CSID 3545

SITE HAZARD ASSESSMENT
WORKSHEET 1
SUMMARY SCORE SHEET

Site Name/Location (Street, City, County, Section/Township/Range, TCP ID Number):

American Wood Treaters
200 Bob Mitchell Road
Sumas, WA 98295

T41N/R04E/Section 34
Facility Site I.D 68458243
Latitude 48°59'32", Longitude 122°16'19"

Site assessed/ranked for August 24, 2005 Update.

Site Description (Include management areas, substances of concern, and quantities):
American Wood Treaters: A Brief Summary of Events

The American Wood Treaters (AWT) property is a 3.3 acre predominantly paved industrial site situated on the east side of Bob Mitchell Avenue in the city of Sumas, WA, at latitude 48°59'32" and longitude 122°16'19".

AWT was a tenant of the Port of Bellingham (the Port) at this location from 1986 to 2004. Prior to this business, the property was undeveloped agricultural land. The current tenant at the site is Teal-Jones Lumber Services Inc., who manufactures and packages wood products. They began operating at the site in early 2005. Similar to AWT, Teal-Jones also does wood treating, however they do not use formaldehyde in the wood treatment process.

The AWT property was listed on the Washington Department of Ecology (Ecology) Confirmed and Suspected Contaminated Sites List by Ecology's Northwest Regional Office on September 26, 2002. It was listed for confirmed contamination of soil by halogenated organic acids. AWT entered the Voluntary Cleanup Program in 2002.

Facility operations at AWT included treatment of shakes, shingles, siding and other wood products with fire retardant chemicals. A drying kiln and building for re-manufacturing of lumber products are also present on site. Fire retardant chemicals used in the treatment process included chemicals used for treatment of exterior and interior lumber. The three exterior chemicals all contained formaldehyde. Two of these also contained phosphoric acid and one contained ammonium phosphate. The interior chemical was comprised of diurea phosphate and urea. Commercial names for these products were *GPL, Fire-X, Irotherm and Pyro-Guard.* According to Terra Environmental Consultants, Ltd., (Terra) who conducted a Phase I and Phase II environmental investigation in 1997, other potential contaminants of concern (in addition to formaldehyde and phosphorous) at the site were considered to be heavy metals (often found in wood treatment chemicals), Nitrates, gasoline, diesel fuel and pH.

The wood treatment process at AWT consisted of placing wood in one of two autoclaves located on site, closing the autoclave door and flooding the wood with fire retardant chemical in liquid form. Each autoclave was surrounded by a concrete sump to collect spilled chemicals. The autoclave was then drained following treatment and excess fire retardant chemicals were pumped into holding tanks for reuse. The treated lumber was placed on racks outside of the autoclave, where excess chemical would drip from the lumber. The drips were

collected under the racks and directed to sumps located under the autoclaves. The lumber was then placed in a drying kiln to bake the chemical into the wood.

Observations & Sampling

During a site visit conducted by Terra in 1997, as part of their investigation, the following housekeeping issues were observed: discoloration and staining was evident in numerous locations on the floors of both buildings (called "Former AWT" and "Former GPL"), indicating spills, drips, and product releases. Grading of the floors in these buildings directed all spills to the sumps around the autoclaves. Total liquid chemical volume in each sump was approximately two to three inches deep. Wood treatment chemical was also seen accumulating to a depth of one to two inches in the pumphouse from an ongoing leak in piping.

The subcontractor hired by Terra, Holt Drilling, advanced 5 boreholes at the site, collected soil samples and installed four monitoring wells. Samples were analyzed for the presence of formaldehyde, metals and petroleum products (see attached tables copied from Terra's report). Elevated levels of formaldehyde (as compared to MTCA Method B cleanup levels) were encountered in groundwater samples collected from monitoring wells BH-02 and BH-04, located to the east of the AWT building. Elevated concentrations of phosphorous were encountered in three of the monitoring wells, and gasoline and diesel range hydrocarbons were detected as well, though chromatographic profiles of these chemicals did not match the patterns of gas and diesel. Soil samples were similarly contaminated by formaldehyde and phosphorous, though formaldehyde was found at levels below MTCA. One sample showed elevated concentrations of arsenic in soil, at 21 mg/Kg, but this was the only sample out of eleven collected with an elevated level, so it was considered an anomaly.

Further Investigations
Site Hazard Assessment American Wood Treaters…Gandalf, January 2001

In this report's executive summary, point sources of contamination identified to have been possible contributors to contamination at the site include former storage ponds utilized in the wood treatment process, an unpaved area on which a former UST used to store the process solutions was located, and a spill of formaldehyde which occurred in the 1990's during the offloading of concentrated formalin into storage tanks on site. Other sources included drippings from the treated wood entering the subsurface through cracks in the pavement, concrete rail pad and through storm drains.

A subsurface investigation was completed as part of the Gandalf site hazard assessment. As part of this investigation, twelve boreholes were advanced and completed as monitoring wells. Soil samples and groundwater samples were collected from these locations and submitted for analysis. Wells were completed at two depths - that of the perched, unconfined upper aquifer and in the lower aquifer. The water table is encountered from four to six feet below ground surface. A blue-grey saturated plastic clay layer approximately eight to ten feet thick separates the two aquifers.

Samples were analyzed for contaminants of concern, including formaldehyde, metals, and phosphorous. Results of these analyses showed elevated levels (exceeding MTCA Method B) of formaldehyde in soil and ground water, and elevated levels of nitrate/nitrite in groundwater. The majority of the formaldehyde contamination was founding the upper aquifer, with one sample from the lower aquifer showing a detection of formaldehyde marginally above the detection limit.

Remedial Action Plan for Formaldehyde in Soils and Groundwater… August 2001
This report proposed in-situ remediation of groundwater via application of hydrogen peroxide to three point source contaminant areas identified in the Site Hazard Assessment. It is unknown as to the status of this in-situ remediation.

Remedial Investigation Work Plan American Wood Treaters… May 2002
This report appeared to be a more in-depth version of the August 2001 Remedial Action Plan. There was no new characterization work done, only a more thorough discussion on prior groundwater sampling results and proposed in-situ remediation, which had not occurred yet.

Remedial Investigation Update and Proposed Work Plan American Wood Treaters… October 2004
Three new monitoring wells were installed at the site in July 2004. The three monitoring wells were sampled along with 8 existing wells on the property. Groundwater samples were analyzed for formaldehyde, nitrate and nitrite, ortho-phosphate, total phosphate and total kjeldahl nitrogen. The formaldehyde concentration in shallow groundwater ranged from 10 to 167 ppb compared to a 1.46 ppb MTCA method B cleanup level. The formaldehyde concentration in deeper groundwater ranges from 61 to 190 ppb.

Ecology Review Draft Water Quality Investigation Former AWT Site…August 2005
Landau Associates performed site reconnaissance and ground and surface water monitoring. Surface water was monitored at up gradient and down gradient locations for formaldehyde and nitrate. The formaldehyde concentration at the up gradient sample location was 8 ppb, and the concentration down gradient was 6 ppb indicating that the probability of formaldehyde impacts to surface water from the site are very low if any. Surface water sample results for nitrate were well below the screening level but do indicate a potential impact to surface water as the up gradient sample was not detected and the down gradient sample was 334 ppb. Groundwater sampling was conducted using a new sample method, modified EPA Method 8315. This method is reportedly more accurate in that there are fewer interferences that may be quantified as formaldehyde. Formaldehyde concentrations in shallow groundwater ranged from 51 to 93 ppb, and concentrations in deep groundwater ranged from 7-10 ppb. Nitrate concentrations in shallow groundwater ranged from 34 to 400 ppm, and concentrations in deep groundwater were below 1 ppm. The monitoring results vary significantly from the July 2004 sampling event in that the deep groundwater formaldehyde concentrations were measurably less during this event, possibly due to the revised sample method.

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): **None**

ROUTE SCORES:

Surface Water/Human Health: 7.2

Surface Water/Environ.: 13.6

Air/Human Health: 18.7

Air/Environmental: not scored

Ground Water/Human Health: 51.0

OVERALL RANK: 4

WORKSHEET 2
ROUTE DOCUMENTATION

1. SURFACE WATER ROUTE

List those substances to be considered for scoring: Source: 1,2
Elevated concentrations of formaldehyde, nitrate and nitrite found in soil.

Explain basis for choice of substance(s) to be used in scoring. Source: 1,2

Soil samples contained concentrations of substances above the MTCA Method A & B soil cleanup levels.

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

Explain basis for choice of unit to be used in scoring. Source: 1,2
Contamination confirmed by sampling. Results summarized in report.

2. AIR ROUTE

List those substances to be considered for scoring: Source: 1,2
Elevated concentrations of formaldehyde found in soil.

Explain basis for choice of substance(s) to be used in scoring. Source: 1,2

Soil samples contained concentrations of substances above the MTCA Method A & B soil cleanup levels.

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

Explain basis for choice of unit to be used in scoring. Source: 1,2
Contamination confirmed by sampling. Results summarized in report.

3. GROUND WATER ROUTE

List those substances to be considered for scoring: Source: 1,2
Elevated concentrations of formaldehyde, nitrate and nitrite found in soil and ground water.

Explain basis for choice of substance(s) to be used in scoring. Source: 1,2
Soil samples contained levels of substances above the MTCA Method A & B soil cleanup levels.

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

Explain basis for choice of unit to be used in scoring. Source: 1,2
Contamination confirmed by sampling. Results summarized in report.

WORKSHEET 4
SURFACE WATER ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drinking Water Standard (ug/l)	Val.	Acute Toxicity (mg/kg-bw)	Val.	Chronic Toxicity (mg/kg/day)	Val.	Carcino-Genicity WOE	PF*	Val.
1. Formaldehyde	1.46*	8	800 rat	5	0.2**	1	1.0	3***	3
2. Nitrate	10000	2	ND	-	0.1	1	ND	-	-
3. Nitrite	1000	4	ND	-	ND	-	ND	-	-

*CLARC '01, Method B carcinogen value, **CLARC '01, Non-carcinogen reference dose, ***CLARC '01, ND = no data

*Potency Factor

Source: 1,2,3,4
Highest Value: 8 (Max.=10)

+2 Bonus Points? no
Final Toxicity Value: 8 (Max.=12)

1.2 Environmental Toxicity

(x) Freshwater
() Marine

Substance	Acute Water Quality Criteria (ug/l)	Value	Non-human Mammalian Acute Toxicity (mg/kg)	Value
1. Formaldehyde	ND	ND	800 rat	5
2. Nitrate	ND	-	ND	-
3. Nitrite	ND	-	ND	-

Source: 1,2,3,4 **Value: 5**

1.3 Substance Quantity: unknown, use default = 1 Source: 2 **Value: 1** (Max.=10)
Explain basis:

2.0 MIGRATION POTENTIAL

2.1 Containment: surface spill, most of site covered with asphalt, will score as ineffectively maintained run on run off control Source: 1 **Value: 4** (Max.=10)

2.2 Surface Soil Permeability: gravel/trace fines Source: 1 **Value: 1** (Max.=7)

2.3 Total Annual Precipitation: 47.2 inches Source: 5 **Value: 3** (Max.=5)

2.4 Max. 2-Yr/24-hour Precipitation: 2.5 inches Source: 2 **Value: 3** (Max.=5)

2.5 Flood Plain: not in 100 year flood plain Source: 10 **Value: 0** (Max.=2)

2.6 Terrain Slope: <2% Source: 12 **Value: 1** (Max.=5)

WORKSHEET 4 (CONTINUED)
SURFACE WATER ROUTE

3.0 TARGETS

3.1 Distance to Surface Water: :>1000-2500'to Johnson Crk. Source: 12 **Value: 7** (Max.=10)

3.2 Population Served within 2 miles (See WARM Scoring Manual Regarding Direction): √0 Source: 8 **Value: 0** (Max.=75)

3.3 Area Irrigated within 2 miles 0.75√no. acres= (Refer to note in 3.2.): 0.75 √298 = 12.9 Source: 8 **Value: 13** (Max.=30)

3.4 Distance to Nearest Fishery Resource:>1000-2500 feet Source: 12 **Value: 9** (Max.=12)

3.5 Distance to, and Name(s) of, Nearest Sensitive Environment(s) wetland >1,000 - 2,500' Source: 12 **Value: 9** (Max.=12)

4.0 RELEASE

Explain basis for scoring a release to surface water: none documented Source: 2 **Value: 0** (Max.=5)

WORKSHEET 5
AIR ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Introduction (WARM Scoring Manual) - Please review before scoring

1.2 Human Toxicity

Substance	Air Standard (ug/m^3)	Val.	Acute Toxicity (mg/m^3)	Val.	Chronic Toxicity (mg/kg/day)	Val.	Carcino-Genicity WOE	PF*	Val.
1. Formaldehyde	.077*	10	No data	-	No data	-	1	5	5

*10-6 RISK ASIL MICROGRAMS/M³ ANNUALAVERAGE

*Potency Factor

Source: 1,2,4
Highest Value: 10 (Max.=10)

+2 Bonus Points? no
Final Toxicity Value: 10 (Max.=12)

1.3 Mobility (Use numbers to refer to above listed substances)

1.3.1 Gaseous Mobility
Vapor Pressure(s) (mmHg): 1.3 mmHg
Source: 13 Value: 3 (Max.=4)

1.3.2 Particulate Mobility -
Soil type:
Erodibility:
Climatic Factor:
Source: Value: 0 (Max.=4)

1.4 Highest Human Health Toxicity/Mobility Matrix Value (from Table A-7) equals **Final Matrix Value: 15** (Max.=24)

1.5 Environmental Toxicity/Mobility
Source: 3,4

(Table A-7)

Substance	Non-human Mammalian Acute Inhal. Toxicity (mg/m^3)	Value	Mobility (mmHg)	Value	Matrix Value
Formaldehyde	No data	-	1.3	3	Not scored

Highest Environmental Toxicity/Mobility Matrix Value (From Table A-7) equals **Final Matrix Value: NS** (Max.=24)

1.6 Substance Quantity: unknown, use default = 1
Source: 2 **Value: 1** (Max.=10)
Explain basis:

WORKSHEET 5 (CONTINUED)
AIR ROUTE

2.0 MIGRATION POTENTIAL

2.1 Containment: surface spills — Source: 1 — **Value: 10** (Max.=10)

3.0 TARGETS

3.1 Nearest Population: ≤1000 feet — Source: 1 — **Value: 10** (Max.=10)

3.2 Distance to, and Name(s) of, Nearest Sensitive Environment(s) >1000 - 2000' to wetland — Source: 12 — **Value: 6** (Max.=7)

3.3 Population within 0.5 miles: □pop.=√1066(.25)= 16.3 — Source: 6 — **Value: 17** (Max.=75)
(Note: am using one-quarter of the 0-1 mile population determined from the U.S. EPA SITEINFO database)

4.0 RELEASE

Explain basis for scoring a release to air: None documented. — Source: 2 — **Value: 0** (Max.=5)

WORKSHEET 6
GROUND WATER ROUTE

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drinking Water Standard (ug/l)	Val.	Acute Toxicity (mg/kg-bw)	Val.	Chronic Toxicity (mg/kg/day)	Val.	Carcino-Genicity WOE	PF*	Val
1. Formaldehyde	1.46*	8	800 rat	5	0.2**	1	1.0	3***	3
2. Nitrate	10000	2	ND	-	0.1	1	ND	-	-
3. Nitrite	1000	4	ND	-	ND	-	ND	-	-

*CLARC '01, Method B carcinogen value, **CLARC '01, Non-carcinogen reference dose, ***CLARC '01

*Potency Factor

Source: 1,2,4

Highest Value: 8 (Max.=10)

+2 Bonus Points? no

Final Toxicity Value: 8 (Max.=12)

1.2 Mobility (Use numbers to refer to above listed substances)
Cations/Anions: _____ Source: 2,13 **Value: 3** (Max.=3)

OR

Solubility(mg/l): 1)100%

1.3 Substance Quantity: unknown, use default = 1 Source: 2 **Value: 1** (Max.=10)
Explain basis: _____

2.0 MIGRATION POTENTIAL

2.1 Containment Source: 1,2 **Value: 10** (Max.=10)
Explain basis: spills/discharge to soil

2.2 Net Precipitation: 30.9 - 5 = 25.9 inches Source: 5 **Value: 3** (Max.=5)

2.3 Subsurface Hydraulic Conductivity: gravelly fill Source: 1 **Value: 4** (Max.=4)

2.4 Vertical Depth to Ground Water: observed release Source: 1 **Value: 8** (Max.=8)

3.0 TARGETS

3.1 Ground Water Usage: public supply no alternative Source: 7,9 **Value: 9** (Max.=10)

3.2 Dist. to Nearest Drinking Water Well: >5,000 - 10,000' Source: 7 **Value: 1** (Max.=5)

WORKSHEET 6 (CONTINUED)
GROUND WATER ROUTE

3.3 Population Served within 2 Miles: $\sqrt{1136}=33.7$ Source: 7,9 **Value: 34** (Max.=100)

3.4 Area Irrigated by (Groundwater) Wells within 2 miles: $0.75\sqrt{\text{no.acres}} = 0.75\sqrt{1942} = 33$ Source: 8 **Value: 33** (Max.=50)

4.0 RELEASE

Explain basis for scoring a release to ground water: release documented by sampling Source: 1 **Value: 5** (Max.=5)

SOURCES USED IN SCORING

1. Gandalf Consulting Ltd. Report. Site Hazard Assessment American Wood Treaters. January 2001.
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. Washington State Department of Ecology. Cleanup Levels and Risk Calculations under the Model Toxics Control Act Cleanup Regulation, ClARC Version 3.1. November 2001.
5. Washington State University Cooperative Extension Service, Washington Climate.
6. U.S. EPA SITEINFO GIS Query for American Wood Treaters location.
7. Washington Department of Ecology, well logs.
8. Water Rights Application Tracking System, NWRO Ecology. List of Wells and Water Usage in Surrounding Area.
9. Washington State Department of Health Public Water Systems (list on file at Whatcom County Health and Human Services Drinking Water Program).
10. Whatcom County Planning & Development. CAO Articles III & IV (Geohaz. & Flooding) T40&41-R4E. Map. 6/1/98.
10. Whatcom County Planning & Development. CAO Articles V & VI (Aquifer & Wetland) T40&41 - R4E. Map. 6/1/98.
11. Whatcom County Planning & Development. Fish Habitat. Map. 3/1/99.
12. Wildflower Productions, TOPO! Interactive Maps On CD-Rom, San Francisco, CA, 1998.
13. Sigma Chemical Co. Material Safety Data Sheet - Formaldehyde (at 37% solution). 27 September 1991.