REMEDIAL INVESTIGATION AND CORRECTIVE ACTION PLAN

PENTA WOOD PRODUCTS INC.
SIREN, WISCONSIN

2/262

REMEDIAL INVESTIGATION AND CORRECTIVE ACTION PLAN

PENTA WOOD PRODUCTS INC.
SIREN, WISCONSIN

March 1992

Ref No. 2140 (5)

CONESTOGA-ROVERS & ASSOCIATES

3/262

TABLE OF CONTENTS

TABLE OF CONTENTS (CONT'D)

TABLE OF CONTENTS (CONT'D)

LIST OF APPENDICES

7/262

LIST OF FIGURES

8/20

LIST OF FIGURES (CONT'D)

9/262

LIST OF TABLES

10/262

EXECUTIVE SUMMARY

Penta Wood Products Inc. (PWP) is a wood treating business located near Siren, Wisconsin. PWP began operations in the mid-1950s. Wood treating operations use pentachlorophenol (PCP) and chemonite (a mixture of arsenate and copper II oxide) to treat posts and timbers.

In 1987 the Wisconsin Department of Natural Resources requested that PWP assess the environmental conditions at the property. Conestoga-Rovers and Associates (CRA) was subsequently retained by PWP to conduct studies to characterize the property's environmental conditions and if necessary, to develop a corrective action plan.

Discussions with PWP representatives, a review of aerial photos and an inspection of the facility allowed CRA to identify areas of potential contamination. Each of these areas was investigated using test pits, boreholes and monitoring well installations. Soil and groundwater samples were collected and characterized by chemical analysis for compounds commonly associated with wood treating chemicals (PCP, copper and arsenic).

Since the inception in 1987 of soil and groundwater studies at the property, a total of 58 soil borings and test pits, and 10 groundwater monitoring wells have been installed. The soils and groundwater have been sampled and analyzed to characterize geologic and groundwater conditions at

11/262

the property . A total of 89 soil samples have been collected and analyzed to delineate the horizontal and vertical extent of contamination within soil. A total of 49 groundwater samples have been collected and analyzed to characterize groundwater quality.

The geology beneath the Penta Wood site consists of the following stratigraphy:

Geologic Unit	Approximate Average Depth Below Ground Surface (ft.)
- Sand and gravel;	0 - 130
- Clayey sand till;	130 - 170
- Sand and gravel; and	170 - 200
- Bedrock.	200

The sand/gravel and till units are not saturated. The uppermost water table is present under the till formation and is the water supply aquifer for PWP's production wells. The water table is essentially flat. Natural groundwater movement, unimpacted by pumping, would be in a southerly direction at an estimated rate of 570 feet per year. CRA's investigation also indicates that there is a slow flowrate or migration in the unsaturated soils from the surface to the groundwater. The combination of slow groundwater movement and slow migration through the soil has limited the migration of contaminants to and within the groundwater system. Hence, groundwater contamination is limited to the area immediately beneath the property .

PCP concentrations in soil exceeding 10 mg/kg are present in the following locations as shown on Figure 4.1c:

- Gully
- Lagoon area
- Wood chip area
- Oil water separator
- Process spill over area
- North area

Total Petroleum Hydrocarbons (TPH) and fuel oil compounds are present in the same areas.

The total volume of impacted soil, with PCP levels exceeding 10 mg/kg, is estimated to be 35,000 cubic yards. CRA estimates 70% of this volume is within ten feet of ground surface.

Samples indicate that the groundwater beneath the property has been impacted by PCP over an area approximating 4 acres.

Based on this information the remedial objectives established for the property are threefold. To contain soil and groundwater contamination and prevent contaminant migration beyond the property and to implement remediation in a cost-effective manner within a reasonable time frame.

Remedial alternatives for the impacted soil and groundwater have been evaluated. The proposed remedy for groundwater remediation consists of the installation of two extraction wells to recover impacted groundwater. The extracted groundwater will be treated and discharged to the ground surface in accordance with applicable WDNR rules. This system is designed to prevent the potential migration of contaminants beyond the immediate area of the property and will prevent any significant impact to other groundwater resources.

Remedial alternatives evaluated for soil include removal, bioremediation, low temperature thermal desorption, soil washing and containment. Each of these alternatives was evaluated with respect to cost, effectiveness and implementability. Removal is impractical and not cost-effective. Bioremediation, thermal desorption and soil washing remedies would rely upon the successful use of relatively new technologies applied to wood treating remediation. Some of the technologies are expected to improve in effectiveness and cost as these technologies are put into practice. All of these remedies are beyond the financial capabilities of Penta Wood Products at this time.

Given the alternatives available it is recommended that the remedy of containment be provided at the PWP property. In addition, PWP and the WDNR may continue to evaluate emerging technologies if they become more cost effective in the future.

14/262

The proposed actions will accomplish the remedial objective by containing impacted soil and groundwater and protect public health and the environment.

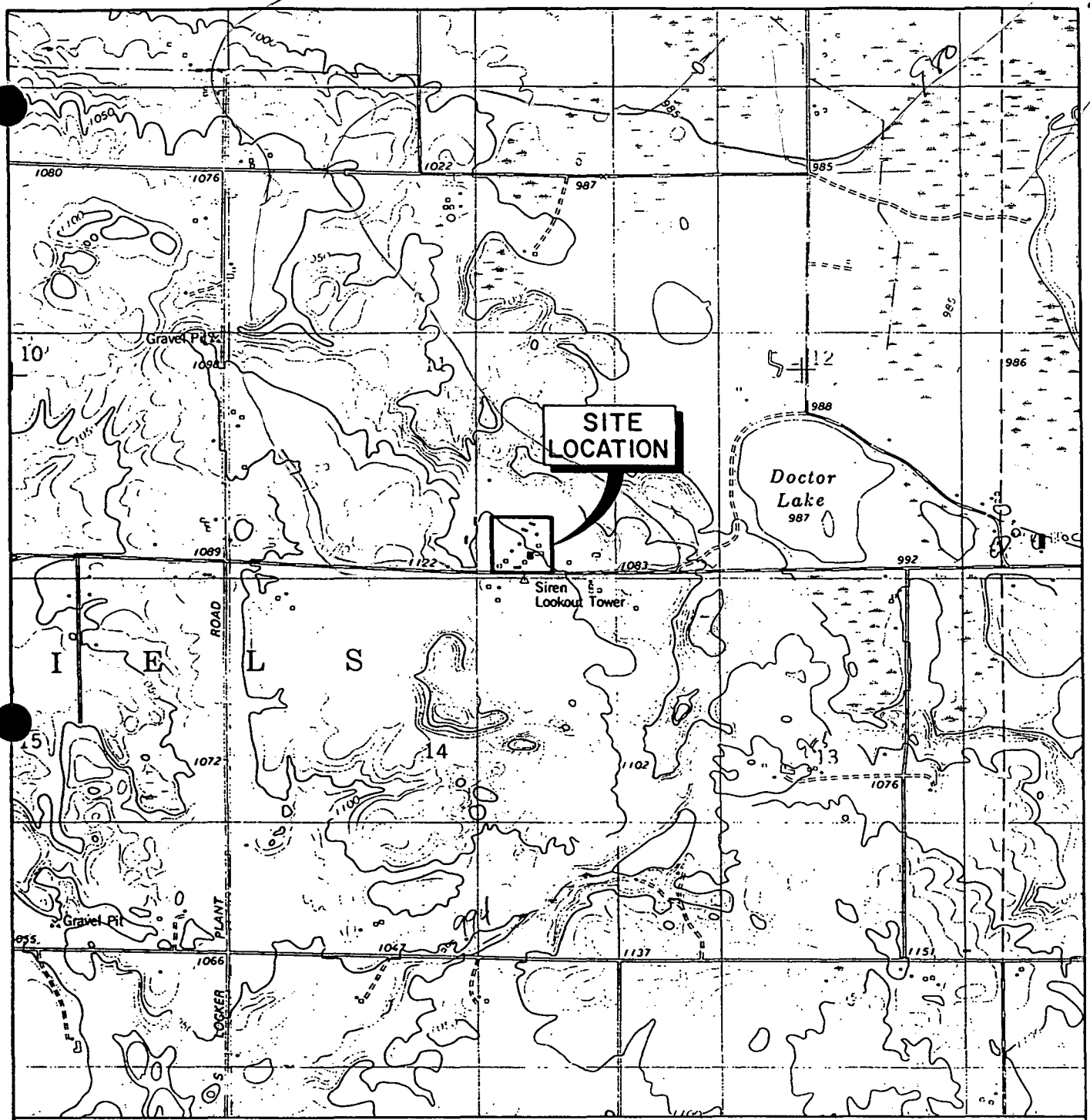
THIS IS NOT A REASONABLE TIME FRAME.
& WILL NOT MEET APLICABLE STANDARDS
(NO DETECT OR PRACTABILITY)

1.0 INTRODUCTION

Penta Wood Products Inc. (PWP) is a wood treating business located near Siren, Wisconsin, which has treated posts and timbers since the 1950s. Figure 1.1 shows the location of PWP (the property).

In 1987, the Wisconsin Department of Natural Resources (WDNR) requested that PWP assess the environmental conditions of the property after two spills were reported. Conestoga-Rovers and Associates (CRA) was subsequently retained by PWP to conduct studies at the property to characterize potential contamination and if necessary, develop a remedial plan.

This report presents the results of CRA's investigation, which was designed to characterize the nature and extent of impacts on soil and groundwater from PWP's operations. This report also presents recommended actions to address impacted soil and groundwater. This report is also submitted pursuant to Special Order NWD-90-08 issued to PWP on September 14, 1990.



SOURCE: USGS TOPOGRAPHIC MAP
SIREN WEST, WIS. QUADRANGLE

N

SCALE: 1" = 2000'

figure 1.1
SITE LOCATION
Penta Wood Products, Inc.

CRA

2140-14/08/87-M

17/262

2.0 BACKGROUND

2.1 LOCAL SETTING

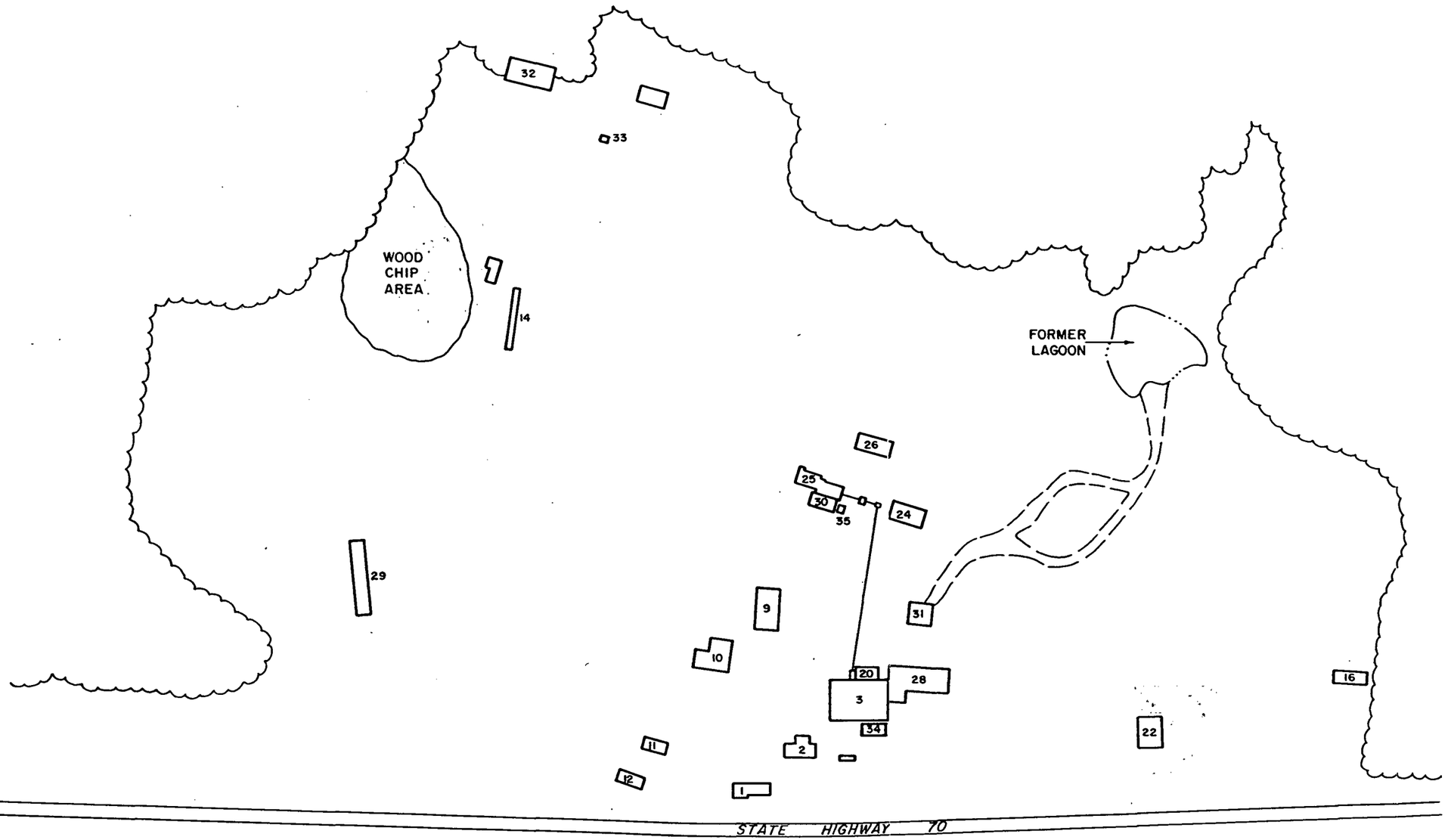
The property is located in Burnett County, Wisconsin approximately 2 miles east of Siren. The property is approximately 120 acres in size and is located in a rural area surrounded by woodlands and agricultural areas. Located on the property are numerous buildings associated with wood treating operations, such as storage sheds, garages, sawmills, pole peelers etc. The main portion of the property is used for an office complex, the wood treating area and the oil/water separator building.

Figure 2.1 shows the location of these buildings on the PWP property.

2.2 HISTORICAL OPERATIONS

Penta Wood Products has been treating and preserving wood products since the mid-1950's and currently employs approximately 25 people.

Prior to 1975, PCP was the only chemical used by PWP to treat wood products. Before 1956, the wood was treated by either dipping the butt ends of poles and timbers into a open tank of PCP solution or by introducing PCP, under a vacuum, into the wood. In 1956 the first pressure



LEGEND

1	OFFICE
2	GARAGE
3	TREATMENT AREA
9	TRUCK SHOP
10	GARAGE
11	LUMBER STORAGE
12	STORAGE SHED
13	POLE PEELER
14	SAWMILL
16	LUMBER SHED
20	NEW BOILER HOUSE
22	STORAGE AND LOADING
24	SHAVINGS VAULT
25	PEELER SHED
26	PLANER MILL
28	TREATMENT AREA
29	SAWMILL
30	PEELER SHED (7' POLES)
31	SEPARATING BUILDING
32	NEW SAWMILL BUILDING
33	SLASHER CONTROL HOUSE
34	PENTA MIXING BUILDING
35	ELECTRICAL CONTROL BUILDING

figure 2.1
SITE PLAN
Penta Wood Products, Inc.

CRA

2140-20/02/92-M

treating cylinder was installed. This method of treating wood was similar to the vacuum treating method except that the treating cylinder was placed under pressure instead of a vacuum.

In 1975 a second pressure process was added using chemonite. Chemonite is a water borne salt treatment consisting of arsenate and copper II oxide. Both the PCP and chemonite pressure treating processes are being utilized at this time.

2.3 REVIEW OF PAST SPILLS AND RESPONSE ACTIONS

This section summarizes past spills of wood treating materials and associated response actions. These summaries are based on information provided by PWP.

In 1986, there were two unintentional spills onto the ground adjacent to the retorts. The first spill was in August, 1986. The PCP treating cylinder had just been filled with a 5 percent solution of PCP and the cylinder was being pressurized when the door gasket failed, allowing approximately 50 gallons of the 5 percent PCP solution to spill into the sump and onto the surrounding ground. The liquid that leaked into the sump was pumped back into the treating cylinder.

The second spill occurred in October, 1986, when the chemonite pressure cylinder was being filled with the chemonite treating solution. The cylinder door was not secured and this allowed approximately 500 gallons of chemonite solution to pass through the crack around the door. Most of the liquid was contained by the sump in front of the cylinder door. Some chemonite solution leaked onto the soil surrounding the sump. The impacted soil was excavated and placed in drums. It was subsequently disposed of through Aqua Tech Co. of Port Washington, Wisconsin.

A third spill occurred on April 15, 1988, at the oil/water separator when a valve was accidentally left open and the storage tank overflowed. Some oil containing and mixed with PCP and water flowed into adjacent soil and pooled in lower spots. Two drums of impacted soil were excavated, drummed and shipped through Aqua Tech Co. for disposal.

A fourth spill occurred on June 9, 1988. Material from the the oil/water separator tank spilled onto the ground. The recovered liquid material was pumped into drums and the impacted soils were excavated and stockpiled on a secured, tarped concrete pad for future disposal.

Due To DNR Invest. of HW Purchase in Oct 89

In 1989, PWP informed the WDNR that excess water from the oil/water separator had occasionally been discharged on the property, primarily in the wood chip area, but also at the north edge of the property and in the area between the oil/water separator and the former lagoon.

2.4 EVALUATION OF POTENTIAL SOURCE AREAS

Based on discussions with PWP, nine potential sources of contamination have been identified. CRA conducted a field investigation of each potential source area. Nine test pits were excavated in and around areas shown on Figure 2.2. The purpose of the test pits was to identify and sample any areas that could impact soil and groundwater. Table 2.1 summarizes the sampling results. At each test pit, soil was inspected for evidence of impacts from operations based on visual and olfactory evidence. Organic vapors in air were monitored using a photoionization field monitor. Elevated organic vapors indicated the presence of petroleum hydrocarbons from the wood treating oil used as a carrier for PCP in the wood treating solution. Representative soil samples were collected and analyzed for arsenic, copper, zinc and PCP.

The potential source areas are discussed below:

Potential Source Area #1 - PCP Treating Area

A test pit was excavated immediately adjacent to and surrounding the retort opening of the current PCP wood treating cylinder and sump, as shown on Figure 2.2. A soil sample was collected three feet below ground surface (bgs) and analyzed for the four process indicator chemicals (arsenic, copper, zinc and PCP). The soil in this test pit had a slight discoloration in the top 1.0 foot and a slight odor from 2.0 to 3.0 feet bgs. There were no organic vapor readings in air above background.

TABLE 2.1

POTENTIAL SOURCE AREA SAMPLING RESULTS

Potential Source Area	Location	Depth (ft.)	*Parameters (mg/kg)* Arsenic	Copper	Zinc	Pentachlorophenol
1	Pentachlorophenol Treating Area	3	0.52	20	16	ND
2	Chemonite Treating Area	3	140	260	23	71
3	Former Lagoon (Composite)	3	38	63	20	ND
6	Oil/Water Separator	2	2.4	7.3	6.4	110
7	Chemonite Treated Wood Storage Area (Composite)	1	150	48	8.1	ND
8	Pentachlorophenol Treated Wood Storage Area (Composite)	1	4.2	7.0	6.4	ND

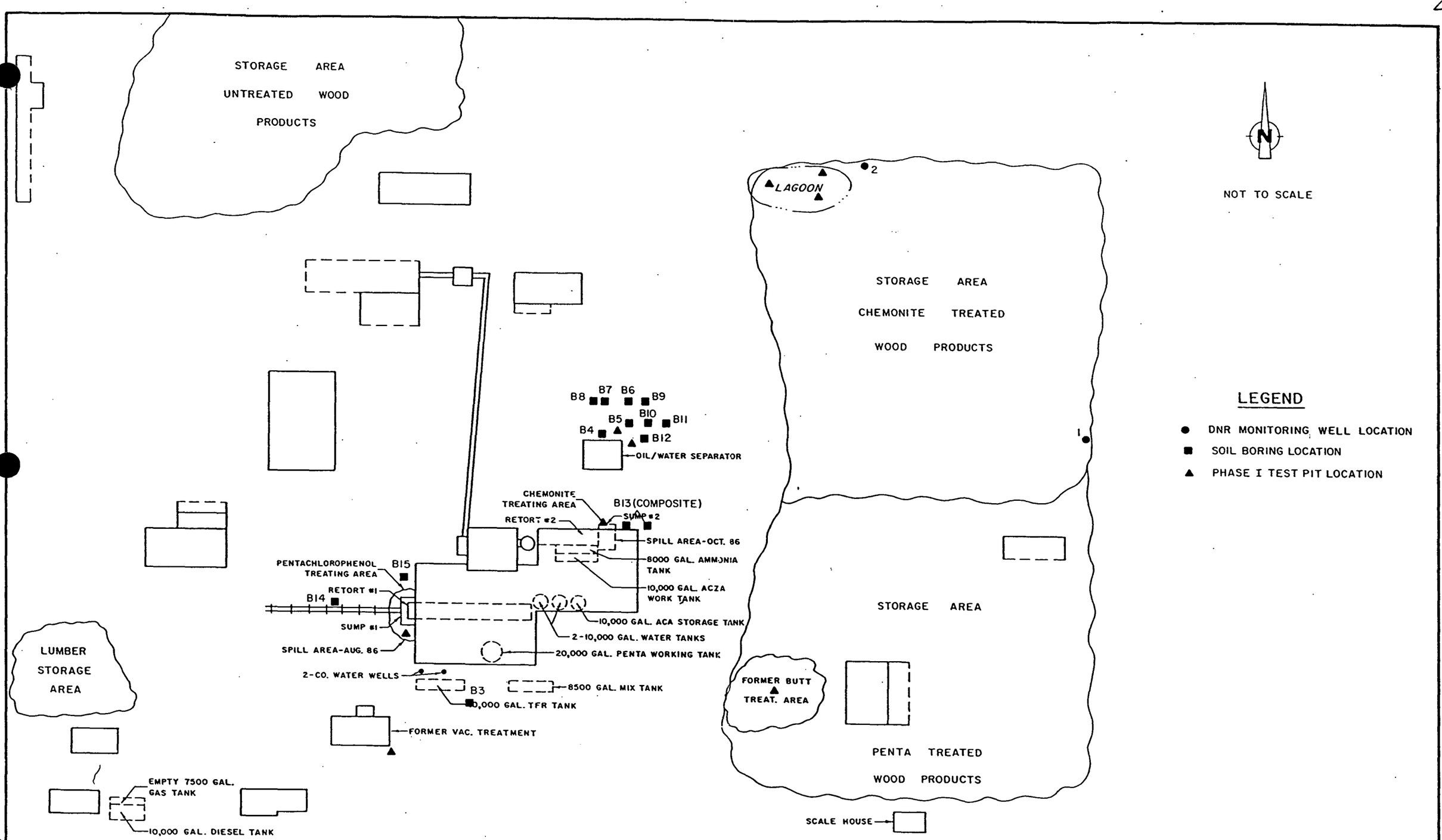


figure 2.2
PHASE I TEST PIT LOCATIONS AND
PHASE II SOIL BORING LOCATIONS
Penta Wood Products, Inc.

CRA

2140-26/09/89-M

Sample results, shown on Table 2.1 indicate that PCP was not detected and metals were not detected at elevated concentrations above background levels.

Potential Source Area #2 - Chemonite Treating Area

A test pit was excavated immediately adjacent to the present chemonite treatment cylinder and sump area. Soils in this test pit were discolored (green) in the top 0.5 foot. There was no odor, and no elevated organic vapor readings in air from this test pit. A soil sample was collected from the test pit at a depth of approximately three feet bgs. This sample exhibited chemonite and PCP impacts as evidenced by elevated levels of PCP and metals in the soil.

Potential Source Area #3 - Former Lagoon Area

Three test pits were excavated in the former lagoon area. As shown on Figure 2.2, the lagoon is located immediately west of monitoring well MW2. The soils in these test pits showed no visual evidence of contamination, but did have a slight odor. There were no elevated organic vapor readings in air above background.

Three soil samples (one from each lagoon test pit) were collected from a depth of approximately three feet below the ground surface and a composite soil sample was prepared. Sample results (Table 2.1) indicate that PCP was not detected. Metals were detected at levels above background (when

compared to results collected from the PCP treated wood storage area). Following the initial sampling, visual evidence of treating solution was noted in the lagoon area which was attributed to drainage from the gully.

The lagoon area was further investigated in 1991 by collecting additional subsurface soil samples. The results show that PCP contamination is present in the lagoon area and are discussed in detail in Section 4.0.

Potential Source Area #4 - Former Vacuum Treatment Area

One test pit was excavated in the area adjacent to the former vacuum treatment facility. This building was used prior to 1956 as a PCP treatment operation similar to the operations used today and is now being used as a garage. The soils excavated in this test pit exhibited no visual contamination or odor. Soil samples were scanned with a photoionization meter and did not exhibit organic vapor readings in air above background.

As there was no evidence of potential contamination. CRA determined it was not necessary to collect a soil sample at this location for chemical analysis.

Potential Source Area #5 - Former Butt Treating Area

One test pit was excavated in the area formerly used to treat pole butts with PCP in the early 1950s. This area is located in the present day PCP treated wood storage area directly east of the present day garage.

The soil excavated from this test pit did not exhibit any visual contamination or odor. Soil samples were scanned with a photoionization meter and did not exhibit organic vapor readings in air above background.

Given the above factors and no evidence of potential contamination, CRA determined that it was not necessary to collect a soil sample for chemical analysis.

Potential Source Area #6 - Oil/Water Separator

Two test pits were excavated in an area located north of the treatment cylinders in the vicinity of the oil/water separator . The oil/water mixture is recovered from the PCP treatment process and used further in the wood treatment process. The oil contains PCP and is separated from the water in a tank. Recovered oil is reused in the PCP treatment process and the water is used as make-up for the chemonite treatment process.

As discussed in Section 2.3, accidental spills have occurred in this area. The two test pits were excavated in areas which visually appeared to be impacted. The soil in both of these test pits had a brown/black discoloration as well as an odor. Both test pits showed elevated organic vapor

readings in air. One soil sample was collected from a depth of two feet. Chemical analysis indicates that this sample contained PCP. Metals concentrations were similar to background levels.

This area was further investigated in 1991 by collecting additional subsurface soil samples. The results of this field work show that PCP is present in the area of the oil/water separator. These results are further discussed in Section 4.0.

Potential Source Area #7 -
Chemonite Treated Wood Products Storage Area

This area was added at the request of the WDNR in a letter dated October 29, 1987. This area is in and around the chemonite treated wood storage areas. As suggested by WDNR, 24 shallow soil samples were collected from locations evenly distributed over the chemonite treated wood storage area. One composite soil sample was prepared and analyzed. As shown on Table 2.1, PCP was not detected in this area as would be expected since PCP treated wood products are not stored there. However, elevated levels of metals similar to the concentrations found in soil adjacent to the chemonite treating area were observed..

Potential Source Area #8 -
PCP Treated Wood Products Storage Area

This area was also evaluated at the request of the WDNR. In a manner similar to the chemonite treated wood products area, CRA collected 24 individual shallow soil samples representing the storage area and prepared one composite sample.

Analytical results for the composite sample (Table 2.1) did not detect PCP. Metals concentrations were similar to the metals concentrations found in soil sampled from the PCP treating area. Since chemonite is not used in this area, these metal concentrations are considered representative of background concentrations.

Potential Source Area #9 -
PCP Storage Tank and Mixing Area

This area was not identified as a potential source area until the end of this study phase and was not investigated until 1991.

Additional Source Areas

Additional source areas were identified in 1989/1990. These areas are near the wood chip pile, the northern edge of the property and the gully leading to the former lagoon.

2.5 SUMMARY OF INVESTIGATIONS

A summary of investigations is shown in Table 2.2.

2.5.1 WDNR Study

The WDNR conducted a preliminary investigation at the property in 1986. This study included the completion of three boreholes and the installation of two monitoring wells (MW1 and MW2).

2.5.2 CRA Phase I

In June of 1988, CRA conducted a field investigation to identify potential source areas at PWP. As discussed earlier, nine test pits were excavated in and around areas shown on Figure 2.2. The purpose of these test pits was to identify and sample any areas that could contribute to soil and groundwater impacts at the property.

The results of the Phase I investigation indicated that the groundwater under the property, below a till strata, was impacted by PCP. The results also indicated that the surficial soils around the oil/water separator and the chemonite treating area have elevated concentrations of PCP and PCP and metals respectively. However, the metals were not considered a potential source

TABLE 2.2

SUMMARY OF FIELD INVESTIGATIONS

	DNR 1986	*CRA Phase I 1988*	*CRA Phase II 1989*	*Special Order 1991*
Test Pits	0	TP1 through TP9	0	0
Boreholes	BH (MW1), BH (MW2), BH (MW3)	0	B3 through B15	BH16 thru BH47
Monitoring Wells	MW1, MW2	0	MW3, MW4, MW5 (Installed after Phase II)	MW6, MW7, MW8 MW9, MW10
Groundwater Sampling	MW1, MW2	MW1, MW2 Production Well	Production Well	MW1, MW3, MW4, MW5, MW6, MW7, MW8, MW9, MW10 Production Well

of groundwater contamination and are limited to the top three feet of the ground surface. The Phase II work plan outlined additional work to be done to further define the extent of this contamination.

2.5.3 CRA Phase II

In June of 1989, the field work for Phase II was completed at the PWP property. Wisconsin Test Drilling (WTD) mobilized a Mobile Drill D-50 soils auger drill rig to the property. This work involved drilling and sampling at two deep borings and 12 shallow borings. These borehole locations are shown on Figure 2.2.

Two soil borings were completed at locations shown on Figure 2.2. The purpose of these soil borings was to define the soil stratigraphy of the property and to install two monitoring wells as outlined in the Phase II Scope of Work. The overburden stratigraphic logs for these borings are presented in Appendix A. Upon completion of these borings, it was discovered that there was no groundwater or any evidence of groundwater above the hard pan unit. Therefore, after discussing this with the WDNR, no monitoring wells were installed.

2.5.3.1 Production Well Area - Deep Boring

Boring B3, which is located very close to the company production wells, showed no evidence of impacts (i.e. visual or olfactory), hence, soil samples were not taken or analyzed at this soil boring location. The till unit was encountered at a depth of 135 feet bgs which is consistent with the soil stratigraphy recorded on the water well logs for PWP's production wells.

2.5.3.2 Oil/Water Separator Deep Boring

Boring B4, which is located on the north side of the oil/water separator, did show evidence of soil impacts to a depth of approximately 15 feet bgs. The top 10 feet had both an "oily" appearance and an odor. The split spoon sample at 15 feet bgs had a slight odor, but no "oily" appearance. A sample was taken at a depth of 20 feet bgs and analyzed for PCP. The results of these analyses are presented in Table 2.3. PCP was not detected below 15 feet.

The till at B4 was found at a depth of 110 feet bgs. This correlates to approximately the same elevation found at Boring B3.

2.5.3.3 Oil/Water Separator Shallow Borings

Eight additional shallow borings were conducted around the north side of the oil/water separator. This area was selected due to past

TABLE 2.3

SUMMARY OF PHASE II ANALYTICAL RESULTS

Sample Location	Depth (BGS)	Visual/Olfactory Contamination	Chemical Concentration
		Production Well/PCP Treating Area	
B4	20'	No	PCP - ND
B14	5'	No	PCP - ND
B14	10'	No	PCP - ND
B15	5'	No	PCP - ND
		Chemonite Treating Area	
B13	5'	No	PCP - 23 mg/kg As - ND Cu - 14 mg/kg Zn - 13 mg/kg
B13	10'	No	PCP - 4.1 mg/kg As - ND Cu - 14 mg/kg Zn - 11 mg/kg
		Oil/Water Separator Area	
B5	5'	No	PCP - ND
B5	10'	No	PCP - ND
B6	5'	No	PCP - ND
B6	10'	No	PCP - ND
B7	5'	No	PCP - ND
B8	5'	No	PCP - ND
B9	2'	Yes	PCP - 2,100 mg/kg
B9	5'	Yes	PCP - 170 mg/kg
B9	10'	No	PCP - ND
B10	5'	No	PCP - ND
B11	5'	No	PCP - ND
B12	5'	No	PCP - ND

Note:

ND - Not Detected

spills in the area and with consideration of existing drainage patterns. The location of these borings are shown on Figure 2.2. Samples taken were taken from these soil borings at depths shown in Table 2.3. Also shown in this table are the analytical results for these soil samples. The only soil boring which had detectable concentrations of PCP was boring B9. At this boring, the sample taken at 2 feet bgs had a concentration of 2,100 mg/kg and the 5 foot sample had a concentration of 170 mg/kg. No PCP was detected in the sample from 10 feet bgs.

2.5.3.4 Chemonite Treating Area

As requested by the WDNR, chemical soil samples from boring B13 were taken at greater depths (5 feet and 10 feet) in this area. Figure 2.2 shows the location of these borings. A composite sample was taken from each boring at a depth of 5 feet and at 10 feet bgs. These samples were analyzed for the target metals of concern: arsenic, copper and zinc and for PCP. The analytical results are summarized on Table 2.3. A sample was collected and held for potential analysis by EP Toxicity Leach Testing procedures. In addition, deeper borings were conducted to provide a metals profile with depth. Analytical results for metals from both Phase I and II were reviewed and indicate that metal concentrations above background were limited to a depth of approximately 3 feet and metal concentrations at depths of 5 and 10 feet were

WHAT IS BACKGROUND?

found to be similar to the background concentrations. As such, an EP Toxicity Leach test was not conducted on these samples because of the very low level presence of metals.

2.5.3.5 PCP Treating Area

As requested by the WDNR, a boring, B14, was conducted in an area along the railroad tracks that lead into the PCP treating retort cylinder. The WDNR originally requested a test trench in this area, however, due to the potential for rail bed disturbance, it was decided by both CRA and the WDNR that a soil boring would be more appropriate. This soil boring location is shown on Figure 2.2. Soil samples were taken at depths of 5 and 10 feet bgs and analyzed for PCP. These results are summarized on Table 2.3. Neither of these soil samples had concentrations of PCP above the method detection limit.

During a field property inspection, the WDNR expressed a concern about an area just north of the PCP treating area. The retaining wall north of the PCP retort sump has a PVC pipe coming out of the side of the wall. Upon further inspection it was found that this pipe did connect to the sump. This pipe was plugged on the sump end with sand. The WDNR was concerned that this pipe may have drained treating solution out of the sump. It was decided that a soil boring, B15, should be done in this area. This location is shown on Figure 2.2. Due to the number of overhead utility lines and plant

piping, a hand auger was used to take a chemical soil sample at a depth of 5 feet bgs. The analytical results are summarized in Table 2.3. No PCP was detected in this soil sample.

Groundwater Sampling - Production Well

During the field investigation, a water sample was taken from PWP's production wells. The faucet outside the treating building was turned on and the system was allowed to purge for 40 minutes to flush the lines to assure that a representative water sample was taken. This groundwater sample was analyzed for PCP. This groundwater sample showed PCP at a concentration of 1,300 ~~mg~~ µg/L, which is consistent with concentrations reported previously.

Wood Chip/Boiler Ash Soil Sample

The WDNR, in their letter dated March 7, 1989, requested a sample of ash be taken and analyzed for octachlorodibenzo-p-dioxin. CRA interviewed several PWP employees and were told that there was only one area where the boiler ash was deposited. This area is outside the door from the boiler room. After discussing this with the WDNR, it was decided that a composite sample be taken from this ash pile. Twenty hand auger holes were conducted in and on top of the ash pile to obtain a representative cross sectional sample. This sample was submitted for a complete (C1 through C8 congeners) dioxin analysis.

An evaluation of the dioxin results was presented in the report titled "Site Evaluation - Phase II, Penta Wood Products Inc." The conclusion of this evaluation is that there is no public health concern associated with the ash. A copy of this evaluation is presented in Appendix B.

2.5.4 Special Order NWD-90-08

Work conducted by CRA on behalf of PWP under the Special Order, beginning in 1990 and continuing through 1992 included:

1) Soil borings and sampling within the wood chip area to delineate PCP concentration in soil,

2) Soil borings and sampling around the 10,000 gallon underground transfer tank to evaluate PCP concentration in soils. WDNR subsequently agreed to defer any decision concerning tank excavation pending review of sampling results.

3) Soil borings and sampling in the oil/water separator building to evaluate the extent of PCP and fuel oil contamination.

4) Soil borings and sampling in the former lagoon area to evaluate the extent of PCP and fuel oil concentrations in soil.

5) Soil borings and sampling along gullies running along a southwest to northeast line from location B9 to the former lagoon.

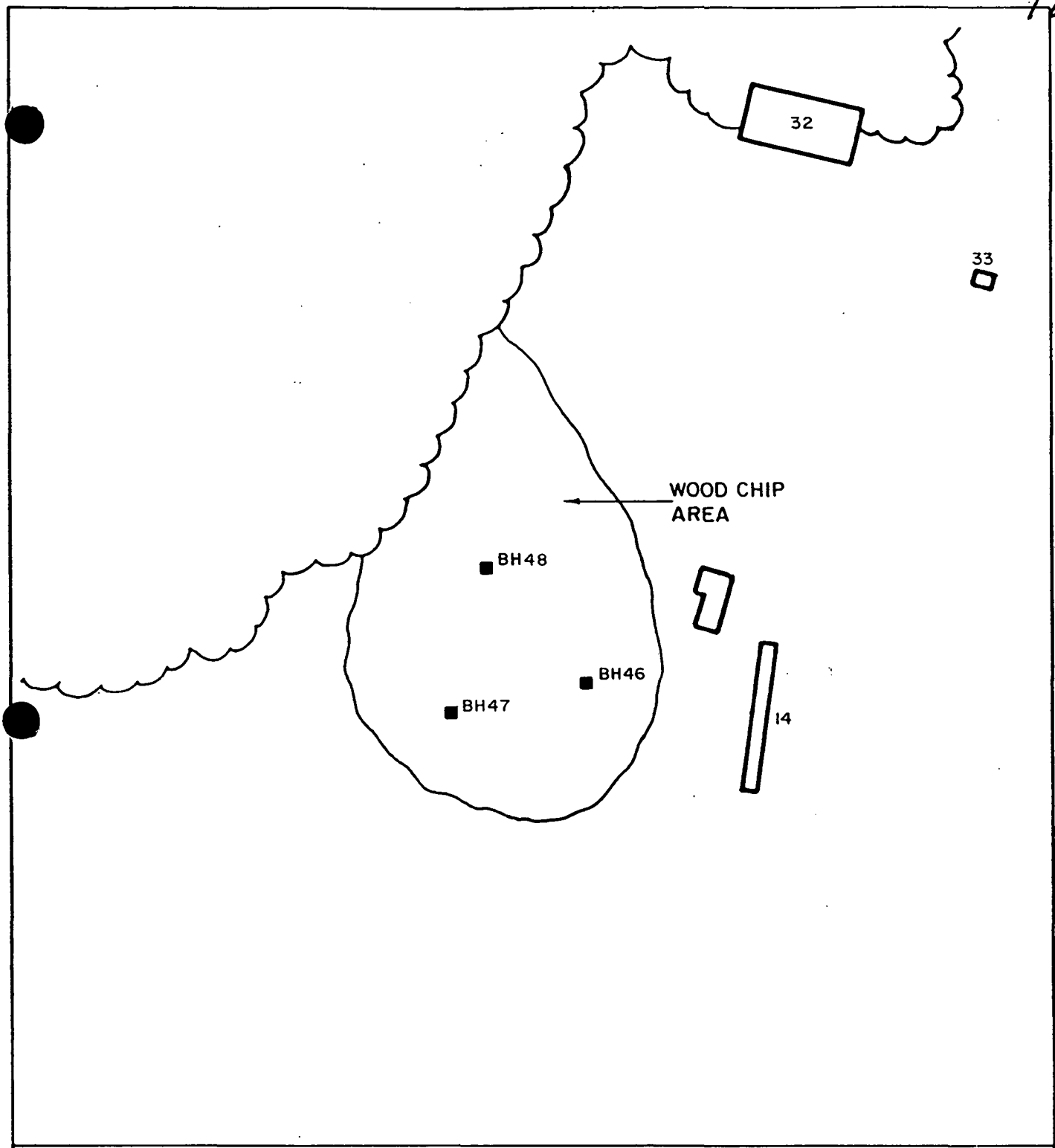
6) Soil borings and sampling near the site of the portable tank to evaluate the potential presence of PCP and fuel oil in the soil.

7) Installation of four additional monitoring wells and groundwater sampling to collect additional hydrogeological and groundwater chemical data.

8) Ongoing verbal and written reports to the WDNR as information became available.

Soil Boring/Sampling

A total of 33 soil borings were advanced for the purpose of characterizing horizontal and vertical extent of PCP and fuel oil in the areas identified as potential source areas. In addition, 7 hand auger borings were advanced in areas which conventional drill rigs could not access. At each area, a minimum of one borehole was advanced to a depth where visual inspection and screening with a photoionization device indicated no evidence of contamination. Figure 2.3a and 2.3b illustrate the locations of the potential source areas and the borings. Borehole logs are located in Appendix A.



LEGEND

■ BOREHOLE LOCATION

N

0 100 200

SCALE IN FEET

figure 2.3b
SOIL BORING LOCATIONS
WOOD CHIP AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

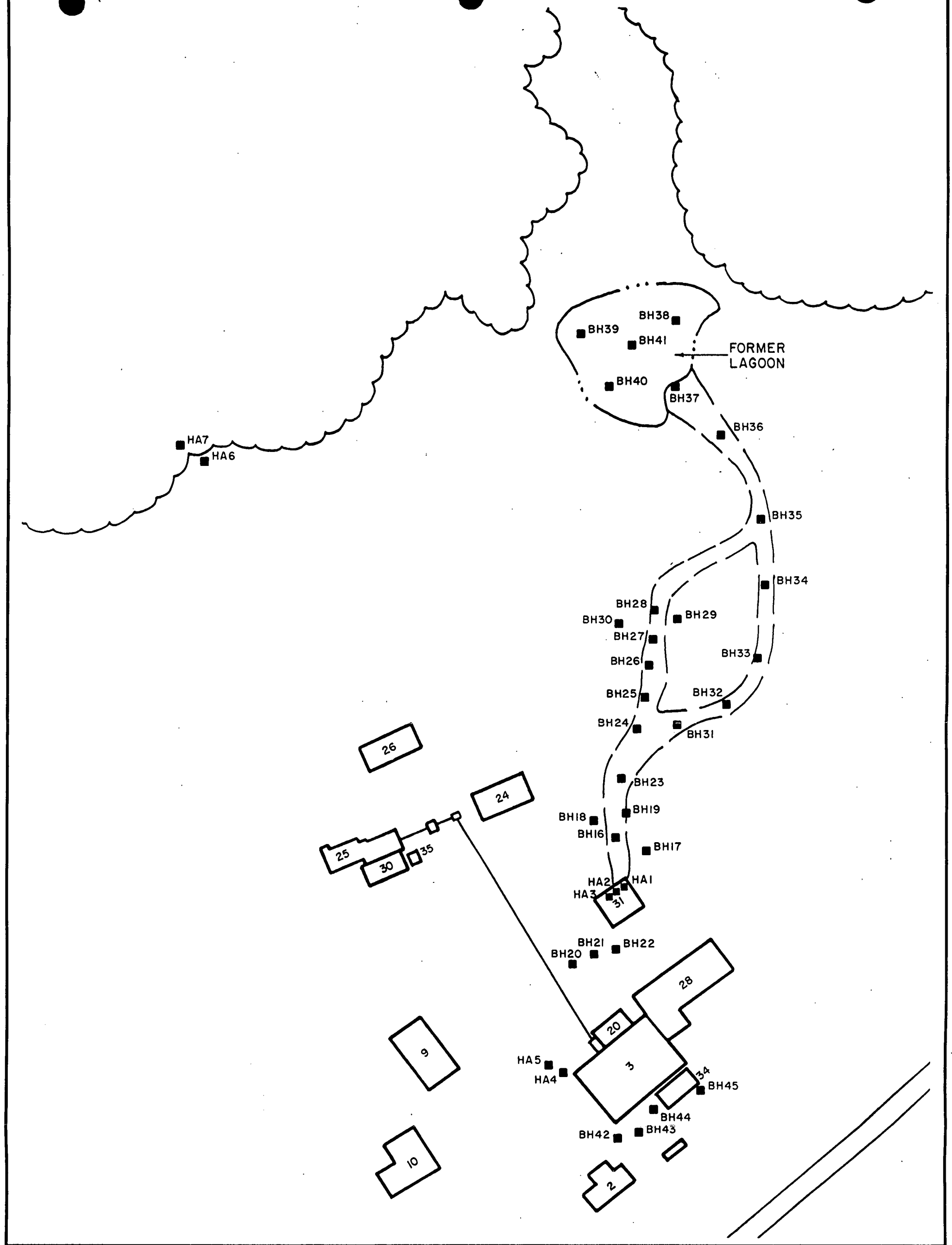


figure 2.3a
SOIL BORING LOCATIONS
SEPARATING BUILDING/
FORMER LAGOON AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

10/2/92

Soil Boring Procedures:

Soil borings were conducted by WTD of Schofield, Wisconsin using both a Dietrich 450 truck-mounted rig, and an all-terrain mounted drill rig. The drill rigs used 4-1/4 inch hollow stem augers to advance the borings. Following auger removal, soil borings were backfilled with hydrated bentonite. Drilling was supervised by a CRA geologist.

Hand auger borings were advanced using a two inch stainless-steel hand "bucket auger".

Soil Sampling Procedures

For chemical and geologic characterization, split spoon samples were collected every two feet from 0 - 20 feet bgs. Where appropriate sample intervals were modified to 5 foot intervals below the 20 foot depth. Hand auger borings were advanced until refusal and or visual lack of contaminant evidence.

All split spoon samples that were collected for geologic characterization were then placed in a glass jar and allowed to warm for approximately 5 minutes inside a heated vehicle. Following the warming period, the samples were screened by performing a headspace analysis using a MSA-PID.

In most boreholes, a minimum of two samples were placed in a pre-cleaned glass jar for subsequent analysis of PCP and fuel oil. These samples were then placed in a cooler to lower the sample temperature to 4°C. Based on visual inspection, and PID screening, a representative sample was chosen for analysis. A second sample was selected for analysis at or near the bottom of the boring to aid in determining vertical extent and or concentration of contaminants. In boreholes where little or no evidence of contaminants were observed, one sample was collected for analysis.

Samples were sent under chain of custody procedures to Pace Laboratories, Inc. of Minneapolis, Minnesota for chemical analysis.

Equipment Cleaning and Decontamination Procedures

Between all soil borings the drilling equipment, including augers, tools and split spoons were cleaned using a high pressure, high temperature wash. The hand bucket auger was also decontaminated between borings using a high pressure, high temperature wash.

Between sampling intervals, split spoon sample devices where cleaned using a water rinse, followed by an alconox soap wash, and final water rinse. For those samples collected for chemical analysis, the split spoons were cleaned as described above and were then decontaminated with a rinse of methanol followed by a rinse of distilled water.

Monitoring Well Installation

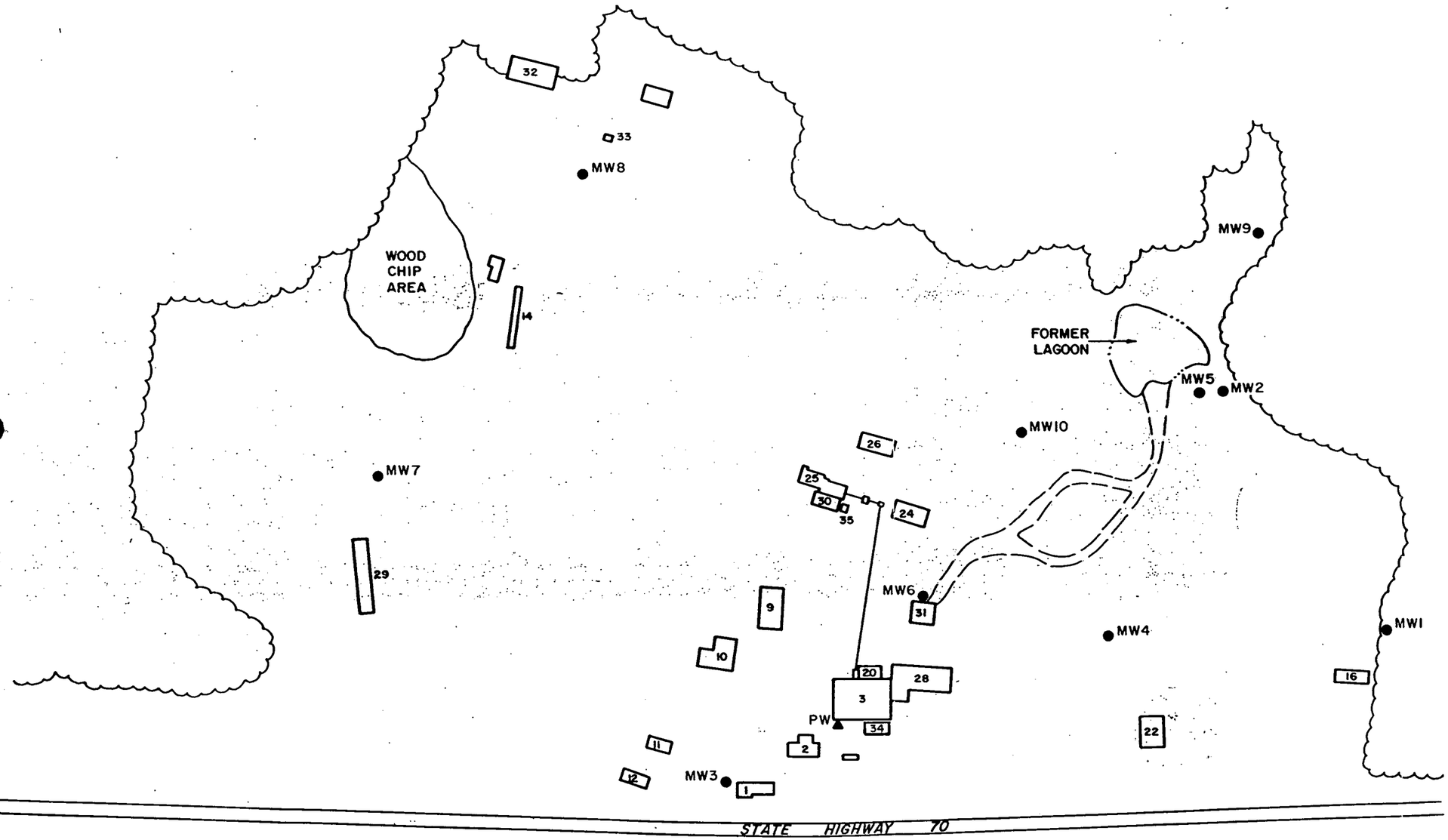
Two new monitoring wells (MW9, MW10) were installed for the purpose of collecting groundwater samples and hydrogeologic data. Following the installation, the wells were surveyed, developed and stabilized. The locations of these wells and other previously installed wells is illustrated on Figure 2.4. Table 2.4 summarizes the construction depths and elevations of the new and existing wells.

Monitoring Well Construction

SIEVE ANALYSIS OF FORMATION FOR SCREEN SIZE

Monitoring well MW10 was installed by Roger's Well Drilling, of Shell Lake, Wisconsin, using cable tool drilling methods. Using this method, a 6-inch diameter steel casing was driven into and seated in a till unit which has been identified beneath the property. Drilling continued by driving a 4-inch diameter casing inside the seated 6-inch casing to the target well depth. All cuttings were then cleaned out of the casing using a bottom filling bailer. After the casing was cleaned out, a stainless steel well screen was inserted, "telescoped", inside the casing to the targeted screen depth. Finally, the 4-inch steel casing was "backed out" of the boring, exposing the well screen.

Monitoring well MW9 was installed by WTD using 4-1/4 inch hollow stem augers advanced by an all terrain drill rig. Split spoon samples were collected from the surface to the target well depth to characterize the soils and determine the depth of the water table. After reaching the target depth, a 2-inch diameter PVC well was installed inside the auger. A sand pack was



N

0 200 400

SCALE IN FEET

LEGEND

1	OFFICE
2	GARAGE
3	TREATMENT AREA
9	TRUCK SHOP
10	GARAGE
11	LUMBER STORAGE
12	STORAGE SHED
13	POLE PEELER
14	SAWMILL
16	LUMBER SHED
20	NEW BOILER HOUSE
22	STORAGE AND LOADING
24	SHAVINGS VAULT
25	PEELER SHED
26	PLANER MILL
28	TREATMENT AREA
29	SAWMILL
30	PEELER SHED (7' POLES)
31	SEPARATING BUILDING
32	NEW SAWMILL BUILDING
33	SLASHER CONTROL HOUSE
34	PENTA MIXING BUILDING
35	ELECTRICAL CONTROL BUILDING
●	MONITORING WELL LOCATION
▲	PRODUCTION WELL LOCATION

figure 2.4
MONITORING WELL LOCATIONS
Penta Wood Products, Inc.

CRA

2140-20/02/92-M

TABLE 2.4

MONTORING WELL INSTALLATION DETAILS

Well No.	Reference Elevation (Ft. AMSL)	Ground Elevation (Ft. AMSL)	Well Depth (Ft. BGS)	Bottom of Screen Elevation (Ft. AMSL)	Diameter of Well Casing (Inches)
MW1	1072.20	1070.5	96.7	973.8	2.0
MW2	1065.51	1063.8	85.0	978.8	2.0
MW3	1129.36	1127.6	182.0	945.6	4.0
MW4	1089.67	1086.9	186.3	900.6	4.0
MW5	1074.07	1072.2	118.0	954.2	4.0
MW6	1095.13	1093.1	147.7	945.4	4.0
MW7	1096.36	1094.2	168.0	926.2	4.0
MW8	1091.07	1088.7	159.5	929.2	4.0
MW9	1020.50	1018.0	54.0	964.0	2.0
MW10	1083.75	1081.8	131.0	950.8	4.0

46/262

installed around the well screen to a level approximately 2 feet above the well screen. A 2-foot thick bentonite pellet seal was placed above the sand pack. The remaining annulus was backfilled with a bentonite grout.

NOT IN COMPLIANCE W/ NR 141 - FILTER PACK SEAL

Geologic and well construction logs are located in Appendix A.

Well Development

Following well construction, the new monitoring wells were developed and stabilized.

MW9 was developed by surging the well screen, and removing sediment and groundwater with a 2-inch stainless steel bailer. A total of 10 well volumes were removed from the well.

MW10 was stabilized by purging with a 4-inch submersible pump.

Periodically during purging, field parameter readings of pH, conductivity and temperature were recorded to document well stabilization. The wells were considered stabilized after three consecutive field parameter readings were obtained which varied by less than 5% from the mean reading.

All development equipment was cleaned by rinsing with clean potable water, followed by a distilled water rinse. The bailer used at MW9 was further decontaminated by rinsing with methanol and distilled water.

Groundwater Sampling

Groundwater samples were collected from all monitoring wells in 1990 and 1991. These results are presented in Section 4.2. Additional, groundwater samples were collected from both the new and existing wells on January 16 and February 13, 1992. Samples collected in January were sent to Pace Labs and the samples taken in February were sent to Interpoll Labs.

A minimum of five well volumes were purged from each well prior to sampling. Field parameters of pH, conductivity and temperature were documented prior to sampling.

All wells (except the 2-inch well MW9) were purged with 4 inch submersible pumps powered by portable generators. Purging was conducted beginning with the least contaminated wells proceeding to the most contaminated wells. At MW9, a 2-inch bailer was used to purge and sample the groundwater.

After purging, groundwater samples were collected using either stainless steel or teflon bailers attached to a nylon rope. Samples were then placed in coolers and sent under chain of custody procedures to the contract lab.

Equipment Cleaning

The 4-inch submersible pumps were cleaned prior to arrival at the PWP property by washing with alconox soap and rinsing with hot potable water. Between sampling locations, the pumps were thoroughly rinsed with potable water followed by a distilled water rinse. As noted previously, to lessen the potential for cross contamination, wells were purged in order from least to most contaminated based on existing chemical data.

Bailers used for collection of the groundwater samples were cleaned by scrubbing with alconox soap, rinsing with potable water, followed by a rinse sequence of methanol, hexane and methanol. Bailers were then wrapped in aluminum foil for transportation to the sample location. Just prior to sampling the well, the bailer was given a final rinse of distilled water.

3.0 GEOLOGY AND HYDROGEOLOGY

This section provides a description of the regional and Site specific geology and hydrogeology beneath the PWP property based on United States Geological Survey data, local well drilling data, and property borehole/well data. In addition, the Penta Wood Property groundwater system is characterized and described according to the hydrostratigraphic units within the glacial deposits beneath the property.

3.1 REGIONAL SETTING

Bedrock Geology

The property overlies the Precambrian aged Keweenawan rift system which consists of a 21,000 foot thick series of basaltic lava flows which have been folded and faulted into a northeast to southwest oriented structural trough. Overlying the basalt are late Precambrian and early Cambrian aged sandstones. The sandstones and basalts are both vertically displaced along several regional, fault zones which parallel the trend of the rift system. The property lies near one of these mapped faults, therefore, the bedrock type beneath the PWP Property could be either basalt or sandstone. The bedrock is overlain by 50 to 200 feet of unconsolidated glacial sediments in the Siren area.

Glacial Sediments

As illustrated by the topography on Figure 1.1, the property is situated in an area of high elevation in relation to the relatively low lying terrain to the north and east. Numerous lakes dot the landscape around the Site. An area of wetlands is located in the large low lying area situated north and northeast of the Site.

Northwestern Wisconsin is situated in an area that was glaciated several times, the last glacier having retreated approximately 10,000 years ago. The present landscape and unconsolidated surface sediment were derived from the activities of these glaciers.

The PWP Site is located on a glacial moraine. The moraine is a manifestation of a period when the glacial ice margin was stationary, depositing a relatively thick sequence of sediment in relation to the surrounding area. The sediment is sand and gravel rich and generally lacks fine grained sediment. Following the retreat of glacial ice, a glacial fluvial outwash was deposited over the area, partially burying the moraine. The outwash deposition resulted in the plain which is seen north and northeast of the Site.

Regional borehole data show that the stratigraphy of the unconsolidated sediments is generally consistent. On the glacial moraine, relatively coarse sand and gravel ice contact deposits are seen to overlie a dense

sandy till unit. Below the till unit, a sand and gravel unit has been observed. In areas off the moraine, a fine to medium grained well sorted sand unit overlies the above described typical sequence.

Regional Surface Hydrology

As illustrated in Figure 1.1, several lakes, and two river basins are located within a few miles of the Site.

To the north and northeast of the Site, several lakes including Doctor Lake, Big Doctor Lake, Crooked Lake and Fish Lake are present. These lakes are shallow depressions in the outwash plain landscape. Most of this area consists of low lying wetlands which extend to the north towards the Clam River.

Doctor Lake is about 2,500 feet east of the Site and has a surface elevation of 987 feet ASL as reported on the 1982 USGS Quadrangle Map.

To the south and southwest of the Site, the high relief glacial moraine topography is punctuated with several small lakes and ponds, and two large lakes (Dunham Lake and Mudhen Lake). These lakes are relatively deep, and are the sources of the Main Branch, and North Fork of the Wood River respectively. The lakes are about 8,000 feet southwest of the Site and have surface elevations of approximately 970 feet ASL.

The PWP Site lies at an approximate elevation of 1100 ft. ASL on or very near the surface water divide separating the Clam and Wood River watersheds. These basins drain into the St. Croix River which is located approximately 17 miles to the west.

Regional Groundwater Hydrology

Groundwater occurs regionally in the extensive unconsolidated glacially derived surficial deposits, the precambrian and cambrian sandstones, and to a lesser extent the precambrian basalt flows.

Annual precipitation and evapotranspiration data indicate that approximately 7 inches of recharge occurs in areas where the presence of extensive sand and gravel surficial deposits facilitate infiltration. Based on the local surficial geology, the PWP Site is situated in a groundwater recharge zone.

Except for a few scattered small lakes located south of the Site, the water level elevations of the lakes can be assumed to represent the regional groundwater table. Figure 1.1 illustrates the locations of the lakes and lake elevations. The map shows that the lakes northeast of the Site have similar elevations and are 10 to 15 feet higher in elevation than the lakes to the southwest of the Site. The few local lakes which appear to be elevated considerably above the other lakes probably represent small perched systems which commonly occur in a glacial moraine setting.

Based on the relationship of elevations of the lakes and wetlands to the Clam and Wood rivers, it is expected that the local groundwater discharge points are these two rivers. The regional discharge point for groundwater is the St. Croix River.

3.2 SITE GEOLOGY

The topography of the Site is typical of the glacially derived terrain of northwestern Wisconsin. The Site is situated near the top of a line of hills which have been interpreted as end moraine deposits by Thwaites (1956). Ground surface elevations range from 1130 feet ASL on the south side of the Site to 1020 feet ASL at the north Site boundary. North of the end moraine deposits is a flat glacial outwash plain that is 990 feet ASL.

Surface water drainage from the Site is to the northeast to the outwash plain. The outwash plain slopes gradually to the north and drains to the Clam River which is approximately 5.5 miles north of the Site.

The deepest wells and borings at the Site show that the unconsolidated glacial sediments extend beneath the Site to an elevation of 900 feet ASL or less. No wells or borings have been drilled to the top of bedrock. However, the thickness of the glacial drift is estimate to be 150 feet to 200 feet thick in the Site area as reported by Young and Hindall, (1973).

54/262

Site Stratigraphy

Three stratigraphic units were identified during the Site investigation. These units are, sequentially, from the surface down:

i) Upper sand and gravel;
ii) Clayey sand till; and
iii) Lower sand and gravel.

The distribution of the units at the Site are shown on geologic cross-sections presented on Figures 3.2 and 3.3. The location of the cross-sections are shown on Figure 3.1.

Sand and Gravel Unit

The sand and gravel is present from the surface to an elevation of approximately 970 to 1000 feet ASL. The upper 5 to 20 feet of the unit is generally clayey or silty with fine to medium sand and gravel. The remainder consists of generally fine to coarse sand. Thick lenses of pea size gravel are common. This unit is present across the entire Site.

Clayey Sand Till Unit

The local well drillers refer to this unit as "hardpan". However, based on the geologic description of Penta Test Hole #3 from the WDNR study, (Appendix A) the unit is a clayey, silty sand and gravel till. The unit is approximately 15 to 50 feet thick and is present beneath most of the Site.

55/262

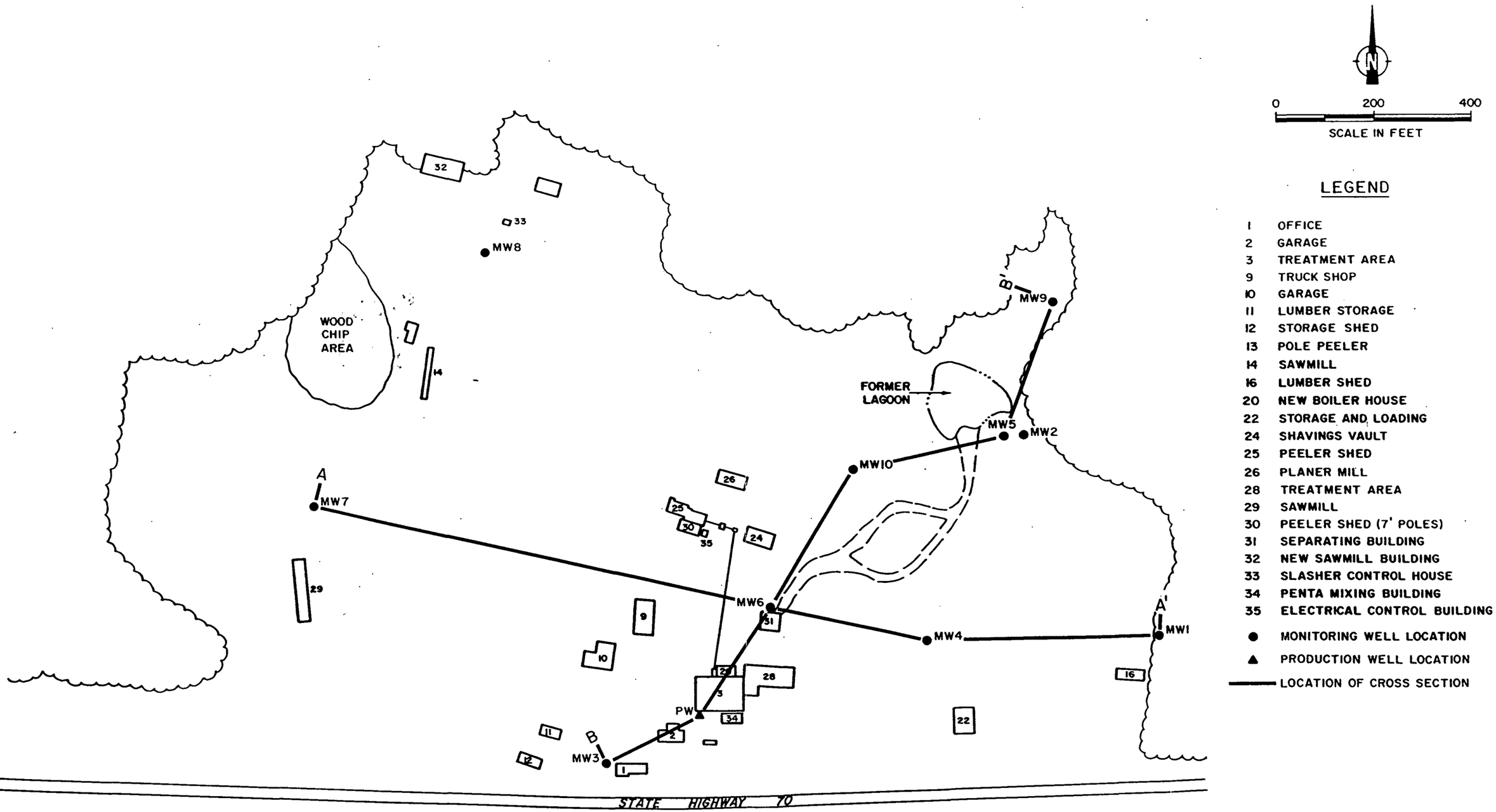
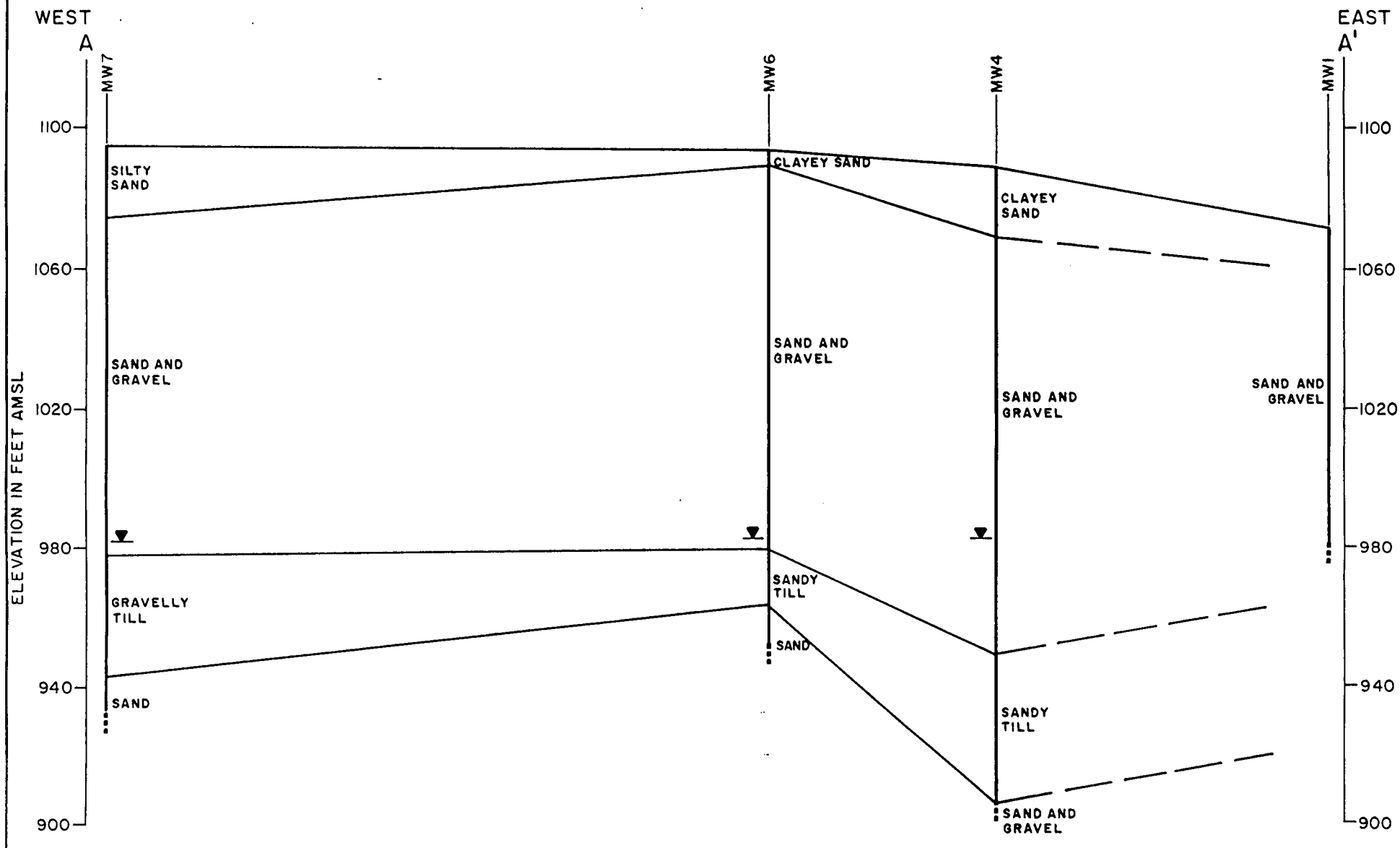


figure 3.1
GEOLOGIC CROSS SECTION LOCATIONS
Penta Wood Products, Inc.

CRA

2140-20/02/92-M

35A



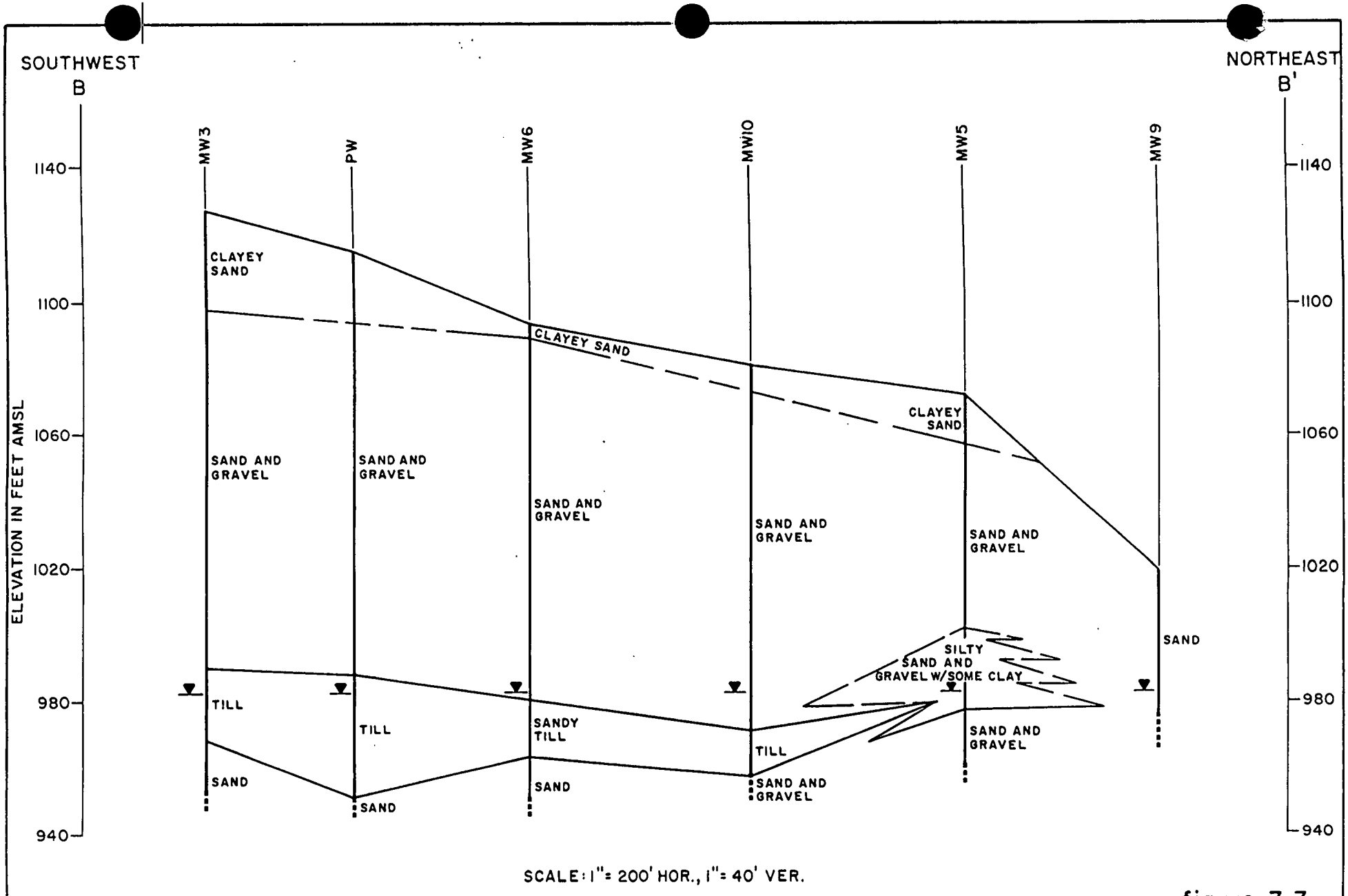
SCALE: 1" = 200' HOR., 1" = 40' VER.

figure 3.2
GEOLOGIC CROSS SECTION A-A'
Penta Wood Products, Inc.

CRA

2140-24/02/92-M

5/6/2002



SCALE: 1" = 200' HOR., 1" = 40' VER.

figure 3.3
GEOLOGIC CROSS SECTION B-B'
Penta Wood Products, Inc.

CRA

2140-24/02/92-M

57/262

At MW5 the unit is gravelly and contains less clay and silt and at MW9, on the far northeast end of the Site, the unit was not encountered to a depth of 964 feet ASL (54 feet bgs) and may be absent.

Lower Sand Unit

The till is underlain by poorly sorted sand and gravel that is similar in composition, texture and depositional environment to the upper sand unit. The top of this unit was found at elevations ranging from 970 to 910 feet ASL. The full thickness of the lower sand has not been determined during any of the subsurface investigation performed at the Site, however it is at least 20 feet thick. Monitoring wells MW3 thru MW10 are screened in the lower sand unit as is PWP's water supply well.

3.3 SITE HYDROGEOLOGY

The stratigraphic units encountered at the Site correspond to the hydrostratigraphic units that define the groundwater flow system. Hydrostratigraphic units are grouped according to their water bearing properties. Units having a significant capacity to transmit water are termed aquifers, while units which have low permeabilities and a low ability to transmit water are termed aquitards.

Upper Sand Hydrostratigraphic Unit

The upper sand and gravel is unsaturated except for a thin zone of groundwater that is perched on top of the till unit. Perched groundwater was not encountered at all of the drilling locations and therefore is not a continuous system. It is likely that precipitation infiltrates down-ward through the upper sand unit until it reaches the top of the till. The water would then follow the slope of the till surface and would pool wherever a basin may exist within the till surface. Any potential flow of perched water within a basin would be vertically downward at a slow rate. Monitoring wells MW1 and MW2 are screened in perched groundwater. Perched groundwater was also observed directly above the till at MW10.

Till Hydrostatigraphic Unit

The silt - and clay-rich composition of the till makes it relatively impermeable and thus an aquitard. The till is a confining unit which causes infiltrating precipitation to perch on top of it. It also creates an upper boundary for the saturated lower sand beneath it. The till is generally 20 to 40 feet thick beneath the Site except to the north where it becomes thinner and is possibly absent.

TABLE 1
PENTA WOOD GROUNDWATER ELEVATIONS

LOCATION	REFERENCE ELEVATION	25-Mar-88	01-Jun-88	08-May-90	25-Jul-90	08-Nov-90	11-Dec-90	30-Jan-91
MW1	1072.21	984.81	984.56	982.19	982.09	982.05	982.01	981.88
MW2	1065.51	984.75	984.51	982.13	982.05	982.04	981.98	981.81
MW3	1129.36	NI	NI	981.70	981.51	981.56	981.59	981.41
MW4	1089.67	NI	NI	981.47	981.35	981.37	981.29	981.15
MW5	1074.07	NI	NI	981.82	981.75	981.70	981.67	981.50
MW6	1095.13	NI	NI	981.53	981.48	981.49	981.40	981.23
MW7	1096.36	NI	NI	NI	NI	NI	NI	NI
MW8	1091.07	NI	NI	NI	NI	NI	NI	NI
MW9	1020.50	NI	NI	NI	NI	NI	NI	NI
MW10	1083.75	NI	NI	NI	NI	NI	NI	NI

LOCATION	REFERENCE ELEVATION	04-Mar-91	03-Jun-91	16-Jan-92	12-Feb-92 07:50 AM	13-Feb-92
MW1	1072.21	981.67	982.11	982.73	982.75	982.78
MW2	1065.51	981.63	982.19	1009.67	982.72	982.75
MW3	1129.36	981.21	981.58	982.35	982.36	982.38
MW4	1089.67	980.92	981.47	982.09	982.04	982.07
MW5	1074.07	981.37	981.79	982.41	982.41	982.43
MW6	1095.13	981.06	981.45	982.22	982.15	982.18
MW7	1096.36	NI	981.58	982.27	982.24	982.26
MW8	1091.07	NI	981.65	982.30	982.29	982.29
MW9	1020.50	NI	NI	982.69	982.66	982.71
MW10	1083.75	NI	NI	982.41	982.41	982.39

NI: not installed
elevations: ft. above mean sea level

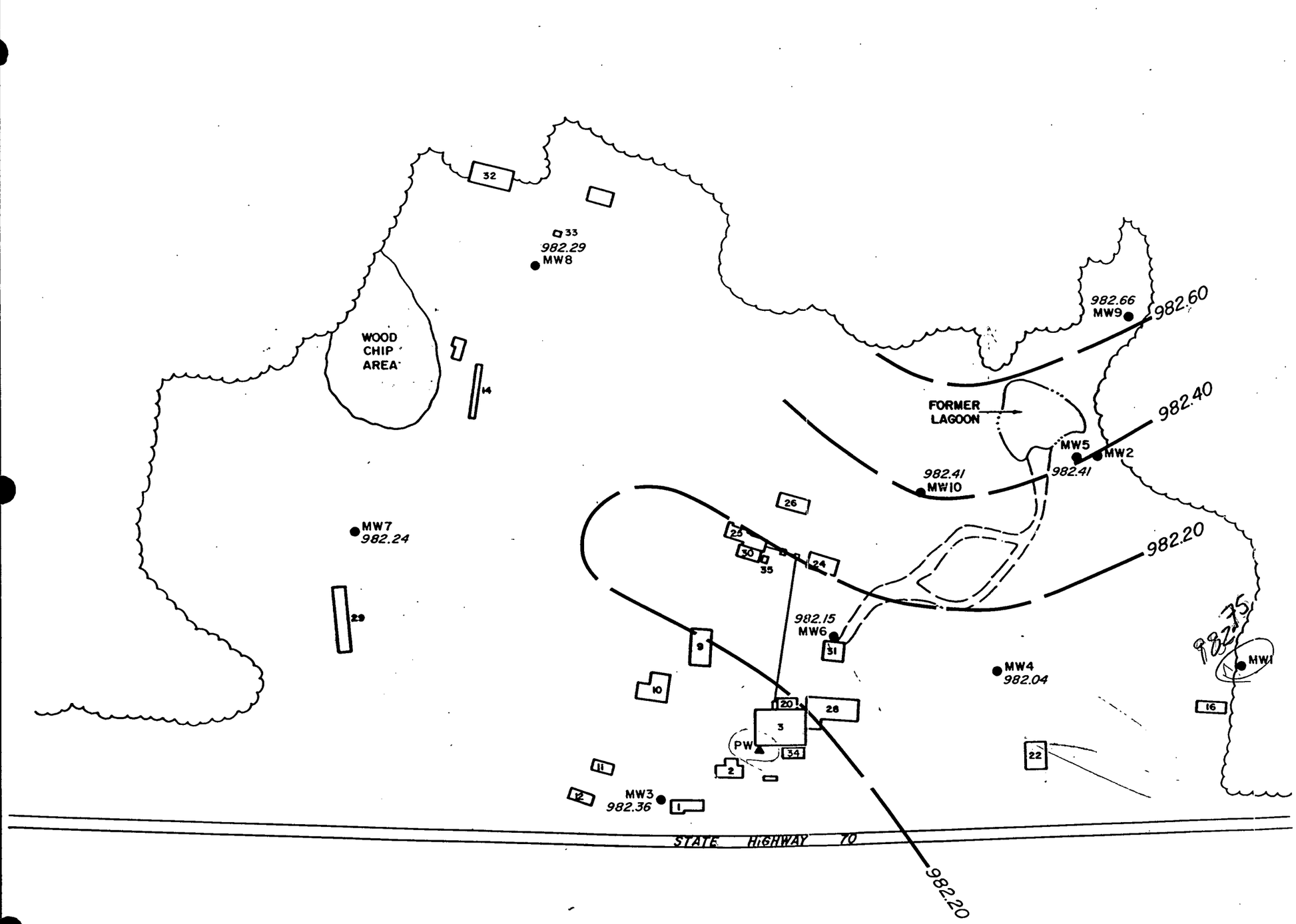
Lower Sand and Gravel Hydrostratigraphic Unit

The lower sand and gravel is a confined aquifer under most of the Site. At MW9 the till was not encountered and the aquifer is unconfined in that area. Eight monitoring wells have been completed within the lower sand aquifer. PWP's water supply well is also screened in the lower sand.

Water level elevations have been measured regularly at the Site since 1988. The elevations are listed on Table 3.1 and a groundwater elevation contour map, for elevations recorded February 12, 1992, is shown on Figure 3.4. The elevations show that the potentiometric surface of the lower sand aquifer is very flat. The average horizontal hydraulic gradient at the Site is approximately 0.0005 ft./ft (which is essentially flat). Under these conditions, groundwater flow can be strongly influenced by pumping conditions. However, the distribution of PCP in groundwater forms a plume within the lower sand aquifer (see Section 4.2.1 and Figure 4.7). The distribution of the contaminant plume implies a groundwater flow direction of northeast to southwest. The regional groundwater flow direction is to the west toward the St. Croix River.

3.3.1 Slug Injection Tests

Slug injection tests were conducted on MW4, MW8 and MW10. These tests were performed by introducing or removing a slug of known volume to the well and monitoring the time required for the water level to return to the static position. The results of the slug tests are summarized on Table 3.2.



LEGEND

1	OFFICE
2	GARAGE
3	TREATMENT AREA
9	TRUCK SHOP
10	GARAGE
11	LUMBER STORAGE
12	STORAGE SHED
13	POLE PEELER
14	SAWMILL
16	LUMBER SHED
20	NEW BOILER HOUSE
22	STORAGE AND LOADING
24	SHAVINGS VAULT
25	PEELER SHED
26	PLANER MILL
28	TREATMENT AREA
29	SAWMILL
30	PEELER SHED (7' POLES)
31	SEPARATING BUILDING
32	NEW SAWMILL BUILDING
33	SLASHER CONTROL HOUSE
34	PENTA MIXING BUILDING
35	ELECTRICAL CONTROL BUILDING
●	MONITORING WELL LOCATION
▲	PRODUCTION WELL LOCATION
982.15	GROUNDWATER ELEVATION IN FEET AMSL (2-12-92)
———	GROUNDWATER CONTOUR

figure 3.4
POTENTIOMETRIC SURFACE
LOWER SAND WELLS
Penta Wood Products, Inc.

CRA

2140-20/02/92-M

TABLE 3.2

SLUG INJECTION TEST RESULTS

Well	*Hydraulic Conductivity (cm/sec)* Falling	Rising	Average
MW4	0.17	0.19	0.18
MW8	0.35	-	.35
MW10	0.61	0.49	0.55
		Geometric Mean	0.33

The hydraulic conductivity (k) values were calculated using the curve-matching method developed by Cooper, et, al., (1967) and Papadopulos et. al., (1973). The geometric mean of the k measured at the three wells is 0.33 cm/second.

The slug injection data and curve matching analyses are contained in Appendix C.

3.3.2 Aquifer Pumping Tests

PWP has a water supply well that is located on the south side of the process building which is on the south central side of the Site (Figure 2.1). A pumping test was performed on February 12, 1992 to define the cone of influence the well creates in the aquifer and to estimate the capture width of the well when pumping.

Prior to starting the test, the production well was shut off for a period of eight hours to ensure that the potentiometric surface of the aquifer was stable at the static level. Water level elevations were measured at all of the monitoring wells shortly before the production well began pumping at 8:10 a.m. The elevations and the potentiometric surface contours are shown on Figure 3.5.

The production well was pumped continuously for four hours. During that period the four monitoring wells nearest to the production well (MW3, MW6, MW10 and MW4) were regularly monitored to measure the amount of drawdown created by pumping. The exact discharge rate of the production well is not known, however, it is believed to be approximately 8 to 12

gallons per minute. Figure 3.5 shows the maximum drawdown measured at the four monitoring wells during the test. The figure shows that the production well influences groundwater flow within an approximate radius of 450 feet. Because the horizontal hydraulic gradient of the groundwater is nearly flat, the capture zone of the production well likely extends nearly as far as the 0.1 foot drawdown contour or approximately 150 feet from the production well.

3.3.3 Groundwater Flow System

The regional groundwater flow direction is to the west. Water level data supports a northeast to southwest flow direction within the lower sand and gravel aquifer. The upper sand unit is 60 to 140 feet thick (except to the northeast where there is no differentiation between the upper and lower sand units) and is unsaturated except for some discontinuous areas of perched groundwater. The till is a confining unit which is present beneath most of the Site except to the northeast.

The lower sand and gravel is saturated and is a confined aquifer beneath most of the Site. The groundwater flow velocity can be estimated using a horizontal hydraulic gradient of 0.0005, a hydraulic conductivity of 0.33 cm/sec and an assumed porosity of 30 percent. This yields a velocity of 570 feet per year.

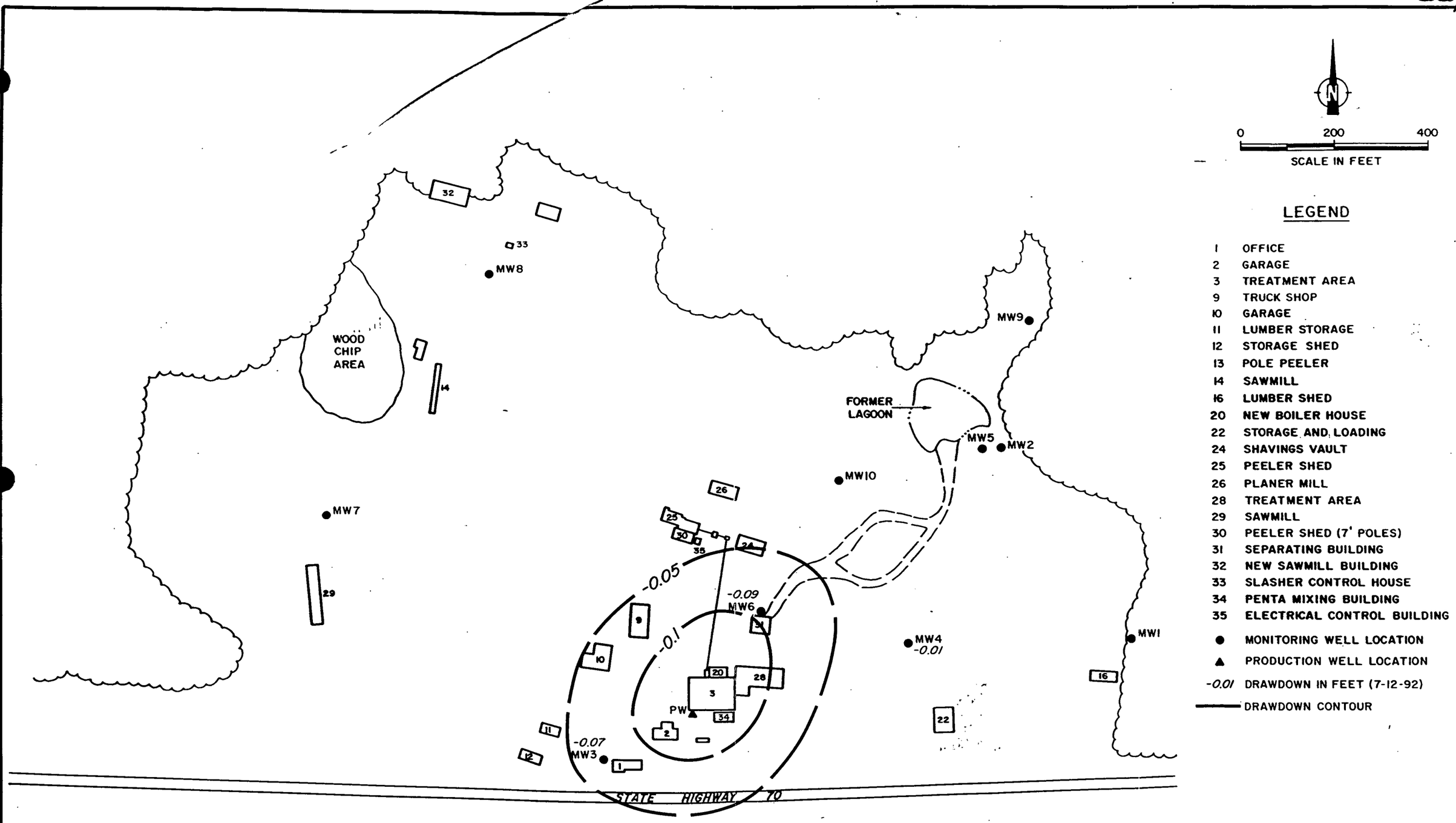
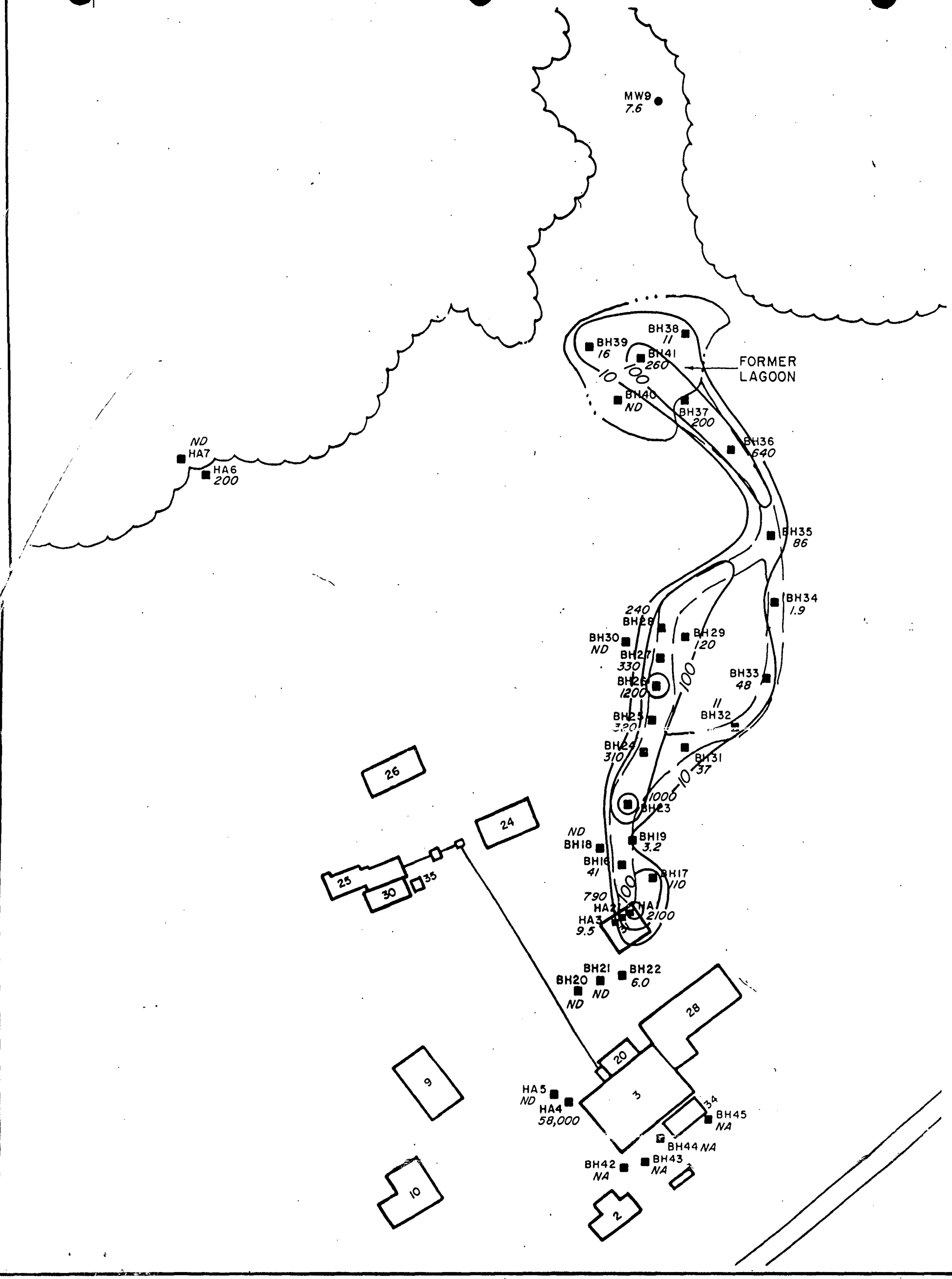


figure 3.5
PUMPING TEST DRAWDOWN CONTOURS
Penta Wood Products, Inc.

CRA

2140-20/02/92-M



LEGEND

- BOREHOLE LOCATION
- 23.5 CHEMICAL CONCENTRATION IN mg/kg
- ND NOT DETECTED
- NA NOT ANALYZED

0 100 200

SCALE IN FEET

figure 4.1a
PCP CONCENTRATIONS
IN SOIL (0-10')
SEPARATING BUILDING/
FORMER LAGOON AREA
Penta Wood Products, Inc.

4.0 SAMPLING RESULTS AND DATA ASSESSMENT

4.1 SOIL SAMPLING RESULTS

Soil samples were taken and analyzed for PCP and fuel oil content in 8 general areas on the PWP property. These areas are:

- Boiler Blowdown Pond;
- Oil/Water Separator;
- Gully;
- Lagoon Area;
- Wood Chip Area;
- Process Area;
- North Area; and
- Abandoned Underground Storage Tank.

These sampling results are summarized in Table 4.1. Each of these areas will be discussed separately.

4.1.1 Boiler Blowdown Pond

Three soil borings (BH20, BH21 and BH22) were completed around the boiler blowdown pond at locations shown on Figure 2.3a.

TABLE 4.1
SOIL SAMPLING RESULTS – PENTA WOOD

BOILER BLOWDOWN POND

LOCATION	DEPTH	Fuel oil #1	Fuel oil #2	PCP	TPH
		mg/kg	mg/kg	mg/kg	mg/kg
BH-20	4-6	< 3.3	< 3.3	< 0.93	< 3.3
BH-20	24-26	< 3.3	< 3.3	< 0.93	< 3.3
BH-21	8-10	< 3.3	< 3.3	< 0.93	< 3.3
BH-22	5-7	< 3.3	< 3.3	6	< 3.3

GULLEY AREA

LOCATION	DEPTH	Fuel oil #1	Fuel oil #2	PCP	TPH
		mg/kg	mg/kg	mg/kg	mg/kg
BH-23	1-3	< 160	30000	1000	
BH-23	20-22	< 3.3	< 3.3	260	2700
BH-24	1-3	< 33	< 33	310	6200
BH-24	10-12	< 3.3	< 3.3	< 0.93	< 3.3
BH-25	1-3	< 66	< 66	320	2500
BH-25	10-12	< 3.3	< 3.3	< 0.93	< 3.3
BH-26	0-5	< 33	< 33	230	8300
BH-26	1-3	< 33	< 33	18	700
BH-26	5-7	< 330	< 330	1200	31000
BH-27	0-5	< 330	< 330	330	7800
BH-28	0-5	< 330	< 330	240	12000
BH-29	0-5	< 160	< 160	120	3300
BH-30	0-5	< 3.3	< 3.3	< 0.93	4.2
BH-31	4-6	< 3.3	< 3.3	37	640
BH-31	18-20	< 3.3	< 3.3	< 0.93	< 3.3
BH-32	2-4	< 3.3	< 3.3	11	81
BH-32	8-10	< 3.3	15	< 0.93	
BH-33	2-4	< 3.3	< 3.3	48	77
BH-33	18-20	< 3.3	< 3.3	< 0.93	< 3.3
BH-34	2-4	< 3.3	< 3.3	1.9	< 3.3
BH-34	8-10	< 3.3	< 3.3	< 0.93	< 3.3
BH-35	4-6	< 33	< 33	86	2000
BH-35	18-20	< 3.3	< 3.3	46	290
BH-36	2-4	< 33	< 33	640	12000
BH-36	8-10	< 33	< 33	230	8800

LAGOON AREA

LOCATION	DEPTH	Fuel oil #1	Fuel oil #2	PCP	TPH
		mg/kg	mg/kg	mg/kg	mg/kg
BH-37	2-4	< 66	< 66	200	3600
BH-37	18-20	< 3.3	< 3.3	< 0.93	< 3.3
BH-38	4-6	< 3.3	190	11	
BH-38	18-20	< 3.3	< 3.3	< 0.93	4
BH-39	4-6	< 3.3	< 3.3	16	30
BH-39	18-20	< 3.3	< 3.3	< 0.93	< 3.3
BH-40	4-6	< 3.3	< 3.3	< 0.93	< 3.3
BH-40	18-20	< 3.3	4.1	< 0.93	
BH-41	4-6	< 66	< 66	260	4000
BH-41	38-40	< 3.3	13	1.9	
MW-9	5-7	< 3.3	< 3.3	7.6	68
MW-9	15-17	< 3.3	< 3.3	< 0.93	< 3.3
TP-03				< 4.7	

TABLE 4.1
SOIL SAMPLING RESULTS – PENTA WOOD

[S]TORAGE TANK AREA

LOCATION	DEPTH	Fuel oil #1	Fuel oil #2	PCP	TPH
		mg/kg	mg/kg	mg/kg	mg/kg
BH-42	12-13	< 3.3	31	1.2	
BH-43	12-13	< 3.3	< 3.3	8.7	40
BH-44	12-13	< 3.3	< 3.3	< 0.93	< 3.3
BH-45	12-13	< 3.3	< 3.3	5.6	44

WOOD CHIP AREA

LOCATION	DEPTH	Fuel oil #1	Fuel oil #2	PCP	TPH
		mg/kg	mg/kg	mg/kg	mg/kg
BH-46	4-7.5	< 160	< 160	1300	14000
BH-46	40-42	< 3.3	< 3.3	< 0.93	< 3.3
BH-47	17-18	< 3.3	< 3.3	< 0.93	1000
BH-47	18-20	< 3.3	< 3.3	< 0.93	150
BH-48	16-17	< 330	< 330	1300	24000
BH-48	18-20	< 33	< 33	12	2500

OIL/WATER SEPERATOR AREA

LOCATION	DEPTH	Fuel oil #1	Fuel oil #2	PCP	TPH
		mg/kg	mg/kg	mg/kg	mg/kg
BH-05	5			< 0.8	
BH-05	10			< 0.8	
BH-06	5			< 0.8	
BH-06	10			< 0.8	
BH-07	5			< 0.8	
BH-08	5			< 0.8	
BH-09	2			2100	
BH-09	5			170	
BH-09	10			< 0.8	
BH-10	5			< 0.8	
BH-11	5			< 0.8	
BH-12	5			< 0.8	
BH-16	4-6	< 3.3	500	41	
BH-16	12-14	< 3.3	14	41	
BH-16	33-35	< 3.3	5.6	< 0.93	
BH-17	5-7	< 3.3	1100	110	
BH-17	10-12	< 3.3	< 3.3	< 0.93	< 3.3
BH-18	4-6	< 3.3	< 3.3	< 0.93	< 3.3
BH-19	4-6	< 3.3	10	3.2	
BH-19	8-10	< 3.3	< 3.3	1	< 3.3
HA-1	2-3	< 33	26000	2100	
HA-1	9-10	< 33	26000	590	
HA-2	2-2.5	< 33	20000	790	
HA-3	3.5-4	< 3.3	< 3.3	9.5	150
TP-04				110	

NORTH AREA

[L]OCATION	DEPTH	Fuel oil #1	Fuel oil #2	PCP	TPH
		mg/kg	mg/kg	mg/kg	mg/kg
HA-6	3.5-4	< 3.3	< 3.3	200	1000
HA-7	3.5-4	< 3.3	< 3.3	< 0.93	400

70/262

TABLE 4.1
SOIL SAMPLING RESULTS – PENTA WOOD

OCESS AREA

LOCATION	DEPTH	Fuel oil #1	Fuel oil #2	PCP	TPH
		mg/kg	mg/kg	mg/kg	mg/kg
BH-04	20			< 0.8	
BH-13	5			23	
BH-13	10			4.1	
BH-14	5			< 0.8	
BH-14	10			< 0.8	
BH-15	5			< 4.6	
HA-4	3.5-4	< 3.3	< 3.3	58000	770
HA-5	3.5-4	< 3.3	29	< 0.93	
TP-01				< 4.7	
TP-02				71	

71/262

Chemical samples were taken at depths ranging from 4 feet to 26 feet bgs. PCP was detected in only one sample (BH22, 5-7 feet bgs) at a concentration of 6 mg/kg. There were no detections of fuel oil or TPH above the detection limits.

4.1.2 Oil/Water Separator

The location of the borings around the oil/water separator building is shown on Figure 2.3a. Seven borings were completed in and around this building. It is visually evident that PCP impacts to surface soil are present inside the building. Hand auger holes were completed and 4 samples were taken below this surface soil staining. The samples were taken at depths ranging from 2 feet to 10 feet bgs. The concentrations of PCP ranged from 9.5 mg/kg to 2100 mg/kg. Fuel oil concentrations ranged from below detection limits to 26,000 mg/kg. Four additional soil borings were completed outside of the oil water separator building near Phase II boring B9. This boring (B9) showed elevated levels of PCP ranging from below detection limits to 2100 mg/kg. Borings BH16, BH17, BH18 and BH19 ranged in depth from 6 feet to 35 feet bgs. Eight chemical samples were taken and the results show concentrations of PCP ranging from non-detect to 110 mg/kg. Fuel oil concentrations ranged from non-detect to 1100 mg/kg.

72/262

4.1.3 The Gully

The gully refers to the natural drainage route that leads from the oil/water separator to the former lagoon. Approximately 200 feet north/northwest of the oil water separator building, this gully branched off into two separate gullies that ultimately discharge to the former lagoon.

A total of 14 soil borings (BH23 through BH36) were completed at approximately 50 foot intervals along these gullies. Figure 2.3a shows the locations of these borings. A total of 25 chemical samples were taken from these borings. The results show that the PCP concentrations range from non-detect to 1200 mg/kg. Fuel oil results range from non-detect to 30,000 mg/kg and TPH results range from non-detect to 31,000 mg/kg. Table 4.1 presents the analytical results.

4.1.4 The Former Lagoon

The former lagoon area is a low lying area which received the majority of the surface run-off from the middle of the Site. A total of 5 boreholes (shown on Figure 2.3a) were completed within the former lagoon and a total of 10 chemical samples were taken at depths ranging from 2 feet to 40 feet bgs. The results show PCP concentrations ranging from non-detect to 190 mg/kg and TPH results range from non-detect to 4000 mg/kg. Table 4.1 presents the analytical results.

4.1.5 Wood Chip Area

The wood chip area is located near the west end of the storage yard. Approximately 20 feet of wood chips and shavings have accumulated in this area. In the past, excess process water had been discharged in this area. The WDNR requested that soil borings and soil samples be taken in this area to determine the extent of contamination. Three soil borings were completed ranging in depth from 20 to 42 feet bgs. Figure 2.3b shows the locations of these borings. Two of the borings (BH46 and BH47) showed visual evidence of contamination to a depth of approximately 15 feet. The analytical results show that PCP concentrations range from non-detect to 1300 mg/kg and TPH concentrations ranged from non-detect to 24,000 mg/kg. Table 4.1 summarizes the analytical data.

4.1.6 Process Area

When WDNR learned that some release of treating solution had occurred, it verbally requested that two hand borings be completed in an area north of the PCP treating area . The borings done in this area are shown on Figure 2.3a. One chemical sample was taken at each location at a depth of 3.5 to 4 feet bgs. The sample closest to the treating area (HA4) had PCP detected at 58,000 mg/kg and TPH detected at 770 mg/kg. Boring HA5 located approximately 20 feet to the north/northwest had no detectable levels of PCP but did show fuel oil at 29 mg/kg. Table 4.1 summarizes the analytical data.

4.1.7 North Area

Two had borings were completed in this area where a portable tank was found. These borings (HA6 and HA7) were completed to a depth of 4 feet bgs and one soil sample was taken from each boring. Figure 2.3a shows that locations of these borings. HA6 showed a PCP concentration of 200 mg/kg and a TPH concentration of 1000 mg/kg. HA7 is located approximately 50 feet down hill of HA6. HA7 had no detectable concentrations of PCP but did have TPH detected at 400 mg/kg. Table 4.1 summarizes the analytical results.

4.1.8 Underground Storage Tank

It was originally proposed to excavate and remove an abandoned underground storage tank located on the south side of the treating building. A concern was raised by PWP that the excavation could damage the foundation of the building. After discussing this with the WDNR, it was decided that soil borings would be completed on all three sides of the tank to determine if significant leakage had occurred. Three soil borings were completed (BH42, BH43 and BH44) on the west, south and east sides of the tank. Figure 2.3a shows the location of these borings. Chemical samples were taken at 12 to 13 feet bgs which would correspond to the bottom side of the tank. The results show PCP concentrations ranging from non-detect to 8.7 mg/kg, fuel oil concentrations

ranging from non-detect to 31 mg/kg and TPH concentrations ranging from non-detect to 40 mg/kg. Table 4.1 summarizes the analytical results. Based on these results and the potential for structural damage to the adjacent building, it is recommended that the tank be left in place.

An additional boring (BH45) was completed at the southeast corner of the mixing tank building. A sample was taken at a depth of 12 - 13 feet bgs and had PCP detected at 5.6 mg/kg and TPH detected at 44 mg/kg.

Soil Assessment

The data presented in the preceding sections shows that impacts from PCP and fuel oil are present in several areas across the Site. The majority of the impacted subsurface soil is located within 10 feet of ground surface. There is visual surface soil staining located in the gully area, the lagoon, the woodchip area, the oil/water separator building and the PCP process area. The boring logs presented in Appendix A noted visual and olfactory impacts in most of these areas. Very few surface soil samples were taken as these areas can be visually delineated by the presence of soil staining. These surface areas are considered impacted and are included in the volume calculations. Figure 4.1a and 4.1b show PCP concentrations and isoconcentration contours for soil located within the top 10 feet of ground surface. These contours are based on actual analytical data. Figure 4.1c shows a PCP contour around the areas where PCP concentrations are expected to be above 10 mg/kg. This contour is based on both analytical and visual evidence.

The actual analytical reports have not been included in this report. Copies of this data are available upon request.

Figures 4.1a and 4.1b show PCP concentrations and isoconcentration contours for soil within 10 feet bgs.

Figures 4.2a and 4.2b show PCP concentrations and isoconcentrations contours for soil >10 feet bgs.

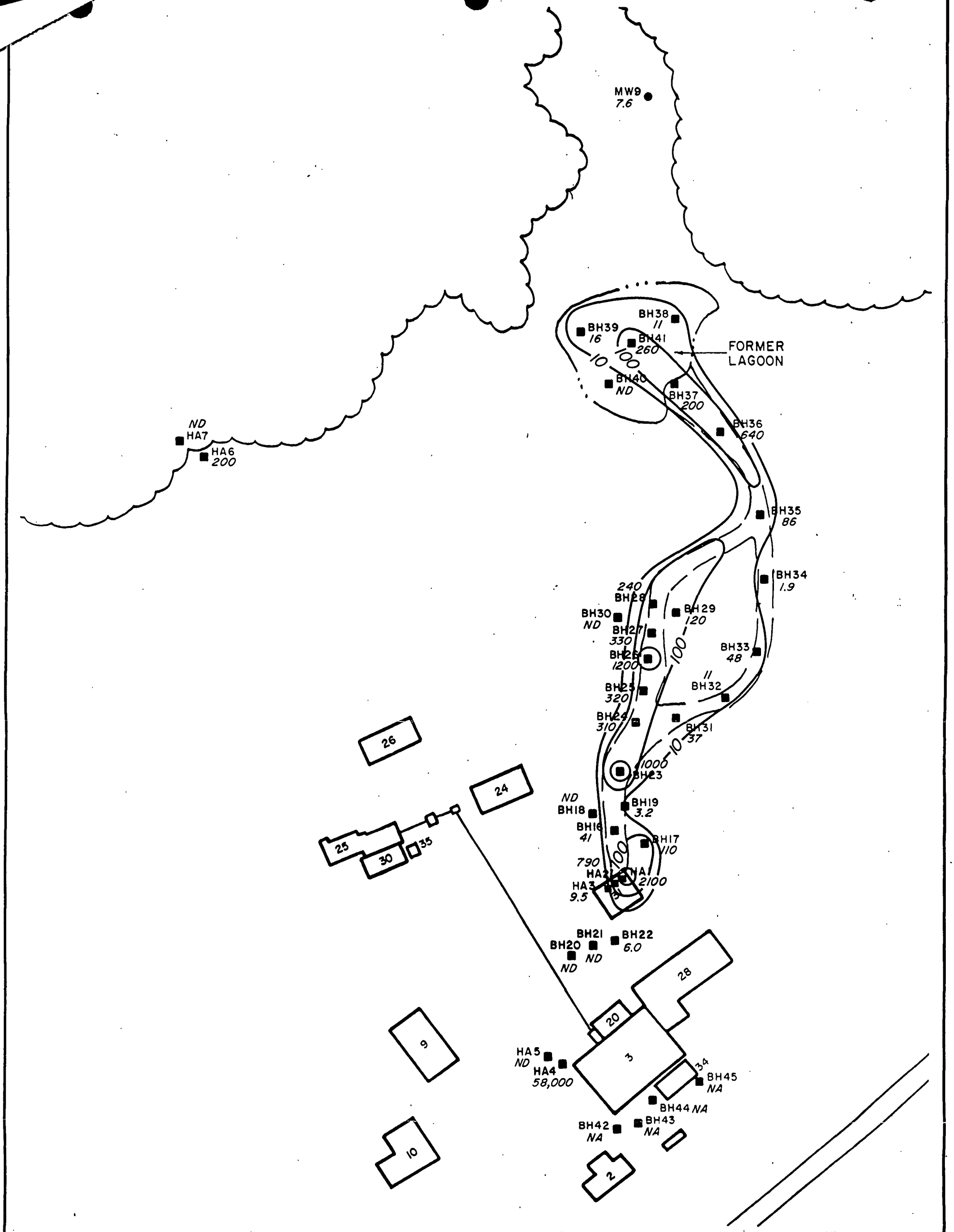
Figures 4.3a and 4.3b shows fuel oil/TPH concentrations and isoconcentration contours for soil within 10 feet bgs.

Figures 4.4a and 4.4b shows fuel oil/TPH concentrations and is isoconcentration contours for soil >10 feet bgs.

Figure 4.5 shows the location of a cross-section extending from the treatment area northeasterly to MW9. Figure 4.6 shows the cross-section PCP concentrations at the boreholes in this area.

4.2 GROUNDWATER SAMPLING RESULTS

A summary table of groundwater monitoring results are presented in Table 4.2. The groundwater quality results for the monitoring done in February, 1992 have not been received. This data will be sent to the WDNR when it is received. This summary shows that monitoring wells MW1, MW2, MW7 and MW8 have had no significant detections of PCP or fuel oil. These



LEGEND

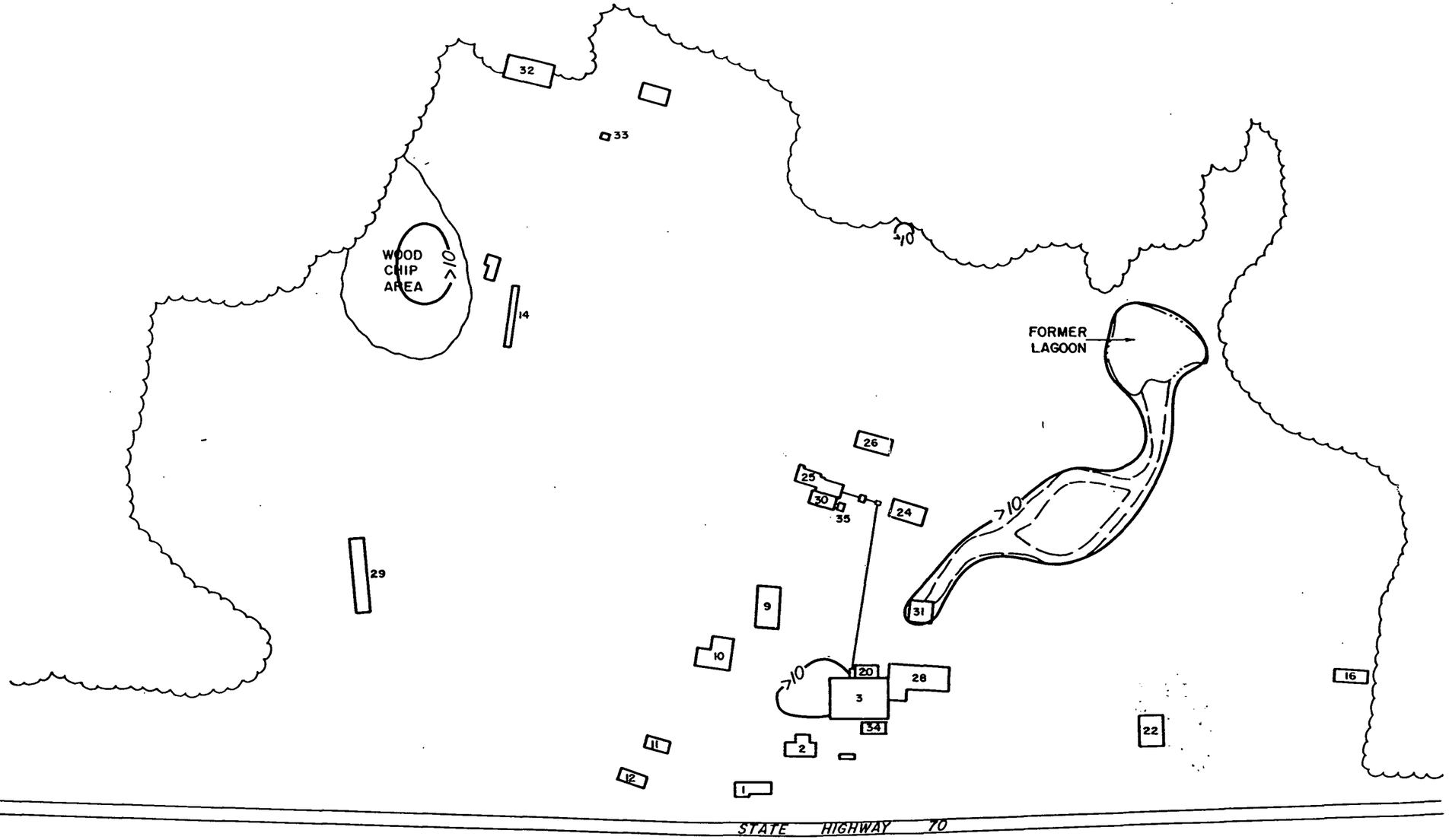
- ■ BOREHOLE LOCATION
- *230* CHEMICAL CONCENTRATION IN mg/kg
- *ND* NOT DETECTED
- *NA* NOT ANALYZED

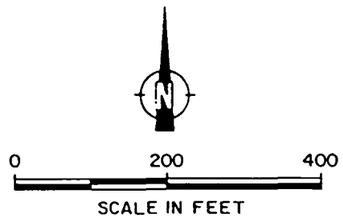
figure 4.1a
PCP CONCENTRATIONS
IN SOIL (0-10')
SEPARATING BUILDING/
FORMER LAGOON AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

78/262





LEGEND

1	OFFICE
2	GARAGE
3	TREATMENT AREA
9	TRUCK SHOP
10	GARAGE
11	LUMBER STORAGE
12	STORAGE SHED
13	POLE PEELER
14	SAWMILL
16	LUMBER SHED
20	NEW BOILER HOUSE
22	STORAGE AND LOADING
24	SHAVINGS VAULT
25	PEELER SHED
26	PLANER MILL
28	TREATMENT AREA
29	SAWMILL
30	PEELER SHED (7' POLES)
31	SEPARATING BUILDING
32	NEW SAWMILL BUILDING
33	SLASHER CONTROL HOUSE
34	PENTA MIXING BUILDING
35	ELECTRICAL CONTROL BUILDING

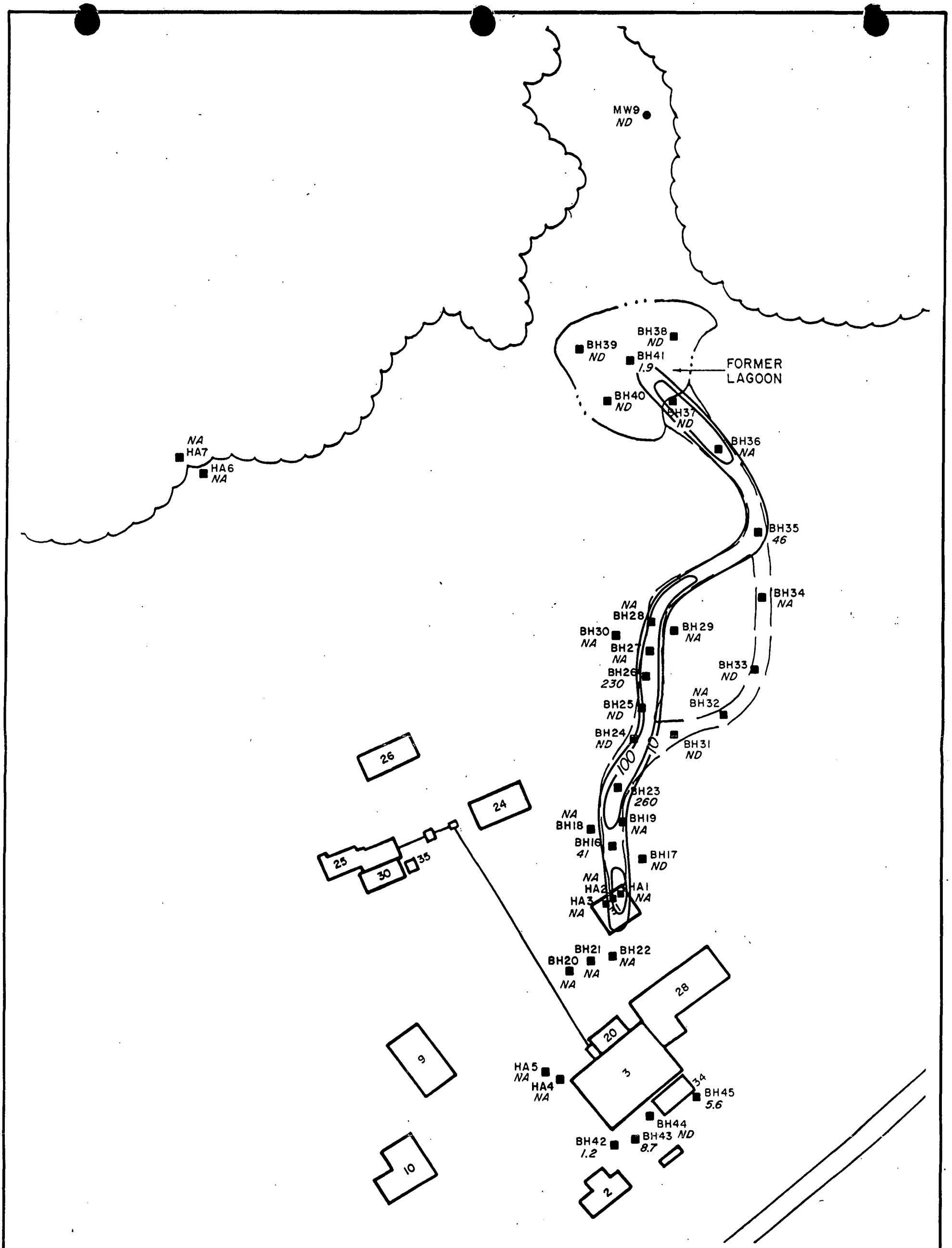
——— PCP CONTOUR ABOVE 10 mg/kg BASED ON ANALYTICAL AND VISUAL EVIDENCE

figure 4.1c
PCP SOIL CONTOUR (0-10')
Penta Wood Products, Inc.

CRA

2140-20/02/92-M

47C



LEGEND

- ■ BOREHOLE LOCATION
- *230* CHEMICAL CONCENTRATION IN mg/kg
- *ND* NOT DETECTED
- *NA* NOT ANALYZED

0 100 200

SCALE IN FEET

figure 4.2a

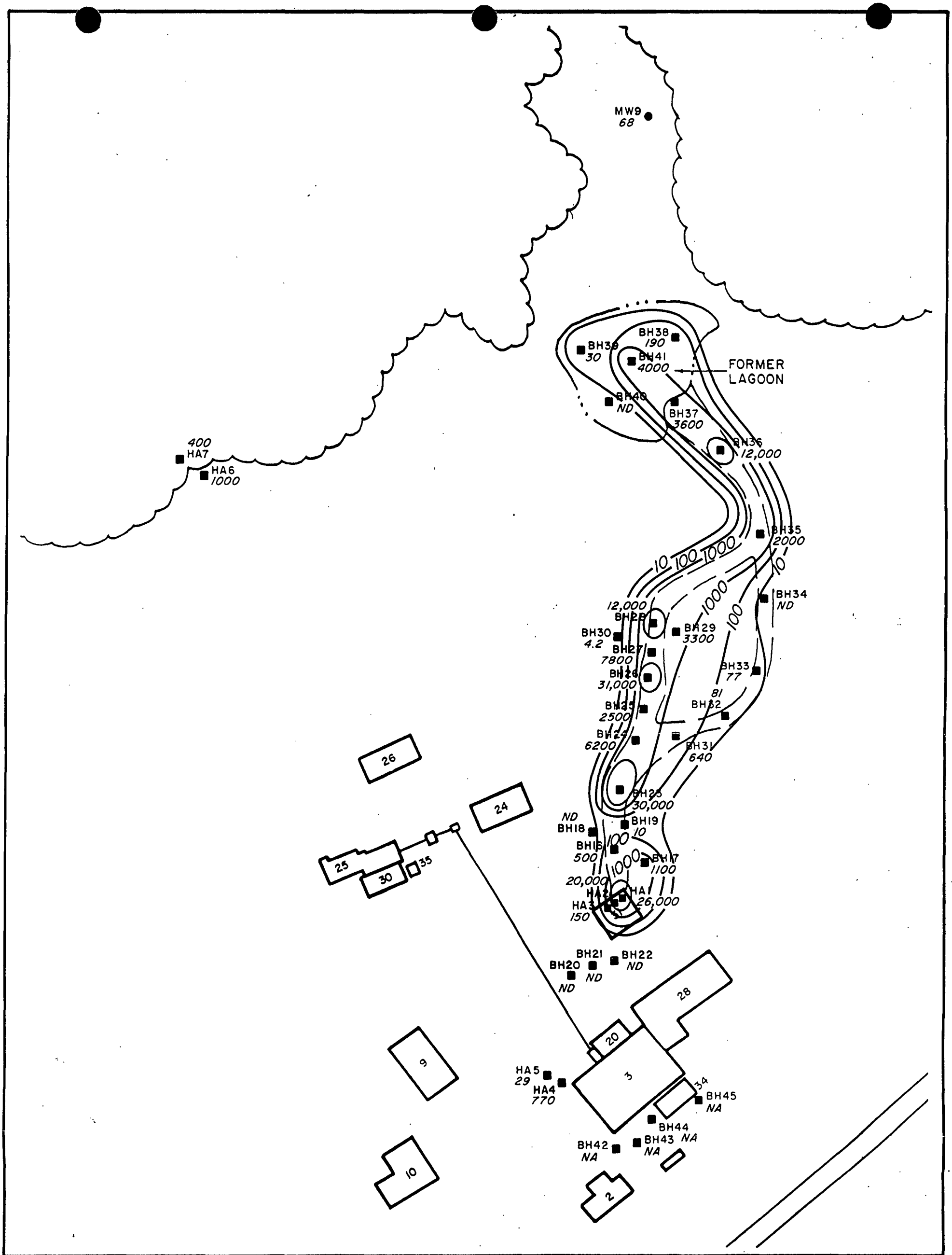
PCP CONCENTRATIONS
IN SOIL (>10')
SEPARATING BUILDING/
FORMER LAGOON AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

4/15

7/6/2



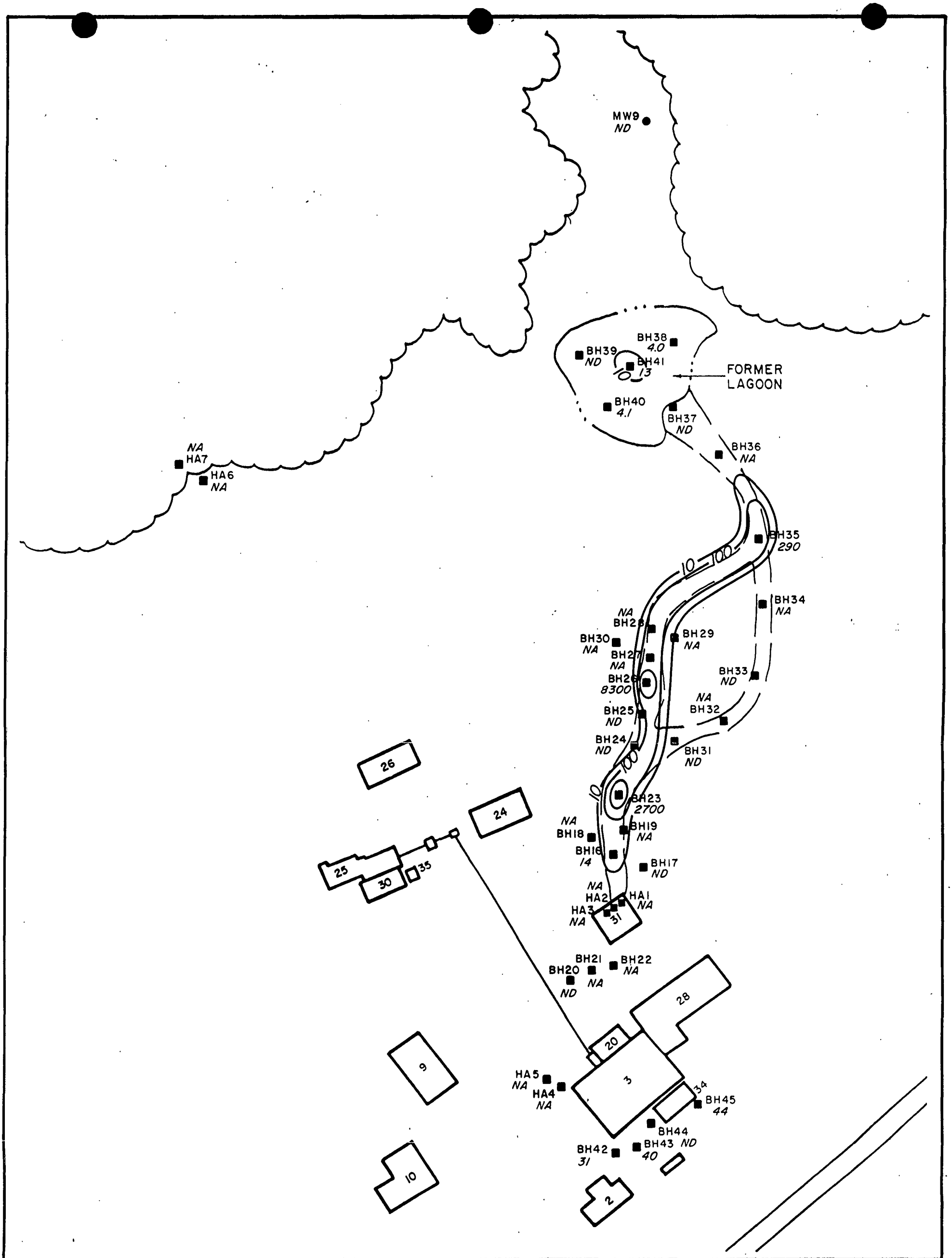
LEGEND

- ■ BOREHOLE LOCATION
- *230* CHEMICAL CONCENTRATION IN mg/kg
- *ND* NOT DETECTED
- *NA* NOT ANALYZED

figure 4.3a
TPH CONCENTRATIONS
IN SOIL (0-10')
SEPARATING BUILDING/
FORMER LAGOON AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M



LEGEND

- ■ BOREHOLE LOCATION
- *230* CHEMICAL CONCENTRATION IN mg/kg
- *ND* NOT DETECTED
- *NA* NOT ANALYZED

0 100 200

SCALE IN FEET

figure 4.4a
TPH CONCENTRATIONS
IN SOIL (>10')
SEPARATING BUILDING/
FORMER LAGOON AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

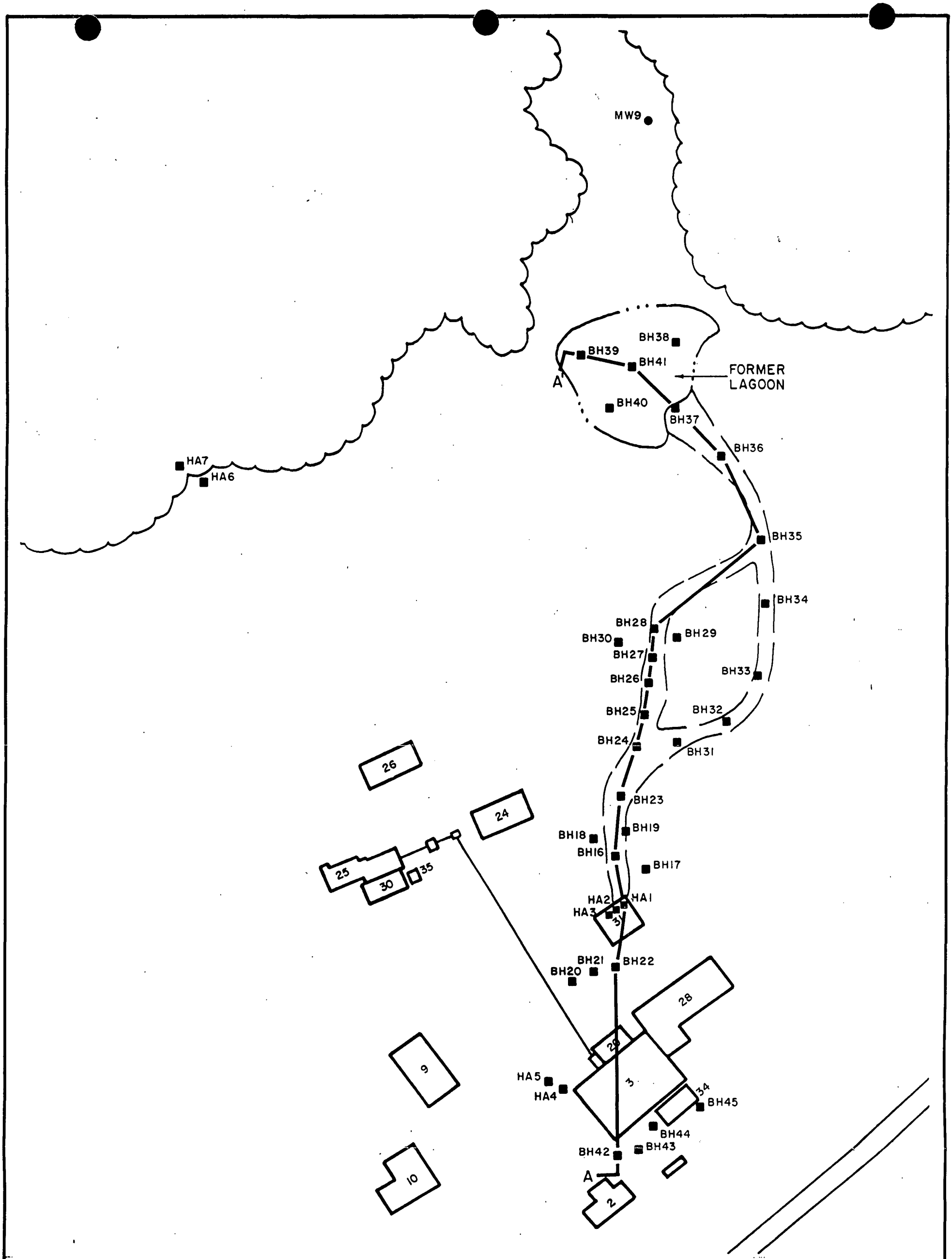


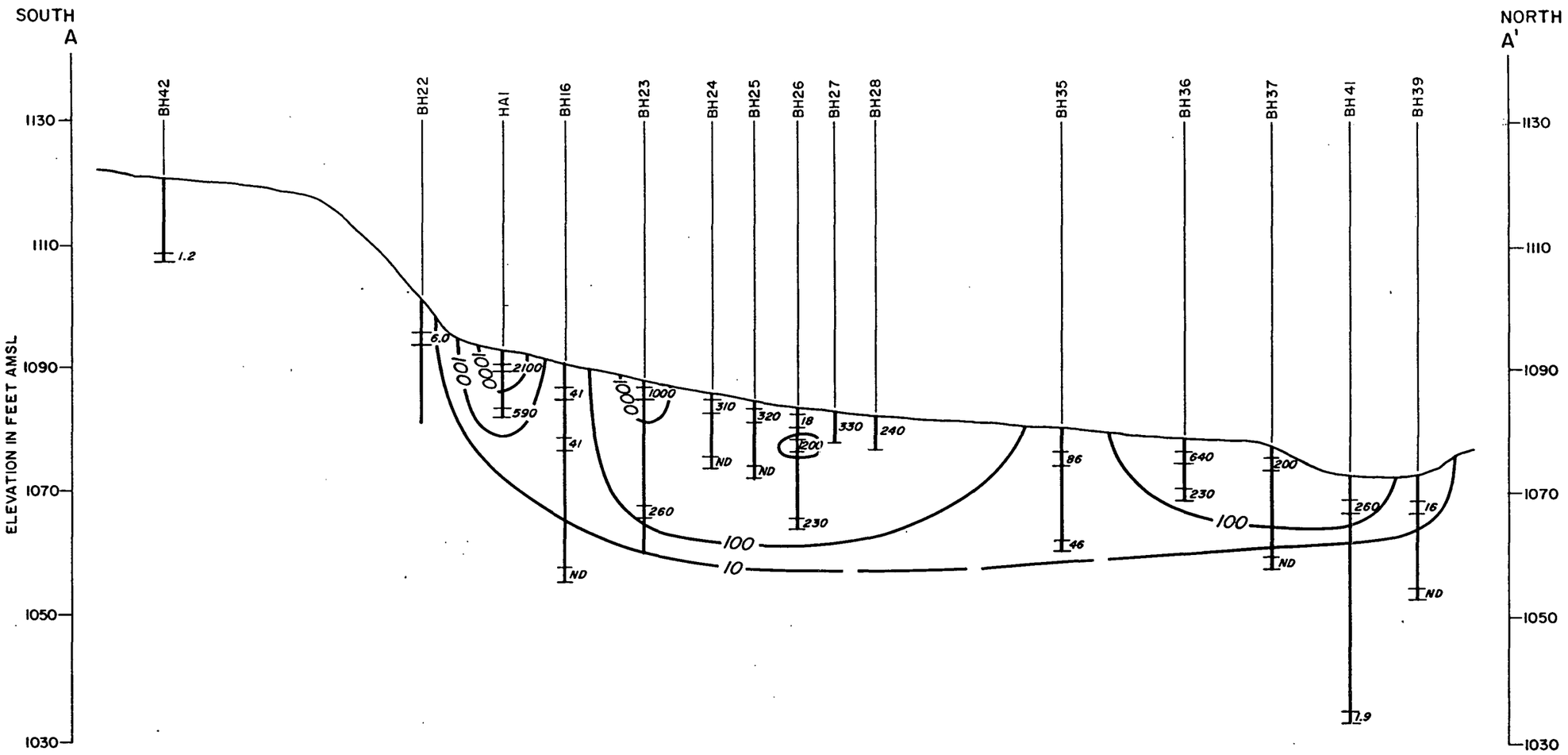
figure 4.5
CHEMICAL CROSS SECTION LOCATION
SEPARATING BUILDING/
FORMER LAGOON AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

4/5

82/262



SCALE: 1"=100' HOR., 1"=20' VER.

LEGEND

41 PCP CONCENTRATION IN mg/kg

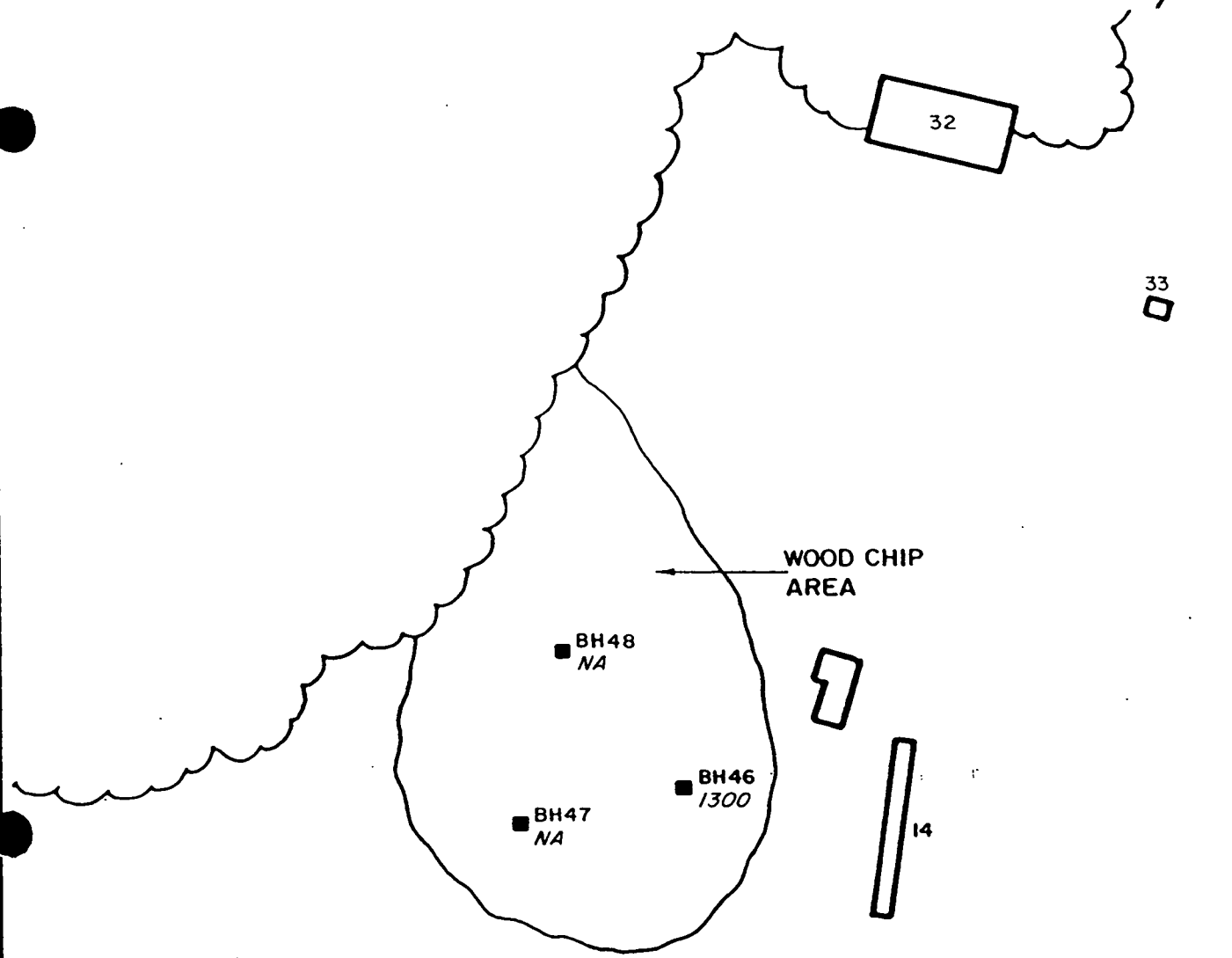
figure 4.6
CHEMICAL CROSS SECTION A-A'
(PCP CONCENTRATIONS)
Penta Wood Products, Inc.

CRA

2140-20/02/92-M

47K

84/262



LEGEND

■ BOREHOLE LOCATION

230 CHEMICAL CONCENTRATION IN mg/kg

ND NOT DETECTED

NA NOT ANALYZED

N

0 100 200

SCALE IN FEET

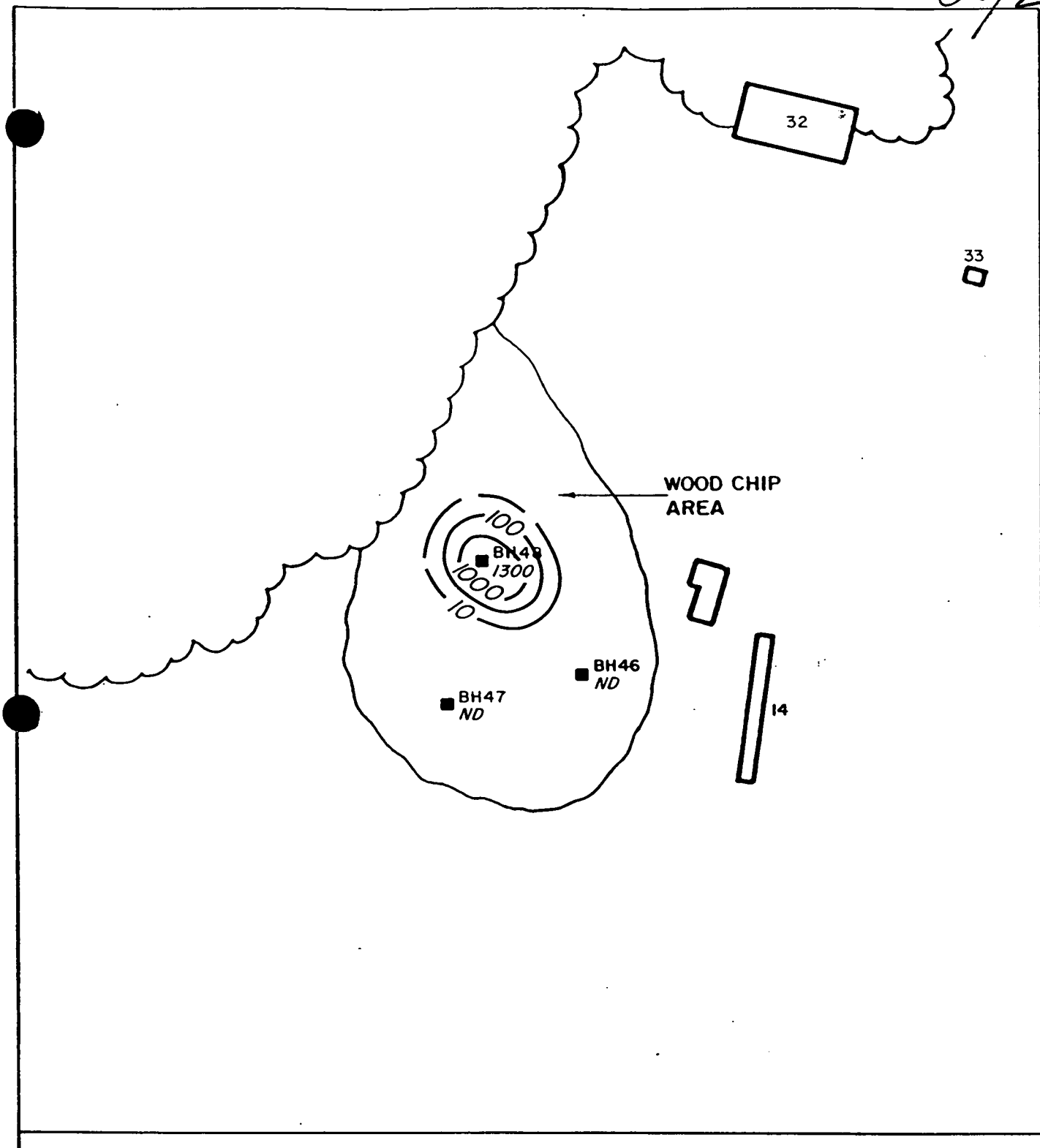
figure 4.1b
PCP CONCENTRATIONS
IN SOIL (0-10')
WOOD CHIP AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

47B

85/262



LEGEND

■ BOREHOLE LOCATION

230 CHEMICAL CONCENTRATION IN mg/kg

ND NOT DETECTED

NA NOT ANALYZED

N

0 100 200

SCALE IN FEET

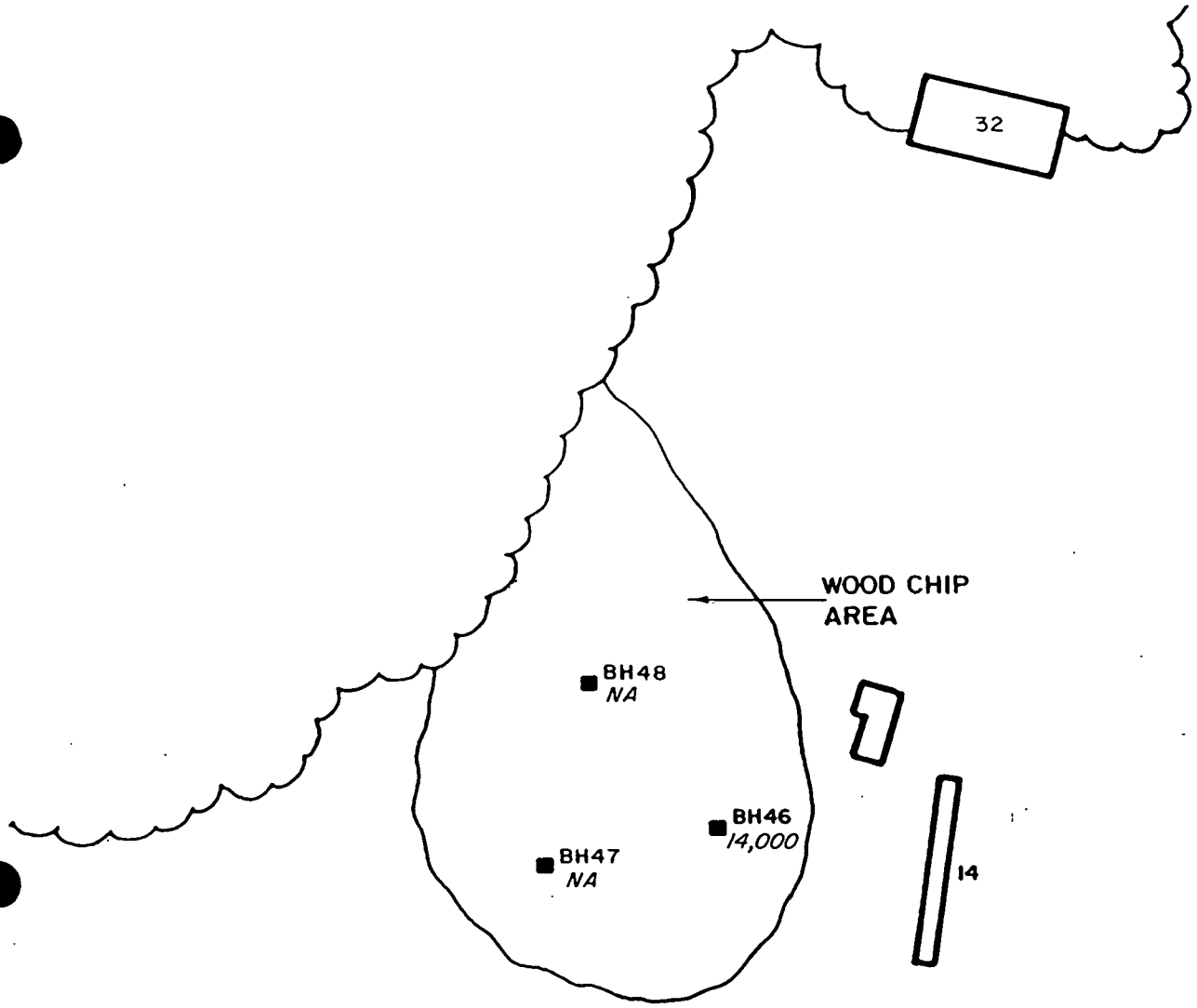
figure 4.2b

PCP CONCENTRATIONS IN SOIL (>10')
WOOD CHIP AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

47E



LEGEND

- ■ BOREHOLE LOCATION
- *230* CHEMICAL CONCENTRATION IN mg/kg
- *ND* NOT DETECTED
- *NA* NOT ANALYZED

N

0 100 200

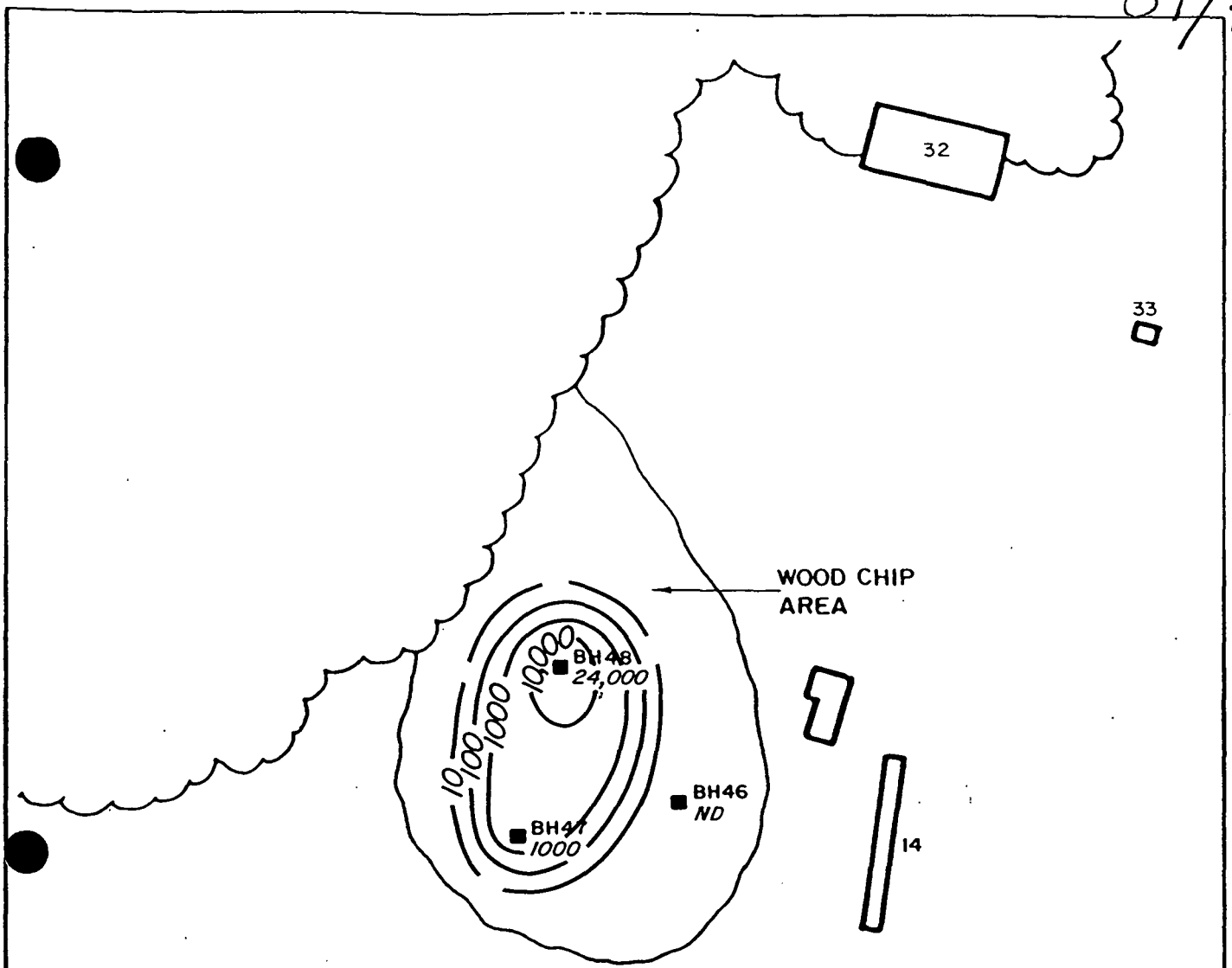
SCALE IN FEET

figure 4.3b
TPH CONCENTRATIONS
IN SOIL (0-10')
WOOD CHIP AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

87/262



LEGEND

■ BOREHOLE LOCATION

230 CHEMICAL CONCENTRATION IN mg/kg

ND NOT DETECTED

NA NOT ANALYZED

N

0 100 200

SCALE IN FEET

figure 4.4b
TPH CONCENTRATIONS
IN SOIL (>10')
WOOD CHIP AREA
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

47I

TABLE 4.2
SUMMARY OF ORGANIC COMPOUNDS–PENTA WOOD
concentration: ug/l

WELL	DATE	G-BHC	GASOLINE	MEXCLR	PCP	PHENOL	SILVEX	TOC	TOH	TPH	TXPHEN
				100/20 (1)	30/30 (1)						.0007/.00007 (1)
CC	900508				2100.000 *						
COWELL	880325				1300.000 *						
MW-01	880325				< 14.000						
MW-01	900725				< 14.000						
MW-01	901108	< 0.050	< 100	< 0.500	0.480	< 5.00	< 0.11	3200	24		< 5.0
MW-01	901211	< 0.003	< 100	< 0.024	0.160	< 5.00	< 0.10	3200	280		< 1.6
MW-01	910130				< 14.000	6.00		14000	820	< 1000	
MW-01	910304		< 100		< 14.000	< 5.00		5200	160		
MW-01	920116				< 14.000			10000	< 4	< 100	
MW-02	880325				< 14.000						
MW-02	900725				< 0.500						
MW-03	900508				1.100	< 3.00					
MW-03	900508				< 15.000						
MW-03	900725				< 14.000						
MW-03	901108	< 0.050	< 100	< 0.500	0.570	13.00	< 0.11	15000	14		< 5.0
MW-03	901211	< 0.002	< 100	< 0.024	1.700	5.00	< 0.10	1900	540		< 1.0
MW-03	910130				< 14.000	6.00		1700	360	< 1000	
MW-03	910304		< 100		< 14.000	10.00		3300	1100		
MW-03	920116				< 14.000	< 2.50		4600	< 4	< 100	
MW-04	900508				< 15.000	< 3.00					
MW-04	900508				< 0.500						
MW-04	900725				13.000						
MW-04	900725				< 14.000						
MW-04	901108	< 0.050	< 100	< 0.500	0.560	5.00	< 0.11	6120	< 10		< 5.0
MW-04	901211	< 0.002	< 100	< 0.024	0.421	< 5.00	< 0.10	2600	200		< 1.0
MW-04	910130				< 14.000	5.00		1200	140	< 1000	
MW-04	910304		< 100		< 14.000	< 5.00		1900	220		
MW-04	920116				< 14.000	< 2.50		2800	< 4	< 100	
MW-05	900508				17000.000 *						
MW-05	900508				39000.000 *						
MW-05	900725				21000.000 *						
MW-05	900725				24000.000 *	--					
MW-05	901108	< 0.050	< 100	< 0.500	13.000	200.00	< 0.11	84000	8800		< 5.0
MW-05	901108	< 0.050	< 100	< 0.500	13000.000 *	250.00	< 110.00	93000	9800		< 5.0
MW-05	901211	< 0.100	< 100	< 1.200	14000.000 *	1300.00	< 10.00	66000	110	32000	< 50.0
MW-05	901211	< 0.100	< 100	< 1.200	14000.000 *	160.00	< 10.00	72000	682	32000	< 50.0
MW-05	910130				2300.000 *	164.00		68000	800	< 1000	

1: Enforcement Standard / Preventative Action Limit a: above preventative action limit * : above enforcement standard

TABLE 4.2
SUMMARY OF ORGANIC COMPOUNDS–PENTA WOOD
concentration: ug/l

WELL	DATE	G-BHC	GASOLINE	MEXCLR	PCP	PHENOL	SILVEX	TOC	TOH	TPH	TXPHEN
				100/20 (1)	300/30 (1)						.0007/.00007 (1)
MW-05	910304		< 140		< 14.000	147.00		120000	2100	35000	
MW-05	920116				25000.000 *	< 250.00		90000	10000	38000	
MW-06	900508				130.000 a	< 3.00					
MW-06	900508				93.000 a						
MW-06	900725				110.000 a						
MW-06	900725				130.000 a						
MW-06	901108	< 0.050	< 100	< 0.500	110.000 a	10.00	< 0.11	18000	100		< 5.0
MW-06	901211	< 0.002	< 100	< 0.024	160.000 a	7.00	< 0.10	6700	10		< 1.0
MW-06	910130				21.000	5.00		8000	260	< 1000	
MW-06	910130				21.000	6.00		8200	1200	< 1000	
MW-06	910304		< 100		43.000 a	8.00		9900	720		
MW-06	910304		< 100		41.000 a	8.00		10000	7500		
MW-06	920116				1800.000 *	< 50.00		13000	1500	690	
MW-07	910603				< 14.000						
MW-07	920116				< 14.000	< 2.50		3500	10	< 100	
MW-08	910603				< 14.000						
MW-08	920116				< 14.000	< 2.50		1100	< 4	< 100	
MW-09	920116				67.000 a	< 2.50		44000	30		
MW-10	920116				11000.000 *	< 250.00		31000	7200	11000	
MW-10	920116				13000.000 *	< 250.00		31000	6800	12000	
PROD WELL	920116				2700.000 *	< 25.00					

1: Enforcement Standard / Preventative Action Limit a: above preventative action limit * : above enforcement standard

01-16-92

CONESTOGA-ROVERS & ASSOCIATES

4/4

89/202

TABLE 4.2
SUMMARY OF ORGANIC COMPOUNDS–PENTA WOOD
concentration: ug/l

WELL	DATE	246TCP	24D	24DCLP	24DMP	24DNP	2CLP	46DN2C	2NP	4CL3C	4NP	ENDRIN	FUEL OIL	FUEL OIL #1	FUEL OIL #2
			100/20 (1)									.2/.02 (1)			
CC	900508														
COWELL	880325														
MW-01	880325														
MW-01	900725														
MW-01	901108		0.52									0.010		100	100
MW-01	901211		0.50									0.011		100	100
MW-01	910130														
MW-01	910304													100	100
MW-01	920116	4.5		2.5	3.0	3.0	1.5	18.0	2.5	7.5	10.0			100	100
MW-02	880325														
MW-02	900725														
MW-03	900508	11.0		7.4	8.6	10.0	7.4	10.0	8.0	9.7	8.3				
MW-03	900508														
MW-03	900725														
MW-03	901108		0.52									0.010		100	100
MW-03	901211		0.50									0.007		100	100
MW-03	910130														
MW-03	910304													100	100
MW-03	920116	4.5		2.5	3.0	3.0	1.5	18.0	2.5	7.5	10.0			100	100
MW-04	900508	11.0		7.4	8.6	10.0	7.4	10.0	8.0	9.7	8.3				
MW-04	900508														
MW-04	900725														
MW-04	900725														
MW-04	901108		0.52									0.010		100	100
MW-04	901211		0.50									0.007		100	100
MW-04	910130														
MW-04	910304													100	100
MW-04	920116	4.5		2.5	3.0	3.0	1.5	18.0	2.5	7.5	10.0			100	100
MW-05	900508														
MW-05	900508														
MW-05	900725														
MW-05	900725														
MW-05	901108		0.52									0.010		100	100
MW-05	901108		510.00									0.010		100	100
MW-05	901211		50.00									0.350		100	100
MW-05	901211		50.00									0.350		100	100
MW-05	910130														

1: Enforcement Standard / Preventative Action Limit a: above preventative action limit * : above enforcement standard

TABLE 4.2
SUMMARY OF ORGANIC COMPOUNDS–PENTA WOOD
concentration: ug/l

WELL	DATE	246TCP	24D	24DCLP	24DMP	24DNP	2CLP	46DN2C	2NP	4CL3C	4NP	ENDRIN	FUEL OIL	FUEL OIL #1	FUEL OIL #2
			100/20 (1)									2/.02 (1)			
MW-05	910304													< 140	< 140
MW-05	920116	< 450.0		< 250.0	< 300.0	< 300.0	< 150.0	< 1800.0	< 250.0	< 750.0	< 1000.0			< 100	< 100
MW-06	900508	< 11.0		< 7.4	< 8.6	< 10.0	< 7.4	< 10.0	< 8.0	< 9.7	< 8.3				
MW-06	900508														
MW-06	900725												< 200		
MW-06	900725														
MW-06	901108		< 0.52									< 0.010		< 100	< 100
MW-06	901211		< 0.50									< 0.007		< 100	< 100
MW-06	910130														
MW-06	910130														
MW-06	910304													< 100	< 100
MW-06	910304													< 100	< 100
MW-06	920116	< 90.0		< 50.0	< 60.0	< 60.0	< 30.0	< 360.0	< 50.0	< 150.0	< 200.0			< 140	< 140
MW-07	910603													< 100	< 100
MW-07	920116	< 4.5		< 2.5	< 3.0	< 3.0	< 1.5	< 18.0	< 2.5	< 7.5	< 10.0			< 100	< 100
MW-08	910603													< 100	< 100
MW-08	920116	< 4.5		< 2.5	< 3.0	< 3.0	< 1.5	< 18.0	< 2.5	< 7.5	< 10.0			< 100	< 100
MW-09	920116	< 4.5		< 2.5	< 3.0	< 3.0	< 1.5	< 18.0	< 2.5	< 7.5	< 10.0			< 100	1700
MW-10	920116	< 450.0		< 250.0	< 300.0	< 300.0	< 150.0	< 1800.0	< 250.0	< 750.0	< 1000.0			< 100	< 100
MW-10	920116	< 450.0		< 250.0	< 300.0	< 300.0	< 150.0	< 1800.0	< 250.0	< 750.0	< 1000.0			< 100	< 100
PROD WELL	920116	< 45.0		< 25.0	< 30.0	< 30.0	< 15.0	< 180.0	< 25.0	< 75.0	< 100.0				

1. Enforcement Standard / Preventative Action Limit a: above preventative action limit * : above enforcement standard

TABLE 4.2
SUMMARY OF INORGANIC RESULTS – PENTA WOOD

concentration: mg/l

WELL	DATE	ARSENIC	BARIUM	CADMIUM	CHLORIDE	CHROMIUM	COLIFORM	COPPER	FLUORIDE	IRON	LEAD	MANGANESE	MERCURY	NITROGEN	SELENIUM	SILVER	SODIUM	SULFATE	ZINC
		.05/.005 (2	1.0/.2 (2	0.01/0.001 (2	250/125 (2	.05/.005 (2	col/l (1)	1/.5 (2	4/.44 (2	.3/.15 (2	.05/.005 (2	.05/.025 (2	.002/.002 (2	10/2 (2	.1/.01 (2	.5/.1 (2		250/125 (2	5/2.5 (2
COWELL	880325	< 0.001						0.020											< 0.01
MW-01	880325	< 0.001						< 0.010											0.02
MW-01	901108	< 0.994	0.025	< 0.006	14	< 0.040	< 10		< 0.100	0.150	< 0.045	0.032 a	< 0.0002	4.40 a	< 0.081	< 0.005	7.2	< 1.0	
MW-01	901211	< 0.002	0.120	< 0.010	15	< 0.100				0.190 a	< 0.100	< 0.010	< 0.0002	4.30 a	< 0.030		3.7	9.0	
MW-01	910130	< 0.002			12					< 0.050		< 0.010		4.20 a			4.8	9.0	
MW-01	910304	< 0.002			13					0.110		< 0.010		4.30 a			4.4	9.6	
MW-01	920116	< 0.040	0.020		9					< 0.020		0.004		4.30 a			7.6	6.0	
MW-02	880325	< 0.001						< 0.010											0.03
MW-03	901108	< 0.994	0.096	< 0.006	120	< 0.040	< 10		< 0.100	0.440 *	< 0.045	0.078 *	< 0.0002	4.90 a	< 0.081	< 0.005	19.0	15.0	
MW-03	901211	< 0.002	0.081	< 0.010	100	< 0.100				0.630 *	< 0.100	0.060 *	< 0.0002	3.80 a	< 0.030		1.4	14.0	
MW-03	910130	< 0.002			98					0.080		0.050 a		3.70 a			14.0	11.0	
MW-03	910304	< 0.002			100					< 0.050		0.080 *		3.40 a			23.0	13.0	
MW-03	920116	< 0.040	0.065		82					< 0.020		0.045 a		5.00 a			22.0	6.0	
MW-04	901108	< 0.994	0.024	< 0.006	4	< 0.040	< 10		0.100	0.032	< 0.045	0.076 *	< 0.0002	< 0.10	< 0.081	< 0.005	4.0	9.0	
MW-04	901211	< 0.002	0.062	< 0.010	5	< 0.050				< 0.005	< 0.100	0.050 a	< 0.0002	0.10	< 0.030		3.9	9.0	
MW-04	910130	< 0.002			3					< 0.050		0.060 *		< 0.10			3.8	9.0	
MW-04	910304	< 0.002			3.9					< 0.050		0.060 *		0.20			3.9	11.0	
MW-04	920116	< 0.040	0.019		3					0.014		0.046 a		< 0.10			4.2	9.0	
MW-05	901108	< 0.994	0.140	< 0.006	70	< 0.040	80		< 0.100	4.600 *	< 0.045	12.000 *	0.0002	0.60	< 0.081	< 0.005	45.0	13.0	
MW-05	901108	< 0.994	0.150	< 0.006	73	< 0.040	110		< 0.100	5.000 *	< 0.045	13.000 *	0.0003	0.60	< 0.081	< 0.005	50.0	13.0	
MW-05	901211	< 0.002	0.120	< 0.010	79	< 0.100				5.200 *	< 0.100	12.000 *	< 0.0002	0.60	< 0.030		48.0	27.0	
MW-05	901211	< 0.002	0.130	< 0.010	80	< 0.100				5.900 *	< 0.100	13.000 *	< 0.0002	0.70	< 0.030		45.0	28.0	
MW-05	910130	< 0.002			80					5.200 *		12.000 *		0.80			440.0	21.0	
MW-05	910304	0.004	< 0.200		81					3.900 *		11.000 *		0.40			46.0	26.0	
MW-05	920116	< 0.040	0.120		79					3.700 *		13.000 *		0.40			43.0	9.0	
MW-06	901108	< 0.994	0.440 a	< 0.006	1200 *	< 0.040	< 10		< 0.100	1.200 *	< 0.045	0.200 *	< 0.0002	13.00 *	< 0.081	< 0.005	430.0	150.0 a	
MW-06	901211	< 0.002	0.413 a	< 0.010	1200 *	< 0.100				12.000 *	< 0.100	0.360 *	< 0.0002	8.80 a	< 0.030		570.0	160.0 a	
MW-06	910130	< 0.002			1600 *					0.890 *		0.100 *		15.00 *			850.0	150.0 a	
MW-06	910130	< 0.002			1400 *					0.930 *		0.100 *		15.00 *			840.0	160.0 a	
MW-06	910304	< 0.002	< 0.200		1300 *					1.000 *		0.600 *		6.40 a			520.0	160.0 a	
MW-06	910304	< 0.002	< 0.200		1300 *					0.920 *		0.600 *		6.70 a			520.0	160.0 a	
MW-06	920116	< 0.040	0.320 a		950 *					0.290 a		0.055 *		9.20 a			660.0	91.0 *	
MW-07	920116	< 0.040	0.039		9					0.400 *		0.094 *		3.70 a			6.7	8.0	
MW-08	920116	< 0.040	0.016		6					< 0.020		0.021		3.10 a			2.7	6.0	
MW-09	920116	< 0.040	0.008		18					0.026		0.180 *		2.60 a			14.0	< 1.0	
MW-10	920116	< 0.040	0.074		57					0.120		1.800 *		1.70			44.0	8.0	
MW-10	920116	< 0.040	0.076		57					0.190 a		1.900 *		1.70			42.0	8.0	

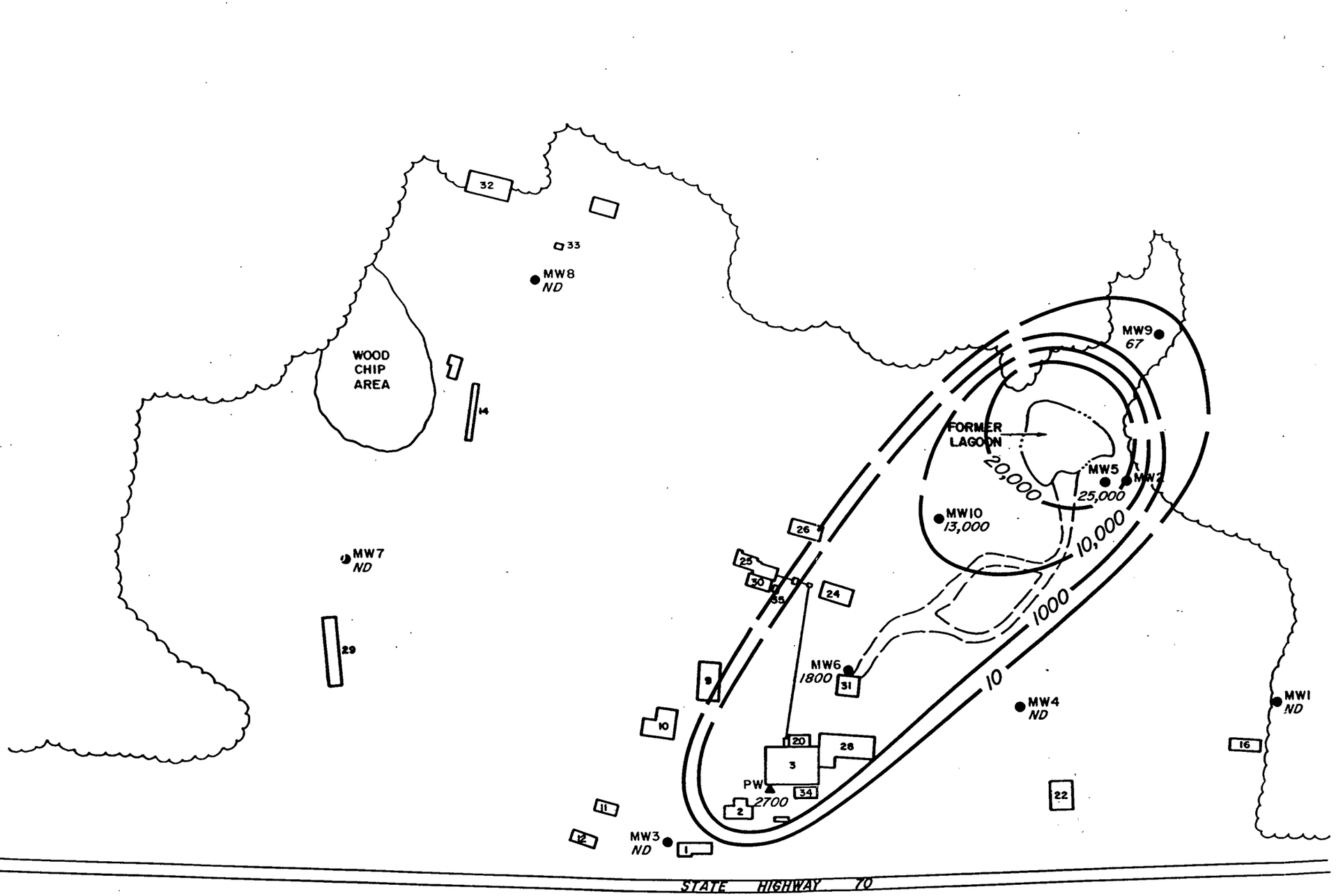
1: Less than one in 100ml for membrane filter method or not present in any 10ml portion by fermentation tube method for both preventative action limit and enforcement standard.
2: Enforcement Standard / Preventative Action Limit a: above preventative action limit *: above enforcement standard

wells are located around the perimeter of the Site. Monitoring wells MW7 and MW8 were installed near the wood chip area to determine if the discharges of process water have impacted the groundwater in that area. The presence of PCP or fuel oil has not been detected.

Monitoring wells MW3 and MW4 are located near the southern portion of the Site. Both of these wells have shown low level detections of PCP ranging from 0.57 to 1.7 ug/l in MW3 and 0.4 to 13 ug/l for MW4. The remaining monitoring wells were installed in potential source areas and do show elevated levels of PCP. Monitoring wells MW5, MW9 and MW10 are located around the former lagoon and show PCP concentrations ranging from 67 to 39,000 ug/l. Monitoring well MW6 is located next to another know source area; the oil/water separator building and has shown PCP concentrations ranging from 21 to 160 ug/l.

Figure 4.7 presents PCP isoconcentration contours for the most recent round of groundwater monitoring at the Site. Figure 4.8 shows the TPH contours for the same round of groundwater monitoring at the Site.

The WDNR has indicated that most of the residential wells near the PWP property have been sampled as well as Doctor Lake. PCP has not been detected in any of the samples taken.



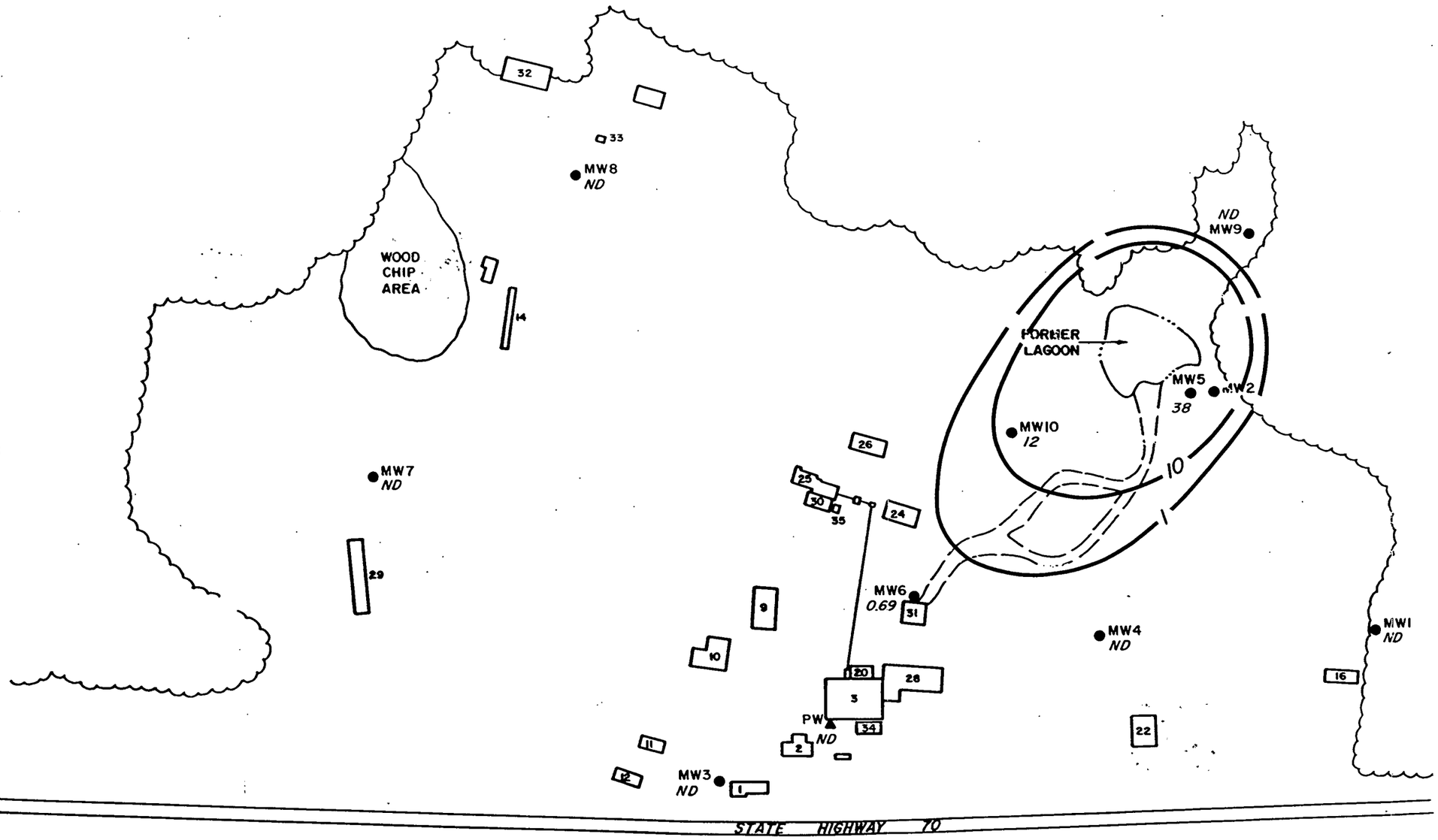
LEGEND

1	OFFICE
2	GARAGE
3	TREATMENT AREA
9	TRUCK SHOP
10	GARAGE
11	LUMBER STORAGE
12	STORAGE SHED
13	POLE PEELER
14	SAWMILL
16	LUMBER SHED
20	NEW BOILER HOUSE
22	STORAGE AND LOADING
24	SHAVINGS VAULT
25	PEELER SHED
26	PLANER MILL
28	TREATMENT AREA
29	SAWMILL
30	PEELER SHED (7' POLES)
31	SEPARATING BUILDING
32	NEW SAWMILL BUILDING
33	SLASHER CONTROL HOUSE
34	PENTA MIXING BUILDING
35	ELECTRICAL CONTROL BUILDING
●	MONITORING WELL LOCATION
▲	PRODUCTION WELL LOCATION
1800	PCP CONCENTRATION IN ug/l (1-16-92)
ND	NOT DETECTED

figure 4.7
PENTACHLOROPHENOL CONCENTRATIONS
IN GROUNDWATER
Penta Wood Products, Inc.

CRA

2140-20/02/92-M



N

0 200 400

SCALE IN FEET

LEGEND

1	OFFICE
2	GARAGE
3	TREATMENT AREA
9	TRUCK SHOP
10	GARAGE
11	LUMBER STORAGE
12	STORAGE SHED
13	POLE PEELER
14	SAWMILL
16	LUMBER SHED
20	NEW BOILER HOUSE
22	STORAGE AND LOADING
24	SHAVINGS VAULT
25	PEELER SHED
26	PLANER MILL
28	TREATMENT AREA
29	SAWMILL
30	PEELER SHED (7' POLES)
31	SEPARATING BUILDING
32	NEW SAWMILL BUILDING
33	SLASHER CONTROL HOUSE
34	PENTA MIXING BUILDING
35	ELECTRICAL CONTROL BUILDING
●	MONITORING WELL LOCATION
▲	PRODUCTION WELL LOCATION
12	TPH CONCENTRATION IN mg/l (1-16-92)
ND	NOT DETECTED

figure 4.8
TOTAL PETROLEUM HYDROCARBONS
IN GROUNDWATER
Penta Wood Products, Inc.

CRA

2140-20/02/92-M

4.2.1 Groundwater Quality Assessment

PCP wood preservative is prepared by mixing PCP with #2 fuel oil. The treating solution typically contains 5% PCP and 95% diesel fuel. The resultant mixture has a specific gravity of 0.9 relative to water.

Soil at the Site has been impacted by spills and releases from historical operations over a period of several decades. Principal contamination exists in the oil/water separator building area, the gully and lagoon area. Surface contamination resulted from drainage along the gully to the lagoon area.

Infiltration of water through contaminated soils causes leaching of PCP from soil to water which in turn migrates vertically downward through the unsaturated zone and enters the groundwater system.

Within the aquifer, dissolved concentrations of PCP migrate horizontally in the direction of groundwater movement. Nonaqueous phase liquids (NAPL) would tend to pool on top of the till unit above the water table or float on top of the water table. NAPL was noted above the till at only one location, MW10.

The data presented in Section 4.2 and in Table 4.2 show that a groundwater impact has occurred under the Site. Elevated levels of PCP and fuel oil have been measured in some of the monitoring wells. Table 4.2 also compares the groundwater results to Wisconsin groundwater quality standards.

97/262

Figures 4.7 and 4.8 show a contaminant plume that appears to originate beneath the former lagoon and migrates to the south. Monitoring wells MW3 and MW4, which are downgradient of this plume have shown little or no impact. The center of the plume appears to originate beneath the former lagoon where the highest concentrations of PCP and TPH are measured. This plume appears to be approximately 4 acres in size and has not migrated off PWP property.

The actual analytical reports have not been included in this report. Copies of this data are available upon request.

98/262

5.0 EVALUATION OF REMEDIAL ALTERNATIVES

5.1 REMEDIAL OBJECTIVES

Based on the results of soil and groundwater studies conducted by CRA, it is concluded that remediation of both soil and groundwater is required. The remedial objectives are as follows:

1. Contain groundwater contamination and prevent its migration off-Site.

2. Contain soil contamination to prevent migration via surface drainage infiltration and dust, and

3. Remediate soil and groundwater in a cost effective manner.

4. Implement a remedy that is protective of human health and the environment.

5.2 GROUNDWATER REMEDIAL ALTERNATIVES ANALYSIS

There is only one feasible remedial alternative that addresses groundwater contamination at the Site. This alternative involves groundwater extraction, treatment and discharge. Groundwater extraction serves two purposes:

- Hydraulic containment of groundwater contamination; and
- Remediation of groundwater by extraction and treatment.

5.2.1 Groundwater Extraction System

The groundwater extraction system would consist of two extraction wells. The location of these well are shown on Figure 5.1. The first well would be installed near the former lagoon which is the principal source area. It would provide source control and significant contaminant removal. The extraction well design would be dependent on several factors:

- Aquifer transmissivity;
- Available drawdown; and
- Calculated zone of capture.

In order to provide source area control, the minimum required zone of capture is approximately 200 feet in width.

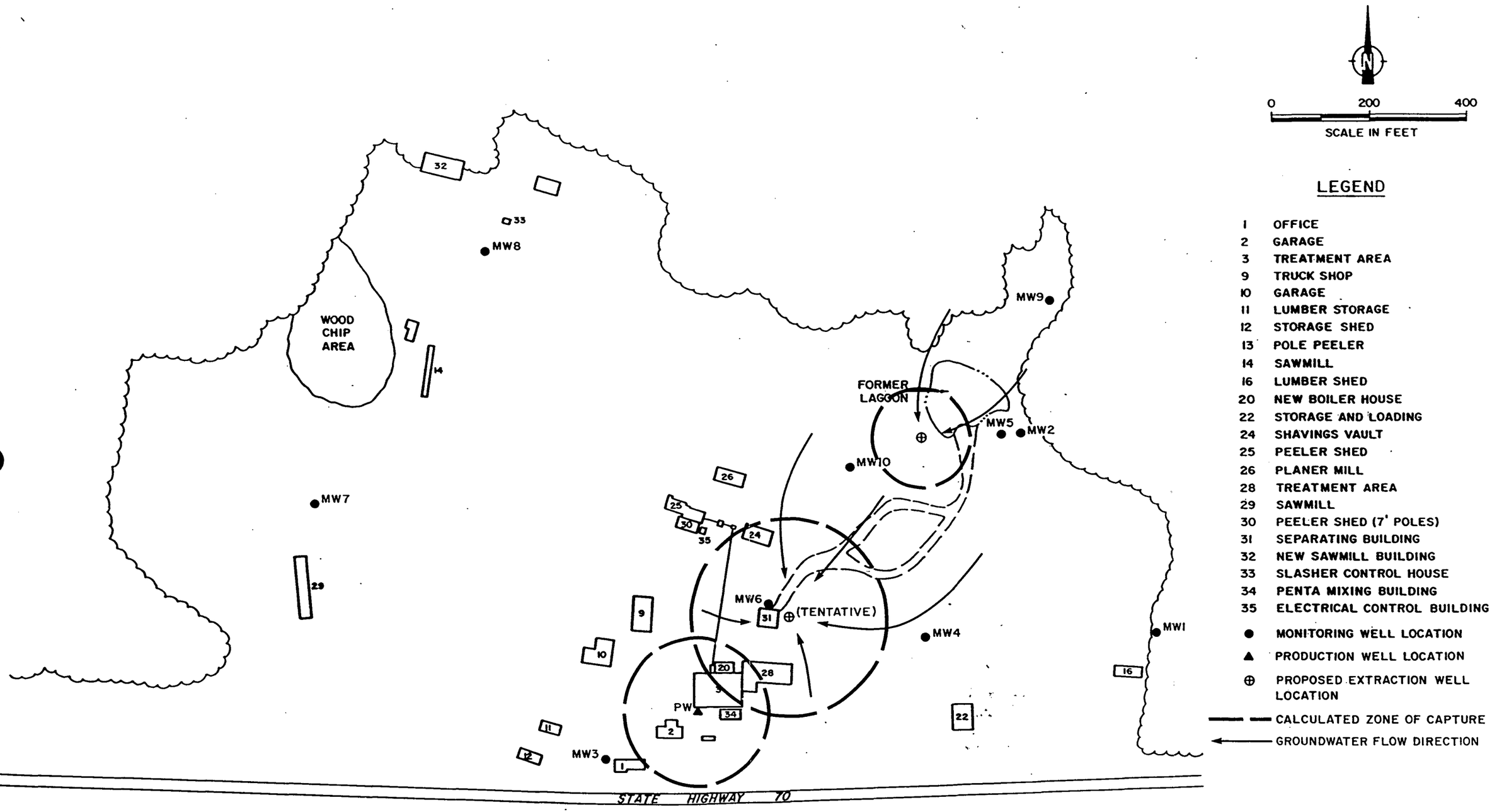


figure 5.1
PROPOSED EXTRACTION WELL LOCATION
Penta Wood Products, Inc.

CRA

2140-20/02/92-M

The required extraction rate is found by using the following method, where:

$$W = \frac{Q}{2\,Ti}$$

Where:

i = the horizontal gradient = 0.0005

k = the hydraulic conductivity = 935 ft/day

b = the aquifer thickness = 20 feet

w = required width of capture = 200 feet

$$200 = \frac{Q}{(2)(935.20)(0.0005)}$$

Q = 10.69 gpm

Thus the calculated total yield from the source extraction well should be 11 gpm.

The second extraction well would be installed downgradient of the plume and would be designed to provide hydraulic containment and prevent off-Site migration. The required zone of capture for this well would be approximately 400 feet in diameter. The required extraction rate to provide the 400 foot diameter zone of capture would be:

$$W = \frac{Q}{2\,Ti}$$

Where:

i = the horizontal gradient = 0.0005

k = the hydraulic conductivity = 935 ft/day

b = the aquifer thickness = 20 feet

w = required width of capture = 400 feet

$$200 = \frac{Q}{(2)(935.20)(0.0005)}$$

Q = 21.4 gpm

Thus the calculated total yield from the containment well should be 22 gpm.

The total extraction rate for this system is calculated to be 33 gpm. The source area extraction well would be installed first. Aquifer tests would be conducted on this well to determine:

- The recommended long term pump rate required in this area;
- Aquifer hydraulic characteristics; and
- Groundwater quality for treatability testing.

This information would then allow for exact placement of the second containment extraction well. This well would also be hydraulically tested to determine the appropriate extraction rate and groundwater quality.

An aquifer study assessment would be prepared and submitted to the WDNR for review and approval prior to system construction and implementation.

5.2.2 Groundwater Treatment System

There are three treatment methods that have been proven to be effective treatment technologies for PCP and fuel oil. These are:

- Granular activated carbon;
- Ultraviolet oxidation; and
- Biological.

Granular Activated Carbon

Treatment granular activated by carbon adsorption involves pumping extracted groundwater through an activated carbon bed in which close contact with the surface of the carbon grains promotes the adsorption of contaminants onto carbon. A carbon treatment schematic is presented on Figure 5.2.

This technology has been extensively developed and proven suitable for the removal of a wide range of contaminants from both air and water phases including PCP. Carbon adsorption generally achieves a high level (to

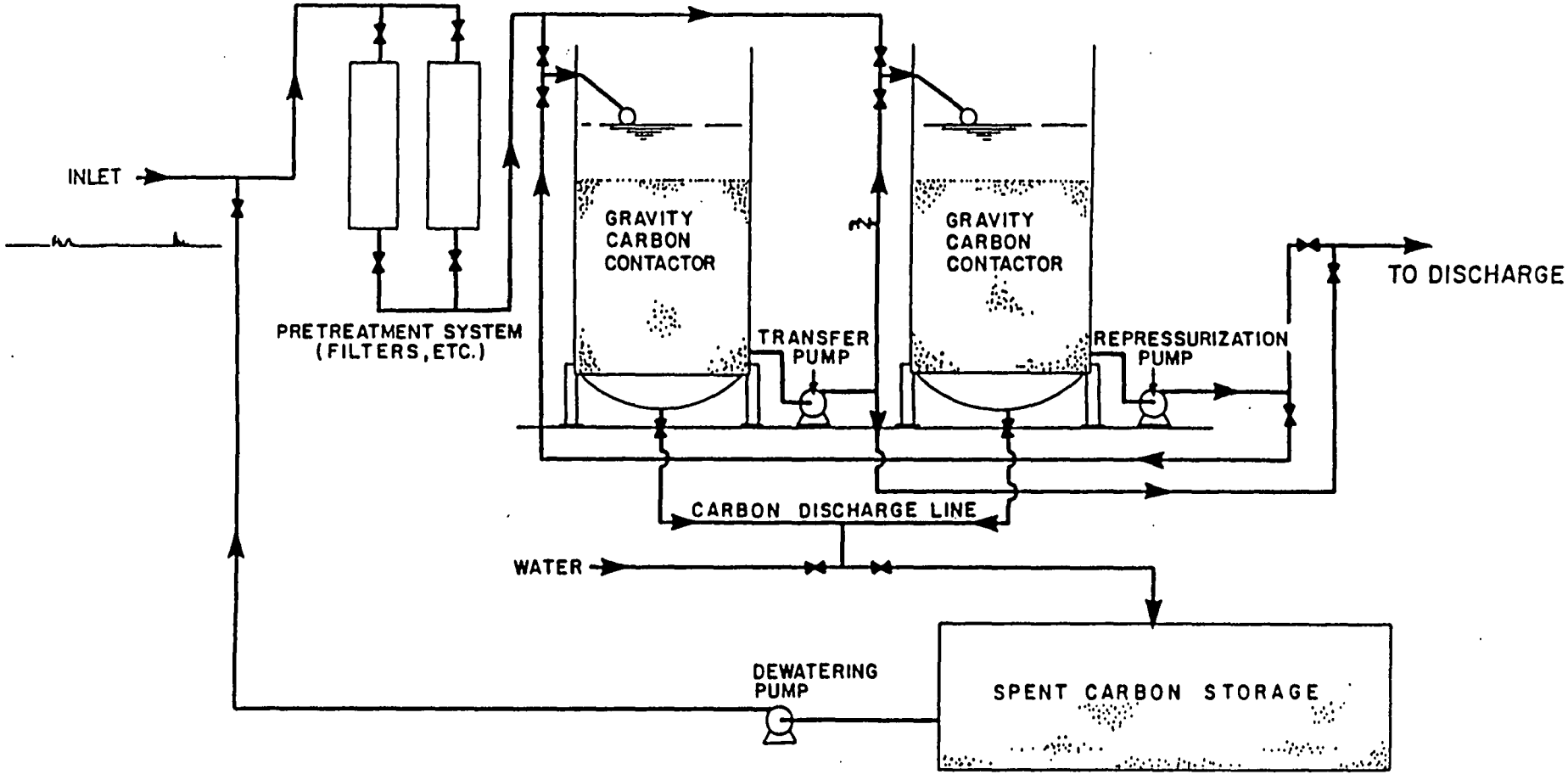


figure 5.2
CARBON TREATMENT SCHEMATIC
GRAVITY SYSTEM
Penta Wood Products, Inc.

CRA

2140-25/02/92-M

104/2102

below 1 ug/l) of organic contaminant removal. Depending on the concentration of fuel oil/TPH, pretreatment for oil may be required.

Carbon adsorption should be considered as a potential removal process for organic contaminates that are non-polar, of low solubility or high molecular weight. Certain inorganic compounds will be adsorbed but a high level of inorganics would create problems in the regeneration process.

A common method of assuring contaminant removal is to install a secondary bank of contact units piped for series operation with the primary bank. Monitoring for contaminant break through at detectable levels is undertaken between the banks of contact units. In this arrangement, the second bank of contact units performs as a polishing unit, thus assuring maximum contaminant removal. It also serves as a backup so that contaminant breakthrough of the first bank of contact units does not result in contaminant escape to the effluent discharge. This backup provides adequate time to recharge the first bank of contact units which is then established as the secondary system by valving changes.

Re-activation of the carbon by a carbon supplier/contractor would include disposal of the extracted contaminants. Carbon regeneration and/or disposal of carbon is commercially available at several U.S. EPA approved facilities.

Ultraviolet/Hydrogen Peroxide

This relatively new and innovative technology involves treatment of groundwater by a combination of oxidation with hydrogen peroxide, and exposure to ultraviolet light. The ultraviolet light in conjunction with hydrogen peroxide catalyzes the chemical oxidation of organic contaminants in water by a combined effect on the organic contaminant and its reaction with hydrogen peroxide. Many organic constituents will adsorb the ultraviolet light and undergo a change in chemical structure. In addition to this hydrogen peroxide reacts with ultraviolet light to form hydroxyl radicals which are powerful oxidizing agents that react with most organic compounds. The end result is carbon dioxide and water. Ultraviolet/hydrogen peroxide treatment systems are commercially available and are proven to be effective for treatment of PCP. An ultraviolet/hydrogen peroxide Treatment Schematic is presented on Figure 5.3.

Hydrogen peroxide is stored in tanks and is fed to the unit based on the required feed rate established during the bench scale testing and calibrated routinely during monitoring.

The efficiency of an ultraviolet/hydrogen peroxide system would be dependent on the type and concentration of the organic constituents, turbidity of the water, type and concentrations of dissolved solids, pH, temperature and the level of ultraviolet and hydrogen peroxide input. In addition, some pretreatment may be required to remove any oil present in the groundwater.

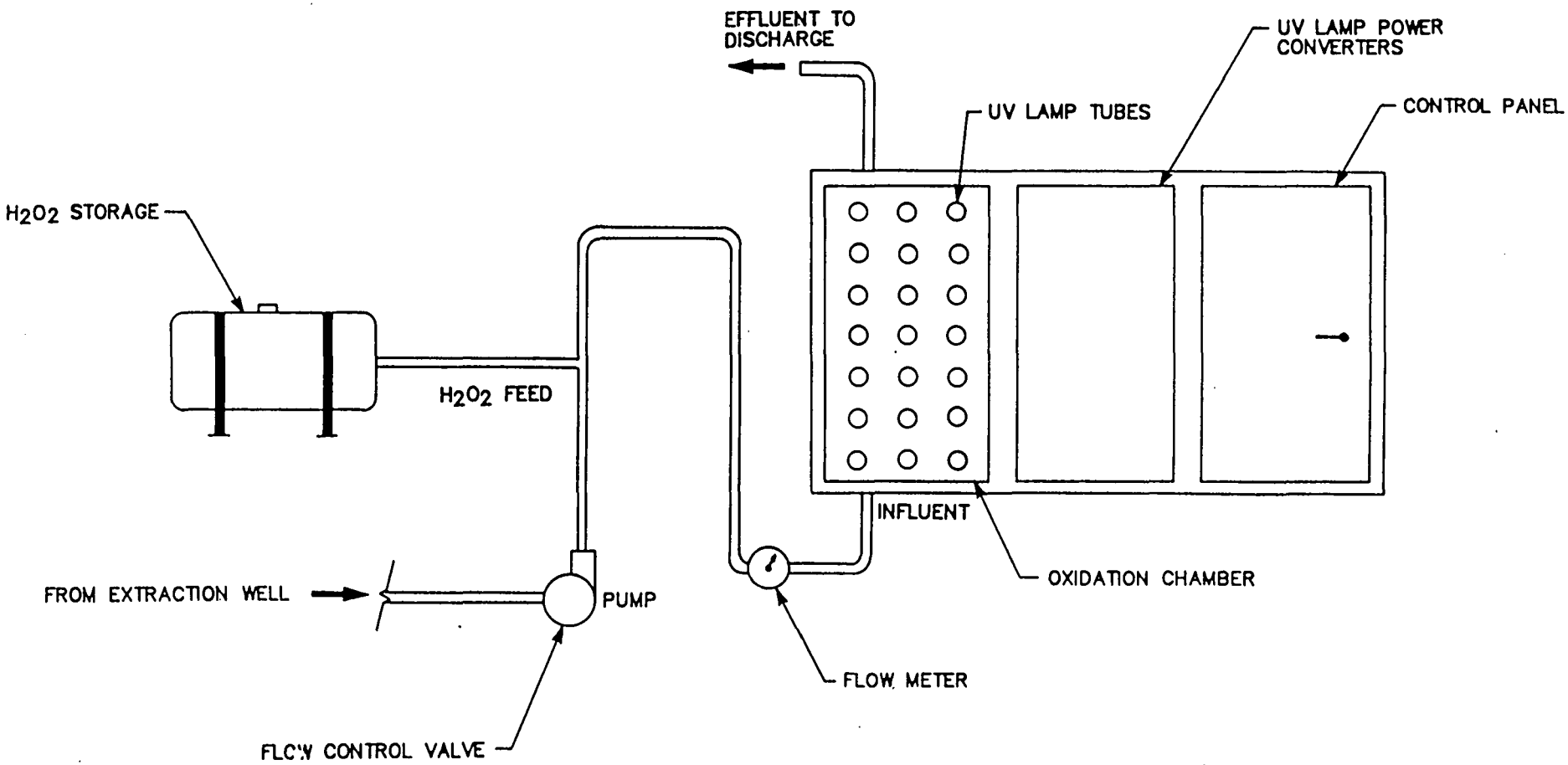


figure 5.3
UV/H202 PROCESS SCHEMATIC
Penta Wood Products, Inc.

CRA

2140-25/02/92-M

107/202

Biological Treatment

PWP currently has a biological treatment unit that they are using on their process water.

This system consists of:

1. Oil flocculation tank;
2. Biological reactor; and
3. Chemical feed equipment.

A biological treatment system schematic is shown on Figure 5.4.

Oil Flocculation Tank

The oil flocculation tank provides additional oil/water separation not achieved by the existing oil/water separator tanks. Chemical flocculants are added and mixed with the water coming from the existing oil/water separator to remove the emulsified oil present.

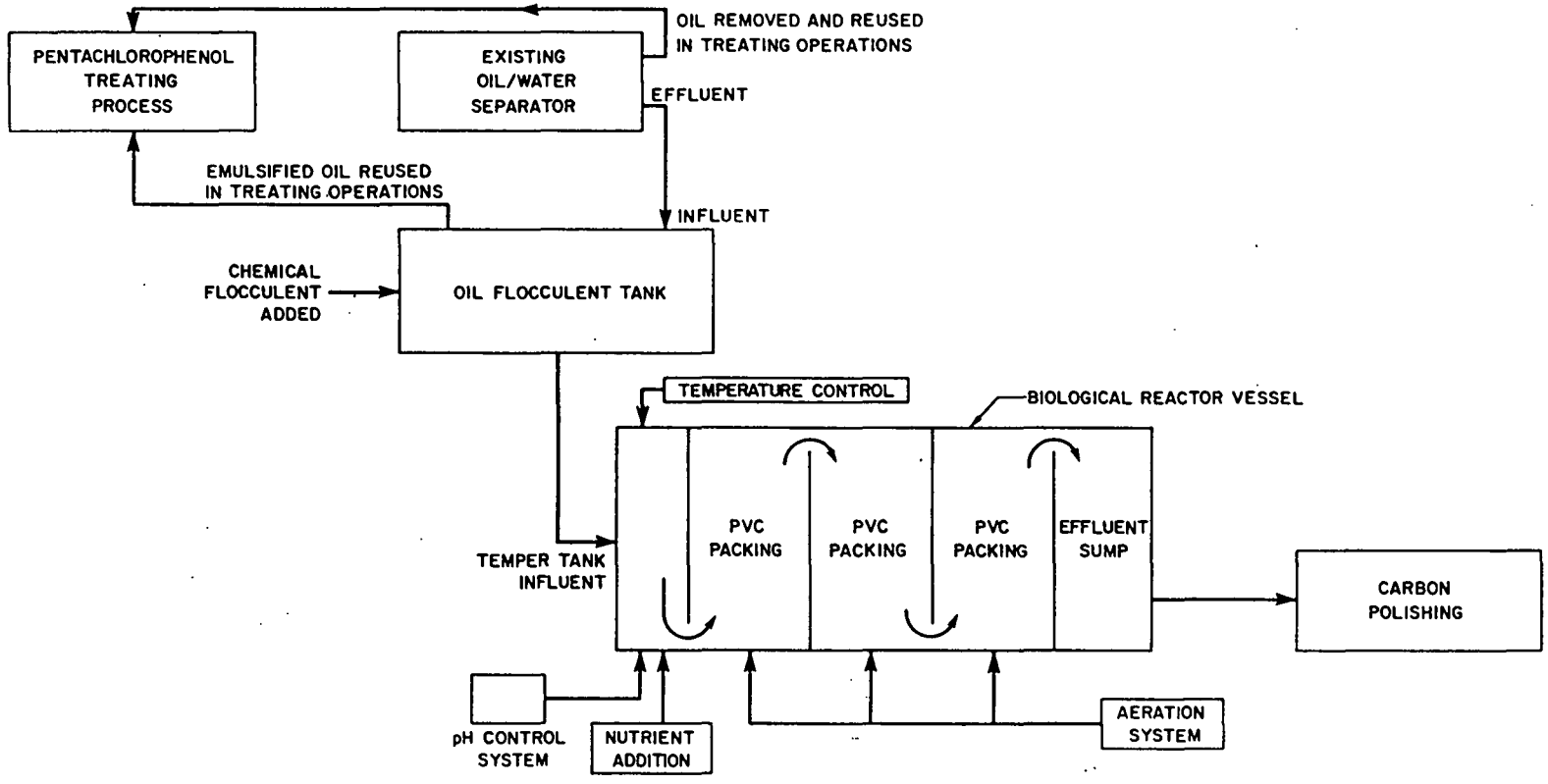


figure 5.4
BIOLOGICAL WATER TREATMENT SCHEMATIC
Penta Wood Products, Inc.

CRA

2140-6/12/90-M

109/2602

Biological Reactor

The biological reactor has five separate compartments. On the influent side of the reactor is the mixing compartment. In this compartment is a mixer to maintain uniform mixing. It also contains an immersion heater with thermostatic controls to maintain optimum temperatures for biological activity.

In the middle of the reactor are separate compartments that contain packing material. This packing provides the necessary surface area for the fixed film biological micro-organisms. The packing is arranged so that vertical flow through the packing material is achieved.

An aeration system is an integral part of the reactor. The aeration system consists of positive displacement blower, filter and silencer. Inlet throttling valves control the distribution of air into each compartment. There are six membrane diffusers in each of the three PVC packing compartments to evenly aerate each compartment. The last compartment in the reactor is the effluent sump, which holds the treated water.

Chemical Feed Equipment

Two chemical feed systems are part of the water treatment unit. One feed system includes a variable speed/variable stroke caustic metering pump and a four function back pressure/pressure relief valve. This system maintains the proper pH level in the reactor. The second chemical feed system

includes a nutrient metering pump and a four function back pressure/pressure relief valve. This system maintains the proper nutrient level in the reactor by adding urea and trisodium phosphate into the system.

Water is pumped from the existing oil/water separator into the flocculation tank and mixed with the chemical flocculant. The emulsified oil is removed from this tank and reused in the PCP treating process. The remaining water is pumped into the mixing compartment of the biological reactor where the pH is adjusted and nutrients are added. The temperature of the water is also adjusted if necessary. The water then flows vertically through the three packed compartments and is aerated from the bottom of the reactor. The water then flows into the effluent sump, where it is pumped into a holding tank.

PCP is reduced by means of biological degradation. The micro-organisms attached to the packing use PCP and the added nutrients as a food source. The end products of this biodegradation are carbon dioxide and water.

It is expected that the discharge limits for the contaminants of concern will be below the treatment capability of commercially available units. Biological treatment can typically reduce the concentrations of PCP to 1 mg/l. Additional treatment using carbon (as described earlier) would then be required to meet the discharge limits. Carbon polishing is a proven treatment method for

low level chlorinated phenol compounds because these phenols are redially adsorbed onto carbon. Thus, carbon polishing would be the final step prior to discharge.

5.2.3 Summary

As part of the water treatment system design a treatability evaluation would be conducted to determine the most efficient and cost effective system. The treatability study would incorporate analytical data and flow rates generated during the pump test on the proposed extraction well(s). Table 5.1 presents a summary of costs associated with groundwater remedy. These costs could fluctuate as much as +/- 20% depending on the treatment system chosen.

5.3 SOIL REMEDIAL ALTERNATIVES ANALYSIS

Potential remedial alternatives for PCP concentrations are listed below:

Alternative 1 - Excavation, Low Temperature Thermal Desorption (LTTD) and Backfill;

Alternative 2 - Excavation, Bioremediation and Backfill;

Alternative 3 - Excavation, Soil Washing and Backfill;

Alternative 4 - Containment; and

Alternative 5 - Removal and Off-Site Disposal.

113/2162

TABLE 5.1

GROUNDWATER REMEDIAL ALTERNATIVE

Item	Description	Estimated Quantity	Unit	Unit Price	Cost
I.	Direct Capital Costs				
	1. Extraction wells: installation, testing plumbing, electrical	2	Each	$ 20,000	$ 40,000
	2. Forcemain: trenching, piping, electrical, backfill	1,500	L.F.	95	$ 142,000
	3. Discharge Line	1,000	L.F.	50	$ 50,000
	4. Treatability Study	1	L.S.	20,000	$ 20,000
	5. Treatment System: Design, Construction	1	L.S.	100,000	$ 100,000
	6. Start-up Monitoring	1	L.S.	25,000	$ 25,000
	7. Permitting	1	L.S.	15,000	$ 15,000
	TOTAL DIRECT CAPITAL COST				$ 392,000
II.	Indirect Capital Costs				
	1. Engineering Design (10% of Direct Capital Cost)				$ 39,200
	2. Construction Supervision (10% of Direct Capital Cost)				$ 39,200
	3. Contingency (20%)				$ 78,400
	TOTAL ESTIMATED COST				$ 538,800
	Annual Operation/ Maintainence and Monitoring (for 30 years)				$ 72,000/year

Each alternative is evaluated by three criteria listed below:

1. Effectiveness - to achieve the Site remedial objectives,
2. Implementability - whether the alternative can be readily constructed at the Site and
3. Cost - to implement the alternative.

The following subsections provide a description and assessment for each alternative listed above.

5.3.1 Alternative 1 - Excavation, Low Temperature Thermal Desorption and Backfill

5.3.1.1 Description

Low Temperature Thermal Desorption (LTTD) technology encompasses processes that are essentially physical separations based on the differences in vapor pressure between the organic contaminants and the matrix they are contained in. Heating of waste materials is used to cause vaporization of the organics and moisture into a gas steam. The gas stream is usually an inert gas which is used to lower the oxygen content in the desorber, which results in the inhibition of combustion reactions. Temperatures used for LTTD are related to the contaminants boiling points and generally range up to 1,100°F.

The wastes usually are dewatered and screened to remove oversize (>2-inch particles) prior to desorption processing. After the contaminants and water are vaporized into the gas stream in a LTTD process, the gas stream is treated for particulate removal. The vapors may be subjected to incineration in an afterburner, otherwise they are cooled to low temperatures to condense the organics and water out as a liquid mixture. The organics are separated (by gravity) from the water and must be treated further to complete remediation (e.g. by incineration). The separated water is treated by carbon adsorption.

The carrier gas after particulate removal and cooling is typically treated by scrubbers and carbon adsorption to allow venting into the atmosphere or recycling to the desorber. The treated solid matrix from the desorber contains the low volatility inorganic contaminants (e.g. metals).

The LTTD process has been successfully applied to solids, sludges, sediments and filter cakes which contain less than 10 percent organics and a minimum of 30 percent solids (i.e. less than 70 percent moisture. Contaminants that have been successfully treated by LTTD at lab, pilot or full-scale include Semi-volitile Organic Compounds (SVOCs), Volatile Organic Compounds (VOCs), Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenols (PCBs) and petroleum-contaminated wastes. Treated solid wastes can usually be backfilled on a property.

5.3.1.2 Effectiveness

Removal levels to low ppm levels by LTTD technology have been documented on many organic contaminants. Demonstrated removal efficiencies (DREs) exceeding 99% are typically reported for LTTD remediation for PCPs. The effectiveness of LTTD technology depends on the type and level of contaminants, the matrix type and moisture content and processing conditions (e.g. temperatures and residence time).

5.3.1.3 Implementability

The significant implementation concern would be the approval of an operations permit, which may take one year or longer to complete. A test burn would be conducted prior to full scale start up to verify adequacy of treatment and controls.

Once the LTTD is mobilized and operating, it can process up to 5,000 cubic yards/month.

Following completion of the incineration project, the incinerator would be dismantled and shipped off-site.

5.3.1.4 Cost

Table 5.2 presents the summary of costs to implement this alternative. The total anticipated cost of over 21.7 million dollars is beyond the present and future financial capability of PWP.

5.3.2 Alternative 2 - Excavation, Bioremediation and Backfilling

5.3.2.1 Description

This technology uses biodegradation techniques to degrade the contaminants in the soil including chlorophenols. The basic concept involves providing a favorable environment to enhance microbial metabolism of organic contaminants resulting in the breakdown and detoxification of those contaminants. Bioremediation is typically conducted by landfarming or a slurry reactor.

Landfarming and slurry reactor bioremediation are ex-situ treatment technologies where contaminated soils are treated with nutrients to enhance microbial destruction of contaminants. Slurry reactors are used to accelerate contaminant destruction by providing a more favorable environment for microbial activity. However, landfarming is typically less costly than using slurry reactors. A typical landfarming layout is shown in Figure 5.5.

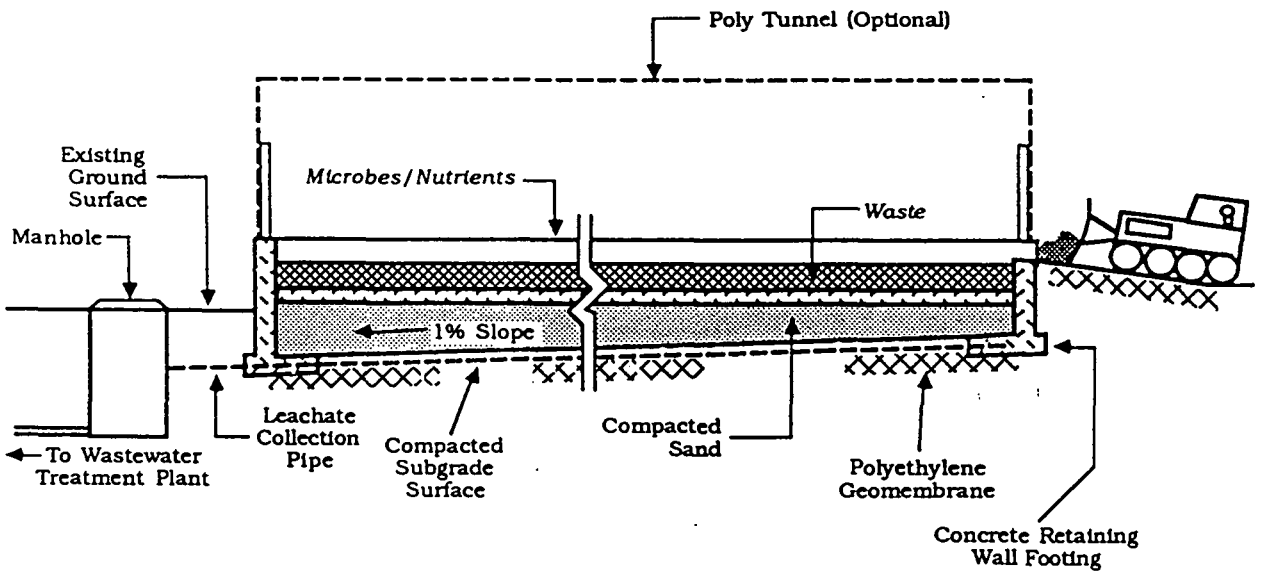


figure 5.5
TYPICAL CONTROLLED BIOLOGICAL LAND TREATMENT UNIT
Penta Wood Products, Inc.

CRA

TABLE 5.2
ALTERNATIVE 1 – EXCAVATION, THERMAL DESORPTION AND BACKFILL

Item	Description	Estimated Quanity	Unit	Unit Price	Cost
I.	DIRECT CAPITAL COSTS				
1.	Permitting	1	L.S.	$50,000	$50,000
2.	Soil Removal (maximum depth 10 feet)	35,000	c. y.	$5.00	$175,000
3.	Site Preparation (Including size reduction equipment)	1	L.S.	$100,000	$100,000
4.	Test Burn	1	L.S.	$200,000	$200,000
5.	Thermal Desoprtion	35,000	c. y.	$420.00	$14,700,000
6.	Backfill of Excavation (treated soil):	35,000	c. y.	$2.50	$87,500
	TOTAL DIRECT CAPITAL COST				$15,087,500
II.	INDIRECT CAPITAL COST				
1.	Engineering Design (10% of Direct Capital Cost)				$1,508,750
2.	Construction Supervison (10% of Direct Capital Cost)				$1,508,750
	TOTAL INDIRECT CAPITAL COST				$3,017,500
III.	CONTINGENCY (20%)				$3,621,000
	TOTAL ESTIMATED COST FOR ALTERNATIVE 1				$21,726,000
			(Rounded)		$21.7 MILLION

Additional area would be needed to landfarm soil. The land treatment unit would need to be constructed to collect and contain leachate. A high density polyethylene (HDPE) liner is typically used for this purpose. Slurry reactor treatment should generate greater volumes of water requiring a further treatment. Any landfarming leachate or slurry reactor effluent water would be collected and reused on the landfarm.

Typically, bioremediation can reduce PCP concentrations to levels below 100 mg/kg using current techniques.

Recently developed soil amendment techniques have shown promising results in further reducing contaminant concentrations when using bioremediation. However, a pilot test would be required.

Based on the treatability studies of contaminated soils at similar sites, landfarming would require one summer season per batch of soil. A typical batch would be from 3000 to 5000 cubic yards. It is estimated that treatment of soil will cost between $200 and $300 per cubic yard.

This alternative involves the excavation of chlorophenolic contaminated soil, with treatment by landfarming technology. As in Alternative 1, treated soil will be used as on-site backfill. Only landfarming was evaluated since bioremediation using a slurry reactor will have similar benefits to that of landfarming but at higher costs.

Landfarming operations would be conducted on-site in a 2-acre land treatment system, which would be constructed using a high density polyethylene (HDPE) liner and would include an underliner system to drain excess water. The landfarm would be designed to collect and contain excess rain water. A water storage area would be constructed to hold excess water after rainfall events and to draw from for moisture addition to soil. Minor amounts of excess water would be treated at the groundwater treatment facility.

Contaminated soil not excavated and treated, as well as backfill soil would be naturally washed by precipitation and groundwater and recovered by the groundwater collection and treatment system.

5.3.2.2 Effectiveness

Treatability studies indicate that residual chlorophenolic concentrations of less than 100 mg/kg can be achieved using landfarming technology. Further study using the amendment technique is required to evaluate whether lower residual contaminant concentrations are achievable.

As with Alternative 1, this alternative is effective since soil will be removed and treated. Further reduction of contaminants must first be evaluated by additional bench scale test. The impact to groundwater would also be significantly reduced since residual chlorophenol concentrations would be lower.

5.3.2.3 Implementability

This alternative utilizes conventional technologies. However, additional land may need to be acquired to offset land needed for the landfarm. Leachate from the land treatment unit would be collected and pumped to the existing treatment system.

Pilot treatment demonstration, as well as appropriate permits, approvals and public meetings, would be required prior to full scale implementation.

5.3.2.4 Cost

Table 5.3 presents the summary of costs associated with this alternative. The total anticipated cost of over 7.1 million dollars is beyond the present and future financial capability of PWP.

5.3.3 Alternative 3 - Excavation, Soil Washing and Backfill

5.3.3.1 Description

This technology involves rinsing contaminated soil with water in a mixing vessel. The effectiveness of soil washing is controlled by the solubility of the contaminant, the tendency of the contaminant to absorb to the

TABLE 5.3
ALTERNATIVE 2 – EXCAVATION, LANDFARMING AND BACKFILL

Item	Description	Quanity	Unit	Unit Price	Cost
I.	DIRECT CAPITAL COSTS				
1.	Permitting	1	L.S.	$20,000	$20,000
2.	Soil Removal (average depth 10 feet):	35,000	c. y.	$5.00	$175,000
3.	Site Preparation (Including size reduction equipment)	1	L.S.	$200,000	$200,000
4.	Pilot Study	1	L.S.	$100,000	$100,000
5.	Land Treatment	35,000	c. y.	$125.00	$4,375,000
6.	Backfill of Excavation (treated soil):	35,000	c. y.	$2.50	$87,500
	TOTAL DIRECT CAPITAL COST				$4,957,500
II.	INDIRECT CAPITAL COST				
1.	Engineering Design (10% of Direct Capital Cost)				$495,750
2.	Construction Supervision (10% of Direct Capital Cost)				$495,750
	TOTAL INDIRECT CAPITAL COST				$991,500
III.	CONTINGENCY (20%)				$1,189,800
	TOTAL ESTIMATED COST FOR ALTERNATIVE 2				$7,138,800
			(ROUNDED)		$7.1 MILLION

soil, the volume of water used and the contact time between the soil and water. This technology can be enhanced by the use of surfactants or bionutrients and oxygen to reduce contaminant concentrations. Large objects and debris would need to be screened and removed to produce particles that are sufficiently small to allow treatment in the mixing vessel without binding the blades. A schematic for a soil washing system is shown in Figure 5.6.

The feasibility of soil washing PCP contaminated soils has been evaluated in several bench and pilot scale tests at other wood treating facilities. These tests show these techniques have been effective at the bench scale but have limited application in the field.

Groundwater extracted from the tile collection system could be used as wash water prior to treatment. The groundwater treatment system may need to be modified to accommodate the increased oil, PCP and solids loading resulting from soil washing operations.

The cost for implementing this technology at other sites ranged from approximately $200 to $400 per cubic yard of soil. Further study would need to be conducted to determine optimum operating conditions and full scale design characteristics.

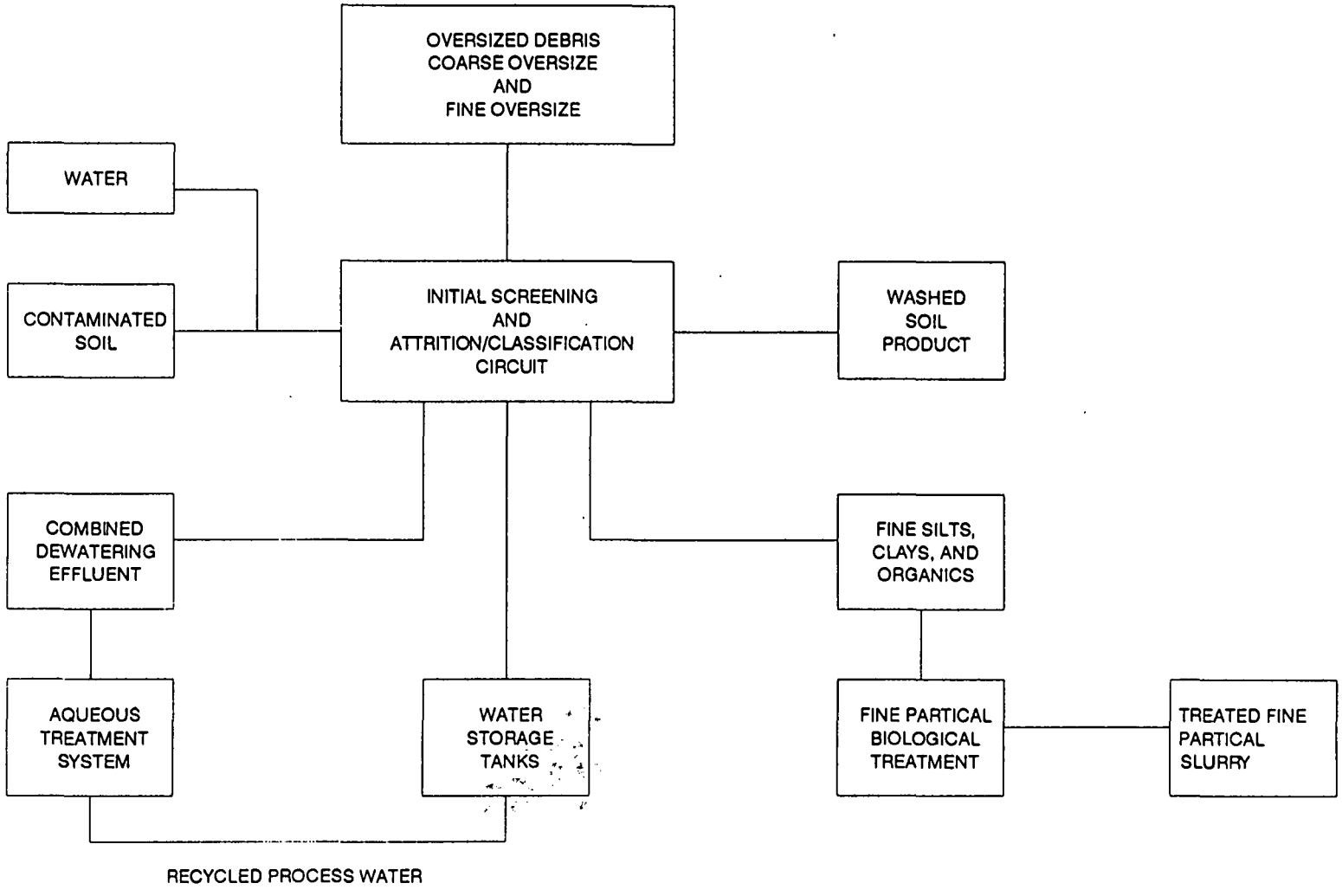


figure 5.6
SOIL WASHING FLOW DIAGRAM
Penta Wood Products, Inc.

CRA

2140-24/02/92-M

125/262

5.3.3.2 Effectiveness

This alternative is effective in meeting all remedial objectives for the Site. Treatability studies show that soil washing will effectively reduce PCP concentrations, thereby reducing the potential contamination via surface drainage or to the groundwater via leaching. However, field demonstrations of this alternative are limited.

5.3.3.3 Implementability

This alternative is readily implementable at the Site and can be effective in summer or winter climates. Treatment rates of 50 yards per day can be achieved. Since this is a relatively new technology, a pilot study would need to be conducted prior to full scale implementation to better define operating conditions.

5.3.3.4 Cost

Table 5.4 presents summary of costs associated with this alternative. The total anticipated cost of over 13.3 million dollars is beyond the present and future financial capability of PWP.

TABLE 5.4
ALTERNATIVE 3 – EXCAVATION, SOIL WASHING AND BACKFILL

Item	Description	Estimated Quanity	Unit	Unit Price	Cost
I.	DIRECT CAPITAL COSTS				
1.	Permitting	1	L.S.	$20,000	$20,000
2.	Soil Removal (average depth 10 feet):	35,000	c. y.	$5.00	$175,000
3.	Site Preparation (Including size reduction equipment)	1	L.S.	$100,000	$100,000
4.	Pilot Study	1	L.S.	$100,000	$100,000
5.	Soil Washing Treatment	35,000	c. y.	$250.00	$8,750,000
6.	Backfill of Excavation (treated soil):	35,000	c. y.	$2.50	$87,500
	TOTAL DIRECT CAPITAL COST				$9,232,500
II.	INDIRECT CAPITAL COST				
1.	Engineering Design (10% of Direct Capital Cost)				$923,250
2.	Construction Supervision (10% of Direct Capital Cost)				$923,250
	TOTAL INDIRECT CAPITAL COST				$1,846,500
III.	CONTINGENCY (20%)				$2,215,800
	TOTAL ESTIMATED COST FOR ALTERNATIVE 3				$13,294,800
				(ROUNDED)	$13.3 MILLION

5.3.4 Containment

5.3.4.1 Description

This technology consists of capping contaminated soils in place to prevent their contact with surface run-off and the leaching of contaminants into the groundwater. The goal of this alternative is to contain the contaminants in the soil and prevent further movement.

In order for a capping system to be effective, it should have:

1) Low maintenance requirements;
2) Efficient surface water drainage;
3) High resistance to damage from settling and subsidence; and
4) A permeability lower than that of the underlying native soils.

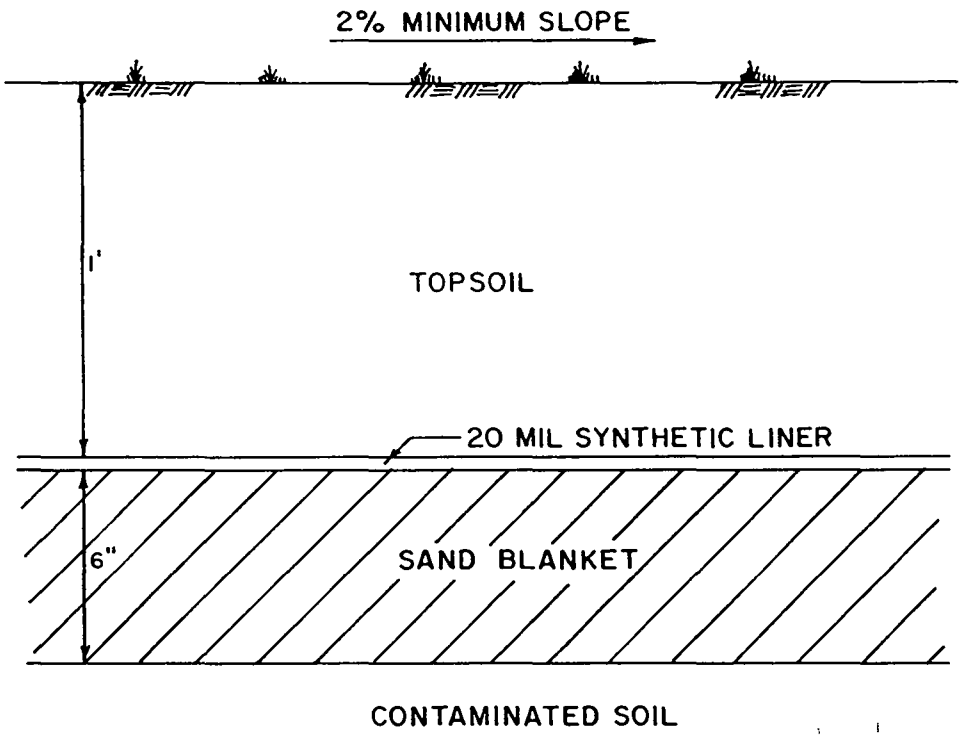
There are a variety of cap designs and capping materials available. Most cap designs are multi-layered to conform with the Federal and State design standards, however, single-layered designs are also sometimes used for special purposes. The selection of capping materials and a cap design is influenced by specific factors such as local availability and costs of cover materials, desired functions of cover materials, the nature of the wastes being covered, local climate and hydrogeology, and project future use of the Site in question.

Capping is necessary whenever contaminated materials are to be buried or left in place at a Site. In general, capping is performed when extensive subsurface contamination at a Site precludes excavation and removal of wastes because of potential hazards and/or unrealistic costs.

Capping is often performed together with the groundwater extract or containment technologies described in Section 5.2 to prevent, or significantly reduce further plume development; thus reducing the time needed to complete groundwater clean-up operations. In addition, groundwater monitoring wells are often used in conjunction with caps to detect any unexpected migration of the capped wastes. A cross-section of a proposed cap for PWP is shown in Figure 5.7.

5.3.4.2 Effectiveness

Capping is a reliable technology for sealing off contamination from the aboveground environment and significantly reducing underground migration of wastes. Caps can be constructed over virtually any Site, and can be completed relatively quickly if the ground is not frozen or saturated. The equipment used for implementing this technology is mostly standard road construction equipment, however some specialized testing equipment must be supplied by the liner installer or a soil testing company.



NOT TO SCALE

figure 5.7
INTERIM CAP
Penta Wood Products, Inc.

CRA

2140-21/02/92-M

At the Site, a capped contained system would be very effective at preventing further leaching of PCP into the groundwater table by preventing the entrance of water into the contaminated soils for the foreseeable future.

5.3.4.3 Implementability

This alternative uses conventional technologies. Due to the lack of appropriate clay sources in the vicinity of the Site, a synthetic liner has been proposed. In terms of preventing water infiltration, properly installed synthetic liners are more effective than clay liners.

5.3.4.4 Costs

Table 5.6 presents a summary of costs associated with this alternative. The total cost of implementing this interim portion of this alternative is estimated at $195,030.

TABLE 5.5
ALTERNATIVE 4 - INTERIM CONTAINMENT

Item	Description	Estimated Quanity	Unit	Unit Price	Cost
I.	DIRECT CAPITAL COSTS				
1.	Approvals	1	L.S.	$20,000	$20,000
2.	Site Preparation and Grading	2.50	Acres	$5,000	$12,500
3.	Site Preparation				
	a. 12 in. Sand Blanket	4000	C.Y.	$2.00	$8,000
	b. 20 mil HDPE	110000	S.F.	$1.10	$121,000
	c. 6 in. Topsoil	2000	C.Y.	$4.00	$8,000
4.	Revegetation	2.50	Acres	$1,500	$3,750
5.	Surface Water Diversion	2.50	Acres	$6,000	$15,000
	TOTAL DIRECT CAPITAL COST				$147,750
II.	INDIRECT CAPITAL COST				
1.	Engineering Design (10% of Direct Capital Cost)				$14,775
2.	Construction Supervison (10% of Direct Capital Cost)				$14,775
	TOTAL INDIRECT CAPITAL COST				$29,550
III.	CONTINGENCY (10%)				$17,730
	TOTAL ESTIMATED COST FOR ALTERNATIVE 4				$195,030
			(ROUNDED)		$0.2 MILLION

5.3.5 Alternative 5 - Excavation and Off-Site Disposal

5.3.5.1 Description

This technology involves the excavation of chlorophenolic contaminated soil and shipment and disposal at an approved off-site disposal facility. The excavation areas would be backfilled with clean fill and graded to promote the proper surface drainage.

Based on costs associated with off-site disposal from other similar facilities, it is estimated that the cost would range from $500 to $600 per cubic yard.

5.3.5.2 Effectiveness

This alternative is effective since soil is excavated and removed from the Site.

5.3.5.3 Implementability

This alternative utilizes conventional excavation techniques. A waste approval process would be completed prior to excavation and transport.

5.3.5.4 Cost

Table 5.6 presents a summary of costs associated with this alternative. The total anticipated cost is $23.5 million and is beyond the financial capabilities of PWP.

5.4 DISCUSSION OF REMEDIAL ALTERNATIVES AND CORRECTIVE ACTION PLAN

The corrective action plan (CAP) has been developed to meet the primary remedial objectives of containment and prevention of migration. The CAP is also designed to be compatible with future additional remediation when a more cost-effective remedial technologies are developed.

5.4.1 Groundwater Containment

As noted in Section 5.2, the only practical method of containing and controlling this source is a groundwater extraction and treatment system. By establishing a proper groundwater removal rate, the wells provide a capture area and draw contaminated groundwater into this capture zone. The movement of the contaminants off-Site can thus be prevented. In addition, this methodology provides removal of contaminants as effectively as current technology allows.

TABLE 5.6
ALTERNATIVE 5 – EXCAVATION AND OFF-SITE DISPOSAL

Item	Description	Estimated Quanity	Unit	Unit Price	Cost
I.	DIRECT CAPITAL COSTS				
1.	Excavation Plan/Approval	1	L.S.	$10,000	$10,000
2.	Waste Approval Fees & Analytical Testing	1	L.S.	$5,000	$5,000
3.	Soil Removal (average depth 10 feet):	35,000	c. y.	$5.00	$175,000
4.	Transportation	1,000	Miles/C.Y.	$0.15	$5,250,000
5.	Disposal/Tipping Fee	35,000	c.y.	$300	$10,500,000
6.	Backfill & Regrade	35,000	c. y.	$10.00	$350,000
	TOTAL DIRECT CAPITAL COST				$16,290,000
II.	INDIRECT CAPITAL COST				
1.	Engineering Design (10% of Direct Capital Cost)				$1,629,000
2.	Construction Supervison (10% of Direct Capital Cost)				$1,629,000
	TOTAL INDIRECT CAPITAL COST				$3,258,000
III.	CONTINGENCY (20%)				$3,909,600
	TOTAL ESTIMATED COST FOR ALTERNATIVE 1				$23,457,600
			(Rounded)		$23.5 MILLION

The United States Environmental Protection Agency (EPA) recently conducted a performance evaluation of operating groundwater extraction systems. The major findings of the study presented in the report "Evaluation of Groundwater Extraction Remedies" (EPA 1989a) were incorporated into an EPA Memorandum "Considerations in Groundwater Remediation at Superfund Sites" (EPA, 1989b). In the memorandum, the EPA stated that:

> *Concentrations of contaminants have generally decreased significantly after initiation of extraction but have tended to level off after a period of time. At the sites examined, this leveling off usually began to occur at concentrations above the cleanup goal concentrations expected to have been attained at that particular point in time.*

EPA further summarized its finding in its evaluation report (Performance Evaluations of Pump and Treat Remediation, October 1989).

> *As more experience has been gained with the long-term operation of groundwater extraction system, it has become apparent that their performance often does not meet initial expectations. This is particularly true of systems that have been installed with the intention of cleaning up contaminated aquifers to health-based concentration goals. Cases where performance goals for aquifer cleanup have been met or exceeded are quite rare. As a result, questions have been raised concerning the general feasibility of aquifer remediation to heath-baed concentration goals. Cases where performance goals for aquifer cleanup have been met or exceeded are quite rare. As a result, questions have been raised concerning the general feasibility of aquifer Remediation to health-based standards, how it is affected by Site conditions, and how long remediation should be expected to take. This study has identified a few sites where groundwater extraction has either achieved the Remediation goals or appears to be approaching those goals on schedule. More commonly, sites have been identified where progress toward remediation is lagging behind expectations, or the goal of Remediation appears to be impractical and has been replaced with a containment objective.*

In summary, a pump and treat system will be effective for containment of groundwater but a clean up time-frame exceeding 30-years should be expected.

5.4.3 Soil Containment Source Control

The source impacting groundwater at this Site is from the soils at and between the oil separator building and the lagoon area. As noted in Section 5.3, there are three possible actions which could be taken immediately to remove the contaminants from the soil and thus eliminate the source.

Removal is impossible and cost prohibitive.

LTTD may be effective, but is prohibitively expensive. Both landfarming and soil washing are emerging technologies. At the present time, the demonstrated capabilities of these methods for PCP containing soils are not well documented. Even then, it may not be possible to reach the clean-up goals given the Site conditions. In addition, the cost of these technologies is prohibitive because of the through-put constraints of these methodologies, the remedy will take five to ten years to implement.

The recommended corrective action for the contaminant source at this time is the containment option. This option mitigates and will prevent run off and dust migration of PCP into the groundwater.

This option would be protective of human health and the environment.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

This section provides conclusions based on the results of four soil and groundwater investigations conducted form 1986 to present at the Penta Wood Site as follows:

1. The Site is underlain by a sequence of soils as follows:

   - Sand and gravel,
   - Clayey sand till,
   - Sand and gravel, and
   - Bedrock.

2) The till unit has a low permeability which retards downward water movement where present. The till surface slopes to a depression located near MW10 which creates a localized area of subsurface ponding for groundwater.

3) The uppermost groundwater table is found beneath the till unit and is located approximately 100 feet bgs.

4) Groundwater migrates to the southwest at a rate of 570 feet/year.

5) Site soils have been impacted from chemonite treating solution (copper and arsenic) in the immediate vicinity of the chemonite treating area. However, groundwater has not been impacted by copper or arsenic above PALs probably due to affinity of metals to adsorb to soils.

6) Site soils are contaminated by PCP treating solution constituents (PCP, fuel oil and total petroleum hydrocarbons). Areas having PCP contamination exceeding 10 mg/kg include:

- Oil/water separator building area,
- The gully,
- The lagoon area,
- The PCP treating area; and
- The wood chip area.

7) It is estimated that 25,000 C.Y. of soil having PCP concentrations greater than 10 mg/kg are present within 10 feet of ground surface. An additional 10,000 C.Y. of soil having PCP concentrations in excess of 10 mg/kg are estimated below a depth of 10 feet.

8) Groundwater contamination beneath the Site is present within the sand aquifer below the till formation at an approximate depth of 100 feet bgs. Contamination consists of PCP and petroleum hydrocarbons and covers an area of 4 acres. Groundwater contamination in limited to the Site and has not impacted groundwater resources surrounding the Site. The only water supply wells impacted by contamination are the on-Site production wells.

9) The potential presence of dioxins was evaluated at the boiler ash pile. Total 2,3,7,8-TCDD equivalents were found to be less than 1 ug/kg which does not pose a significant health risk.

10) Aquifer hydraulic tests indicate that an extraction well pumped at 11 gpm would create an area of groundwater capture having a diameter of 200 feet and pumping at 27 gpm would create area of groundwater capture having a diameter of 400 feet.

11) A review of the status of groundwater remediation technologies indicates that the current technology of groundwater extraction and treatment is the best remediation technology available for groundwater. This technology is effective for containing groundwater contamination but is not effective at remediating groundwater within a reasonable time frame. The clean-up time frame for groundwater based on groundwater extraction and treatment is estimated to exceed 30 years.

Technical literature and practices indicate that there are not any currently available technologies to accelerate groundwater remediation and USEPA recommends that groundwater containment remedies be implemented until better technologies are developed.

12) Contaminated groundwater can be effectively contained by groundwater extraction and will prevent impacts to neighboring groundwater resources.

13) Migration of contamination from soil via dust migration, leaching and surface water drainage can be effectively contained by capping and groundwater extraction.

6.2 RECOMMENDATIONS

Based on the results of the remedial investigation and the conclusions presented herein, it is recommended that PWP implement the corrective action plan presented in Section 5.4. This involves the installation of a cap and a groundwater extraction system to contain soil and groundwater contamination.

143/262

All of Which is Respectfully Submitted,

CONESTOGA-ROVERS & ASSOCIATES

Ronald Frehner ENG

Ronald Frehner

S. E. Mockenhaupt

Stephen E. Mockenhaupt

Charles Ahrens HYDRO

Charles Ahrens

REFERENCES

(1) Scope of Work, Penta Wood Products, Inc., Siren, Wisconsin, by CRA, dated August 1987.

(2) Site Evaluation, Penta Wood Products, Inc., Siren, Wisconsin, by CRA, dated July 1988.

(3) Site Evaluation - Phase II, Penta Wood Products, Inc., Siren, Wisconsin, by CRA, dated October 1989.

145/262

APPENDIX A

BOREHOLE LOGS

146/262

ENVIRONMENTAL DRILLING
UTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. MW-9

GROUND WATER
While drilling 20.2' — Time after drilling ½HR.
Before casing removal — Depth to water 34.8'
After casing removal — Depth to cave-in

Start 11/27/91
Unit 805
Chief M.P.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS (Casing/Probe Weight 140# Drop 30")	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
											HSA 4¼
1	M	5	9			M-F Brown SAND w/Trace of Silt					
		13	17	1.8	22						
2	M	12	17								
		14	13	2.0	21						
						14.0'					
3	M	9	10								
		12	11	2.0	22	F-C Brown SAND					
4	W	7	9								
		9	10	1.9	18						
5	W	12	19								
		27	33	1.8	46						
6	M	19	25								
		28	32	2.8	53						
7	W	18	24								
		28	29	1.4	52						
8	W	16	26								
		34	56	2.0	60						
9	W	8	13								
		21	25	1.8	34						

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF WOODWARD-CLYDE CONSULTANTS

FIELD BORING LOG

Sheet 2 Of 2

FOR C R A Penta Wood Products

LOCATION Siren, WI Elev.

Job No. 440-1264

Boring No. MW-9

GROUND WATER
While drilling — Time after drilling —
Before casing removal — Depth to water —
After casing removal — Depth to cave-in —

Start
Unit
Chief

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
10	W	19	32			F-C Brown SAND						
		58	73	1.9	90							
						E.O.B. 55.0'						
						Set Well @ 54.0'						

55 60 65 70 75 80 85 90 95

148/262

ENVIRONMENTAL DRILLING
UTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-16

GROUND WATER
While drilling: Dry — Time after drilling: ½HR.
Before casing removal: — — Depth to water: Dry
After casing removal: — — Depth to cave-in: —

Start 11/21/91
Unit 814
Chief M.C.

Casing/Probe —
Weight 140#
Drop 30"

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size —	Blows on Probe Size —	Drilling Method
											HSA 4¼
1	M	3	6			F-M Brown SAND w/Trace of Gravel					
		9	12	1.4	15						
2	M	2	5								
		8	17	1.4	13						
3	M	5	9								
		17	19	1.5	26						
4	M	5	5								
		10	21	1.7	15						
5	M	4	12								
		17	20	1.2	29						
6	M	8	22								
		24	29	1.3	46						
7	M	14	21								
		24	30	1.2	45						
8	M	4	16								
		27	36	1.2	43						
9	M	4	14								
		33	37	1.2	47						
10	M	6	18								
		31	32	1.5	49						
11	M	4	13								
		27	38	1.6	40						
12	M	5	17								
		29	34	1.4	46						
13	M	15	17								
		34	48	1.7	51						
14	M	7	21								
		37	52	1.9	58						
15	M	5	22								
		37	58	1.2	59	E.O.B. 35.0'					

Boring Backfilled With
Bentonite Holeplug

149/262

ENVIRONMENTAL DRILLING WTD A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A Penta Wood Products

LOCATION Siren, WI Elev.

Job No. 440-1264

Boring No. BH-17

GROUND WATER
While drilling — Time after drilling —
Before casing removal — Depth to water —
After casing removal — Depth to cave-in —

Start 11/21/91
Unit 814
Chief M.C.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												HSA
1	M	100/.2			100	Fine Brown Silty SAND E.O.B. 2.5' (Auger Refusal)						4¼

Boring Backfilled With Cuttings

150/262

ENVIRONMENTAL DRILLING
UTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-17A

GROUND WATER
While drilling: Dry — Time after drilling: ¼HR.
Before casing removal: — — Depth to water: Dry
After casing removal: — — Depth to cave-in: —

Start 11/21/91
Unit 814
Chief M.C.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												HSA 4¼
1	M	4	27			F-M Brown SAND						
		26	24	1.1	53							
2	M	15	25									
		18	30	1.3	43							
						E.O.B. 12.0'						
						Boring Backfilled With Bentonite Holeplug						

5 10 15 20 25 30 35 40 45

151/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-18

GROUND WATER	While drilling	Dry	Time after drilling	¼HR.	Start 11/22/91
	Before casing removal		Depth to water	Dry	Unit 814
	After casing removal		Depth to cave-in		Chief M.C.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												HSA 4¼
1	M	2	12			F-M Brown SAND						
		10	12	1/0	22							
2	M	3	9									
		9	7	1.5	18							
3	M	3	6									
		9	13	1.6	15	E.O.B. 8.0'						
						Boring Backfilled With Bentonite Holeplug						

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

Job No. 440-1264

Boring No. BH-19

OR C R A Penta Wood Products

OC ON Siren, WI Elev.

GROUND WATER
While drilling: Dry — Time after drilling: ½HR.
Before casing removal: — — Depth to water: Dry
After casing removal: — — Depth to cave-in: —

Start 11/22/91
Unit 814
Chief M.C.

Casing/Probe —
Weight 140#
Drop 30"

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
											HSA 4¼
1	M	2	4			F-M Brown SAND					
		5	4	1.5	9						
2	M	1	2								
		8	12	1.5	10						
3	M	4	12								
		15	20	1.8	27						
4	M	6	12								
		10	10	1.8	22	E.O.B. 10.0'					
						Boring Backfilled With Bentonite Holeplug					

5 10 15 20 25 30 35 40 45

153/262

ENVIRONMENTAL DRILLING WTD A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-20

GROUND WATER: While drilling Dry — Time after drilling ¼HR. — Start 11/22/91

Before casing removal — Depth to water Dry — Unit 814

After casing removal — Depth to cave-in — Chief M.C.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												HSA 4¼
1	M	9	4			F-M Brown SAND						
		5	7	1.5	9							
2	M	5	6									
		9	14	1.3	15							
3	M	12	7									
		9	16	1.5	16							
						8.0'						
4	M	9	9									
		13	24	1.6	22	F-C Brown SAND w/Gravel						
5	M	6	7									
		14	19	1.3	21							
6	M	9	18									
		25	29	1.7	43							
7	M	8	18									
		25	33	1.5	43							
8	M	11	40									
		49	36	1.0	89							
						E.O.B. 37.0'						
						Boring Backfilled With Bentonite Holeplug						

154/262

ENVIRONMENTAL DRILLING
UTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-21

GROUND WATER
While drilling: Dry — Time after drilling: ¼HR.
Before casing removal: — Depth to water: Dry
After casing removal: — Depth to cave-in:

Start 11/22/91
Unit 814
Chief M.C.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS (Casing/Probe Weight 140# Drop 30")	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
											HSA 4¼
1	M	26	13			F-M Brown SAND					
		25	12	1.0	38						
2	M	46	24								
		100/.4		.6	124						
3	M	11	12								
		17	21	1.3	29						
4	M	17	48								
		27	81/.1	.9	100	E.O.B. 17.0'					
						Boring Backfilled With Bentonite Holeplug					

5 10 15 20 25 30 35 40 45

155/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-22

GROUND WATER	While drilling	Dry	Time after drilling	¼HR.	
	Before casing removal		Depth to water	Dry	
	After casing removal		Depth to cave-in		

Start 11/22/91
Unit 814
Chief M.C.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												HSA 4¼
1	M	2	2			F-M Brown SAND w/Wood Chips and Some Concrete						
		2	3	1.0	4							
						5.0'						
2	M	3	12			F-M Brown SAND						
		11	13	1.2	23							
3	M	3	7									
		12	21	1.5	19	E.O.B. 12.0'						
						Boring Backfilled With Bentonite Holeplug						

156/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-23

GROUND WATER
While drilling: Dry — Time after drilling: 1/4HR.
Before casing removal: — — Depth to water: Dry
After casing removal: — — Depth to cave-in: —

Start 11/25/91
Unit 814
Chief M.C.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS (Casing/Probe Weight 140# Drop 30")	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
											HSA 4 1/4
1	M	20	22			F-M Brown Silty SAND w/Trace of Gravel					
		23	28	1.4	45						
						4.0'					
2	M	9	9			F-M Brown SAND					
		11	12	1.8	20						
3	M	2	5								
		9	13	1.5	14						
4	M	2	5								
		9	13	1.5	14						
5	M	2	8								
		9	27	1.6	17						
6	M	9	12								
		21	30	1.6	33						
7	M	5	9								
		30	34	1.6	39	21.0'					
						Fine Brown Silty SAND w/Some Clay					
8	M	5	12			25.0'					
		31	36	1.5	43	F-C Brown SAND w/Trace of Gravel					
						E.O.B. 27.0'					
						Boring Backfilled With Bentonite Holeplug					

157/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-24

GROUND WATER	While drilling	Dry	Time after drilling	½HR.	
	Before casing removal		Depth to water	Dry	
	After casing removal		Depth to cave-in		

Start 11/25/91
Unit 814
Chief M.C.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Casing/Probe — Weight 140# Drop 30"					HSA 4¼
1	M	9	10			F-M Brown SAND					
		17	15	1.5	27						
2	M	3	9								
		10	12	1.5	19						
3	M	6	9								
		11	13	1.5	20						
4	M	7	12			10.0'					
		15	16	1.9	27	F-C Brown SAND w/Trace of Gravel					
						E.O.B. 12.0'					
						Boring Backfilled With Bentonite Holeplug					

158/262

ENVIRONMENTAL DRILLING WTD A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren , WI — Elev.

Job No. 440-1264

Boring No. BH-25

GROUND WATER — While drilling: Dry — Time after drilling: ¼HR. — Before casing removal: — — Depth to water: Dry — After casing removal: — — Depth to cave-in: —

Start 11/25/91
Unit 814
Chief M.C.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS (Casing/Probe Weight 140# Drop 30")	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
											HSA 4¼
1	M	4	10			F-M Brown SAND					
		12	14	2.0	22						
						4.0'					
2	M	4	8			F-C Brown SAND w/Trace of Gravel					
		12	13	1.5	20						
3	M	4	9								
		14	20	1.8	23						
4	M	5	7								
		12	19	1.9	19						
						E.O.B. 12.0'					
						Boring Backfilled With Bentonite Holeplug					

5 10 15 20 25 30 35 40 45

159/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-26

GROUND WATER	While drilling	Dry	Time after drilling	½HR.	
	Before casing removal		Depth to water	Dry	
	After casing removal		Depth to cave-in		

Start 11/25/91
Unit 814
Chief M.C.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
1	M	7	10			F-M Brown SAND w/Wood Chips						HSA 4¼
		11	12	1.5	19							
2	M	7	10									
		15	21	1.2	25	F-M Brown SAND						
3	M	10	12									
		15	22	1.9	27							

15.0'

E.O.B. 19.0'

Boring Backfilled With Bentonite Holeplug

160/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A Penta Wood Products

LOCATION Siren, WI Elev.

Job No. 440-1264

Boring No. BH-27

GROUND WATER
While drilling ____ Time after drilling ____
Before casing removal ____ Depth to water ____
After casing removal ____ Depth to cave-in ____

Start 11/25/9
Unit 750
Chief M.P.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						SAND w/Wood Chips (FILL)						FA
						E.O.B. 5.0'						

5 10 15 20 25 30 35 40 45

161/262

ENVIRONMENTAL DRILLING
UTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A Penta Wood Products

LOCATION Siren, WI Elev.

Job No. 440-1264

Boring No. BH-28

GROUND WATER
While drilling — Time after drilling —
Before casing removal — Depth to water —
After casing removal — Depth to cave-in —

Start 11/25/91
Unit 750
Chief M.P.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						F-M Reddish-Brown SAND (FILL)						FA
						2.5'						
						Wood Chips (FILL)						
						E.O.B. 5.0'						

5 10 15 20 25 30 35 40 45

162/262

ENVIRONMENTAL DRILLING WTD A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-29

GROUND WATER: While drilling ____ Time after drilling ____ ____; Before casing removal ____ Depth to water ____ ____; After casing removal ____ Depth to cave-in ____ ____

Start 11/25/91
Unit 750
Chief M.P.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe ____ Weight ____ Drop ____	Unconfined Strength	Boulders	Blows on Casing Size ____	Blows on Probe Size ____	Drilling Method
						Wood Waste (FILL)						FA
						E.O.B. 5.0'						

5 10 15 20 25 30 35 40 45

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

163/262

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-30

GROUND WATER
While drilling — Time after drilling
Before casing removal — Depth to water
After casing removal — Depth to cave-in

Start 11/25/91
Unit 750
Chief M.P.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe / Weight / Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						F-M Reddish-Brown SAND						FA
						E.O.B. 5.0'						

5 10 15 20 25 30 35 40 45

164/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A Penta Wood Products

LOCATION Siren, WI Elev.

Job No. 440-1264

Boring No. BH-31

GROUND WATER
While drilling: Dry — Time after drilling: ¼HR.
Before casing removal: — — Depth to water: Dry
After casing removal: — — Depth to cave-in: —

Start 11/26/91
Unit 805
Chief M.P.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS (Casing/Probe Weight 140# Drop 30")	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
											HSA 4¼
1	M	7	6								
		6	5	1.8	12	F-C Brown SAND					
2	M	8	12								
		12	11	.1	24						
3	M	14	17								
		21	22	1.6	32						
4	M	8	4								
		11	14	1.8	15						
5	M	13	21								
		25	31	1.7	46	11.0'					
						F-M Reddish-Brown SAND					
6	M	16	26								
		31	38	1.8	57	15.0'					
						F-C Brown SAND					
7	M	11	19								
		29	37	1.4	48	E.O.B. 20.0'					
						Boring Backfilled With Bentonite Holeplug					

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-32

GROUND WATER
While drilling: Dry — Time after drilling: ¼HR.
Before casing removal: — — Depth to water: Dry
After casing removal: — — Depth to cave-in: —

Start 11/26/91
Unit 805
Chief M.P.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Casing/Probe — Weight 140# Drop 30"					HSA 4¼
1	M	23	37			F-M Brown Silty SAND					
		43	46	L 9	70	3.0'					
2	M	16	23			F-M Brown SAND					
		28	34	L 8	51						
3	M	9	21								
		24	31	L 9	55						
4	M	13	19								
		23	26	L 8	42	E.O.B. 10.0'					
						Boring Backfilled With Bentonite Holeplug					

1606/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-33

GROUND WATER	While drilling	Dry	Time after drilling	½HR.	
	Before casing removal		Depth to water	Dry	
	After casing removal		Depth to cave-in		

Start 11/26/91
Unit 805
Chief M.P.

Casing/Probe
Weight 140#
Drop 30"

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
											HSA 4¼
1	M	6	7								
		9	13	1.1	16	M-C Brown SAND w/Trace of Gravel					
2	M	8	11								
		11	15	1.6	22						
3	M	6	12								
		14	17	1.5	26						
4	M	8	13								
		17	19	1.4	30						
5	M	9	19								
		19	23	1.3	38						
6	M	13	18								
		27	28	1.3	45						
						17.5'					
7	M	16	27			F-M Brown SAND					
		33	44	1.2	60	E.O.B. 20.0'					
						Boring Backfilled With Bentonite Holeplug					

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-34

GROUND WATER
While drilling: Dry — Time after drilling: ¼HR.
Before casing removal: — — Depth to water: Dry
After casing removal: — — Depth to cave-in: —

Start 11/26/91
Unit 805
Chief M.P.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Casing/Probe — Weight 140# Drop 30"					HSA 4¼
1	M	13	18			F-M Brown SAND					
		21	24	1.9	39						
2	M	10	16								
		21	26	1.8	37						
3	M	6	8								
		17	19	1.1	25						
4	M	12	16								
		25	29	1.1	41	E.O.B. 10.0'					
						Boring Backfilled With Bentonite Holeplug					

5 10 15 20 25 30 35 40 45

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

168/262

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-35

GROUND WATER: While drilling 8.0' — Time after drilling ¼HR.; Before casing removal — Depth to water Dry; After casing removal — Depth to cave-in

Start 11/26/91
Unit 805
Chief M.P.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Casing/Probe — Weight 140# Drop 30"					HSA 4¼
1	M	4	7			F-M Reddish-Brown SAND w/Wood Chips					
		11	15	1.2	18						
2	M	5	9								
		11	19	1.1	20	6.0'					
3	M	4	8								
		15	21	1.2	22	F-M Brown SAND					
4	W	4	12								
		11	25	1.4	23						
5	W	2	11								
		25	34	1.2	36						
6	M	7	11								
		21	26	1.4	32						
7	M	10	17								
		39	63	1.0	56	E.O.B. 20.0'					
						Boring Backfilled With Bentonite Holeplug					

169/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-36

GROUND WATER	While drilling	Dry	Time after drilling	¼HR.	
	Before casing removal		Depth to water	Dry	
	After casing removal		Depth to cave-in	6.1'	

Start 12/2/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												HSA 4¼
1	M	5	10			F-M Brown SAND w/Some Gravel						
		10	12	1.3	20							
2	M	3	10									
		8	11	1.5	18							
3	M	3	3									
		3	4	1.5	6							
4	M	5	5									
		6	5	1.1	11	E.O.B. 10.0'						
						Boring Backfilled With Bentonite Holeplug						

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-37

GROUND WATER

While drilling: Dry — Time after drilling: ¼HR.

Before casing removal: — — Depth to water: Dry

After casing removal: — — Depth to cave-in: 14.5'

Start 12/3/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS (Casing/Probe — Weight 140# — Drop 30")	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
											HSA 4¼
1	M	2	3			F-M Brown SAND w/ Trace of Gravel					
		3	4	1.6	6						
2	M	3	6								
		5	9	1.0	11						
3	M	5	6								
		9	10	1.6	15						
4	M	6	8								
		10	11	1.6	18						
5	M	9	15								
		20	16	1.2	35	E.O.B. 20.0'					
						Boring Backfilled With Bentonite Holeplug					

5 10 15 20 25 30 35 40 45

171/262

ENVIRONMENTAL DRILLING WTD A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A Penta Wood Products

LOCATION Siren ,WI Elev.

Job No. 440-1264

Boring No. BH-38

GROUND WATER				
While drilling	Dry	Time after drilling	¼HR.	
Before casing removal		Depth to water	Dry	
After casing removal		Depth to cave-in	14.1'	

Start 12/3/91
Unit 804
Chief C.B.

Casing/Probe
Weight 140#
Drop 30"

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
											HSA
											4¼
1	M	3	6			F-M Brown SAND w/Trace of Gravel					
		5	6	1.0	11						
2	M	2	5								
		7	9	1.1	12						
3	M	7	9								
		12	14	1.4	21						
4	M	8	12								
		15	13	1.6	27						
5	M	9	15								
		15	14	1.9	30						
						E.O.B. 20.0'					
						Boring Backfilled With Bentonite Holeplug					

172/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-39

GROUND WATER

While drilling: Dry — Time after drilling: ¼HR.

Before casing removal: — — Depth to water: Dry

After casing removal: — — Depth to cave-in: 17.5'

Start 12/3/91

Unit 804

Chief C.B.

Casing/Probe — Weight 140# — Drop 30"

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size —	Blows on Probe Size —	Drilling Method
											HSA 4¼
1	M	1	1			F-M Brown SAND w/Trace of Gravel					
		3	7	1.6	4						
2	M	6	8								
		7	7	1.5	15						
3	M	4	3								
		4	4	1.6	7						
4	M	7	8								
		9	15	1.8	17						
5	M	7	14								
		18	21	1.7	32	E.O.B. 20.0'					
						Boring Backfilled With Bentonite Holeplug					

5 10 15 20 25 30 35 40 45

ENVIRONMENTAL DRILLING
UTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

173/262

FOR C R A Penta Wood PRoducts

LOCATION Siren, WI Elev.

Job No. 440-1264

Boring No. BH-40

GROUND WATER				
While drilling	Dry	Time after drilling	1/4HR.	
Before casing removal		Depth to water	Dry	
After casing removal		Depth to cave-in	15.5'	

Start 1/4/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												HSA 4 1/4
1	M	7	8			F-M Brown SAND						
		8	9	2.0	16							
2	M	7	13									
		13	15	1.2	26							
3	M	8	12									
		11	12	1.4	23							
						E.O.B. 20.0'						
						Boring Backfilled With Bentonite Holeplug						

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

174/262

Sheet 1 Of 1

FOR C R A Penta Wood PRoducts

LOCATION Siren, WI Elev.

Job No. 440-1264

Boring No. BH-41

GROUND WATER
While drilling: Dry — Time after drilling: ¼HR.
Before casing removal: — — Depth to water: Dry
After casing removal: — — Depth to cave-in: 25.5'

Start 12/4/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												HSA 4¼
1	M	2	2									
		6	5	1.5	8	Dark Brown Silty PEAT w/Wood Pieces (Organic Material)						
2	M	18	11									
		10	7	.8	21							
						16.5'						
3	M	8	10			F-M Brown SAND						
		12	15	1.4	22							
4	M	8	9									
		11	13	1.4	20							
5	M	7	11									
		17	17	1.4	28	E.O.B. 40.0'						
						Boring Backfilled With Bentonite Holeplug						

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

175/262

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-42

GROUND WATER — While drilling — Time after drilling ½HR. — Before casing removal — Depth to water — After casing removal — Depth to cave-in

Start 12/3/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Earth Drill (Auger Sample)						FA
						F-M Brown SAND						
						E.O.B. 12.0'						
						Boring Backfilled With Bentonite Holeplug						

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

176/262

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-43

GROUND WATER				
While drilling		Time after drilling	1/4 HR.	
Before casing removal		Depth to water		
After casing removal		Depth to cave-in	12.0'	

Start 12/3/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												FA

Earth Drill
(Auger Sample)

F-M Brown SAND

E.O.B. 12.0'

Boring Backfilled With
Bentonite Holeplug

177/262

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-44

GROUND WATER	While drilling		Time after drilling ¼HR.	
	Before casing removal		Depth to water	
	After casing removal		Depth to cave-in	

Start 12/3/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												FA

Earth Drill
(Auger Sample)

F-M Brown SAND

E.O.B. 12.0'

Boring Backfilled With
Bentonite Holeplug

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A Penta Wood Products

LOCATION Siren, WI Elev.

Job No. 440-1264

Boring No. BH-45

GROUND WATER	While drilling		Time after drilling	¼HR.
	Before casing removal		Depth to water	
	After casing removal		Depth to cave-in	

Start 12/3/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight Drop	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												FA

Earth Drill
(Auger Sample)

F-M Brown SAND

5

10

E.O.B. 12.0'

15

Boring Backfilled With
Bentonite Holeplug

20

25

30

35

40

45

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 440-1264

Boring No. BH-46

GROUND WATER	While drilling	Dry	Time after drilling	¼HR.	
	Before casing removal		Depth to water	Dry	
	After casing removal		Depth to cave-in	24.8'	

Start 12/4/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Casing/Probe — Weight 140# Drop 30"					HSA 4¼
1	M	3	4								
		7	4	0	11						
2	M	13	40			Wood Chips (FILL)					
		100/.0		1.0	140						
3	M	100/.4									
				.4	100						
						13.0'					
4	M	7	5			F-M Brown SAND					
		5	4	.1	10						
5		9	7								
		7			14						
6	M	10	13								
		12	11	1.2	25						
7	M	16	18								
		20	30	1.7	38						
8	M	20	40								
		50	60	1.8	90						
						E.O.B. 42.0'					
						Boring Backfilled With Bentonite Holeplug					

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

FIELD BORING LOG

180/262

Sheet 1 Of 1

FOR C R A Penta Wood Products

LOCATION Siren, WI Elev.

Job No. 440-1264

Boring No. BH-47

GROUND WATER	While drilling	Dry	Time after drilling	¼HR.	
	Before casing removal		Depth to water	Dry	
	After casing removal		Depth to cave-in	15.2'	

Start 12/14/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												HSA 4¼
1	M	20	30			Wood Chips (FILL)						
		20	15	1.5	50							
2	M	5	6									
		6	7	1.5	12							
3	M	15	11									
		7	3	1.5	18	19.5'						
						* E.O.B. 20.0'						
						* F-M Brown SAND						
						Boring Backfilled With Bentonite Holeplug						

181/262

ENVIRONMENTAL DRILLING WTD A DIVISION OF GOODYEAR COMPANY

FIELD BORING LOG

Sheet 1 Of 1

FOR C R A Penta Wood Products

LOCATION Siren, WI Elev.

Job No. 440-1264

Boring No. BH-48

GROUND WATER	While drilling	Dry	Time after drilling	¼HR.	
	Before casing removal		Depth to water	Dry	
	After casing removal		Depth to cave-in	16.7'	

Start 12/4/91
Unit 804
Chief C.B.

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												HSA 4½
						Wood Chips (FILL)						
						18.0'						
1	M	7	9			F-M Brown SAND						
		8	12	20	17	E.O.B. 20.0'						
						Boring Backfilled With Bentonite Holeplug						

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Pentawood
PROJECT NUMBER
CLIENT Pentawood
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Mark - Tim
SURFACE ELEVATION
WEATHER (A.M.) 35° Cldy
(P.M.) 35° Cldy

HOLE DESIGNATION BH-16
DATE STARTED 11-21-91
DATE COMPLETED 11-21-91
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2	(SW) SAND, some silt, trace gravel, Red brown, dry		AC	3	6	9	12	WA	
	25	2.9	Black seam - Product Odor	1	SS	3	6	9	12	2/4	MSA = 4.0
4		6	(SW) SAND med - coarse, red, moist, product odor	2	SS	4	6	6	8	4/6	MSA = 20.0 ID: BH16-01
6		8		3	SS	6	6	10	12	6/8	HSA = 102.0 MSA = 55 HS
10		12	(SW) SAND, med - coarse, red product odor							8/10	MSA = 65 HS
12		14		4	SS	9	15	18	20	12/14	MSA = 311 BH-16-02
14		16	(SW) med - Coarse, red, odor	5	SS	19	24	30	20	14/16	MSA = 61
16		18		6	SS	24	30	26	17	16/16	
18		20		7	SS					18/20	MSA = 222
20		22		8	SS					20/20	MSA = 253
22		24									MSA = 220

182/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Penfa Wood
PROJECT NUMBER 2140
CLIENT Penfa wood
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Mark - Tim
SURFACE ELEVATION
WEATHER (A.M.) 35 Cldy
(P.M.) 35 Cldy

HOLE DESIGNATION BH-26
DATE STARTED 11-21-91
DATE COMPLETED 11-21-91
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR Jwm

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
24		26	(SP) SAND, med grained, Brown, dry, odor	9	SS	30	34	29	27	24/26	MSA = 355
26		28		10	SS	35	30	32	38	26/28	MSA = 310
28		30	(SW) SAND med - coarse, gray, dry prod. odor	11	SS	40	38	41	39	28/30	MSA = 380
				12	SS	45	40	35	40	30/32	MSA = 250
			SOB	13	SS	40	45	50	4	33/35	MSA = 100

1831/2021

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Pentawood
PROJECT NUMBER 2140
CLIENT Pentawood
LOCATION Sicka, WI

DRILLING CONTRACTOR WTD
DRILLER Mark - Tim
SURFACE ELEVATION
WEATHER (A.M.) 35° cldy
(P.M.) 35 cldy

HOLE DESIGNATION BH 17
DATE STARTED 11-21-91
DATE COMPLETED
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR Jwm

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR, MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2	(SW) SAND, med-fine		AC						
			Red, moist								
2		4	(SW) SAND, silty, black,	1	SS	100	Refusal			0/	MSA = 450
	2.5		Refusal / Rig 64							1.5	
			Move boring 5.0' Resume								
				2	⇒	50	85	40	20		-04 sample
8		10	(SW) SAND, med-coarse,	3	SS	25	19	30	23	8/	MSA = 295
			Red, moist, Product odor							10	-05 sample
			EOB 10.0'								

1/2021

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Pentawood
PROJECT NUMBER 2140
CLIENT Penta Wood
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Mark-Tim
SURFACE ELEVATION
WEATHER (A.M.) 30° Cldy
(P.M.)

HOLE DESIGNATION OH-8
DATE STARTED 11-22-91
DATE COMPLETED 11-22-91
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR Swm

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2	(SW) SAND, mud- fin, brown		AC	10	10	12	11	0/2	MSA = 8.0
			Red, moist			↓	↓	↓	↓		
2			(SP) Sand med grained, lt brown,	1	SS	↓	↓	↓	↓		
			product odor								
				2	SS	3	7	9	9	2/4	MSA = 3.5
			INK Product odor								
				3	SS	7	10	10	11	4/6	MSA = 3.1
			EOB 6.0								

185/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Penta Ward
PROJECT NUMBER
CLIENT Penta
LOCATION Site

DRILLING CONTRACTOR WTD
DRILLER Mark - Tim
SURFACE ELEVATION
WEATHER (A.M.) 30 o Clay
(P.M.)

HOLE DESIGNATION DH-19
DATE STARTED 11-22-91
DATE COMPLETED 11-22-91
DRILLING METHOD 4¼ CFA
CRA SUPERVISOR Jmc

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2	Asphalt (SW) Sand fine-med Red,		AC						
2		4		1	SS	8	9	10	11	2/4	MH = ? 40 ppm elevated
4			(SW) SAND, med-fine, brown Red, odor	2	SS	10	12	14	15	4/C	MSA 420
4		6	"								
6		8	"	3	SS						

1861/262

Boring Log #10

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Pentawood
PROJECT NUMBER
CLIENT Pentawood
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Mark-Tim
SURFACE ELEVATION
WEATHER (A.M.)
(P.M.)

HOLE DESIGNATION BH-20
DATE STARTED 11-22-91
DATE COMPLETED
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2	Auger (SP) SAND, med fine, Brown Red, moist	1	SS	10	10	12	9	2/4	MSA down
2		4	(SP)								
4		6	" No notiable odor	2	SS	10	12	15	20	4/6	MSA = 0
6		8	(SW) SAND, med- fine- coarse, red brown - moist	3	SS	10	15	10	12	6/8	MSA = 92
8		10									
10		12									
12		14									MSA = 0
14		16									MSA = 0
16		20									MSA = 0
24		26									MSA = 0

35 37 Sample

1871/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Pentwood
PROJECT NUMBER
CLIENT Pentwood
LOCATION Sioux, M

DRILLING CONTRACTOR WTD
DRILLER Mark-Tim
SURFACE ELEVATION
WEATHER (A.M.) 30° clay
(P.M.)

HOLE DESIGNATION BH-21
DATE STARTED 11-22-91
DATE COMPLETED 11-22-91
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR Jwm

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS								NOTES AND COMMENTS
FROM	--AT	TO	ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL		
0		2	(SW) SAND, fine-medium, red, moist	1	SS	25	12	10	30	2/4		MSA = 0
2		4		2	SS	46	24	30	12	4/6		MSA = 42.0
8		10		3	SS	25	30	31	28	8/10		MSA = 0
				4	SS	17	48	27	15	15/17		MSA = 0
			EOB 17.0									

186/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Pentwood
PROJECT NUMBER
CLIENT Pentwood
LOCATION Sitka, AK

DRILLING CONTRACTOR WTD
DRILLER Mark - Tim
SURFACE ELEVATION
WEATHER (A.M.) 30 Cldy
(P.M.) 25 Clr

HOLE DESIGNATION BH-22
DATE STARTED 11-21-91
DATE COMPLETED 11-22-91
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0			(GL)(SW) Sand brwn - Cinders etc. moist	1	SS	1	2	2	1	2/4	MSA = 2
				2	SS	3	3	6	2	4/6	= 9
				3	SS	2	2	5	7	6/8	= 3
			(SW) SAND, Med-coarse, Brown - Red Sl. oder	4	SS	4	4	7	3	8/10	= 0
				5	SS	5	4	5	3	10/12	= 0
				6	SS	10	15	10	12	12/14	= 5
				7	SS	8	10	15	19	14/16	= 10
				8	SS	9	9	15	4	16/18	= 0
				9	SS	15	20	21	20	18/20	= 0
	20		(DI)	10	SS	25	20	5	8		

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Pentwood
PROJECT NUMBER
CLIENT Pentwood
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Mark - Tim
SURFACE ELEVATION
WEATHER (A.M.) 5° Cldy
(P.M.)

HOLE DESIGNATION BH-23
DATE STARTED 11-25-91
DATE COMPLETED 11-25-91
DRILLING METHOD 4 1/4 HSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0			(SF) SAND, fine-med, Black, Product odor		AC					0/2	
	1	3	Wood fragments	1	SS	20	22	23	38	1/3	MSA = > 1000
	4		Same except Red-brown color	2	SS	11	12	18	20	4/6	MSA = 185
	6	6.5	(ML) SILT, Clayey, brown, moist product odor								
				3	SS	2	5	9	12	6/8	MSA = 220
				4	SS	2	5	9	13	8/10	MSA = 165
			as above, moist - wet	6	SS	2	8	9	27	12/14	MSA = 350
				7	SS	9	12	21	30	16/18	MSA = 165
	21.5		(ML) SILT, some clay, brown, moist, Prod odor	8	SS					20/22	MSA = 370
				9	SS					25/24	MSA = 95

10/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Pentenwood
PROJECT NUMBER
CLIENT Pentenwood
LOCATION Siren WI.

DRILLING CONTRACTOR WTD
DRILLER Mark Tim
SURFACE ELEVATION
WEATHER (A.M.) Sunny cold
(P.M.)

HOLE DESIGNATION BH 23
DATE STARTED 11-25
DATE COMPLETED 11-25
DRILLING METHOD SSA
CRA SUPERVISOR JBH

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
			~~Bx~~ Same, Dry Zone Benefith	10	SS	5	12	21	36	25/27	
			the silt, thin gravel seam								
	27'		End of Hole								

19 1/2 262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Pentwood
PROJECT NUMBER
CLIENT Pentwood
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Mark-Tim
SURFACE ELEVATION
WEATHER (A.M.) 10° PC day
(P.M.)

HOLE DESIGNATION B-H-24
DATE STARTED 11-25-91
DATE COMPLETED 11-25-91
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		1.5	(SW) SAND, fine-med, brown-black, Product odor		AC					0/1	
				1	SS	9	10	17	15	1/3	MSA=25.0
1.5		EOB	(SW) SAND, fine-coarse, brown-Red moist			4					ID: BH-24-21
				2	SS		10	10	12	4/6	MSA = 0.0
				3	SS	3	9	10	12	6/8	MSA = 0.0
				4	SS					10/12	MSA = 0.0
											ID: BH-24-22
			EOB 12.0								

92/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME Pentwood
PROJECT NUMBER
CLIENT PWP
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Mark-Tim
SURFACE ELEVATION
WEATHER (A.M.)
(P.M.) 15 Clear

HOLE DESIGNATION BH-25
DATE STARTED 11-25-91
DATE COMPLETED 11-25-91
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2.0	(SW) SAND, fine-med, brown -		AC					0/1	
			black; product odor, dry	1	SS	2	10	15	18	1/3	MSA=23.0 Sample: BH-25-23
2.0		9.0	(SW) SAND, fine-coarse,	2	SS	4	8	12	13	4/6	MSA=0.0
			red brown, dry	3	SS	4	9	14	20	6/8	MSA=0.0
10.5		E/OB	(SP) SAND, medium, Red-brown, moist	4	SS	5	7	15	19	10/12	MSA=0.0 ID: BH-25-24
			12.0 EOB								

193/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Mark-Tim
SURFACE ELEVATION
WEATHER (A.M.) 15° Clear
(P.M.) 15°C Clear

HOLE DESIGNATION BH-26
DATE STARTED 11-25-91
DATE COMPLETED 11-25-91
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		1.0	(SP) SAND, fine-med, brown-black		A					0/1	
1.0		15.0	Wood waste, Black, odor moist	1	SS	2	2	4	5	1/3	MSA = 55.0 ID-BH-26-19
			Same - wet	2	AC					5/7	MSA = 95 ID-BH-26-20
				3	SS					7/9	MSA = 85
			(SP) SAND, med grained, red-brown, moist, product odor.	4	AC					13/15	MSA = 110
15											
			SAND fine gr red-Brown, moist product odor,	5	SS					18/20	ID: BH-26-25 MSA = 98
	20	!	EOH -								

11/94
1262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION siren, W/I

DRILLING CONTRACTOR
DRILLER Mark - Steve
SURFACE ELEVATION
WEATHER (A.M.) -10° Clear
(P.M.) 100 Clear

HOLE DESIGNATION BH-27-96
DATE STARTED 11-25-91
DATE COMPLETED 11-25-91
DRILLING METHOD 3¼ SSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		EOB	Wood waste - (SP) Sand mixed	1	AC					0/	MSA = 32.0
			brown, product odor							/5	ED: BH-27-96
			EOB: 5.0'								

195/202

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Sirem, Alt

DRILLING CONTRACTOR WTD
DRILLER [illegible]
SURFACE ELEVATION
WEATHER (A.M.)
(P.M.)

HOLE DESIGNATION BH-28
DATE STARTED 11-25-91
DATE COMPLETED 11-25-91
DRILLING METHOD SSA
CRA SUPERVISOR JM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS								NOTES AND COMMENTS
FROM	AT	TO	ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL		
0		EOB	Wood Waste (SP) mixed	1	AC					0/5		MSA = 120 ID: BH28-27

1969/262

PAGE 1 OF 1

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Strom, WI

DRILLING CONTRACTOR WTD
DRILLER Mark, Steve
SURFACE ELEVATION
WEATHER (A.M.) 10° Clear
(P.M.) 10° Clear

HOLE DESIGNATION BH-09
DATE STARTED 11-25-91
DATE COMPLETED 11-25-91
DRILLING METHOD 3¼ SSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS								NOTES AND COMMENTS
FROM	AT	TO	ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL		
0				1	AC					0/5		NSA = 7510

197/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION SITE

DRILLING CONTRACTOR WTD
DRILLER Mark - Shane
SURFACE ELEVATION
WEATHER (A.M.)
(P.M.)

HOLE DESIGNATION BH-30
DATE STARTED 11-25-91
DATE COMPLETED 11-25-91
DRILLING METHOD 3 1/4 HSA
CRA SUPERVISOR Dan

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		EOB	(SP) SAND, Medium, red-brown, dry,	1	AC					0/5	MSA = 0.0 BH-30-29
			EOB 5.0								

11/26/91

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION

DRILLING CONTRACTOR WTD
DRILLER Mark - Steve
SURFACE ELEVATION
WEATHER (A.M.) 10° Cldy
(P.M.)

HOLE DESIGNATION BH-91
DATE STARTED 11-26-91
DATE COMPLETED 11-26-91
DRILLING METHOD 4 1/4 HSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0			(SP) SAND, medium, brown, moist product odor	1	AC					0/2	
				2	SS	5	9	12	18	2/4	MSA = 16.0
				3	SS	20	30	35	40	4/6	MSA = 10.0 ID: BH-31-30
			(SW) SAND, fine - medium, trace gravel, red, moist.	4	SS	15	21	26	30	6/8	MSA = 16.1
			(SW) SAND, med - coarse	5	SS	14	12	19	24	8/10	MSA = 19.4
			(SW) SAND, fine - med							10/12	MSA = 7500
										14/16	MSA = 90
										18/20	MSA = 28
			EOB 18-20								

1991/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Mark - Steve
SURFACE ELEVATION
WEATHER (A.M.) 100 Cldy
(P.M.)

HOLE DESIGNATION BH-32
DATE STARTED 11-26-91
DATE COMPLETED 11-26-91
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR JWM

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2	(SP) SAND, med, red brown -	1	AC					0/2	
			black stains, product								
			odor			10	19	25	26	2/4	MSA=25
2		3	(ML) silt, sandy, brown-gray,	2	SS					4/6	ID: BH-32-32
			product odor								
3			(SP) Sand, med, red,	3	SS	15	19	21	25	4/6	MSA=27
			product odor								
										6/8	65.0 MSA
			SP SAND med red Dry	4						8/10	BH32-33
			slight product odor								MSA 205.
	10		EOH								

200/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 21410
CLIENT PWP
LOCATION Siren WI

DRILLING CONTRACTOR WTD
DRILLER Mark-Steve
SURFACE ELEVATION
WEATHER (A.M.) 10° Rain-Snow
(P.M.)

HOLE DESIGNATION BH 33
DATE STARTED 11-20-21
DATE COMPLETED 11-26-21
DRILLING METHOD 4¼ HSA
CRA SUPERVISOR DRS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0-		4'	SD med-fine gr Red-Brn moist	1	AC					0/4	MSA 18
			slight product odor								
	4'		SAME	2	SS	6	7	9	13	2/4	BH33-38
	6'		SW Gravel wt coarse sand Red Brn		SS					4/6	MSA-3.0
			slight Product odor, moist							~~4/6~~	
			SW coarse gravel / sand mix sorted	3		12	12	14	17	6/8	MSA 39.0
			moist slight product odor								
			SP coarse sand some gravel Red Brown	4						8/10	MSA 48 ppm
			Moist No Odor								
			SP Coarse-Med Sand Tr gravels Red Brown.	5		9	19	19	23	10/12	MSA 41 ppm
			SW-SP Coarse sand wt Coarse gr.	6		13	18	27	28	14-16	MSA 33.
				7						1/0	
			SP Med-Fine Sand Red Brown Dry, Little odor	7		16	27	33	44	18/20	
	20'		EOH								

201/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren WI

DRILLING CONTRACTOR WTD
DRILLER Mark Steve
SURFACE ELEVATION
WEATHER (A.M.) Snowing
(P.M.) 0

HOLE DESIGNATION BH
DATE STARTED 11-26-91
DATE COMPLETED 11-26-91
DRILLING METHOD HSA
CRA SUPERVISOR ORS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2	SP fine to med silty SAND Red Br. Moist, Odor Product	1	AC					0/2	MSA 5.4
@		4	Same	2	SS	13	15	21	24	2/4	BH-3440 ID
	5'		SP Fine Sand w/silt Red Brn, Moist								
4		6	Same	3	SS					4/6	MSA-10 PPM
6		8	Med SAND Same as Above	4	SS					6/8	MSA 10 ppm
8		10	Same	5	SS	12	16	25	24	8/10	BH-3441 ID
	10		EOH								
		1									

202/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWD
LOCATION Siren WI

DRILLING CONTRACTOR WITD
DRILLER Mark - Steve
SURFACE ELEVATION
WEATHER (A.M.) Snowy/Windy 20
(P.M.)

HOLE DESIGNATION BH 35
DATE STARTED 11-26-91
DATE COMPLETED 11-26-91
DRILLING METHOD HSA
CRA SUPERVISOR DRS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2	SP med sand, Brown, wet Heavy product odor	1	AC					0/2	MSA 209
			some fill wood chips								
			SP SAME Product sheen - odor	2	SS					2/4	MSA 142
4		6	SP SAME Product visible white oily	3	SS	5	9	11	19	4/6	BH35-42 SAMP. I.D.
		8	SP SAME, NO WOOD, Heavy product sheen on Spoon	4	SS					6/8	MSA = 128.
			SP SAME M-F, Brn, Product.	5	SS					8/10	MSA = 143
			SP SAME AS ABOVE	6	SS					10/12	MSA = 83
			SP med to coarse Wt product odor	7	SS					14/16	MSA = 22
			SP " " "	8	SS					18/20	BH35-43 ID
	20'		End of Hole								50% recovery rock in Spoon.

203/2622

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren WI

DRILLING CONTRACTOR MTD
DRILLER Kurt - Mark
SURFACE ELEVATION
WEATHER (A.M.) Cold
(P.M.)

HOLE DESIGNATION BH-36
DATE STARTED 12-2-91
DATE COMPLETED 12-2-91
DRILLING METHOD 14SA
CRA SUPERVISOR DRJ

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2	SP med-fine Brown to Red Brown moist loose	1	AC					0/2	MSA > 789
	1.5'		Visible product sheen in sand. Saturated.								
			~~0' to 3'~~ SP same Brn Saturated to 3.8	2	SS	5	10	10	12	2/4	BH-36-47 ID (MSA > 200)
			SP, med-fn. Reddish Brn. Saturated wt Prod.	3	SS	3	10	8	11	4/6	MSA = 156
			SAME	4	SS					6/8	MSA 250
			SAME. Spoon is saturated Heavily wt product	5	SS					8-10	BH-36-48 ID
	10'		EOH								
		!									

204/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren WI.

DRILLING CONTRACTOR MTD
DRILLER Kurt - Marlc
SURFACE ELEVATION
WEATHER (A.M.) colc
(P.M.) colc

HOLE DESIGNATION BH-37-
DATE STARTED 12-3-91
DATE COMPLETED 12-3-91
DRILLING METHOD HSA
CRA SUPERVISOR DRS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2.5	SP. med-fine Brown, Moist product odor								
	2.5		SP wt / wood chips Heavy contamination	1	AC					2.5'	MSA. > 500ppm
			SP/wt pebbles Brown, Heavily contaminated	2	SS					2/4	ID. # BH-37-49
4		5.5	SP med poorly sorted Heavy contamination.								MSA ≥ 480
	5.5		CL, wt mixed sand silt Red, Plastic moist contaminated,	3	SS	6	5	9	12	4/6	MSA = 110
			SP med-fin Reddish Brown Low visible contam.	4	SS					10/12	MSA 28.0
			SP med to coarse fr gravels, Dry, silty lenses 16'	5	SS					15/17	MSA 168
			GW Gravel, 10-20mm, wt coarse brown sand Red Brown Some product odor	6	SS					18/20	108? Odor But NO Reading Changed Batt, + CALIB.
	20'		EOH								

205/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren WI

DRILLING CONTRACTOR WTD
DRILLER Kurt – Mark
SURFACE ELEVATION
WEATHER (A.M.) Snow 12°
(P.M.)

HOLE DESIGNATION BH-3
DATE STARTED 12-3-91
DATE COMPLETED 12-3-91
DRILLING METHOD HSA
CRA SUPERVISOR DRS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		3.5	ML-CL, Fill woodchips + product wet, Saturated								
	3.5		SP fine TAN Brown Moist product odor	1		2	4	6	7	3.5/4	MSA @ ≥ 700
			SP fine TAN Brown to Yellow, slightly moist wood obstruction at 4.5' Product odor	2		7	5	7	9	4/6	ID BH-3851, MSA @
			SP med gr, Red Brn, moist, stringers of product running perpindicular to sewer, product odor.	3						8/10	MSA > 300 ppm
	9.5									8/	
										B	
			SP med-coarse Red Br. moist, Product odor.	4		6	13	13	10	13/15	? > 200 (@ 88°F)
			SP med to coarse, Red Br moist Product odor	5						18/20	? > 250 (@ 88°)
	20		EOH								
		!									

206/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren WI

DRILLING CONTRACTOR MID
DRILLER Kurt - MARK
SURFACE ELEVATION
WEATHER (A.M.) 10°
(P.M.)

HOLE DESIGNATION BH-91
DATE STARTED 12-3-91
DATE COMPLETED 12-3-91
DRILLING METHOD HSA
CRA SUPERVISOR DRS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		3.5	SP - Fill mixed with wood fiber moist to SATURATED								
			Bk Brown, product odor slight	SS		1	1	2	7	2/4	
	3.5		SP - Fine, Med Brown, Dry product odor and sheen								
			SP, mixed w/ wood, Med Br, Product sheen in wood	SS		6	8	7	7	4/6	ID BH39-53
	5.8'		SP med-fine, Reddish Brown, Prod. odor								MSA > 500
			SAME AS 5' (Above)	SS		3	3	4	5	8/10	
		14	SP SAME AS Above	SS		9	9	9	11	13/15	
14	(14)	14.2	CL Reddish 2" thick followed by ~~WATER~~ —								
14.5			SP Coarse SAND, Very clean No silts Some prod. odor								
										18	
			SP Med-fine Coarse, Dry Beige							18/20	ID BH39-54
											MSA > 375 ppm
	20'		EOH								
		!									

207/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren WI

DRILLING CONTRACTOR WTD
DRILLER Kurt-Mark
SURFACE ELEVATION
WEATHER (A.M.) -10°
(P.M.)

HOLE DESIGNATION BH40
DATE STARTED 12-4-91
DATE COMPLETED 12-4-91
DRILLING METHOD HSA
CRA SUPERVISOR DRJ

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		20	SP med-coarse Red Brown, product sheen and odor slight	1	AC						
				2	SS	3	5	8	6	4/6	BH-40-5S MSA 227.
			SP SAME AS ABOVE	3	SS	7	13	13	16	10/12	MSA 342.
			SP SAME AS ABOVE, product odor hard to detect at 15°	4	SS	8	12	12	13	18/20	BH-40-5S MSA 160.
	20		EOH								

208/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME NWP
PROJECT NUMBER 2140
CLIENT NWP
LOCATION Siren WI

DRILLING CONTRACTOR WTD
DRILLER Kurt-Mark
SURFACE ELEVATION
WEATHER (A.M.) -5° 10:00
(P.M.)

HOLE DESIGNATION BH-40
DATE STARTED 12-4-91
DATE COMPLETED 12-4-91
DRILLING METHOD SSA
CRA SUPERVISOR DAVID SIVERD

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0			SP - SATURATED Black Brown, muddy with wood chips-fibers Etc. product sheen and odor obvious, strong.		AC						
			SP - Alternating with wood fill, saturated wet oily Brown to clear liquids	1	SS	2	3	4	6	4/6	BH-40-5 FID MSA -1
10		12	Wood chips and undifferentiated soil saturated wet Brown viscous liquid with oily odor	2	SS					10/12	MSA > 250
	19		SP med gr, Brownish, Heavy Product odor visible oily sheen (clear)	3	SS					18-20	MSA > 367
			SP med-fg Reddish Brn, moist slight product sheen odor.	4	SS	8	9	11	14	28/30	MSA 98 ppm
			SP med to fg gr, Reddish Brown slightly moist,	5						38/40	MSA 25ppm,
	40'		EOH								

209/202

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren, WI.

DRILLING CONTRACTOR WTD
DRILLER Mark-Kurt
SURFACE ELEVATION
WEATHER (A.M.)
(P.M.) -2°

HOLE DESIGNATION BH-42
DATE STARTED 12-4-91
DATE COMPLETED 12-4-91
DRILLING METHOD SSA
CRA SUPERVISOR DRS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		4'	SP med to fine gr. DK Brown no product odor and stain.								
4		13	SP med-fine gr Reddish Brown slightly moist no product odor or sheen								
				1	AC					12/13	
	13'		EOH								
		1									

210/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren WI

DRILLING CONTRACTOR WTD
DRILLER Kust-Mark
SURFACE ELEVATION
WEATHER (A.M.) -
(P.M.) -2°

HOLE DESIGNATION BH-3
DATE STARTED 12-4-91
DATE COMPLETED 12-4-91
DRILLING METHOD SSA
CRA SUPERVISOR DRS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS)			SAMPLE DESCRIPTION	SAMPLE DETAILS								NOTES AND COMMENTS
FROM	AT	TO	ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL		
0		2	SP - Fill Dk Brn, some product odor									
2		13	SP - med - fine gr sand Reddish Brown	1	AC					12/13		
			slightly moist. No odor or sheen									
	13'		EOH									

211/2602

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 3140
CLIENT PWP
LOCATION Siren WI.

DRILLING CONTRACTOR WTD
DRILLER Kurt-Mark
SURFACE ELEVATION
WEATHER (A.M.)
(P.M.) -2°

HOLE DESIGNATION B14-14
DATE STARTED 12-4-91
DATE COMPLETED 12-4-91
DRILLING METHOD SSA.
CRA SUPERVISOR DRS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		2'	GP - Crushed Gravel .5 - 1.5"								
2'		13'	SP Med-fine gr Reddish Brown Sand								
			NO product odor or sheen	1	AC					12/13	
	13'		EOH								
		!									

2/2/92

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Kurt - Mark
SURFACE ELEVATION
WEATHER (A.M.)
(P.M.) -2°

HOLE DESIGNATION BH-4
DATE STARTED 12-4-91
DATE COMPLETED 12-4-91
DRILLING METHOD H.S.A.
CRA SUPERVISOR ORS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		6'	SP, Med to fine gr sand Heavy product odor and visible sheen Brown								
6'		13'	SP Med to fine gr sand Reddish Brown slight to moderate product odor and sheen decreasing with depth.	1	AC					12/13	
	13'		EOH								

213/262

STRATIGRAPHY LOG (OVERBURDEN) Wood Chip Pile #1

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren, WI

DRILLING CONTRACTOR WTD
DRILLER Kurt-Mark
SURFACE ELEVATION
WEATHER (A.M.) Snow 2°
(P.M.)

HOLE DESIGNATION BH-46
DATE STARTED 12-5-91
DATE COMPLETED 12-5-91
DRILLING METHOD HSA
CRA SUPERVISOR DR.S

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0			Wood chips shavings & Fibers visible Brn viscous liquid soaked into chips and free on their surfaces	1	AC	—	—	—	—	0/2	MSA ≥ 100 ppm
			SAME, Lower concentration of Brown stain lighter solvent odor.	2	SS	—	—	—	—	4/7.5	ID BH-46-63 MSA ≥ 100 ppm
			Wood saturated with Black Brown liquid with solvent odor-Heavy.	3	SS					10/11.5	MSA ≥ 200 ppm
	13.5		Wood / SP interface Auger clogged and - SS was not able to bring up sample of SAND, There was sand on the spoon tip JAMMED into the wood, WOOD WAS SATURATED	4	SS						MSA ≥ 200
			SM fine grain silty sand moist, Grey Brown, Solvent Odor	5	SS					15/16.5	MSA > 100
20		22	GW Grey-Brown Heavy product odor, moist	6	SS					20/22	MSA > 100
30		32	SP Med-coarse Reddish Brn product odor moist.							30/32	MSA ≥ 200 4 min
40		42	SP SAME, Distinct lower grain coloring odor.	7	SS					40/42	ID BH-46-64
	42		EOH								MSA = 264

2140/262

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren WI

DRILLING CONTRACTOR WTD
DRILLER Kurt - Mark
SURFACE ELEVATION
WEATHER (A.M.)
(P.M.) Ok

HOLE DESIGNATION BH-47
DATE STARTED 12-5 91
DATE COMPLETED 12 5 91
DRILLING METHOD HSA
CRA SUPERVISOR DRS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
①		19	wood chips, moist, composting								
			No contamination apparent								
	19'		ML wet plastic gritty Grey								
			1/2 clay 1/2 wood in sample jar	1'	SS				18	18/20	BH-47-65
	20'		EOH.								

9/15/2022

STRATIGRAPHY LOG (OVERBURDEN)

PROJECT NAME PWP
PROJECT NUMBER 2140
CLIENT PWP
LOCATION Siren WI

DRILLING CONTRACTOR WTD
DRILLER Kurt - Mark
SURFACE ELEVATION
WEATHER (A.M.)
(P.M.) 2°

HOLE DESIGNATION BH-48
DATE STARTED 12-5-91
DATE COMPLETED 12-5-91
DRILLING METHOD HSA
CRA SUPERVISOR DRS

STRATIGRAPHIC INTERVALS (DEPTHS IN ft/m BGS) FROM	AT	TO	SAMPLE DESCRIPTION — ORDER OF DESCRIPTORS: SOIL SYMBOL, (PRIMARY COMPONENT) SECONDARY COMPONENTS, RELATIVE DENSITY/CONSISTENCY, GRAIN SIZE/PLASTICITY, GRADATION/STRUCTURE, COLOUR MOISTURE CONTENT, SUPPLEMENTARY DESCRIPTORS	SAMPLE DETAILS: SAMPLE #	SAMPLING METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	SAMPLE INTERVAL	NOTES AND COMMENTS
0		17	Wood moist, Black-Brown, solvent								
			Vapor saturated w/ Liquid (H_2O?) at	SS						16/17	JD BH-48-66
			17'								
	17'		SP fine-med TAN Brown wet, solvent odor	SS						18/20	JD BH-48-67
	20'		EOH								

2140/262

217/262

WISCONSIN TEST DRILLING, INC. — **FIELD BORING LOG** — Sheet 1 Of 3

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products.

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. MW-3

GROUND WATER: While drilling Dry — Time after drilling — Before casing removal — Depth to water — After casing removal — Depth to cave-in Grout from 110.0'

Start 6-13-89
Unit D-50
Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS (Casing/Probe — Weight 140# — Drop 30")	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
											4¼ HSA
1	D	4	4								
		5		10	9	Brn. Med. Grain SAND					
2	D	9	10								
		14		12	24						
3	D	11	16								
		22		14	38						
						16.0'					
						M-SAND & M-C GRAVEL					
4	D	13	16								
		21		12	37						
						21.0'					
						F-C Milti-colored SAND w/Rd. CLAY, Some Gravel					
5	D	20	38								
		54		19	92						
6	D	14	21								
		28		15	49						
						31.0'					
						F-C Multi-colored SAND w/Rd. Clay, Some Gravel					
7	D	17	28								
		47		13	75						
						36.0'					
						F-C Multi-colored SAND w/Occas. Gravel					
8	D	18	33								
		48		11	81						
						41.0'					
						Fine Multi-colored SAND					
9	D	16	36								
		67		12	103						

218/262

WISCONSIN TEST DRILLING, INC. — FIELD BORING LOG

Sheet 2 Of

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. MW-3

GROUND WATER — While drilling: Dry — Time after drilling: — — Before casing removal: — — Depth to water: — — After casing removal: — — Depth to cave-in: —

Start 6-13-89

Unit D-50

Chief MM

Casing/Probe — Weight 140# — Drop 30"

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
10	D	21	27								4¼
		34		1.5	61	Fine Multi-colored SAND					HSA
11	D	15	27			55	55				
		44		1.4	71						
						56.0'					
						F-C Multi-colored SAND, Occas. Gravel					
12	D	21	45			60	60				
		55		1.5	100						
						61.0'					
						F-C Multi-colored SAND					
13	D	27	55			65	65				
		80		1.5	135						
						66.0'					
						F-C Multi-colored SAND w/Gravel					
14	D	32	38			70	70				
		42		1.0	80						
						71.0'					
						F-C Multi-colored SAND					
15	M	29	66			75	75				
		68		1.3	34						
						76.0'					
						F-C Multi-colored SAND, Occas. Gravel					
16	D	27	43			80 Brn. w/Silt Lens @ 81.0'	80				
		46		1.0	89						
						81.0'					
						F-C Multi-colored SAND, Occas. Gravel					
17	D	45	66			85	85				
		85		1.1	151						
18	D	20	47			90	90				
		93		1.0	140						
19	D	45	67			95	95				
		90		1.5	157						

219/262

WISCONSIN TEST DRILLING, INC. — **FIELD BORING LOG** — Sheet 3 Of 3

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. MW-3

GROUND WATER: While drilling Dry — Time after drilling — Start

Before casing removal — Depth to water — Unit

After casing removal — Depth to cave-in — Chief

Casing/Probe — Weight 140# — Drop 30"

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
20	D	25	57								4¼ HSA
		87		1.4	144	F/C SAND, Multi-colored w/Gravel					
21	D	28	56								
		100		1.4	156	105					
						110					
22	D	86	100								
				1.0	100	115					
23	D	110	73								
		73		.9	146	120					
24	D	72	97								
		93		1.0	190	125					
						126.0'					
						VC SAND & GRAVEL, Little Silt, Some Kind of Green Rock					
25	D	117	125								
				.5	125	130					
						130.5'					
						Sandy Silty CLAY					
26	W	150	200								
				1.0	200	135					
						E.O.B. @ 135.5'					
						Possible Hand Pan, Red					
						140					
						145					

220/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 3

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. MW-4

GROUND WATER: While drilling Dry — Time after drilling — Before casing removal — Depth to water — After casing removal — Depth to cave-in Grout from 95.0'

Start 6-15-89
Unit D-50
Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe — Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size —	Blows on Probe Size —	Drilling Method
												4¼ HSA
						F-C SAND						
1	M	6	11									
		15		12	26							
						6.0'						
						F-C Multi-colored SAND						
2	M	7	15									
		19		14	34							
3	M	10	17									
		22		14	39							
4	M	22	26									
		29		15	55							
						21.0'						
						F-C Multi-colored SAND, Occas. Gravel						
5	M	28	35									
		33		16	68							
6	D	23	33									
		39		17	72							
7	D	39	52									
		54		17	106							
8	D	17	37									
		57		15	94							
9	D	25	50									
		60		17	110							

221/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 2 Of 3

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. MW-4

GROUND WATER: While drilling Dry — Time after drilling — Before casing removal — Depth to water — After casing removal — Depth to cave-in

Start 6-15-89
Unit D-50
Chief MM

Casing/Probe — Weight 140# — Drop 30"

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
10	D	20	37	1.0							4¼
		48			85	F-C Multi-colored SAND w/Gravel					HSA
11	M	50	50			55					
		62		.9	112						
						60					
12	M	16	50			65					
		112		1.1	162						
						70					
13	M	35	59			75					
		77		1.5	136						
						76.0'					
						80					
14	M	21	57			F & M Multi-colored SAND					
		85		1.5	142	85					
						86.0'					
						90					
15	D	216	42			M-C Multi-colored SAND w/Gravel					
		63		1.1	105	95					

2221

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 3 Of 3

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. MW-4

GROUND WATER — While drilling: Dry — Time after drilling: — — Before casing removal: — — Depth to water: — — After casing removal: — — Depth to cave-in: — —

Start 6-15-89
Unit D-50
Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												4¼ HSA
16	D	137	75			F-M Brn. SAND						
		121		9	196	105						
17	D	300		2		Hard Pan						
						110 — E.O.B. @ 110.0'						
						115						
						120						
						125						
						130						
						135						
						140						
						145						

223/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. BH-5

GROUND WATER	While drilling	Dry	Time after drilling		Start 6-16-89
	Before casing removal		Depth to water		Unit D-50
	After casing removal		Depth to cave-in	7.2'	Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												4½ HSA
						Brn. F-C SAND						
1	D	Pushed		2.0								
2	D	Pushed		2.0		E.O.B. @ 12.0'						

224/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. BH-6

GROUND WATER: While drilling Dry — Time after drilling — Before casing removal — Depth to water — After casing removal — Depth to cave-in 6.2'

Start 6-16-89
Unit D-50
Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe — Weight 140# — Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												4¼ HSA
1	D	Pushed		20		Brn. F-C SAND						
2	D	Pushed		18		E.O.B. @ 12.0'						

5 10 15 20 25 30 35 40 45

225/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR CRA Penta Wood Products

LOCATION Siren, WI Elev.

Job No. 1745

Boring No. BH-7

GROUND WATER
While drilling Dry
Before casing removal
After casing removal
Time after drilling
Depth to water
Depth to cave-in 3.6'

Start 6-16-89
Unit D-50
Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Brn. F-C SAND						4¼ HSA
1	D	Pushed		2.0		E.O.B. @ 7.0'						

5 10 15 20 25 30 35 40 45

226/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. BH-8

GROUND WATER — While drilling: Dry; Before casing removal; After casing removal; Time after drilling; Depth to water; Depth to cave-in: 4.0'

Start 6-16-89
Unit D-50
Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Brn. F-C SAND						4¼ HSA
1	D	Pushed		2.0		E.O.B. @ 7.0'						

5 10 15 20 25 30 35 40 45

227/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. BH-9

GROUND WATER	While drilling	Dry	Time after drilling		Start 6-16-89
	Before casing removal		Depth to water		Unit D-50
	After casing removal		Depth to cave-in	7.3'	Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												4¼ HSA
						Brn. F-C SAND						
1	D	Pushed		20								
2	D	Pushed		20								
						E.O.B. @ 12.0'						

5 10 15 20 25 30 35 40 45

228/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. BH-10

GROUND WATER — While drilling: Dry; Before casing removal: ; After casing removal: ; Time after drilling: ; Depth to water: ; Depth to cave-in: 4.2'

Start 6-16-89
Unit D-50
Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												4¼ HSA
						Brn. F-C SAND						
1	D	Pushed		18		E.O.B. @ 7.0'						

5 10 15 20 25 30 35 40 45

229/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. BH-11

GROUND WATER	While drilling	Dry	Time after drilling		Start 6-16-89
	Before casing removal		Depth to water		Unit D-50
	After casing removal		Depth to cave-in	4.0'	Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												4¼ HSA
						Brn. F-C SAND						
1	D	Pushed		2.0								
						E.O.B. @ 7.0'						

5 10 15 20 25 30 35 40 45

230/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. BH-12

GROUND WATER
While drilling: Dry — Time after drilling:
Before casing removal: — Depth to water:
After casing removal: — Depth to cave-in: 3.4'

Start 6-16-89
Unit D-50
Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
						Brn. F-C SAND						4¼ HSA
1	D	Pushed		2.0		E.O.B. @ 7.0'						

5 10 15 20 25 30 35 40 45

231/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. BH-13A

GROUND WATER	While drilling	Dry	Time after drilling		Start 6-16-89
	Before casing removal		Depth to water		Unit D-50
	After casing removal		Depth to cave-in	9.2'	Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												4¼ HSA
						Brn. F-C SAND, Trc. Silt						
1	D			2.0								
						E.O.B. @ 10.0'						
2	D			2.0		Grab Samples						

232/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

CHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. BH-13B

GROUND WATER

While drilling: Dry — Time after drilling:

Before casing removal: — Depth to water:

After casing removal: — Depth to cave-in: 9.6'

Start 6-16-89

Unit D-50

Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												4¼ HSA
						Brn. F-C SAND, Trc. Silt						
1	D											
2	D					E.O.B. @ 10.0'						

5 10 15 20 25 30 35 40 45

233/262

WISCONSIN TEST DRILLING, INC.

FIELD BORING LOG

Sheet 1 Of 1

SCHOFIELD, WISCONSIN

FOR CRA — Penta Wood Products

LOCATION Siren, WI — Elev.

Job No. 1745

Boring No. BH-14

GROUND WATER	While drilling	Dry	Time after drilling	
	Before casing removal		Depth to water	
	After casing removal		Depth to cave-in	8.2'

Start 6-16-89
Unit D-50
Chief MM

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Casing/Probe Weight 140# Drop 30"	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
												4¼ HSA
						Brn. F-C SAND						
1	D	Pushed		2.0								
2	D	Pushed		2.0		E.O.B. @ 12.0'						

234/262

WELL CONSTRUCTOR'S REPORT TO WISCONSIN STATE BOARD OF HEALTH

See Instructions on Reverse Side

1. County Burnett — Town ☒ / Village ☐ / City ☐ Daniels (Check one and give name)

2. Location ?SE-20-R-Co 402 Govt Lot 5 — 38 17
Name of street and number of premise or Section, Town and Range numbers

3. Owner ☒ or Agent ☐ Ed Almquist or SW, NE, sec 13
Name of individual, partnership or firm

4. Mail Address Siren Wis
Complete address required

5. From well to nearest: Building 4 ft; sewer 10 ft; drain ____ ft; septic tank 40 ft; dry well or filter bed ____ ft; abandoned well ____ ft.

6. Well is intended to supply water for: home

7. DRILLHOLE:

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
4	1	104			

8. CASING AND LINER PIPE OR CURBING:

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	Steel	1	104

9. GROUT:

Kind	From (ft.)	To (ft.)

10. FORMATIONS:

Kind	From (ft.)	To (ft.)
Sandy gravel	1	80
hard clay gravel	80	98
	98	104

RECEIVED
MAR 9 1959
ENVIRONMENTAL SANITATION

11. MISCELLANEOUS DATA:

Yield test: Cont Hrs. at 6 GPM.

Depth from surface to water-level: 30 ft.

Water-level when pumping: 15 ft.

Water sample was sent to the state laboratory at: Madison (City) on March 4 1959

Construction of the well was completed on: Feb 27 1959

The well is terminated 10 inches ☒ above, below ☐ the permanent ground surface.

Was the well disinfected upon completion? Yes X No ____

Was the well sealed watertight upon completion? Yes X No ____

Signature Wm Bressette (Registered Well Driller) — Osm Falls Wis (Complete Mail Address)

Please do not write in space below

Rec'd ____ No. ____

Ans'd ____

Interpretation ____

	10 ml	10 ml	10 ml	10 ml	10 ml
Gas—24 hrs.					
48 hrs.					
Confirm					
B. Coli					

235/262

State of Wisconsin
Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

NOTE:
White Copy – Division's Copy
Green Copy – Driller's Copy
Yellow Copy – Owner's Copy

WELL CONSTRUCTOR'S REPORT
Form 3300–15 Rev. 2-79

AUG 30 1982

1. COUNTY: Burnett
CHECK (✓) ONE: ☒ Town ☐ Village ☐ City
Name: Daniels

2. LOCATION: ¼ Section or Gov't. Lot: SW-SW. | Section: 13 | Township: 38N | Range: 17W
3. NAME ☒ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE: Mrs. Wilber Petersen
OR – Grid or Street No. | Street or Road Name | ADDRESS
AND – If available subdivision name, lot & block No. | POST OFFICE: Siren, Wis. | ZIP CODE

4. Distance in feet from well to nearest: (Record answer in appropriate block)

Building	Sanitary Bldg. Drain		Sanitary Bldg. Sewer		Floor Drain Connected To:		Storm Bldg. Drain		Storm Bldg. Sewer	
	C.I.	Other	C.I.	Other	C.I. Sewer	Other Sewer	C.I.	Other	C.I.	Other
5'										

Street Sewer		Other Sewers		Foundation Drain Connected to:		Sewage Sump		Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit:	Manure Hopper or Retention or Pneumatic Tank
San.	Storm	C.I.	Other	Sewer	Sewage Sump	C.I.	Other		none		Seepage Pit	
				Clearwater Dr.	Clearwater Sump						Seepage Bed	
											Seepage Trench	

Privy	Pet Waste Pit	Pit: Nonconforming Existing	Subsurface Pumproom	Barn Gutter	Animal Barn Pen	Animal Yard	Silo With Pit	Glass Lined Storage Facility	Silo w/o Pit	Earthen Silage Storage Trench Or Pit	Earthen Manure Basi
		Well	Nonconforming Existing								
		Pump									
		Tank									

Temporary Manure Stack or Platform	Watertight Liquid Manure Tank or Basin	Manure Pressure Pipe	Subsurface Gasoline or Oil Tank	Waste Pond or Land Disposal Unit (Specify Type)	Manure Storage Basin	Other (Describe)
					Concrete Floor Only	
					Concrete Floor and Partial Concrete Walls	

5. Well is intended to supply water for: Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	15			
4	15	148			

7. CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
4"	New 10.79 Hco BlkPla End Bt Cald	Surface	144 3/12
4"	#10 SS Howard Smith Tele.	144 3/12	148

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Clay slurry	Surface	15

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Hardpan	Surface	15
Sand & gravel	15	148

10. TYPE OF DRILLING MACHINE USED
☒ Cable Tool ☐ Rotary-air w/drilling mud ☐ Rotary-w/drilling mud ☐ Rotary-hammer w/drilling mud & air ☐ Rotary-hammer & air ☐ Reverse Rotary ☐ Jetting with ☐ Air ☐ Water

Well construction completed on July 10 19 82

11. MISCELLANEOUS DATA
Yield Test: 1 Hrs. at 20 GPM
Depth from surface to normal water level 110 Ft.
Depth of water level when pumping 120 Ft. Stabilized ☒ Yes ☐ No

Well is terminated 16 inches ☒ above ☐ below final grade
Well disinfected upon completion ☒ Yes ☐ No
Well sealed watertight upon completion ☒ Yes ☐ No

Water sample sent to Madison laboratory on July 12 19 82

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature | Business Name and Complete Mailing Address

236/262

ELL CONSTRUCTOR'S REPORT
FORM 3300–15

JUN 4 1975

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

NOTE
WHITE COPY – DIVISION'S COPY
GREEN COPY – DRILLER'S COPY
YELLOW COPY – OWNER'S COPY

COU Burnett

CHECK ONE: ☒ Town ☐ Village ☐ City

NAME Daniels

LOCATION – ¼ Section: SW¼ 5

Township: 38N Range: 12W

3. OWNER AT TIME OF DRILLING: Leonard Clay

ADDRESS: Rt. 1

POST OFFICE: Siren, Wis.

– Grid or S

D – If a

These are the reports available – but may not

Distance

(Record

DING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
6'	15		None		None		None	

EAR WATER I C. I.	EAR WATER I TI.	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
None	30'	None	75	None	None		None	None

HER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.): None

Well is intended to supply water for: Private residence

DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
8	Surface	20			
4	20	158			

CASING, LINER, CURBING, AND SCREEN

Dia.	New Kind and Weight	From (ft.)	To (ft.)
4	Std. Blk. Pipe 11#/ft. T&C	Surface	154
4	S.S. #18 slot well screen	154	158

GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
clay slurry	Surface	20

9. FORMATIONS

Kind	From (ft.)	To (ft.)
sand & gravel	Surface	15
gravel & clay	15	70
gravel	70	158

10. TYPE OF DRILLING MACHINE USED

☒ Cable Tool ☐ Direct Rotary ☐ Reverse Rotary
☐ Rotary – air w/drilling mud ☐ Rotary – hammer with drilling mud & air ☐ Jetting with ☐ Air ☐ Wate

Well construction completed on: 5 - 5 1975

Well is terminated: 10 inches ☒ above ☐ below final grac

Well disinfected upon completion: ☒ Yes ☐

Well sealed watertight upon completion: ☒ Yes ☐

11. MISCELLANEOUS DATA

Yield test: 3 Hrs. at 13 GPM

Depth from surface to normal water level: 125' ft.

Depth to water level when pumping: 132 ft.

Water sample sent to: Madison laboratory on: 4 - 22 1975

Additional information concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, se type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., shou given on reverse side.

SIGNATURE: Rodney Klatt Registered Well Driller

COMPLETE MAIL ADDRESS: Rt. 3 Frederic, Wis.

Please do not write in space below

WATER TEST RESULT	GAS – 24 HRS	GAS – 48 HRS	CONFIRMED	REMARKS

237/262
Wel

:LL CONSTRUCTOR'S REPORT

WISCONSIN STATE BOARD OF HEALTH

COUNTY: Burnett

CHECK ONE: ☒ Town ☐ Village ☐ City

NAME: Daniels

LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.): SW-SE-Sec 11 Tw 38 N-R 17W

OWNER AT TIME OF DRILLING: Penta Wood Products, Inc.

OWNER'S COMPLETE MAIL ADDRESS: Siren, Wis.

Distance in feet from well to nearest: (Record answer in appropriate block)	BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
	4								

YEAR WATER DRAIN C. I.	YEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		90		95					

HER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

Well is intended to supply water for: plant

DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
4	Surface	170			

CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
4	11# black	Surface	165½
4	Everdure, 20 slot, Johnson screen	165	170

GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
	Surface	

10. FORMATIONS

Kind	From (ft.)	To (ft.)
sand	Surface	128
hard pan	128	152
Clay-ey gravel	152	165
sand	165	170

Well construction completed on: Aug. 24 19 66

Well is terminated 8 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

. MISCELLANEOUS DATA

eld test: 1 Hrs. at 15 GPM

epth from surface to normal water level 145 ft.

epth to water level when pumping 150 ft.

ater sample sent to Madison laboratory on: Dec. 14 19 66

our opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearb ells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sul rface pumprooms, access pits, etc., should be given on reverse side.

GNA E: Wm. K Beecroft Registered Well Driller

COMPLETE MAIL ADDRESS: BEECROFT BROS. WELL DRILLING
Clarence & William K. Beecroft
Rt. 2 Box 109
Frederic, Wisconsin 54837

Please do not write in space below

OLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS

238/262

L CONSTRUCTOR'S REPORT
3300–15

NOTE
WHITE COPY – DIVISION'S COPY
GREEN COPY – DRILLER'S COPY
YELLOW COPY – OWNER'S COPY

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

UM Burnett | CHECK ONE ☒ Town ☐ Village ☐ City | NAME Daniels

CATION ¼ Section: SE-SE | Section: 11 | Township: 38N | Range: 17W | 3. OWNER AT TIME OF DRILLING: Fenda Wood products

Grid or street no. | Street name | ADDRESS: Siren, Wis

If available subdivision name, lot & block no. | POST-OFFICE

stance in feet from well to nearest: (Record answer in appropriate block)	BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
	4	120							

R WATER DRAIN I.	R WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		140		160					

R POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

ell is intended to supply water for: Industry

RILLHOLE

(in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	20			
6	20	175			

ASI LINER, CURBING, AND SCREEN

(in.	Kind and Weight	From (ft.)	To (ft.)
6	19.45 # black steel T+C	Surface	170 6/12
5	Johnson screen Procedure No 15 slot	169 9/12	174 6/12

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand & Gravel	Surface	125
hard pan	125	170
Sand	170	175
hard pan	175	

JUN 10 19

ROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Neat cement	Surface	20

10. TYPE OF DRILLING MACHINE USED

☒ Cable Tool ☐ Direct Rotary ☐ Reverse Rotary
☐ Rotary – air w/drilling mud ☐ Rotary – hammer with drilling mud & air ☐ Jetting with ☐ Air ☐ Water

Well construction completed on June 14 19 73

Well is terminated 10 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

MISCELLANEOUS DATA

d test: 1 Hrs. at 35 GPM

th from surface to normal water level 135 ft.

th to water level when pumping 160 ft.

er sample sent to laboratory on: 19

r op n concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, of ng joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should ven on reverse side.

NATURE

Registered Well Driller

COMPLETE MAIL ADDRESS

Please do not write in space below

EFORM TEST RESULT	GAS – 24 HRS.	GAS – 48 HRS.	CONFIRMED	REMARKS

WELL DETAIL INFORMATION SHEET

239/262

ENVIRONMENTAL DRILLING WTD
A DIVISION OF LONGYEAR COMPANY

JOB NO. 440-1264

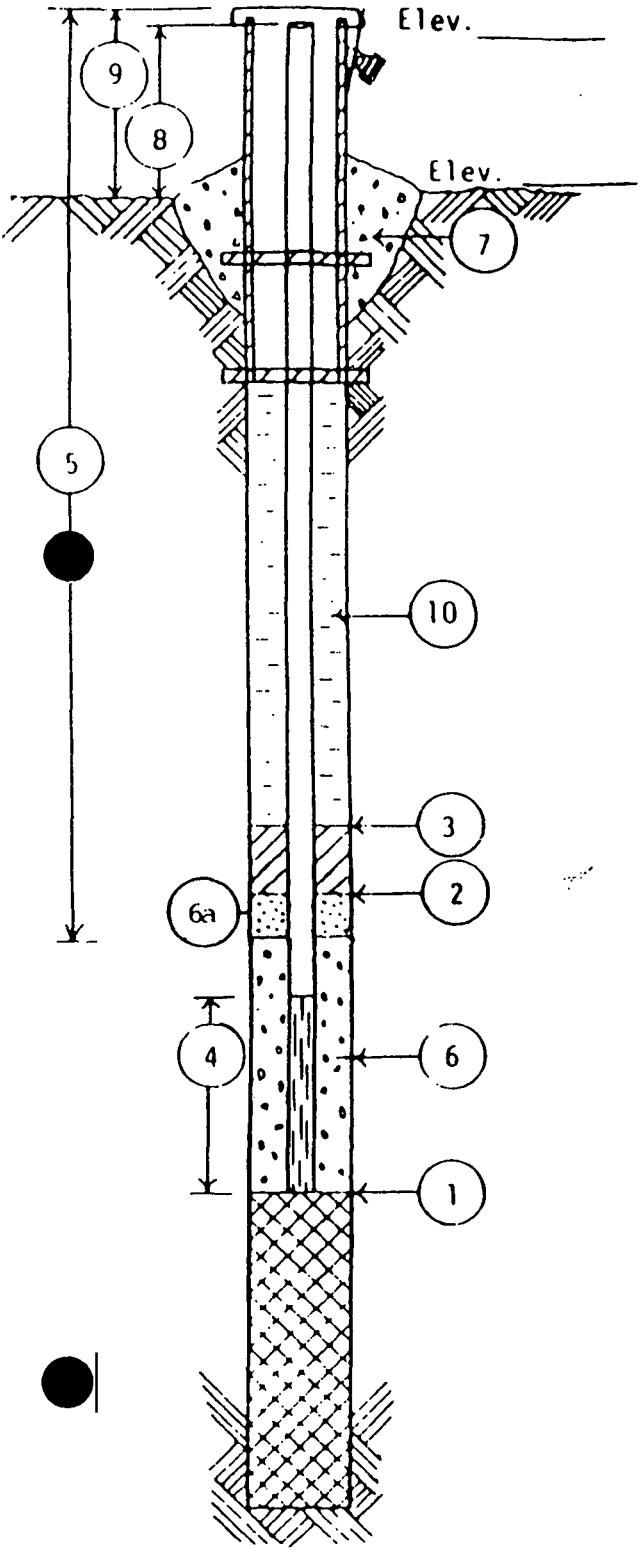
BORING NO. MW-9

DATE 11/27/91

CHIEF M.P.

LOCATION Penta Wood Products, Siren, WI

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.



(1) DEPTH TO BOTTOM OF WELL POINT OR SLOTTED PIPE 54.0 FEET.

(2) DEPTH OF BOTTOM OF SEAL (if installed) 40.0 FEET.

(3) DEPTH TO TOP OF SEAL (if installed) 37.5 FEET.

(4) LENGTH OF WELL POINT, (PVC WELL SCREEN) (Sch 40/Sch 80), OR SLOTTED PIPE 10.0 FEET. (Circle One)

(5) TOTAL LENGTH OF PIPE 46.5 FEET @ 2 IN. DIAMETER.

(6) TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE #30 Red Flintsand

(6a) LENGTH OF FINE SAND 2.0 FEET.

(7) CONCRETE CAP, YES (NO) (Circle One)

(8) HEIGHT OF WELL CASING ABOVE GROUND 2.5 FEET.

(9) PROTECTIVE CASING? YES NO (Circle One)
HEIGHT ABOVE GROUND 2.6 FEET.
LOCKING CAP? (YES) NO (Circle One)
BUMPER POST? (YES) NO (Circle One)

(10) TYPE OF BACKFILL: Granular Bentonite

WATER LEVEL CHECKS

*From top of casing, if protective casing higher, take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS

240/262

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(L-01)

PROJECT NAME: PENTA WOOD PRODUCTS
PROJECT NO.: 2140
CLIENT: PENTA WOOD PRODUCTS
LOCATION: SIREN, WI

HOLE DESIGNATION: MW-9
(Page 1 of 2)
DATE COMPLETED: NOVEMBER 27, 1991
DRILLING METHOD: 4 1/4" ID HSA
CRA SUPERVISOR: D. SHEILD

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE HNu (ppm)
2.5	SP-SAND, fine to medium grained, red brown, dry		CEMENT/ BENTONITE GROUT				
5.0	- brown, product odor			1AC			21
7.5	- some silt lenses, dry			2SS		22	12
10.0							
12.5			8"ø BOREHOLE	3SS		31	12
15.0	SW-SAND, medium to coarse grained, red brown, dry	-15.0					
17.5			2"ø PVC PIPE	4SS		22	2
20.0	- silty clay lense (2"), fine to coarse grained sand		BENTONITE GROUT	5SS		18	6.1
22.5							
25.0	- moist			6SS		46	3
27.5							
30.0				7SS			1.7
32.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (oval) WATER FOUND ▽ STATIC WATER LEVEL ▼

241/262

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

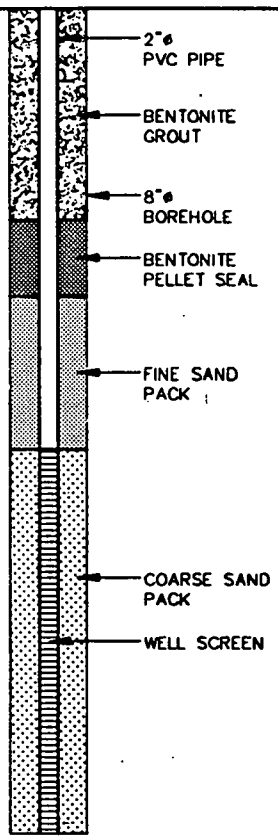
(L-01)

PROJECT NAME: PENTA WOOD PRODUCTS
PROJECT NO.: 2140
CLIENT: PENTA WOOD PRODUCTS
LOCATION: SIREN, WI

HOLE DESIGNATION: MW-9 (Page 2 of 2)
DATE COMPLETED: NOVEMBER 27, 1991
DRILLING METHOD: 4 1/4" ID HSA
CRA SUPERVISOR: D. SHEILD

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL
35.0	SP-SAND, fine to medium grained, brown, moist	-35.0
37.5	- saturated	
40.0		
42.5		
45.0	- medium to coarse grained	
47.5		
50.0		
52.5	- brownish red	
	END OF HOLE @ 54.0 FT. BGS	-54.0
55.0		
57.5		
60.0		
62.5		
65.0		

MONITOR INSTALLATION



SCREEN DETAILS:
Screened Interval:
44.0 to 54.0' BGS
Length -10.0'
Diameter -2.0"
Slot # 10
Material -Plastic
Sand pack interval:
40.0 to 44.0' BGS
Material -# 30 Coarse Sand/ Fine Sand

SAMPLE NUMBER	STATE	'N' VALUE	HNu (ppm)
8SS	X	51	12.4
9SS	X	47	1.6
10SS	X	53	
11SS	X	90	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (○) WATER FOUND ▽ STATIC WATER LEVEL ▼

2

242/262
Wel 6

CONSTRUCTOR'S REPORT — WISCONSIN STATE BOARD OF HEALTH

JNTY: Burnett — CHECK ONE: ☒ Town ☐ Village ☐ City — NAME: Daniels

CATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)
SW-SE Sec. 11, Twp. 38 N. R. 17 W.

NER'S NAME AT TIME OF DRILLING: Penta Wood Prdcts Inc. Walter Johnson

NER'S COMPLETE MAIL ADDRESS: Siren, Wis

stance in feet from well to nearest: (Record answer in appropriate block)	BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
	4								

WATER DRAIN C. I.	WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		90		95					

POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

ell is intended to supply water for: plant

DRILLHOLE

(in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	Surface	170			

CASING, LINER, CURBING, AND SCREEN

(in.)	Kind and Weight	From (ft.)	To (ft.)
6	11# black	Surface	165½
4	Enurdure	165	170
	No 20 slot		
	Ald. Fittings		

GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
	Surface	

10. FORMATIONS

Kind	From (ft.)	To (ft.)
sand	Surface	128
~~clayey gravel~~	~~128~~	~~152~~
hard pan	128	152
Clayey gravel	152	165
sand	165	170

RECEIVED
JUN 19 1968

Well construction completed on Aug 24 1966

Well is terminated 8 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

MISCELLANEOUS DATA

test: 1 Hrs. at 15 GPM

h from surface to normal water level 145 ft.

h to water level when pumping 150 ft.

r sample sent to — laboratory on: Dec. 15 19

opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby , screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub- ce pumprooms, access pits, etc., should be given on reverse side.

ATU[illegible] — COMPLETE MAIL ADDRESS

Registered Well Driller

Please do not write in space below

FORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS

243/262
725

CONSIN GEOLOGICAL and NATURAL HISTORY SURVEY
Mineral Point Road • Madison, WI 53705

Log No.P199-Bt-~~158~~

l name Penta Test Hole #3
Town of Daniels
er.... Dept. of Natural Resources
ress.. Box 7921
Madison, WI 53707
ller.. Wis. Geological & Natural History
ineer. Survey

County: Burnett
Completed... 7/23/85
Field check. WG&NHS-M. Lemcke
Altitude.... 1123' ETM
Use..... Test
Static w.l.. ~130'
Spec. cap...

R.17 W.
T. 38 N.
Sec. 14

cation: NE corner, NW¼, sec.14, T38N, R17W Quad. Siren West 7½'

Drill Hole					Casing & Liner Pipe or Curbing						
from	to	Dia.	from	to	Dia.	Wgt.& Kind	from	to	Dia.	Wgt.& Kind	from	to
0	160'					No construction						

Grout	from	to

lling method: auger
mples from 0 to 160' Rec'd: 12/5/85

died by: Terrence P. Killeen

rmations: Drift

Issued: 6/2/86

marks:

No Well Constructor's Report Received

OF WELL:

Depths	Graphic Section	Rock Type	Color	Grain Size Mode	Grain Size Range	Miscellaneous Characteristics
0-5		Sand & silt	Dk rd bn	C	Vfn/VC	Siliceous. Much gravel(Gran/L peb). Little clay.
5-10		Sand	"	"	"	Much gravel(Gran/M peb),silt, Little clay.
10-15		"	"	"	"	Same.
15-20		Gravel	Mixed	S peb	Gran/VL peb	Grnt,volc,rhy,qtzt,ss(hem,sil cem),qtz,sts,sch,trap. Mch snd,st,
20-25		"	"	"	"	Same but little silt,trace clay. Ltl cl,
25-30		"	"	M peb	Gran/L peb	Grnt,sch,qtzt,volc,rhy,ss(sil,hem cem),sts,qtz,cht,trap. Mch snd.
30-35		"	"	VLP	Gran/VL peb	Volc,qtzt. Ltl sand. Tr silt,clay. Ltl st. Tr cl.
35-40		"	"	L peb	"	Volc,grnt,rhy,qtzt,qtz,hem cemtd ss,sts. Mch snd. Tr silt,clay.
40-45		"	"	S peb	Gran/M peb	Same plus silica cemented sandstone,chert,but little silt.
45-50		"	"	"	Gran/L peb	Volc,grnt,qtzt,qtz,sch,hem cemtd ss,cht,oolic cht(hemic ool),
50-55		"	"	"	"	Same plus sil cemtd ss, trap, Mch snd, Ltl st, Tr cl,
55-60		"	"	M peb	"	Volc,qtzt,grnt,rhy,qtz,hem cemtd ss,sts,trap. Mch snd. Ltl st.
60-65		"	"	S peb	"	Same plus silica cemtd sandstone,chert,schist. Tr cl,
65-70		"	"	"	"	Volc,grnt,rhy,qtzt,sch,ss(sil,hem cem),sts,cht,qtzt,trap. Mch
70-75		"	"	"	"	Same. snd. Ltl st. Tr cl.
75-80		"	"	"	Gran/M peb	Same but trace silt.
80-85		"	"	"	"	Volc,grnt,rhy,qtzt,sch,qtz,ss(sil),hem cem),sts,cht,trap. Mch snd.
85-90		"	"	"	"	Same. Ltl st. Tr cl.
90-95		"	"	"	"	"
95-100		"	"	"	"	"
100-105		"	"	"	"	"
105-110		"	"	"	"	Rhy,volc,sch,qtzt,cht,qtz,ss(sil,hem cem),sts,trap. Mch snd, Ltl
110-115		"	"	M peb	"	Same plus granite. st. Tr cl.
115-120		"	"	"	Gran/VL peb	Volc,qtzt,rhy,qtz,ss(sil,her cem),cht,sts,trap. Mch snd. Ltl st,
120-125		"	"	S peb	Gran/L peb	Same but much silt,little clay. Tr cl,
125-130		Sand	Strg brown	C	Vfn/VC	Much gravel(Gran/M peb),silt, Little clay.
130-135		"	Yl rd bn	"	"	Same but little gravel(Gran/S peb).
135-140		"	"	M/C	"	Much silt, Little gravel(Gran/S peb),clay.
140-145		"	"	C	"	Same but much gravel(Gran/M peb).
145-150		"	Red brown	M/C	"	Much silt, Little gravel(Gran/M peb),clay.
150-155		Sand & silt	"	C	"	Calcareous. Much clay, Little gravel(Gran/S peb).
155-160		Gravel	Mixed	S peb	Gran/L peb	Volcanics,quartzite,schist,quartz,siltstone,sandstone(silica, hematite cement),chert. Much sand,silt. Little clay.

APPENDIX B

DIOXIN ASSESSMENT/EVALUATION

89

AUSTIN TX - NO
CHAN - NO
EXPOSURE - 245/262

Evaluation of Chlorinated Dibenzoparadioxin (PCDD)
Reported in a Soil/Ash Sample from Penta Wood Products Site

A composite sample of ash/soil was analyzed for PCDDs and the levels of tetra-, penta-, hexa- and octachlorinated isomers reported. The analyses were conducted by International Technology Corporation (IT) Analytical Services and reported July 27, 1989, to CRA. The sample was identified as Ash/Soil, Project ID 2140.

Evaluation Procedure

The evaluation of mixtures of PCDDs is frequently necessary but only a few of the 75 PCDD isomers have been studied sufficiently to conduct adequate risk assessments on the individual isomers. The isomers vary extensively with respect to their toxic potency although they all produce qualitatively similar toxic effects.

One isomer, 2,3,7,8-tetrachlorodibenzodioxon (2,3,7,8-TCDD), which is the most toxic, has been studied extensively. Comparative studies have been conducted on the other PCDD cogeners to allow estimates of their toxicity in comparison to 2,3,7,8-TCDD. From these comparisons, toxicity equivalence factors (TEFs) have been developed. See Table 2. Multiplying the TEF times the concentration of the appropriate congener yields the concentration of 2,3,7,8-TCDD comparable to the congener concentration on a toxicity basis. With all cogeners converted to a 2,3,7,8-TCDD equivalent base, the concentrations can be added to determine the total 2,3,7,8-TCDD equivalent concentration and this concentration evaluated for

TABLE 2

2,3,7,8-TCDD TOXICITY EQUIVALENCE FACTORS (TEF)[1]

	PCDDs		PCDFs	
Chlorination	2,3,7,8-Cogeners	All Others	2,3,7,8-Cogeners	All Others
Mono-, Di-, Tri-	0	0	0	0
Tetra-	1	0.01	0.1	0.001
Penta-	0.5	0.005	0.1	0.001
Hexa-	0.04	0.0004	0.01	0.0001
Hepta-	0.001	0.00001	0.0001	0.00001
Octa-	0	0	0	0

Note:

1. Source: Chlorinated Dioxins Workgoup Position Document. April 1986 - updated. Interim Risk Assessment Procedures for Mixturs of Chlorinated -Dibenzodioxins and -Dibenzofurans (CDDs and CDFs).

been developed by the Chlorinated Dioxin Work Group and published in a position document "Interim Task Assessment Procedures for Mixtures of Chlorinated-Dibenzodioxins and -Dibenzofurans (CDDs and CDFs)". This documented was updated April 1986.[2]

Evaluation and Discussion

Table 3 presents the reported PCDD concentrations for the sample and the 2,3,7,8-TCDD toxicity equivalent concentrations. Three equivalence values are presented for each homologous group (tetra-, penta-, hexa-, etc). The "worst case" set of values assumes all the isomers in the homologous group contain 2,3,7,8 position substitutions. 2,3,7,8 cogeners are considered more toxic than non-2,3,7,8 cogeners and are therefore given high TEF factors. The "best case" set of values assumes none of the isomers reported in the homologous group contains the 2,3,7,8 substitution. For the "more likely case", it is assumed that each isomer in the homologous group is present at equal concentrations. In this evaluation where the original source of the PCDDs is not identified, the "most likely case" seems most appropriate. For the sake of completeness, values have been calculated and are presented for all three assumptions.

The total equivalent concentrations of 2,3,7,8-TCDD for the sample was 0.331, 0.039 and 0.003 ug/kg for worst, more likely and best case, respectively. These concentrations all are less than 1 ppb (ug/kg) guideline concentrations established by the Center for Disease Control (CDC) for 2,3,7,8-

[2]Interim Risk Assessment Procedures for Mixtures of Chlorinated-Dibenzodioxins and -Dibenzofurans (CDDs and CDFs). Chlorinated Dioxin Work Group Position Paper: April 1986 - updated (Unpublished)

248/262

TABLE 3

CONCENTRATIONS EXPRESSED AS 2,3,7,8-TCDD TOXICITY EQUIVALENTS

Chemical	Reported Concentration (ug/kg)	2,3,7,8-TCDD Equivalent Concentrations (ug/kg)			
		Worst Case	More Likely Case		Best Case
			2,3,7,8-Congeners	All Others	
2,3,7,8-TCDD	ND (0.084)	ND	ND	ND	ND
Other TCDD	ND (0.10)	ND	ND	ND	ND
Total PCDDs	0.260	0.130	0.009	0.001	0.001
Total HxCdds	3.800	0.152	0.003	0.001	0.002
Total HpCDDs	48.500	0.049	0.024	0.0002	0.00049
OCDD	74.200	0.000	0.000	0.000	0.000
Total PCDDs	126.760	0.331	0.037	0.003	0.003

TCDD in soil in a residential area.[3] In the reference the author states: "We therefore conclude that a soil level of 1 ppb TCDD (2,3,7,8-TCDD) in residential areas is a reasonable level at which to express TCDD (2,3,7,8-TCDD) below 1 ppb are, for practical purposes considered not to reach a level of concern". With respect to commercial areas, CDC concludes: "Since these total doses for all routes are so much smaller than in residential areas, a level of concern may not necessarily be reached unless levels are several fold or more above 1 ppb".

Conclusion

The evaluation proposed by the Cancer Work Group Policy Document and the CDC guidelines for levels of 2,3,7,8-TCDD which would be a level of concern in soil from residential and industrial areas, support the conclusion that the reported concentrations of PCDDs in an ash/soil sample are not levels of public health concern, regardless of the disposition of the ash/soil.

[3]Kimbrough, R.D., et.al. Health Implications of 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) Contamination of Residential Soil. Journal of Toxicology and Environmental Health, 14:47-93. 1984

APPENDIX C

SLUG INJECTION DATA AND ANALYSIS

251/262

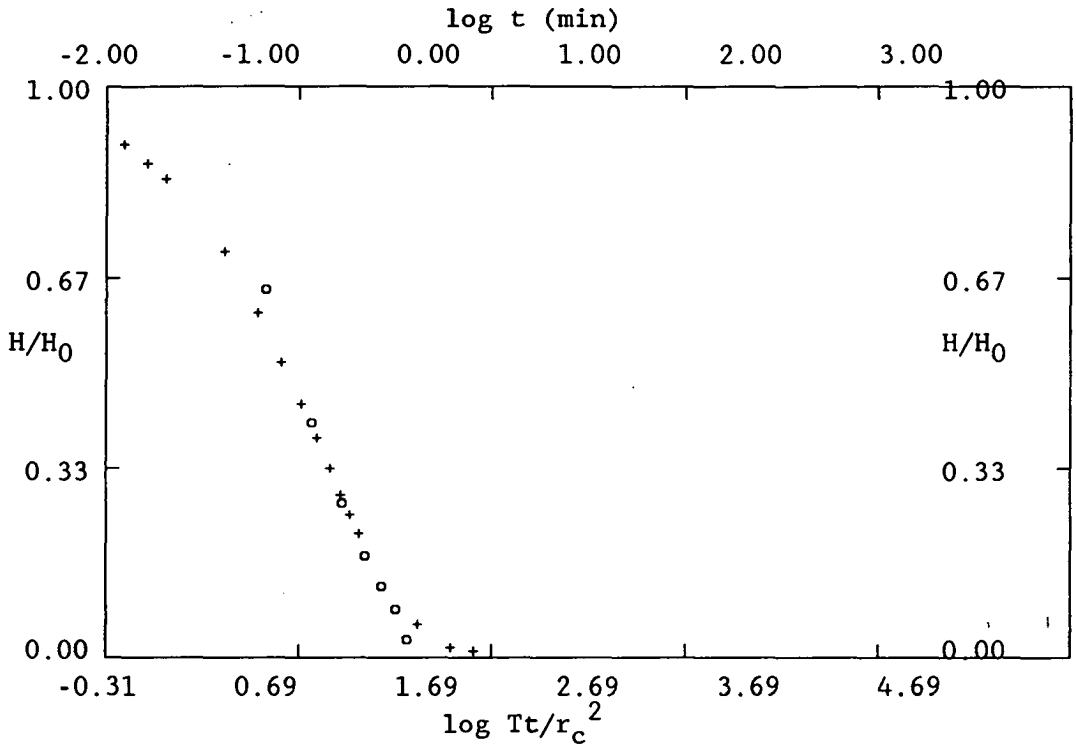
Data for Slug Injection/Withdrawal Test

Well Name: MW10(R) Date of Test: 2/13/92
Aquifer Thickness (b): 5.500 ft
Change in Vol.of Water = 0.254 cu ft
Effective Radius of Well = 0.330 ft
Radius of Casing(rc) over Water Level Decline = 0.330 ft

Entry No.	Time(t) (min)	Head (ft)	H (ft)	H/H0
1	-1.000	101.350		
2	0.000	104.260	2.910	1.000
3	0.067	103.240	1.890	0.649
4	0.117	102.550	1.200	0.412
5	0.167	102.140	0.790	0.271
6	0.217	101.880	0.530	0.182
7	0.267	101.720	0.370	0.127
8	0.317	101.600	0.250	0.086
9	0.367	101.440	0.090	0.031
10	0.417	101.370	0.020	0.007

252/262

SINGLE WELL RESPONSE MW10(RISE)



o - Data

\+ - Type Curve
Slug Test: alpha =-10.0

SOLUTION

Transmissivity = 8.259E-0003 sq m/sec
Aquifer Thick. = 1.676E+0000 m
Hydraulic Cond.= 4.926E-0003 m/sec
Storativity = 1.000E-0010

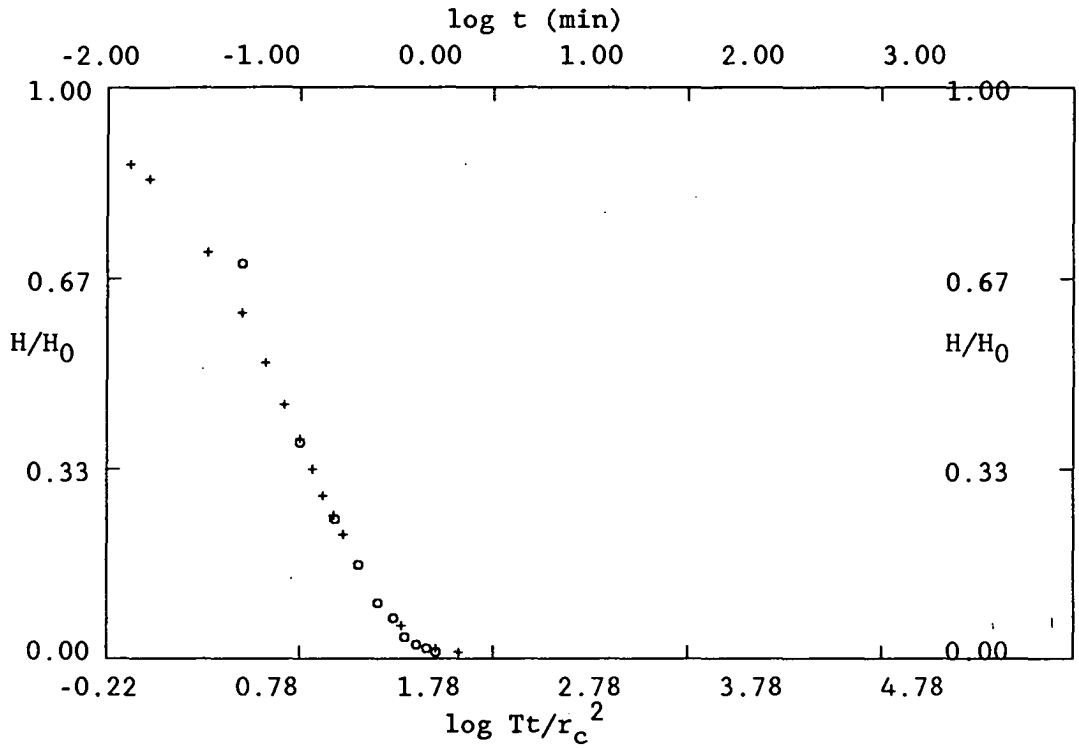
253/262

Data for Slug Injection/Withdrawal Test

Well Name: MW10(F) Date of Test: 2/13/92
Aquifer Thickness (b): 5.500 ft
Change in Vol.of Water = 0.254 cu ft
Effective Radius of Well = 0.330 ft
Radius of Casing(rc) over Water Level Decline = 0.330 ft

Entry No.	Time(t) (min)	Head (ft)	H (ft)	H/H0
1	-1.000	101.350		
2	0.000	98.440	2.910	1.000
3	0.050	99.340	2.010	0.691
4	0.100	100.240	1.110	0.381
5	0.150	100.630	0.720	0.247
6	0.200	100.860	0.490	0.168
7	0.250	101.050	0.300	0.103
8	0.300	101.140	0.210	0.072
9	0.350	101.230	0.120	0.041
10	0.400	101.280	0.070	0.024
11	0.450	101.300	0.050	0.017
12	0.500	101.320	0.030	0.010
13	0.550	101.350	0.000	0.000

SINGLE WELL RESPONSE MW10(FALL)



o - Data

\+ - Type Curve
Slug Test: alpha =-10.0

SOLUTION

Transmissivity = 1.016E-0002 sq m/sec
Aquifer Thick. = 1.676E+0000 m
Hydraulic Cond.= 6.061E-0003 m/sec
Storativity = 1.000E-0010

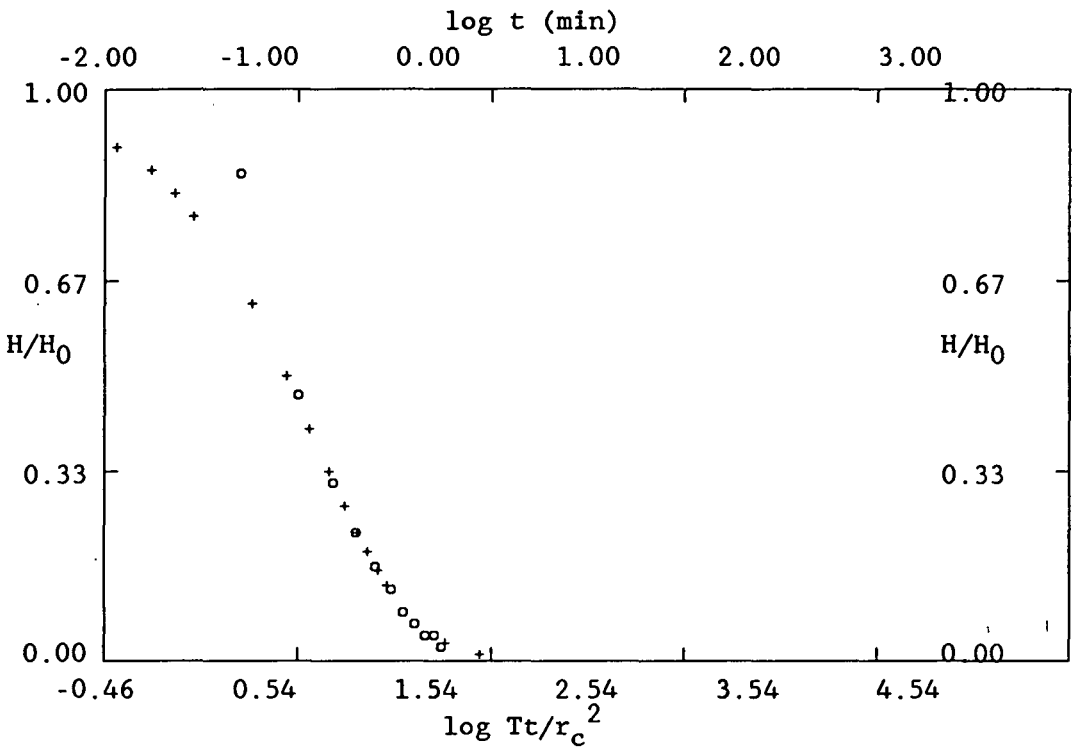
Data for Slug Injection/Withdrawal Test

Well Name: MW8(F) Date of Test: 2/13/92
Aquifer Thickness (b): 5.500 ft
Change in Vol.of Water = 0.254 cu ft
Effective Radius of Well = 0.330 ft
Radius of Casing(rc) over Water Level Decline = 0.330 ft

Entry No.	Time(t) (min)	Head (ft)	H (ft)	H/H0
1	-1.000	108.790		
2	0.000	105.880	2.910	1.000
3	0.050	106.300	2.490	0.856
4	0.100	107.430	1.360	0.467
5	0.150	107.870	0.920	0.316
6	0.200	108.140	0.650	0.223
7	0.250	108.300	0.490	0.168
8	0.300	108.420	0.370	0.127
9	0.350	108.530	0.260	0.089
10	0.400	108.600	0.190	0.065
11	0.450	108.650	0.140	0.048
12	0.500	108.650	0.140	0.048
13	0.550	108.720	0.070	0.024

256/262

SINGLE WELL RESPONSE MW8 (FALL)



o - Data

\+ - Type Curve
Slug Test: alpha = -7.0

SOLUTION

Transmissivity = 5.847E-0003 sq m/sec
Aquifer Thick. = 1.676E+0000 m
Hydraulic Cond.= 3.488E-0003 m/sec
Storativity = 1.000E-0007

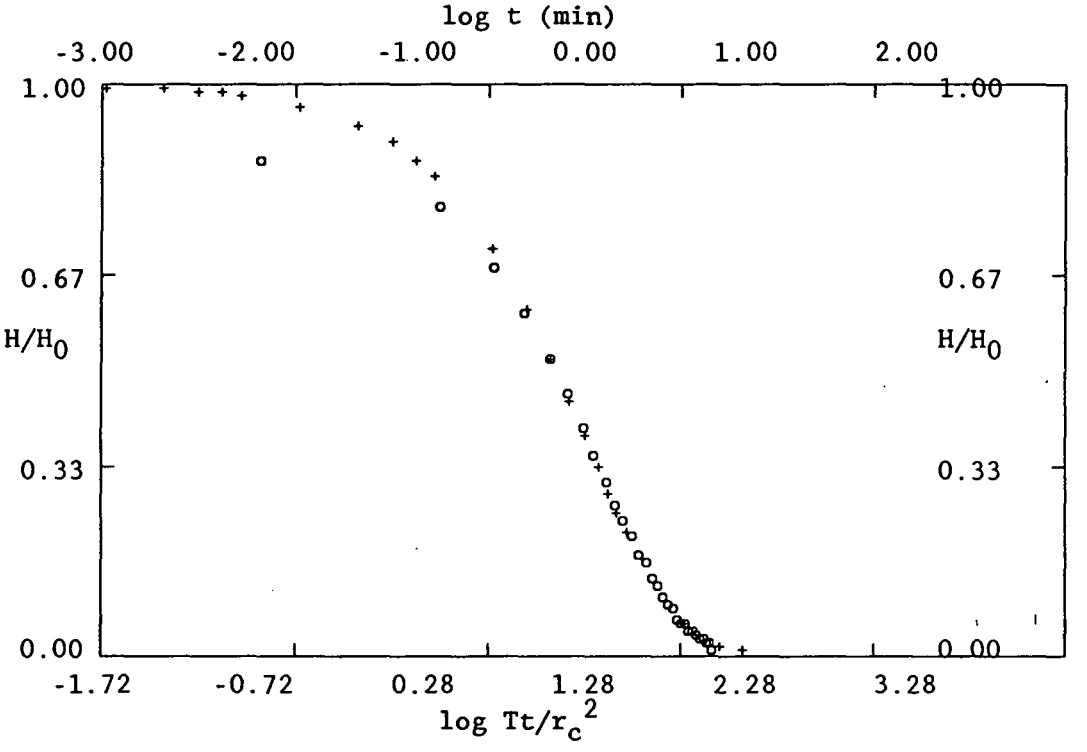
Data for Slug Injection/Withdrawal Test

Well Name: MW4(R) Date of Test: 2/13/92
Aquifer Thickness (b): 5.500 ft
Change in Vol.of Water = 0.254 cu ft
Effective Radius of Well = 0.330 ft
Radius of Casing(rc) over Water Level Decline = 0.330 ft

Entry No.	Time(t) (min)	Head (ft)	H (ft)	H/H0
1	-1.000	107.580		
2	0.000	110.490	2.910	1.000
3	0.007	110.110	2.530	0.869
4	0.057	109.860	2.280	0.784
5	0.107	109.560	1.980	0.680
6	0.157	109.330	1.750	0.601
7	0.207	109.100	1.520	0.522
8	0.257	108.910	1.330	0.457
9	0.307	108.750	1.170	0.402
10	0.357	108.610	1.030	0.354
11	0.407	108.480	0.900	0.309
12	0.457	108.360	0.780	0.268
13	0.507	108.270	0.690	0.237
14	0.557	108.200	0.620	0.213
15	0.607	108.110	0.530	0.182
16	0.657	108.060	0.480	0.165
17	0.707	107.990	0.410	0.141
18	0.757	107.950	0.370	0.127
19	0.807	107.900	0.320	0.110
20	0.857	107.850	0.270	0.093
21	0.907	107.830	0.250	0.086
22	0.957	107.780	0.200	0.069
23	1.007	107.760	0.180	0.062
24	1.057	107.760	0.180	0.062
25	1.107	107.710	0.130	0.045
26	1.157	107.710	0.130	0.045
27	1.207	107.690	0.110	0.038
28	1.257	107.670	0.090	0.031
29	1.307	107.670	0.090	0.031
30	1.357	107.650	0.070	0.024
31	1.407	107.650	0.070	0.024
32	1.457	107.620	0.040	0.014

258/262

SINGLE WELL RESPONSE MW4 (RISE)



o - Data

\+ - Type Curve
Slug Test: alpha =-10.0

SOLUTION

Transmissivity = 3.213E-0003 sq m/sec
Aquifer Thick. = 1.676E+0000 m
Hydraulic Cond.= 1.917E-0003 m/sec
Storativity = 1.000E-0010

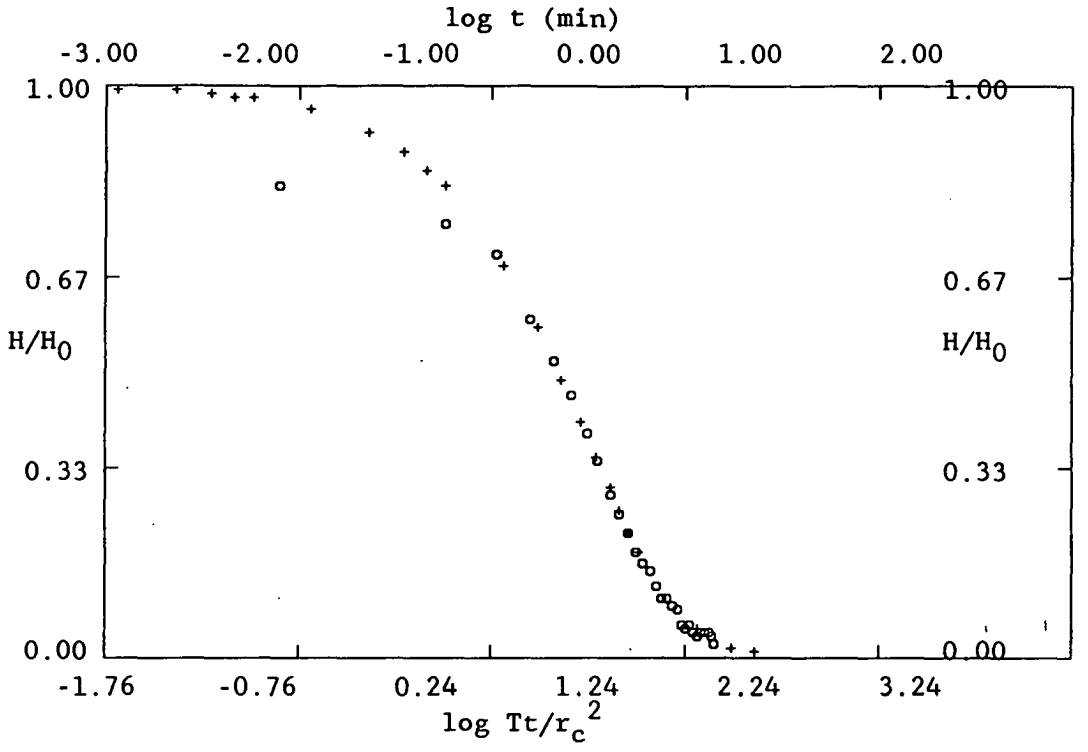
259/262

Data for Slug Injection/Withdrawal Test

Well Name: MW4(F) Date of Test: 2/13/92
Aquifer Thickness (b): 5.500 ft
Change in Vol.of Water = 0.254 cu ft
Effective Radius of Well = 0.330 ft
Radius of Casing(rc) over Water Level Decline = 0.330 ft

Entry No.	Time(t) (min)	Head (ft)	H (ft)	H/H0
1	-1.000	107.600		
2	0.000	104.690	2.910	1.000
3	0.008	105.200	2.400	0.825
4	0.058	105.390	2.210	0.759
5	0.108	105.550	2.050	0.704
6	0.158	105.870	1.730	0.595
7	0.208	106.080	1.520	0.522
8	0.258	106.260	1.340	0.460
9	0.308	106.450	1.150	0.395
10	0.358	106.590	1.010	0.347
11	0.408	106.770	0.830	0.285
12	0.458	106.860	0.740	0.254
13	0.508	106.960	0.640	0.220
14	0.558	107.050	0.550	0.189
15	0.608	107.120	0.480	0.165
16	0.658	107.160	0.440	0.151
17	0.708	107.230	0.370	0.127
18	0.758	107.280	0.320	0.110
19	0.808	107.280	0.320	0.110
20	0.858	107.330	0.270	0.093
21	0.908	107.350	0.250	0.086
22	0.958	107.420	0.180	0.062
23	1.008	107.440	0.160	0.055
24	1.058	107.420	0.180	0.062
25	1.108	107.460	0.140	0.048
26	1.158	107.490	0.110	0.038
27	1.208	107.460	0.140	0.048
28	1.258	107.460	0.140	0.048
29	1.308	107.460	0.140	0.048
30	1.358	107.490	0.110	0.038
31	1.408	107.530	0.070	0.024

SINGLE WELL RESPONSE MW4 (FALL)



o - Data

\+ - Type Curve
Slug Test: alpha = -9.0

SOLUTION

Transmissivity = 2.930E-0003 sq m/sec
Aquifer Thick. = 1.676E+0000 m
Hydraulic Cond.= 1.748E-0003 m/sec
Storativity = 1.000E-0009