

Reviewed 7/24
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SITE HAZARD ASSESSMENT
Summary Score Sheet

SITE INFORMATION:

Name: PSE Sedro Woolley Substation
Address: 24972 (formerly 2284 and referred to as 284) Minkler Road
City: Sedro Woolley County: Skagit State: WA Zip: 98284
Parcels: P40022, P40045, P39774 NW1/4 SW 1/4 20 35 05
Latitude: 48° 30' 19.4" Longitude: -122° 12' 13.4"
FSID #: 32313154

| Site scored/ranked for the August 19, 2009 update of the Site Register June 123, 2009

SITE DESCRIPTION:

Background

the The PSE Sedro Woolley Substation site is located just to the east of the City of Sedro Woolley. It is bordered on the north by Minkler Road, to the south by Hoehn Road, to the west by a trailer park, and to east by Hanson Creek, a salmon stream. Surrounding land use consists of mixed rural farmland and residential. The site falls within the Sedro Woolley service area for PUD of Skagit County for drinking water. The area to the east of Sedro Woolley is served by individual drinking water wells and on site septic systems. The site has operated for decades as a transmission facility for Puget Power and subsequently Puget Sound Energy. The site contains a 55kV yard, a 115kV yard, and a 230kV yard. Each yard consists of transformers, breakers, bus works, and switches. The 11 acre substation is entirely fenced although Puget Sound Energy property ownership extends beyond the boundaries of the fence. The ground surface is mostly level and the yard is covered with gravel with concrete pads under equipment.

In 1994 Puget Sound Power and Light employees reported several pieces of equipment leaking transformer oil to the ground surface. Washington State Department of Ecology was notified of the releases in July 1994. GeoEngineers was contracted to evaluate the contamination at the site. In June 1995 GeoEngineers issued a report summarizing soil and groundwater conditions at the site. During 1994, 17 groundwater monitoring wells were installed in the areas of leaking equipment and at the substation perimeter. Limited soil remediation occurred at the site as a result of the findings and select groundwater wells were monitored until 2001. In 2007 further site evaluation occurred of surface soil only resulting in additional soil removal in locations. Sampling and remediation activities are discussed below by area, as pertaining to the 55kV yard located in the north portion of the site nearest Minkler Road, and the 230kV yard located in the central portion of the site. In the 2007 GeoEngineers report the 55kV yard is referred to as Area A and the 230 kV yard is referred to as Area B. Refer to Figure 1 for details of the site and the locations of the historic areas of concern.

55 kV Yard (Area A)

| From GeoEngineers, 1995, in the 55kV yard the highest soil sample results were found in sample B-8 at 2.5 feet depth with levels of heavy oil range hydrocarbons at 321 mg/kg and diesel range at 3,480 mg/kg. No other soil samples from the 55kV yard exceeded 150 mg/kg for either constituent. Of 19 samples analyzed for heavy oil, four were also analyzed for PCBs using method 8080. All were

reported as <0.05mg/kg. PCBs were not analyzed for in the samples containing the highest levels of hydrocarbons, particularly B-8.

Monitoring wells 9-12 were drilled in the 55kV yard. Groundwater was encountered between 7 and 10 feet below ground surface. Water from the wells was analyzed for TPH diesel and heavy oil and select samples were analyzed for PCBs. Wells 10 and 12 had significant detections of diesel and heavy oil range hydrocarbons of 0.55mg/L to 1.4 mg/L. The detection limit for the heavy oil analysis was 0.71 – 0.75 mg/L, or greater than the current clean up level of 0.5 mg/L. A sample from MW 10 was analyzed for PCBs and the result is listed as <0.094ug/L. This same result is listed in a later report as 0.94ug/L, in line with the detection limits of the rest of the PCB samples, so indicating the detection limit listed in the original report may be an error. A limited soil excavation was conducted between the transformers of bank 1 in the 55kV yard in September 1995. Approximately 50 yards of soil was removed to a depth of 3 feet. Three empty above ground oil storage tanks were removed as a part of this remediation. Overall groundwater monitoring at the site will be discussed later.

In 2006 in preparation for construction work at the substation, GeoEngineers again evaluated the site for signs of spills and leaks. In the former 55kV yard area, signs of surface contamination were observed in four areas, including the location of contaminated soil removal in 1995. A total of 27 test pits were dug around the yard to a depth of approximately 3 feet. One soil sample from each of 22 test pits was analyzed for either Mineral Oil Range Hydrocarbons or PCBs or both. Mineral oil range hydrocarbons were detected in 8 of the 14 samples analyzed with two locations exceeding the MTCA Method A clean up level of 4000 mg/kg. Nineteen samples were analyzed for PCBs and all of these were below the detection limit range of 0.053 to 0.082mg/kg. PCBs were analyzed in the soil samples with the highest mineral oil detections. Surface soil was excavated from the two areas with detections above MTCA with follow up samples from the limits of excavation showing no results over the detection limit range of 62 to 70mg/kg. Refer to Figure 2, copied from GeoEngineers 2007 for sample and remediation locations. No groundwater was evaluated during this study.

230 kV Yard (Area B)

The second area of historic contamination at the substation site is between the 115kV yard and the 230kV yard, specifically near the 230kV transformers and former above ground oil storage tanks. In 1994 nine soil borings were completed in the area. Soil at three locations (B-4, MW-13, and HA-5) was found to contain significant levels of heavy oil range hydrocarbons with the highest result from B-4 at 7.5 feet below ground surface with a result of 3950 mg/kg heavy oil. These three samples were also analyzed for PCBs. PCBs were not detected in MW-13 and HA-5 at <0.05mg/kg. PCBs were detected in B-4 at 0.11mg/kg, below the MTCA Method A clean up level of 1.0mg/kg.

Monitoring wells 13-17 were drilled in the immediate vicinity of the 230kV transformer and oil ASTs. In the first samples from November 1994 petroleum hydrocarbons were detected in all five wells. The highest levels were in MW-13 (34mg/L diesel, 6.0 mg/L heavy oil) and MW-15 (6.6 mg/L diesel, 2.3 mg/L heavy oil). PCBs were analyzed in the MW-13 sample and listed as not detected at <0.094ug/L.

Very limited soil excavation was performed in September 1995 in the vicinity of the 230kV transformer in order to install a secondary containment system around the transformer. Monitoring wells MW-13, MW-14, and MW-15 were destroyed during the excavation. Approximately 180 cubic yards of soil were excavated down to 1.5 feet below ground surface. Soil contamination found during the 1994 sampling remained on site. Secondary containment around the 230kV transformer consisted of a concrete curb around the perimeter and a bentonite seal on the floor.

In 2007 GeoEngineers took one soil sample from the 230kV transformer area (referred to as Area B in GeoEngineers 2007). The sample was analyzed for mineral oil range hydrocarbons (24,000 mg/kg) and PCBs (<0.097mg/kg). Soil was excavated in the area of contamination along the south side of the transformer pad down to 6.5 feet below ground surface. Seven samples from the limits of excavation were analyzed for mineral oil with results ranging from non-detect-ND to 830mg/kg.

Groundwater Monitoring

Groundwater was monitored in various wells throughout the site from 1994 until 2001. The initial monitoring from 1994 is discussed above for the 50kV yard and the 230kV yard. Of the 17 original groundwater wells drilled in 2004, 13 were monitored for in 1994 and 1995. Four were monitored until 1998 or 1999 and one was further sampled in 2000 and 2001. All groundwater monitoring ceased after 2001. The direction of groundwater flow taken from the well elevations is shown to be to the northeast toward Hanson Creek at the site. Monitoring wells 5 and 12 on the northeast edge of the 55 kV yard were the only wells in the immediate vicinity of known soil contamination that remained to be sampled after 1995. Sampling was performed at most twice per year. MW-MW-5 showed intermittent detections of diesel and heavy oil through 1996 and then the three remaining samples taken between 1997 and 1998 did not have detections of diesel or heavy oil. MW-MW-12 showed consistent detections of diesel and heavy oil through June 1999 and then one sample each in 11/2000 and 12/2001 show no detections of either constituent. MW-MW-12 was never sampled for PCBs in any sample event.

No monitoring wells remained in the vicinity of the 230 kV yard after the 1995 work. MW-2 and 3 located near the substation gate to the northeast could be considered to reflect movement of contamination from the 230 kV area. These wells were monitored until 1998 with detections of diesel and heavy oil in MW-3 in 1/96 and then no detections during the bi-annual samples from 1997 and 1998. MW-2 had only two low level detections of diesel in 1994 and 1997 with remaining results ND for diesel and heavy oil. Detection limits for all of the diesel analyses were 0.24 mg/L, for heavy oil 0.75 mg/L (greater than the current clean up level for groundwater) and PCB 0.94-1.0 mg/L (greater than the 1996 and 2001 MTCA clean up level of 0.1 mg/L). Please refer to Table 2, Summary of Ground Water Chemical Analytical Data Monitoring Well copied from GeoEngineers 2002, Annual Groundwater Monitoring Results for the complete groundwater monitoring data. No further groundwater monitoring has occurred on the site since the final sample of MW-12 in 2001.

Discussion

Polly Dubbel from the Skagit County Public Health Department conducted a site visit as a part of the Site Hazard Assessment (SHA) for this property on February 10, 2009. John Rork from Puget Sound Energy was present. The site visit confirmed the restructuring of the yard described by GeoEngineers, 2007. All site features of the historic 55 kV yard including all above ground oil storage tanks have been removed. Transformers are being changed to gas insulating coolant from mineral oil. No obvious areas of surface contamination were seen in the former 55 kV yard or the 230 kV yard. It was not possible to approach the equipment areas up close due to safety concerns. Site photos area attached.

While this site has had two clean up actions in 1995 and 2007, residual groundwater contamination has not been adequately documented as resolved for the purposes of this SHA. A detailed review of the clean up actions and groundwater monitoring data through the Voluntary Clean Up Program may resolve concerns but this limited SHA review is not sufficient to determine that No Further Action is

warranted at the site. Ground water wells in areas of contamination were not monitored consistently enough with adequate detection limits to determine that MTCA Clean Up Levels are met. The 2007 release and clean up was stated by GeoEngineers to be a surface release only and so no ground water was analyzed. This site is scored for the groundwater exposure route.

ROUTE SCORES:

Surface Water/Human Health: NS

Air/Human Health: NS

Surface Water/Environmental: NS

_____Air/Environmental: NS

Groundwater/Human Health: 9.5

OVERALL RANK: 5

WORKSHEET 2

ROUTE DOCUMENTATION

1. SURFACE WATER ROUTE

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

Route not scored, subsurface only contamination remaining.

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

List those management units to be considered for scoring: Source: 1, 2, 4

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

2. AIR ROUTE

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

Route not scored, subsurface only contamination remaining.

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

List those management units to be considered for scoring: Source: 1, 2, 4

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

3. GROUND WATER ROUTE

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

Mineral oil

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

Substances present in subsurface soil and groundwater

List those management units to be considered for scoring: Source: 1, 2, 4

Contaminated subsurface soil and groundwater

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

Documented soil and groundwater contamination above MTCA Method A Clean up Standards

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 | Mineral Oil/TPH Gas | ND5 | -8 | ND3306; rat | -3 | 0.1ND | 1- | ND A | - 0.02 9 | -5 |
| 2 | TPH Diesel | 160 | 4 | 490; rat | 5 | 0.004 | 3 | ND | ND | - |
| 3 | Cadmium | 5 | 8 | 225; rat | 5 | 0.0005 | 5 | ND | ND | - |
| 4 | Copper | 1300 | 2 | ND | - | 0.037 | 1 | ND | ND | - |
| 5 | Lead | 5 | 8 | ND | - | <0.001 (NOAEL) | 10 | ND | ND | - |
| 6 | 4,4 DDD | ND | - | 113; rat | 5 | ND | - | B2 | -24 | 4 |

* Potency Factor

Source: 2,6,7

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= 1800-value=3 <1 mg/kg = 0 |
| 2= | 2=30-value=1 |
| 3= >1 value=3 | 3= |
| 4= 0.1 to 1.0 value=2 | 4= |
| 5= 0.1 to 1.0 value=2 | 5= |
| 6= | 6= 0.1 value=0 |

Source: 2,6,7

Value: 30

(Max = 3)

| 1.3 Substance Quantity (volume): | |
|---|--|
| Explain basis: Unknown quantity, default to 1 | Source: 2,4,6 Value: <u>1</u> (Max=10) |

2.0 MIGRATION POTENTIAL

| | | Source | Value |
|-----|---|--------|-------------------------|
| 2.1 | Containment (explain basis): Contaminated soil, no cap | 1,2,6 | 10 (Max = 10) |
| 2.2 | Net precipitation: $(3.5+3.8+3.4+2.6+2.4+1.5+5.6+6.4+5.4+4.2+4.7+3.3)-(1.0+9+.75+.5+.74+1.2+6+2.1+1.2) = 11.023.8''$ | 6,8 | 23 (Max = 5) |
| 2.3 | Subsurface hydraulic conductivity: sand and gravel > 10E-3 <u>sandy silt, silty sand</u> | 2,5,6 | 43 (Max = 4) |
| 2.4 | Vertical depth to groundwater: Soil borings on site found groundwater at 4.06.5 - 102 feet bgs | 2,5,6 | 8 (Max = 8) |

3.0 TARGETS

| | | Source | Value |
|-----|--|---------|-----------------------------|
| 3.1 | Groundwater usage: Ground water not used but useable <u>Private supply, alternative source available</u> | 6,10,12 | 24 (Max = 10) |
| 3.2 | Distance to nearest drinking water well: >10,000 <u>1300 - 2600 feet</u> | 6,10,12 | 03 (Max = 5) |
| 3.3 | Population served within 2 miles: $\sqrt{\text{pop.}} = \sqrt{0-129} = 0$ | 6,10,12 | 011 (Max = 100) |
| 3.4 | Area irrigated by (groundwater) wells within 2 miles: $(0.75)*\sqrt{\# \text{ acres}} = 0.75 * \sqrt{0-367.5} = 0-14.25$ | 6,10,12 | 014.25 (Max = 50) |

4.0 RELEASE

| | | Source | Value |
|--|--|--------|------------------------|
| | Explain basis for scoring a release to groundwater: No documented release to groundwater <u>Documented release to groundwater</u> | 2,5,6 | 05 (Max = 5) |

SOURCES

1.