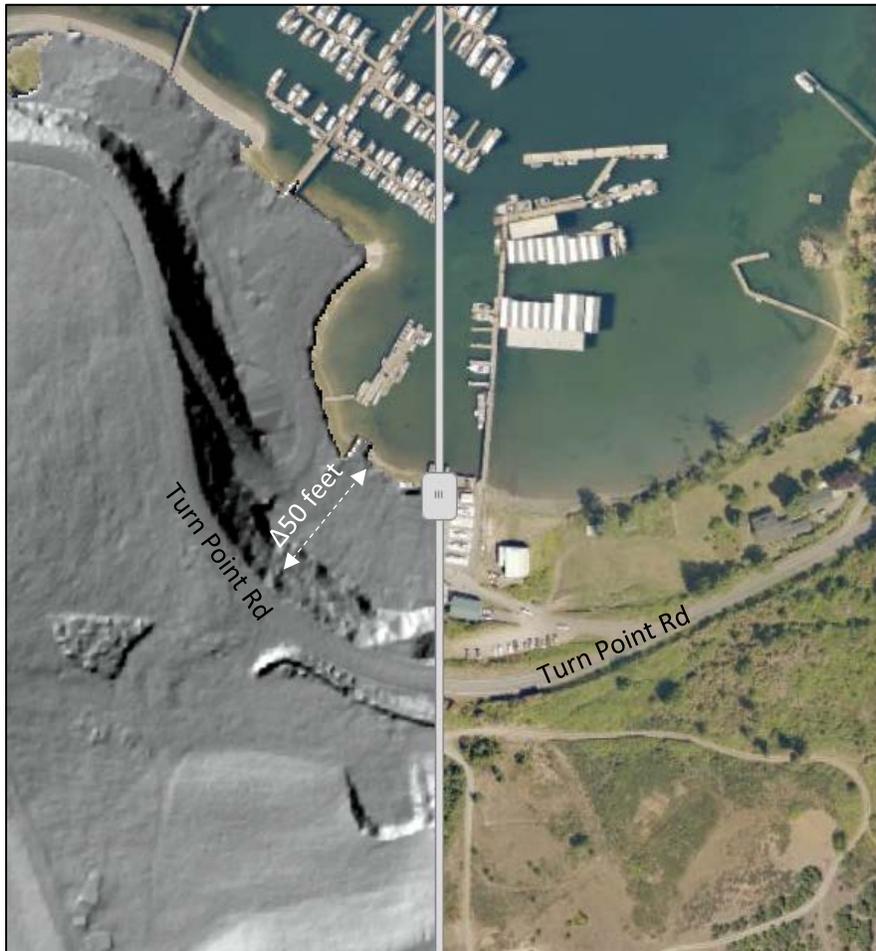


Figure 4: Area (in yellow) served by Town of Friday Harbor surface water supply (source: Dept. of Health)

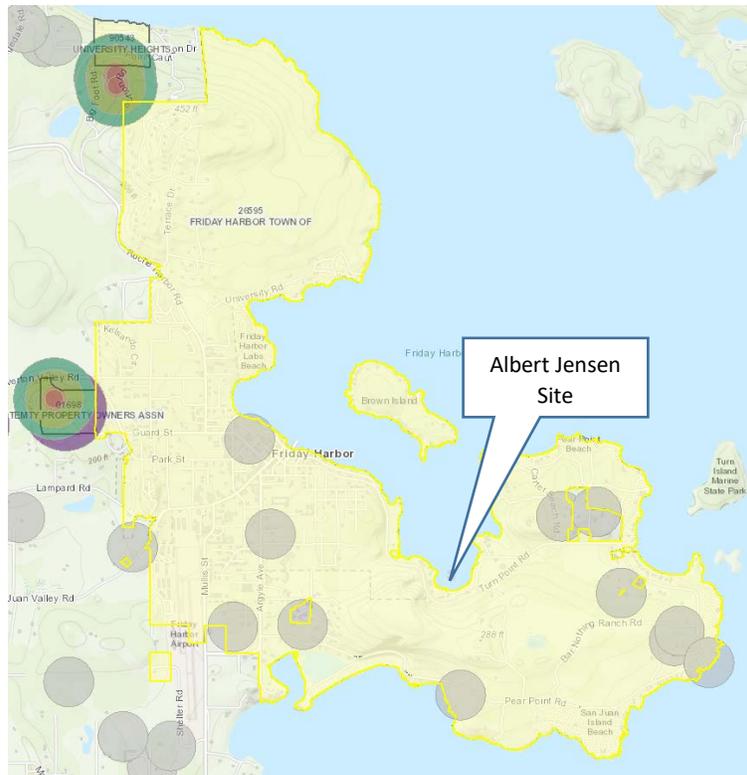


Figure 5: Surface topography mapped with red arc showing limits of two-mile radius to the west

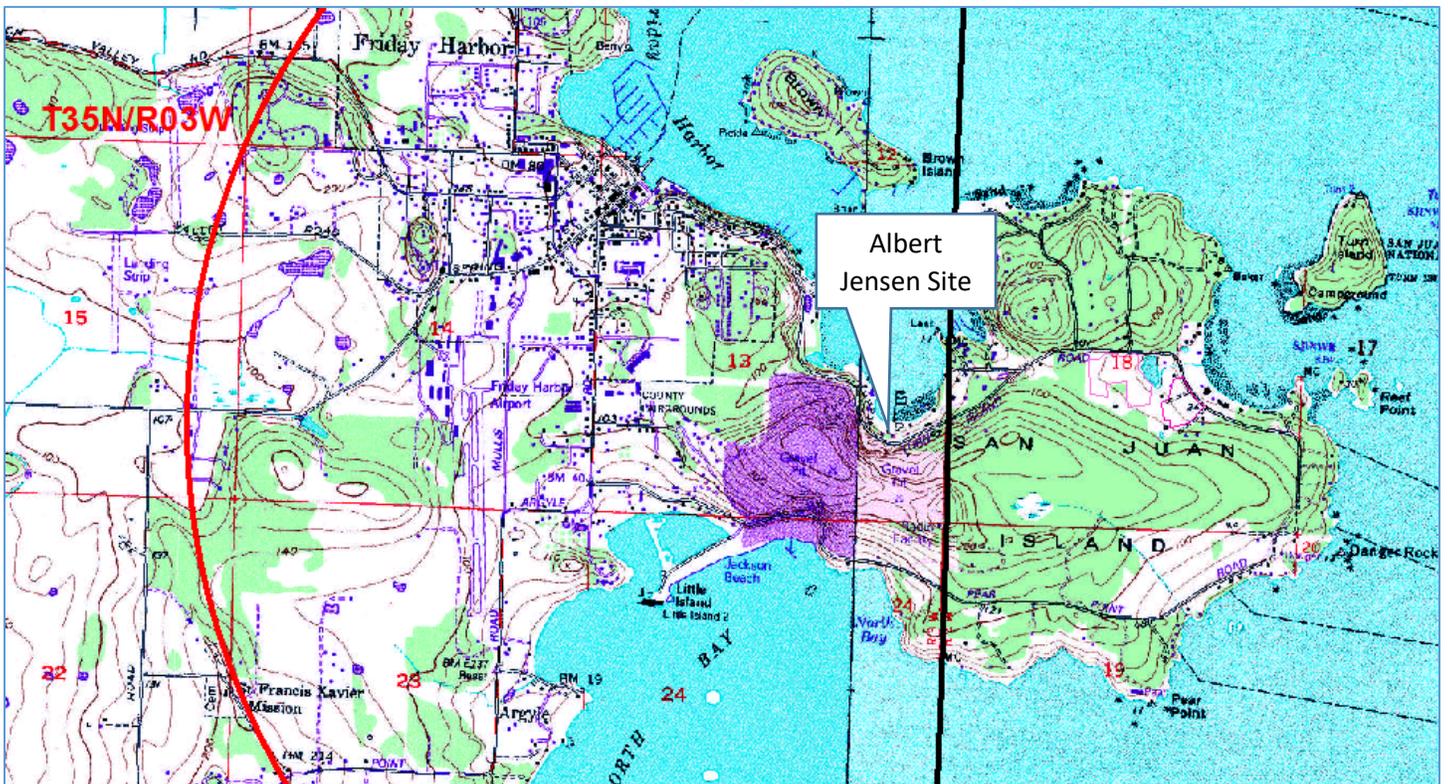


Figure 6: Subject property with potential areas of contamination and initial investigation sampling locations. MW-1 is in the location of Shop Floor Drains 1-3 (source: Whatcom Environmental Initial Investigation Report)



Figure 7: Upland Soil Sample Results Map (source: Whatcom Environmental Initial Investigation Report)

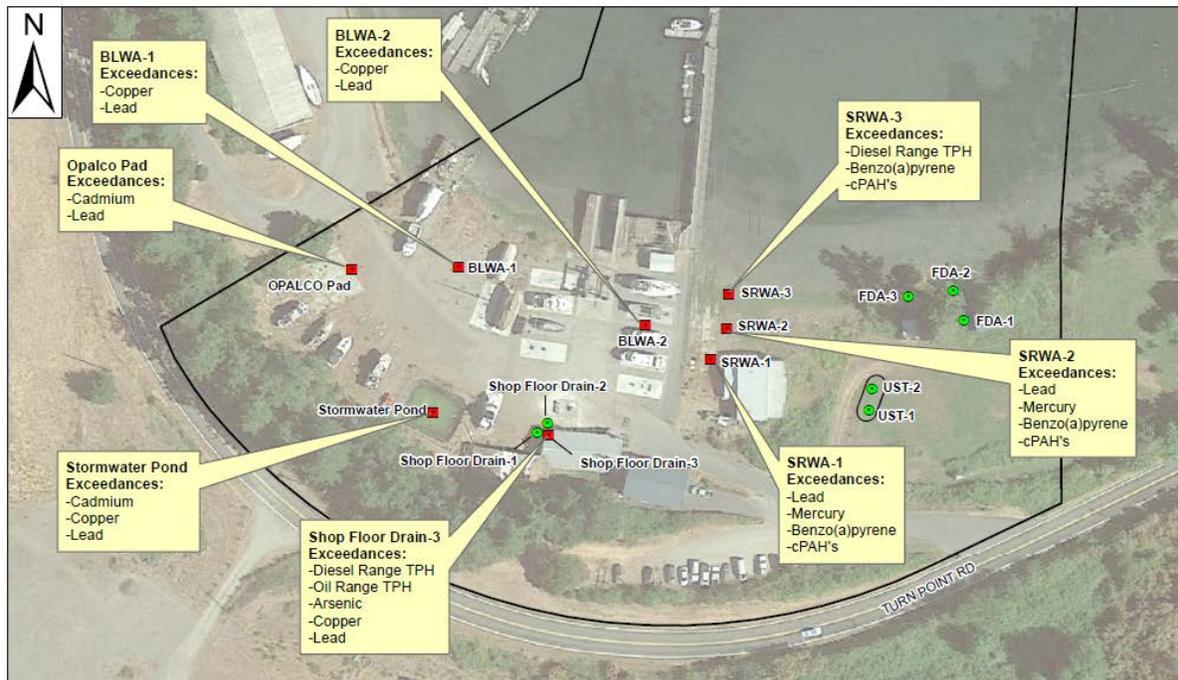


Figure 8: Sediment sample locations exceeding MTCA cleanup standards (source: Whatcom Environmental Initial Investigation Report)

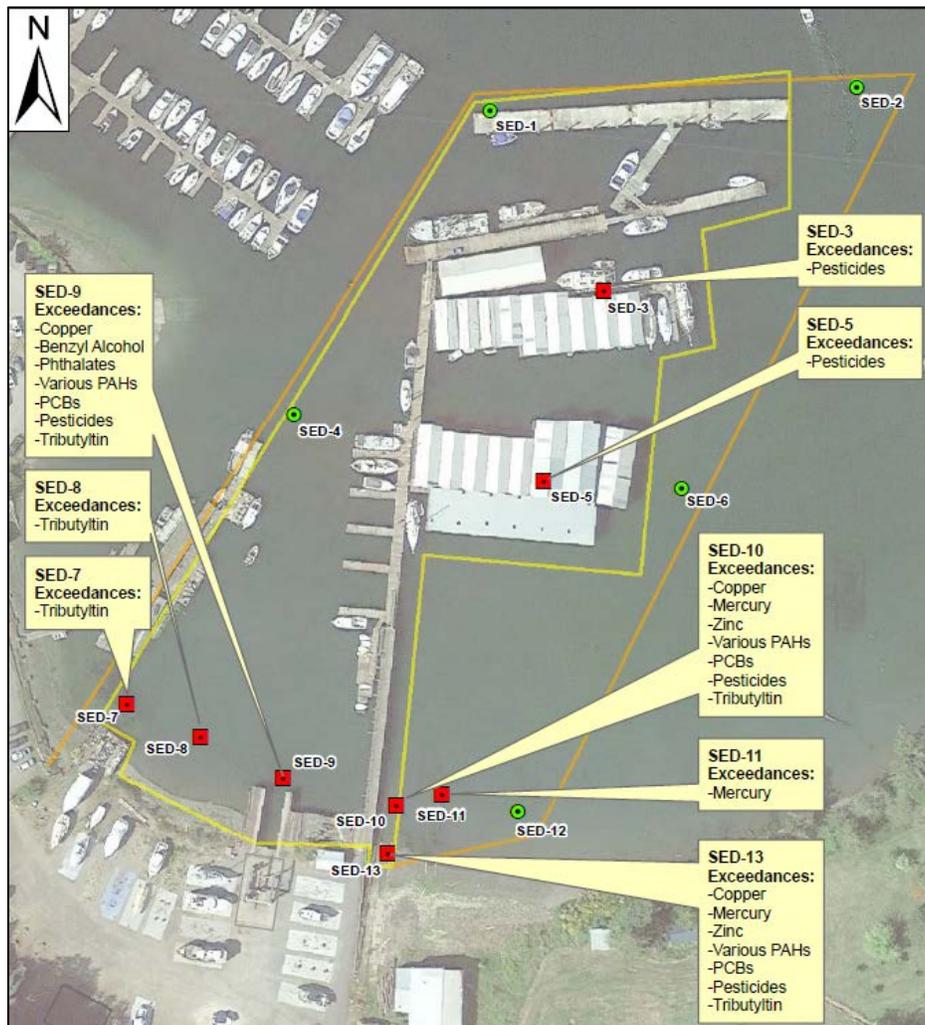
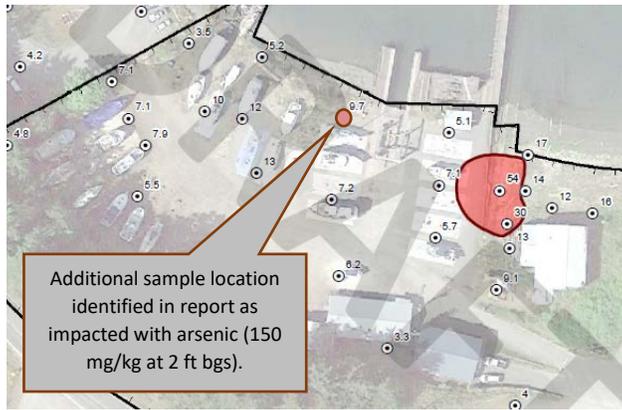
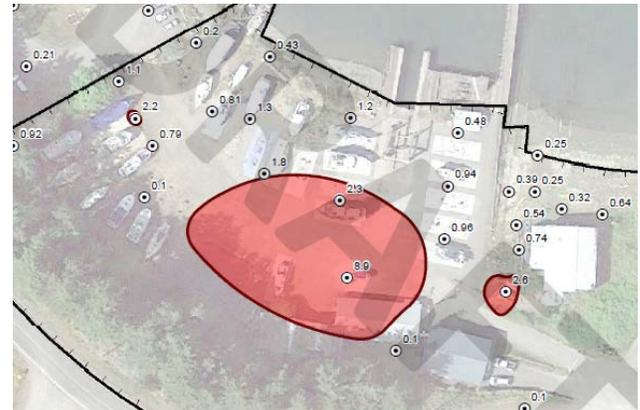


Figure 9: Surficial soil contaminant concentration maps with MTCA cleanup standards (source: Whatcom Environmental RI/FS Report)

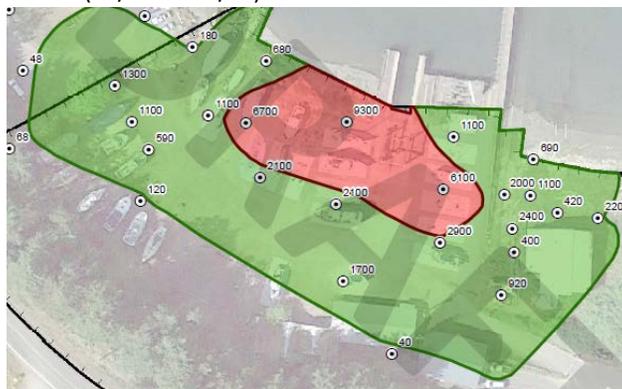
ARSENIC (20 MG/KG):



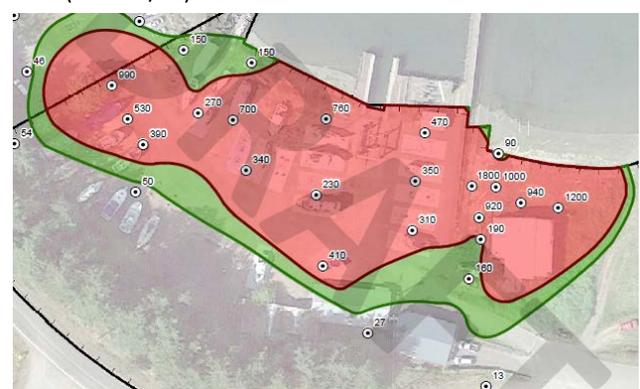
CADMIUM (2.0 MG/KG):



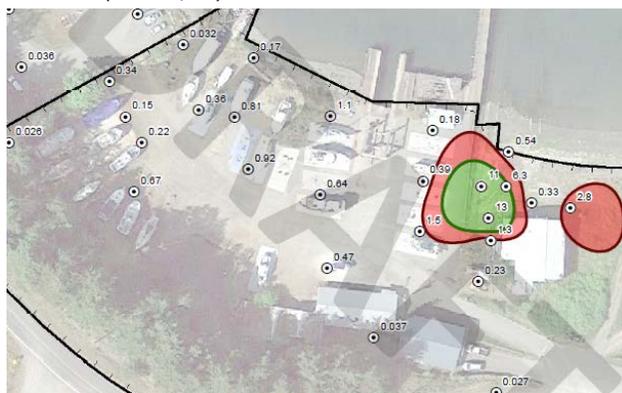
COPPER (19/2000 MG/KG):



LEAD (250 MG/KG):



MERCURY (2.0 MG/KG):



DIESEL (2000 MG/KG):



CPAHS (0.1 MG/KG TOXICITY EQUIVALENCY)

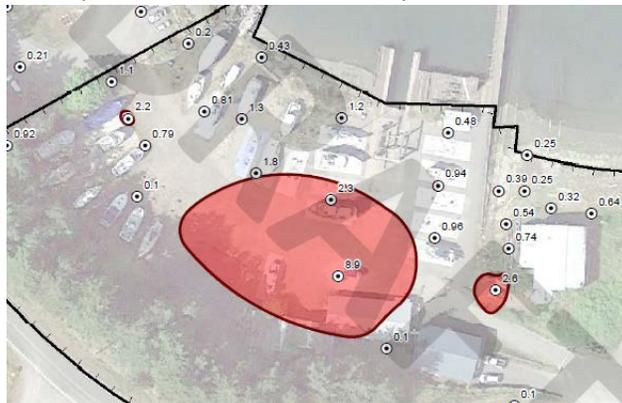


Table 1: Management units and hazardous substances exceeding MTCA Method A levels as described in Whatcom Environmental reports

Hazardous Substance	Potential Exposure Route(s)*	Sediments		Uplands										GW		
		DIY Repairs & Maintenance (sediment)		Boat Lift & Work Areas (soil)		Stormwater Evaporation Pond		Shipyard Railways and Work Area		OPALCO Pad		Shop Floor Drains		AST		MW-1 (Shop Floor Drain area)
		> MTCA Method A	depth present	> MTCA Method A	depth present	> MTCA Method A	depth present	> MTCA Method A	depth present	> MTCA Method A	depth present	> MTCA Method A	depth present	> MTCA Method A	depth present	> MTCA Method A
arsenic	Air, SW, GW			x	2'			x	3-6"			x	1.5'			x
cadmium	Air, SW			x	6", 2'	x	surface	x	2-6"	x	1-4"	x	2-6"			
copper	SW	x	shoreline	x	0-6", 2'	x	surface					x	1.5'			
cPAHs (TEQ based on benzo[a]pyrene)	Air, SW	x	shoreline	x	2-6"			x	0-6", 3'							
diesel/oil	Air							x	0-6"			x	2-6", 1.5'	x	2'	
dioxins (TEQ based on 2, 3, 7, 8-TCDD)	Air, SW			x	2-6"			x	2-6"							
lead	Air, SW			x	0-6", 2', 5'	x	surface	x	1-6"	x	1-6"	x	2-6"			
mercury	Air, SW	x	shoreline					x	1-6"							
PCBs (total Aroclors)	SW	x	shoreline													

* if the exposure route is listed, it indicates an 8-10 toxicity scoring value (using WARM) for that contaminant of concern management unit used in this SHA

Worksheet 4

Surface Water Route

CSID: Albert Jensen & Son

Site: 14759

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drink. Wat. Stnd.		Acute Toxicity		Chronic Toxicity		Carcinogenicity <small>AQJ, CPFO</small>	
	Value (ug/L)	Score	Value (mg/kg)	Score	Value (mg/kg/day)	Score	(risk/mg/kg- day)	Score
Benzo(a)pyrene	0.2	10	50	10	3.00E-04	5	8.00E-01	5
Copper	1,000	4	--	X	4.00E-02	1	--	X
Mercury, inorganic	2	8	--	X	--	X	--	X
PCBs	0.5	10	1,315	3	--	X	1.60E+00	7

Maximum score: 10

Bonus points: 2

Source: WARM Toxicity Database

Human Toxicity Score: 12

Range: 1-12

1.2 Environmental Toxicity

Freshwater:

Marine: x

Substance	Acute Water Quality Criterion Value	
	(ug/L)	Score
Benzo(a)pyrene	300	4
Copper	4.8	8
Mercury, inorganic	1.8	8
PCBs	10	8

Maximum score: 8

Source: WARM Toxicity Database

Environmental Toxicity Score: 8

Range: 2-10

1.3 Substance Quantity

Amount: ~626-3125 cubic yards

Basis: calc. surface area * depth of confirmed cPAH in sediments

Source: Initial Investigation Report

Substance Quantity Score: 6

Range: 1-10

2.1 Containment

Description: none - the substances are in contact with surface water

Source: Initial Investigation Report

Containment Score: 10
Range: 0-10

SUBSTANCE PARAMETER CALCULATIONS

Human Health Pathway

SUBh (Human Toxicity + 3) x (Containment + 1) + Substance Quantity

171.0

Environmental Pathway

SUBe (Environ. Toxicity + 3) x (Containment + 1) + Substance Quantity

127.0

2.0 MIGRATION POTENTIAL

2.2 Surface Soil Permeability

Description: sand

Source: San Juan County Polaris Property Search

Soil Permeability Score: 1
Range: 1-7

2.3 Total Annual Precipitation

Amount (in.): apply max score - substances in contact

Source: Initial Investigation Report

Annual Precipitation Score: 5
Range: 1-5

2.4 Maximum Two-Year/24-Hour Precipitation

Amount (in.): apply max score - substances in contact

Source: Initial Investigation Report

24-Hour Precipitation Score: 5
Range: 1-5

2.5 Flood Plain

Classification: apply max score - substances in direct contact

Source: Initial Investigation Report

Floodplain Score: 2
Range: 0-2

2.6 Terrain Slope

Degree of slope: apply max score - substances in direct contact

Source: Initial Investigation Report

Terrain Slope Score: 5
Range: 1-5

MIGRATION PARAMETER CALCULATION

MIG = Soil Permeability + Annual Precip. + 24-Hour Precip. + Floodplain + Slope

18.0

3.0 TARGETS

3.1 Distance to Surface Water

Name: Pacific Ocean (via Friday Harbor)
Distance (ft): <1000
Source: iMap

Distance to Surface Water Score: 10
Range: 0-10

3.2 Population Served within 2 Miles

Population: 0 - marine waters not used for drinking
Source: n/a

Population Served Score: 0
Range: 0-75

3.3 Area Irrigated within 2 Miles

Basis: marine water not used for irrigation
Area (acres): 0
Source: n/a

Area Irrigated Score: 0
Range: 0-30

3.4 Distance to Nearest Fishery Resource

Name: Friday Harbor
Distance (ft): <1000
Source:

Distance to Fishery Score: 12
Range: 0-12

3.5 Distance to Nearest Sensitive Environment

Name: Friday Harbor - critical habitat for pinto abalone and golden eagles
Distance (ft): <1000
Source: WDFW PHS on the Web

Distance to Sensitive Environment Score: 12
Range: 0-12

TARGET PARAMETER CALCULATIONS

Human Health Pathway

TARh: Dist. to Surface Water + Population Served + Area Irrigated 10.0

Environmental Pathway

TARe Dist. to Surface Water + Dist. to Fishery + Dist. to Sensit. Environ. 34.0

4.0 RELEASE

Evid. of release? substances are confirmed in sediment samples
Source: Initial Investigation Report

Release Score (REL): 5.0
Range: 0 or 5

SURFACE WATER ROUTE CALCULATIONS

Human Health Pathway

$$SW_h = (SUB_h \times 40/175) \times [(MIG \times 25/24) + REL + (TAR_h \times 30/115)] / 24$$

42.9

Environmental Pathway

$$SW_e = (SUB_e \times 40/153) \times [(MIG \times 25/24) + REL + (TAR_e \times 30/34)] / 24$$

74.4

Range: 0-100

Worksheet 5

Air Route

CSID: Albert Jensen & Son:

Site: 14759

1.0 SUBSTANCE CHARACTERISTICS

1.1 Introduction

No scoring in Section 1.1.

1.2 Human Toxicity

Substance	Amb. Air Stnd.		Acute Toxicity		Chronic Toxicity		Carcinogenicity	
	Value (ug/m ³)	Score	Value (mg/m ³)	Score	Value (mg/kg/day)	Score	AQJ. CPFI (risk/mg/kg- day)	Score
Arsenic	0.000303	10	--	X	4.29E-06	10	1.51E+01	9
Benzo(a)pyrene	0.000909	10	--	X	5.71E-07	10	1.68E+00	7
Cadmium	0.000238	10	25	10	2.86E-06	10	5.04E+00	7
Diesel (naphthalene)	0.0294	10	--	X	8.57E-04	10	5.95E-02	5
Lead	0.0833	10	--	X	--	X	--	X
Mercury, inorganic	0.09	10	--	X	8.50E-05	10	--	X
TCDD [dioxins]	2.63E-08	10	--	X	--	X	--	X

Maximum score: 10

Bonus points: 2

Source: WARM Toxicity Database

Human Toxicity Score: 12

Range: 1-12

1.3 Mobility

Gaseous Mobility

Substance	Vapor Pressure		Henry's Law	
	Value (mm Hg)	Score	Value (atm- m ³ / mol)	Score
Arsenic			0.0E+00	X
Benzo(a)pyrene	< 1E-4	1		
Cadmium	0.0E+00	X		
Diesel (naphthalene)	8.2E-02	3		
Lead	0.0E+00	X		
Mercury, inorganic	2.0E-03	3		
TCDD [dioxins]	1.7E-06	1		

Maximum score: 3

Source: WARM Toxicity Database

Particulate Mobility

Soil type: sand and gravel

Erodibility factor: 22

Climatic factor: 1-10
Mobility value: 0
Source:

Mobility Score: 3
Range: 0-4

1.4 Human Toxicity/Mobility

Source: WARM Scoring Manual

Human Tox/Mobil Score: 18
Range: 1-24

1.5 Environmental Toxicity/Mobility

Substance	Acute	
	Value (mg/m ³)	Score
Arsenic	--	X
Benzo(a)pyrene	--	X
Cadmium	25	10
Diesel (naphthalene)	--	X
Lead	--	X
Mercury, inorganic	--	X
TCDD [dioxins]	--	X

Maximum score 10
Source: WARM Toxicity Database

Environmental Toxicity Score: 10
Range: 1-10

Environmental Tox/Mobil Score: 15
Range: 1-24

1.6 Substance Quantity

Quantity: 51,000 sq ft
Basis: estimated aerial extent of lead contamination
Source: RI/FS Report

Substance Quantity Score: 6
Range: 1-10

2.1 Containment

Description: no cover
Basis: RI/FS Report

Containment Score: 10
Range: 0-10

SUBSTANCE PARAMETER CALCULATIONS

Human Health Pathway

SUBh (Human Tox/Mobil + 5) x (Containment +1) + Substance Quantity

259.0

Environmental Pathway

SUBe (Environ. Tox/Mobil + 5) x (Containment +1) + Substance Quantity

226.0

3.0 TARGETS

3.1 Nearest Population

Description: residence
Distance (ft): <1000 ft
Source: San Juan County Polaris Property Search

Nearest Population Score: 10
Range: 0-10

Worksheet 6

Groundwater Route

CSID: Albert Jensen & Son

Site: 14759

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human toxicity

Substance	Drink. Wat. Stnd		Acute Toxicity		Chronic Toxicity		Carcinogenicity	
	Value (ug/L)	Score	Value (mg/kg)	Score	Value (mg/kg/day)	Score	Adj. CPFO (risk/mg/kg-day)	Score
arsenic	10	8	763	5	3.00E-04	5	1.50E+00	7

Maximum score: 8

Bonus points: NA

Source: WARM Toxicity Database

Human Toxicity Score: 8

Range: 1-12

1.2 Mobility

Substance	Solubility	
	Value (mg/L)	Score
arsenic	K >1	3

Maximum value: 3

Source: WARM Toxicity Database

Mobility Score: 3

Range: 1-3

1.3 Substance quantity

Quantity: 1000-5000 cubic yards

volume estimated based on area and depth of arsenic-impacted soil on entire

Basis: site

Source: Initial Investigation and RI/FS reports

Substance Quantity Score: 4

Range: 1-10

2.1 Containment

Description: spill directly to surface soil or floor drain; no containment present

Source: Initial Investigation and RI/FS reports

Containment Score: 10

Range: 0-10

SUBSTANCE PARAMETER CALCULATION

SUB = (Human Toxicity + Mobility + 3) x (Containment + 1) + Substance Quantity

158.0

2.0 MIGRATION POTENTIAL

2.2 Net precipitation (April - Nov)

Amount (in.): 16.54 in (ave precip) - 0.23 (ET)= 16.31 in Net Precipitation Score: 2
Source: US Climate Data and Rain Master Control Systems Range: 0-5

2.3 Subsurface Hydraulic Conductivity

Description: sand/gravel
Source: RI/FS report Hydraulic Conductivity Score: 4
Range: 1-4

2.4 Vertical Depth to Aquifer

Depth (ft): release to gw is confirmed Depth to Aquifer Score: 8
Source: RI/FS Report (MW-1 only) Range: 1-8

MIGRATION PARAMETER CALCULATION

MIG = Depth to Aquifer + Net Precipitation + Hydraulic Conductivity

14.0

3.0 TARGETS

3.1 Aquifer Usage

Description: unused - brackish water
Source: RI/FS Report (MW-1 only) Aquifer Use Score: 1
Range: 1-10

3.2 Distance to Nearest Drinking Water Well

Distance (ft): > 10000 ft Well Distance Score: 0
Source: WDOH Water System Database Range: 0-5

3.3 Population Served by Drinking Water Wells within Two Miles

No. of people: 0 - all in area should be on municipal supply Population Served Score: 0.0
Source: WDOH Water System Database Range: 0-100

3.4 Area Irrigated by Wells within Two Miles

Area (acres): 1.5 Area Irrigated Score: 0.9
Source: Water Resources Explorer Range: 0-50

TARGET PARAMETER CALCULATION

1.9

TAR = Aquifer Use + Well Distance + Population Served + Area Irrigated

4.0 RELEASE

Evid. of release? groundwater contamination confirmed
Source: RI/FS Report

Release Score (REL): 5.0

Range: 0 or 5

GROUND WATER ROUTE CALCULATION

32.8

$GW = (SUB \times 40/208) \times \{(MIG \times 25/17) + REL + (TAR \times 30/165)\} / 24$

Range: 0-100

Washington Ranking Method

Route Scoring Summary and Ranking Calculation

CSID: Albert Jensen & Sons, Inc.
Site: 14759

Human Health Route Scores		
Pathway	Score	Quintile
Surface water	42.9	5
Air	19.9	3
Groundwater	32.8	2

Quintile	Value
High (H)	5
Middle (M)	3
Low (L)	2

Human Health Pathway Quintiles - based off February 2019 HSL							
Quintile	Surface Water		Air		Groundwater		
1	<=	7.9	<=	8.6	<=	24.1	
2		8.0		15.2		8.7	
3		15.3		21.2		16.4	
4		21.3		29.7		25.4	
5	>=	29.8	>=	40.2	>=	49.5	

$$(H^2 + 2M + L) / 8$$

Human Health Priority Bin Score: 4.1

Environmental Route Scores		
Pathway	Score	Quintile
Surface water	74.4	5
Air	4.9	3

Quintile	Value
High (H)	5
Low (L)	3

Environmental Pathway Quintiles - based off February 2019 HSL				
Quintile	Surface Water		Air	
1	<=	11.3	<=	1.2
2		11.4		24.1
3		24.2		32.0
4		32.1		49.9
5	>=	50.0	>=	26.6

$$(H^2 + 2L) / 7$$

Environmental Priority Bin Score: 4.4

FINAL MATRIX RANKING

Human Health Priority	Environmental Priority					
	5	4	3	2	1	n/a
5	1	1	1	1	1	1
4	1	2	2	2	3	2
3	1	2	3	4	4	3
2	2	3	4	4	5	3
1	2	3	4	5	5	5
n/a	3	4	5	5	5	NFA

n/a - not applicable

NFA - no further action

Site Rank: 1