CSID 3313

WORKSHEET 1
SUMMARY SCORE SHEET

Site Name/Location

PSE Blumaer Substation
N. Hodgedon St. & SE Garfield Ave.
Tenino, WA 98589

Thurston County, S19/T16N/R1W.
Tax Parcel #09490012002
Ecology Facility ID: 6413759
Date Scored: June 2004

Site Description

On October 23, 2001 a release of mineral oil containing polychlorinated biphenyls (PCBs) occurred as a result of a lightning strike. Approximately 200 to 400 gallons of mineral oil containing 6.81 ppm PCB (according to PSE database) was released into the soil. Remedial excavation activities resulted in the removal of approximately 100 cubic yards of contaminated soil from the release area. Final analytical results indicated that the remediation was successful with one exception. An area of contaminated soil still remains on site, which is located directly beneath a concrete pad (13 feet long by 10 feet wide). Since this pad is utilized to support electrical equipment, the area beneath was not excavated due to stability issues. This lens of remaining contamination is estimated to be a maximum of 13 feet long by 10 feet wide by one foot thick. Since the remaining material is located directly beneath the pad, the total depth of contamination is estimated to be 1-1.5 feet below ground surface. Soil samples collected from this lens (edge of concrete pad) revealed that mineral oil concentrations were above Model Toxics Control Act (MTCA) cleanup levels. The mineral oil concentration remaining in the soil ranges from 17,600-29,300 ppm. The current cleanup level for mineral oil under MTCA is 4,000 ppm. These samples were not analyzed for PCBs, so it is suspected that the mineral oil still contains a maximum of 6.81 ppm PCB (original concentration in the mineral oil according to PSE).

Since the remaining contamination is shallow and capped by the concrete, it does not appear to pose an immediate threat to human health or the environment. Additionally, the concrete cap significantly reduces the potential for contaminant migration. Subsequent ground water sampling did not detected contamination. However, since the remaining soil contamination exceeds MTCA cleanup levels for mineral oil, which is also contaminated with PCBs, further remediation is recommended when the soil becomes accessible in the future.

Special Considerations

Due to the contamination documented on-site being primarily subsurface, the surface water and air routes are not applicable to WARM scoring for this site, thus only the groundwater route will be scored.

ROUTE SCORES:

Surface Water/Human Health: NS
Air/Human Health: NS
Ground Water/Human Health: 25.0

Surface Water/Environment: NS
Air/Environmental: NS
OVERALL RANK: 5

WORKSHEET 2
ROUTE DOCUMENTATION

1. SURFACE WATER ROUTE

List those substances to be considered for scoring. Source: NS

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

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

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

2. AIR ROUTE

List those substances to be considered for scoring. Source: NS

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

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

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
Polychlorinated Biphenyls (PCBs), mineral oil

Explain basis for choice of substance(s) to be used in scoring.
PCBs are a suspected contaminant in mineral oil, which may be in excess of MTCA cleanup levels. Soil contaminated with mineral oil still remains on site, which also exceeds MTCA cleanup levels.

List those management units to be considered for scoring. Source: 1
Contaminated soil

Explain basis for choice of unit to be used in scoring.
Analytical Results, PSE database

WORKSHEET 6

GROUND WATER ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drinking Water Standard		Acute Toxicity		Chronic Toxicity		Carcinogenicity		
	(ug/m^3)	Val	(mg/kg/bw)	Val	(mg/kg/day)	Val	WOE	PF	Val
1. PCBs	0.5	10	1315	3	-	-	B2	7.7	7
2.									
3.									
4.									
5.									

Source: **Value:** 10 (Max. =10)
+2 Bonus Points?
Final Toxicity Value: 10

1.2 Mobility
(Use numbers to refer to above listed substances)
Cations/Anions Source: __ **Value:**__ (Max. =12)
1.
2.
3.
4.
5.

OR Solubility Source: 1 **Value:** 0 (Max. =3)
1. PCBs, 3.1E-02
2.
3.
4.
5.

1.3 Substance Quantity Source: 3 **Value:** 1 (Max. =10)
4.8 cubic yards (approximate)
Explain basis: The remaining lens of contamination is approximately 10 feet by 13 feet by 1 foot (130 cubic feet = 4.8 cubic yards).

2.0 MIGRATION POTENTIAL

2.1 Containment Source: 3 **Value:** 6 (Max. =10)
Explain Basis: Landfill (concrete cover)

2.2 Net Precipitation (inches): Source: 4 **Value:** 4 (Max. =5)
38.98"

2.3 Subsurface Hydraulic Conductivity: Source: 5 **Value:** 4 (Max. =4)
poorly sorted sand, gravel, cobbles $>10^{-3}$

2.4 Vertical Depth to Ground Water: Source: 5 **Value:** 8 (Max. =8)
10-13 feet

3.0 Targets

3.1 Ground Water Usage: Source: 6 **Value: 4** (Max. =10)
Public Supply Alt. Source Available

3.2 Distance to Nearest Drinking Well (ft): Source: 6 **Value: 5** (Max. =5)
350 feet

3.3 Population Served within 2 miles: Source: 6 **Value: 39** (Max. =100)
1495 people, $\sqrt{1495} = 38.6$

3.4 Area irrigated by Wells within 2 miles: Source: 7 **Value: 9** (Max. =50)
149.5 acres
$0.75\sqrt{}$ # of acres = n
$0.75\sqrt{150} = 0.75(12.2) = 9.12$

4.0 RELEASE Source: 3 **Value: 0** (Max. =5)
Explain basis for scoring a release to ground water:
No release

SOURCES USED IN SCORING

1. Washington State Dept. of Ecology, Toxicology Database for Use in WARM Scoring, January 1992.
2. Washington State Dept. of Ecology, Washington Ranking Method, Scoring Manual, April 1992.
3. Remedial Action Summary, GeoEngineers, Inc., Paul Craig, P.G., Kurt Fraese, P.G., March 2002.
4. Washington State Dept. of Ecology website, Precipitation Map, DAYMET U.S. Data Center, June 2004.
5. Thurston County Public Health and Social Services, Well Log Report #043776, October 1991.
6. Thurston County Roads and Transportation Division, Geodata Center, Amy Calahan, June 2004.
7. Washington State Dept. of Ecology, Water Right Application Tracking System (WRATS), Sheri Carroll, June 2004.

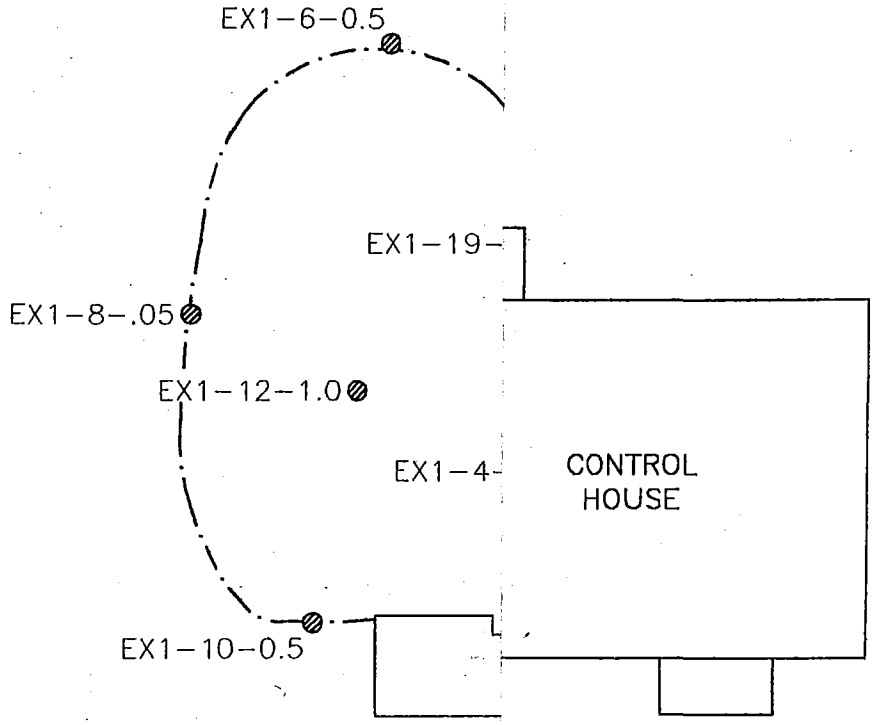
TABLE 1
FIELD SCREENING AND SOIL CHEMICAL ANALYTICAL DATA[1]
BLUMAER SUBSTATION, HODGEDEN & GARFIELD
TENINO, WASHINGTON

PUGET SOUND ENERGY

GEI PROJECT NO. 0186-482-01, Task 46

Sample Identification[1,3]	Date Sampled	Sample Depth (feet bgs)	Water Sheen Screening	Mineral Oil-Range Hydrocarbons[4] (mg/kg)	Diesel-Range Hydrocarbons[4] (mg/kg)	Polychlorinated Biphenyls[5] (mg/kg)
Disposal Characterization Samples						
PCS-1[2,6]	10/23/01	0.5	HS	15,000	--	0.184
PCS-2[6]	11/02/01	0.5	HS	980	<20.0	ND
PCS-3	11/26/01	0.5	HS	<50.0	320	ND
Confirmation Samples						
EX1-1-1.5	11/02/01	1.5	SS	<50.0	<20.0	ND
EX1-2-1.0	11/02/01	1.0	NS	<50.0	<20.0	ND
EX1-3-1.5	11/02/01	1.5	NS	<50.0	<20.0	ND
EX1-4-1.5	11/02/01	1.5	NS	<50.0	<20.0	ND
EX1-5-1.0	11/02/01	1.0	HS	24,800	<20.0	--
EX1-5-2.0	11/02/01	2.0	NS	<50.0	<20.0	--
EX1-6-0.5	11/26/01	0.5	SS	<50.0	<20.0	--
EX1-7-0.5	11/02/01	0.5	HS	29,300	<20.0	--
EX1-7-1.5	11/02/01	1.5	SS	<50.0	<20.0	--
EX1-8-0.5	11/26/01	0.5	SS	<50.0	<20.0	--
EX1-9-0.5	11/02/01	0.5	HS	17,600	<20.0	--
EX1-9-2.0	11/02/01	2.0	SS	257	<20.0	--
EX1-10-0.5	11/26/01	0.5	NS	<50.0	<20.0	--
EX1-11-1.0	11/02/01	1.0	MS	180	<20.0	--
EX1-11-2.0	11/02/01	2.0	SS	<50.0	<20.0	--
EX1-12-1.0	11/26/01	1.0	SS	<50.0	<20.0	ND
EX1-13-1.0	11/02/01	1.0	NS	<50.0	<20.0	--
EX1-14-1.5	11/02/01	1.5	NS	<50.0	<20.0	--
EX1-15-1.0	11/02/01	1.0	NS	<50.0	<20.0	--
EX1-16-2.0	11/02/01	2.0	NS	<50.0	<20.0	--
EX1-17-2.0	11/02/01	2.0	NS	<50.0	<20.0	--
EX1-18-2.0	11/26/01	2.0	SS	<50.0	<20.0	--
EX1-19-2.5	11/26/01	2.5	MS	<50.0	<20.0	--
CS-1	11/02/01	0.5	NS	175	<20.0	--
CS-2	11/02/01	0.5	NS	570[7]	<20.0	--
CS-3	11/02/01	0.5	NS	<50.0	<20.0	--
CS-4	11/02/01	0.5	NS	<50.0	<20.0	--
MTCA Method A Cleanup Level				4,000	2,000	1.0

Notes on page 2 of 2.



WPLE
AND
POSAL

N

0 10 20

SCALE IN FEET

Notes: 1. The locations of all features shown
2. This figure is for informational purp
discussed in a related document. D
sources do not guarantee these dat
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copy is stored by GeoEngineers, Inc

Reference: Drawing entitled "Blumaer Substati

SITE PLAN

FIGURE 2

REDMOND\P:\0186482\CAD\01\T46\0186482O1T46A.DWG PRC:SYF 03/21/02

GeoEngineers

March 22, 2002

Puget Sound Energy
Environmental Services Department
P.O. Box 90868, SKC-WMF
Bellevue, Washington 98009-0868

Attention: John Rork

Remedial Action Summary
Puget Sound Energy – Mineral Oil Release
Blumaer Substation
N. Hodgeden St. & Garfield Ave. SE
Tenino, Washington
File No. 0186-482-01, Task 46

INTRODUCTION

This letter presents a summary of remedial activities related to an electrical transformer oil (mineral oil) release on October 23, 2001 at Puget Sound Energy's (PSE's) Blumaer Substation located at North Hodgeden St. and Garfield Avenue SE in Tenino, Washington. The general site location is shown on the attached vicinity map in Figure 1. The release reportedly occurred when lightning struck an electrical regulator resulting in an explosion and subsequent mineral oil fire. An estimated 200 to 400 gallons of mineral oil were released onto soil adjacent to the regulator. The mineral oil had a polychlorinated biphenyl (PCB) concentration of 6.81 milligrams per kilogram (mg/kg) as shown in PSE's database. This release was reported to Jeri Berube at the Southwest Regional Office of the Washington State Department of Ecology (Ecology) on October 23, 2001 at 12:00 p.m. (Ecology Incident Number 521755). The release also was reported to the Washington Emergency Management Department on October 23, 2001 at 12:44 p.m.

SCOPE OF SERVICES

The purpose of these services was to cleanup the release area in accordance with the Model Toxics Control Act (MTCA). The scope of our services included site reconnaissance, monitoring and documenting of remedial activities, soil sampling and analysis, and evaluation of chemical analytical results relative to MTCA cleanup levels.

RESPONSE AND REMEDIAL EXCAVATION ACTIVITIES

SPILL RESPONSE ACTIVITIES

Initial response was conducted by PSE to contain the oil. Following a response to the site by the fire department to extinguish the fire, PSE used oil sorbent materials (kitty litter and oil sorbent pads) to minimize the spread of mineral oil at the site. The kitty litter was used on oil on

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Redmond, WA 98052
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Fax (425) 861-6050
www.geoengineers.com

the concrete pad where the damaged device was located to the migration of the oil to gravel and soil surrounding the pad. The oil sorbent pads were used in depressions at the site to absorb accumulating free product on water observed at the site surface. The oil sorbent pads were removed and replaced as necessary when they became saturated with oil. Contaminated pads were placed in plastic bags and removed from the site for temporary storage at PSE's Waste Management Facility in Kent, Washington.

GeoEngineers began remedial excavation activities to remove free product and mineral oil-impacted soil and gravel at the site on October 23, 2001. We performed field screening (sheen testing) for petroleum hydrocarbons in soil samples to evaluate the vertical and lateral extent of mineral oil-impacted soil in the release area. A description of our soil sampling and sheen testing methods is provided in Attachment A.

Initial field screening of soil in the release area prior to remedial excavation activities yielded a heavy sheen, indicating that mineral oil was present in surface soil at high concentrations in an area measuring approximately 70 feet long by 40 feet wide. Our main objective on October 23 was to remove oil-saturated materials from the site that had the potential to spread contamination at the site in the event of rain.

GeoEngineers, PSE and Aqua Clean Jet-n-Vac (Aqua Clean) removed approximately 30 cubic yards of soil from the site using a backhoe, two dump tucks and a vactor truck. The backhoe and dump trucks were used to remove large volumes of soil in the release area. The vactor truck was used to remove water from fire-fighting activities and oil-saturated soil in areas not accessible to the backhoe. Although field screening of soil within the release area still yielded some moderate to heavy sheens, indicating that significant concentrations of residual contamination remained in soil at the site, soil and gravel observed to be saturated with mineral oil was successfully removed from the site. The initial remedial excavation reduced the likelihood for mineral oil to migrate to areas at the site that were not as yet impacted by the October 23, 2001 mineral oil release.

Oil-impacted materials removed from the site on October 23, 2001 were transported to TPS Technologies (TPS) in Tacoma, Washington for permitted thermal treatment and recycling.

REMEDIAL EXCAVATION ACTIVITIES

Subsequent remedial excavation activities occurred between November 1, 2001 and November 26, 2001 following the completion of electrical equipment replacement at the substation. Initial field screening of soil and gravel in the release area prior to resuming remedial excavation activities yielded a heavy sheen, indicating that residual mineral oil was present in surface gravel and underlying soil at high concentrations. Representatives from PSE and Aqua Clean removed mineral oil-impacted soil and gravel within the release area using a backhoe and vactor truck. The dense soil underlying the gravel was loosened up using the backhoe and removed by the vactor truck. Soil excavated at the site was temporarily stockpiled on plastic sheeting at the site and transfer on the same day to a permitted disposal facility. Field screening continued as needed throughout the course of remedial excavation activities at the site. Based on our field screening results, an additional approximately 70 cubic yards of mineral oil-impacted

material was excavated and removed from the site in an area measuring approximately 60 feet long by 30 feet wide by 1 foot deep.

Field screening of soil at the final limits of the remedial excavation yielded moderate to no sheen, indicating that soil with significant concentrations of mineral oil had been removed from the release area, with three exceptions. Soil yielding a heavy sheen remained in-place on the north, east and west sides of the excavation beneath the concrete pad associated with the damaged regulator. Due to stability issues concerning the electrical equipment located on the concrete pad, this contaminated soil located beneath the regulator's concrete pad was not excavated.

Plastic sheeting used for temporary stockpiling of excavated soils was placed in three 55-gallon drums and transferred to PSE's Waste Management Facility in Kent, Washington for temporary storage prior to transport to a permitted off-site disposal facility. Gravel and soil removed from the site was transferred either by vactor truck or dump truck to TPS for permitted thermal treatment and recycling. Approximately 1,000 gallons of fluids removed from the site were transferred by vactor truck to TPS for permitted disposal. A total of approximately 100 cubic yards of soil and gravel were removed from the substation during remedial excavation activities between October 23, 2001 and November 26, 2001.

SOIL SAMPLING AND CHEMICAL ANALYSIS

A total of thirty soil samples were obtained from the site for chemical analysis of petroleum hydrocarbons by Ecology Northwest Method NWTPH-Dx and/or PCBs by EPA Method 8082. North Creek Analytical (NCA) of Bothell, Washington analyzed one sample (PCS-1). Environmental Services Network (ESN) of Lacey, Washington analyzed the other 29 samples in their mobile laboratory at the site and/or in their fixed-base laboratory in Bellevue, Washington. PCS-1, PCS-2 and PCS-3 were obtained from mineral oil-contaminated soil at the ground surface within the release area to characterize the mineral oil-impacted soil for disposal. CS-1, CS-2, CS-3 and CS-4 were obtained from immediately outside the final limits of excavation to document soil conditions immediately adjacent to the remedial excavation. EX1-1-1.5 through EX1-19-2.5 were obtained from the final limits of excavation. The excavation limits and approximate locations of soil samples obtained from the site are shown in the attached Figure 2. Standard chain-of-custody procedures were followed in submitting the samples to the testing laboratory.

Mineral oil-range hydrocarbons in samples CS-1 through CS-4 and EX-1 through EX-19 either were not detected or were detected at concentrations less than the Model Toxics Control Act (MTCA) Method A cleanup level of 4,000 milligrams per kilogram (mg/kg), with three exceptions. Mineral oil-range hydrocarbons were detected at concentrations exceeding the MTCA Method A cleanup level in EX-1-5-1.0 (24,800 mg/kg), EX1-7-0.5 (29,300 mg/kg) and EX1-9-0.5 (17,600 mg/kg). EX-1-5-1.0, EX1-7-0.5 and EX1-9-0.5 represent mineral oil-impacted soil remaining in place on the east, north and west sidewalls of the excavation, respectively, beneath the concrete pad associated with the damaged regulator. The samples were obtained approximately 6 inches below the 1-foot thick concrete pad and the soil was inaccessible to further excavation without removal or shoring of critical site facilities. Three supplemental soil samples EX1-5-2.0 (<50.0 mg/kg), EX1-7-1.5 (<50.0 mg/kg) and EX1-9-2.0 (257 mg/kg) were obtained beneath EX-1-5-1.0, EX1-7-0.5 and EX1-9-0.5, respectively, to demonstrate that

the residual mineral oil-impacted soil remaining in place beneath the regulator's concrete pad was limited in extent. Mineral oil-range hydrocarbons in these samples were either were not detected or were detected at a concentration less than the MTCA Method A cleanup level.

PCBs were not detected in the samples obtained and tested from the final limits of the excavation. Chemical analytical results are presented in the laboratory report in Attachment B and summarized in Table 1.

SITE RESTORATION

Site restoration activities were conducted by PSE personnel following the completion of remedial excavation activities at the site November 26, 2001. GeoEngineers was not present during site restoration activities.

TERRESTRIAL ECOLOGICAL EVALUATION

A Terrestrial Ecological Evaluation is now required for sites with releases of hazardous substances to soil. We completed the Terrestrial Ecological Evaluation for the site in accordance with MTCA. Because mineral oil is not a chemical of ecological concern and PCBs were not detected in the samples obtained and tested from the final limits of the excavation (WAC 173-340, Table 749-2), and remaining contaminated soil is isolated beneath the concrete pad, it is our opinion that soil conditions at the final limits of the excavation are protective of terrestrial plants and animals relative to mineral oil.

CONCLUSIONS

Based on our observations, field screening results and chemical analytical results, it is our opinion that readily accessible soil and gravel with residual mineral oil and PCB concentrations exceeding the MTCA Method A cleanup levels, associated with PSE's October 23, 2001 mineral oil release, were successfully removed from the site.

A localized lens of mineral oil-contamination, approximately 1-foot thick, remains in place beneath the concrete pad associated with the damaged regulator at the site. This small volume of remaining soil with elevated mineral oil concentrations is effectively capped by the concrete pad that prevented further remedial excavation. Based on the inaccessibility of this soil and its shallow and limited extent, it is our opinion that the soil does not represent a threat to human health or the environment. Additionally, the soil (located between 0.5- and 1.5 feet bgs) does not appear to present a threat to groundwater beneath the site, which is located approximately 8 feet bgs, as observed in PSE's monitoring well TMW-7 located approximately 125 feet to the northwest. Nevertheless, groundwater in the TMW-7 will be sampled in the summer of 2002 and will be evaluated for potential impacts relative to the remaining contaminated soil beneath the concrete pad. We recommend that when, and if, the soil becomes accessible for remedial excavation in the future, that PSE remove it at that time. The residual mineral oil-impacted soil beneath the concrete cap will be noted in PSE's Spill Prevention Control and Countermeasure (SPCC) plan.

It is our opinion that no further remedial action related to this mineral oil release is necessary at this time.

LIMITATIONS

We have prepared this report for the exclusive use of Puget Sound Energy, their authorized agents and regulatory agencies. This report is not intended for use by others and the information contained herein is not applicable to other sites. No other party may rely on the product of our services unless we agree in advance, and in writing, to such reliance. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Our conclusions are based on our observations, field screening results and chemical analysis of limited number of soil samples. It is always possible that contaminants remain in areas that were not sampled or tested.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with our general agreement with PSE (Contract No. 4600001763) and generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

If you have any questions or comments regarding this summary, please contact Paul Craig at (425) 861-6000.

Respectfully submitted,

GeoEngineers, Inc.

Paul Craig, P.G.
Project Geologist

Kurt R. Fraese, P.G.
Principal

GJA:PRC:KRF:ja
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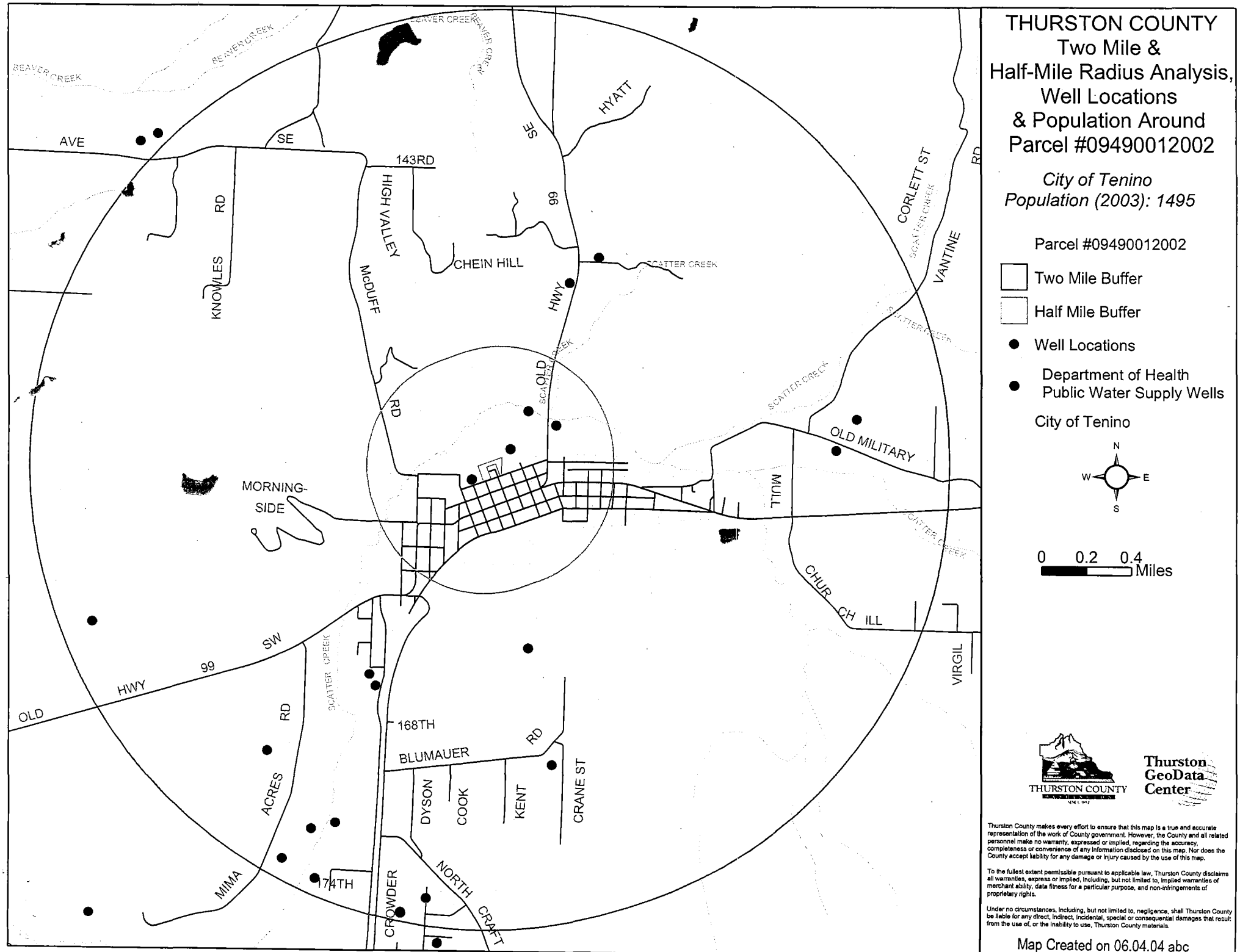
Attachments

cc: Washington State Department of Ecology
Southwest Regional Office
Toxics Cleanup Program
P.O. Box 47775
Olympia, Washington 98504-7775



THURSTON COUNTY
Two Mile & Half-Mile Radius Analysis, Well Locations & Population Around Parcel #09490012002

City of Tenino
Population (2003): 1495

Parcel #09490012002

Two Mile Buffer

Half Mile Buffer

Well Locations

Department of Health Public Water Supply Wells

City of Tenino

N
W E
S

0 0.2 0.4 Miles

THURSTON COUNTY

Thurston GeoData Center

Map Created on 06.04.04 abc

THURSTON COUNTY
Two Mile & Half-Mile Radius Analysis, Well Locations & Population Around Parcel #09490012002

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THURSTON COUNTY

Thurston GeoData Center

Map Created on 06.04.04 abc