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TO: Harry Allen, U.S. EPA/ERT Work Assignment Manager

THROUGH: R. M. Shapot, REAC Program Manager

FROM: M. F. Mohn, REAC Sub-Task Leader M. F. Mohn

SUBJECT: BIOREMEDIATION ACTIVITY SUMMARY, PENTA WOOD PRODUCTS SITE, SIREN, WISCONSIN, WA # 0-026 - TECHNICAL MEMORANDUM

This memorandum contains results from Phase II bioremediation activities conducted by the United States Environmental Protection Agency/Environmental Response Team (U.S. EPA/ERT) and Roy F. Weston, Inc. (WESTON) Response Engineering and Analytical Contract (REAC) personnel at the Penta Wood Products (PWP) site, located in Siren, Wisconsin. Several bioremedial processes employed at the site for pentachlorophenol (PCP) degradation were evaluated, including landfarming, biopiles, and anaerobic dechlorination. Test methodologies and results are presented below.

Landfarming

A landfarm treatability experiment was initiated at the PWP site on October 24, 1994 and was concluded on March 14, 1995. The objective of the study was to determine the effectiveness of a proprietary soil amendment (Daramend 6380) in reducing PCP levels in contaminated PWP site soil. Daramend is an organic soil amendment marketed by Grace Dearborn Inc. (GDI) for use in solid phase applications requiring increased biodegradation rates resulting from improvement of environmental conditions (nutrient content, biologically available water, surfaces for microbial adhesion, and interfacial contact between the target compounds and the microorganisms that degrade them).[1] GDI was subcontracted by REAC to set up the landfarm treatability test.

Methodology

The experimental setup was located in the garage building and consisted of a wooden box framework fabricated from 3-inch x 3-inch lumber. The approximate dimensions of the wood framework were 2 feet high x 8 feet wide x 22 feet long. The structure was divided into two compartments (approximately 8 feet x 8 feet; and approximately 8 feet x 14 feet) by a wall constructed from 3-inch x 3-inch lumber. Plastic 6-mil sheeting was then used to line the interior of each of the two compartments. After lining the compartments, styrofoam insulation sheets approximately 1 inch thick were placed in the floors of both compartments to reduce heat loss from the soil during cold weather. Sheets of 1/2-inch plywood were then placed on top of the styrofoam to provide a barrier able to resist mechanical damage that might occur during subsequent soil handling operations (i.e., rototilling and soil sampling). A 1500-watt electric heater was placed in the wooden box. Finally, removable lid sections fabricated from 1-inch thick styrofoam were used to provide a closed system for the experiment. Figure 1 shows the experimental setup for the landfarm plots (the lid sections are not shown).

Soil used in the treatability study was excavated and prepared by the Region V Emergency Response Cleanup Services (ERCS) contractor, Environmental Quality Management, Inc. (EQM) and was mixed into one large [approximately 8 cubic yards (cu yd)] pile. A Bobcat loader was used to transfer approximately 1.5 tons and 2.9 tons of soil, respectively, into the untreated and Daramend-treated landfarm plot compartments. Daramend amendment was added manually by GDI personnel. The untreated and Daramend-treated plots were adjusted to approximately 15 percent moisture content and 20 percent moisture content, respectively, and both landfarm plots were rototilled to obtain a homogeneous soil matrix prior to sampling.

Initial soil samples were collected from the untreated and Daramend-treated plots following moisture addition and rototilling. Each plot was divided into a grid matrix containing nine equal portions. A soil sample was collected by means of a 4-inch diameter hand auger from each of the nine plot portions. Figure 2 illustrates the sampling grid. Each soil sample was placed in a bucket separately, mixed by hand, and then passed through a 1/4-inch wire mesh screen to remove particles and debris larger than 1/4 inch. The screened soil was then mixed by hand again, and then placed into the appropriate containers for PCP, pH, and moisture content analyses.

This soil sampling procedure was followed for the untreated and Daramend-treated plots approximately once per month for the first three sampling events of the treatability study. The same sampling procedure was used during the fourth sampling event, with the exception that the core samples collected from grids 1-3 were composited together. Three separate samples were then collected for analysis from this composite soil batch. Similar samples were collected from composited soil batches containing soil from grids 4-6, and from grids 7-9. Nine samples were obtained during each sampling event.

Samples for analysis of nutrients [ammonia, nitrate, total Kjeldahl nitrogen (TKN), phosphate, and total phosphorous]; inorganics (arsenic, copper, zinc, chloride, and sulfate); total organic carbon (TOC); and total petroleum hydrocarbons (TPH) were collected using a protocol similar to that used for the fourth sampling event. However, only three composite samples were collected, and only during the first sampling event.

Additionally, during each sampling event, composite samples containing screened soil from grids 1-9 were collected from the untreated and Daramend-treated plots.

Water samples were analyzed for PCP at the REAC facility, located in Edison, NJ. Soil samples were analyzed for PCP at REAC's High Hazard Laboratory (HHL), located in Brunswick, GA. Soil samples were analyzed for pH and moisture content at WESTON's Environmental Technology Laboratory (ETL), located in Lionville, PA. Nutrients and inorganics analyses (water and soil) were subcontracted to Southwest Research Institute, located in San Antonio, TX; ATEC Associates, located in Indianapolis, IN; and Analab, located in Edison, NJ. Chlorinated phenols analyses (water and soil) were subcontracted to Analab. Selected soil samples were split for parallel analyses of PCP, pH, and moisture content by REAC and GDI (using their own analytical laboratory). Appendix A contains Final Analytical Reports with results from REAC and subcontractor analytical laboratories. Appendix B contains analytical results and other correspondence from GDI.

Rototilling was conducted for the untreated and Daramend-treated soil plots after each sampling event. Based on GDI recommendations, approximately 1.2 kilogram (kg) of calcium oxide (CaO) and 15 gallons of water were added to the untreated soil plot, and 2.1 kg of CaO and 60 gallons of water were added to the Daramend-treated plot after sampling event 3.

Results and Discussion

Table 1 contains PCP results for soil samples collected through March 14, 1995 (i.e., the first five sampling events) from the untreated and Daramend-treated landfarm plots. The data are illustrated graphically in Figure 3, and show that after 37 days, PCP concentrations in untreated soil samples were essentially unchanged [average of 47 milligrams per kilogram (mg/kg) PCP], while those in Daramend-treated soil samples were reduced to an average of 16 mg/kg. However, after 142 days, the average PCP concentration in soil samples collected from the untreated and Daramend-treated plots was 13 mg/kg and 14 mg/kg, respectively. Table 1 also shows that, for each sampling event, the PCP levels in the nine soil samples collected from each plot were very consistent and exhibited good precision. This is most likely a result of rototilling and the sample preparation method used (mixing and screening).

Table 1 also shows that the results from the untreated and Daramend-treated composite samples created by blending soil taken from each of the nine respective plot grids were very similar to the data obtained from individual sample analysis results. Appendix B contains analytical reports from GDI which summarize the parallel analyses results of these composited samples. The results generally agree with those from REAC. However, the absolute values of the results from GDI are typically lower than the corresponding REAC results. This may be due to the fact that the analyses were carried out in different laboratories.

Table 2 presents initial chemical characterization results for untreated and Daramend-treated soil samples. The table shows that the Daramend-treated soil samples exhibited higher ammonia, nitrate, TKN, phosphate, total phosphorous, and chloride levels than the untreated soil. Water holding capacity values were also greater for Daramend-treated soil. Water holding capacity results appear to be too low and are suspect. There appeared to be no significant changes in the remainder of the parameters evaluated (arsenic, copper, zinc, sulfate, TOC, and TPH as a result of Daramend addition. The presence of nitrogen and phosphorous nutrients in Daramend are probably partially responsible for the greater initial PCP reduction exhibited by Daramend-treated soil compared to the untreated soil.

Table 3 lists final chemical characterization data for untreated and Daramend-treated soil samples. The table shows results similar to those in Table 2, i.e., the Daramend-treated samples had higher ammonia, nitrate, TKN, phosphate, total phosphorous, and chloride levels, as well as TOC concentrations, compared to the untreated soil. Water holding capacity data again appear too low for both untreated and Daramend-treated soil.

The untreated soil samples summarized in Table 3 exhibited greater ammonia and chloride concentrations compared to the initial values for this sample (Table 2), and lower total phosphorous, arsenic, zinc, TOC, and TPH concentrations. The Daramend-treated soil samples summarized in Table 3 had greater ammonia, nitrate, and TKN concentrations than the corresponding initial samples (Table 2), and lower total phosphorous, arsenic, TOC, and TPH concentrations.

Table 4 contains a summary of several average physical characteristics results of soil samples collected from the untreated and Daramend-treated landfarm plots. The table shows that the untreated soil exhibited an average temperature of approximately 5° C and increased to almost 20° C by day 108.

In contrast, the average temperature of the Daramend-treated soil was almost 20° C at days 37 and 72, and then decreased to approximately 2° C by day 108. Neither plot exhibited any significant temperature change after 108 days. Ambient temperatures are also included in the table. With the exception of ambient temperature measurements, each temperature data point represented in the table is an average of nine individual temperature measurements, which were obtained from the sampling locations in each respective treatment plot. Appendix C contains all temperature data.

Based on these data, it is believed that PCP-degrading activity in the Daramend-treated soil plot was high initially and then decreased with time. PCP-degrading activity in the untreated soil plot required a greater time period to reach its maximum. Assuming that increased soil temperature is due to microbial activity, these data may account for the early reduction of PCP concentrations in Daramend-treated soil, as well as the lengthy acclimation period required by the microorganisms in the untreated soil before PCP removal occurred. Figure 4 presents a graph of average soil temperature as a function of time for the untreated and Daramend-treated landfarm plots.

Table 4 also shows that the average moisture level in the Daramend-treated soil was typically higher than in the untreated soil. Target soil moisture concentrations were approximately 15 percent and 20 percent, respectively, for the untreated and Daramend-treated plots. This was due to the lower water holding capacity of the untreated soil, i.e., the tendency of excess water to leach out from the untreated soil. Moisture conditions during this test favored the Daramend-treated plot since high moisture concentrations are desirable for maintaining a viable microbial population. This may also explain why there was greater initial PCP degrading activity in the Daramend-treated soil. Figure 5 shows the average soil moisture as a function of time for the untreated and Daramend-treated landfarm plots. Each moisture content data point in the figure is an average of nine individual moisture content measurements obtained from soil collected at each sampling location in both plots. Appendix C contains all moisture content data.

Table 4 shows the average moisture level in the Daramend-treated soil was consistent and ranged from 14.4 percent to 20.2 percent. However, the moisture level of the untreated soil decreased steadily to a low of 3.5 percent after 142 days. The moisture content of the Daramend-treated soil did not decrease greatly because there was little biological activity to generate heat in the interval between days 72 and 108. In contrast, the moisture level of the untreated soil decreased significantly. This was likely due to the heat generated as a result of microbial activity between days 72 and 108, which was probably sufficient to drive off the water added following sampling event 3 (day 72).

Table 4 shows that the average pH value of the untreated soil was approximately 6.3 for the first 72 days, while that of the Daramend-treated soil ranged between approximately 5.9 and 7.0 during this time period. The pH of both plots was increased to above 8 following CaO addition on day 72. Figure 6 illustrates the average soil pH as a function of time for the untreated and Daramend-treated landfarm plots. Each pH data point in the figure is an average of nine individual soil pH measurements obtained from soil collected from each sampling location. Appendix C contains all pH data used.

The advantage offered by treatment with Daramend, i.e., earlier increase in microbiological activity, which in turn causes a faster reduction in soil PCP concentration, is most likely due to one or more of the following characteristics:

- increased phosphorous and nitrogen levels in Daramend;
- increased amount of readily degradable biomass (Daramend resembles chopped hay or straw) - this would allow the general population of microbes in the soil to thrive and release considerable amounts of heat energy relatively early in the process, which would be expected

to result in increased activity of PCP-degrading organisms, especially in cold weather;

- greater moisture holding capacity - treatment with chopped plant amendments like Daramend, sawdust, leaves, grass clippings, etc. permits an increase in the quantity of water that can be stored in the soil without producing leachate;[2]

The landfarming test has been completed.

Biopiles

Methodology

A biopile treatability study was initiated at the PWP site in early September 1994 by ERT and REAC personnel. Construction of the biopiles took place September 2-10, 1994. A Bobcat loader equipped with a bucket was used by EQM to place 8 batches of PCP-contaminated soil mixed with various amendments in a storage building located on the PWP site (see Figure 7). This building is approximately 70 feet long and 45 feet wide, and has a concrete floor containing a built-in drain that extends almost the entire length of the building. Leachate from the piles flows into the drain and is carried to a communal sump located at the north end of the floor drain. A submersible pump equipped with level switches periodically pumps the leachate into 1 of 3 1,500-gallon plastic leachate storage tanks located inside the storage building.

As shown in Figure 7, each biopile was placed on a base of wood post peelings (pieces of wood up to approximately 4 inches in length) approximately 4-6 inches in depth. The post peelings were placed directly on the concrete floor of the storage building. Each biopile was approximately 10 feet long x 5 feet wide x 4 feet high. The biopiles were placed to provide access to tanks and equipment located in the building and to permit periodic mechanical turning of the biopiles. Slotted plastic 4-inch diameter hose was placed lengthwise in the base of post peelings and was connected to an air blower that supplied air to the piles. Four air blowers were used to aerate the biopiles - each blower supplied air to two biopiles for 15 minutes per hour. Thus, each biopile was aerated for approximately 6 hours per day.

A flat garden-type plastic soaker hose was placed across the top of each biopile. This hose was attached to an electric submersible pump that was placed in a 850-gallon plastic water storage tank in order to supply water to the treated soil piles. Periodic daily water usage measurements indicated that approximately 20 gallons of water was applied to the piles on a daily basis. This is equal to approximately 2.5 gallons of water per biopile per day. A total of approximately 3,450 gallons of leachate was collected over 185 days of testing. This equates to an average leachate generation rate of 18.6 gallons per day, or approximately 2.3 gallons of leachate per biopile per day. Each pile was then covered with black plastic liner material to retain heat and moisture.

Two 375,000-British Thermal Unit (BTU) per hour propane gas heaters were installed in the building to maintain biopile temperatures above freezing. These heaters were supplied by 3 x 1,000-gallon propane tanks that were placed outside the building. A large plastic tarp was fabricated and raised inside the building to approximately 8 feet above floor level to reduce heat loss from the building during the winter months.

Biopile temperatures were monitored by means of two thermocouples inserted into each pile. In addition, ambient air temperature within the building, and outside air temperature were monitored. A computer equipped with a data aquisition and process control board was used to save temperature data every 4 hours. Access to the computer at any time from the REAC facility was made possible via a modem telephone link. The computer was also used to control air blower activity and moisture addition. Figure 8 illustrates the computer-controlled data aquisition and process control system.

The following table summarizes the treatability test matrix used in the biopile study:

Pile No.	Formulation Ingredients					
	Soil (cu yd)	Wood Chips (cu yd)	Turkey Manure (cu yd)	Expanded Sawdust (cu yd)	Ammonium Nitrate (lb)	Sawdust Extract (gal)
1	2	2	--	--	--	--
2	2	2	1	--	--	--
3	2	2	1	--	100	--
4	2	2	2	--	--	--
5	2	2	1	0.5	100	--
6	2	2	1	0.5	--	--
7	2	2	--	1	100	--
8	2	2	--	1	100	150

The sawdust used in amending the biopiles was soaked in caustic solution (pH 13-14) for several days. This resulted in solubilization of lignins and other wood cell components, and their subsequent removal from the sawdust particles. The caustic mixture was then neutralized to a pH of 7 using sulfuric and hydrochloric acids. The sawdust (now containing more readily available cellulose) was then separated from the liquid and was used as a biopile amendment. The aqueous liquid remaining (neutralized sawdust extract) was stored in 55-gallon drums. Approximately 150 gallons of this liquid was used to amend biopile 8.

Soil samples were collected from the biopiles using a 4-inch diameter hand auger to remove 3 full depth cores from each pile. One core each was removed from the center, and the east and west ends of the pile. Figure 9 shows the sampling grid for the biopiles. Initially, each full depth core was placed into a bucket separately, mixed by hand, and then passed through a 1/4-inch wire mesh screen to remove material greater than 1/4 inch. The screened soil was then mixed again and placed into appropriate containers for PCP, pH, and moisture content analyses. During the initial sampling event, triplicate PCP samples were collected from each core to obtain statistically reliable analytical data. Thus, for each biopile, 9 PCP soil samples were collected. Nutrients and inorganic analysis samples were also collected during the initial sampling event.

During sampling events 2-4, the same soil collection and preparation procedures were followed, with the exception that only 3 PCP samples (one from each core) were collected. No samples were collected for nutrients or inorganics analyses. The sampling protocol used in sampling events 5 and 6 were identical to that used initially (i.e., 9 PCP soil samples were collected during each sampling event).

Influent and leachate samples were collected periodically for PCP analyses. Nutrients and metals analyses were also conducted on influent and leachate samples collected at the beginning of the test program.

The biopiles were turned manually using shovels and pitchforks after each of the 5 sampling events. A rototiller was used to help turn and homogenize the soil in the biopiles after sampling events 4 and 5. Approximately 2 pounds of ammonium nitrate fertilizer was added to each of the biopiles after sampling event 5, but prior to the turning/rototilling operations.

Results and Discussion

Table 5 presents the initial chemical characterization results for soil samples collected from the compost piles. The results show that the untreated soil (pile 1) exhibited lower concentrations of nearly every nutrient tested, compared to the amended samples. Arsenic, copper, and zinc appear to be the only analytes tested whose concentrations were similar in the untreated and amended biopiles. While the ammonia concentrations of piles 1 and 6 were relatively low (1.6 mg/kg and 320 mg/kg, respectively) compared to the rest of the piles (up to 2,300 mg/kg) these 2 piles consistently exhibited the best PCP removal.

Table 6 contains PCP results for soil samples collected through March 15, 1995 (i.e., the first 6 sampling events) from the untreated (control) and amended compost piles. The table shows that the control pile (pile 1) and pile 6 (Wood chips/turkey manure/sawdust) were consistently the most effective treatments and displayed the greatest PCP reductions. It should also be noted that the average initial PCP level of the control sample was 460 mg/kg, while those of the amended piles ranged from 160 mg/kg (pile 4) to 240 mg/kg (pile 3). The reason for this significant difference in PCP concentrations is not known; however, it is possible that dilution effects due to amendment addition may account for some, but not all, of this difference (see Appendix C). In addition, since the initial soil samples (collected September 12, 1994) were actually collected several days after the compost piles were prepared, the possibility exists that the PCP concentrations in the amended piles were originally closer to that of the control pile, but decreased at a faster rate initially due to the presence of greater amounts of nutrients. Regardless, the lowest soil PCP concentrations were consistently observed in biopiles 1 and 6. Percent reductions in soil PCP concentrations were similar to those observed in the untreated and Daramend-treated plots in the landfarm study. However, after 6 sampling events, the PCP concentrations of soil samples from biopiles 1 and 6 were 96 mg/kg and 97 mg/kg, respectively. These PCP concentrations are much higher than those in samples from the landfarm study (see Table 1). Figure 10 contains a graph of average soil PCP concentration as a function of time for each of the biopiles.

Table 7 contains a summary of several average physical characterization results of soil samples collected from each of the biopiles. The table shows that the average temperature range of the biopiles during a given sampling event was typically 2-5° C. Over the course of the test program, average biopile temperatures ranged from approximately 5° C to 18° C. Figure 11 contains biopile temperatures vs. time. In addition to the temperature trends in Table 7, the figure shows that significantly greater temperature fluctuations were recorded for the ambient air in the building compared to the biopiles. This is due to the greater thermal mass (heat capacity) of soil compared to that of air. Figure 11 also contains outside air temperatures.

Table 7 also shows that the average moisture content in the biopiles ranged between approximately 14 percent and 36 percent. Although the absolute values of the average moisture content varied, the average moisture content of the biopiles were fairly consistent at any given sampling event, i.e., the relative ranking with regard to moisture in the biopiles (from highest moisture content to lowest moisture content) generally was similar at different sampling events. Figure 12 illustrates moisture content as a function of time for each biopile.

The pH data in Table 7 indicate that several of the biopiles exhibited initially high pH values (above 8), which then typically stabilized at pH values between approximately 6 and 7. The pH of the control biopile was consistently the lowest, and ranged between 5.2 and 6.2. Figure 13 illustrates biopile pH as a function of time.

Table 8 lists chemical characterization results for the influent (feedwater) used in the biopile treatability test. Influent was obtained from Monitor Well 6 except during periods of cold weather when the well plumbing was frozen. At these times potable water from either Siren, WI, or Grantsburg, WI was used. Leachate characterization results are also presented. The table shows that calcium, magnesium, and nitrate were present in the influent at concentrations of 46 mg/L, 29 mg/L, and 15 mg/L, respectively. All other analytes were present in the influent at relatively low concentrations.

Table 8 also shows that several compounds were present in the leachate at high concentrations compared to the influent values. Nutrients (ammonia, nitrate, TKN, phosphate, and total phosphorous) were all present at concentrations up to approximately 670 mg/L. TOC was present in the leachate at 520 mg/L. Several metals, including calcium, iron, manganese, arsenic, copper, zinc, and cadmium, were present at concentrations higher than the corresponding values reported for the influent. Based on the results in Table 8, leaching of several compounds occurred.

Table 9 lists PCP results for influent, leachate, and neutralized sawdust extract samples collected over the course of the treatability study. The table shows that influent PCP concentrations ranged from 0.0012 mg/L to 1.4 mg/L, while sump leachate PCP concentrations ranged from 2.4 mg/L to 13 mg/L. Storage tank leachate concentrations ranged from 1.2 mg/L to 63 mg/L. The reason for the wide PCP concentration variation in Green Storage Tank 1 is not known. It is possible that a nonhomogeneous sample was collected during at least one sampling event (all of the tanks, particularly Tank 1, were noted to have an oily layer at the surface of the water) and/or that biodegradation took place in the tank. Based on the results of Table 9, leaching of PCP from the biopiles occurred.

Individual mass balances for each biopile were not calculated since leachate produced from all the biopiles was mixed together. However, the mass of PCP contained in the stored leachate (approximately 3,450 gallons) was calculated to be approximately 6 percent of the total mass of PCP contained within the 8 biopiles initially (see mass balance calculations in Appendix C). Additional possible PCP recovery losses not accounted for in this calculated value include:

- Leachate PCP concentration reduction resulting from liquid phase biodegradation (extent unknown);

- Evaporative losses of PCP from biopiles (considered unlikely due to relatively low soil temperatures during test program).

Table 9 also shows that the reported PCP concentration for the sawdust extract is 1.8 mg/L and is likely a result of contamination from any of several possible handling/transfer sources (pumps, containers, etc.).

A final biopile sampling event will be conducted during the next trip to the PWP site. The date of this trip will be determined when the HHL (currently at REAC for reconditioning) is available for use.

Anaerobic Dechlorination

Methodology

An anaerobic dechlorination treatability study was initiated at the PWP site by ERT and REAC personnel on October 22, 1994. PCP-contaminated soil was used in the treatability study tests and was obtained from the same batch of soil that was used in the landfarming treatability test. The contaminated soil was passed through a 1/4-inch screen to remove large particles and debris. The soil was then mixed with the proper amendments and was placed into 55-gallon open-top plastic drums (with the exception of Cell no. 4, which was a closed-top drum) that served as reactor cells for the process. Water was then added to the drums to provide moisture, purge air trapped in the voids of the soil/amendment mixture, and act as an oxygen barrier.

The contents of each drum were mixed thoroughly using a large wooden paddle. Each drum was then sealed. The top of each cell was vented using 1/2 inch plastic tubing to remove gases (i.e., carbon dioxide, methane, etc.) that formed from anaerobic degradation, and to provide pressure relief within the headspace of the drums. The drums were placed along the east wall of the compost pile building.

The following table summarizes the treatability test matrix used in the anaerobic dechlorination study:

Cell No.	Formulation Ingredients						
	Soil (kg)	Turkey Manure (kg)	Limestone (kg)	Blood meal (kg)	Potassium Phosphate Monobasic (g)	Potassium Phosphate Dibasic (g)	Water (kg)
1	24.5	--	--	--	--	--	40
2	24.5	2.5	1.7	2.5	5	18	40
3	24.5	2.5	1.7	--	5	18	40
4	24.5	--	--	7.5	15	55	20

Soil and water samples were collected from each of the drums initially, and on a monthly basis for the first five months of the test. Water samples were collected using teflon bailers, while soil samples were collected using a long handled glass container. During each sampling event, soil samples were collected in triplicate, and supernatant water samples were collected in duplicate. These samples were submitted for PCP and chlorinated phenols analyses. No chlorinated phenols analyses were conducted on samples collected during the initial sampling event.

Results and Discussion

Table 10 presents chemical characterization results for soil samples collected from each of the four treatment cells. The table shows that, with the exception of nitrate, nutrient concentrations typically increased after soil amendment compared to the untreated soil sample. Soil amended with the manure/phosphate/limestone/blood meal (M/P/L/B) treatment generally exhibited the greatest increases in nutrient concentrations, while soil amended with the phosphate/blood meal (P/B) treatment exhibited the lowest increases in nutrient concentrations. Soil amended with the manure/phosphate/limestone (M/P/L) treatment typically displayed nutrient concentrations between those of the M/P/L/B and P/B treatments.

Table 11 and Figure 14 summarize the results of PCP analyses conducted on soil samples collected from the anaerobic dechlorination cells. The table shows that the M/P/L/B and P/B treatments generally appeared to be the most successful in reducing soil PCP concentrations (up to 62 percent and 76 percent reductions, respectively). The untreated and M/P/L-treated mixtures also exhibited decreases in soil PCP levels. These data suggest that blood meal addition may be important in aiding PCP degradation when using anaerobic processes.

Table 12 lists intermediate chlorinated phenol compounds detected in untreated and treated soil samples. No samples were collected initially. The presence of these compounds may be due to partial degradation of PCP via different microbial metabolic pathways. The table shows that the untreated soil contained only PCP. However, each of the amended soils contained several chlorophenol-based compounds, including meta, para chlorophenol (m,p CP); 3,5-Dichlorophenol (3,5 DiCP); 2,3,5-Trichlorophenol (2,3,5 TriCP); and 2,3,4,6-Tetrachlorophenol (2,3,4,6 TetCP). In addition, 2,4,5-Trichlorophenol (2,4,5 TriCP) was detected in the M/P/L treatment cell, and 2,4,6TriCP was detected in the P/B treatment cell.

Table 13 contains PCP results for water samples collected from the anaerobic dechlorination cells. The table shows that these PCP concentrations were typically below 1 mg/L. PCP concentration reductions were greater than 92 percent after 143 days, with the exception of the M/P/L treatment (reduction of 79 percent).

Table 14 lists intermediate chlorinated phenol compounds detected in supernatant samples collected from each of the treatment cells. No samples were collected initially. According to the table, only PCP was detected in the supernatant from the cell containing untreated soil. Both m,p CP and 3,5 DiCP were detected in supernatants from the cells containing P/B- and M/P/L-treated soil. Only m,p CP was detected in the supernatant from the cell containing M/P/L/B-treated soil.

Overall, anaerobic dechlorination does not appear to be an economically feasible treatment option in this application due to the relatively large volume of soil to be treated, and the quantity of amendments that would be required. Additionally, this process produced odor-causing compounds.

A final sampling event for the anaerobic dechlorination cells will be conducted during the next trip to the PWP site.

REFERENCES

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2. Haug, R. 1993. *The Practical Handbook of Compost Engineering*. Lewis Publishers. Boca Raton, Florida.

Tables

TABLE 1
Soil PCP Concentration vs. Time – Landfarm Plots
Penta Wood Products
Siren, WI
May 1995

Treatment	Sampling Event/Sampling Date/Test Day				
	Initial/Oct 24, 1994/1		2 /Nov 29, 1994/37		
	Concentration	Average	Concentration	Average	% Reduction (1)
Untreated	52/57/46 45/48/47 44/40/35	46	55/58/46 49/47/39 50/61/22	47	−3
Untreated Composite (2)	--	--	--	--	--
Daramend	50/49/56 47/45/58 49/38/46	49	20/16/25 16/14/14 13/14/12	16	67
Daramend Composite (2)	--	--	--	--	--

Results in milligrams per kilogram (mg/kg).

(1) Compared to average initial PCP concentration of respective treatment.

(2) Prepared by combining soil from corresponding nine individual samples.

TABLE 1 (cont'd)
Soil PCP Concentration vs. Time – Landfarm Plots
Penta Wood Products
Siren, WI
May 1995

Treatment	Sampling Event/Sampling Date/Test Day					
	3/Jan 3, 1995/72			4/Feb 8, 1995/108		
	Concentration	Average	% Reduction (1)	Concentration	Average	% Reduction (1)
Untreated	31/29/27 34/30/28 35/38/29	31	33	18/14/19 24/16/18 13/14/11	16	65
Untreated Composite (2)	28	--	39	14	--	70
Daramend	14/14/14 14/12/13 12/12/19	14	71	12/13/15 13/13/12 22/13/13	14	71
Daramend Composite (2)	13	--	73	13	--	73

Results in milligrams per kilogram (mg/kg).
(1) Compared to average initial PCP concentration of respective treatment.
(2) Prepared by combining soil from corresponding nine individual samples.

TABLE 1 (cont'd)
Soil PCP Concentration vs. Time – Landfarm Plots
Penta Wood Products
Siren, WI
May 1995

Treatment	Sampling Event/Sampling Date/Test Day		
	5/Mar 14, 1995/142		
	Concentration	Average	% Reduction (1)
Untreated	15/13/14 13/10/8.6 15/15/13	13	72
Untreated Composite (2)	16	--	65
Daramend	17/16/13 14/12/13 14/13/10	14	71
Daramend Composite (2)	12	--	76

Results in milligrams per kilogram (mg/kg).
(1) Compared to average initial PCP concentration of respective treatment.
(2) Prepared by combining soil from corresponding nine individual samples.

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TABLE 2
Initial Chemical Characterization Results for Soil Samples – Landfarm Plots
Penta Wood Products
Siren, WI
May 1995

Parameter	Untreated		Daramend	
	Concentration	Average	Concentration	Average
Ammonia Nitrogen	1.0 U/1.0 U/1.2	1.1 U	18/25/59	34
Nitrate Nitrogen	28U/27 U/27 U	27 U	55/59/44	53
TKN	270/240/260	260	1,200/640/820	890
Phosphate	28 U/27 U/27 U	27 U	39/47/34	40
Total Phosphorous	250/310/290	280	340/340/390	360
Arsenic	17/14/14	15	12 U/23/12 U	16
Copper	26/29/28	28	27/34/24	28
Zinc	41/43/44	43	46/45/46	45
Chloride	40/33/32	35	130/130/120	130
Sulfate	28 U/27 U/27 U	27 U	31 U/30 U/31 U	31 U
TOC	39,000/40,000/35,000	38,000	37,000/34,000/45,000	39,000
TPH	3,000/2,900/3,100	3,000	2,500/2,700/2,400	2,500
Water Holding Capacity (%)	5.1/4.8/3.4	4.4	8.6/6.4/13	9.3

Results in milligrams per kilogram (mg/kg) except where noted otherwise.
U indicates compound not detected at the indicated detection limit.

TABLE 3
Final Chemical Characterization Results for Soil Samples – Landfarm Plots
Penta Wood Products
Siren, WI
May 1995

Parameter	Untreated		Daramend	
	Concentration	Average	Concentration	Average
Ammonia Nitrogen	22/16/15	18	200/320/160	230
Nitrate Nitrogen	1.8/1.3 U/1.3 U	1.5	300/360/310	320
TKN	240/210/250	230	1,500/1,400/1,100	1,300
Phosphate	3.1/2.7/5.7	3.8	50/48/39	46
Total Phosphorous	33/120/77	77	140/150/560	280
Arsenic	4.8/4.9/5.0	4.9	0.2 U/7.6/5.5	4.4
Copper	22/19/22	21	23/30/25	26
Zinc	35/30/35	33	32/40/37	36
Chloride	180/46 U/210	145	55 U/330/240	210
Sulfate	9.4 U/8.8 U/11	9.7	13/11 U/11 U	12
TOC	6,200/8,100/6,800	7,000	14,000/32,000/19,000	22,000
TPH	720/1,700/1,300	1,200	1,100/1,300/1,100	1,200
Water Holding Capacity (%)	1.3/0.95/0.98	1.1	4.9/2.7/3.1	3.6

Results in milligrams per kilogram (mg/kg) except where noted otherwise.
U indicates compound not detected at the indicated detection limit.

TABLE 4
Average Physical Characterization Results of Test Soil – Landfarm Plots
Penta Wood Products
Siren, WI
May 1995

Sampling Event	Date	Test Day	Temperature (deg C)			Moisture (%)		pH (std. units)	
			Ambient	Untreated	Daramend	Untreated	Daramend	Untreated	Daramend
Initial	10/24/94	1	12 (1)	--	--	12.0	20.2	6.3	6.6
2	11/29/94	37	−3.0	5.0	17.2	9.8	18.0	6.4	7.0
3	1/3/95	72	−14.5	12.4	18.2	8.2	14.4	6.3	5.9
4	2/8/95	108	−9.8	18.7	2.2	5.6	19.5	8.4	8.1
5	3/14/95	142	13.3	17.8	0.8	3.5	18.1	8.4	8.2

All temperature, moisture, and pH values for soil are average of nine individual measurements unless noted otherwise.
(1) Value equal to average ambient (air) temperature recorded in compost pile building on 10/24/94 (test day 1).

TABLE 5
Initial Chemical Characterization Results for Soil Samples – Biopiles
Penta Wood Products
Siren, WI
May 1995

Parameter	Pile No. 1 Concentration	1 Average	2 Concentration	2 Average	3 Concentration	3 Average	4 Concentration	4 Average
Ammonia Nitrogen (mg/kg)	1.8/1.4/ND	1.6 (1)	970/1,300/1,200	1,200	2,500/2,200/2,100	2,300	1,400/1,200/1,200	1,300
Nitrate Nitrogen (mg/kg)	ND/ND/ND	ND	ND/ND/ND	ND	2,400/1,900/1,800	2,000	ND/ND/ND	ND
TKN (mg/kg)	540/740/730	670	3,700/4,500/4,500	4,200	6,700/8,300/7,100	7,400	5,400/5,700/5,600	5,600
Phosphate (mg/kg)	42/35/38	38	1,300/1,300/1,300	1,300	1,400/1,300/1,400	1,400	1,700/1,900/1,600	1,700
Total Phosphorous (mg/kg)	260/240/240	250	3,000/3,900/3,000	3,300	3,700/3,300/3,500	3,500	4,300/4,500/4,500	4,400
Arsenic (mg/kg)	21/13/13	16	25/25/14	21	ND/19/19	19 (1)	17/19/30	22
Copper (mg/kg)	50/42/41	44	66/66/60	64	66/63/69	66	74/86/72	77
Zinc (mg/kg)	78/40/42	53	72/76/68	72	82/78/81	80	87/97/81	88
Chloride (mg/kg)	ND/ND/ND	ND	900/990/1,000	960	1,100/940/1,000	1,000	1,700/1,800/1,600	1,700
Sulfate (mg/kg)	ND/ND/ND	ND	780/870/870	840	990/730/850	860	1,500/1,500/1,300	1,400
TOC (mg/kg)	57,000/41,000/38,000	45,000	42,000/49,000/48,000	46,000	68,000/69,000/62,000	66,000	78,000/84,000/49,000	70,000
TPH (mg/kg)	3,200/3,900/4,500	3,900	2,200/2,400/4,100	2,900	2,600/3,300/3,000	3,000	3,300/3,300/4,200	3,600
Water Holding Capacity (%)	14/13/9.6	12	25/25/19	23	27/22/18	22	30/29/26	28
CEC (mEQ/g)	0.42/0.59/0.53	0.51	0.47/0.74/0.80	0.67	1.1/0.34/0.49	0.64	0.93/0.87/0.18	0.66

Parameter	Pile No. 5 Concentration	5 Average	6 Concentration	6 Average	7 Concentration	7 Average	8 Concentration	8 Average
Ammonia Nitrogen (mg/kg)	2,300/2,100/2,300	2,200	400/270/280	320	700/710/850	750	900/830/870	870
NitrateNitrogen (mg/kg)	1,400/1,400/1,800	1,500	ND/ND/ND	ND	1,100/1,100/1,100	1,100	1,500/1,100/1,000	1,200
TKN (mg/kg)	6,300/5,600/6,700	6,200	1,200/1,300/1,000	1,200	1,900/1,800/2,300	2,000	2,600/2,200/2,400	2,400
Phosphate (mg/kg)	1,300/1,300/1,200	1,300	340/260/230	280	46/71/37	51	41/99/95	78
Total Phosphorous (mg/kg)	2,800/3,700/3,100	3,200	750/580/650	660	300/270/230	270	260/360/400	340
Arsenic (mg/kg)	22/21/ND	22 (1)	ND/ND/15	15 (1)	ND/13/ND	13 (1)	ND/13/ND	13 (1)
Copper (mg/kg)	73/68/71	71	33/30/50	38	29/50/30	36	33/33/33	33
Zinc (mg/kg)	74/76/84	78	39/51/41	44	40/36/49	42	34/38/44	39
Chloride (mg/kg)	2,100/2,600/3,000	2,600	1,400/1,800/1,200	1,500	2,300/2,500/2,100	2,300	3,300/2,700/2,700	2,900
Sulfate (mg/kg)	830/820/870	840	190/150/120	150	ND/ND/ND	ND	ND/ND/ND	ND
TOC (mg/kg)	85,000/81,000/77,000	81,000	33,000/18,000/25,000	25,000	37,000/28,000/29,000	31,000	39,000/35,000/27,000	34,000
TPH (mg/kg)	3,600/2,200/3,900	3,200	2,700/2,500/3,500	2,900	3,400/2,900/4,000	3,400	2,000/1,500/2,600	2,000
Water Holding Capacity (%)	23/21/14	19	11/6.3/8.0	8.4	4.6/6.4/3.2	4.7	7.4/9.5/3.2	6.7
CEC (mEQ/g)	0.48/0.24/1.3	2.0	0.31/0.40/0.52	0.41	0.50/0.27/0.56	0.44	0.64/0.20/0.69	0.51

ND indicates compound not detected.

(1) Nondetected value(s) not included in calculating average concentration of analyte.

TABLE 6
Soil PCP Concentration vs. Time – Biopiles
Penta Wood Products
Siren, WI
May 1995

Pile No.	Treatment	Sampling Event/Sampling Date/Test Day				
		Initial/Sep 12, 1994/1		2/Oct 23, 1994/42		
		Concentration	Average	Concentration	Average	% Reduction (1)
1	Control (Soil – 2 yd)/ Wood chips – 2 yd)	470/470/450 430/430/500 490/470/470	460	110/62/67	80	83
2	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (1 yd)	250/220/200 180/210/230 230/180/220	210	100/45/240	130	38
3	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (1 yd)/ Ammonium nitrate (1 bag)	220/230/230 250/240/240 230/260/230	240	54/33/270	120	50
4	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (2 yd)	190/170/150 140/150/160 160/170/180	160	240/53/99	130	20
5	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (2 yd)/ Ammonium nitrate (1 bag)/ Expanded sawdust (0.5 yd)	250/220/240 240/220/210 250/230/230	230	80/51/150	94	59
6	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (1 yd)/ Expanded sawdust (0.5 yd)	130/140/140 170/160/170 210/180/200	170	31/42/41	38	77
7	Soil (2 yd)/ Wood chips (2 yd)/ Ammonium nitrate (1 bag)/ Expanded sawdust (1 yd)	240/200/230 230/220/240 240/220/230	230	49/160/130	110	52
8	Soil (2 yd)/ Wood chips (2 yd)/ Ammonium nitrate (1 bag)/ Expanded sawdust (1 yd)/ Sawdust extract (neutralized)	220/230/250 220/220/200 220/220/220	220	180/46/92	110	50

Results in milligrams per kilogram (mg/kg).

(1) Compared to average initial PCP concentration of respective treatment.

TABLE 6 (cont'd)
Soil PCP Concentration vs. Time – Biopiles
Penta Wood Products
Siren, WI
May 1995

Pile No.	Treatment	Sampling Event/Sampling Date/Test Day					
		3/Nov 29, 1994/79			4/Jan 4, 1995/115		
		Concentration	Average	% Reduction (1)	Concentration	Average	% Reduction (1)
1	Control (Soil – 2 yd/ Wood chips – 2 yd)	54/110/97	87	81	74/73/77	75	84
2	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (1 yd)	240/260/300	270	–29	220/250/260	240	–14
3	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (1 yd)/ Ammonium nitrate (1 bag)	38/330/230	200	17	170/230/230	210	13
4	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (2 yd)	160/69/200	140	13	180/290/300	260	–63
5	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (2 yd)/ Ammonium nitrate (1 bag)/ Expanded sawdust (0.5 yd)	150/320/290	250	–9	200/240/280	240	–4
6	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (1 yd)/ Expanded sawdust (0.5 yd)	55/56/46	52	69	75/72/45	64	62
7	Soil (2 yd)/ Wood chips (2 yd)/ Ammonium nitrate (1 bag)/ Expanded sawdust (1 yd)	110/160/77	120	48	66/120/140	110	52
8	Soil (2 yd)/ Wood chips (2 yd)/ Ammonium nitrate (1 bag)/ Expanded sawdust (1 yd)/ Sawdust extract (neutralized).	80/110/180	120	45	120/110/150	130	41

Results in milligrams per kilogram (mg/kg).
(1) Compared to average initial PCP concentration of respective treatment.

TABLE 6 (cont'd)
Soil PCP Concentration vs. Time – Biopiles
Penta Wood Products
Siren, WI
May 1995

Pile No.	Treatment	Sampling Event/Sampling Date/Test Day					
		5/Feb 8, 1995/150			6/Mar 15, 1995/185		
		Concentration	Average	% Reduction (1)	Concentration	Average	% Reduction (1)
1	Control (Soil – 2 yd/ Wood chips – 2 yd)	64/72/62 61/76/75 79/86/76	72	84	94/110/95 92/100/86 82/110/92	96	79
2	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (1 yd)	210/220/230 200/210/200 210/210/200	210	0	240/240/230 230/230/220 200/200/200	220	–5
3	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (1 yd)/ Ammonium nitrate (1 bag)	270/200/230 300/260/280 270/270/290	260	–8	170/190/170 180/190/160 180/240/210	190	21
4	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (2 yd)	230/240/260 260/250/260 270/240/270	250	–56	160/150/130 180/170/170 240/240/240	190	–19
5	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (2 yd)/ Ammonium nitrate (1 bag)/ Expanded sawdust (0.5 yd)	250/260/250 250/270/280 330/280/330	280	–22	200/220/250 280/270/250 280/260/290	260	–13
6	Soil (2 yd)/ Wood chips (2 yd)/ Turkey manure (1 yd)/ Expanded sawdust (0.5 yd)	96/80/60 67/67/69 59/57/57	68	60	110/120/120 87/83/88 84/87/93	97	43
7	Soil (2 yd)/ Wood chips (2 yd)/ Ammonium nitrate (1 bag)/ Expanded sawdust (1 yd)	130/140/130 130/120/130 120/120/110	130	43	150/110/130 170/170/190 140/140/150	150	35
8	Soil (2 yd)/ Wood chips (2 yd)/ Ammonium nitrate (1 bag)/ Expanded sawdust (1 yd)/ Sawdust extract (neutralized)	140/120/100 97/110/110 110/100/120	110	50	150/150/150 160/140/140 200/200/220	170	23

Results in milligrams per kilogram (mg/kg).
(1) Compared to average initial PCP concentration of respective treatment.

TABLE 7
Average Physical Characterization Results of Test Soil – Biopiles
Penta Wood Products
Siren, WI
May 1995

	Sampling Event/Sampling Date/Test Day					
	Initial/Sep 12, 1994/1			2/Oct 23, 1994/42		
Pile No.	Temperature (deg C)	Moisture (%)	pH (std. units)	Temperature (deg C)	Moisture (%)	pH (std. units)
1	--	18.5	6.2	14	25.1	6.8
2	--	20.9	8.5	14	31.4	8.5
3	--	24.7	8.7	13	37.6	8.1
4	--	21.1	8.2	14	31.7	8.5
5	--	26.6	8.2	13	40.2	8.6
6	--	14.1	8.0	13	19.5	8.0
7	--	16.8	6.6	13	21.6	6.8
8	--	20.8	6.9	13	27.6	7.1

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TABLE 7 (cont'd)
Average Physical Characterization Results of Test Soil – Biopiles
Penta Wood Products
Siren, WI
May 1995

Pile No.	Sampling Event/Sampling Date/Test Day					
	3/Nov 29, 1994/79			4/Jan 4, 1995/115		
	Temperature (deg C)	Moisture (%)	pH (std. units)	Temperature (deg C)	Moisture (%)	pH (std. units)
1	10	20.4	6.2	5	20.5	5.2
2	14	28.3	7.1	8	25.1	7.1
3	13	32.9	6.9	5	32.0	7.0
4	12	33.3	6.8	5	30.5	7.1
5	15	33.8	7.0	8	31.9	7.3
6	14	15.9	6.7	8	15.8	6.6
7	11	17.7	6.3	8	14.3	6.2
8	14	23.6	6.5	7	23.2	6.7

TABLE 7 (cont'd)
Average Physical Characterization Results of Test Soil – Biopiles
Penta Wood Products
Siren, WI
May 1995

Pile No.	Sampling Event/Sampling Date/Test Day					
	5/Feb 8, 1995/150			6/Mar 15, 1995/185		
	Temperature (deg C)	Moisture (%)	pH (std. units)	Temperature (deg C)	Moisture (%)	pH (std. units)
1	9	17.3	5.4	17	17.5	5.2
2	12	17.8	7.2	18	22.3	5.9
3	11	32.3	7.1	17	33.1	6.9
4	8	24.7	7.3	15	25.9	6.2
5	11	34.6	7.4	17	36.1	7.6
6	11	18.7	6.6	16	20.7	6.5
7	12	15.8	6.2	16	17.5	6.5
8	8	22.5	6.8	15	24.4	6.8

TABLE 8
Chemical Characterization Results for Influent and Leachate -- Biopiles
Penta Wood Products
Siren, WI
May 1995

Parameter	Influent (mg/L)	Leachate (mg/L)
Ammonia Nitrogen	0.81	317
Nitrate/Nitrite Nitrogen	15	156
TKN	<2.0	670
Phosphate	<0.5	75
Total Phosphorous	<0.5	82
TOC	<10	520
TPH	<1.0	<1.7
Calcium	46	74
Magnesium	29	13.7
Iron	0.46	7.3
Manganese	0.059	1.3
Cobalt	<0.05	<0.05
Arsenic	0.01	4.4
Copper	0.096	7.5
Zinc	0.20	0.92
Chromium	<0.05	<0.05
Cadmium	<0.01	0.046

TABLE 9
Water PCP Concentration vs. Time – Biopiles
Penta Wood Products
Siren, WI
May 1995

Treatment	Sampling Event	Initial	2	3	4	5	6
	Sampling Date	Sep 12, 1994	Oct 23, 1994	Nov 29, 1994	Jan 4, 1995	Feb 8, 1995	Mar 15, 1995
	Test Day	1	42	79	115	150	185
Influent		--	0.42	--	1.4	0.001	0.0012
Leachate		--	13	--	4.9	8.4	2.4
Green Leachate Storage Tank 1		--	28	--	63	--	5.5
White Leachate Storage Tank 2		--	1.6	--	15	--	11
White Leachate Storage Tank 3		--	5.1	--	5.5	5.1	1.2
Sawdust Extract		--	--	--	1.8	--	--

Results in milligrams per liter (mg/L).

TABLE 10
Initial Characterization Results for Soil Samples – Anaerobic Dechlorination
Penta Wood Products
Siren, WI
May 1995

	Cell no./Treatment			
	1	2	3	4
Parameter	Untreated	Manure/ Phosphate/ Limestone/ Blood meal	Manure/ Phosphate/ Limestone	Phosphate/ Blood meal
Ammonia Nitrogen	5.4	1,200	920	310
Nitrate Nitrogen	29 U	64 U	39 U	31 U
TKN	300	31,000	2,100	5,400
Phosphate	29 U	1,300	970	290
Total Phosphorous	210	4,300	2,100	680
Arsenic	12 U	26 U	15 U	12 U
Copper	27	77	50	21
Zinc	31	99	75	35
Chloride	74	730	430	110
Sulfate	29 U	64 U	270	100
TOC	25,000	25,000	36,000	26,000
TPH	1,800	4,300	2,700	1,900
Water Holding Capacity (%)	--	--	4.8	3.4

Results in milligrams per kilogram (mg/kg) except where noted otherwise.
U indicates compound not detected at the indicated detection limit.

TABLE 11
Soil PCP Concentration vs. Time – Anaerobic Dechlorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day: Initial/Oct 23, 1994/1 Concentration	Initial/Oct 23, 1994/1 Average	2 /Nov 28, 1994/37 Concentration	2 /Nov 28, 1994/37 Average	2 /Nov 28, 1994/37 % Reduction (1)
1	Untreated	27/18/40	28	13/18/14	15	47
2	Manure/Phosphate/Limestone/Blood meal	18/15/40	24	34/48/35	39	−63
3	Manure/Phosphate/Limestone	30/26/33	30	6.7/9.3/6.9	7.6	75
4	Phosphate/Blood meal	37/61/29	42	31/39/41	37	13

Results in milligrams per kilogram (mg/kg).
(1) Compared to average initial PCP concentration of respective treatment.

TABLE 11 (cont'd)
Soil PCP Concentration vs. Time – Anaerobic Declorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day: 3/Jan 4, 1995/74 Concentration	Average	% Reduction (1)	4/Feb 8, 1995/109 Concentration	Average	% Reduction (1)
1	Untreated	14/26/18	19	32	15/13/22	17	39
2	Manure/Phosphate/Limestone/Blood meal	2.5 J/6.1 J/6.1	4.9	80	6.2 J/8.9/2.4 J	5.8	76
3	Manure/Phosphate/Limestone	21/19/23	21	30	15/17/16	16	47
4	Phosphate/Blood meal	27/21/9	19	55	10/11/11	11	73

Results in milligrams per kilogram (mg/kg).
J Indicates compound found below detection limit and is an estimated value.
(1) Compared to average initial PCP concentration of respective treatment.

TABLE 11 (cont'd)
Soil PCP Concentration vs. Time – Anaerobic Declorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day		
		5/Mar 14, 1995/143		
		Concentration	Average	% Reduction (1)
1	Untreated	22/20/24	22	21
2	Manure/Phosphate/Limestone/Blood meal	11/6.7 J/9.8	9.2	62
3	Manure/Phosphate/Limestone	25/28/27	27	10
4	Phosphate/Blood meal	17/6.6/7.5	10	76

Results in milligrams per kilogram (mg/kg).
J Indicates compound found below detection limit and is an estimated value.
(1) Compared to average initial PCP concentration of respective treatment.

TABLE 12
Soil Chlorophenol Concentration vs. Time – Anaerobic Dechlorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day: Initial/Oct 23, 1994/1 Concentration	Initial/Oct 23, 1994/1 Average	2/Nov 28, 1994/37 Concentration	2/Nov 28, 1994/37 Average
1	Untreated	--	--	PCP: 23/19/18	PCP: 20
2	Manure/Phosphate/Limestone/Blood meal	--	--	m,p CP: 21/8.5/11 2,5 DiCP: ND/ND/ND 3,5 DiCP: 15/4.4 J/8.3 2,3,5 TriCP: 5.6 J/ND/3.4 J 2,3,4,6 TetCP: 22/5.9 J/12 PCP: 78/36/57	m,p CP: 14 2,5 DiCP: ND 3,5 DiCP: 9.2 2,3,5 TriCP: 4.5 J (1) 2,3,4,6 TetCP: 13 PCP: 57
3	Manure/Phosphate/Limestone	--	--	m,p CP: ND/ND/ND 3,5 DiCP: 5.1/7.0/5.0 2,3,5 TriCP: 2.3 J/2.9/3.0 2,4,5 TriCP: ND/ND/ND 2,3,4,6 TetCP: ND/ND/ND PCP: 5.4/7.0/5.4	m,p CP: ND 3,5 DiCP: 5.7 2,3,5 TriCP: 2.7 2,4,5 TriCP: ND 2,3,4,6 TetCP: ND PCP: 5.9
4	Phosphate/Blood meal	--	--	m,p CP: 1.3 J/3.4 J/2.9 J 3,5 DiCP: 1.3 J/2.1 J/1.7 J 2,3,5 TriCP: ND/ND/ND 2,4,6 Tri CP: ND/ND/ND 2,3,4,6 TetCP: 23/18/16 PCP: 54/46/44	m,p CP: 2.5 J 3,5 DiCP: 1.7 J 2,3,5 TriCP: ND 2,4,6 Tri CP: ND 2,3,4,6 TetCP: 19 PCP: 48

Results in milligrams per kilogram (mg/kg).

Note: m,p CP denotes meta, para chlorophenol; 2,5 DiCP denotes 2,5–Dichlorophenol; 3,5 DiCP denotes 3,5–Dichlorophenol; 2,3,5 TriCP denotes 2,3,5–Trichlorophenol; 2,4,5 TriCP denotes 2,4,5–Trichlorophenol; 2,4,6 TriCP denotes 2,4,6–Trichlorophenol; 2,3,4,6 TetCP denotes 2,3,4,6–Tetrachlorophenol.

ND indicates compound not detected.

J indicates compound found below detection limit and is an estimated value.

(1) Nondetected value(s) not included in calculating average concentration of analyte.

TABLE 12 (cont'd)
Soil Chlorophenol Concentration vs. Time – Anaerobic Dechlorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day			
		3/Jan 4,1995/74		4/Feb 8, 1995/109	
		Concentration	Average	Concentration	Average
1	Untreated	PCP: 13/28/21	PCP: 21	PCP: 13/10/22 E	PCP: 15
2	Manure/Phosphate/Limestone/Blood meal	m,p CP: ND/ND/ND 2,5 DiCP: ND/ND/ND 3,5 DiCP: ND/ND/ND 2,3,5 TriCP: ND/ND/ND 2,3,4,6 TetCP: ND/ND/ND PCP: 7/5.9/7	m,p CP: ND 2,5 DiCP: ND 3,5 DiCP: ND 2,3,5 TriCP: ND 2,3,4,6 TetCP: ND PCP: 6.6	m,p CP: ND/5.2/ND 2,5 DiCP: ND/1.3 J/ND 3,5 DiCP: ND/3.6/0.22 J 2,3,5 TriCP: ND/1.2 J/ND 2,3,4,6 TetCP: ND/2.3/ND PCP: 2.6/11/2.5	m,p CP: 5.2 J (1) 2,5 DiCP: 1.3 J (1) 3,5 DiCP: 1.9 J (1) 2,3,5 TriCP: 1.2 J (1) 2,3,4,6 TetCP: 2.3 (1) PCP: 5.4
3	Manure/Phosphate/Limestone	m,p CP: ND/ND/ND 3,5 DiCP: ND/3.3 J/ND 2,3,5 TriCP: ND/ND/ND 2,4,5 TriCP: ND/ND/4.0 J 2,3,4,6 TetCP: ND/ND/ND PCP: 33/16/20	m,p CP: ND 3,5 DiCP: 3.3 J (1) 2,3,5 TriCP: ND 2,4,5 TriCP: 4.0 J (1) 2,3,4,6 TetCP: ND PCP: 23	m,p CP: ND/ND/0.29 J 3,5 DiCP: 5.6/5.7/6.1 2,3,5 TriCP: 3.8/3.6/3.4 2,4,5 TriCP: ND/ND/ND 2,3,4,6 TetCP: 0.78 J/1.3 J/0.42 J PCP: 24/10/20	m,p CP: 0.29 J (1) 3,5 DiCP: 5.8 2,3,5 TriCP: 3.6 2,4,5 TriCP: ND 2,3,4,6 TetCP: 0.83 J PCP: 18
4	Phosphate/Blood meal	m,p CP: ND/ND/ND 3,5 DiCP: ND/ND/ND 2,3,5 TriCP: ND/ND/ND 2,4,6 TriCP: ND/ND/ND 2,3,4,6 TetCP: ND/4.0 J/ND PCP: 40/33/47	m,p CP: ND 3,5 DiCP: ND 2,3,5 TriCP: ND 2,4,6 TriCP: ND 2,3,4,6 TetCP: 4.0 J (1) PCP: 40	m,p CP: ND/0.80 J/ND 3,5 DiCP: ND/0.94 J/ND 2,3,5 TriCP: ND/0.56 J/ND 2,4,6 TriCP: ND/ND/ND 2,3,4,6 TetCP: 3.3/8.0/4.4 PCP: 8.4/27/15	m,p CP: 0.80 J (1) 3,5 DiCP: 0.94 J (1) 2,3,5 TriCP: 0.56 J (1) 2,4,6 TriCP: ND 2,3,4,6 TetCP: 5.2 PCP: 17

Results in milligrams per kilogram (mg/kg).

Note: m,p CP denotes meta, para chlorophenol; 2,5 DiCP denotes 2,5–Dichlorophenol; 3,5 DiCP denotes 3,5–Dichlorophenol; 2,3,5 TriCP denotes 2,3,5–Trichlorophenol; 2,4,5 TriCP denotes 2,4,5–Trichlorophenol; 2,4,6 TriCP denotes 2,4,6–Trichlorophenol; 2,3,4,6 TetCP denotes 2,3,4,6–Tetrachlorophenol.

ND indicates compound not detected.

J indicates compound found below detection limit and is an estimated value.

E indicates estimated value.

(1) Nondetected value(s) not included in calculating average concentration of analyte.

TABLE 12 (cont'd)
Soil Chlorophenol Concentration vs. Time – Anaerobic Dechlorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day 5/Mar 14, 1995/143 Concentration	 5/Mar 14, 1995/143 Average
1	Untreated	PCP: 19/17/22	PCP: 19
2	Manure/Phosphate/Limestone/Blood meal	m,p CP: ND/ND/ND 2,5 DiCP: ND/ND/ND 3,5 DiCP: 0.64 J/ND/2.8 2,3,5 TriCP: ND/ND/1.1 J 2,3,4,6 TetCP: 1.1 J/ND/2.4 PCP: 7.5/8.1/12	m,p CP: ND 2,5 DiCP: ND 3,5 DiCP: 1.7 J (1) 2,3,5 TriCP: 1.1 J (1) 2,3,4,6 TetCP: 1.8 J (1) PCP: 9.2
3	Manure/Phosphate/Limestone	m,p CP: ND/ND/ND 3,5 DiCP: 10/ND/3.6 2,3,5 TriCP: 6.1/ND/3.2 2,4,5 TriCP: ND/ND/ND 2,3,4,6 TetCP: 7.9/1.9/8.1 PCP: 17/34/16	m,p CP: ND 3,5 DiCP: 6.8 (1) 2,3,5 TriCP: 4.7 (1) 2,4,5 TriCP: ND 2,3,4,6 TetCP: 6.0 PCP: 22
4	Phosphate/Blood meal	m,p CP: ND/ND/ND 3,5 DiCP: ND/1.8/ND 2,3,5 TriCP: ND/ND/ND 2,4,6 TriCP: ND/0.76 J/ND 2,3,4,6 TetCP: 1.3/1.5 J/1.1 J PCP: 4.8/14/23	m,p CP: ND 3,5 DiCP: 1.8 (1) 2,3,5 TriCP: ND 2,4,6 TriCP: 0.76 J (1) 2,3,4,6 TetCP: 1.3 J PCP: 14

Results in milligrams per kilogram (mg/kg).

Note: m,p CP denotes meta, para chlorophenol; 2,5 DiCP denotes 2,5–Dichlorophenol; 3,5 DiCP denotes 3,5–Dichlorophenol; 2,3,5 TriCP denotes 2,3,5–Trichlorophenol; 2,4,5 TriCP denotes 2,4,5–Trichlorophenol; 2,4,6 TriCP denotes 2,4,6–Trichlorophenol; 2,3,4,6 TetCP denotes 2,3,4,6–Tetrachlorophenol.

ND indicates compound not detected.

J indicates compound found below detection limit and is an estimated value.

(1) Nondetected value(s) not included in calculating average concentration of analyte.

TABLE 13
Water PCP Concentration vs. Time – Anaerobic Dechlorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day				
		Initial/Oct 23, 1994/1		2 /Nov 28, 1994/37		
		Concentration	Average	Concentration	Average	% Reduction (1)
1	Untreated	0.88/0.81	0.85	0.012/.012	0.012	99
2	Manure/Phosphate/Limestone/Blood meal	0.69/0.58	0.64	0.019/0.024	0.022	97
3	Manure/Phosphate/Limestone	0.046/0.039	0.043	0.022/0.021	0.022	49
4	Phosphate/Blood meal	0.17/0.17	0.17	0.006/0.005	0.006	96

Results in milligrams per liter (mg/L).
(1) Compared to average initial PCP concentration of respective treatment.

TABLE 13 (cont'd)
Water PCP Concentration vs. Time – Anaerobic Declorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	3/Jan 4, 1995/74 Concentration	3/Jan 4, 1995/74 Average	3/Jan 4, 1995/74 % Reduction (1)	4/Feb 8, 1995/109 Concentration	4/Feb 8, 1995/109 Average	4/Feb 8, 1995/109 % Reduction (1)
1	Untreated	0.019/0.020	0.020	98	0.015/0.015	0.015	98
2	Manure/Phosphate/Limestone/Blood meal	0.019/0.013	0.016	98	0.55/0.017 (2)	0.017	97
3	Manure/Phosphate/Limestone	0.007/0.010	0.009	79	0.043/0.011	0.027	37
4	Phosphate/Blood meal	0.008/0.017	0.013	92	0.017/0.008	0.013	92

Sampling Event/Sampling Date/Test Day

Results in milligrams per liter (mg/L).
(1) Compared to average initial PCP concentration of respective treatment.
(2) Value of 0.55 mg/L assumed to be anomolous and was not used to calculate average PCP concentration or percent PCP reduction for the sample.

TABLE 13 (cont'd)
Water PCP Concentration vs. Time – Anaerobic Declorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day 5/Mar 14, 1995/143 Concentration	Average	% Reduction (1)
1	Untreated	0.033/0.022	0.028	97
2	Manure/Phosphate/Limestone/Blood meal	0.013/0.012	0.013	98
3	Manure/Phosphate/Limestone	0.009/0.009	0.009	79
4	Phosphate/Blood meal	0.012/0.013	0.013	92

Results in milligrams per liter (mg/L).
(1) Compared to average initial PCP concentration of respective treatment.

TABLE 14
Water Chlorophenol Concentration vs. Time – Anaerobic Dechlorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day			
		Initial/Oct 23, 1994/1		2/Nov 28, 1994/37	
		Concentration	Average	Concentration	Average
1	Untreated	--	--	PCP: ND/ND	PCP: ND
2	Manure/Phosphate/Limestone/Blood meal	--	--	m,p CP: ND/ND	m,p CP: ND
3	Manure/Phosphate/Limestone	--	--	3,5 DiCP: ND/0.018 J	3,5 DiCP: 0.018 J (1)
4	Phosphate/Blood meal	--	--	m,p CP: ND/ND 3,5 DiCP: ND/0.012 J	m,p CP: ND 3,5 DiCP: 0.012 J (1)

Results in milligrams per liter (mg/L).

Note: m,p CP denotes meta, para–chlorophenol; 3,5 DiCP denotes 3,5–Dichlorophenol.

J indicates compound found below detection limit and is an estimated value.

(1) Nondetected value not included in calculating average concentration of analyte.

TABLE 14 (cont'd)
Water Chlorophenol Concentration vs. Time – Anaerobic Dechlorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day: 3/Jan 4,1995/74 Concentration	3/Jan 4,1995/74 Average	4/Feb 8, 1995/109 Concentration	4/Feb 8, 1995/109 Average
1	Untreated	PCP: ND/ND	PCP: ND	PCP: 0.006 J/0.011 J	PCP: 0.009 J
2	Manure/Phosphate/Limestone/Blood meal	m,p CP: ND/ND	m,p CP: ND	m,p CP: ND/10 J	m,p CP: 10 J (1)
3	Manure/Phosphate/Limestone	3,5 DiCP: ND/ND	3,5 DiCP: ND	3,5 DiCP: ND/ND	3,5 DiCP: ND
4	Phosphate/Blood meal	m,p CP: ND/ND 3,5 DiCP: ND/ND	m,p CP: ND 3,5 DiCP: ND	m,p CP: ND/4 J 3,5 DiCP: ND/ND	m,p CP: 4 J (1) 3,5 DiCP: ND

Results in milligrams per liter (mg/L).

Note: m,p CP denotes meta, para chlorophenol; 3,5 DiCP denotes 3,5–Dichlorophenol.

J indicates compound found below detection limit and is an estimated value.

(1) Nondetected value not included in calculating average concentration of analyte.

TABLE 14 (cont'd)
Water Chlorophenol Concentration vs. Time – Anaerobic Dechlorination
Penta Wood Products
Siren, WI
May 1995

Cell No.	Treatment	Sampling Event/Sampling Date/Test Day	
		5/Mar 14, 1995/143	
		Concentration	Average
1	Untreated	PCP: 0.013 J/0.018 J	PCP: 0.016 J
2	Manure/Phosphate/Limestone/Blood meal	m,p CP: ND/ND	m,p CP: ND
3	Manure/Phosphate/Limestone	3,5 DiCP: ND/ND	3,5 DiCP: ND
4	Phosphate/Blood meal	m,p CP: ND/ND 3,5 DiCP: ND/ND	m,p CP: ND 3,5 DiCP: ND

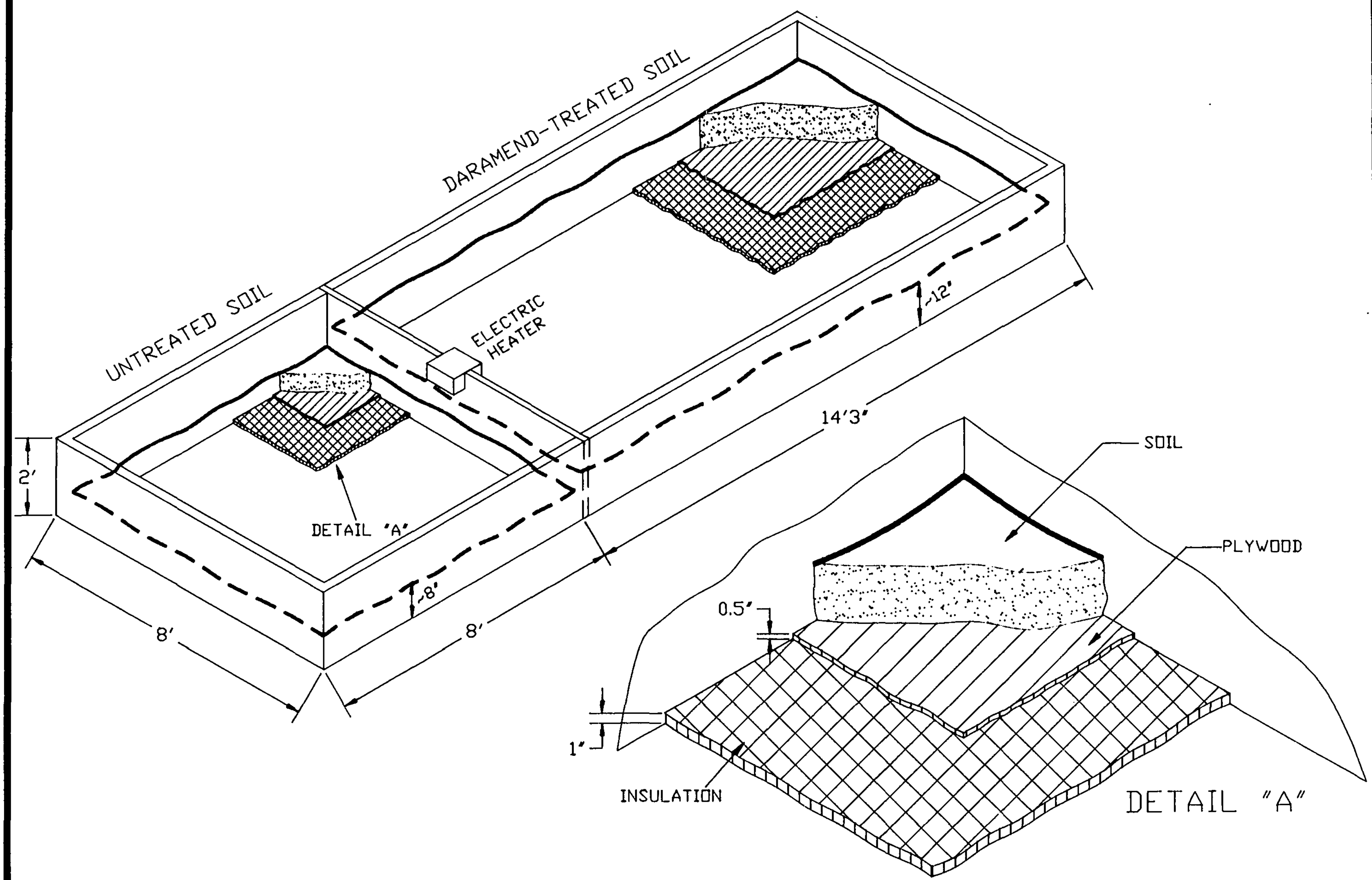
Results in milligrams per liter (mg/L).

Note: m,p CP denotes meta, para chlorophenol; 3,5 DiCP denotes 3,5–Dichlorophenol.

J indicates compound found below detection limit and is an estimated value.

Figures

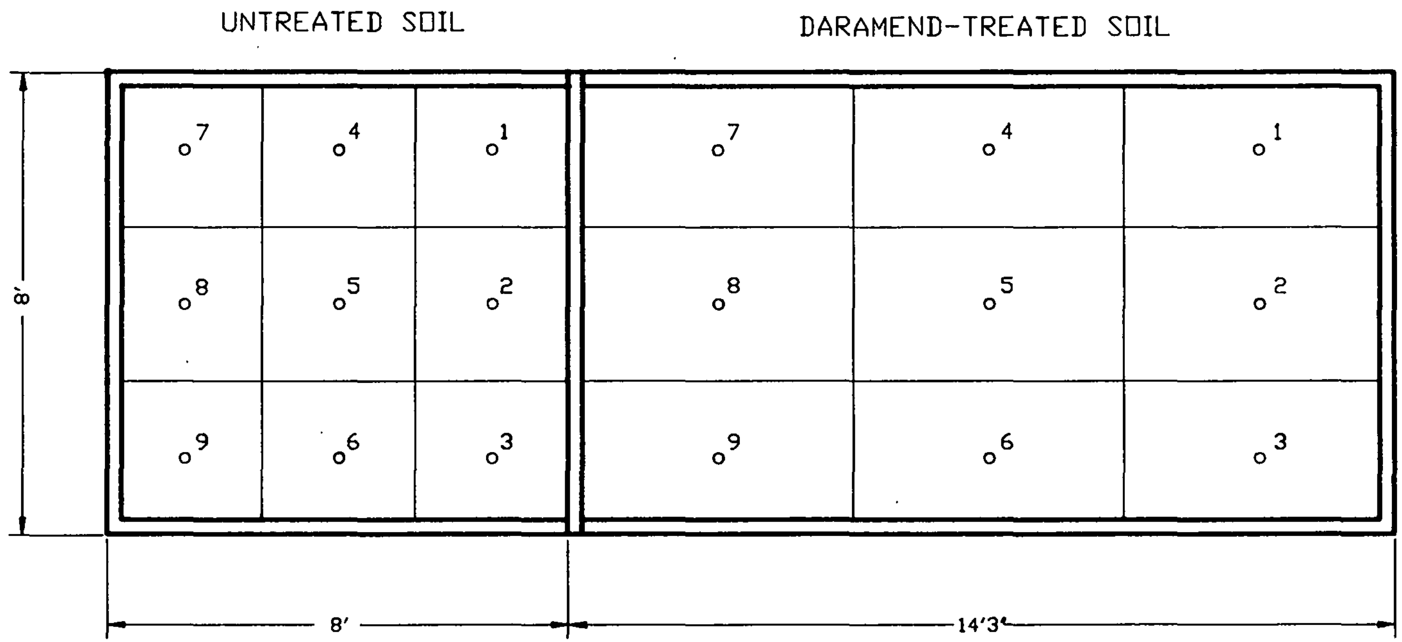
Figures



U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0022
W.O.# 03347-040-001-0026-01

FIGURE 1
LANDFARM PLOTS
PENTA WOOD PRODUCTS
SIREN, WISCONSIN
MAY 1995

0026-BIO.DWG 5/3/1995



LEGEND

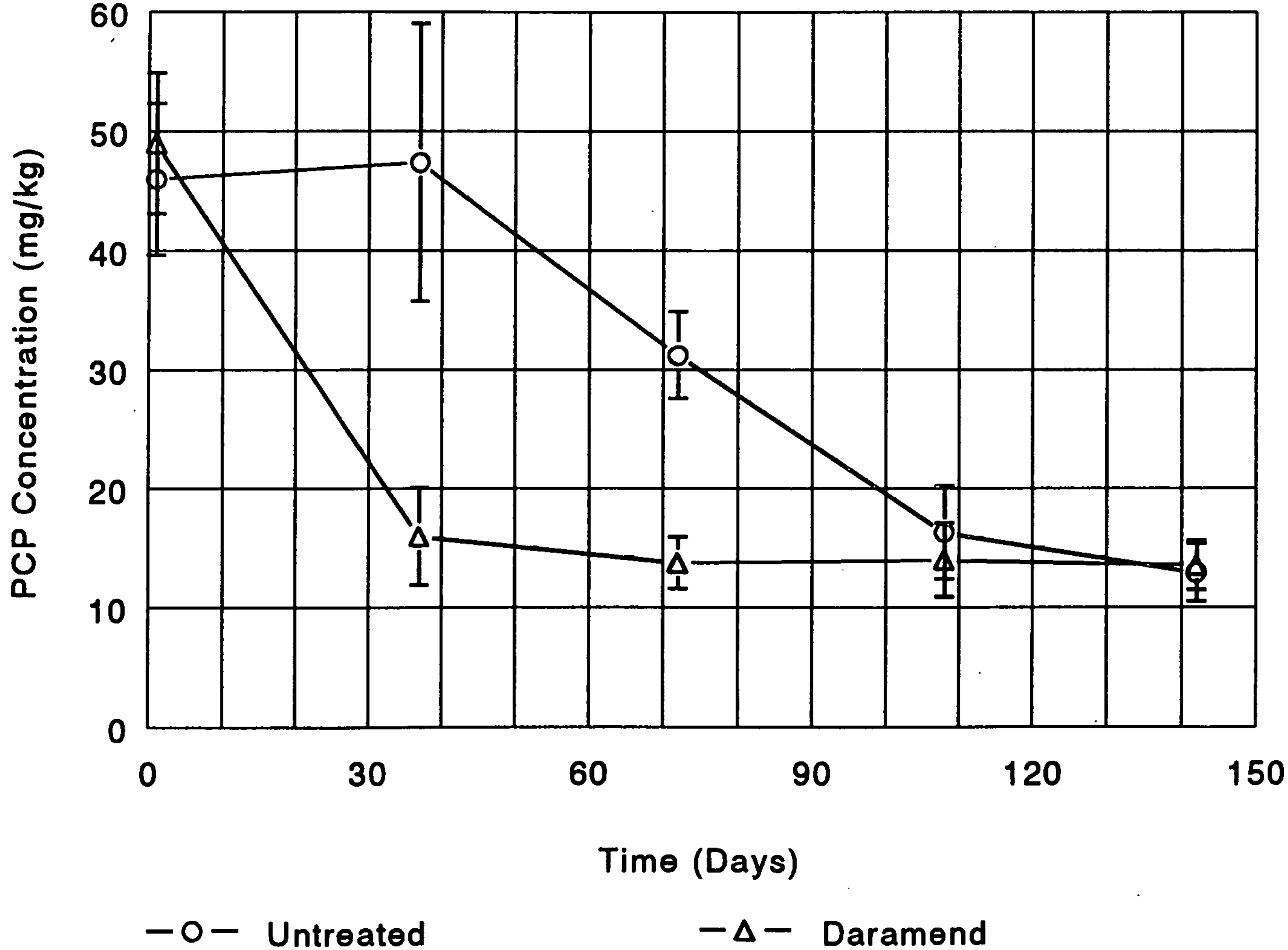
o TYPICAL SAMPLE CORE LOCATION

FIGURE 2
LANDFARM PLOT SAMPLE GRID
PENTA WOOD PRODUCTS
SIREN, WISCONSIN
MAY 1995

U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0022
V.O.# 03347-040-001-0026-01

\026-BIO2.DWG 5/3/1995

Average Soil PCP Concentration vs Time - Landfarm Plots



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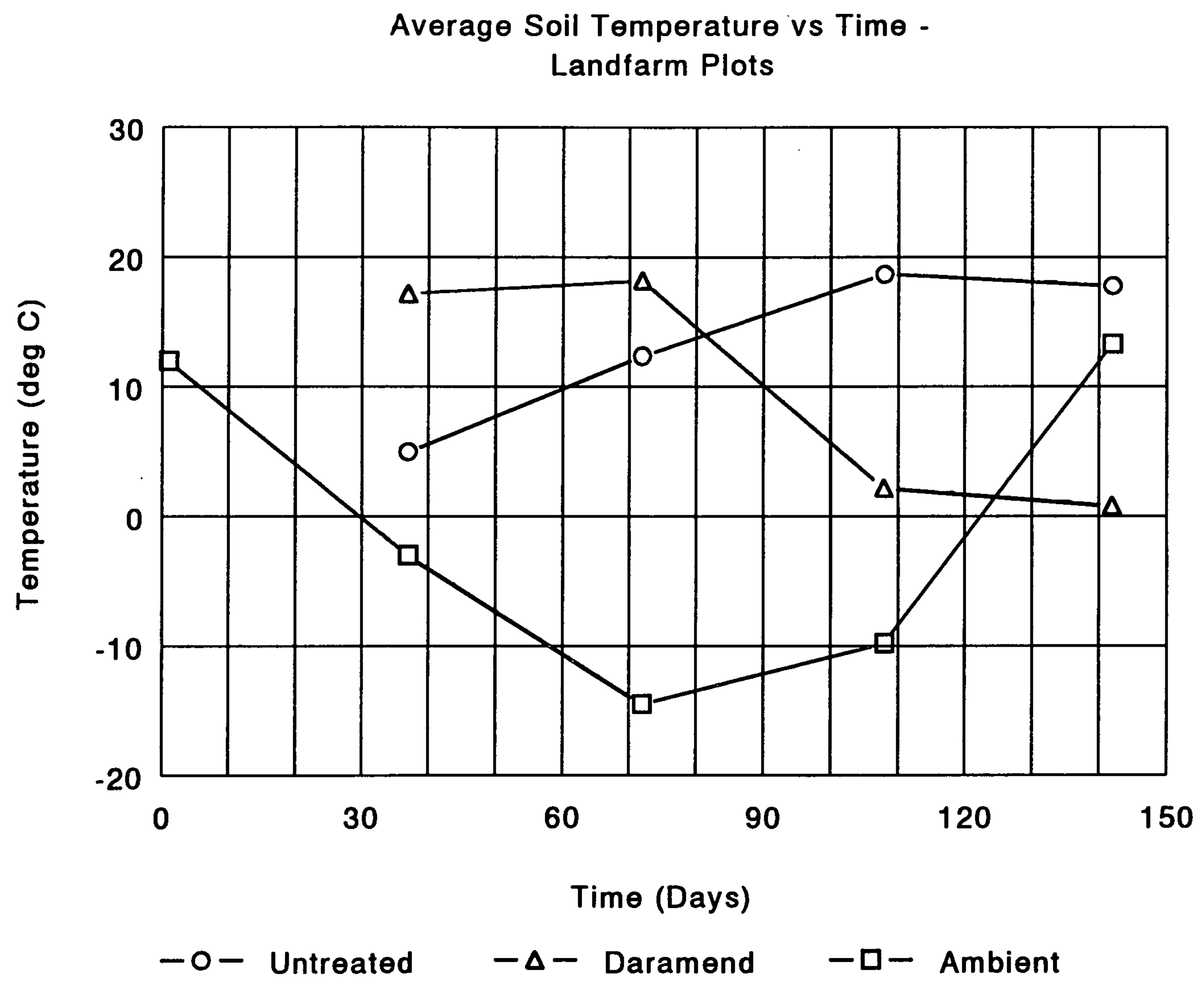
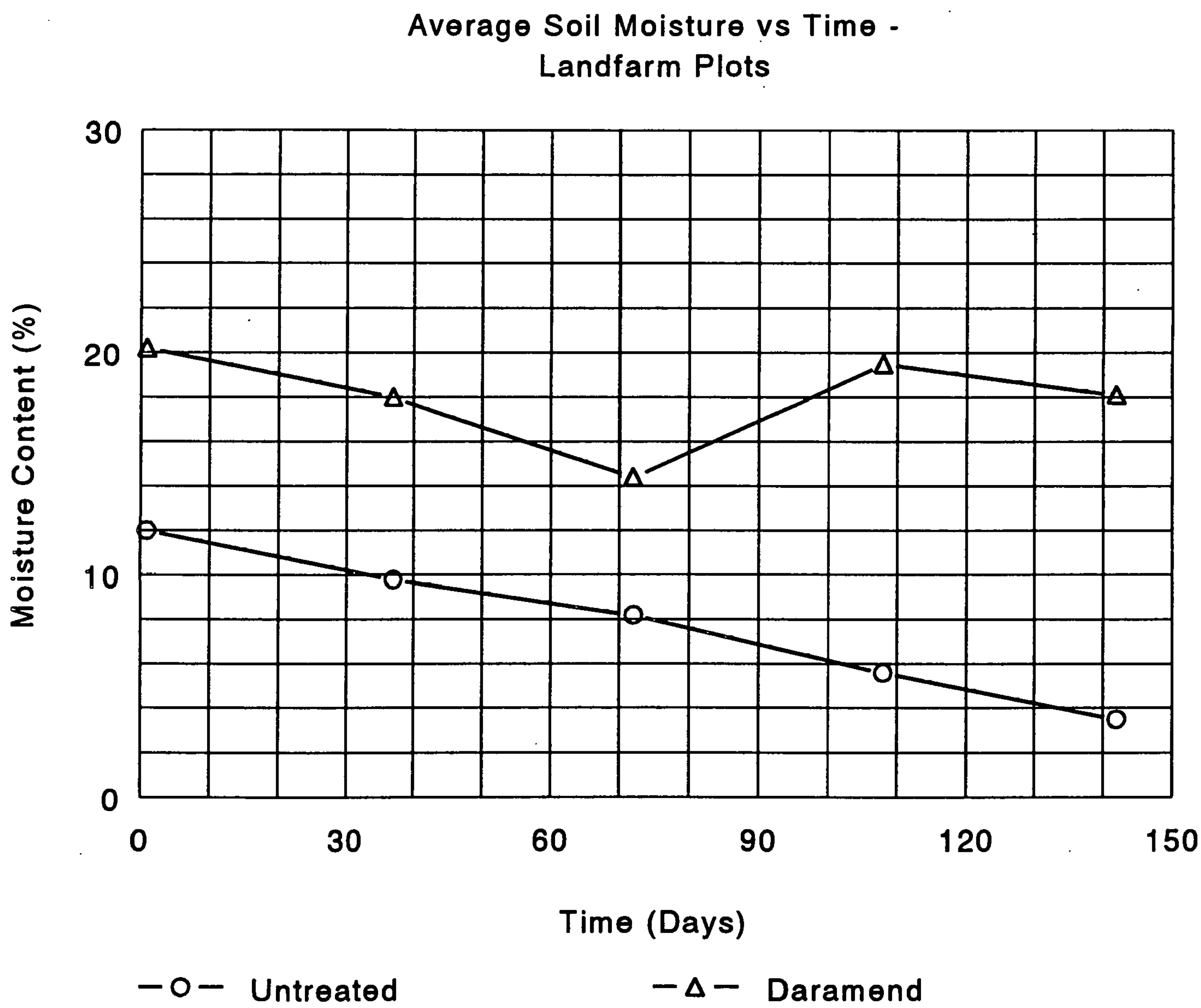
U.S. EPA ENVIRONMENTAL RESPONSE TEAM RESPONSE ENGINEERING AND ANALYTICAL CONTRACT 68-C4-0022 WO# 03347-040-001-0026-01	FIGURE 3 PENTA WOOD PRODUCTS SIREN, WISCONSIN MAY 1995



U.S. EPA ENVIRONMENTAL RESPONSE TEAM	FIGURE 4
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT	PENTA WOOD PRODUCTS
68-C4-0022	SIREN, WISCONSIN
WO# 03347-040-001-0026-01	MAY 1995



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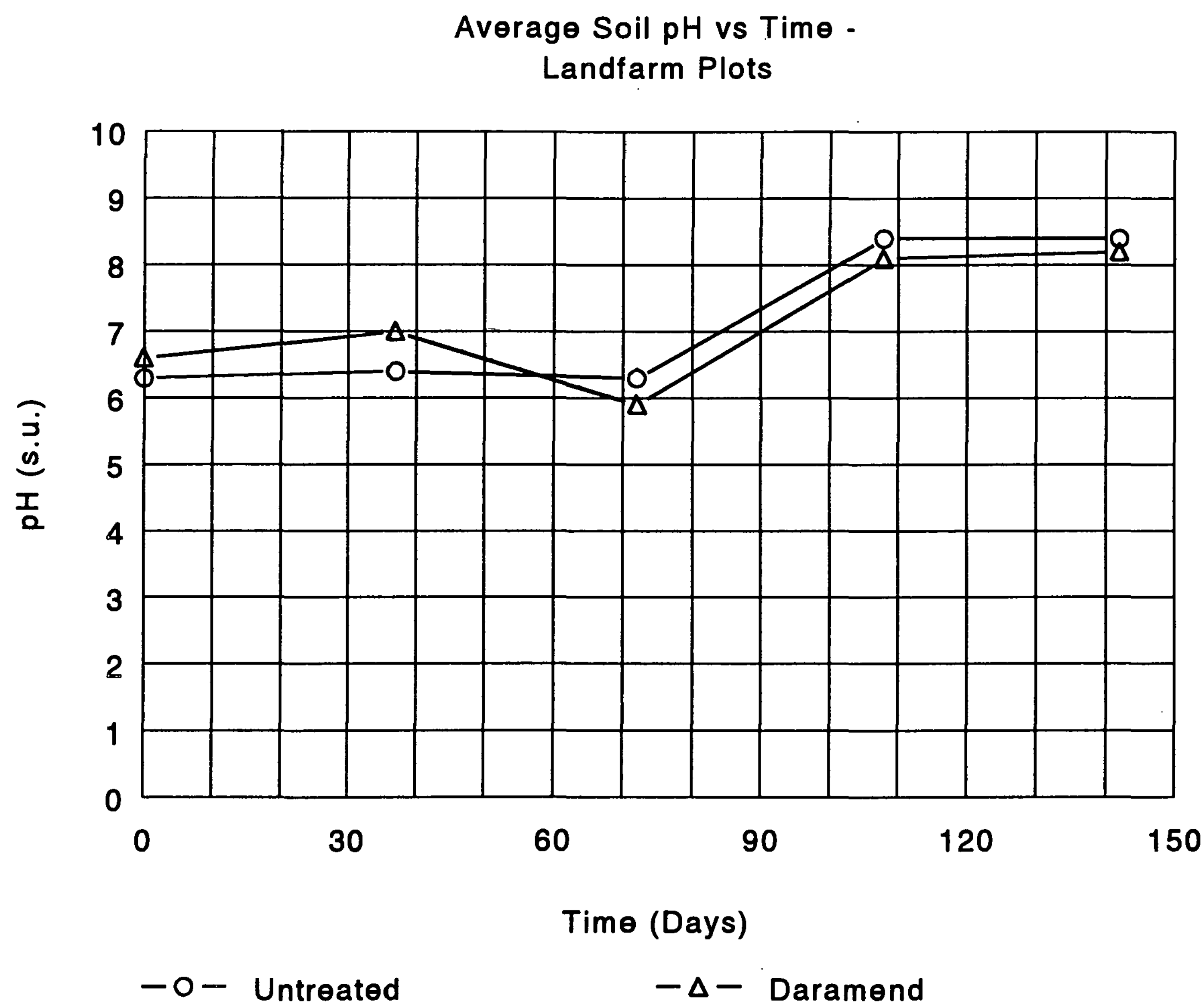
U.S. EPA ENVIRONMENTAL RESPONSE TEAM RESPONSE ENGINEERING AND ANALYTICAL CONTRACT 68-C4-0022 WO# 03347-040-001-0026-01	FIGURE 5 PENTA WOOD PRODUCTS SIREN, WISCONSIN MAY 1995



LANDPH2.TC

U.S. EPA ENVIRONMENTAL RESPONSE TEAM	FIGURE 6
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT	PENTA WOOD PRODUCTS
68-C4-0022	SIREN, WISCONSIN
WO# 03347-040-001-0026-01	MAY 1995

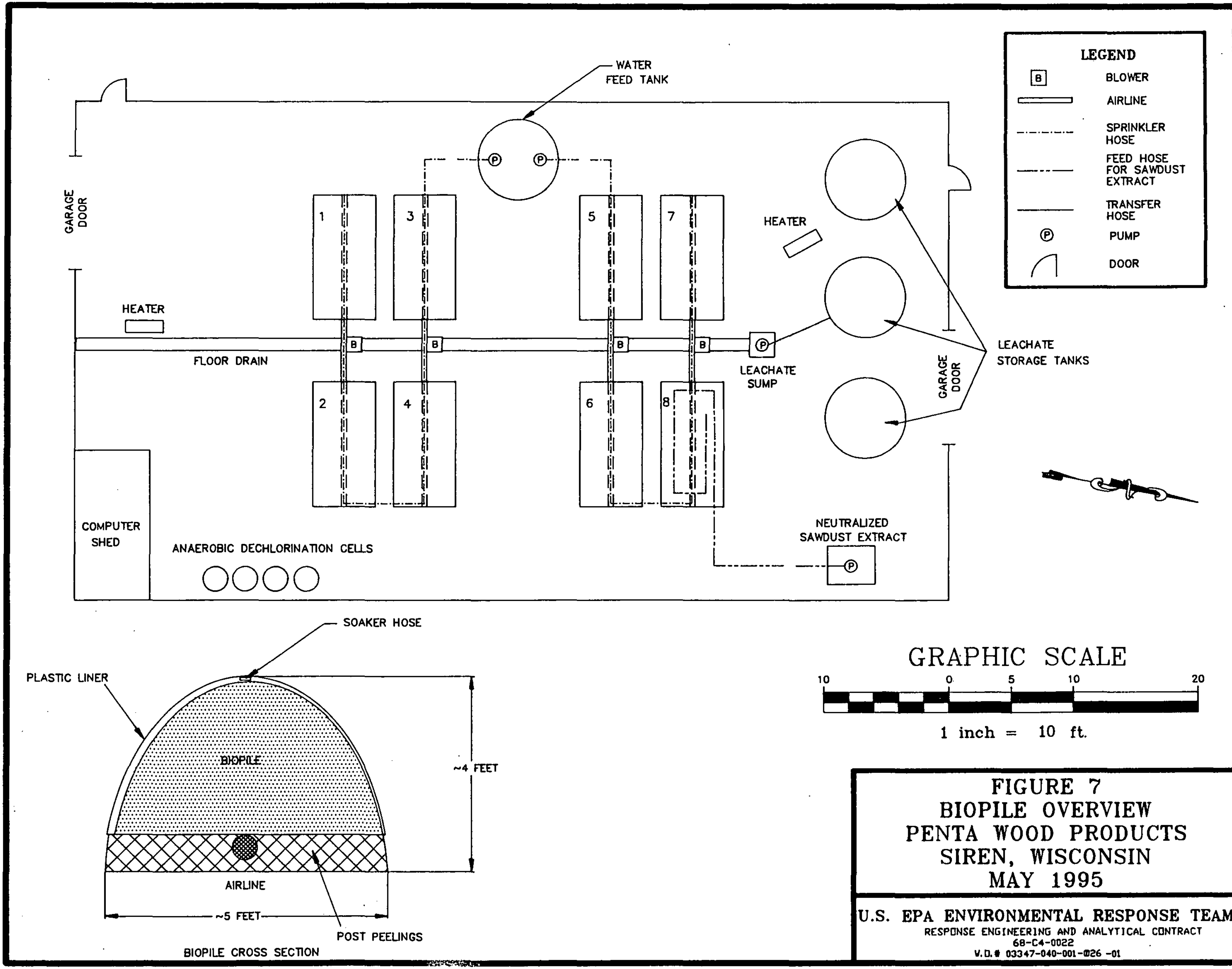


FIGURE 7
BIOPILE OVERVIEW
PENTA WOOD PRODUCTS
SIREN, WISCONSIN
MAY 1995

U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0022
V.O.# 03347-040-001-026 -01

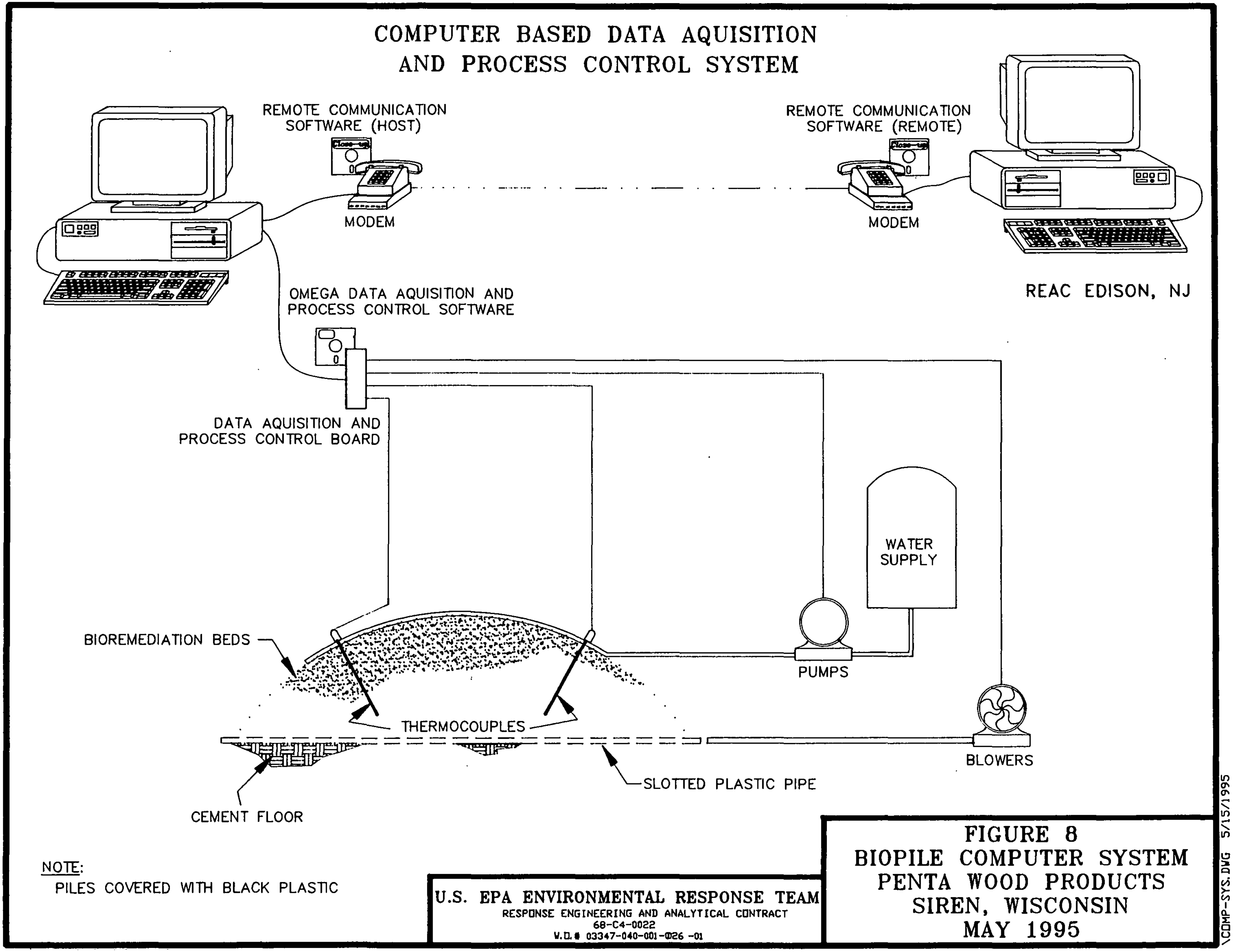
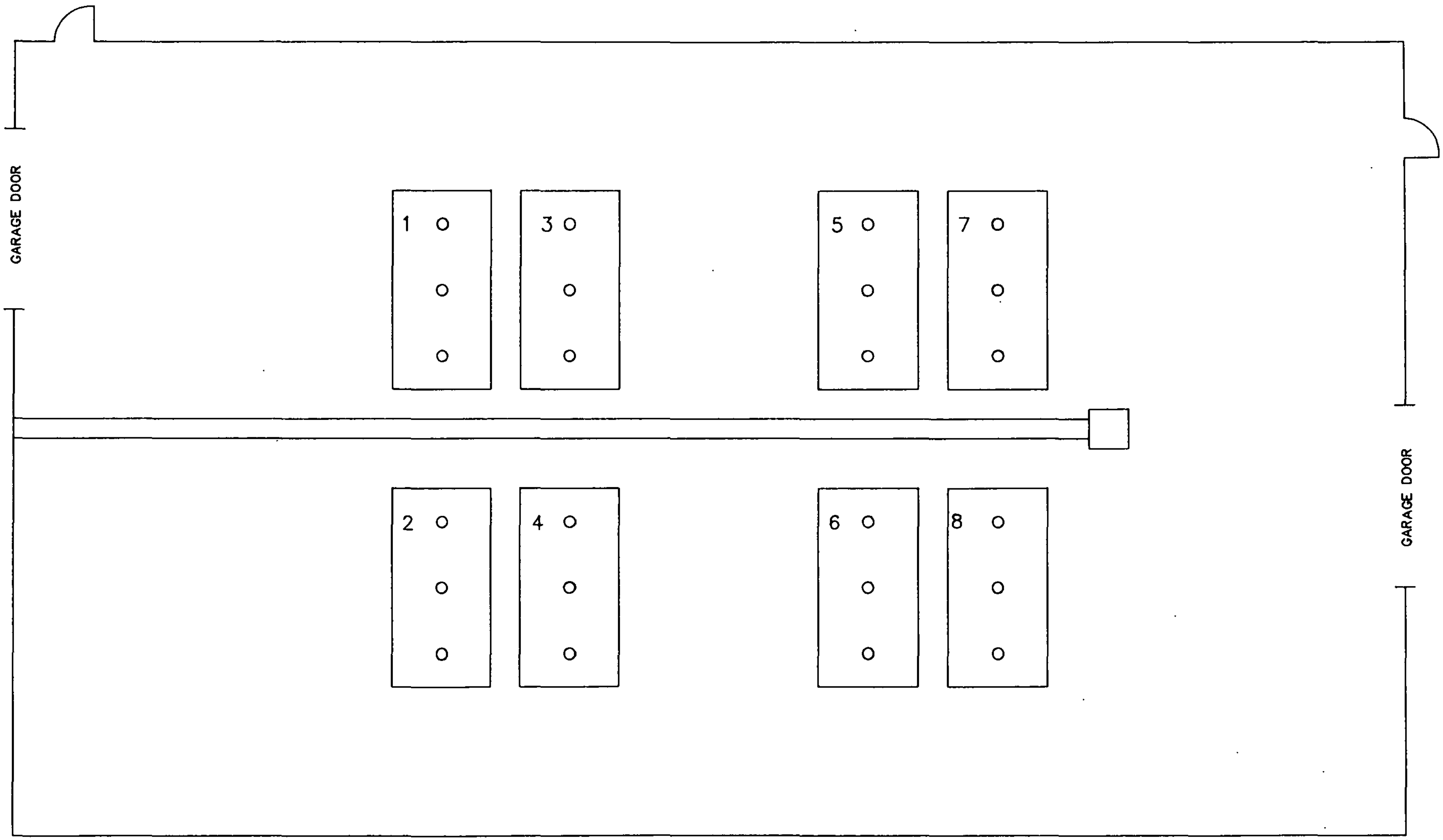


FIGURE 8
BIOPILE COMPUTER SYSTEM
PENTA WOOD PRODUCTS
SIREN, WISCONSIN
MAY 1995



LEGEND

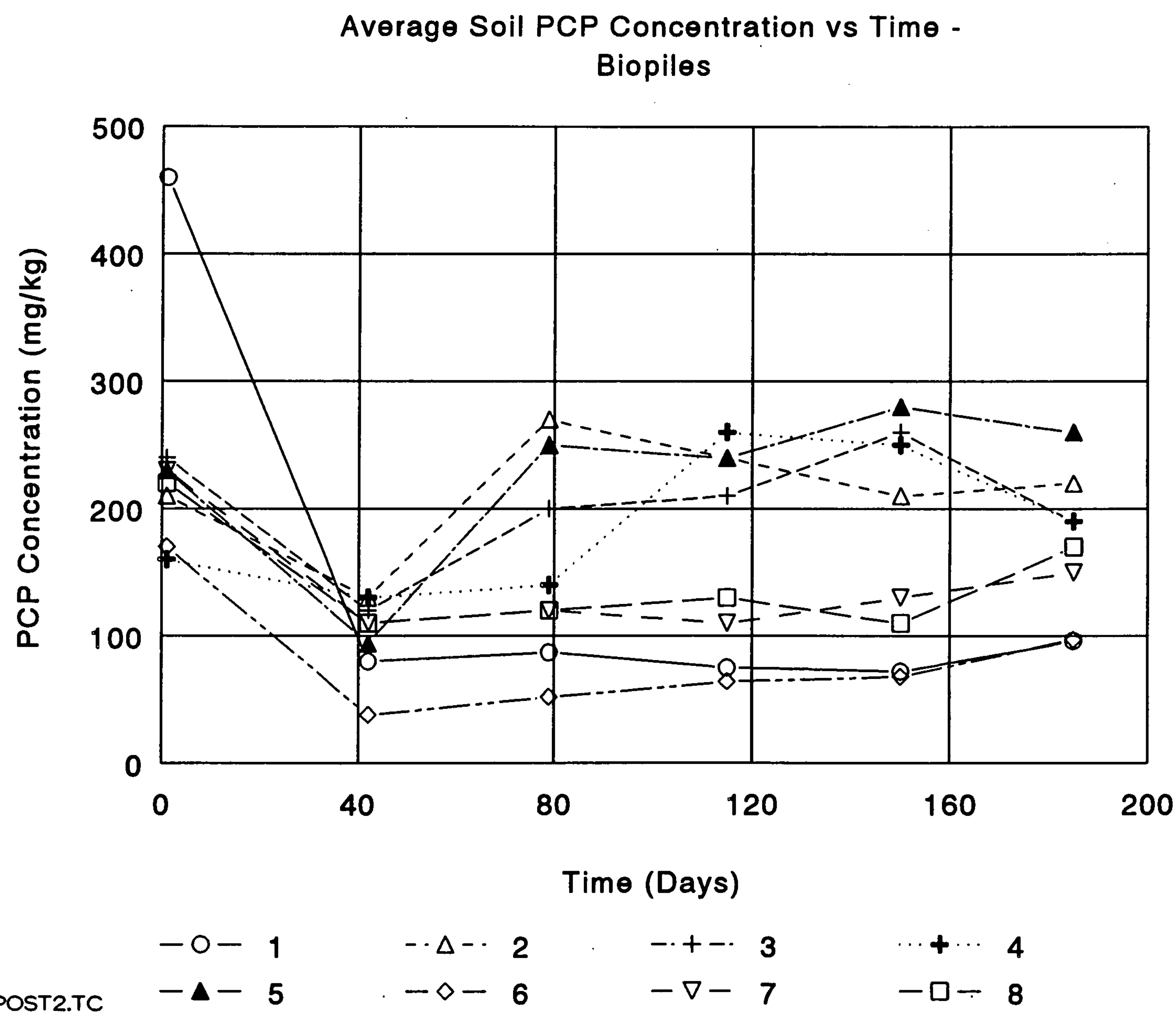
o TYPICAL SAMPLE CORE LOCATION

DOOR

U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0022
W.O.# 03347-040-001-0026-01

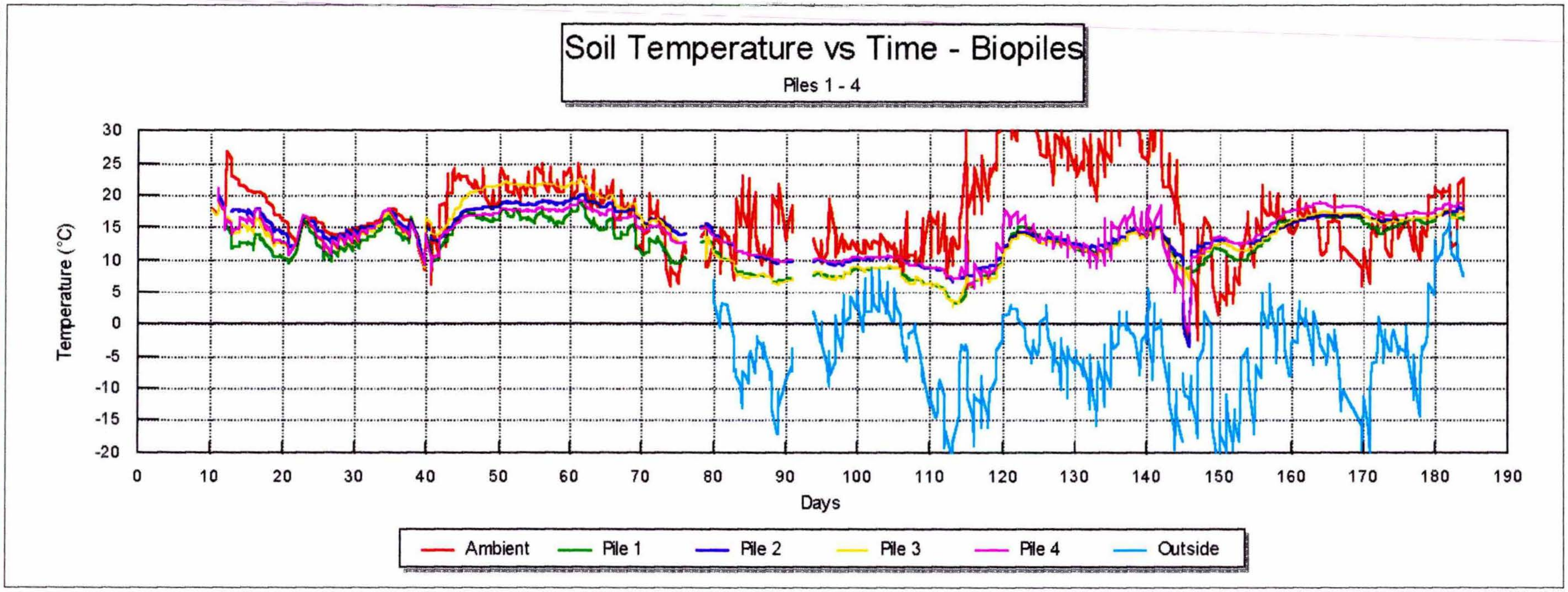
FIGURE 9
BIOPILE SAMPLE GRID
PENTA WOOD PRODUCTS
SIREN, WISCONSIN
MAY 1995

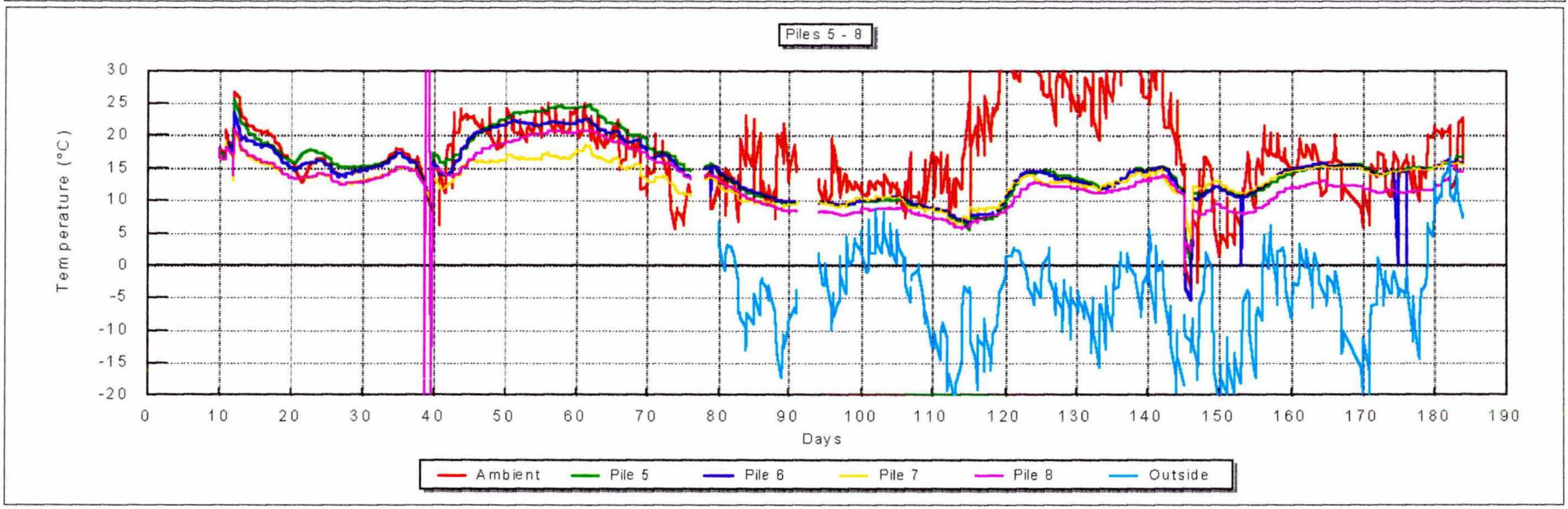
\026BIO-2.DWG 5/24/1995



COMPOST2.TC

U.S. EPA ENVIRONMENTAL RESPONSE TEAM	FIGURE 10
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT	PENTA WOOD PRODUCTS
68-C4-0022	SIREN, WISCONSIN
WO# 03347-040-001-0026-01	MAY 1995

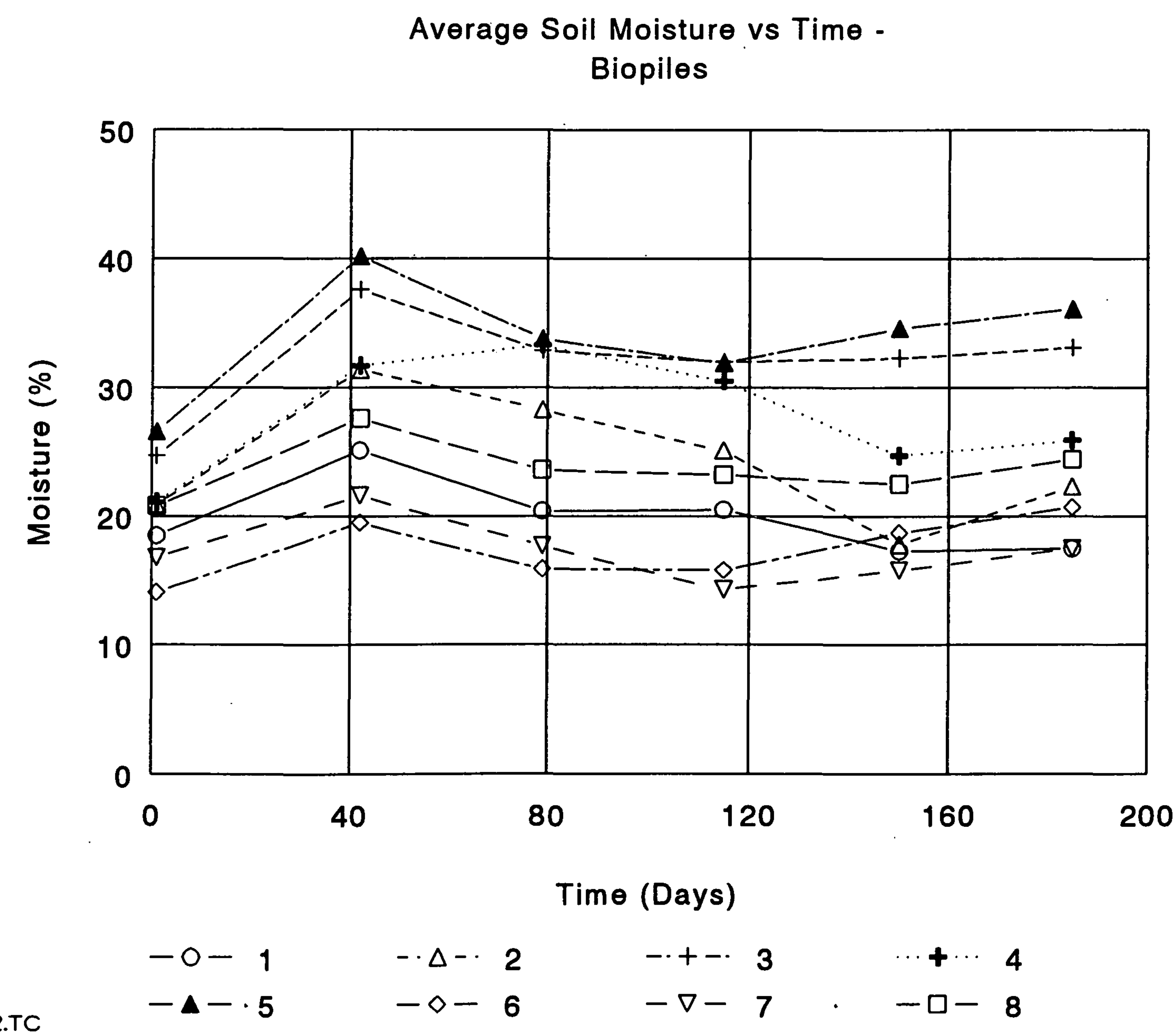




U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0022
W.O.# 03347-040-001-0026-01

FIGURE 11
PENTA WOOD PRODUCTS
SIREN, WISCONSIN
MAY 1995

026-TEMP.WB1 5/12/95



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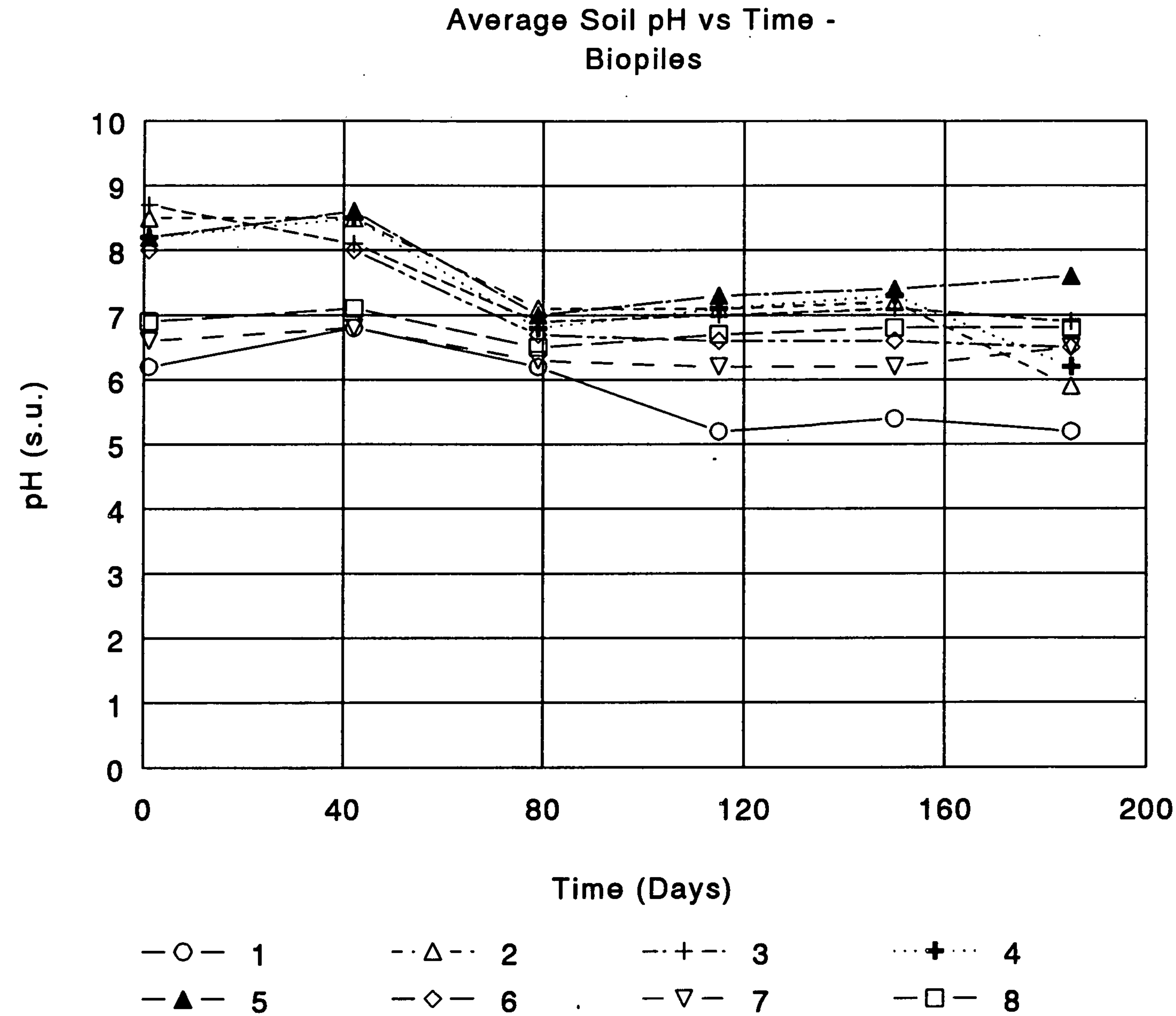
U.S. EPA ENVIRONMENTAL RESPONSE TEAM	FIGURE 12
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT	PENTA WOOD PRODUCTS
68-C4-0022	SIREN, WISCONSIN
WO# 03347-040-001-0026-01	MAY 1995

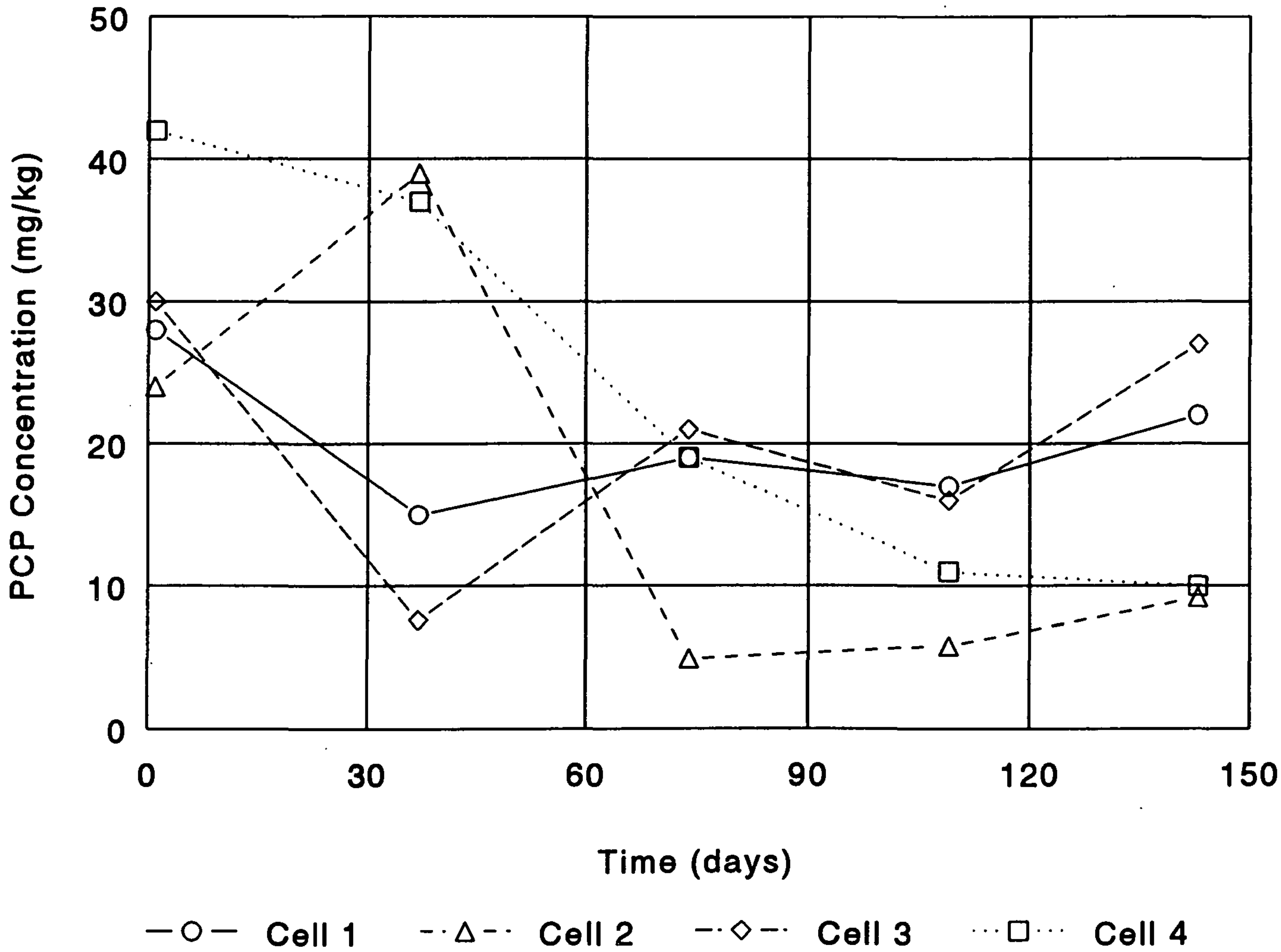


COMPH2.TC

U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
68-C4-0022
WO# 03347-040-001-0026-01

FIGURE 13
PENTA WOOD PRODUCTS
SIREN, WISCONSIN
MAY 1995

Average Soil PCP Concentration vs Time - Anaerobic Dechlorination



ANAEROB2.TC

U.S. EPA ENVIRONMENTAL RESPONSE TEAM RESPONSE ENGINEERING AND ANALYTICAL CONTRACT 68-C4-0022 WO# 03347-040-001-0026-01	FIGURE 14 PENTA WOOD PRODUCTS SIREN, WISCONSIN MAY 1995

Appendix A

APPENDIX A
Analytical Reports
Penta Wood Products
May 1995

026\del\tm\9505\tm0026

WESTON
MANAGERS DESIGNERS.CONSULTANTS

Roy F. Weston, Inc.
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908-321-4200 • Fax 908-494-4021

DATE: January 20, 1995

TO: R. Singhvi EPA/ERT

FROM: V. Kansal Analytical Section Leader Vinod Kansal

SUBJECT: DOCUMENT TRANSMITTAL UNDER WORK ASSIGNMENT # 0-026

Attached please find the following document prepared under this work assignment:

Penta Wood Products - Analytical Report

Central File WA # 0-026	(w/attachment)
T. Mignone	Task Leader
G. Armstrong	Data Validation and Report Writing Group Leader
H. Allen	Work Assignment Manager

ANALYTICAL REPORT

Prepared by
Roy F. Weston, Inc.

Penta Wood Products Site
Siren, WI

January, 1995

EPA Work Assignment No. 0-026
Weston Work Order No. 03347-040-001-0026-01
EPA Contract No. 68-C4-0022

Submitted to
H. Allen
EPA-ERT

T. Mignone Task Leader	Date	Analysis by: REAC (HHL) SWRI
Vinod Kansal V. Kansal Analytical Section Leader	1/19/95 Date	Prepared by: G. Karustis
Ralph M. Shapot Program Manager	Date	Reviewed by: G. Armstrong

Table of Contents

Appendices will be furnished on request.

INTRODUCTION

REAC Laboratory, in response to WA # 0-026, provided analytical support for soil samples collected from the Penta Wood Products Site in Siren, WI. This support included the analyses of soil samples as described in the following table. The support also included the installation and operation of a High Hazard Laboratory in Brunswick, GA, QA/QC, data review, and preparation of an analytical report containing a summary of the analytical methods, the results, QA/QC methods, and the QA/QC results.

The samples were treated with procedures consistent with those specified in REAC SOP # 1008 and are summarized in the following table:

COC #**	Number of Samples	Sampling Date	Date Received	Matrix	Analysis	Laboratory
9215	1	9/23/94	9/24/94	Soil	PCP, As, Cu, Zn	SWRI
9219	5	8/27/94	8/29/94	Soil	PCP	HHL***
9220	5	8/27/94	8/30/94	Soil	As, Cu, Zn, Fe, Ca, Mg	SWRI
9220	5	8/27/94	8/30/94	Soil	TPH	SWRI
9220	5	8/27/94	8/30/94	Soil	TOC	SWRI
9220	5	8/27/94	8/30/94	Soil	CEC	SWRI
9487	7	8/24/94	8/26/94	Soil	TPH	SWRI
9028	18	9/12/94	9/13/94	Soil	PCP	HHL***
9029	18	9/12/94	9/13/94	Soil	PCP	HHL***
9030	18	9/12/94	9/13/94	Soil	PCP	HHL***
9031	18	9/12/94	9/13/94	Soil	PCP	HHL***
10358	20	9/12/94	9/14/94	Soil	Ammonia-N, Nitrate-N TKN, Phosphate, Total Phosphorous As, Cu, Zn Chloride, Sulfate TOC, CEC, TPH Water Holding Capacity	SWRI
10359	4	9/12/94	9/14/94	Soil	Ammonia-N, Nitrate-N TKN, Phosphate, Total Phosphorous As, Cu, Zn Chloride, Sulfate TOC, CEC, TPH Water Holding Capacity	SWRI

COC # denotes Chain of Custody number
HHL denotes High Hazard Laboratory
SWRI denotes SouthWest Research Institute

CASE NARRATIVE

Pentachlorophenol Package D55

The data satisfied all criteria.

Pentachlorophenol Package D63

Every sample extracted on 9/17/94 exceeds the acceptable QC limit for the percent recovery of 2,4,6-tribromophenol. The data are not affected.

TPH, Metals, TOC and CEC Package D64

The data satisfied all criteria.

Pentachlorophenol Package D123

The surrogate recoveries for samples CO9969 DL and CO9969 DUP DL exceeded the acceptable QC limits due to the large dilutions. The data are not affected.

The area count for the internal standard perylene-d_{12} exceeded the acceptable QC limits for CO9969, CO9969 DUP, CO9969 MS, and CO9969 MSD. Since this internal standard was not used to quantitate any analyte, the data are not affected.

The percent recoveries for pentachlorophenol were not calculated for the MS/MSD pair due to the large concentration of pentachlorophenol in the unspiked sample.

SUMMARY of ABBREVIATIONS

B	The analyte was found in the blank
BFB	Bromofluorobenzene
BPQL	Below the Practical Quantitation Limit
C	Centigrade
D	(Surrogate Table) this value is from a diluted sample and was not calculated (Result Table) this result was obtained from a diluted sample
CLP	Contract Laboratory Protocol
COC	Chain of Custody
CONC	Concentration
CRDL	Contract Required Detection Limit
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
E	The value is greater than the highest linear standard and is estimated
EMPC	Estimated maximum possible concentration
J	The value is below the method detection limit and is estimated
HHL	High Hazard Laboratory, Brunswick, GA
IDL	Instrument Detection Limit
ISTD	Internal Standard
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MI	Matrix Interference
MS	Matrix spike
MSD	Matrix spike duplicate
MW	Molecular weight
NA	either Not Applicable or Not Available
NC	Not Calculated
ND	Not Detected
NR	Not Requested
NS	Not Spiked
% D	Percent difference
% REC	Percent Recovery
PQL	Practical quantitation limit
PPBV	Parts per billion by volume
QL	Quantitation Limit
RPD	Relative percent difference
RSD	Relative Standard Deviation
SIM	Selected Ion Mode

m^3	cubic meter	kg	kilogram
l(L)	liter	g	gram
dl	deciliter	cg	centigram
ml	milliliter	mg	milligram
ul	microliter	ug	microgram
		ng	nanogram
		pg	picogram

*	denotes a value that exceeds the acceptable QC limit

Abbreviations that are specific to a particular table are explained in footnotes on that table

Revision 1/9/95

Analytical Procedure for Pentachlorophenol in Soil (SIM)
(HHL)

Extraction Procedure

Ten grams of sample was spiked with the surrogate 2,4,6-tribromophenol, mixed with 10 g anhydrous sodium sulfate, and shaker extrated three times with a 40 ml, 30 ml, and 30 ml portions of 15:85 acetone:methylene chloride. A 1.0 ml aliquot was spiked with an internal standard phenanthrene-d_{10}, and analyzed.

Analytical Procedure

An HP 5971A Mass Selection Detector equipped with a 5890 Series II GC, a 7673A autosampler and controlled by an HP-Chem Station/Window/DOS5.0 software driven IBM compatible computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.25mm ID, 0.50 µm film thickness
Injection Temperature	290° C
Transfer Temperature	315° C
Source Temperature	240° C
Analyzer Temperature	240° C
Temperature Program	100°C for 0.5 min 30° C/min to 305° C Hold for 2 min.
Splitless Injection	Split time = 0.88 min
Injection Volume	2 µl

The GC/MS system was calibrated using 6 pentachlorophenol standards at 0.5, 1.0, 5.0, 10.0, 25.0, and 50.0 µg/ml. Before analysis each day, the system was tuned with 50 ng decafluorotriphenylphosine (DFTPP) and passed a continuing calibration check when analyzing a 5 µg/ml standard mixture in which the responses were evaluated by comparison to the average response of the calibration curve.

The pentachlorophenol results, based on dry weight, are listed in Table 1.1. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF_{ave} x V_i x W x D}$$

where

DF	=	Dilution Factor
RF_{ave}	=	Average Response Factor (unitless)
A_u	=	Area of analyte
A_{is}	=	Area of internal standard
I_{is}	=	Mass of internal standard (ng)
C_u	=	Concentration of analyte (μg/Kg)
V_t	=	Volume of extract (μl)
V_i	=	Volume of extract injected (μl)
W	=	Weight of sample (g)
D	=	Decimal per cent solids

The average Response Factor is used when a sample is associated with an initial calibration curve. The Response Factor is used when a sample is associated with a continuing calibration.

Response Factor calculation:

The response factor (RF) for each specific analyte is quantitated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \ x \ I_{is}}{A_{is} \ x \ I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
A_{is}	=	Area of the internal standard in the standard
I_c	=	Mass of the analyte in the standard
I_{is}	=	Mass of the internal standard in the standard

$$RF_{ave} = \frac{RF_1 + ... + RF_n}{n}$$

and

n = number of Samples

Revision of 7/12/94

ANALYTICAL PROCEDURE FOR PENTACHLOROPHENOL (SUBCONTRACTED)

The subcontract laboratory determined the pentachlorophenol concentration in the samples using USEPA Method 8270. The results of the analysis are listed in Table 1.1.

ANALYTICAL PROCEDURE FOR METALS

The subcontract laboratory determined the metals concentration in the samples using USEPA Method ICP 6010. The results of the analysis are listed in Table 1.2.

ANALYTICAL PROCEDURE FOR ARSENIC, COPPER, AND ZINC

The subcontract laboratory determined the concentration of arsenic, copper, and zinc in the samples using USEPA Method ICP 6010. The results of the analysis are listed in Table 1.3.

ANALYTICAL PROCEDURE FOR ANIONS

The subcontract laboratory determined the concentration of chloride, nitrate, and sulfate in the samples using USEPA Method 300. The results of the analysis are listed in Table 1.4.

ANALYTICAL PROCEDURE FOR PHOSPHATE

The total phosphorous was also determined using USEPA Method 300. The ortho phosphate was determined using USEPA Method 6010 and phospate was calculated by difference. The results of the analysis are listed in Table 1.4.

ANALYTICAL PROCEDURE FOR TOTAL ORGANIC CARBON

The subcontract laboratory determined the total organic carbon of the samples using USEPA Method 9060. The results of the analysis are listed in Table 1.5.

ANALYTICAL PROCEDURE FOR CATION EXCHANGE CAPACITY

The subcontract laboratory determined the cation exchange capacity of the samples using USEPA Method 9081. The results of the analysis are listed in Table 1.5.

ANALYTICAL PROCEDURE FOR TOTAL PETROLEUM HYDROCARBONS

The subcontract laboratory determined the total petroleum hydrocarbon concentration in the samples by preparing them using USEPA Method 9071 and analyzing them using USEPA Method 418.1. The results of the analysis are listed in Table 1.6.

ANALYTICAL PROCEDURE FOR AMMONIA

The subcontract laboratory determined the ammonia content of the samples using USEPA Method 350.2. This method is contained in "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1979. The results of the analysis are listed in Table 1.7.

ANALYTICAL PROCEDURE FOR TOTAL KJELDAHL NITROGEN

The subcontract laboratory determined the total Kjeldahl nitrogen content of the samples using USEPA Method 351.3. The results of the analysis are listed in Table 1.7.

ANALYTICAL PROCEDURE FOR TOTAL PHOSPHATE

The subcontract laboratory calculated the total phosphate concentration of the samples by using USEPA Method 300. The results of the analysis are listed in Table 1.7.

ANALYTICAL PROCEDURE FOR WATER HOLDING CAPACITY

The subcontract laboratory determined the water holding capacity of the samples using ASTM Method 2980-71. The results of the analysis are listed in Table 1.7.

Table 1.1 Results of the Pentachlorophenol Analysis
WA # 0-026 Penta Wood Products
Based on Dry Weight

Sample ID	Location	Percent Solids	Conc mg/kg	MDL mg/kg
BLANK 166	SAND BLANK	100	ND	5.0
A26759	Clean Sand Untreated	97	ND	5.1
A26760	LYSIM 3 (3-5') Untreated	94	130	5.2
A26761	Col A Treated	90	39	5.4
A26762	Col B Treated	90	27	5.4
A26763	Col C Treated	88	11	5.2
BLANK 172	SAND BLANK	100	ND	5.0
A26608	3A1 COMP	68	220	7.2
A26609	3A2 COMP	70	230	7.1
A26610	3A3 COMP	68	230	7.3
A26612	3B1 COMP	69	250	7.1
A26613	3B2 COMP	72	240	6.9
A26614	3B3 COMP	70	240	6.9
A26616	3C1 COMP	71	230	6.8
A26617	3C2 COMP	67	260	7.2
A26618	3C3 COMP	69	230	7.0
A26620	4A1 COMP	72	190	6.9
BLANK #173	SAND BLANK	100	ND	5.0
A26621	4A2 COMP	76	170	6.4
A26622	4A3 COMP	75	150	6.5
A26624	4B1 COMP	78	140	6.2
A26625	4B2 COMP	78	150	6.3
A26626	4B3 COMP	77	160	6.2
A26628	4C1 COMP	79	160	6.1
A26629	4C2 COMP	79	170	6.1
A26630	4C3 COMP	78	180	6.3
A26584	1A1 COMP	79	470	6.3
A26585	1A2 COMP	80	470	6.2
A26586	1A3 COMP	81	450	5.9
A26588	1B1 COMP	81	430	6.1
A26589	1B2 COMP	79	430	6.3
A26590	1B3 COMP	80	500	6.1
A26592	1C1 COMP	83	490	5.9
A26593	1C2 COMP	81	470	6.1
A26594	1C3 COMP	83	470	5.8
A26596	2A1 COMP	78	250	6.2
A26597	2A2 COMP	78	220	6.1

Table 1.1 (Cont) Results of the Pentachlorophenol Analysis
WA # 0-026 Penta Wood Products
Based on Dry Weight

Sample ID	Location	Percent Solids	Conc mg/kg	MDL mg/kg
BLANK #174	SAND BLANK	100	ND	5.0
A26598	2A3 COMP	76	200	6.6
A26600	2B1 COMP	76	180	6.4
A26601	2B2 COMP	75	210	6.5
A26602	2B3 COMP	73	230	6.8
A26604	2C1 COMP	72	230	6.8
A26605	2C2 COMP	76	180	6.4
A26606	2C3 COMP	72	220	6.8
A26632	5A1 COMP	69	250	7.2
A26633	5A2 COMP	71	220	6.8
A26634	5A3 COMP	69	240	7.2
A26636	5B1 COMP	68	240	7.3
A26637	5B2 COMP	70	220	6.9
A26638	5B3 COMP	69	210	7.2
A26640	5C1 COMP	67	250	7.4
A26641	5C2 COMP	66	230	7.2
A26642	5C3 COMP	66	230	7.3
BLANK #175	SAND BLANK	100	ND	5.0
A26644	6A1 COMP	86	130	5.8
A26645	6A2 COMP	87	140	5.5
A26646	6A3 COMP	86	140	5.6
A26648	6B1 COMP	88	170	5.6
A26649	6B2 COMP	87	160	5.6
A26764	6B3 COMP	86	170	5.6
A26766	6C1 COMP	88	210	5.5
A26767	6C2 COMP	88	180	5.4
A26768	6C3 COMP	88	200	5.6
A26711	7A1 COMP	82	240	6.1
A26712	7A2 COMP	89	200	5.5
A26713	7A3 COMP	83	230	5.9
A26715	7B1 COMP	84	230	5.8
A26716	7B2 COMP	83	220	5.9
A26717	7B3 COMP	83	240	5.8
A26719	7C1 COMP	82	240	5.9
A26720	7C2 COMP	84	220	6.0
A26721	7C3 COMP	83	230	5.8
A09951	8A1 COMP	79	220	6.4
BLANK #176	SAND BLANK	100	ND	5.0
A09952	8A2 COMP	74	230	6.7
A09953	8A3 COMP	74	250	6.6
A09955	8B1 COMP	76	220	6.5
A09956	8B2 COMP	75	220	6.4
A09957	8B3 COMP	76	200	6.3
A09959	8C1 COMP	75	220	6.4
A09960	8C2 COMP	77	220	6.5
A09961	8C3 COMP	78	220	6.1

Table 1.1 (Cont) Results of the Pentachlorophenol Analysis
WA # 0-026 Penta Wood Products
Based on Dry Weight

Sample ID	Location	Percent Solids	Conc mg/kg	MDL mg/kg
SBLK01		100	ND	0.33
CO9969	Master Batch BIO Soil	91	160	36

Table 1.2 Results of the Metals Analysis
WA # 0-026 Penta Wood Products
(based on dry weight)

Sample ID	Method		26759		26760		26761		26762		26763	
Location	Blank		Clean Sand Untreated		Lysim 3 (3-5') Untreated		Col A Treated		Col B Treated		Col C Treated	
% Solids	100		98		94		90		91		88	
Analyte	Conc (mg/kg)	MDL (mg/kg)	Conc (mg/kg)	MDL (mg/kg)	Conc (mg/kg)	MDL (mg/kg)	Conc (mg/kg)	MDL (mg/kg)	Conc (mg/kg)	MDL (mg/kg)	Conc (mg/kg)	MDL (mg/kg)
Arsenic	ND	10	ND	10	55	11	42	11	38	11	ND	11
Calcium	ND	10	1400	10	950	11	1100	11	1000	11	1900	11
Copper	ND	2.0	14	2.0	72	2.1	63	2.2	57	2.2	16	2.3
Iron	ND	4.0	5500	4.0	6400	4.2	5700	4.5	5400	4.4	6600	4.6
Magnesium	ND	10	2000	10	1800	11	1800	11	1500	11	2100	12
Zinc	ND	2.0	9.5	2.0	17	2.1	16	2.2	14	2.2	92	2.3

Table 1.3 Results of the Arsenic, Copper, and Zinc Analysis
WA# 0-026 Penta Wood Products

Sample ID	Location	Percent Solids	Arsenic Conc. (mg/kg)	MDL (mg/kg)	Copper Conc. (mg/kg)	MDL (mg/kg)	Zinc Conc. (mg/kg)	MDL (mg/kg)
Method Blank			ND	10	ND	1.0	ND	2.0
26587	1A4 COMP	82	21	12	50	1.2	78	2.4
26591	1B4 COMP	79	13	13	42	1.3	40	2.6
26595	1C4 COMP	84	13	12	41	1.2	42	2.4
26599	2A4 COMP	79	25	13	66	1.3	72	2.6
26603	2B4 COMP	79	25	13	66	1.3	76	2.6
26607	2C4 COMP	76	14	13	60	1.3	68	2.6
26611	3A4 COMP	74	ND	13	66	1.3	82	2.6
26615	3B4 COMP	74	19	13	63	1.3	78	2.6
26619	3C4 COMP	77	19	13	69	1.3	81	2.6
26623	4A4 COMP	76	17	13	74	1.3	87	2.6
26627	4B4 COMP	81	19	12	86	1.2	97	2.4
26631	4C4 COMP	81	30	12	72	1.2	81	2.4
26635	5A4 COMP	75	22	13	73	1.3	74	2.6
26639	5B4 COMP	75	21	13	68	1.3	76	2.6
26643	5C4 COMP	73	ND	14	71	1.4	84	2.8
26647	6A4 COMP	88	ND	11	33	1.1	39	2.2
26765	6B4 COMP	87	ND	11	30	1.2	51	2.3
26710	6C4 COMP	87	15	11	50	1.2	41	2.3
26714	7A4 COMP	83	ND	12	29	1.2	40	2.4
26718	7B4 COMP	83	13	12	50	1.2	36	2.4
26722	7C4 COMP	84	ND	12	30	1.2	49	2.4
09954	8A4 COMP	79	ND	13	33	1.3	34	2.6
09958	8B4 COMP	79	13	13	33	1.3	38	2.6
09962	8C4 COMP	82	ND	12	33	1.2	44	2.4
C 09969	Master Batch Bio Soil	91	15	10	31	2.0	40	2.0

Table 1.4 Results of the Anions Analysis
WA# 0-026 Penta Wood Products

Sample ID	Location	Percent Solids	Chloride Conc. (mg/kg)	MDL (mg/kg)	Nitrate-N Conc. (mg/kg)	MDL (mg/kg)	Phosphate Conc. (mg/kg)	MDL (mg/kg)	Sulfate Conc. (mg/kg)	MDL (mg/kg)
Method Blank			ND	50	ND	25	ND	25	ND	50
26587	1A4 COMP	82	ND	60	ND	30	42	30	ND	61
26591	1B4 COMP	79	ND	63	ND	31	35	31	ND	63
26595	1C4 COMP	84	ND	59	ND	30	38	30	ND	59
26599	2A4 COMP	79	900	63	ND	31	1300	62	780	63
26603	2B4 COMP	79	990	63	ND	31	1300	62	870	63
26607	2C4 COMP	76	1000	66	ND	33	1300	66	870	66
26611	3A4 COMP	74	1100	67	2400	170	1400	170	990	67
26615	3B4 COMP	74	940	67	1900	170	1300	34	730	67
26619	3C4 COMP	77	1000	65	1800	160	1400	160	850	65
26623	4A4 COMP	76	1700	330	ND	33	1700	164	1500	330
26627	4B4 COMP	81	1800	310	ND	31	1900	160	1500	310
26631	4C4 COMP	81	1600	310	ND	31	1600	160	1300	310
26635	5A4 COMP	75	2100	330	1400	170	1300	170	830	65
26639	5B4 COMP	75	2600	330	1400	170	1300	170	820	67
26643	5C4 COMP	73	3000	340	1800	170	1200	170	870	68
26647	6A4 COMP	88	1400	220	ND	28	340	28	190	55
26765	6B4 COMP	87	1800	120	ND	28	260	28	150	58
26710	6C4 COMP	87	1200	120	ND	28	230	28	120	58
26714	7A4 COMP	83	2300	120	1100	30	46	30	ND	60
26718	7B4 COMP	83	2500	300	1100	150	71	30	ND	60
26722	7C4 COMP	84	2100	300	1100	150	37	30	ND	60
09954	8A4 COMP	79	3300	310	1500	160	41	31	ND	62
09958	8B4 COMP	79	2700	310	1100	31	99	31	ND	62
09962	8C4 COMP	82	2700	300	1000	30	95	30	ND	60

Table 1.5 Results of the Total Organic Carbon and Cation Exchange Capacity Analysis
WA # 0–026 Penta Wood Products

Sample ID	Location	Percent Solids	Cation Exchange Capacity (mEq/g)	MDL (mEq/g)	Total Organic Carbon (mg/kg)	MDL (mg/kg)
Blank			ND	0.001	ND	500
B,C 26759	Clean Sand Untreated	99	0.027	0.001	2400	500
B,C 26760	Lysim 3(3–5') Untreated	100	0.034	0.001	30000	500
B,C 26761	Col A Treated	100	0.033	0.001	26000	500
B,C 26762	Col B Treated	100	0.028	0.001	25000	500
B,C 26763	Col C Treated	100	0.024	0.001	5700	500
26587	1A4 COMP	82	0.42	0.006	57000	500
26591	1B4 COMP	79	0.59	0.006	41000	500
26595	1C4 COMP	84	0.53	0.006	38000	500
26599	2A4 COMP	79	0.47	0.007	42000	500
26603	2B4 COMP	79	0.74	0.007	49000	500
26607	2C4 COMP	76	0.80	0.007	48000	500
26611	3A4 COMP	74	1.1	0.007	68000	500
26615	3B4 COMP	74	0.34	0.007	69000	500
26619	3C4 COMP	77	0.49	0.007	62000	500
26623	4A4 COMP	76	0.93	0.007	78000	500
26627	4B4 COMP	81	0.87	0.007	84000	500
26631	4C4 COMP	81	0.18	0.007	49000	500
26635	5A4 COMP	75	0.48	0.007	85000	500
26639	5B4 COMP	75	0.24	0.006	81000	500
26643	5C4 COMP	73	1.3	0.007	77000	500
26647	6A4 COMP	88	0.31	0.006	33000	500
26765	6B4 COMP	87	0.40	0.006	18000	500
26710	6C4 COMP	87	0.52	0.006	25000	500
26714	7A4 COMP	83	0.50	0.007	37000	500
26718	7B4 COMP	83	0.27	0.006	28000	500
26722	7C4 COMP	84	0.56	0.006	29000	500
09954	8A4 COMP	79	0.64	0.007	39000	500
09958	8B4 COMP	79	0.20	0.007	35000	500
09962	8C4 COMP	82	0.69	0.006	27000	500

Table 1.6 Results of the Total Petroleum Hydrocarbon Analysis
WA # 0-026 Penta Wood Products

Sample ID	Location	Percent Solids	TPH Conc (mg/kg)	MDL (mg/kg)
Method Blank	–	100	ND	5
26549	ACA Soil	95	68	54
26550	95A/5PA Soil	95	900	54
26551	90A/10PA Soil	97	2400	53
26552	80A/20PA Soil	96	8700	107
26553	70A/30PA Soil	97	8600	106
26554	60A/40PA Soil	91	12000	290
26555	PENTA/ACA Soil	90	30000	1500
26759	Clean Sand Untreated	92	840	56
26760	Lysim 3(3-5') Untreated	87	1300	59
26761	Col A Treated	82	980	63
26762	Col B Treated	85	1100	61
26763	Col C Treated	82	93	63
Method Blank*	–	100	ND	2.1
26722	7C4 Comp	79	4000	32
09954	8A4 Comp	79	2000	32
09958	8B4 Comp	83	1500	31
09962	8C4 Comp	83	2600	31
26587	1A4 Comp	84	3200	31
26591	1B4 Comp	80	3900	32
26595	1C4 Comp	87	4500	29
26599	2A4 Comp	83	2200	31
26603	2B4 Comp	81	2400	32
26607	2C4 Comp	77	4100	33
26611	3A4 Comp	75	2600	34
26615	3B4 Comp	75	3300	34
26619	3C4 Comp	77	3000	32
26623	4A4 Comp	82	3300	31
26627	4B4 Comp	82	3300	31
26631	4C4 Comp	82	4200	31
26635	5A4 Comp	76	3600	34
26639	5B4 Comp	74	2200	35
26643	5C4 Comp	74	3900	35
26647	6A4 Comp	89	2700	29
Method Blank*	–	100	ND	2.1
26765	6B4 Comp	89	2500	29
26710	6C4 Comp	90	3500	28
26714	7A4 Comp	85	3400	30
26718	7B4 Comp	86	2900	30

* denotes that the units for the method blank are mg/l

Table 1.7 Results of the Ammonia, Phosphorous, Total Kjeldahl Nitrogen, and Water Holding Capacity Analysis
WA# 0-026 Penta Wood Products

Sample ID	Location	Percent Solids	Ammonia Conc. mg/Kg	Ammonia MDL	Total Phosphorous Conc. ug/g	Total Phosphorous MDL	TKN Conc. mg/Kg	TKN MDL	Water Holding Capacity Conc. Percent	Water Holding Capacity MDL
26587	1A4 COMP	82	1.8	1	260	3.6	540	2	13.9	NA
26591	1B4 COMP	79	1.4	1	240	3.5	740	2	12.84	NA
26595	1C4 COMP	84	ND	1	240	3.3	730	2	9.56	NA
26599	2A4 COMP	79	970	10	3000	3.7	3700	2	25.15	NA
26603	2B4 COMP	79	1300	10	3900	3.6	4500	2	25.1	NA
26607	2C4 COMP	76	1200	10	3000	3.6	4500	2	18.81	NA
26611	3A4 COMP	74	2500	10	3700	3.5	6700	2	27.14	NA
26615	3B4 COMP	74	2200	10	3300	3.7	8300	2	21.68	NA
26619	3C4 COMP	77	2100	10	3500	3.5	7100	2	18.42	NA
26623	4A4 COMP	76	1400	10	4300	3.8	5400	2	29.69	NA
26627	4B4 COMP	81	1200	10	4500	3.4	5700	2	29.34	NA
26631	4C4 COMP	81	1200	10	4500	3.4	5600	2	26.44	NA
26635	5A4 COMP	75	2300	10	2800	3.8	6300	2	23.23	NA
26639	5B4 COMP	75	2100	10	3700	3.8	5600	2	20.49	NA
26643	5C4 COMP	73	2300	10	3100	4.0	6700	2	13.89	NA
26647	6A4 COMP	88	400	10	750	3.0	1200	2	10.55	NA
26765	6B4 COMP	87	270	10	580	3.0	1300	2	6.30	NA
26710	6C4 COMP	87	280	10	650	3.2	1000	2	7.95	NA
26714	7A4 COMP	83	700	10	300	3.1	1900	2	4.58	NA
26718	7B4 COMP	83	710	10	270	3.2	1800	2	6.38	NA
26722	7C4 COMP	84	850	10	230	3.5	2300	2	3.23	NA
09954	8A4 COMP	79	900	10	260	3.2	2600	2	7.42	NA
09958	8B4 COMP	79	830	10	360	3.6	2200	2	9.47	NA
09962	8C4 COMP	82	870	10	400	3.1	2400	2	3.21	NA

QA/QC FOR PCP

Each sample, except C 09969, was spiked with 2,4,6-tribromophenol as a surrogate. Sample C 09969 was spiked with nitrobenzene-d_5, 2-fluorobiphenyl, terphenyl-d_{14}, phenol-d_5, 2-fluorophenol and 2,4,6-tribromophenol. Percent recoveries ranged from 43 to 144. One hundred and fifteen out of one hundred and thirty-nine values were within the QC limits. Results of the surrogate recoveries are listed in Table 2.1.

Samples A 26763, A 26610, A 26584, A 26589, A 26598, A 26636, A 26644, A 26711, A 09952 and C 09969 and Blank 166, were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analyses. The percent recoveries ranged from 76 to 163 and nine out of twenty values were within the acceptable QC limits. Two values were not calculated because the concentration spiked was much less than the concentration of analyte in the sample. The relative percent differences ranged from 0 (zero) to 42 and all ten values were within the acceptable QC limits. One value was not calculated because the concentration spiked was much less than the concentration of analyte in the sample. The results are listed in Table 2.2.

The blank was chosen for the MS analysis. The percent recovery, listed in Table 2.3, was 78. The percent recovery was within the acceptable QC limits.

Sample C 09969 was chosen for the duplicate analysis. The relative percent difference, listed in Table 2.4, was 6. The subcontract laboratory did not provide QC limits for this analysis.

Table 2.1 Results of the Surrogate Recoveries
in Soil Samples
WA # 0-026 Penta Wood Products

Sample ID	2,4,6-Tribromophenol % Recovery
BLANK 166	83
BLANK 166 MS	89
BLANK 166 MSD	88
A26759	66
A26760	90
A26761	76
A26762	86
A26763	85
A26763 MS	94
A26763 MSD	98
BLANK 172	88
A26608	103
A26609	108
A26610	106
A26612	108
A26613	109
A26614	108
A26616	86
A26617	114
A26618	97
A26620	109
A26610MS	114
A26610MSD	113
BLANK #173	127 *
A26621	124 *
A26622	128 *
A26624	129 *
A26625	136 *
A26626	136 *
A26628	129 *
A26629	135 *
A26630	130 *
A26584	135 *
A26585	135 *
A26586	134 *
A26588	140 *
A26589	137 *
A26590	131 *
A26592	137 *
A26593	132 *
A26594	132 *
A26596	144 *
A26597	128 *
A26584MS	132 *
A26584MSD	131 *
A26589MS	125 *
A26589MSD	125 *

	QC LIMITS
2,4,6-Tribromophenol	19-122

Table 2.1 (Cont) Results of the Surrogate
Recoveries in Soil Samples
WA # 0-026 Penta Wood Products

Sample ID	2,4,6-Tribromophenol % Recovery
BLANK #174	119
A26598	97
A26600	104
A26601	98
A26602	105
A26604	97
A26605	92
A26606	115
A26632	117
A26633	99
A26634	109
A26636	103
A26637	111
A26638	116
A26640	100
A26641	114
A26642	115
A26598MS	106
A26598MSD	122
A26636MS	117
A26636MSD	120
BLANK #175	90
A26644	81
A26645	79
A26646	86
A26648	89
A26649	87
A26764	90
A26766	95
A26767	92
A26768	89
A26711	96
A26712	95
A26713	96
A26715	95
A26716	96
A26717	99
A26719	96
A26720	95
A26721	99
A09951	98
A26644MS	98
A26644MSD	98
A26711MS	99
A26711MSD	95

	QC LIMITS
2,4,6-Tribromophenol	19-122

Table 2.1 (Cont) Results of the Surrogate
Recoveries in Soil Samples
WA # 0-026 Penta Wood Products

Sample ID	2,4,6-Tribromophenol % Recovery
BLANK #176	94
A09952	92
A09953	84
A09955	92
A09956	94
A09957	79
A09959	98
A09960	96
A09961	96
A09952MS	98
A09952MSD	98

	QC LIMITS
2,4,6-Tribromophenol	19-122

Table 2.1 (Cont) Results of the Surrogate Recoveries in Soil Samples
WA # 0-026 Penta Wood Products

Sample ID	2,4,6-Tribromophenol % Recovery
BLANK #176	94
A09952	92
A09953	84
A09955	92
A09956	94
A09957	79
A09959	98
A09960	96
A09961	96
A09952MS	98
A09952MSD	98

	QC LIMITS
2,4,6-Tribromophenol	10-123

Table 2.1 (Cont) Results of the Surrogate Recoveries
in Soil Samples
WA # 0–026 Penta Wood Products

Sample ID	S1 (NBZ)	S2 (FBP)	S3 (TPH)	S4 (PHL)	S5 (2FP)	S6 (DCB)	Total Out
BLK MS	57	55	83	70	59	95	0
C 09969	54	53	83	56	46	77	0
C 09969 DUP	57	53	91	61	48	79	0
C 09969 MS	49	46	70	56	43	68	0
C 09969 MSD	54	50	77	61	47	74	0
SBLK01	49	50	75	57	48	79	0

	QC Limits
S1 (NBZ) = Nitrobenzene–d5	23–120
S2 (FBP) = 2–Fluorobiphenyl	30–115
S3 (TPH) = Terphenyl–d14	18–137
S4 (PHL) = Phenol–d5	24–113
S5 (2FP) = 2–Fluorophenol	25–121
S6 (TBP) = 2,4,6–Tribromophenol	19–122

Table 2.2 Results of the MS/MSD Analysis for PCP in the Soil Samples
WA # 0-026 Penta Wood Site
Based on Dry Weight

Sample ID	Spike Added mg/kg	Sample Conc mg/kg	MS Conc mg/kg	MSD Conc mg/kg	MS % Rec	MSD % Rec	RPD	Recovery Limits	RPD Limits
BLANK 166	96.1	ND	90.8	91.0	95	95	0	17-109	47
A26763	104	11.0	90.3	105	76	90	17	17-109	47
A26610	100	234	369	373	135 *	139 *	3	17-109	47
A26584	100	473	577	624	104	151 *	37	17-109	47
A26589	100	434	597	540	163 *	106	42	17-109	47
A26598	100	197	337	307	140 *	110 *	24	17-109	47
A26636	100	238	359	352	121 *	114 *	6	17-109	47
A26644	100	127	226	250	99	123 *	22	17-109	47
A26711	100	236	333	327	97	91	6	17-109	47
A09952	100	228	348	352	120 *	124 *	3	17-109	47

Sample ID	Spike Added mg/kg	Sample Conc mg/kg	MS Conc mg/kg	MSD Conc mg/kg	MS % Rec	MSD % Rec	RPD	Recovery Limits	RPD Limits
C 09969	2.7	160	170 E	170 E	NC	NC	NC	14-176	47

Table 2.3 Results of the MS Analysis for PCP in the Soil Samples
WA # 0-026 Penta Wood Site
Based on Dry Weight

Sample ID	Spike Added mg/kg	Sample Conc mg/kg	MS Conc mg/kg	MS % Rec	Recovery Limits
BLK	2.5	ND	1.957	78	14-176

Table 2.4 Results of the Duplicate Analysis for the Soil Samples
WA # 0-026 Penta Wood Site
Based on Dry Weight

Sample ID	First Analysis mg/kg	Second Analysis mg/kg	RPD %
C 09969	160	150	6

QA/QC FOR METALS

Samples 26759, 26765 and C 09969 were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries ranged from 82 to 109 and all eighteen values were within the acceptable QC limits. Two additional values were not calculated because the concentration of analyte spiked was less than the concentration of analyte in the sample. The relative percent differences ranged from 1 to 27 and eight out of nine values that were calculated were within the acceptable QC limits. One value was not calculated because the concentration of analyte spiked was less than the concentration of analyte in the sample. The results are listed in Table 2.5.

Samples 26759, 26765, 26722 and C 09969 were chosen for the duplicate analysis. The relative percent differences ranged from 0 (zero) to 34. Four values were not calculated because the analyte was not detected in either analysis. The results are listed in Table 2.6.

The subcontract laboratory also analyzed a laboratory control standard. The percent recoveries ranged from 66 to 97. All six values were within the acceptable QC limits. The results are listed in Table 2.7.

Table 2.5 Results of the MS/MSD Analysis
WA # 0-026 Penta Wood Products

Sample ID: 26759

Parameter	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Recov. (mg/kg)	% Recovery	MSD Recov. (mg/kg)	% Recovery	RPD	QC Limits RPD	QC Limits Rec.
Arsenic	409	ND	422.7	103	418.2	102	1	20	75-125
Copper	51.12	13.5	64.8	100	64.2	99	1	20	75-125
Iron	204.5	5452.9	5602.8	NC	6138.4	NC	NC	20	75-125
Zinc	102.25	9.5	112.8	101	112	100	1	20	75-125

Table 2.5 (Cont) Results of the MS/MSD Analysis
WA # 0-026 Penta Wood Products

Sample ID: 26765

Parameter	MS Spike Added (mg/kg)	MSD Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Recov. (mg/kg)	% Recovery	MSD Recov. (mg/kg)	% Recovery	RPD	QC Limits RPD	QC Limits Rec.
Arsenic	213.35	229.21	ND	210.15	99	228.96	100	1	20	75-125
Copper	26.67	28.65	30.02	55.11	94	61.22	109	27 *	20	75-125
Iron	53.34	57.30	51.07	96.35	85	97.87	82	8	20	75-125

Sample ID: C 09969

Parameter	MS Spike Added (mg/kg)	MSD Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Recov. (mg/kg)	% Recovery	MSD Recov. (mg/kg)	% Recovery	RPD	QC Limits RPD	QC Limits Rec.
Arsenic	430	388.2	15.0	419.3	94	376.9	93	1	20	75-125
Copper	53.7	48.95	31.0	79.4	90	76.44	93	6	20	75-125
Iron	107.5	97.9	40.4	153.3	105	143.7	106	1	20	75-125

Table 2.6 Results of the Duplicate Analysis
WA # 0-026 Penta Wood Products

Sample ID 26759

Analyte	Results of the First Analysis (mg/kg)	Results of the First Analysis (mg/kg)	Relative Percent Difference
Arsenic	ND	ND	NC
Calcium	1388.20	1500.3	8
Copper	13.50	13.0	3
Iron	5452.9	6280.5	14
Magnesium	1926.8	1918.2	0
Zinc	9.5	10.7	12

Sample ID 26765

Analyte	Results of the First Analysis (mg/kg)	Results of the First Analysis (mg/kg)	Relative Percent Difference
Arsenic	ND	ND	NC
Calcium	30.020	27.917	7
Copper	51.068	40.755	22

Sample ID 26722

Analyte	Results of the First Analysis (mg/kg)	Results of the First Analysis (mg/kg)	Relative Percent Difference
Arsenic	ND	ND	NC
Calcium	29.587	25.616	14
Copper	48.918	34.663	34

Sample ID C 09969

Analyte	Results of the First Analysis (mg/kg)	Results of the First Analysis (mg/kg)	Relative Percent Difference
Arsenic	15	ND	NC
Copper	31	31	0
Zinc	40.4	45.3	11

Table 2.7 Results of the Analysis of the Laboratory Control Standard WA # 0-026 Penta Wood Products

Analyte	True Value (mg/kg)	Conc Found (mg/kg)	Percent Recoveries	QC Limits (mg/kg)
Arsenic	112	104.1	93	54.7-166.0
Calcium	2500	1967.1	79	1750-3400
Copper	144	139.5	97	87.7-203
Iron	10400	6890.3	66	6240-14600
Magnesium	2230	2081.1	93	1400-3140
Zinc	259	235.0	91	148-394

QA/QC FOR ANIONS

The results of the analysis of the laboratory control standard are listed in Table 2.8. The percent recoveries ranged from 96 to 109.

Samples 26722 and 26765 were chosen for the duplicate analysis. The relative percent differences ranged from 0 (zero) to 16. The results are listed in Table 2.9.

Samples 26722 and 26765 were chosen for the matrix spike (MS) analysis. The percent recoveries ranged from 98 to 109. All five percent recoveries for which values were calculated were within the acceptable QC limits as supplied by the subcontract laboratory. Three values were not calculated because the concentration of analyte spiked was much less than that contained in the sample. The results are listed in Table 2.10.

Table 2.8 Results of the Analysis of the
Laboratory Control Standard
WA# 0-026 Penta Wood Products

Analyte	True Value (Mg/L)	Observed Value (Mg/L)	Percent Recovery
Chloride	400.0	437.2	109
Nitrate-N	181.0	175.3	97
Phosphate	383.0	389.4	102
Sulfate	800.0	836.4	105

Analyte	True Value (Mg/L)	Observed Value (Mg/L)	Percent Recovery
Chloride	400.0	413.7	103
Nitrate-N	181.0	174.5	96
Phosphate	383.0	382.7	100
Sulfate	800.0	821.0	103

Table 2.9 Results of the Duplicate Analysis for Anions
WA # 0-026 Penta Wood Products

Parameter	Analysis	Sample ID	Conc (mg/kg)	RPD
Chloride	First	26722	2113	
Chloride	Second	26722	2157	2
Chloride	First	26765	1747	
Chloride	Second	26765	1739	0
Nitrate-N	First	26722	1079	
Nitrate-N	Second	26722	1034	4
Nitrate-N	First	26765	ND	
Nitrate-N	Second	26765	ND	NC
Phosphate	First	26722	37	
Phosphate	Second	26722	39	4
Phosphate	First	26765	262	
Phosphate	Second	26765	222	16
Sulfate	First	26722	ND	
Sulfate	Second	26722	ND	NC
Sulfate	First	26765	151	
Sulfate	Second	26765	152	1

Table 2.10 Results of the Matrix Spike Analysis for Anions
WA # 0-026 Penta Wood Products

Sample ID 26722

Analyte	Sample Conc (mg/kg)	Conc Spiked (mg/kg)	MS Conc Found (mg/kg)	MS Percent Recovery	QC Limits Percent Recovery
Chloride	2113	467	3017	NC	70–130
Nitrate–N	1078	211	1515	NC	70–130
Phosphate	37	447	496	103	70–130
Sulfate	ND	934	1016	109	70–130

Sample ID 26765

Analyte	Sample Conc (mg/kg)	Conc Spiked (mg/kg)	MS Conc Found (mg/kg)	MS Percent Recovery	QC Limits Percent Recovery
Chloride	1747	415	1768	NC	70–130
Nitrate–N	ND	188	188	100	70–130
Phosphate	262	398	650	98	70–130
Sulfate	151	830	1009	103	70–130

QA/QC FOR CATION EXCHANGE CAPACITY

Sample 26759 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis for cation exchange capacity. The percent recoveries were 88 and 89. The relative percent difference was 2. The results are listed in Table 2.11. The subcontract laboratory did not supply QC limits for this analysis.

Samples 26765 and 26722 were chosen for the MS analysis for cation exchange capacity. The percent recoveries were 79 and 84. The results are listed in Table 2.12. The subcontract laboratory did not supply QC limits for this analysis.

Samples 26759, 26765 and 26722 were chosen for the duplicate analysis for cation exchange capacity. The relative percent differences ranged from 4 to 13. The results are listed in Table 2.13. The subcontract laboratory did not supply QC limits for this analysis.

Table 2.11 Results of the MS/MSD Analysis
WA # 0-026 Penta Wood Products

Sample ID: 26759

Parameter	Spike Added (mEq/g)	Sample Conc. (mEq/g)	MS Recov. (mEq/g)	% Recovery	MSD Recov. (mEq/g)	% Recovery	RPD
Cation Exchange Capacity	0.056	0.027	0.076	88	0.077	89	2

Table 2.12 Results of the MS Analysis
for Cation Exchange Capacity
WA # 0-026 Penta Wood Products

Sample ID: 26765

Parameter	Spike Added (mEq/g)	Sample Conc. (mEq/g)	MS Recov. (mEq/g)	% Recovery
Cation Exchange Capacity	0.587	0.399	0.867	79

Sample ID: 26722

Parameter	Spike Added (mEq/g)	Sample Conc. (mEq/g)	MS Recov. (mEq/g)	% Recovery
Cation Exchange Capacity	0.63	0.561	1.09	84

Table 2.13 Results of the Duplicate Analysis
for Cation Exchange Capacity
WA # 0-026 Penta Wood Products

Sample ID 26759

Parameter	Results of the First Analysis (mEq/g)	Results of the Second Analysis (mEq/g)	Relative Percent Difference
Cation Exchange Capacity	0.027	0.028	4

Sample ID 26765

Parameter	Results of the First Analysis (mEq/g)	Results of the Second Analysis (mEq/g)	Relative Percent Difference
Cation Exchange Capacity	0.399	0.353	12

Sample ID 26722

Parameter	Results of the First Analysis (mEq/g)	Results of the Second Analysis (mEq/g)	Relative Percent Difference
Cation Exchange Capacity	0.561	0.636	13

QA/QC FOR TOTAL PHOSPHOROUS

Samples 26765 and 26722 were chosen for the MS analysis for total phosphorous. The percent recoveries ranged from 89 to 217. The results are listed in Table 2.14. The subcontract laboratory did not supply QC limits for this analysis.

Samples 26765 and 26722 were chosen for the duplicate analysis for total phosphorous. The relative percent differences were 11 and 14. The results are listed in Table 2.15. The subcontract laboratory did not supply QC limits for this analysis.

Table 2.14 Results of the MS Analysis
for Total Phosphorous
WA # 0–026 Penta Wood Products

Sample ID: 26765

Parameter	Spike Added ug/g	Sample Conc. ug/g	MS Recov	%
Total Phosphorous	739	580	1240	89

Sample ID: 26765

Parameter	Spike Added ug/g	Sample Conc. ug/g	MS Recov	%
Total Phosphorous	106	580	810	217

Sample ID: 26722

Parameter	Spike Added ug/g	Sample Conc. ug/g	MS Recov	%
Total Phosphorous	293	232	522	99

Sample ID: 26722

Parameter	Spike Added ug/g	Sample Conc. ug/g	MS Recov	%
Total Phosphorous	111	232	443	190

Table 2.15 Results of the Duplicate Analysis
for Total Phosphorous
WA # 0-026 Penta Wood Products

Sample ID 26765

Parameter	Results of the First Analysis ug/g	Results of the Second Analysis ug/g	Relative Percent Difference
Total Phosphorous	580	667	14

Sample ID 26722

Parameter	Results of the First Analysis ug/g	Results of the Second Analysis ug/g	Relative Percent Difference
Total Phosphorous	232	258	11

QA/QC FOR AMMONIA

Samples 26710 and 26587 were chosen for the matrix spike (MS) analysis for ammonia. The percent recoveries ranged from 89 to 113. The results are listed in Table 2.16. The subcontract laboratory did not supply QC limits for this analysis.

Sample 26765, 26587 and 26710 were chosen for the duplicate analysis for ammonia. The relative percent differences ranged from 1 to 14. The results are listed in Table 2.17. The subcontract laboratory did not supply QC limits for this analysis.

The percent recovery for the Laboratory Control Standard, listed in Table 2.18, was 104.

Table 2.16 Results of the MS Analysis
for Ammonia
WA # 0–026 Penta Wood Products

Sample ID: 26710

Parameter	Method	Spike Added mg/kg	Sample Conc. mg/kg	MS Recov.	%
Ammonia	Titration	115	281	383	89

Sample ID: 26587

Parameter		Spike Added mg/kg	Sample Conc. mg/kg	MS Recov.	%
Ammonia	Titration	12.2	1.77	15.5	113

Sample ID: 26587

Parameter		Spike Added mg/kg	Sample Conc. mg/kg	MS Recov.	%
Ammonia	Color	122	ND	114	93

Table 2.17 Results of the Duplicate Analysis for Ammonia
WA # 0-026 Penta Wood Products

Sample ID 26765

Parameter	Results of the First Analysis ug/g	Results of the Second Analysis ug/g	Relative Percent Difference
Ammonia (Titration)	580	667	14

Sample ID 26587

Parameter	Results of the First Analysis ug/g	Results of the Second Analysis ug/g	Relative Percent Difference
Ammonia (Titration)	1.77	1.76	1

Sample ID 26710

Parameter	Results of the First Analysis ug/g	Results of the Second Analysis ug/g	Relative Percent Difference
Ammonia (Titration)	281	265	6

Sample ID 26587

Parameter	Results of the First Analysis ug/g	Results of the Second Analysis ug/g	Relative Percent Difference
Ammonia (Color)	1.77	1.76	1

Table 2.18 Results of the Analysis
of the Laboratory Control Standard
WA # 0-026 Penta Wood Products

Parameter	Results of the Analysis mg/kg	True Value mg/kg	Percent Recovery
Ammonia (Titration)	11.6	11.2	104

QA/QC FOR TOTAL KJELDAHL NITROGEN

Samples 26710 and 26587 were chosen for the matrix spike (MS) analysis. The percent recoveries were 103 and 111. The results are listed in Table 2.19. The subcontract laboratory did not supply QC limits for this analysis.

Samples 26710 and 26722 were chosen for the duplicate analysis. The relative percent differences were 9 and 1. The results are listed in Table 2.20. The subcontract laboratory did not supply QC limits for this analysis.

The percent recoveries for the Laboratory Control Standard, listed in Table 2.21, were 93 and 105.

Table 2.19 Results of the MS Analysis
for Total Kjeldahl Nitrogen
WA # 0–026 Penta Wood Products

Sample ID: 26710

Parameter	Spike Added mg/kg	Sample Conc. mg/kg	MS Recov.	%
Total Kjeldahl Nitrogen	1200	997	2230	103

Sample ID: 26587

Parameter	Spike Added mg/kg	Sample Conc. mg/kg	MS Recov.	%
Total Kjeldahl Nitrogen	1000	535	1640	111

Table 2.20 Results of the Duplicate Analysis
for Total Kjeldahl Nitrogen
WA # 0-026 Penta Wood Products

Sample ID 26710

Parameter	Results of the First Analysis ug/g	Results of the Second Analysis ug/g	Relative Percent Difference
Total Kjeldahl Nitrogen	997	1090	9

Sample ID 26722

Parameter	Results of the First Analysis ug/g	Results of the Second Analysis ug/g	Relative Percent Difference
Total Kjeldahl Nitrogen	535	532	1

Table 2.21 Results of the Analysis of the Laboratory Control Standard WA # 0–026 Penta Wood Products

Parameter	Results of the Analysis mg/kg	True Value mg/kg	Percent Recovery
Total Kjeldahl Nitrogen	1940	2080	93
Total Kjeldahl Nitrogen	2190	2080	105

QA/QC FOR TOTAL ORGANIC CARBON

The percent recovery for the Laboratory Control Standard, listed in Table 2.22, was 96.

Table 2.22 Results of the Analysis
of the Laboratory Control Standard
WA # 0-026 Penta Wood Products

Parameter	Results of the Analysis mg/kg	True Value mg/kg	Percent Recovery
Total Organic Carbon	963	1002	96

QA/QC FOR TOTAL PETROLEUM HYDROCARBONS

The blank and samples 26555, 26714 and 26635 were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries ranged from 72 to 113. Three percent recoveries were not calculated because the concentration of analyte spiked was much less than that contained in the sample. The relative percent differences (RPDs) were 19 and 26. Two RPDs were not calculated because the concentration of analyte spiked was much less than that contained in the sample. The results are listed in Table 2.23. The subcontract laboratory did not supply QC limits for this analysis.

Table 2.23 Results of the MS/MSD Analysis
WA # 0-026 Penta Wood Products

Sample ID: 26555

Parameter	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Recov. (mg/kg)	% Recovery	MSD Recov. (mg/kg)	% Recovery	RPD
Total Petroleum Hydrocarbons	915	29515	30175	72	31450	NC	NC

Sample ID: 26714

Parameter	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Recov. (mg/kg)	% Recovery	MSD Recov. (mg/kg)	% Recovery	RPD
Total Petroleum Hydrocarbons	1015.8	3354	3847	NC	4208	NC	NC

Sample ID: 26635

Parameter	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Recov. (mg/kg)	% Recovery	MSD Recov. (mg/kg)	% Recovery	RPD
Total Petroleum Hydrocarbons	1015.8	3626.4	4574.1	93	4773.0	113	19

Sample ID: Blank

Parameter	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Recov. (mg/kg)	% Recovery	MSD Recov. (mg/kg)	% Recovery	RPD
Total Petroleum Hydrocarbons	61.76	ND	51.7	84	67.4	109	26

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA WOOD PRODUCTS
Project Number: 03437-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 9028

SHEET NO. 1 OF ____

SAMPLE IDENTIFICATION | ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		PCP				
	A26584	1A1 COMP	S	9/12/94	1	4 oz g/	—	X				
	A26585	1A2 COMP										
	A26586	1A3 COMP										
	A26588	1B1 COMP										
	A26589	1B2 COMP										
	A26590	1B3 COMP										
	A26592	1C1 COMP										
	A26593	1C2 COMP										
	A26594	1C3 COMP										
	A26596	2A1 COMP										
	A26597	2A2 COMP										
	A26598	2A3 COMP										
	A26600	2B1 COMP										
	A26601	2B2 COMP										
	A26602	2B3 COMP										
	A26604	2C1 COMP										
	A26605	2C2 COMP										
	A26606	2C3 COMP										
				MFM								

MFM

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
DO MS/MSD at RATE OF 10%

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	9/12/94	[illegible]	9-13-94	10:00am						

00054

D630009

Roy F. eston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA W D PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 9029

SHEET NO. ____ OF ____

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	PCP			
	A26608	3A1 COMP	S	9/12/94	1	4oz gl / –	X			
	A26609	3A2 COMP								
	A26610	3A3 COMP								
	A26612	3B1 COMP								
	A26613	3B2 COMP								
	A26614	3B3 COMP								
	A26616	3C1 COMP								
	A26617	3C2 COMP								
	A26618	3C3 COMP								
	A26620	4A1 COMP								
	A26621	4A2 COMP								
	A26622	4A3 COMP								
	A26624	4B1 COMP								
	A26625	4B2 COMP								
	A26626	4B3 COMP								
	A26628	4C1 COMP								
	A26629	4C2 COMP								
	A26630	4C3 COMP								

MFM

MFM

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions: DO MS/MSD AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	9/12/94	[illegible]	9-13-94	10:00						

00055

D630008

FWA 8R

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 9030

SHEET NO. 1 OF 2

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		PCP			
	A26632	5A1 COMP	S	9/12/94	1	4 oz gl	-	X			
	A26633	5A2 COMP									
	A26634	5A3 COMP									
	A26636	~~X~~ 5B1 COMP									
	A26637	5B2 COMP									
	A26638	5B3 COMP									
	A26640	5C1 COMP									
	A26641	5C2 COMP									
	A26642	5C3 COMP									
	A26644	6A1 COMP									
	A26645	6A2 COMP							MFM		
	A26646	6A3 COMP									
	A26648	6B1 COMP									
	A26649	6B2 COMP									
	~~A26650~~ MFM										
	A26764	6B3 COMP									
	A26766	6C1 COMP									
	A26767	6C2 COMP									
	A26768	6C3 COMP									
									MFM		

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
DO MS/MSD AT RATE OF 10%.

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF
CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	9/13/94	[illegible] Olmstead	9-14-94	10:00Am						

00056

D630010

[redacted] CH[redacted] OF [redacted]UST[redacted]DY [redacted]COR[redacted]/LA[redacted]WO[redacted]RE[redacted]ES[redacted] [redacted] Pw A [redacted] 8R [redacted]

Roy F. eston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

Project Name: PENTA WOO PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 9031

SHEET NO. 2 OF 2

SAMPLE IDENTIFICATION | **ANALYSES REQUESTED**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative		PCP			
	A26711	7A1 COMP	S	9/12/94	1	4 oz g/l	—	X			
	A26712	7A2 COMP									
	A26713	7A3 COMP									
	A26715	7B1 COMP									
	A26716	7B2 COMP									
	A26717	7B3 COMP									
	A26719	7C1 COMP									
	A26720	7C2 COMP								MFM	
	A26721	7C3 COMP									
	A09951	8A1 COMP									
	A09952	8A2 COMP									
	A09953	8A3 COMP									
	A09955	8B1 COMP									
	A09956	8B2 COMP									
	A09957	8B3 COMP									
	A09959	8C1 COMP									
	A09960	8C2 COMP									
	A09961	8C3 COMP									
			MFM								

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
DO MS/MSD AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF
CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	9/13/94	[illegible]	9-14-94	10:00AM						

000057

D630011

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA WOOD PROD
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 9215

SHEET NO. 1 OF 1

SAMPLE IDENTIFICATION | ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	PCP	As, Cu, Zn		
	C09969	MASTER BATCH B/O SOIL	S	9/23/94	1	32 OZ gl/ -	X	X		Intact

MFM

MFM

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions: DO MS/MSD ON ALL PARAMETERS

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
1/ Analysis	M. Mohn	9/23/94	[illegible signature]	9/24/94	930						

Cooler Temp 4°c/#6

0123042

00058

000039

[redacted]Roy F. [redacted]eston, Inc. [redacted]CHAIN OF CUSTODY RECORD/LAB WORK REQUEST[redacted]
REAC, Edison, N.J.
EPA Contract 68-03-3482

Project Name: PENTA & JOD PROD
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 9219

SHEET NO. 1 OF 1

SAMPLE IDENTIFICATION | **ANALYSES REQUESTED**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A26759	CLEAN SAND UNTREATED	S	8/27/94	1	4 oz gl / -	X			
	A26760	LYSIM 3 (3-5') UNTREATED								
	A26761	COL A TREATED								
	A26762	COL ~~A~~ B TREATED								
	A26763	COL C TREATED								

MFM

MFM

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
PLEASE SELECT ONE SAMPLE TO DO MS/MSD THE CLEAN SAND HAS LEAST PCP - THE LYSIM 3 (3-5') HAS MOST.

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
M1/ANALYSIS	M. Mohn	8/27/94	~~[illegible]~~	~~[illegible]~~	~~14:00~~						
			J. Sypolo	8/29/94	10:07am						

00059

D 55012

ENGINEERING - SOIL FLUSH

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

PWA 10

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

Project Name: PENTA
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 9220

SHEET NO. 1 OF __

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	TPH	TOC	CEC	Metals*
✓	BC26759	CLEAN SAND UNTREAT.	S	8/27/94	2	4oz gl / –	X	X	X	X
✓	BC26760	LYSIM 3 (3-5') UNTREATED	↓	↓	↓	↓	↓	↓	↓	↓
✓	BC26761	COL A TREATED								
✓	BC26762	COL B TREATED								
✓	BC26763	COL C TREATED	↓	↓	↓	↓	↓	↓	↓	↓

INT.

MFM

D640028

00069

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
* Metals = As, Cu, Zn, Fe, Ca, Mg
Please do MS/MSD on ALL PARAMETERS FOR ONE SAMPLE

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	8/27/94									
			Joe Morris	8/30-94	0920						

0033

Cool. Temp 2.7°C

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

Project Name: PENTA [illegible] PROD.
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 9487

SHEET NO. 1 OF 1

SAMPLE IDENTIFICATION

ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	TPH			INTACT
✓	B26549	ACA SOIL	S	8/24/94	1	4OZG / –	X			
✓	B26550	95A/5PA SOIL	↓	↓	↓	↓	↓			↓
✓	B26551	90A/10PA SOIL	↓	↓	↓	↓	↓			↓
✓	B26552	80A/20PA SOIL	↓	↓	↓	↓	↓			↓
✓	B26553	70A/30PA SOIL	↓	↓	↓	↓	↓			↓
✓	B26554	60A/40PA SOIL	↓	↓	↓	↓	↓			↓
✓	C,D26555	PENTA/ACA SOIL (+MS/MSD)	↓	↓	2	↓	↓			↓

MFM

MFM

D640027

00061

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	8/24/94	Joe Morin[illegible]	8-26-94	0916	Rec. @ SWRI					

Samples Rec. at Room Temp
#1 @ 25.0 C°

0002

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

PU . . 8 R

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10358

SHEET NO. 1 OF

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		*	H_2O HOLD. CAP'Y		
	A,B 26587	1A4 COMP ✓	S	9/12/94	2	4,8 OZ gl	—	X	X		INTACT
	A,B 26591	1B4 COMP ✓									
	A,B 26595	1C4 COMP ✓									
	A,B 26599	2A4 COMP ✓									
	A,B 26603	2B4 COMP ✓									
	A,B 26607	2C4 COMP ✓									
	A,B 26611	3A4 COMP ✓									
	A,B 26615	3B4 COMP ✓									
	A,B 26619	3C4 COMP ✓									
	A,B 26623	4A4 COMP ✓									
	A,B 26627	4B4 COMP ✓									
	A,B 26631	4C4 COMP ✓									
	A,B 26635	5A4 COMP ✓									
	A,B 26639	5B4 COMP ✓									
	A,B 26643	5C4 COMP ✓									
	A,B 26647	6A4 COMP ✓									
	A,B 26765	6B4 COMP ✓									
	A,B 26710	6C4 COMP ✓									
	A,B 26714	7A4 COMP ✓									
	A,B 26718	7B4 COMP ✓									

D1080007

00062

Matrix:
SD - Sediment PW - Potable Water S - Soil
DS - Drum Solids GW - Groundwater W - Water
DL - Drum Liquids SW - Surface Water O - Oil
X - Other SL - Sludge A - Air

Special Instructions:
* = NH_3 N, NO_3 N, TKN, PO_4^{-3}, TOT P, As, Cu, Zn, Cl^-, SO_4^{-2}, TOC, CEC, TPH

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF
CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	9/13/94	R.Pusan	9/14/94	09:30						

000018

Temp. 4.0°C v/#1

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CH[redacted]N O[redacted]CUST[redacted]D [redacted]ECORD/L[redacted]B WORK R[redacted]QUE[redacted] PW[redacted] [redacted]

Project Name: PENTA WO PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: Phone:

No: 10359

SHEET NO. 2 OF 2

SAMPLE IDENTIFICATION — ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative		*	H_2O HOLD. CAP'Y		
	A,B 26722	7C4 COMP ✓	S	9/12/94	2	4,8 oz g//	–	X	X		INTACT
	A,B 09954	8A4 COMP ✓	↓	↓	↓	↓	↓	↓	↓		↓
	A,B 09958	8B4 COMP ✓	↓	↓	↓	↓	↓	↓	↓		↓
	A,B 09962	8C4 COMP ✓	↓	↓	↓	↓	↓	↓	↓		✓

MFM

MFM

D1b80006

000065

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
* = NH_3 N, NO_3 N, TKN, PO_4^{-3}, TOT P, As, Cu, Zn, Cl^-, SO_4^{-2}, TOC, CEC, TPH

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	9/13/94	L. Puse	9-14-94	09:30						

000019

Temp 4°C w/ #1

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

Southwest Research Institute
PO Box 28510, 6220 Culebra
San Antonio, TX 78228-0510

August 23, 1994

Attn: Jo Ann Boyd
Project # 3347-040-01-0026, Penta Wood Products(Engineering)

As per Weston REAC Purchase Order number 08-30555, dated 08/23/94, please analyze samples according to the following parameters:

Analysis/Method	Matrix	# of samples
Metals As,Cu,Zn/6010	Soil	76
TCLP Metals As,Cu,Zn/6010	Soil	22
Metals Fe/6010	Soil	10
TPH/SW-846-9071	Soil	32
Ammonia/350	Soil	44
Anions Cl,NO3,SO4/300.0	Soil	44
TKN/351	Soil	44
Ortho phosphate/365.2	Soil	44
Total phosphorus/365.2	Soil	44
Water Holding Capacity/ASTM 2980-71	Soil	44
Cation Exchange Capacity/SW-846-9081	Soil	54
TOC/SW-846-9060	Soil	10
Data package as per attached Deliverables Requirements		

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

Samples are expected to arrive at your laboratory September 2, 1994. All applicable QA/QC (MS/MSD) analysis will be performed on each of our sample matrix. Preliminary results tables including MS/MSD's plus a signed copy of our Chain of Custody are due at REAC ten working days after sample receipt, with the complete data package due twenty one working days after sample receipt. The complete data package must include all items on the deliverables checklist.

SAMPLES MAY BE DIOXIN CONTAMINATED.

Should any questions or problems arise concerning this project,please call **John Johnson at (908) 321-4248 or fax to (908) 494-4020**. Any billing question, please call Cindy Snyder at (908) 321-4296. Thank you

Sincerely,

George Armstrong
Data Validation and Report Writing Group Leader
Roy F. Weston, Inc. / REAC Project

GA: jj Attachments

cc.	R. Singhvi	V. Kansal	C. Snyder
	H. Allen	Subcontracting File	M. Mohn
	Central File	M. Van Clef	G. Armstrong
	0026.CON3	T. Mignone	

September 30, 1994

Weston
Roy F. Weston, Inc.
GSA Raritan Depot
2800 Woodbridge Avenue Bldg. 209 Annex (Bay F)
Edison, NJ 08837-3679

Attention: Mr. Chandra

Subject: Response for Penta Wood Treating Site
SwRI Project Number: 01-6421-011
SDG: 26549 & 26759

Dear Mr. Chandra:

In response to the questions concerning the above referenced case, we are submitting the following:

Item 1
MS/MSD Table indicating the amount of spike added etc. for TPHC.

Response
This is still being worked on, however, it will be sent as soon as it's done.

Item 2
Percent solid worksheet for TPHC, Metals, CEC and TOC.

Response
Percent solids worksheet for Metals, CEC, and TOC are located on page 020032 of the data deliverables.

Item 3
Clarification and the basis of MDL DATA for CEC & TOC with emphasis on whether or not MDL for CEC & TOC are adjusted for & solid and other related factors.

Response
This is still being worked on, however, it will be sent as soon as it's done.

Item 4

Please include the manner in which the final result is derived for CEC & TOC providing a specimen example of calculation of our sample.

Response

See attached sheet for TOC and CEC samples calculations.

If you should have any questions, or need additional information, please do not hesitate to call me at (210) 522-2169 or by FAX at (210) 522-2021.

Sincerely,

Maria Padilla

for Jo Ann Boyd
Group Leader, QAU

JAB/mjp

Calculation for TOC Sample 26759:

g/kg from curve = (817.8 * 1.025879) + 10.002 =

838.96384 + 10.002 = 848.96584

(mg/kg from curve * Injection Vol) / (Sample Wt. * % Solids, decimal) = mg/kg TOC

(848.96584 * 40) / (12.94 * .9939) = mg/kg TOC

33958.633 / 12.861066 = 2640.4213 mg/kg TOC

round to 3 sig figs. = 2640 mg/kg TOC

SOUTHWEST RESEARCH INSTITUTE

6220 CULEBRA ROAD • POST OFFICE DRAWER 28510 • SAN ANTONIO, TEXAS, USA 78228-0510 • (210) 684-5111 • TELEX 244846

September 30, 1994

Weston
Roy F. Weston, Inc.
GSA Raritan Depot
2800 Woodbridge Avenue Bldg. 209 Annex (Bay F)
Edison, NJ 08837-3679

Attention: Mr. Chandra

Subject: Response for Penta Wood Treating Site
SwRI Project Number: 01-6421-011
SDG: 26549 & 26759

Dear Mr. Chandra:

In response to the questions concerning the above referenced case, we are submitting the following:

Item 1

MS/MSD Table indicating the amount of spike added etc. for TPHC.

Response

This information is on the raw data (page 30002) for both SDGs.

Item 2

Percent solid worksheet for TPHC, Metals, CEC and TOC.

Response

Percent solids worksheet for Metals, CEC, and TOC are located on page 020032 of the data deliverables.

Item 3

Clarification and the basis of MDL DATA for CEC & TOC with emphasis on whether or not MDL for CEC & TOC are adjusted for & solid and other related factors.

Response

Yes, MDL for CEC & TOC are adjusted for & solid and other related factors.

Response Weston 01-6421-011
September 30, 1994
Page 2

Item 4

Please include the manner in which the final result is derived for CEC & TOC providing a specimen example of calculation of our sample.

Response

Example calculation for TOC sample 26759.

mg/kg from curve = (817.8 * 1.025879) + 10.002 =
838.96384 + 10.002 = 848.96584

(mg/kg from curve * Injection Vol)/(Sample Wt. * %Solids, decimal) = mg/kg TOC

(848.96584 * 40)/(12.94 * .9939) = mg/kg TOC

33958.633/12.861066 = 2640.4213 mg/kg TOC

round to 3 sig. figs. = 2640 mg/kg TOC

Example calculation for CEC sample 26759.

$$4.91\ \text{ug/mL} * 5\ \text{DF} * \frac{100\text{mL}}{3.9953\text{g} * \frac{97.77\%}{100}} = 628\ \text{ug/g}$$

$$628\text{ug/g} \times \frac{1\ \text{mole}}{22989770\ \text{ug Na}} \times \frac{1000\text{mole}}{1\ \text{mole}} = 0.027\ \frac{\text{mmde}}{\text{g}} = 0.027\ \frac{\text{meq}}{\text{g}}$$

Cation Exchange Calculation:

Na

$$@\text{instr ug/ml} \times \frac{\text{FV ml}}{\text{IWtg} \times \frac{\%\ \text{Solids}}{100}} = \square\text{ug/g}$$

$$\square \text{ ug/g} \times \frac{1 \text{ mole}}{22989770 \text{ug Na}} \times \frac{1000 \text{mmole}}{1 \text{ mole}} = \frac{\text{mmole}}{\text{g}}$$

mmole Na = meq Na

$$\frac{\text{mmole}}{\text{g}} = \frac{\text{Meq}}{\text{g}}$$

If you should have any questions, or need additional information, please do not hesitate to call me at (210) 522-2169 or by FAX at (210) 522-2021.

Sincerely,

Jo Ann Boyd

Jo Ann Boyd
Group Leader, QAU

JAB/mjp

September 13, 1994
Analytical Report Summary
Penta Wood Products
WA# 0-026

On 8/29/94 the REAC High Hazard lab received a total of 5 soil samples for PCP analysis by SIM on chain of custody 9219.

There were no apparent problems with the analysis. Both MS/MSD recoveries were within the CLP limits of 17 to 109 %. All surrogate recoveries were within the CLP limits.

The untreated sample result was 130 ppm; the treated samples ranged from 11 to 39 ppm. All MDLs were in the 5 ppm range. Both the lab blank and the sample labeled "clean sand untreated" were clean.

Calibrations were fine.

MB 9/13/94

EXTRACTION PROCEDURE:

Ten grams of sample was spiked with the surrogate (500 ul of a 1000 ppm standard of 2,4,6-Tribromophenol) , mixed with 10 g anhydrous sodium sulfate, and extracted four times with 20:80 acetone:methylene chloride. The four extracts (25, 25, 25, and 25 ml) are combined, and 1.0 ml is drawn off for analysis. Before injection on the mass spectrometer, 20 ul of 200 ppm d10 Phenanthrene internal standard is spiked into the 1.0 ml extract.

ANALYSIS PROCEDURE:

An HP 5971A Mass Selective Detector, equipped with a 5890 series II GC, a 7637A autosampler and controlled by HP-ChemStation/Windows/DOS 5.0 software driven IBM-Compatible computer is used to analyze the samples.

The instrument conditions are:

Column	Restek Rtx-5 (SE-54 equivalent) 30 meter X 0.25mm ID, 0.50 um film thickness.
Injection Temperature	290o C
Transfer Line Temp.	315o C
Temperature Program:	

Initial temp = 100o C
Initial time = 0.5 min

Level	Rate (C/min)	Final Temp. (C)	Final Time (min)
1	30.00	305	*2.00

Splitless injection	Split time = 0.88 min
Injection Volume	2.0 ul
EM Voltage	350 above tune (~2150 EMV)
Column flow	0.95 ml/min EPS enabled.

* May be shortened/lenghthened depending on matrix contaminants etc.

The GC/MS system was calibrated using 6 standards at 0.5, 1.0, 5.0, 10.0, 25.0, and 50 ug/ml standards. All samples are quantititated using the average response factors from the calibration range. The calibration allows a detection limit of 5.0 ppm each compound (based on dry weight) in soil. Before analysis each day, the system is tuned to DFTPP and passed a continuing calibration check analyzing a 5.0 ug/ml standard.

Since this is a non "CLP" and field procedure, these are the QA/QC criteria that were be adopted for calibration range, calibration check, and DFTPP etc.

Calibration Range: all compounds must have a %RSD of less than 30 %. Compounds not meeting this criteria, and detected in samples will be marked as "J" which are quantitiated using this calibration range.
All samples are quantitated using the average response factors from the calibration range.

Continuing Calibration: A 5.0 ppm continuing calibration standard is analyzed daily to monitor the stability of the instrument as demonstrated by the calibration range. A continuing calibration will be analyzed once per 24 hours (daily). All compounds must be less than or equal to 25% Diff. The continuing calibration check is not used for quantitiation, just as a check on the calibration range and instrument stability.

DFTPP: A 50 ppm dftpp standard will be analyzed once per day/or 24 hour clock. The Dftpp must pass CLP criteria. Although this criteria is somewhat redundant since we are using SIM, it is a good standard method to check system performance.

MS/MSD pairs and BLANKS: One MS/MSD pair and a blank are required per 20 samples. The MS/MSD is prepared by extracting one sample in triplicate, but spiking two replicates with 500 ul of 2000 ppm Pentachlorophenol. The recoveries and concentration will be based on "dry weight" basis of the sample. The following approximated BNA/CLP percent recovery criteria have been adopted for the MS/MSD compounds:

	% Recovery Limit	RPD
Pentachlorophenol	56 - 162	47

The RPD limit was chosen from CLP MS/MSD QA/QC criteria. The PCP recovery was determined from 37 MS/MSD pairs analyzed from over 500 Penta samples analyzed at the High Hazard Lab. These limits should not be used to validate or invalidate data, but should be used as a guide to compare the data to "CLP type" QA/QC requirements.

A blank which consists of blank sand, extracted in the same manner as the samples will be analyzed with each batch of 40 samples.

SURROGATE RECOVERIES: Field surrogate recoveries of 43% to 151 % were used as a guide to check the recoveries from this procedure. These limits were based on 279 Penta samples analyzed at Brunswick using this method.

INSTRUMENT SCANNING IONS/COMPOUND LIST: DETECTION LIMIT.

A copy of the method is submitted with the calibration range data. Minor adjustemnts may be made during analysis to facilitate quantitation and integration of samples due to anamolous matrices. An example of the minor adjustments consists of lenthening/shortening the final time of the temperature program.

The SIM ions are placed into 1 group. The group contains 9 ions that are characteristic, or present in the compounds of interest. I have included 3 ions from each compound. The following table is a list of each compound and the identification ions quantitation.

PCP ANALYSIS COMPOUND LIST
BRUNSWICK MOBILE HIGH HAZARD GC/MS LAB

Compound Name	Quant Ion	Identification ions
d10 Penanthrene {IS}	188	188, 94 , 80
2,4,6-Tribromophenol {SURR}	330	330, 332, 143
Pentachlorophenol	266	266, 268, 264

The detection limit for each compound will be 5.0 ppm in soil based on dry weight. Naturally detection limits will be raised if the sample analytes are too concentrated, or due to matrix interferences, such as 100 % oil or other "pure product" matrices. Samples may be diluted because of the extract color which usually indicates a "hot" sample.

for QA/QC heads:

The concentration of detected compounds is calculated using the following equation:

$$Cu = \frac{DF \times Au \times Iis \times Vt}{Ais \times ARF \times Vi \times W}$$

where

DF = Dilution factor of extract
ARF = Average response factor from calibration range (unitless)
Au = Area of analyte
Ais = Area of internal standard
Iis = Mass of internal standard (ng)
Cu = Concentration of analyte (ug/Kg)
Vt = Volume of extract (uL)
Vi = Volume of extract injected (uL)
W = Weight of sample

Response factor calculation:

The response factor (RF) for each specific analyte is quantitated based on the following equation :

$$RF = \frac{Ac \times Iis}{Ais \times Ic}$$

where,

RF = Response factor of analyte
Ac = Area of analyte
Ais = Area of internal standard
Ic = Mass of the analyte
Iis = Mass of the internal standard

The average response factor ARF is calculated from the average from the 5 points on the calibration range.

The sample concentrations are corrected for % solids

Table 1.1 Results of the Pentachlorophenol Analysis
WA # 0-026 Penta Wood Products
Based on Dry Weight

Sample ID	Location	Conc. mg/kg	MDL mg/kg
BLANK 166	SAND BLANK	ND	5.0
A26759	Clean Sand Untreated	ND	5.1
A26760	LYSIM 3 (3-5') Untreated	130	5.2
A26761	Col A Treated	39	5.4
A26762	Col B Treated	27	5.4
A26763	Col C Treated	11	5.2

A:\MPEN1\MPNRES01.WK3

Table 2.X Results of the Surrogate Recoveries in Soil Samples
WA # 0-026 Penta Wood Products

Sample ID	2,4,6-Tribromophenol % Recovery
BLANK 166	83
BLANK 166 MS	89
BLANK 166 MSD	88
A26759	66
A26760	90
A26761	76
A26762	86
A26763	85
A26763 MS	94
A26763 MSD	98

	QC LIMITS
2,4,6-Tribromophenol	10 - 123

Table 2.X Results of the MS/MSD Analysis for PCP in Soil Samples
WA # 0-026 Penta Wood Site
Based on Dry Weight

Sample ID	Spike Added mg/kg	Sample Conc. mg/kg	MS Conc. mg/kg	MSD Conc. mg/kg	MS %Rec.	MSD %Rec.	Recovery Limits	RPD Limits	% RPD
BLANK 166	96.1	ND	90.8	91.0	95	95	17-109	47	0
A26763	104	11.0	90.3	105	76	90	17-109	47	17

A:\MPEN1\MPENMSD.WK3

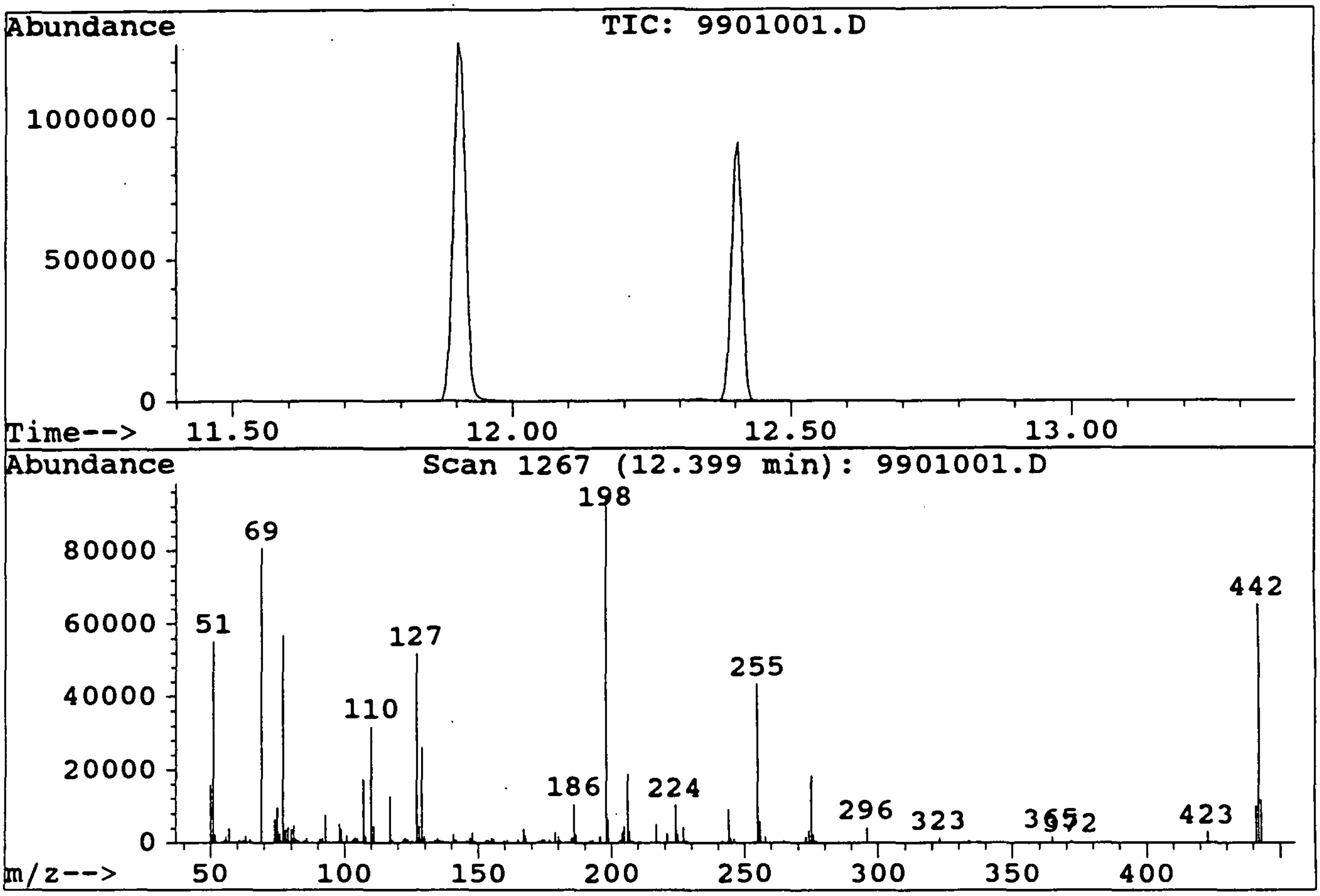
D 55003

DFTPP

Data File : D:\083094\9901001.D
Acq Time : 30 Aug 94 9:47 pm
Sample : 50NG DFTPP STD
Misc : 08/30/94 MS TUNE CHECK

Operator: Syslo
Inst : 5971A MSD
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\PEN0830.M
Title : BRUNSWICK Creosote Calibration SIM Method



Peak Apex is scan: 1267

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51	198	30	80	58.8	55296	PASS
68	69	0	2	0.0	0	PASS
69	198	0	100	85.9	80744	PASS
70	69	0	2	0.0	0	PASS
127	198	25	75	55.2	51936	PASS
197	198	0	1	0.0	0	PASS
198	198	100	100	100.0	94024	PASS
199	198	5	9	6.7	6337	PASS
275	198	10	30	19.5	18360	PASS
365	198	1	100	1.9	1813	PASS
441	443	0	100	87.4	10093	PASS
442	198	40	110	69.3	65120	PASS
443	442	15	24	17.7	11547	PASS

Roy F. Weston, Inc.
GSA Raritan Depot
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Edison, New Jersey 08837-3679
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DATE: December 14, 1994

TO: R. Singhvi EPA/ERT

FROM: V. Kansal Analytical Section Leader Vinod Kansal

SUBJECT: DOCUMENT TRANSMITTAL UNDER WORK ASSIGNMENT # 0-026

Attached please find the following document prepared under this work assignment:

Penta Wood Products Site- Analytical Report

Central File WA# 0-026	(with attachment)
T. Mignone	Task Leader
G. Armstrong	Data Validation and Report Writing Group Leader
H. Allen	Work Assignment Manager

ANALYTICAL REPORT

Prepared by
Roy F. Weston, Inc.

Penta Wood Products
Siren, Wisconsin

December 1994

EPA Work Assignment No. 0-026
WESTON Work Order No. 03347-040-001-0026-01
EPA Contract No. 68-C4-0022

Submitted to
H. Allen
EPA-ERT

T. Mignone Task Leader	Date	Analysis by: REAC SWRI
V. Kansal Analytical Section Leader	12/14/94 Date	Prepared by: L. Sun
R. M. Shapot Program Manager	12/14/94 Date	Reviewed by: G. Armstrong

Table of Contents

Appendices will be furnished on request.

INTRODUCTION

The REAC Laboratory, in response to ERT work assignment #0-026, provided analytical support for samples collected from the Penta Wood Products Site, Siren, Wisconsin. This support included subcontracting of environmental samples as described in the following table. The support also included QA/QC, data review, and preparation of an analytical report containing a summary of the analytical methods, the results of analyses, QA/QC methods, and the QA/QC results.

The samples were treated with procedures consistent with those described in SOP #1008 and are summarized in the following table:

COC #	Number of Samples	Sampling Date	Date Received	Matrix	Analysis	Laboratory
9217	8	10/24/94	10/25/94	Water	PCP	REAC
10251	20	10/23/94	10/26/94	Soil	PCP	REAC-HHL
10250	4	10/23/94	10/23/94	Soil	PCP	REAC-HHL
9218	12	10/23/94	10/26/94	Soil	PCP	REAC-HHL
10246	18	10/24/94	10/26/94	Soil	PCP	REAC-HHL
9216	4	10/23/94	10/26/94	Soil	Ammonia, Anion, Total Phosphorus, Ortho Phosphate, TOC, TKN, TPH Arsenic, Copper, Zinc	SWRI
10247	9	10/24/94	10/26/94	Soil	Water Holding Capacity	SWRI
	6	10/24/94	10/26/94	Soil	Ammonia, Anion, Total Phosphorus, Ortho Phosphate, TOC, TKN, TPH Arsenic, Copper, Zinc	SWRI

REAC-HHL	REAC High Hazardous Laboratory
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Content
TPH	Total Petroleum Hydrocarbons

CASE NARRATIVE

Pentachlorophenol Analysis - Package D138

The method blank analyzed on 10/30/94 had 2.9 mg/Kg of pentachlorophenol. The positive results are all greater than 14.5 mg/Kg, therefore, the data are not affected.

SUMMARY of ABBREVIATIONS

B	The analyte was found in the blank
BFB	Bromofluorobenzene
BPQL	Below the Practical Quantitation Limit
C	Centigrade
D	(Surrogate Table) this value is from a diluted sample and was not calculated (Result Table) this result was obtained from a diluted sample
CLP	Contract Laboratory Protocol
COC	Chain of Custody
CONC	Concentration
CRDL	Contract Required Detection Limit
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
E	The value is greater than the highest linear standard and is estimated
EMPC	Estimated maximum possible concentration
J	The value is below the method detection limit and is estimated
HHL	High Hazard Laboratory, Brunswick, GA
IDL	Instrument Detection Limit
ISTD	Internal Standard
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MI	Matrix Interference
MS	Matrix spike
MSD	Matrix spike duplicate
MW	Molecular weight
NA	either Not Applicable or Not Available
NC	Not Calculated
ND	Not Detected
NS	Not Spiked
% D	Percent difference
% REC	Percent Recovery
PQL	Practical quantitation limit
PPBV	Parts per billion by volume
QL	Quantitation Limit
RPD	Relative percent difference
RSD	Relative Standard Deviation
SIM	Selected Ion Mode

m^3	cubic meter	kg	kilogram
l(L)	liter	g	gram
dl	deciliter	cg	centigram
ml	milliliter	mg	milligram
ul	microliter	ug	microgram
		ng	nanogram
		pg	picogram

*	denotes a value that exceeds the acceptable QC limit

Abbreviations that are specific to a particular table are explained in footnotes on that table

Revision 11/17/94

Analytical Procedure for PCP in Water (SIM)
(REAC)

Extraction Procedure

One liter of sample was spiked with 2,4,6-tribromophenol as a surrogate, and extracted with three 60 ml portions of methylene chloride according to Method 625, Section 10, as outlined in the Federal Register Vol. 49, #209, Friday, October 26, 1984. The extracts were combined, concentrated to 1.0 ml, an internal standard phenanthrene-d_{10} was added, and analyzed.

Analytical Procedure

An HP 5890 Gas Chromatograph, equipped with a 5970 Mass Selective Detector and controlled by an HP-1000 RTE/VM computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.25mm ID, 0.50 µm film thickness
Injection Temperature	260° C
Transfer Temperature	260° C
Temperature Program	100° C for 0.5 min 30 °C/min to 305° C hold for 5 min
Splitless Injection	Split time = 0.75 min
Injection Volume	2 µl

The GC/MS system was calibrated using 6 pentachlorophenol standards at 0.5, 1.0, 5.0, 10.0, 25.0, and 50.0 µg/ml. All samples were quantified using the average response factor obtained from the calibration range. Before analysis each day, the system was tuned with 50 ng deacflurotriphenylphosine (DFTPP) and passed a continuing calibration check when analyzing a 5.0 µg/ml standard mixture.

The Pentachlorophenol results are listed in Table 1.1. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF (or RF_{ave}) x V_i x V_o}$$

where

C_u	=	Concentration of target analyte (µg/L)
DF	=	Dilution Factor
A_u	=	Area of target analyte
I_{is}	=	Mass of specific internal standard (ng)
V_t	=	Volume of extract (µl)
A_{is}	=	Area of specific internal standard
RF	=	Response Factor (unitless)
RF_{ave}	=	average Response Factor
V_i	=	Volume of extract injected (µl)
V_o	=	Volume of sample (ml)

The RF_{ave} is used when a sample is associated with an initial calibration curve. The RF is used when a sample is associated with a continuing calibration curve.

Response Factor calculation:

The RF for each specific analyte is quantitated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \ x \ I_{is}}{A_{is} \ x \ I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
I_{is}	=	Mass of the specific internal standard
A_{is}	=	Area of the specific internal standard
I_c	=	Mass of the analyte in the standard

$$RF_{ave} = \frac{RF_1 + ... + RF_n}{n}$$

and

n = number of Samples

Compound	Quantitation Ion	Ions in Group
2,4,6-tribromophenol (SURR)	330	143, 330, 332
pentachlorophenol	266	264, 266, 268
d_{10}-phenanthrene (IS)	188	80, 94, 188

Analytical Procedure for Pentachlorophenol in Soil (SIM)
(HHL)

Extraction Procedure

Ten grams of sample was spiked with the surrogate 2,4,6-tribromophenol, mixed with 10 g anhydrous sodium sulfate, and shaker extracted four times with 25 ml portions of 1:4 acetone:methylene chloride. A 1.0 ml aliquot was spiked with the internal standard phenanthrene-d_{10}, and analyzed.

Analytical Procedure

An HP 5971A Mass Selective Detector equipped with a 5890 Series II GC, a 7673A autosampler and controlled by an HP-Chem Station/Windows/DOS 5.0 software driven IBM compatible computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.25mm ID, 0.50 μm film thickness
Injection Temperature	290° C
Transfer Temperature	315° C
Source Temperature	240° C
Analyzer Temperature	240° C
Temperature Program	100°C for 0.5 min 30° C/min to 305° C Hold for 2 min.
Splitless Injection	Split time = 0.88 min
Injection Volume	2 μl

The GC/MS system was calibrated using 6 pentachlorophenol standards at 0.5, 1.0, 5.0, 10.0, 25.0, and 50.0 μg/ml. Before analysis each day, the system was tuned with 50 ng decafluorotriphenylphosphine (DFTPP) and passed a continuing calibration check when analyzing a 5 μg/ml standard mixture in which the responses were evaluated by comparison to the average response of the calibration curve.

The pentachlorophenol results, based on dry weight, are listed in Table 1.2. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF_{ave} x V_i x W x D}$$

where

DF	=	Dilution Factor
RF_{ave}	=	Average Response Factor (unitless)
A_u	=	Area of analyte
A_{is}	=	Area of internal standard
I_{is}	=	Mass of internal standard (ng)
C_u	=	Concentration of analyte (µg/Kg)
V_t	=	Volume of extract (µl)
V_i	=	Volume of extract injected (µl)
W	=	Weight of sample (g)
D	=	Decimal per cent solids

The average Response Factor is used when a sample is associated with an initial calibration curve. The Response Factor is used when a sample is associated with a continuing calibration.

Response Factor calculation:

The response factor (RF) for each specific analyte is quantitated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \ x \ I_{is}}{A_{is} \ x \ I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
A_{is}	=	Area of the internal standard in the standard
I_c	=	Mass of the analyte in the standard
I_{is}	=	Mass of the internal standard in the standard

$$RF_{ave} = \frac{RF_1 + \ldots + RF_n}{n}$$

and

n = number of Samples

Revision of 7/12/94

Analytical Procedure for Arsenic, Copper, and Zinc in Soil

The subcontract laboratory analyzed the soil samples for arsenic, copper and zinc, according to "Test Methods for Evaluating Solid Wastes", SW-846, September, 1987, Method 6010.

Results of the arsenic, copper and zinc analysis in soil are listed in Table 1.3.

Analytical Procedure for Ammonia in Soil

The subcontract laboratory analyzed the soil samples for ammonia, according to U.S. EPA Method 350. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the ammonia are listed in Table 1.4.

Analytical Procedure for Nitrate as Nitrogen in Soil

The subcontract laboratory analyzed the soil samples for nitrate, according to U.S. EPA Method 300. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the nitrate are listed in Table 1.4.

Analytical Procedure for Total Phosphorus in Soil

The subcontract laboratory analyzed the soil samples for total phosphorus, according to U.S. EPA Method 365.2. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the total phosphorus are listed in Table 1.4.

Analytical Procedure for Phosphate as Phosphorus in Soil

The subcontract laboratory analyzed the soil samples for phosphate, according to U.S. EPA Method 365.2. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the phosphate are listed in Table 1.4.

Analytical Procedure for Total Organic Content

The subcontractlaboratory analyzed the soil samples for total organic content, according to U.S. EPA Method 9060. This method is outlined in "Test Methods for Evaluating Solid Wastes", SW-846, September, 1987.

Results of the total organic content are listed in Table 1.4.

Analytical Procedure for Sulfate in Soil

The subcontract laboratory analyzed the soil samples for sulfate, according to U.S. EPA Method 300.0. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the sulfate are listed in Table 1.4.

Analytical Procedure for Total Kjeldahl Nitrogen in Soil

The subcontract laboratory analyzed the soil samples for total Kjeldahl nitrogen, according to U.S. EPA Method 351. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the total Kjeldahl nitrogen are listed in Table 1.4.

Analytical Procedure for Total Petroleum Hydrocarbons in Soil

The subcontract laboratory analyzed the soil samples for total petroleum hydrocarbons, according to U.S. EPA Method 9071. This method is outlined in "Test Methods for Evaluating Solid Wastes", SW-846, September, 1987.

Results of the total petroleum hydrocarbons are listed in Table 1.4.

Analytical Procedure for Water Holding Capacity in Soil

The subcontract laboratory analyzed the soil samples for water holding capacity, according to ASTM method 2980-71.

Results of the water holding capacity are listed in Table 1.4.

Analytical Procedure for Chloride in Soil

The subcontract laboratory analyzed the soil samples for chloride, according to U.S. EPA Method 300.0. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the chloride are listed in Table 1.4.

Table 1.1 Results of the Pentachlorophenol Analysis for Water Samples

WA # 0-026 Penta Wood Products Site

		Pentachlorophenol	
SAMPLE ID	LOCATION	CONC (ug/L)	MDL (ug/L)
BLANK	WBLK102694	ND	5.0
A9994	DW1A0	880	52
A9995	DW1B0	810	54
A9996	DW2A0	690	50
A9997	DW2B0	580	53
A9998	DW3A0	46	5.3
A9999	DW3B0	39	5.6
A10000	DW4A0	170	5.4
A10001	DW4B0	170	5.3

Table 1.2 Results of the Pentachlorophenol Analysis for Soil Samples

WA # 0-026 Penta Wood Products

(Results are Based on Dry Weight)

		Pentachlorophenol		
Sample ID	Location	Conc. (mg/Kg)	MDL (mg/Kg)	% Solid
Blank #185	SAND BLANK	2.9 J	5.0	100
A09970	1ACOMP 2	110	6.4	75.2
A09971	1BCOMP 2	62	6.5	76.4
A09972	1C COMP 2	67	6.4	72.6
A09973	2A COMP 2	100	7.4	69.1
A09974	2B COMP 2	45	6.6	69.6
A09975	2C COMP 2	240	7.8	66.0
A09976	3A COMP 2	54	6.6	64.1
A09977	3B COMP 2	33	8.1	59.4
A09978	3C COMP 2	270	8.8	62.3
A09979	4A COMP 2	240	8.5	61.7
A09980	4B COMP 2	53	8.1	59.1
A09981	4C COMP 2	99	7.8	62.8
A09982	5A COMP 2	80	7.8	59.4
A09983	5B COMP 2	51	8.6	60.6
A09984	5C COMP 2	150	7.2	61.9
A09985	6A COMP 2	31	5.7	76.9
A09986	6B COMP 2	42	5.4	83.0
A09987	6C COMP 2	41	5.5	80.5
A09988	7A COMP 2	49	6.1	79.5
A09989	7B COMP 2	160	5.3	79.9
A09990	7C COMP 2	130	6.1	78.2
A09991	8A COMP 2	180	7.0	72.6
A09992	8B COMP 2	46	6.3	72.2
A09993	8C COMP 2	92	5.4	74.0

Table 1.2(Con't) Results of the Pentachlorophenol Analysis for Soil Samples

WA # 0-026 Penta Wood Products

(Results are Based on Dry Weight)

Sample ID	Location	Conc. (mg/Kg)	MDL (mg/Kg)	% Solid
Blank #186	SAND BLANK	ND	5.0	100
A26145	DS1A0	27	5.2	84.7
A26146	DS1B0	18	6.3	83.4
A26147	DS1C0	40	4.6	90.7
A26148	DS2A0	18	7.7	64.6
A26149	DS2B0	15	5.9	75.1
A26150	DS2C0	40	5.6	81.9
A26151	DS3A0	30	5.1	77.4
A26152	DS3B0	28	5.7	78.1
A26153	DS3C0	33	5.4	85.5
A17131	DS4A0	37	7.6	52.6
A17129	DS4B0	61	8.3	52.7
A17130	DS4C0	29	4.8	92.4
Blank #187	SAND BLANK	ND	5.0	100
A09901	DC1	52	4.4	92.5
A09902	DC2	57	4.6	88.0
A09903	DC3	46	4.6	88.3
A09904	DC4	45	5.6	89.6
A09905	DC5	48	5.2	88.7
A09906	DC6	47	4.5	88.7
A09907	DC7	44	5.0	88.0
A09908	DC8	40	4.7	88.5
A09909	DC9	35	4.5	89.4
A09910	DT1	50	5.4	79.4
A09911	DT2	49	5.6	79.1
A09912	DT3	56	6.2	79.4
A09913	DT4	47	5.4	81.8
A09914	DT5	45	6.4	83.5
A09915	DT6	58	5.5	78.3
A09916	DT7	49	5.8	81.8
A09917	DT8	38	6.6	80.0
A09918	DT9	46	5.2	78.7

Table 1.3 Results of the Arsenic, Copper and Zinc Analysis for Soil Samples

WA # 0-026 Penta Wood Products Site

(Results are Based on Dry Weight)

			Arsenic		Copper		Zinc	
Sample ID	Location	%Solid	Conc. (mg/Kg)	MDL (mg/Kg)	Conc. (mg/Kg)	MDL (mg/Kg)	Conc. (mg/Kg)	MDL (mg/Kg)
AB09919	DT1-3 COMP	80	ND	12	27	1.3	46	2.6
AB09920	DT4-6 COMP	82	23	12	34	1.2	45	2.5
AB09921	DT7-9 COMP	61	ND	12	24	1.2	46	2.5
AB09922	DC1-3 COMP	90	17	11	26	1.1	41	2.2
AB09923	DC4-6 COMP	91	14	11	29	1.1	43	2.2
AB09924	DC7-9 COMP	90	14	11	28	1.1	44	2.2
B26145	DS1AO	84	ND	12	27	1.2	31	2.4
B26148	DS2AO	38	ND	26	77	2.6	99	5.3
B26151	DS3AO	65	ND	15	50	1.5	75	3.1
B17131	DS4AO	79	ND	12	21	1.3	35	2.5

Table 1.4 Results of the Wet Chemistry Analysis for Soil Samples

WA #0-026 Penta Wood Products Site

Sample ID		Method		A,B 09919		A,B 09920		A,B 09921		A,B 09922	
Location		---		DT1-3 COMP		DT4-6 COMP		DT7-9 COMP		DC1-3 COMP	
Analyte	Unit	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Ammonia	mg/Kg	ND	1.0	18	1.0	25	1.0	59	1.0	ND	1.0
Chloride	mg/Kg	ND	0.5	130	31	130	30	120	31	40	28
Nitrate as Nitrogen	mg/Kg	ND	0.5	55	31	59	30	44	31	ND	28
Phosphate as Phosphorus	mg/Kg	ND	0.5	39	31	47	30	34	31	ND	28
Sulfate	mg/Kg	ND	0.5	ND	31	ND	30	ND	31	ND	28
Total Phosphorus	mg/Kg	ND	0.07	340	4.4	340	4.3	390	4.3	250	3.8
TOC	mg/Kg	ND	500	37000	500	34000	500	45000	500	39000	500
TKN	mg/Kg	ND	2.0	1200	2.0	640	2.0	820	2.0	270	2.0
TPH	mg/Kg	ND	3.4	2500	3.4	2700	3.4	2400	3.1	3000	3.1
Water Holding Capacity	Percent	NA	NA	8.6	NA	6.4	NA	13	NA	5.1	NA

Sample ID		A,B 09923		A,B 09924		B26145		B26148	
Location		DC4-6 COMP		DC7-9 COMP		DS1AO		DS2AO	
Analyte	Unit	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Ammonia	mg/Kg	ND	1.0	1.2	1.0	5.4	1.0	1200	1.0
Chloride	mg/Kg	33	27	32	27	74	29	730	64
Nitrate as Nitrogen	mg/Kg	ND	27	ND	27	ND	29	ND	64
Phosphate as Phosphorus	mg/Kg	ND	27	ND	27	ND	29	1300	64
Sulfate	mg/Kg	ND	27	ND	27	ND	29	ND	64
Total Phosphorus	mg/Kg	310	3.8	290	3.9	210	4.1	4300	9.1
TOC	mg/Kg	40000	500	35000	500	25000	500	25000	500
TKN	mg/Kg	240	2.0	260	2.0	300	2.0	31000	2.0
TPH	mg/Kg	2900	3.1	3100	3.1	1800	3.3	4300	7.2
Water Holding Capacity	Percent	4.8	NA	3.4	NA	NA	NA	NA	NA

Sample ID		B26151		B17131		A09925		B09926		A09927	
Location		DS3AO		DS4AO		DT1-3 COMP UN		DT4-6 COMP UN		DT7-9 COMP UN	
Analyte	Unit	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Ammonia	mg/Kg	920	1.0	310	1.0	NA	NA	NA	NA	NA	NA
Chloride	mg/Kg	430	39	110	31	NA	NA	NA	NA	NA	NA
Nitrate as Nitrogen	mg/Kg	ND	39	ND	31	NA	NA	NA	NA	NA	NA
Phosphate as Phosphorus	mg/Kg	970	39	290	31	NA	NA	NA	NA	NA	NA
Sulfate	mg/Kg	270	39	100	31	NA	NA	NA	NA	NA	NA
Total Phosphorus	mg/Kg	2100	5.3	680	4.3	NA	NA	NA	NA	NA	NA
TOC	mg/Kg	36000	500	26000	500	NA	NA	NA	NA	NA	NA
TKN	mg/Kg	2100	2.0	5400	2.0	NA	NA	NA	NA	NA	NA
TPH	mg/Kg	2700	4.0	1900	3.4	NA	NA	NA	NA	NA	NA
Water Holding Capacity	Percent	4.8	NA	3.4	NA	1.8	NA	9.2	NA	5.7	NA

QA/QC for Pentachlorophenol

Results of the Surrogate Recoveries for Pentachlorophenol Analysis in Water Samples

One surrogate compound, 2,4,6-tribromophenol, was added in the water samples prior to extraction. The surrogate recoveries, listed in Table 2.1, range from 71 to 107. All eleven surrogate recoveries are within acceptable QC limits.

Results of the Pentachlorophenol MS/MSD Analysis for Water Samples

Sample A9996 was chosen for matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.2, are not calculated (NC) because the analyte concentration in the sample is much higher than that spiked. The relative percent difference (RPD) is also not calculated because neither the matrix spike percent recovery nor the matrix spike duplicate recoveries could be calculated.

Results of the Surrogate Recoveries for Pentachlorophenol Analysis in Soil Samples

One surrogate compound, 2,4,6-tribromophenol, was added in the soil samples prior to extraction. The surrogate recoveries, listed in Table 2.3, range from 90 to 112. All fifty-seven surrogate recoveries are within acceptable QC limits.

Results of the Pentachlorophenol MS/MSD Analysis for Soil Samples

Samples A09978, A09988, A26153, A09906 and A09916 were chosen for matrix spike duplicate analysis for soil samples. The percent recoveries, listed in Table 2.4, range from 35 to 112. Seven out of eight percent recoveries are within QC limits. Sample A09916 did not have spike added, therefore, only one RPD value is reported. The relative percent differences (RPDs), also listed in Table 2.4, range from 0 (zero) to 13. All five RPD values are within QC limits.

Table 2.1 Results of the Surrogate Recoveries for Pentachlorophenol Analysis in Water Samples

WA # 0-026 Penta Wood Products Site

Sample Number	2,4,6-Tribromophenol Percent Recovery
BLANK	71
A9994	100
A9995	82
A9996	105
A9996 MS	82
A9996 MSD	103
A9997	73
A9998	96
A9999	83
A10000	107
A10001	104

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.2 Results of the Pentachlorophenol MS/MSD Analysis for Water Samples

WA # 0-026 Penta Wood Products Site

Sample ID: A9996

Sample ID	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MSD Conc. (µg/L)	MS %Rec.	MSD %Rec.	% RPD
Pentachlorophenol	5	692	523	581	NC	NC	NC

QC Limits: RPD < 47
%Recovery = 17 - 109

Table 2.3 Results of the Surrogate Recoveries for Pentachlorophenol Analysis in Soil Samples

WA # 0-026 Penta Wood Products

Sample ID	2,4,6-Tribromophenol % Recovery
Blank #185	94
A09970	100
A09971	95
A09972	106
A09973	104
A09974	99
A09975	98
A09976	104
A09977	101
A09976	101
A09979	100
A09980	102
A09981	100
A09982	102
A09983	103
A09984	103
A09985	99
A09986	101
A09987	102
A09988	99
A09989	105
A09990	105
A09991	103
A09992	103
A09993	99
Blank #186	98
A26145	108
A26146	100
A26147	105
A26148	100
A26149	103
A26150	98
A26151	107
A26152	103
A26153	101
A17131	100
A17129	110
A17130	98
Blank #187	90
A09901	108
A09902	105
A09903	108
A09904	105
A09905	108
A09906	108
A09907	107
A09908	108
A09909	105
A09910	112
A09911	111
A09912	109
A09913	111
A09914	107
A09915	112
A09916	111
A09917	107
A09918	111

Table 2.4 Results of the Pentachlorophenol MS/MSD Analysis for Soil Samples

WA # 0-026 Penta Wood Products Site

Results are based on dry weight

Sample ID	Spike Added mg/kg	Sample Conc. mg/kg	MS Conc. mg/kg	MSD Conc. mg/kg	MS %Rec.	MS %Rec.	RPD	Advisory QC Limits %Rec.	Advisory QC Limits RPD
A09978	153	270	330	323	39	35	11	17-109	47
A09988	127	49	191	186	112 *	108	3	17-109	47
A26153	116	33	113	119	69	74	8	17-109	47
A09906	107	47	161	147	106	94	13	17-109	47
A09916 #	0	49	50	50	-	-	0	17-109	47

Sample was not spiked; RPD was calculated based on the unspiked MS and MSD results

QA/QC for Arsenic, Copper, and Zinc

Results of the Sample Spike Analysis for Arsenic, Copper, and Zinc in Soil Samples

Sample B26145 was chosen for the sample spike analysis. The percent recoveries, listed in Table 2.5, range from 82 to 109. All three percent recoveries are within the QC limits.

Results of the Sample Duplicate Analysis for Arsenic, Copper and Zinc in Soil Samples

Sample B26145 was chosen for the sample duplicate analysis. The relative percent differences (RPDs), listed in Table 2.6, are 40 and 18. The RPD for arsenic is not calculated (NC) because both the sample concentration and the duplicate concentration are reported as not detected. The RPD for copper is outside the QC criteria; according to the U.S. EPA Method 6010, no further action is indicated.

Results of the Laboratory Control Sample Analysis for Arsenic, Copper and Zinc in Soil Samples

One set of laboratory control sample analysis was performed. The percent recoveries, listed in Table 2.7, range from 100 to 110. All three found concentrations are within QC limits. The laboratory control samples QC limits were provided by the subcontract laboratory.

Table 2.5 Results of the Sample Spike Analysis for Arsenic, Copper, and Zinc in Soil Samples

WA #0-026 Penta Wood Products Site

Results are based on dry weight

Sample ID: B26145

	Sample Result (mg/Kg)	Spike Added (mg/Kg)	Spike Recovered (mg/Kg)	MS %Rec.	QC Limits %Rec.
Arsenic	ND	468.69	478.04	102	75 - 125
Copper	26.73	58.59	74.92	82	75 - 125
Zinc	30.99	117.17	159.05	109	75 - 125

Table 2.6 Results of the Sample Duplicate Analysis for Arsenic, Copper, and Zinc in Soil Samples

WA #0-026 Penta Wood Products Site

Results are based on dry weight

Sample ID: B26145

	Sample Results (mg/Kg)	Duplicate Results (mg/Kg)	%RPD	QC Limits RPD
Arsenic	ND	ND	NC	20
Copper	26.74	17.89	40 *	20
Zinc	30.99	25.78	18	20

Table 2.7 Results of the Laboratory Control Sample Analysis for Arsenic, Copper and Zinc in Soil Samples

WA #0-026 Penta Wood Products Site

	True (mg/Kg)	Found (mg/Kg)	QC Limits (mg/Kg)	%Rec
Arsenic	112	123	55 - 166	110
Copper	144	155	88 - 203	107
Zinc	259	260	148 - 394	100

QA/QC for Wet Chemistry

Results of the Laboratory Control Sample Analysis for Wet Chemistry

The percent recoveries of the laboratory control sample analysis, listed in Table 2.8, range from 94 to 104. There are no QC limits available.

Results of the MS/MSD Analysis for Wet Chemistry

Samples B26145 and A,B 09919 were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.9, range from 69 to 111. The relative percent differences (RPDs), also listed in Table 2.9, range from 0 (zero) to 47. There are no QC limits available.

Results of the Matrix Spike Analysis for Wet Chemistry

Samples B26145 and A,B 09919 were chosen for the matrix spike analysis for ammonia. The percent recoveries, listed in Table 2.10, are 121 and 85. There are no QC limits available.

Results of the Sample Duplicate Analysis for Wet Chemistry

Samples B26145 and A,B 09919 were chosen for the sample duplicate analysis. The relative percent differences (RPDs), listed in Table 2.11, range from 0 (zero) to 19. Three RPD values are not calculated because either sample concentrations or duplicate concentrations are below detection limits. There are no QC limits available.

Table 2.8 Results of the Laboratory Control Sample Analysis for Wet Chemistry

WA #0-026 Penta Wood Products Site

Analysis	True mg/Kg	Found mg/Kg	%Recovery
Ammonia	11.2	10.5	94
Chloride	7.69	7.54	98
Nitrate	3.46	3.42	98
Phosphate	7.36	6.26	85
Sulfate	15.4	15.6	101
Total Phosphorus	2.0	2.06	103
TOC	950	992	104
TKN	838	842	101

Table 2.9 Results of the MS/MSD Analysis for Wet Chemistry

WA #0-026 Penta Wood Products Site

Analysis	Sample ID	Sample Result mg/Kg	MS Spiked mg/Kg	MS Result mg/Kg	MS %Recovery	MSD Spiked mg/Kg	MSD Result mg/Kg	MSD %Recovery	%RPD
Chloride	B26145	73.8	467	565	105	473	573	106	0
Nitrate	B26145	ND	211	216	102	214	216	101	1
Phosphate	B26145	ND	447	427	96	453	428	94	1
Sulfate	B26145	ND	933	994	107	946	994	105	1
Total Phosphorus	B26145	210	118	291	69	293	534	111	47
TKN	B26145	295	500	766	94	500	775	96	2
TKN	A,B 09919	1180	500	1730	110	500	1600	84	27

Table 2.10 Results of the Matrix Spike Analysis for Wet Chemistry

WA #0-026 Penta Wood Products Site

Analysis	Sample ID	Sample Result mg/Kg	Spiked Added mg/Kg	Spike Recovered mg/Kg	%Rec
Ammonia	A,B 09919	18.4	12.53	33.50	121
Ammonia	B26145	5.43	11.8	15.50	85

Table 2.11 Results of the Sample Duplicate Analysis for Wet Chemistry

WA #0-026 Penta Wood Products Site

Sample ID: B26145

Analysis	Sample Result mg/Kg	Duplicate Result mg/Kg	%RPD
Ammonia	5.43	4.62	16
Chloride	73.8	72.9	1
Nitrate	ND	ND	NC
Phosphate	ND	ND	NC
Sulfate	ND	ND	NC
Total Phosphorus	210	202	4
TOC	NA	NA	NC
TKN	295	252	16
TPH	1791	1790	0

Sample ID: A,B 09919

Analysis	Sample Result mg/Kg	Duplicate Result mg/Kg	%RPD
Ammonia	18.4	19.4	5
TKN	1180	1240	5
Water Holding Capacity	12.77	10.54	19

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

Southwest Research Institute
PO Box 28510, 6220 Culebra
San Antonio, TX 78228-0510

August 23, 1994

Attn: Jo Ann Boyd
Project # 3347-040-01-0026, Penta Wood Products(Engineering)

As per Weston REAC Purchase Order number 08-30555, dated 08/23/94, please analyze samples according to the following parameters:

Analysis/Method	Matrix	# of samples
Metals As,Cu,Zn/6010	Soil	76
TCLP Metals As,Cu,Zn/6010	Soil	22
Metals Fe/6010	Soil	10
TPH/SW-846-9071	Soil	32
Ammonia/350	Soil	44
Anions Cl,NO3,SO4/300.0	Soil	44
TKN/351	Soil	44
Ortho phosphate/365.2	Soil	44
Total phosphorus/365.2	Soil	44
Water Holding Capacity/ASTM 2980-71	Soil	44
Cation Exchange Capacity/SW-846-9081	Soil	54
TOC/SW-846-9060	Soil	10
Data package as per attached Deliverables Requirements		

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

Samples are expected to arrive at your laboratory September 2, 1994. All applicable QA/QC (MS/MSD) analysis will be performed on each of our sample matrix. Preliminary results tables including MS/MSD's plus a signed copy of our Chain of Custody are due at REAC ten working days after sample receipt, with the complete data package due twenty one working days after sample receipt. The complete data package must include all items on the deliverables checklist.

SAMPLES MAY BE DIOXIN CONTAMINATED.

Should any questions or problems arise concerning this project,please call **John Johnson at (908) 321-4248 or fax to (908) 494-4020**. Any billing question, please call Cindy Snyder at (908) 321-4296. Thank you

Sincerely,

George Armstrong
Data Validation and Report Writing Group Leader
Roy F. Weston, Inc. / REAC Project

GA: jj Attachments

cc.	R. Singhvi	V. Kansal	C. Snyder
	H. Allen	Subcontracting File	M. Mohn
	Central File	M. Van Clef	G. Armstrong
	0026.CON3	T. Mignone	

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PWP
Project Number: 0026
RFW Contact: MOHN MIKE Phone: (908) 321-4200

No: 9217

SHEET NO. 1 OF 1

X22594-

SAMPLE IDENTIFICATION | ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	PCP			
	~~DW1A0~~									R.V
610	A9994	DW1A0	R.V ~~S~~W	oct ~~23~~ 24 94 MM	1	1 lit poly (4°c)				
611	A9995	DW1B0			1	1 lit poly (4°c)				
612 B,C	A9996	DW2A0			*					
613	A9997	DW2B0								
614	A9998	DW3A0								
615	A9999	DW3B0							R.V	
616	A10000	DW4A0								
617	A10001	DW4B0								

R.V

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
DO MS/MSD ON A, B, C 9996
* 3 bottles, not one MVC

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF
CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
~~M. Mohn~~						MFM					
All/Analysis	M. Mohn	10/24/94	Michael Van Clef	10/25/94	1050	8/analysis	Michael Van Clef	10/25/94	[illegible]	10/25/94	11.35

ENGINEERING - RIO PILES #2

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

PWA 1 2

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10251

SHEET NO. 1 OF 2

SAMPLE IDENTIFICATION — ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		PCP			
	A09970	1A COMP 2	S	10/23/94	1	4 oz gl	–	X			
	A09971	1B COMP 2									
	A09972	1C COMP 2									
	A09973	2A COMP 2									
	A09974	2B COMP 2									
	A09975	2C COMP 2									
	A09976	3A COMP 2									
	A09977	3B COMP 2									
	A09978	3C COMP 2									
	A09979	4A COMP 2									
	A09980	4B COMP 2							MCM		
	A09981	4C COMP 2									
	A09982	5A COMP 2									
	A09983	5B COMP 2									
	A09984	5C COMP 2									
	A09985	6A COMP 2									
	A09986	6B COMP 2									
	A09987	6C COMP 2									
	A09988	7A COMP 2									
	A09989	7B COMP 2									

13805

00031

Matrix:
SD - Sediment; DS - Drum Solids; DL - Drum Liquids; X - Other
PW - Potable Water; GW - Groundwater; SW - Surface Water; SL - Sludge
S - Soil; W - Water; O - Oil; A - Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	10/23/94	[signature]	10/26/94	–						

ENGINEERING - BIO PILES #2

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

PWA 12R

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10250

SHEET NO. 2 OF 2

SAMPLE IDENTIFICATION | **ANALYSES REQUESTED**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	PCP			
	A09990	7C COMP 2	S	10/23/94	1	4 oz g/l —	X			
	A09991	8A COMP 2	↓	↓	↓	↓ ↓	↓			
	A09992	8B COMP 2	↓	↓	↓	↓ ↓	↓			
	A09993	8C COMP 2	↓	↓	↓	↓ ↓	↓			

MFM

MFM

1380006

00022

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	10/23/94	[illegible signature]	10/25/94							

Roy F. ..eston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PWI
Project Number: 0026
RFW Contact: MOHN MIKE Phone: (908) 321-4200

No: 9218

SHEET NO. 1 OF 1

SAMPLE IDENTIFICATION							ANALYSES REQUESTED			
REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	PCP			
	A26145	DS1A0	S	Oct23,94	1	1x4oz (4C)				
	A26146	DS1B0			1					
	A26147	DS1C0								
	A26148	DS2A0								
	A26149	DS2B0								
	A26150	DS2C0								
	A26151	DS3A0								
	A26152	DS3B0								
	A26153	DS3C0								
	~~A26~~									R.V
	A17131	DS4A0							R.V	
	A17129	DS4B0								
	A17130	DS4C0								
				R.V						

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions: DO MS/MSD AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	10/24/94	[illegible]	[illegible]							

ENGINEERING - MRAMEND PWA 12R

CHAIN OF CUSTODY :CORD/LAB WORK REQUEST

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

Project Name: PENTA WOOD PRODUCTS
Project Number: 0026
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10246

SHEET NO. 1 OF ___

SAMPLE IDENTIFICATION | ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	PCP			
	A09901	DC1	S	10/24/97	1	4 oz gl / -	X			
	A09902	DC2								
	A09903	DC3								
	A09904	DC4								
	A09905	DC5								
	A09906	DC6								
	A09907	DC7								
	A09908	DC8								
	A09909	DC9								
	A09910	DT1								
	A09911	DT2								
	A09912	DT3							MFM	
	A09913	DT4								
	A09914	DT5								
	A09915	DT6								
	A09916	DT7								
	A09917	DT8								
	A09918	DT9								
						MFM				

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
DO MS/MSD AT RATE OF 10%.

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF
CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	10/24/97	[illegible signature]	10/26/97							

13800 8

00024

Roy [redacted] ston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

[redacted]

Project Name: [redacted]
Project Number: 0026
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10247

SHEET NO. 1 OF 1

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	A H2O HOLD.CAP's	B *		* INTACT
✓	A, B 09919	DT1-3 COMP	S	10/24/94	2	4, 8 oz gl / -	X	X		INTACT
✓	A, B 09920	DT4-6 COMP								
✓	A, B 09921	DT7-9 COMP								
✓	A, B 09922	DC1-3 COMP								
✓	A, B 09923	DC4-6 COMP								
✓	A, B 09924	DC7-9 COMP								
✓	A 09925	DT 1-3 COMP UN			1	8 oz gl /				
✓	A 09926	DT 4-6 COMP UN								
✓	A 09927	DT7-9 COMP UN								

MFM MFA MFA

DO MS/MSD ON ALL PARAMETERS AT RATE OF 10%

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
* = NH_3N, NO_3N, TKN, TOT P., PO_4^{-3}, As, Cu, Zn, Cl, SO_4^{-2}, TOC, TPH

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF
CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	10/24/94									

[signature] 10/26/94 09:00

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

Project Name: Penta Wood Products, WI
Project Number: 0026
RFW Contact: Mike Hohn Phone: (908) 321-4200

No: 9216

SHEET NO. 1 OF 1

SAMPLE IDENTIFICATION

ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	*			
✓	B26145	DS1A0	S	OCT 23,94	1	1x4oz (4°C)				INTACT
✓	B26148	DS2A0	S	OCT 23,94	1					
✓	B26151	DS3A0	S	OCT 23,94	1					
✓	B17131	DS4A0	S	OCT 23,94	1					

R.V

R.V

(B26145)
DO MS/MSD ON DS1A0 FOR ALL PARAMETERS

00026

Matrix:
SD - Sediment; PW - Potable Water; S - Soil
DS - Drum Solids; GW - Groundwater; W - Water
DL - Drum Liquids; SW - Surface Water; O - Oil
X - Other; SL - Sludge; A - Air

Special Instructions:
* = NH_3N, NO_3N, TKN, PO_4^{-3}, TOT P, As, Cu, Zn, Cl^-, SO_4^{-2}, TOC, ~~CEC~~, TPH

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	10/24/94									
									Joe Mo[illegible]	10-26-94	09:00

028

ANALYTICAL REPORT

Prepared by
Roy F. Weston, Inc.

Penta Wood Products
Siren, Wisconsin

January 1995

EPA Work Assignment No. 0-026
Weston Work Order No. 03347-040-001-0026-01
EPA Contract No. 68-C4-0022

Submitted to
H. Allen
EPA-ERT

T. Mignone — Date
Task Leader

V. Kansal — Date 1/23/95
Analytical Section Leader

R. M. Shapot — Date 1/24/95
Program Manager

Analysis by:
REAC
REAC-HHL
Analab

Prepared by:
L. Sun

Reviewed by:
G. Armstrong

Table of Contents

Appendices will be furnished on request.

INTRODUCTION

The REAC Laboratory, in response to ERT work assignment #0-026, provided analytical support for samples collected from the Penta Wood Products Site located in Siren, Wisconsin. This support included analysis and subcontracting of environmental samples as described in the following table. The support also included QA/QC, data review, and preparation of an analytical report containing a summary of the analytical methods, the results, the QA/QC methods, and the QA/QC results.

The samples were treated with procedures consistent with those described in SOP #1008 and are summarized in the following table:

COC #	Number of Samples	Sampling Date	Date Received	Matrix	Analysis	Laboratory
10045	8	11/28/94	11/30/94	Water	Chlorinated Phenols	Analab
	12	11/28/94	11/30/94	Soil		
10046	8	11/28/94	11/30/94	Water	Pentachlorophenol	REAC
10047	12	11/28/94	11/30/94	Soil		REAC-HHL
10049	10	11/29/94	12/01/94	Soil	BNA	Analab
10050	20	11/29/94	11/30/94	Soil	Pentachlorophenol	REAC-HHL
10051	4	11/29/94	11/30/94	Soil		
10052	18	11/29/94	11/30/94	Soil		
10056	5	11/30/94	12/01/94	Water		REAC

REAC-HHL   REAC High Hazard Laboratory located in Brunswick, Georgia

CASE NARRATIVE

<u>BNA Analysis in Soil - Package D198</u>

The continuing calibration of 12/10/94 exceeds the 25% difference (%D) requirement for benzidine (44.26%). There is no benzidine detected in the associated samples, therefore, the data are not affected.

One base neutral surrogate recovery is outside QC limits for samples C00145MS, C00136 (2X), C00139, C00139 (10X), C00142, C00145, C00145 (2X), C00148, and C00148 (2X). The data is not affected.

Pentachlorophenol Analysis in Soil - Package D174

Surrogate recoveries exceed QC criteria for samples A00134, A00137, A00138, A00139, A00140, A00141, A00142, A00143, A00144, A00145, A00146, A00147, A00148, A00149, A00157, A00158, A00159, A00160, A00161, A00162, A00163, A00164, A00165, A00166, A00167, A00168, A00169, and A00170. The positive results detected in these samples are considered to be estimated.

Chlorinated Phenols Analysis in Water - Package D196

The continuing calibration of 12/15/94 exceeds the 30% difference (%D) requirement for pentachlorophenol (35.38%). There is no pentachlorophenol detected in the associated samples, therefore, the data are not affected.

One acid surrogate recovery exceeds QC criteria for samples B00133, B00135, B00118, and blank spike. The data are not affected.

SUMMARY of ABBREVIATIONS

B	The analyte was found in the blank
BFB	Bromofluorobenzene
BPQL	Below the Practical Quantitation Limit
C	Centigrade
D	(Surrogate Table) this value is from a diluted sample and was not calculated (Result Table) this result was obtained from a diluted sample
CLP	Contract Laboratory Protocol
COC	Chain of Custody
CONC	Concentration
CRDL	Contract Required Detection Limit
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
E	The value is greater than the highest linear standard and is estimated
EMPC	Estimated maximum possible concentration
J	The value is below the method detection limit and is estimated
HHL	High Hazard Laboratory, Brunswick, GA
IDL	Instrument Detection Limit
ISTD	Internal Standard
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MI	Matrix Interference
MS	Matrix spike
MSD	Matrix spike duplicate
MW	Molecular weight
NA	either Not Applicable or Not Available
NC	Not Calculated
ND	Not Detected
NS	Not Spiked
% D	Percent difference
% REC	Percent Recovery
PQL	Practical quantitation limit
PPBV	Parts per billion by volume
QL	Quantitation Limit
RPD	Relative percent difference
RSD	Relative Standard Deviation
SIM	Selected Ion Mode

m^3	cubic meter	kg	kilogram
l(L)	liter	g	gram
dl	deciliter	cg	centigram
ml	milliliter	mg	milligram
ul	microliter	ug	microgram
		ng	nanogram
		pg	picogram

*	denotes a value that exceeds the acceptable QC limit

Abbreviations that are specific to a particular table are explained in footnotes on that table

Analytical Procedure for BNA in Soil

The subcontract laboratory analyzed the soil samples for BNA compounds, according to U.S. EPA Method 8270. This method is outlined in "Test Methods for Evaluating Solid Wastes", U.S. EPA, SW-846, September, 1987.

Results of the BNA analyses in soil are listed in Table 1.1.

Analytical Procedure for PCP in Water (SIM) (REAC)

Extraction Procedure

One liter of sample was spiked with 2,4,6-tribromophenol as a surrogate, and extracted with three 60 ml portions of methylene chloride according to Method 625, Section 10, as outlined in the Federal Register Vol. 49, #209, Friday, October 26, 1984. The extracts were combined, concentrated to 1.0 ml, an internal standard phenanthrene-d_{10} was added, and analyzed.

Analytical Procedure

An HP 5890 Gas Chromatograph, equipped with a 5970 Mass Selective Detector and controlled by an HP-1000 RTE/VM computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.25mm ID, 0.50 µm film thickness
Injection Temperature	260° C
Transfer Temperature	260° C
Temperature Program	100° C for 0.5 min 30 °C/min to 305° C hold for 5 min
Splitless Injection	Split time = 0.75 min
Injection Volume	2 µl

The GC/MS system was calibrated using 6 pentachlorophenol standards at 0.5, 1.0, 5.0, 10.0, 25.0, and 50.0 µg/ml. All samples were quantified using the average response factor obtained from the calibration range. Before analysis each day, the system was tuned with 50 ng deacfluorotriphenylphosphine (DFTPP) and passed a continuing calibration check when analyzing a 5.0 µg/ml standard mixture.

The Pentachlorophenol results for water samples are listed in Table 1.2. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF (or RF_{ave}) x V_i x V_o}$$

where

C_u	=	Concentration of target analyte (μg/L)
DF	=	Dilution Factor
A_u	=	Area of target analyte
I_{is}	=	Mass of specific internal standard (ng)
V_t	=	Volume of extract (μl)
A_{is}	=	Area of specific internal standard
RF	=	Response Factor (unitless)
RF_{ave}	=	average Response Factor
V_i	=	Volume of extract injected (μl)
V_o	=	Volume of sample (ml)

The RF_{ave} is used when a sample is associated with an initial calibration curve. The RF is used when a sample is associated with a continuing calibration curve.

Response Factor calculation:

The RF for each specific analyte is quantitated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \ x \ I_{is}}{A_{is} \ x \ I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
I_{is}	=	Mass of the specific internal standard
A_{is}	=	Area of the specific internal standard
I_c	=	Mass of the analyte in the standard

$$RF_{ave} = \frac{RF_1 + ... + RF_n}{n}$$

and

n = number of Samples

Rev. 7/11/94

Compound	Quantitation Ion	Ions in Group
2,4,6-tribromophenol (SURR)	330	143, 330, 332
pentachlorophenol	266	264, 266, 268
d_{10}-phenanthrene (IS)	188	80, 94, 188

Analytical Procedure for Pentachlorophenol in Soil (SIM) (HHL)

Extraction Procedure:

Ten grams of sample was spiked with the surrogate 2,4,6-tribromophenol, mixed with 10 g anhydrous sodium sulfate, and shaker extracted three times with 40, 30, and 30 ml portions of 1:4 acetone:methylene chloride. A 1.0 ml aliquot was spiked with an internal standard phenanthrene-d_{10}, and analyzed.

Analytical Procedure:

An HP 5971A Mass Selection Detector equipped with a 5890 Series II GC, a 7673A autosampler and controlled by an HP-Chem Station/Window/DOS5.0 software driven IBM compatible computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.25mm ID, 0.50 µm film thickness
Injection Temperature	290° C
Transfer Temperature	315° C
Source Temperature	240° C
Analyzer Temperature	240° C
Temperature Program	100°C for 0.5 min 30° C/min to 305° C Hold for 2 min.
Splitless Injection	Split time = 0.88 min
Injection Volume	2 µl

The GC/MS system was calibrated using 6 pentachlorophenol standards at 0.5, 1.0, 5.0, 10.0, 25.0, and 50.0 µg/ml. Before analysis each day, the system was tuned with 50 ng decafluorotriphenylphosphine (DFTPP) and passed a continuing calibration check when analyzing a 5 µg/ml standard mixture in which the responses were evaluated by comparison to the average response of the calibration curve.

The pentachlorophenol results for soil samples, based on dry weight, are listed in Table 1.3. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF_{ave} x V_i x W x D}$$

where

DF	=	Dilution Factor
RF_{ave}	=	Average Response Factor (unitless)
A_u	=	Area of analyte
A_{is}	=	Area of internal standard
I_{is}	=	Mass of internal standard (ng)
C_u	=	Concentration of analyte (µg/Kg)
V_t	=	Volume of extract (µl)
V_i	=	Volume of extract injected (µl)
W	=	Weight of sample (g)
D	=	Decimal per cent solids

The average Response Factor is used to quantitate the analyses.

Response Factor calculation:

The response factor (RF) for each specific analyte is calculated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \ x \ I_{is}}{A_{is} \ x \ I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
A_{is}	=	Area of the internal standard in the standard
I_c	=	Mass of the analyte in the standard
I_{is}	=	Mass of the internal standard in the standard

$$RF_{ave} = \frac{RF_1 + ... + RF_n}{n}$$

and

n = number of Samples

Revision of 1/13/95

Analytical Procedure for Chlorinated Phenols in Water

The subcontract laboratory analyzed the water samples for chlorinated phenols, according to U.S. EPA Method 8270. This method is outlined in "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", U.S. EPA, SW-846.

Results of the analyses are listed in Table 1.4.

Analytical Procedure for Chlorinated Phenols in Soil

The subcontract laboratory analyzed the soil samples for chlorinated phenols, according to U.S. EPA Method 8270. This method is outlined in "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", U.S. EPA, SW-846.

Results of the analyses are listed in Table 1.5.

Table 1.1 Results of the BNA Analysis in Soil

WA #0-026 Penta Wood Products Site
Based on Dry Weight

Sample ID	Method Blank		C00136		C00139		C00142		C00145	
Location	---		1A COMP 3		2A COMP 3		3A COMP 3		4A COMP 3	
%Solid	100		78		73		67		68	
Compound	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg
Pyridine	ND	330	ND	430	ND	460	ND	500	ND	490
n-Nitrosodimethylamine	ND	330	ND	430	ND	460	ND	500	ND	490
Aniline	ND	330	ND	430	ND	460	ND	500	ND	490
bis(2-Chloroethyl) Ether	ND	330	ND	430	ND	460	ND	500	ND	490
1,3-Dichlorobenzene	ND	330	ND	430	ND	460	ND	500	ND	490
1,4-Dichlorobenzene	ND	330	ND	430	ND	460	ND	500	ND	490
1,2-Dichlorobenzene	ND	330	ND	430	ND	460	ND	500	ND	490
Benzyl Alcohol	ND	330	ND	430	ND	460	ND	500	ND	490
bis(2-Chloroisopropyl) Ether	ND	330	ND	430	ND	460	ND	500	ND	490
Hexachloroethane	ND	330	ND	430	ND	460	ND	500	ND	490
n-Nitrosodipropyl Amine	ND	330	ND	430	ND	460	ND	500	ND	490
Nitrobenzene	ND	330	ND	430	ND	460	ND	500	ND	490
Isophorone	ND	330	ND	430	ND	460	ND	500	ND	490
bis(2-Chloroethoxy) Methane	ND	330	ND	430	ND	460	ND	500	ND	490
1,2,4-Trichlorobenzene	ND	330	ND	430	ND	460	ND	500	ND	490
Naphthalene	ND	330	ND	430	ND	460	ND	500	ND	490
Benzoic Acid	ND	1700	ND	2100	ND	2300	ND	2500	ND	2400
4-Chloroaniline	ND	330	ND	430	ND	460	ND	500	ND	490
Hexachlorobutadiene	ND	330	ND	430	ND	460	ND	500	ND	490
2-Methylnaphthalene	ND	330	ND	430	ND	460	ND	500	ND	490
Hexachlorocyclopentadiene	ND	330	ND	430	ND	460	ND	500	ND	490
2-chloronaphthalene	ND	330	ND	430	ND	460	ND	500	ND	490
2-Nitroaniline	ND	1700	ND	2100	ND	2300	ND	2500	ND	2400
Acenaphthylene	ND	330	ND	430	ND	460	ND	500	ND	490
Dimethyl Phthalate	ND	330	ND	430	ND	460	ND	500	ND	490
2,6-Dinitrotoluene	ND	330	ND	430	ND	460	ND	500	ND	490
Acenaphthene	ND	330	ND	430	ND	460	ND	500	ND	490
3-Nitroaniline	ND	1700	ND	2100	ND	2300	ND	2500	ND	2400
Dibenzofuran	ND	330	ND	430	ND	460	ND	500	ND	490
2,4-Dinitrotoulene	ND	330	ND	430	ND	460	ND	500	ND	490
Fluorene	ND	330	ND	430	ND	460	ND	500	ND	490
Diethyl Phthalate	ND	330	ND	430	ND	460	ND	500	ND	490
4-Chlorophenyl Phenyl Ether	ND	330	ND	430	ND	460	ND	500	ND	490
4-Nitroaniline	ND	1700	ND	2100	ND	2300	ND	2500	ND	2400
N-nitrosodiphenyl Amine	ND	330	ND	430	ND	460	ND	500	ND	490
4-Bromophenyl Phenyl Ether	ND	330	ND	430	ND	460	ND	500	ND	490
Hexachlorobenzene	ND	330	ND	430	ND	460	ND	500	ND	490
Phenanthrene	ND	330	ND	430	ND	460	ND	500	ND	490
Anthracene	ND	330	ND	430	ND	460	ND	500	ND	490
di-n-Butyl Phthalate	ND	330	52 J	430	69 J	460	100 J	500	ND	490
Fluoranthene	ND	330	ND	430	ND	2300	ND	2500	ND	2400
Benzidine	ND	1700	ND	2100	ND	460	ND	500	ND	490
Pyrene	ND	330	43 J	430	72 J	460	45 J	500	ND	490
Butylbenzyl Phthalate	ND	330	ND	430	ND	460	ND	500	ND	490
Benzo (a) Anthracene	ND	330	ND	430	ND	2300	ND	2500	ND	2400
3-3'-Dichlorobenzidine	ND	1700	ND	2100	ND	460	ND	500	ND	490
Chrysene	ND	330	ND	430	26 J	460	ND	500	ND	490
bis (2-Ethylhexyl) Phthalate	ND	330	100 J	430	240 J	460	66 J	500	93 J	490
di-n-Octyl Phthalate	ND	330	ND	430	ND	460	ND	500	ND	490
Benzo(b)Fluoranthene	ND	330	ND	430	ND	460	ND	500	ND	490
Benzo(k)Fluoranthene	ND	330	ND	430	ND	460	ND	500	ND	490
Benzo(a)Pyrene	ND	330	ND	430	ND	460	ND	500	ND	490
Indeno(1,2,3-cd)Pyrene	ND	330	ND	430	ND	460	ND	500	ND	490
Dibenzo(a,h)Anthracene	ND	330	ND	430	ND	460	ND	500	ND	490
Benzo(ghi)Perylene	ND	330	ND	430	ND	460	ND	500	ND	490
Phenol	ND	330	ND	430	ND	460	ND	500	ND	490
2-Nitrophenol	ND	330	ND	430	ND	460	ND	500	ND	490
2,4-dimethylphenol	ND	330	ND	430	ND	460	ND	500	ND	490
2-Chlorophenol	ND	330	ND	430	ND	460	ND	500	ND	490
2,4-Dichlorophenol	ND	330	ND	430	ND	460	ND	500	ND	490
p-Chloro-m-Cresol	ND	330	ND	430	ND	460	ND	500	ND	490
2,4,6-Trichlorophenol	ND	330	ND	430	ND	460	ND	500	ND	490
2,4-Dinitrophenol	ND	1700	ND	2100	ND	2300	ND	2500	ND	2400
4,6-Dinitro-2-Methylphenol	ND	1700	ND	2100	ND	2300	ND	2500	ND	2400
4-Nitrophenol	ND	1700	ND	2100	ND	2300	ND	2500	ND	2400
Pentachlorophenol	ND	1700	6400	4300	30000	23000	3600	2500	14000	2400
2,4,5-Trichlorophenol	ND	330	ND	430	ND	460	ND	500	ND	490
2-Methylphenol	ND	330	ND	430	ND	460	ND	500	ND	490
4-Methylphenol	ND	330	ND	430	ND	460	ND	500	ND	490

Table 1.1(Con't) Results of the BNA Analysis in Soil

WA #0-026 Penta Wood Products Site
Based on Dry Weight

Sample ID Location %Solid	C00148 5A COMP 3 83		C00151 6A COMP 3 86		C00154 7A COMP 3 84		C00157 8A COMP 3 77		C00177 DC1-9 COMP2 90	
Compound	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg
Pyridine	ND	400	ND	390	ND	400	ND	440	ND	370
n-Nitrosodimethylamine	ND	400	ND	390	ND	400	ND	440	ND	370
Aniline	ND	400	ND	390	ND	400	ND	440	ND	370
bis(2-Chloroethyl) Ether	ND	400	ND	390	ND	400	ND	440	ND	370
1,3-Dichlorobenzene	ND	400	ND	390	ND	400	ND	440	ND	370
1,4-Dichlorobenzene	ND	400	ND	390	ND	400	ND	440	ND	370
1,2-Dichlorobenzene	ND	400	ND	390	ND	400	ND	440	ND	370
Benzyl Alcohol	ND	400	ND	390	ND	400	ND	440	ND	370
bis(2-Chloroisopropyl) Ether	ND	400	ND	390	ND	400	ND	440	ND	370
Hexachloroethane	ND	400	ND	390	ND	400	ND	440	ND	370
n-Nitrosodipropyl Amine	ND	400	ND	390	ND	400	ND	440	ND	370
Nitrobenzene	ND	400	ND	390	ND	400	ND	440	ND	370
Isophorone	ND	400	ND	390	ND	400	ND	440	ND	370
bis(2-Chloroethoxy) Methane	ND	400	ND	390	ND	400	ND	440	ND	370
1,2,4-Trichlorobenzene	ND	400	ND	390	ND	400	ND	440	ND	370
Naphthalene	ND	400	ND	390	ND	400	ND	440	ND	370
Benzoic Acid	ND	2000	ND	1900	ND	2000	ND	2200	ND	1800
4-Chloroaniline	ND	400	ND	390	ND	400	ND	440	ND	370
Hexachlorobutadiene	ND	400	ND	390	ND	400	ND	440	ND	370
2-Methylnaphthalene	ND	400	ND	390	ND	400	ND	440	ND	370
Hexachlorocyclopentadiene	ND	400	ND	390	ND	400	ND	440	ND	370
2-chloronaphthalene	ND	400	ND	390	ND	400	ND	440	ND	370
2-Nitroaniline	ND	2000	ND	1900	ND	2000	ND	2200	ND	1800
Acenaphthylene	ND	400	ND	390	ND	400	ND	440	ND	370
Dimethyl Phthalate	ND	400	ND	390	ND	400	ND	440	ND	370
2,6-Dinitrotoluene	ND	400	ND	390	ND	400	ND	440	ND	370
Acenaphthene	ND	400	ND	390	ND	400	ND	440	ND	370
3-Nitroaniline	ND	2000	ND	1900	ND	2000	ND	2200	ND	1800
Dibenzofuran	ND	400	ND	390	ND	400	ND	440	ND	370
2,4-Dinitrotoulene	ND	400	ND	390	ND	400	ND	440	ND	370
Fluorene	ND	400	ND	390	ND	400	ND	440	ND	370
Diethyl Phthalate	ND	400	ND	390	ND	400	ND	440	ND	370
4-Chlorophenyl Phenyl Ether	ND	400	ND	390	ND	400	ND	440	ND	370
4-Nitroaniline	ND	2000	ND	1900	ND	2000	ND	2200	ND	1800
N-nitrosodiphenyl Amine	ND	400	ND	390	ND	400	ND	440	ND	370
4-Bromophenyl Phenyl Ether	ND	400	ND	390	ND	400	ND	440	ND	370
Hexachlorobenzene	ND	400	ND	390	ND	400	ND	440	ND	370
Phenanthrene	ND	400	ND	390	ND	400	ND	440	ND	370
Anthracene	ND	400	ND	390	ND	400	ND	440	ND	370
di-n-Butyl Phthalate	98 J	400	98 J	390	67 J	400	100 J	440	94 J	370
Fluoranthene	ND	400	ND	1900	ND	400	ND	440	ND	370
Benzidine	ND	2000	ND	390	ND	2000	ND	2200	ND	1800
Pyrene	41 J	400	ND	390	63 J	400	ND	440	ND	370
Butylbenzyl Phthalate	ND	400	ND	390	ND	400	ND	440	ND	370
Benzo (a) Anthracene	ND	400	ND	1900	ND	400	ND	440	ND	370
3-3'-Dichlorobenzidine	ND	400	ND	390	ND	400	ND	440	ND	370
Chrysene	ND	400	ND	390	ND	400	ND	440	ND	370
bis (2-Ethylhexyl) Phthalate	76 J	400	ND	390	50 J	400	ND	440	51 J	370
di-n-Octyl Phthalate	ND	400	ND	390	ND	400	ND	440	ND	370
Benzo(b)Fluoranthene	ND	400	ND	390	ND	400	ND	440	ND	370
Benzo(k)Fluoranthene	ND	400	ND	390	ND	400	ND	440	ND	370
Benzo(a)Pyrene	ND	400	ND	390	ND	400	ND	440	ND	370
Indeno(1,2,3-cd)Pyrene	ND	400	ND	390	ND	400	ND	440	ND	370
Dibenzo(a,h)Anthracene	ND	400	ND	390	ND	400	ND	440	ND	370
Benzo(ghi)Perylene	ND	400	ND	390	ND	400	ND	440	ND	370
Phenol	ND	400	ND	390	ND	400	ND	440	ND	370
2-Nitrophenol	ND	400	ND	390	ND	400	ND	440	ND	370
2,4-dimethylphenol	ND	400	ND	390	ND	400	ND	440	ND	370
2-Chlorophenol	ND	400	ND	390	ND	400	ND	440	ND	370
2,4-Dichlorophenol	ND	400	ND	390	ND	400	ND	440	ND	370
p-Chloro-m-Cresol	ND	400	ND	390	ND	400	ND	440	ND	370
2,4,6-Trichlorophenol	ND	400	ND	390	ND	400	ND	440	ND	370
2,4-Dinitrophenol	ND	2000	ND	1900	ND	2000	ND	2200	ND	1800
4,6-Dinitro-2-Methylphenol	ND	2000	ND	1900	ND	2000	ND	2200	ND	1800
4-Nitrophenol	ND	2000	ND	1900	ND	2000	ND	2200	ND	1800
Pentachlorophenol	12000	2000	7000	3900	13000	4000	6000	2200	7100	3700
2,4,5-Trichlorophenol	ND	400	ND	390	ND	400	ND	440	ND	370
2-Methylphenol	ND	400	ND	390	ND	400	ND	440	ND	370
4-Methylphenol	ND	400	ND	390	ND	400	ND	440	ND	370

Table 1.1(Con't) Results of the BNA Analysis in Soil

WA #0-026 Penta Wood Products Site
Based on Dry Weight

Sample ID Location %Solid Compound	C00178 DT1-9 COMP 2 81 Conc. µg/Kg	 MDL µg/Kg
Pyridine	ND	410
n-Nitrosodimethylamine	ND	410
Aniline	ND	410
bis(2-Chloroethyl) Ether	ND	410
1,3-Dichlorobenzene	ND	410
1,4-Dichlorobenzene	ND	410
1,2-Dichlorobenzene	ND	410
Benzyl Alcohol	ND	410
bis(2-Chloroisopropyl) Ether	ND	410
Hexachloroethane	ND	410
n-Nitrosodipropyl Amine	ND	410
Nitrobenzene	ND	410
Isophorone	ND	410
bis(2-Chloroethoxy) Methane	ND	410
1,2,4-Trichlorobenzene	ND	410
Naphthalene	ND	410
Benzoic Acid	ND	2100
4-Chloroaniline	ND	410
Hexachlorobutadiene	ND	410
2-Methylnaphthalene	ND	410
Hexachlorocyclopentadiene	ND	410
2-chloronaphthalene	ND	410
2-Nitroaniline	ND	2100
Acenaphthylene	ND	410
Dimethyl Phthalate	ND	410
2,6-Dinitrotoluene	ND	410
Acenaphthene	ND	410
3-Nitroaniline	ND	2100
Dibenzofuran	ND	410
2,4-Dinitrotoulene	ND	410
Fluorene	ND	410
Diethyl Phthalate	ND	410
4-Chlorophenyl Phenyl Ether	ND	410
4-Nitroaniline	ND	2100
N-nitrosodiphenyl Amine	ND	410
4-Bromophenyl Phenyl Ether	ND	410
Hexachlorobenzene	ND	410
Phenanthrene	ND	410
Anthracene	ND	410
di-n-Butyl Phthalate	69 J	410
Fluoranthene	ND	410
Benzidine	ND	2100
Pyrene	ND	410
Butylbenzyl Phthalate	ND	410
Benzo (a) Anthracene	ND	410
3-3'-Dichlorobenzidine	ND	410
Chrysene	ND	410
bis (2-Ethylhexyl) Phthalate	50 J	410
di-n-Octyl Phthalate	ND	410
Benzo(b)Fluoranthene	ND	410
Benzo(k)Fluoranthene	ND	410
Benzo(a)Pyrene	ND	410
Indeno(1,2,3-cd)Pyrene	ND	410
Dibenzo(a,h)Anthracene	ND	410
Benzo(ghi)Perylene	ND	410
Phenol	ND	410
2-Nitrophenol	ND	410
2,4-dimethylphenol	ND	410
2-Chlorophenol	ND	410
2,4-Dichlorophenol	ND	410
p-Chloro-m-Cresol	ND	410
2,4,6-Trichlorophenol	ND	410
2,4-Dinitrophenol	ND	2100
4,6-Dinitro-2-Methylphenol	ND	2100
4-Nitrophenol	ND	2100
Pentachlorophenol	3500	2100
2,4,5-Trichlorophenol	ND	410
2-Methylphenol	ND	410
4-Methylphenol	ND	410

Table 1.2 Results of Pentachlorophenol Analysis in Water

WA # 0-026 Penta Wood Products Site

Sample No.	Sampling Location	Conc. (µg/L)	MDL (µg/L)
WBLK120194	Water Blank #1	ND	0.5
A00116	DW1A2	12	0.5
A00117	DW1B2	12	0.5
A00118	DW2A2	19	1.0
A00119	DW2B2	24	0.5
A00120	DW3A2	22	0.5
A00121	DW3B2	21	0.5
A-C00122	DW4A2	5.9	0.5
A00123	DW4B2	5.4	0.6
WBLK120294	Water Blank #2	ND	0.5
ABC00180	BIO Influent-3	420	110
A00181	BIO Leachate-3	13000	1200
A00182	Green Tank 1-3	28000	1200
A00183	White Tank 2-3	1600	540
A00184	White Tank 3-3	5100	570

Table 1.3 Results of the Pentachlorophenol Analysis in Soil

WA # 0-026 Penta Wood Products

(Results are Based on Dry Weight)

Sample ID	Location	Conc. (mg/Kg)	MDL (mg/Kg)
Blank #197	SAND BLANK	ND	5.0
A-00124	DS1A2	13	5.6
A-00125	DS1B2	18	5.9
A-00126	DS1C2	14	5.7
A-00127	DS2A2	34	10
A-00128	DS2B2	48	10
A-00129	DS2C2	35	10
A-00130	DS3A2	6.7	5.9
A-00131	DS3B2	9.3	5.9
A-00132	DS3C2	6.9	5.7
A-00133	DS4A2	31	6.0
A-00134	DS4B2	39	6.6
A-00135	DS4C2	41	8.5
Blank #198	SAND BLANK	ND	5.0
A-00136	1A COMP 3	54	6.4
A-00137	1B COMP 3	110	6.0
A-00138	1C COMP 3	97	6.0
A-00139	2A COMP 3	240	6.7
A-00140	2B COMP 3	260	6.7
A-00141	2C COMP 3	300	7.0
A-00142	3 A COMP 3	38	7.3
A-00143	3 B COMP 3	330	7.4
A-00144	3 C COMP 3	230	7.1
A-00145	4 A COMP 3	160	7.2
A-00146	4 B COMP 3	69	7.3
A-00147	4 C COMP 3	200	7.5
A-00148	5 A COMP 3	150	7.0
A-00149	5 B COMP 3	320	7.5
A-00150	5 C COMP 3	290	7.5
A-00151	6 A COMP 3	55	5.9
A-00152	6 B COMP 3	56	5.9
A-00153	6 C COMP 3	46	5.8
A-00154	7 A COMP 3	110	6.1
A-00155	7 B COMP 3	160	5.8
A-00156	7 C COMP 3	77	6.0
A-00157	8 A COMP 3	60	6.5
A-00158	8 B COMP 3	110	6.5
A-00159	8 C COMP 3	180	6.2

Table 1.3(Con't) Results of the Pentachlorophenol Analysis in Soil

WA # 0-026 Penta Wood Products

(Results are Based on Dry Weight)

Sample ID	Location	Conc. (mg/Kg)	MDL (mg/Kg)
Blank #199	SAND BLANK	ND	5.0
A-00160	CT1 -2	55	5.4
A-00161	CT2 -2	58	5.3
A-00162	CT3 -2	46	5.4
A-00163	CT4 -2	49	5.4
A-00164	CT5 -2	47	5.3
A-00165	CT6 -2	39	5.4
A-00166	CT7 -2	50	5.4
A-00167	CT8 -2	61	5.5
A-00168	DT1 -2	20	6.1
A-00169	DT2 -2	16	6.2
A-00170	DT3 -2	25	5.9
A-00171	DT4 -2	16	5.7
A-00172	DT5 -2	14	5.9
A-00173	DT6 -2	14	6.0
A-00174	DT7 -2	13	6.0
A-00175	DT8 -2	14	5.8
A-00176	DT9 -2	12	6.1
A-00179	CT9 -2	22	5.5

Table 1.4 Results of the Chlorinated Phenols Analysis in Water

WA #0-026 Penta Wood Products Site

Sample ID Location	Method Blank ---		B00116 DW1A2		B00117 DW1B2		B00118 DW2A2		B00119 DW2B2	
Compound	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L
2-Chlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
m,p-Chlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
2,6-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
2,4,5-Trichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
2,3-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
2,5-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
3,4-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
2,4-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
3,5-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
2,3,6-Trichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
2,4,6-Trichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
2,3,5-Trichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
2,3,4,6-Tetrachlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100
Pentachlorophenol	ND	20	ND	20	ND	20	ND	100	ND	100

Sample ID Location	B00120 DW3A2		B00121 DW3B2		D,E,F00122 DW4A2		B00123 DW4B2	
Compound	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L
2-Chlorophenol	ND	20	ND	20	ND	20	ND	20
m,p-Chlorophenol	ND	20	30	20	79	20	90	20
2,6-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
2,4,5-Trichlorophenol	ND	20	ND	20	ND	20	ND	20
2,3-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
2,5-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
3,4-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
2,4-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
3,5-Dichlorophenol	ND	20	18 J	20	ND	20	12 J	20
2,3,6-Trichlorophenol	ND	20	ND	20	ND	20	ND	20
2,4,6-Trichlorophenol	ND	20	ND	20	ND	20	ND	20
2,3,5-Trichlorophenol	ND	20	ND	20	ND	20	ND	20
2,3,4,6-Tetrachlorophenol	ND	20	ND	20	ND	20	ND	20
Pentachlorophenol	ND	20	ND	20	ND	20	ND	20

Table 1.5 Results of the Chlorinated Phenols Analysis in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID	Method Blank		B00124		B00125		B00126		B00127	
Location	---		DW1A2		DW1B2		DS1C2		DS2A2	
%Solid	100		81		80		79		23	
	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MDL
Compound	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
2-Chlorophenol	ND	330	ND	2500	ND	2500	ND	2500	ND	8700
m,p-Chlorophenol	ND	330	ND	2500	ND	2500	ND	2500	21000	8700
2,6-Dichlorophenol	ND	330	ND	2500	ND	2500	ND	2500	ND	8700
2,4,5-Trichlorophenol	ND	330	ND	2500	ND	2500	ND	2500	ND	8700
2,3-Dichlorophenol	ND	330	ND	2500	ND	2500	ND	2500	ND	8700
2,5-Dichlorophenol	ND	330	ND	2500	ND	2500	ND	2500	ND	8700
3,4-Dichlorophenol	ND	330	ND	2500	ND	2500	ND	2500	ND	8700
2,4-Dichlorophenol	ND	330	ND	2500	ND	2500	ND	2500	ND	8700
3,5-Dichlorophenol	ND	330	ND	2500	ND	2500	ND	2500	15000	8700
2,3,6-Trichlorophenol	ND	330	ND	2500	ND	2500	ND	2500	ND	8700
2,4,6-Trichlorophenol	ND	330	ND	2500	ND	2500	ND	2500	ND	8700
2,3,5-Trichlorophenol	ND	330	ND	2500	ND	2500	ND	2500	5600 J	8700
2,3,4,6-Tetrachlorophenol	ND	330	ND	2500	ND	2500	ND	2500	22000	8700
Pentachlorophenol	ND	330	23000	2500	19000	2500	18000	2500	78000	8700

Sample ID	B00128		B00129		B00130		B00131		B00132	
Location	DS2B2		DS2C2		DS3A2		DS3B2		DS3C2	
%Solid	32		36		81		81		78	
	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MDL	Conc.	MDL
Compound	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
2-Chlorophenol	ND	6200	ND	5500	ND	2500	ND	2500	ND	2600
m,p-Chlorophenol	8500	6200	11000	5500	ND	2500	ND	2500	ND	2600
2,6-Dichlorophenol	ND	6200	ND	5500	ND	2500	ND	2500	ND	2600
2,4,5-Trichlorophenol	ND	6200	ND	5500	ND	2500	ND	2500	ND	2600
2,3-Dichlorophenol	ND	6200	ND	5500	ND	2500	ND	2500	ND	2600
2,5-Dichlorophenol	ND	6200	ND	5500	ND	2500	ND	2500	ND	2600
3,4-Dichlorophenol	ND	6200	ND	5500	ND	2500	ND	2500	ND	2600
2,4-Dichlorophenol	ND	6200	ND	5500	ND	2500	ND	2500	ND	2600
3,5-Dichlorophenol	4400 J	6200	8300	5500	5100	2500	7000	2500	5000	2600
2,3,6-Trichlorophenol	ND	6200	ND	5500	ND	2500	ND	2500	ND	2600
2,4,6-Trichlorophenol	ND	6200	ND	5500	ND	2500	ND	2500	ND	2600
2,3,5-Trichlorophenol	ND	6200	3400 J	5500	2300 J	2500	2900	2500	3000	2600
2,3,4,6-Tetrachlorophenol	5900 J	6200	12000	5500	ND	2500	ND	2500	ND	2600
Pentachlorophenol	36000	6200	57000	5500	5400	2500	7000	2500	5400	2600

Sample ID	B00133		B00134		B00135	
Location	DS4A2		DS4B2		DS4C2	
%Solid	45		42		36	
	Conc.	MDL	Conc.	MDL	Conc.	MDL
Compound	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
2-Chlorophenol	ND	4500	ND	4800	ND	5500
m,p-Chlorophenol	1300 J	4500	3400 J	4800	2900 J	5500
2,6-Dichlorophenol	ND	4500	ND	4800	ND	5500
2,4,5-Trichlorophenol	ND	4500	ND	4800	ND	5500
2,3-Dichlorophenol	ND	4500	ND	4800	ND	5500
2,5-Dichlorophenol	ND	4500	ND	4800	ND	5500
3,4-Dichlorophenol	ND	4500	ND	4800	ND	5500
2,4-Dichlorophenol	ND	4500	ND	4800	ND	5500
3,5-Dichlorophenol	1300 J	4500	2100 J	4800	1700 J	5500
2,3,6-Trichlorophenol	ND	4500	ND	4800	ND	5500
2,4,6-Trichlorophenol	ND	4500	ND	4800	ND	5500
2,3,5-Trichlorophenol	ND	4500	ND	4800	ND	5500
2,3,4,6-Tetrachlorophenol	23000	4500	18000	4800	16000	5500
Pentachlorophenol	54000	4500	46000	4800	44000	5500

QA/QC for BNA in Soil

Results of the Blank Spike Analysis for BNA in Soil

The percent recoveries, listed in Table 2.1, range from 64 to 101. All eleven recoveries are within QC limits.

Results of the MS/MSD Analysis for BNA in Soil

Sample C00145 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.2, range from 41 to 87. All twenty-two recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.2, range from 5 to 37. All eleven RPD values are within QC criteria.

Results of the Surrogate Recoveries for BNA in Soil

Sixsurrogate compounds, nitrobenzene-d5, 2-fluorobiphenyl, terphenyl-d14, phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol, were added to the soil samples prior to extraction. The surrogate recoveries, listed in Table 2.3, range from 20 to 117. One hundred and seventeen out of 126 recoveries are within QC limits. Surrogate 2-fluorobiphenyl exceeds QC limits for samples C00145MS, C00136(2X), C00139, C00139(10X), C00142, C00145, C00145(2X), C00148, and C00148(2X). Tha data not are affected.

Table 2.1 Results of the Blank Spike Analysis for BNA in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Compound	Sample Conc. µg/Kg	Spike Conc. µg/Kg	%Rec.	QC Limits
1,2 4-Trichlorobenzene	2889	3333	87	38-107
Acenaphthene	2859	3333	86	31-137
2,4-Dinitrotoluene	2167	3333	65	28-105
Pyrene	2927	3333	88	29-135
n-Nitrosodipropyl Amine	2262	3333	68	41-126
1,4-Dichlorobenzene	2258	3333	68	28-104
Pentachlorophenol	5766	6667	86	17-109
Phenol	5576	6667	84	26-105
2-Chlorophenol	5082	6667	76	25-102
p-Chloro-m-Cresol	6761	6667	101	26-103
4-Nitrophenol	4257	6667	64	11-114

Table 2.2 Results of the MS/MSD Analysis for BNA in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID: C00145

Compound	Sample Conc. µg/Kg	Spike Added µg/Kg	MS Conc. µg/Kg	MSD Conc. µg/Kg	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec.
2-Chlorophenol	ND	9804	5374	6375	55	65	17	35	26 - 90
Phenol	ND	9804	5734	6200	58	63	8	50	25-102
1,4-Dichlorobenzene	ND	4901	2531	2716	52	55	7	27	28-104
n-Nitrosodipropyl Amine	ND	4901	2875	3034	59	62	5	38	41-126
1,2,4-Trichlorobenzene	ND	4901	3181	3550	65	72	11	23	38-107
p-Chloro-m-Cresol	ND	9804	6843	5884	70	60	15	33	26-103
Acenaphthene	ND	4901	3435	3619	70	74	5	19	31-137
4-Nitrophenol	ND	9804	4026	5066	41	52	23	50	11-114
2,4-Dinitrotoluene	ND	4901	2325	2660	47	54	13	47	28 - 89
Pentachlorophenol	14104	9804	20149 E	22647 E	62	87	34	47	17-109
Pyrene	ND	4901	3722	4072	76	83	9	36	35-142

Table 2.3 Results of the Surrogate Recoveries for BNA in Soil

WA #0-026 Penta Wood Products Site

Sample ID	S1	S2	S3	S4	S5	S6
	% Recovery					
Blank	98	93	107	99	104	117
Blank Spike	88	92	97	84	83	100
C00145MS	58	25 *	37	65	64	47
C00145MSD	66	31	47	74	75	62
C00136	71	30	37	83	80	44
C00136 (2X)	47	27 *	32	87	61	45
C00139	69	25 *	38	66	61	47
C00139 (10X)	52	24 *	34	83	71	46
C00142	66	23 *	40	82	77	54
C00145	66	22 *	42	78	75	52
C00145 (2X)	52	20 *	37	66	69	51
C00148	62	26 *	39	75	72	52
C00148 (2X)	55	26 *	37	67	69	55
C00151	69	36	41	83	74	67
C00151 (2X)	57	36	41	73	73	66
C00154	69	41	46	80	71	69
C00154 (2X)	80	46	49	72	72	70
C00157	69	30	42	79	76	59
A00177	72	41	43	84	76	67
A00177 (2X)	61	42	43	72	73	67
A00178	75	37	46	81	79	77

	QC Limits Soil
S1 = Nitrobenzene-d5	23 - 120
S2 = 2-Fluorobiphenyl	30 - 116
S3 = Terphenyl-d14	18 - 137
S4 = Phenol-d5	24 - 113
S5 = 2-Fluorophenol	25 - 121
S6 = 2,4,6-Tribromophenol	19 - 122

QA/QC for Pentachlorophenol in Water

Results of the Surrogate Recoveries for Pentachlorophenol in Water

Surrogate 2,4,6-tribromophenol was added in samples prior to extraction. The surrogate recoveries, listed in Table 2.4, range from 43 to 102. The surrogate values are not calculated for samples ABC00180, ABC00180MS, ABC00180MSD, A00181, A00182, A00183, and A00184, because these samples were analyzed with 2000 times dilution, therefore, the surrogates were diluted out.

Results of the MS/MSD Analysis for Pentachlorophenol in Water

Samples A-C00122 and ABC00180 were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries for sample A-C00122, listed in Table 2.5, are 65 and 43. The relative percent difference (RPD) is 40 and also listed in Table 2.5. Both percent recoveries and RPD values are within QC criteria. The percent recoveries and RPD value for sample ABC00180, listed in table 2.5, are not calculated, because the sample concentration is much higher than that spiked.

Table 2.4 Results of the Surrogate Recoveries for Pentachlorophenol in Water

WA # 0-026 Penta Wood Products Site

Sample ID	2,4,6-Tribromophenol %Recovery	QC Limits
WBLK120194	64	19 - 122
A00116	87	19 - 122
A00117	84	19 - 122
A00118	102	19 - 122
A00119	67	19 - 122
A00120	43	19 - 122
A00121	45	19 - 122
A-C00122	72	19 - 122
A-C00122 MS	70	19 - 122
A-C00122 MSD	66	19 - 122
A00123	71	19 - 122
WBLK120294	65	19 - 122
ABC00180	NC *	19 - 122
ABC00180 MS	NC *	19 - 122
ABC00180 MSD	NC *	19 - 122
A00181	NC *	19 - 122
A00182	NC *	19 - 122
A00183	NC *	19 - 122
A00184	NC *	19 - 122

* NC denotes Not Calculable. Samples had to be diluted up to 2000x to prevent instrument/detector damage.

Table 2.5 Results of the MS/MSD Analysis for Pentachlorophenol in Water

WA # 0-026 Penta Wood Products Site

Sample ID	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MSD Conc. (µg/L)	MS %Rec.	MSD %Rec.	RPD	QC Limits	
								RPD	%Rec.
A-C00122	5.1	5.9	9.2	8.1	65	43	40	47	17 - 109
ABC00180	5.6	420	300	260	NC	NC	NC	47	17 - 109

QA/QC for Pentachlorophenol in Soil

Results of the Surrogate Recoveries for Pentachlorophenol in Soil

Surrogate 2,4,6-tribromophenol was added in samples prior to extraction. The surrogate recoveries, listed in Table 2.6, range from 66 to 155. Thirty-one out of 69 recoveries are within QC limits.

Results of the MS/MSD Analysis for Pentachlorophenol in Soil

Samples A00125, A00133, A00136, A00154, A00169, and A00174 were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.7, range from 95 to 165. Two out of 12 recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.7, range from 4 to 27. All six RPDs are within QC criteria.

Table 2.6 Results of the Surrogate Recoveries for Pentachlorophenol in Soil

WA # 0-026 Penta Wood Products

Sample ID	2,4,6-Tribromophenol % Recovery	QC Limits
Blank #197	68	10 - 123
Blank #198	113	10 - 123
Blank #199	67	10 - 123
A-00124	78	10 - 123
A-00125	93	10 - 123
A-00125MS	104	10 - 123
A-00125MSD	119	10 - 123
A-00126	70	10 - 123
A-00127	90	10 - 123
A-00128	113	10 - 123
A-00129	94	10 - 123
A-00130	101	10 - 123
A-00131	118	10 - 123
A-00132	81	10 - 123
A-00133	95	10 - 123
A-00133MS	118	10 - 123
A-00133MSD	127 *	10 - 123
A-00134	126 *	10 - 123
A-00135	117	10 - 123
A-00136	75	10 - 123
A-00136MS	88	10 - 123
A-00136MSD	88	10 - 123
A-00137	133 *	10 - 123
A-00138	135 *	10 - 123
A-00139	146 *	10 - 123
A-00140	126 *	10 - 123
A-00141	143 *	10 - 123
A-00142	127 *	10 - 123
A-00143	135 *	10 - 123
A-00144	147 *	10 - 123
A-00145	130 *	10 - 123
A-00146	142 *	10 - 123
A-00147	144 *	10 - 123
A-00148	148 *	10 - 123
A-00149	142 *	10 - 123

Table 2.6(Con't) Results of the Surrogate Recoveries for Pentachlorophenol in Soil

WA # 0-026 Penta Wood Products

Sample ID	2,4,6-Tribromophenol % Recovery	QC Limits
A-00150	91	10 - 123
A-00151	90	10 - 123
A-00152	91	10 - 123
A-00153	99	10 - 123
A-00154	103	10 - 123
A-00154MS	115	10 - 123
A-00154MSD	110	10 - 123
A-00155	112	10 - 123
A-00156	118	10 - 123
A-00157	125 *	10 - 123
A-00158	124 *	10 - 123
A-00159	136 *	10 - 123
A-00160	127 *	10 - 123
A-00161	127 *	10 - 123
A-00162	136 *	10 - 123
A-00163	135 *	10 - 123
A-00164	136 *	10 - 123
A-00165	138 *	10 - 123
A-00166	137 *	10 - 123
A-00167	134 *	10 - 123
A-00168	137 *	10 - 123
A-00169	130 *	10 - 123
A-00169MS	155 *	10 - 123
A-00169MSD	141 *	10 - 123
A-00170	124 *	10 - 123
A-00171	116	10 - 123
A-00172	104	10 - 123
A-00173	102	10 - 123
A-00174	91	10 - 123
A-00174MS	96	10 - 123
A-00174MSD	86	10 - 123
A-00175	76	10 - 123
A-00176	66	10 - 123
A-00179	71	10 - 123

Table 2.7 Results of the MS/MSD Analysis for Pentachlorophenol in Soil

WA # 0-026 Penta Wood Products Site

Results are Based on Dry Weight

Sample ID	Spike Added mg/kg	Sample Conc. mg/kg	MS Conc. mg/kg	MSD Conc. mg/kg	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec.
A00125	121	18	161	186	118 *	138 *	16	47	17 – 109
A00133	121	31	147	183	95	125	27	47	17 – 109
A00136*	638	54	866	881	127 *	130 *	2	47	17 – 109
A00154*	610	111	1022	985	149 *	143 *	4	47	17 – 109
A00169*	617	16	1031	989	165 *	158 *	4	47	17 – 109
A00174*	598	13	805	730	133 *	120 *	10	47	17 – 109

* Samples were spiked at 5 times normal concentration level

QA/QC for Chlorinated Phenols in Water

Results of the Surrogate Recoveries for Chlorinated Phenols in Water

Surrogates phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol were added to the samples prior to extraction. The surrogate recoveries, listed in Table 2.8, range from 5 to 155. Thirty-four out of 36 recoveries are within QC limits.

Results of the Blank Spike Analysis for Chlorinated Phenols in Water

The percent recoveries, listed in Table 2.9, range from 77 to 151.

Results of the MS/MSD Analysis for Chlorinated Phenols in Water

Sample D,E,F00122 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.10, range from 45 to 93. All eight recoveris are within QC limits. The relative percent differences (RPDs), also listed in Table 2.10, range from 16 to 38. All four RPDs are within QC limits.

Table 2.8 Results of the Surrogate Recoveries for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Sample ID	S1	S2	S3
	%Recovery		
Blank	56	75	121
Blank Spike	87	94	155 *
D,E,F00122MS	48	70	95
D,E,F00122MSD	35	55	73
B00116	46	59	93
B00117	45	65	100
B00118	21	5.0 *	29
B00119	34	46	74
B00120	26	34	63
B00121	39	47	68
D,E,F00122	42	65	101
B00123	51	68	110

	QC Limits
S1 = Phenol-d5	10- 94
S2 = 2-Fluorophenol	21-100
S3 = 2,4,6-Tribromophenol	10-123

Table 2.8 Results of the Blank Spike Analysis for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Compound	Sample Conc. µg/L	Spike Conc. µg/L	%Rec.
2-Chlorophenol	379	400	95
2,4-Dichlorophenol	422	400	106
2,5-Dichlorophenol	602	400	151
2,3-Dichlorophenol	309	400	77
2,6-Dichlorophenol	386	400	97
m,p-Chlorophenol	499	400	125
2,3,5-Trichlorophenol	419	400	105
2,4,6-Trichlorophenol	382	400	96
2,4,5-Trichlorophenol	433	400	108
2,3,6-Trichlorophenol	346	400	87
3,5-Dichlorophenol	372	400	93
3,4-Dichlorophenol	383	400	96
2,3,4,6-Tetrachlorophenol	481	400	120
Pentachlorophenol	546	400	137

Table 2.10 Results of the MS/MSD Analysis for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Sample ID: D,E,F00122

Compound	Sample Conc. µg/L	Spiked Added µg/L	MS Conc. µg/L	MSD Conc. µg/L	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec
2-Chlorophenol	ND	2000	1720	1337	86	67	25	42	12-189
Phenol	ND	2000	1330	908	67	45	38	40	27-123
4-Nitrophenol	ND	2000	1865	1268	93	63	38	50	10- 80
Pentachlorophenol	ND	2000	1846	1572	92	79	16	50	9-103

Results of the Surrogate Recoveries for Chlorinated Phenols in Soil

Surrogates phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol were added in the samples prior to extraction. The surrogate recoveries, listed in Table 2.11, range from 51 to 180. Fifty-two out of 57 recoveries are within QC limits.

Results of the Blank Spike Analysis for Chlorinated Phenols in Soil

Two sets of blank spikes were analyzed. The percent recoveries, listed in Table 2.12, range from 55 to 167.

Results of the MS/MSD Analysis for Chlorinated Phenols in Soil

Sample B00125 and B00133 were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.13, range from 79 to 246. Nine out of 16 recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.13, range from 7 to 39. All eight RPDs are within QC limits.

Table 2.11 Results of the Surrogate Recoveries for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Sample ID	S1	S2	S3
	%Recovery		
Blank	54	70	117
Blank Spike	102	114	145 *
B00125MS	70	111	89
B00125MSD	61	91	81
B00124	104	67	83
B00125	105	52	99
B00126	101	54	98
B00127	107	63	143 *
B00128	108	59	111
B00129	103	54	151 *
B00130	111	56	113
B00131	108	73	121
B00132	112	67	119
B00133	90	65	122
B00134	98	54	118
B00135	93	51	114
Blank Spike	112	109	180 *
B00133MS	58	107	113
B00133MSD	54	116	126 *

	QC Limits
S1 = Phenol-d5	24-113
S2 = 2-Fluorophenol	25-121
S3 = 2,4,6-Tribromophenol	19-122

Table 2.12 Results of the Blank Spike Analysis for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Compound	Sample Conc. µg/Kg	Spike Conc. µg/Kg	%Rec.
2-Chlorophenol	6901	6667	104
2,4-Dichlorophenol	6613	6667	99
2,5-Dichlorophenol	8941	6667	134
2,3-Dichlorophenol	5509	6667	83
2,6-Dichlorophenol	6829	6667	102
m,p-Chlorophenol	9034	6667	136
2,3,5-Trichlorophenol	7077	6667	106
2,4,6-Trichlorophenol	6416	6667	96
2,4,5-Trichlorophenol	3692	6667	55
2,3,6-Trichlorophenol	5753	6667	66
3,5-Dichlorophenol	6812	6667	102
3,4-Dichlorophenol	6870	6667	103
2,3,4,6-Tetrachlorophenol	7932	6667	119
Pentachlorophenol	9047	6667	136

Compound	Sample Conc. µg/Kg	Spike Conc. µg/Kg	%Rec.
2-Chlorophenol	7153	6667	107
2,4-Dichlorophenol	7766	6667	116
2,5-Dichlorophenol	11137	6667	167
2,3-Dichlorophenol	5471	6667	62
2,6-Dichlorophenol	8160	6667	122
m,p-Chlorophenol	8607	6667	129
2,3,5-Trichlorophenol	8698	6667	130
2,4,6-Trichlorophenol	8149	6667	122
2,4,5-Trichlorophenol	6695	6667	100
2,3,6-Trichlorophenol	6096	6667	91
3,5-Dichlorophenol	8702	6667	131
3,4-Dichlorophenol	7109	6667	107
2,3,4,6-Tetrachlorophenol	9935	6667	149
Pentachlorophenol	9723	6667	146

Table 2.13 Results of the MS/MSD Analysis for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID: B00125

Compound	Sample Conc. µg/Kg	Spiked Added µg/Kg	MS Conc. µg/Kg	MSD Conc. µg/Kg	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec
2-Chlorophenol	ND	50000	47838	44681	96 *	89	7	42	26-90
Phenol	ND	50000	43835	40924	88	82	7	40	25-102
4-Nitrophenol	ND	50000	79591	68416	159 *	137 *	15	50	11-114
Pentachlorophenol	16625	50000	74954	59674	113 *	82	31	50	17-109

Sample ID: B00133

Compound	Sample Conc. µg/Kg	Spiked Added µg/Kg	MS Conc. µg/Kg	MSD Conc. µg/Kg	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec
2-Chlorophenol	ND	88889	73940	82169	83	92	11	35	26-90
Phenol	ND	88889	70642	77038	79	87	9	50	25-102
4-Nitrophenol	ND	88889	173153	218709	195 *	246 *	23	50	11-114
Pentachlorophenol	53738	88889	131122	168738	87	129 *	39	47	17-109

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

Analab, Inc.
205 Campus Plaza I
Edison, NJ 08837

November 29, 1994

Attn: Joe Larusso
Project # 3347-040-001-0026, Penta Wood

As per Weston REAC Purchase Order number 08-31216, dated 11/28/94, please analyze samples according to the following parameters:

Analysis/Method	Matrix	# of samples
BNA/SW-846-8270 Table 5	Soil	10 one sampling only
Phenols/SW-846-8270 See Attached List	Water Soil	8/month for 5 months 12/month for 5 months
Data package as per attached Deliverables Requirements		

Samples are expected to arrive at your laboratory on December 2, 1994 and early January with subsequent sampling events resuming in late March 1995. All applicable QA/QC (MS/MSD) analysis will be performed on each of our sample matrix. Preliminary results tables including MS/MSD's plus a signed copy of our Chain of Custody is due at REAC 10 business days after each sample receipt, with the complete data package due 21 business days after each sample receipt. The complete data package must include all items on the deliverables checklist. Samples may be potenially dioxin contaminated.

ALL ORGANIC EXTRACTIONSON SOLIDS IE: BNA,PEST/PCBMUST BE BY SOXHLETEXTRACTION

Should any questions or problems arise concerning this project, please call John Johnson at (908) 321-4248 or fax to (908) 494-4020. Any contractual question, please call Cindy Snyder at (908) 321-4296. Thank you

Sincerely,

George Armstrong
Data Validation and Report Writing Group Leader
Roy F. Weston, Inc. / REAC Project

GA: jj Attachments

cc. R. Singhvi
H. Allen
Central File
0026.CON7
V. Kansal
Subcontracting File
M. Van Clef
C. Snyder
M. Mohn/T. Mignone
G. Armstrong

0026\non\mem\9411\sub\0026.CON7

ENGINEERING - PWA 13

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

Project Name: PENTA WOOD PROD.
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10045

SHEET NO. 1 OF 1

94-11-492

SAMPLE IDENTIFICATION **ANALYSES REQUESTED**

	REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	(1)			
1		B00116	DW1A2	W	11/28/94	1	32 oz gl/ —				1 Ltr
2		B00117	DW1B2								"
3		B00118	DW2A2								"
4		B00119	DW2B2								"
5		B00120	DW3A2								"
6		B00121	DW3B2								"
7		D,E,F 00122	DW4A2			3					3Ltr
8		B00123	DW4B2			1					1 Ltr
9		B00124	DS1A2	S			4 oz gl/ —				1-4oz
10		B00125	DS1B2								"
11		B00126	DS1C2								"
12		B00127	DS2A2								"
13		B00128	DS2B2								"
14		B00129	DS2C2								"
15		B00130	DS3A2								"
16		B00131	DS3B2								"
17		B00132	DS3C2								"
18		B00133	DS4A2								"
19		B00134	DS4B2								"
20		B00135	DS4C2								"

MFM

Matrix:
SD - Sediment PW - Potable Water S - Soil
DS - Drum Solids GW - Groundwater W - Water
DL - Drum Liquids SW - Surface Water O - Oil
X - Other SL - Sludge A - Air

Special Instructions:
(1) = Chlorinated Phenols
DO MS/MSD ON D-F 00122, B00125, B00133

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	11/28/94					Federal Express	11/28/94	[illegible]	11/30/94	10:00

002

All Samples Received
Temp. Cool °C Cool Yes No
Samples Intact Yes No
Properly Preserved Yes No

000037

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10046

SHEET NO. 1 OF

113094-

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		PCP			
177	A00116	DW1A2	W	11/28/94	1	32 oz gl	—	X			
178	A00117	DW1B2									
179	A00118	DW2A2									
180	A00119	DW2B2									
181	A00120	DW3A2									
182	A00121	DW3B2									
183	A-C 00122	DW4A2			3						
184	A00123	DW4B2			1						

MEM

MEM

00038

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
DO MS/MSD on A-C 00122

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF
CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	11/28/94	Michael Van Cleef	11/30/94	10:00	8/analysis	Michael Van Cleef	11/30/94	[illegible]	11-30-94	11:40

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA WC PROD
Project Number: 03347-070-001-0026-01
RFW Contact: M. MOHN Phone: 908-322-4257

No: 10047

SHEET NO. 1 OF 1

SAMPLE IDENTIFICATION **ANALYSES REQUESTED**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A00124	DS1A2	S	11/28/94	1	4 oz gl / —	X			
	A00125	DS1B2								
	A00126	DS1C2								
	A00127	DS2A2								
	A00128	DS2B2								
	A00129	DS2C2								
	A00130	DS3A2								
	A00131	DS3B2							MEM	
	A00132	DS3C2								
	A00133	DS4A2								
	A00134	DS4B2								
	A00135	DS4C2								
					MEM					

DI740013

00039

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
DO MS/MSD ON A00125, A00133

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF
CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	11/28/94	[illegible]	11/30/94	10:00						

ENGINEERING - BIO -

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10049

SHEET NO. 1 OF 1

SAMPLE IDENTIFICATION 94-12-002 ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	BNA			
1	C00136	1A COMP 3	S	11/29/94	1	4oz gl / —	X			4oz
2	C00139	2A COMP 3								"
3	C00142	3A COMP 3								"
4	C00145	4A COMP 3								"
5	C00148	5A COMP 3								"
6	C00151	6A COMP 3								"
7	C00154	7A COMP 3								"
8	C00157	8A COMP 3								"
9	A00177	DC 1-9 COMP 2								"
10	A00178	DT 1-9 COMP 2								"

MFM

MFM

60008659

00040

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions: DO MS/MSD ON RANDOMLY SELECTED SAMPLE.

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	11/30/94	K. Cole	12/1/94			Federal Express	12/1/94	[illegible]	12/1/94	10:00

2

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA WOO. PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10050

SHEET NO. ____ OF ____

SAMPLE IDENTIFICATION | **ANALYSES REQUESTED**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative		PCP			
	A00136	1A COMP 3	S	11/29/94	1	4oz gl	—	X			
	A00137	1B									
	A00138	1C									
	A00139	2A									
	A00140	2B									
	A00141	2C									
	A00142	3A									
	A00143	3B									
	A00144	3C									
	A00145	4A									
	A00146	4B									
	A00147	4C									
	A00148	5A									
	A00149	5B									
	A00150	5C									
	A00151	6A									
	A00152	6B									
	A00153	6C									
	A00154	7A									
	A00155	7B									

MEM

D174001 2

00041

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
DO MS/MSD SAMPLES AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn		[illegible]	11-30-94	10:30						

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY ECORD/LAB WORK REQUEST

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10051

SHEET NO. ____ OF ____

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative		PCP			
	A00156	7C COMP 3	S	11/29/94	1	4 oz gl	–	X			
	A00157	8A	↓	↓	↓	↓	↓	↓			
	A00158	8B	↓	↓	↓	↓	↓	↓			
	A00159	8C	↓	↓	↓	↓	↓	↓			

D174D011

0000-12

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions: DO MS/MSD SAMPLES AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	11/30/94	[illegible]	11-30-94	10:30 AM						

CHAIN OF CUSTODY [illegible]CORD/LAB WORK REQUEST

Roy F. [illegible]ston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10052

SHEET NO. ____ OF ____

SAMPLE IDENTIFICATION **ANALYSES REQUESTED**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative		PCP			
	A00160	CT1-2	S	11/29/94	1	4 oz gl	—	X			
	A00161	CT2-2									
	A00162	CT3-2									
	A00163	CT4-2									
	A00164	CT5-2									
	A00165	CT6-2									
	A00166	CT7-2									
	A00167	CT8-2									
	A00179	CT9-2									
	A00168	DT1-2									
	A00169	DT2-2									
	A00170	DT3-2									
	A00171	DT4-2									
	A00172	DT5-2									
	A00173	DT6-2									
	A00174	DT7-2									
	A00175	DT-8-2									
	A00176	DT9-2									
				MFM							

MFM

DI740010

00013

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions: DO MS/MSD SAMPLES AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	11/30/94	[illegible]	12/2/94	10:30						

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA WOOD PRODUCTS
Project Number: ~~01~~ 03347-040-001-0028-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10056

SHEET NO. ____ OF ____

120194-

SAMPLE IDENTIFICATION | ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	PCP			
105	BC,A 00180	BIO INFLUENT - 3	W	11/30/94	3	32 oz gl / —	X			
106	A 00181	BIO LEACHATE - 3	↓	↓	1	↓ ↓	↓			
107	A 00182	GREEN TANK 1 - 3	↓	↓	1	↓ ↓	↓			
108	A 00183	WHITE TANK 2 - 3	↓	↓	1	↓ ↓	↓			
109	A 00184	WHITE TANK 3 - 3	↓	↓	1	↓ ↓	↓			

MFM

MFM

000-11

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
DO MS/MSD ON A 00180 (LOW PCP CONC).

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	11/30/94	[signature]	12/1/94	10:00	All/Analysis	[signature]	12/1/94	[signature]	12-01-94	11:30

WESTON
MANAGERS DESIGNERS CONSULTANTS
Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

DATE: February 28, 1995

TO: R. Singhvi EPA/ERT

FROM: V. Kansal Analytical Section Leader Vinod Kansal

SUBJECT: DOCUMENT TRANSMITTAL UNDER WORK ASSIGNMENT # 0-026

Attached please find the following document prepared under this work assignment:

Penta Wood Products Site - Analytical Report

Central File WA # 0-026	(w/attachment)
T. Mignone	Task Leader
G. Armstrong	Data Validation and Report Writing Group Leader
H. Allen	Work Assignment Manager

ANALYTICAL REPORT

Prepared by
Roy F. Weston, Inc.

Penta Wood Products
Siren, Wisconsin

February 1995

EPA Work Assignment No. 0-026
Weston Work Order No. 03347-040-001-0026-01
EPA Contract No. 68-C4-0022

Submitted to
H. Allen
EPA-ERT

T. Mignone — Date 2/27/95
Task Leader

V. Kansal — Date 2/27/95
Analytical Section Leader

R. M. Shapot — Date 2/23/95
Program Manager

Analysis by:
REAC
REAC-HHL
Analab
GP Environmental

Prepared by:
L. Sun

Reviewed by:
G. Armstrong

Table of Contents

Appendices will be furnished on request.

INTRODUCTION

The REAC Laboratory, in response to ERT work assignment #0-026, provided analytical support for samples collected from the Penta Wood Products Site located in Siren, Wisconsin. This support included analysis and subcontracting of environmental samples as described in the following table. The support also included QA/QC, data review, and preparation of an analytical report containing a summary of the analytical methods, the results, the QA/QC methods, and the QA/QC results.

The samples were treated with procedures consistent with those described in SOP #1008 and are summarized in the following table:

COC #	Number of Samples	Sampling Date	Date Received	Matrix	Analysis	Laboratory
03613	8	1/04/95	1/06/95	Water	Pentachlorophenol	REAC
03614	8	1/04/95	1/06/95	Water	Chlorinated Phenols	Analab
03615	12	1/04/95	1/06/95	Soil	Pentachlorophenol	REAC-HHL
03616	12	1/04/95	1/06/95	Soil	Chlorinated Phenols	Analab
03617	10	1/04/95	1/06/95	Soil	Acid Extractable Organics (BNA)	Analab
03618	6	1/04/95	1/06/95	Water	Pentachlorophenol	REAC
03623	20	1/03/95	1/05/95	Soil	Pentachlorophenol	REAC-HHL
03652	20	1/04/95	1/06/95	Soil	Pentachlorophenol	REAC-HHL
03653	4	1/04/95	1/06/95	Soil		
T4-4967	10	1/04/95	1/20/95	Soil		GPE

REAC-HHL   REAC High Hazard Laboratory located in Brunswick, Georgia

CASE NARRATIVE

Acid Extractable Organics Analysis in Soil - Package E048

By direction of the work assignment manager and task leader on 2/22/95,only acid extractable organics have been reviewed and reported.

In the daily calibration of 1/20/95 (file>F4502), the REAC 25% difference criteria was exceeded by 2,4-dinitrophenol (65.17%) and 4,6-dinitro-2-methylphenol (53.92%). No positive results were obtained for these compounds. Because the percent difference is greater than 50, the non-detects will be considered as estimated.

In the daily calibration of 1/23/95 (file>F4526), the REAC 25% difference criteria was exceeded by 2,4-dinitrophenol (31.50%), 4-nitrophenol (47.81%), and 4,6-dinitro-2-methylphenol (25.66%). No positive results were obtained for these compounds; the data are not affected.

Surrogate phenol-d5 exceeds QC limits for samples C00338, C00341, C00350, and C09937. The data are not affected.

Pentachlorophenol Analysis in Soil - Package E015

The surrogate 2,4,6-tribromophenol was diluted out for samples ABC00258, A00359, A00360, A00361, A00262, and A00363. The data are not affected.

The surrogate 2,4,6-tribromophenol was outside QC limits for samples A00364, A00365, A00366, and A00369. The data associated with these samples is to be considered as estimated.

Pentachlorophenol Analysis in Soil - Package E037

The surrogate recoveries exceeded QC limits for samples 1AA00332DL (167%), 4AA00341DL (125%), 6AA00347DL (129%), DS1A3A00DL (154%), and DS2A3A00DL (151%). The positive results are considered to be estimated for these samples.

Chlorinated Phenols Analysis in Water - Package E038

The initial Calibration of 1/25/95 exceeded the 30% relative standard deviation (%RSD) requirement for 2,4-dichlorophenol (30.71%) and pentachlorophenol (47.95%). There are no positive results for the associated samples quantitated by this initial calibration range. The data are not affected.

The continuing calibration of 1/19/95 exceeded the 25% difference (%D) requirement for 3,4-dichlorophenol (37.98%) and pentachlorophenol (29.33%). There are no positive results for the associated samples quantitated by this continuing calibration. The data are not affected.

Two acid surrogate recoveries exceeded QC limits for sample 00368. The data are considered to be estimated.

Chlorinated Phenols Analysis in Soil - Package E046

The initial Calibration of 1/25/95 exceeded the 30% relative standard deviation (%RSD) requirement for 2,4-dichlorophenol (30.71%) and pentachlorophenol (47.95%). The positive results for these analytes in the sample B00376 are considered to be estimated.

The continuing calibration of 1/18/95 exceeded the 25% difference (%D) requirement for 3,4-dichlorophenol (27.54%) and pentachlorophenol (30.05%). The positive results for these analytes which are detected in samples B00372, B00373, B00374, and B00375 are considered to be estimated.

The continuing calibration of 1/19/95 exceeded the 25% difference (%D) requirement for 2,4-dichlorophenol (37.98%) and pentachlorophenol (29.33%). The positive results for these analytes which are detected in samples B00377, B00378, B00379, B00380, B00381, B00382, and B00383 are considered to be estimated.

SUMMARY of ABBREVIATIONS

B	The analyte was found in the blank
BFB	Bromofluorobenzene
BPQL	Below the Practical Quantitation Limit
C	Centigrade
D	(Surrogate Table) this value is from a diluted sample and was not calculated
	(Result Table) this result was obtained from a diluted sample
CLP	Contract Laboratory Protocol
COC	Chain of Custody
CONC	Concentration
CRDL	Contract Required Detection Limit
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
E	The value is greater than the highest linear standard and is estimated
EMPC	Estimated maximum possible concentration
J	The value is below the method detection limit and is estimated
HHL	High Hazard Laboratory, Brunswick, GA
IDL	Instrument Detection Limit
ISTD	Internal Standard
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MI	Matrix Interference
MS	Matrix spike
MSD	Matrix spike duplicate
MW	Molecular weight
NA	either Not Applicable or Not Available
NC	Not Calculated
ND	Not Detected
NS	Not Spiked
% D	Percent difference
% REC	Percent Recovery
PQL	Practical quantitation limit
PPBV	Parts per billion by volume
QL	Quantitation Limit
RPD	Relative percent difference
RSD	Relative Standard Deviation
SIM	Selected Ion Mode

m^3	cubic meter	kg	kilogram
l(L)	liter	g	gram
dl	deciliter	cg	centigram
ml	milliliter	mg	milligram
ul	microliter	ug	microgram
		ng	nanogram
		pg	picogram

* denotes a value that exceeds the acceptable QC limit

Abbreviations that are specific to a particular table are explained in footnotes on that table

Analytical Procedure for Acid Extractable Organics in Soil

The subcontract laboratory analyzed the soil samples for acid extractable organic compounds, according to U.S. EPA Method 8270. This method is outlined in "Test Methods for Evaluating Solid Wastes", U.S. EPA, SW-846, September, 1987.

Results of the acid extractable organics analysis in soil are listed in Table 1.1.

Analytical Procedure for PCP in Water (SIM)
(REAC)

Extraction Procedure

One liter of sample was spiked with 2,4,6-tribromophenol as a surrogate, and extracted with three 60 ml portions of methylene chloride according to Method 625, Section 10, as outlined in the Federal Register Vol. 49, #209, Friday, October 26, 1984. The extracts were combined, concentrated to 1.0 ml, an internal standard phenanthrene-d_{10} was added, and analyzed.

Analytical Procedure

An HP 5890 Gas Chromatograph, equipped with a 5970 Mass Selective Detector and controlled by an HP-1000 RTE/VM computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.25mm ID, 0.50 µm film thickness
Injection Temperature	260° C
Transfer Temperature	260° C
Temperature Program	100° C for 0.5 min 30 °C/min to 305° C hold for 5 min
Splitless Injection	Split time = 0.75 min
Injection Volume	2 µl

The GC/MS system was calibrated using 6 pentachlorophenol standards at 0.5, 1.0, 5.0, 10.0, 25.0, and 50.0 µg/ml. All samples were quantified using the average response factor obtained from the calibration range. Before analysis each day, the system was tuned with 50 ng deacfluorotriphenylphosphine (DFTPP) and passed a continuing calibration check when analyzing a 5.0 µg/ml standard mixture.

The Pentachlorophenol results for water samples are listed in Table 1.2. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF (or RF_{ave}) x V_i x V_o}$$

where

C_u	=	Concentration of target analyte (µg/L)
DF	=	Dilution Factor
A_u	=	Area of target analyte
I_{is}	=	Mass of specific internal standard (ng)
V_t	=	Volume of extract (µl)
A_{is}	=	Area of specific internal standard
RF	=	Response Factor (unitless)
RF_{ave}	=	average Response Factor
V_i	=	Volume of extract injected (µl)
V_o	=	Volume of sample (ml)

The RF_{ave} is used when a sample is associated with an initial calibration curve. The RF is used when a sample is associated with a continuing calibration curve.

Response Factor calculation:

The RF for each specific analyte is quantitated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \ x \ I_{is}}{A_{is} \ x \ I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
I_{is}	=	Mass of the specific internal standard
A_{is}	=	Area of the specific internal standard
I_c	=	Mass of the analyte in the standard

$$RF_{ave} = \frac{RF_1 + ... + RF_n}{n}$$

and

n = number of Samples

Rev. 7/11/94

Analytical Procedure for Pentachlorophenol in Soil (SIM) (HHL)

Extraction Procedure

Ten grams of sample was spiked with the surrogate 2,4,6-tribromophenol, mixed with 10 g anhydrous sodium sulfate, and shaker extrated four times with a 25 ml portions of 1:4 acetone:methylene chloride. A 1.0 ml aliquot was spiked with an internal standard phenanthrene-d_{10}, and analyzed.

Analytical Procedure

An HP 5971A Mass Selection Detector equipped with a 5890 Series II GC, a 7673A autosampler and controlled by an HP-Chem Station/Window/DOS5.0 software driven IBM compatible computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.25mm ID, 0.50 μm film thickness
Injection Temperature	290° C
Transfer Temperature	315° C
Source Temperature	240° C
Analyzer Temperature	240° C
Temperature Program	100°C for 0.5 min 30° C/min to 305° C Hold for 2 min.
Splitless Injection	Split time = 0.88 min
Injection Volume	2 μl

The GC/MS system was calibrated using 6 pentachlorophenol standards at 0.5, 1.0, 5.0, 10.0, 25.0, and 50.0 μg/ml. Before analysis each day, the system was tuned with 50 ng decafluorotriphenylphosine (DFTPP) and passed a continuing calibration check when analyzing a 5 μg/ml standard mixture in which the responses were evaluated by comparison to the average response of the calibration curve.

The pentachlorophenol results, based on dry weight, are listed in Table 1.3. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF_{ave} x V_i x W x D}$$

where

DF	=	Dilution Factor
RF_{ave}	=	Average Response Factor (unitless)
A_u	=	Area of analyte
A_{is}	=	Area of internal standard
I_{is}	=	Mass of internal standard (ng)
C_u	=	Concentration of analyte (μg/Kg)
V_t	=	Volume of extract (μl)
V_i	=	Volume of extract injected (μl)
W	=	Weight of sample (g)
D	=	Decimal per cent solids

The average Response Factor is used to quantitate the analyses.

Response Factor calculation:

The response factor (RF) for each specific analyte is calculated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \ x \ I_{is}}{A_{is} \ x \ I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
A_{is}	=	Area of the internal standard in the standard
I_c	=	Mass of the analyte in the standard
I_{is}	=	Mass of the internal standard in the standard

$$RF_{ave} = \frac{RF_1 + ... + RF_n}{n}$$

and

n = number of Samples

Revision of 1/13/95

Analytical Procedure for Chlorinated Phenols in Water

The subcontract laboratory analyzed the water samples for chlorinated phenols, according to U.S. EPA Method 8270. This method is outlined in "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", U.S. EPA, SW-846.

Results of the analyses are listed in Table 1.4.

Analytical Procedure for Chlorinated Phenols in Soil

The subcontract laboratory analyzed the soil samples for chlorinated phenols, according to U.S. EPA Method 8270. This method is outlined in "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", U.S. EPA, SW-846.

Results of the analyses are listed in Table 1.5.

Table 1.1 Results of the Acid Extractable Organics Analysis in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID	Method Blank		C00332		C00335		C00338		C00341		C00344	
Location	---		1A COMP4		2A COMP4		3A COMP4		4A COMP4		5A COMP4	
%Solid	100		80		78		68		66		67	
Compound	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg	Conc. µg/Kg	MDL µg/Kg
Phenol	ND	1000	ND	13000	ND	1300	ND	1500	ND	1500	ND	1500
2-Nitrophenol	ND	1000	ND	13000	ND	1300	ND	1500	ND	1500	ND	1500
2,4-Dimethylphenol	ND	1000	ND	13000	ND	1300	ND	1500	ND	1500	ND	1500
2-Chlorophenol	ND	1000	ND	13000	ND	1300	ND	1500	ND	1500	ND	1500
2,4-Dichlorophenol	ND	1000	ND	13000	ND	1300	ND	1500	ND	1500	ND	1500
p-Chloro-m-cresol	ND	1000	ND	13000	ND	1300	ND	1500	ND	1500	ND	1500
2,4,6-Trichlorophenol	ND	1000	ND	13000	ND	1300	ND	1500	ND	1500	ND	1500
2,4-Dinitrophenol	ND	5000	ND	63000	ND	6400	ND	7400	ND	7600	ND	7500
4,6-Dinitro-2-methylphenol	ND	5000	ND	63000	ND	6400	ND	7400	ND	7600	ND	7500
4-Nitrophenol	ND	5000	ND	63000	ND	6400	ND	7400	ND	7600	ND	7500
Pentachlorophenol	ND	5000	56000 J	63000	150000	6400	100000	7400	110000	7600	140000	7500
2,4,5-Trichlorophenol	ND	1000	ND	13000	ND	1300	ND	1500	ND	1500	ND	1500
2-Methylphenol	ND	1000	ND	13000	ND	1300	ND	1500	ND	1500	ND	1500
4-Methylphenol	ND	1000	ND	13000	ND	1300	ND	1500	ND	1500	ND	1500

Sample ID	C00347		C00350		C00353		D09937		D09947	
Location	6A COMP4		7A COMP4		8A COMP4		DT 1-9 COMP3		DC 1-9 COMP3	
%Solid	84		85		79		88		92	
Compound	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
Phenol	ND	1200	ND	1200	ND	1300	ND	1100	ND	11000
2-Nitrophenol	ND	1200	ND	1200	ND	1300	ND	1100	ND	11000
2,4-Dimethylphenol	ND	1200	ND	1200	ND	1300	ND	1100	ND	11000
2-Chlorophenol	ND	1200	ND	1200	ND	1300	ND	1100	ND	11000
2,4-Dichlorophenol	ND	1200	ND	1200	ND	1300	ND	1100	ND	11000
p-Chloro-m-cresol	ND	1200	ND	1200	ND	1300	ND	1100	ND	11000
2,4,6-Trichlorophenol	ND	1200	ND	1200	ND	1300	ND	1100	ND	11000
2,4-Dinitrophenol	ND	5400	ND	5900	ND	6400	ND	5700	ND	54000
4,6-Dinitro-2-methylphenol	ND	5400	ND	5900	ND	6400	ND	5700	ND	54000
4-Nitrophenol	ND	5400	ND	5900	ND	6400	ND	5700	ND	54000
Pentachlorophenol	57000	5400	36000	5900	95000	6400	5900	5700	10000 J	54000
2,4,5-Trichlorophenol	ND	1200	ND	1200	ND	1300	ND	1100	ND	11000
2-Methylphenol	ND	1200	ND	1200	ND	1300	ND	1100	ND	11000
4-Methylphenol	ND	1200	ND	1200	ND	1300	ND	1100	ND	11000

Table 1.2 Results of Pentachlorophenol Analysis in Water

WA # 0-026 Penta Wood Products

Sample No.	Sampling Location	Conc. (µg/L)	MDL (µg/L)
WBLK010695	Water Blank #1	ND	5.0
ABC00358	BIO Influent-4	1400	50
A00359	BIO Leachate-4	4900	130
A00360	Green Tank 1-4	63000	2000
A00361	White Tank 2-4	15000	500
A00362	White Tank 3-4	5500	140
A00363	Saw Dust Juice-4	1800	53
WBLK010995	Water Blank #2	ND	5.0
A00364	DW1A-3	19	5.1
A00365	DW1B-3	20	5.2
A00366	DW2A-3	19	5.3
A00367	DW2B-3	13	5.3
ABC00368	DW3A-3	6.8	5.2
A00369	DW3B-3	10	5.2
A00370	DW4A-3	7.8	5.0
A00371	DW4B-3	17	5.1

Table 1.3 Results of the Pentachlorophenol Analysis in Soil

WA # 0-026 Penta Wood Products

(Results are Based on Dry Weight)

Sample Number	Location	Conc. (mg/Kg)	MDL (mg/Kg)
Blank #203	Sand Blank	ND	5.0
A09928	DT1-3	14	6
A09929	DT2-3	14	6
A09930	DT3-3	14	5.4
A09931	DT4-3	14	5.4
A09932	DT5-3	12	5.1
A09933	DT6-3	13	5.7
A09934	DT7-3	12	5.2
A09935	DT8-3	12	5.1
A09936	DT9-3	19	5.8
A09937	DT1-9 COMP 3	13	5.7
A09938	DC1-3	31	3.9
A09939	DC2-3	29	4.7
A09940	DC3-3	27	3.9
A09941	DC4-3	34	4.3
A09942	DC5-3	30	4.6
A09943	DC6-3	28	5.1
A09944	DC7-3	35	4.5
A09945	DC8-3	38	4
A09946	DC9-3	29	5.3
A09947	DC1-9 COMP 3	28	5.3
Blank #204	Sand Blank	ND	5
A00332	1A Comp 4	74	6.4
A00333	1B Comp 4	73	6.1
A00334	1C Comp 4	77	6.3
A00335	2A Comp 4	220	6.7
A00336	2B Comp 4	250	6.7
A00337	2C Comp 4	260	6.3
A00338	3A Comp 4	170	7.2
A00339	3B Comp 4	230	7.2
A00340	3C Comp 4	230	7.2
A00341	4A Comp 4	180	7.2
A00342	4B Comp 4	290	7.2
A00343	4C Comp 4	300	6.7
A00344	5A Comp 4	200	7.2
A00345	5B Comp 4	240	7.1
A00346	5C Comp 4	280	7.3
A00347	6A Comp 4	75	5.8
A00348	6B Comp 4	72	5.8
A00349	6C Comp 4	45	5.7
A00350	7A Comp 4	66	5.8
A00351	7B Comp 4	120	5.8
A00352	7C Comp 4	140	5.5
A00353	8A Comp 4	120	6.2
A00354	8B Comp 4	110	6.4
A00355	8C Comp 4	150	5.8
Blank #205	Sand Blank	ND	5
A00372	DS1A-3	14	5.5
A00373	DS1B-3	26	5.5
A00374	DS1C-3	18	5.6
A00375	DS2A-3	2.5 J	5.1
A00376	DS2B-3	6.1 J	7.5
A00377	DS2C-3	6.1	5.8
A00378	DS3A-3	21	6.2
A00379	DS3B-3	19	7
A00380	DS3C-3	23	6.4
A00381	DS4A-3	27	8.8
A00382	DS4B-3	21	7.3
A00383	DS4C-3	9.3	6.2

Table 1.3(Con't) Results of the Pentachlorophenol Analysis in Soil

WA # 0-026 Penta Wood Products

(Results are Based on Dry Weight)

Sample Number	Location	Conc. (mg/Kg)	MDL (mg/Kg)
Blank	Sand Blank	ND	1.8
A00332	1ACOMP4	95	13
A00335	2ACOMP4	370	65
A00338	3ACOMP4	240	36
A00341	4ACOMP4	61	14
A00344	5ACOMP4	250	71
A00347	6ACOMP4	98	29
A00350	7ACOMP4	57	12
A00353	8ACOMP4	190	25
A00372	DS1A-3	12	1.2
A00375	DS2A-3	3.0	1.2

Table 1.4 Results of the Chlorinated Phenols Analysis in Water

WA #0-026 Penta Wood Products Site

Sample ID Location	Method Blank ---		B00364 DW1A-3		B00365 DW1B-3		B00366 DW2A-3		B00367 DW2B-3	
Compound	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L
2-Chlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
m,p-Chlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
2,6-Dichlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
2,4,5-Trichlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
2,3-Dichlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
2,5-Dichlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
3,4-Dichlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
2,4-Dichlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
3,5-Dichlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
2,3,6-Trichlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
2,4,6-Trichlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
2,3,5-Trichlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
2,3,4,6-Tetrachlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200
Pentachlorophenol	ND	40	ND	40	ND	40	ND	200	ND	200

Sample ID Location	D.E.F00368 DW3A-3		B00369 DW3B-3		B00370 DW4A-3		B00371 DW4B-3	
Compound	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L
2-Chlorophenol	ND	200	ND	200	ND	400	ND	400
m,p-Chlorophenol	ND	200	ND	200	ND	400	ND	400
2,6-Dichlorophenol	ND	200	ND	200	ND	400	ND	400
2,4,5-Trichlorophenol	ND	200	ND	200	ND	400	ND	400
2,3-Dichlorophenol	ND	200	ND	200	ND	400	ND	400
2,5-Dichlorophenol	ND	200	ND	200	ND	400	ND	400
3,4-Dichlorophenol	ND	200	ND	200	ND	400	ND	400
2,4-Dichlorophenol	ND	200	ND	200	ND	400	ND	400
3,5-Dichlorophenol	ND	200	ND	200	ND	400	ND	400
2,3,6-Trichlorophenol	ND	200	ND	200	ND	400	ND	400
2,4,6-Trichlorophenol	ND	200	ND	200	ND	400	ND	400
2,3,5-Trichlorophenol	ND	200	ND	200	ND	400	ND	400
2,3,4,6-Tetrachlorophenol	ND	200	ND	200	ND	400	ND	400
Pentachlorophenol	ND	200	ND	200	ND	400	ND	400

Table 1.5 Results of the Chlorinated Phenols Analysis in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID	Method Blank		B00372		B00373		B00374		B00375	
Location	---		DW1A-3		DW1B-3		DS1C-3		DS2A-3	
%Solid	100		82		81		81		78	
Compound	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
2-Chlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
m,p-Chlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
2,6-Dichlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
2,4,5-Trichlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
2,3-Dichlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
2,5-Dichlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
3,4-Dichlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
2,4-Dichlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
3,5-Dichlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
2,3,6-Trichlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
2,4,6-Trichlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
2,3,5-Trichlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
2,3,4,6-Tetrachlorophenol	ND	670	ND	4900	ND	4900	ND	5000	ND	5100
Pentachlorophenol	ND	670	13000	4900	28000	4900	21000	5000	7000	5100

Sample ID	B00376		B00377		B00378		B00379		B00380	
Location	DS2B-3		DS2C-3		DS3A-3		DS3B-3		DS3C-3	
%Solid	70		72		65		76		74	
Compound	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
2-Chlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
m,p-Chlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
2,6-Dichlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
2,4,5-Trichlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	4000 J	5400
2,3-Dichlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
2,5-Dichlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
3,4-Dichlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
2,4-Dichlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
3,5-Dichlorophenol	ND	5700	ND	5600	ND	6200	3300 J	5300	ND	5400
2,3,6-Trichlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
2,4,6-Trichlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
2,3,5-Trichlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
2,3,4,6-Tetrachlorophenol	ND	5700	ND	5600	ND	6200	ND	5300	ND	5400
Pentachlorophenol	5900	5700	7000	5600	33000	6200	16000	5300	20000	5400

Sample ID	B00381		B00382		B00135	
Location	DS4A-3		DS4B-3		DS4C-3	
%Solid	44		64		53	
Compound	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
2-Chlorophenol	ND	9000	ND	6300	ND	7600
m,p-Chlorophenol	ND	9000	ND	6300	ND	7600
2,6-Dichlorophenol	ND	9000	ND	6300	ND	7600
2,4,5-Trichlorophenol	ND	9000	ND	6300	ND	7600
2,3-Dichlorophenol	ND	9000	ND	6300	ND	7600
2,5-Dichlorophenol	ND	9000	ND	6300	ND	7600
3,4-Dichlorophenol	ND	9000	ND	6300	ND	7600
2,4-Dichlorophenol	ND	9000	ND	6300	ND	7600
3,5-Dichlorophenol	ND	9000	ND	6300	ND	7600
2,3,6-Trichlorophenol	ND	9000	ND	6300	ND	7600
2,4,6-Trichlorophenol	ND	9000	ND	6300	ND	7600
2,3,5-Trichlorophenol	ND	9000	ND	6300	ND	7600
2,3,4,6-Tetrachlorophenol	ND	9000	4000 J	6300	16000	7600
Pentachlorophenol	40000	9000	33000	6300	47000	7600

QA/QC for Acid Extractable Organics in Soil

Only the acid extractable organics have been reviewed and reported in this analytical report, by the direction of the work assignment manager and the task leader.

Results of the Surrogate Recoveries in Soil

Three acid surrogate compounds, phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol, were added to the soil samples prior to extraction. The surrogate recoveries, listed in Table 1.1, range from 61 to 119. Thirty out of thirty-four recoveries are within QC limits. Surrogate phenol-d5 exceeds QC limits for samples C00338, C00341, C00350, and C09937. The data not are affected.

Results of the Acid Extractable Organics MS/MSD Analysis in Soil

Sample C00350 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.2, range from 39 to 88. All ten recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.2, range from 3 to 33. All five RPD values are within QC criteria.

Results of the Blank Spike Analysis in Soil

The percent recoveries, listed in Table 2.3, range from 69 to 81. All five recoveries are within QC limits.

Table 2.1 Results of the Surrogate Recoveries in Soil

WA #0-026 Penta Wood Products Site

Sample ID	S1	S2	S3
	%Recovery		
Blank	96	82	76
Blank Spike	76	67	71
C00335MS	96	81	63
C00335MSD	89	77	61
C00332	99	95	69
C00335	110	93	82
C00338	115 *	99	87
C00341	117 *	93	83
C00344	111	97	93
C00347	111	91	85
C00350	119 *	100	92
C00353	112	95	93
D09937	116 *	97	80
D09947	94	93	71

	QC Limits
S1 = Phenol-d5	24- 113
S2 = 2-Fluorophenol	25- 121
S3 = 2,4,6-Tribromophenol	19-122

Table 2.2 Results of the Acid Extractable Organics MS/MSD Analysis in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID: C00350

Compound	Sample Conc. µg/Kg	Spiked Added µg/Kg	MS Conc. µg/Kg	MSD Conc. µg/Kg	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec.
2-Chlorophenol	ND	24000	21231	20308	88	85	3	40	26- 90
Phenol	ND	24000	21112	20107	88	84	5	50	25-102
p-Chloro-m-cresol	ND	24000	18083	16781	75	70	7	33	26-103
4-Nitrophenol	ND	24000	10178	9337	42	39	7	50	11-114
Pentachlorophenol	35846	24000	49822	55373	58	81	33	47	17-109

Table 2.3 Results of the Blank Spike Analysis in Soil

WA #0-026 Penta Wood Products Site

Compound	Sample Conc. µg/kg	Spike Conc. µg/kg	%Rec.	QC Limits %Rec.
Pentachlorophenol	16146	20000	81	17-109
Phenol	15214	20000	76	26-105
2-Chlorophenol	13722	20000	69	25-102
p-Chloro-m-cresol	13884	20000	69	26-103
4-Nitrophenol	14652	20000	73	11-114

QA/QC for Pentachlorophenol in Water

Results of the Surrogate Recoveries in Water

Surrogate 2,4,6-tribromophenol was added in samples prior to extraction. The surrogate recoveries, listed in Table 2.4, range from 76 to 140. The surrogate values are not calculated for samples ABC00358, ABC00358MS, ABC00358MSD, A003359, A00360, A00361, A00362 and A00363, because these samples were analyzed with up to 4000 times dilution and the surrogates were diluted out. Eight out of twelve calculated surrogate recoveries are within QC limits.

Results of the Pentachlorophenol MS/MSD Analysis in Water

Samples ABC00358 and ABC00368 were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries for sample ABC00368, listed in Table 2.5, are 62 and 77. The relative percent difference (RPD) is 22 and is also listed in Table 2.5. Both percent recoveries and RPD values are within QC criteria. The percent recoveries and RPD value for sample ABC00358, listed in table 2.5, are not calculated, because the sample concentration is much higher than that spiked.

Table 2.4 Results of the Surrogate Recoveries in Water

WA # 0-026 Penta Wood Products

Sample ID	Location	2,4,6-Tribromophenol %Recovery
WBLK010695	---	76
ABC00356	BIO INFLUENT-4	NC
ABC00358 MS	BIO INFLUENT-4	NC
ABC00358 MSD	BIO INFLUENT-4	NC
A00359	BIO LEACHATE-4	NC
A00360	GREEN TANK 1-4	NC
A00361	WHITE TANK 2-4	NC
A00362	WHITE TANK 3-4	NC
A00363	SAW DUST JUICE-4	NC
WBLK010995	---	82
A00364	DW1A-3	126 *
A00365	DW1B-3	128 *
A00366	DW2A-3	140 *
A00367	DW2B-3	104
ABC00368	DW3A-3	114
ABC00368 MS	DW3A-3	114
ABC00368 MSD	DW3A-3	116
A00369	DW3B-3	130 *
A00370	DW4A-3	102
A00371	DW4B-3	104

	QC LIMITS
2,4,6-Tribromophenol	19 - 122

Table 2.5 Results of the Pentachlorophenol MS/MSD Analysis in Water

WA # 0-026 Penta Wood Products

Sample ID	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MSD Conc. (µg/L)	MS %Rec.	MSD %Rec.	% RPD
ABC00358	5.0	1384	1475	1282	NC	NC	NC
ABC00366	5.2	6.8	10	10.8	62	77	22

QC Limits: RPD < 47
% Recovery = 17 - 109

QA/QC for Pentachlorophenol in Soil

Results of the Surrogate Recoveries in Soil

Surrogate 2,4,6-tribromophenol was added in samples prior to extraction. The surrogate recoveries, listed in Table 2.6, range from 66 to 155. Seventy-nine out of eighty-four recoveries are within QC limits.

Results of the Pentachlorophenol MS/MSD Analysis in Soil

Samples A09928, A09936, A00344 (COC#03652), A00348, A00351, A00382 and A00344 (COC#T4-4967) were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.7, range from 52 to 207. Six out of fourteen recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.7, range from 0 (zero) to 24. All seven RPDs are within QC criteria.

Table 2.6 Results of the Surrogate Recoveries in Soil

WA # 0-026 Penta Wood Products

Sample ID	Location	2,4,6-Tribromophenol Percent Recovery
Blank #203	---	95
A09928	DT1-3	95
A09928 MS	DT1-3	110
A09928 MSD	DT1-3	116
A09929	DT2-3	110
A09930	DT3-3	110
A09931	DT4-3	105
A09932	DT5-3	106
A09933	DT6-3	100
A09934	DT7-3	90
A09935	DT8-3	96
A09936	DT9-3	94
A09936 MS	DT9-3	96
A09936 MSD	DT9-3	94
A09937	DT1-9 COMP 3	94
A09938	DC1-3	94
A09939	DC2-3	97
A09940	DC3-3	92
A09941	DC4-3	97
A09942	DC5-3	97
A09943	DC6-3	93
A09944	DC7-3	97
A09945	DC8-3	100
A09946	DC9-3	97
A09947	DC1-9 COMP 3	98
Blank #204	---	66
A00332	1A COMP 4	80
A00333	1B COMP 4	81
A00334	1C COMP 4	84
A00335	2A COMP 4	79
A00336	2B COMP 4	89
A00337	2C COMP 4	91
A00338	3A COMP 4	100
A00339	3B COMP 4	97
A00340	3C COMP 4	98
A00341	4A COMP 4	100
A00342	4B COMP 4	99
A00343	4C COMP 4	98
A00344	5A COMP 4	98
A00344 MS	5A COMP 4	97
A00344 MSD	5A COMP 4	97
A00345	5B COMP 4	94
A00346	5C COMP 4	94
A00347	6A COMP 4	89
A00348	6B COMP 4	92
A00348 MS	6B COMP 4	87
A00348 MSD	6B COMP 4	87
A00349	6C COMP 4	88
A00350	7A COMP 4	87
A00351	7B COMP 4	86
A00351 MS	7B COMP 4	84
A00351 MSD	7B COMP 4	80
A00352	7C COMP 4	88
A00353	8A COMP 4	88
A00354	8B COMP 4	87
A00355	8C COMP 4	88

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.6(Con't) Results of the Surrogate Recoveries in Soil

WA # 0-026 Penta Wood Products

Sample ID	Location	2,4,6-Tribromophenol Percent Recovery
Blank #205	---	74
A00372	DS1A-3	83
A00373	DS1B-3	81
A00374	DS1C-3	83
A00375	DS2A-3	80
A00376	DS2B-3	79
A00377	DS2C-3	77
A00378	DS3A-3	81
A00379	DS3B-3	85
A00380	DS3C-3	94
A00381	DS4A-3	80
A00382	DS4B-3	80
A00382 MS	DS4B-3	82
A00382 MSD	DS4B-3	75
A00383	DS4C-3	79

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.6(Con't) Results of the Surrogate Recoveries in Soil

WA # 0-026 Penta Wood Products

Sample ID	Location	2,4,6-Tribromophenol Percent Recovery
Blank	---	107
A00332	1ACOMP4	167 *
A00335	2ACOMP4	122
A00336	3ACOMP4	116
A00341	4ACOMP4	125 *
A00344	5ACOMP4	107
A00344MS	5ACOMP4	113
A00344MSD	5ACOMP4	98
A00347	6ACOMP4	129 *
A00350	7ACOMP4	110
A00353	7ACOMP4	104
A00372	DS1A-3	154 *
A00375	DS2A-3	151 *

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.7 Results of the Pentachlorophenol MS/MSD Analysis in Soil

WA # 0–026 Penta Wood Site

(Results are Based on Dry Weight)

Sample ID	Spike Added (mg/Kg)	Sample Conc. (mg/Kg)	MS Conc. (mg/Kg)	MSD Conc. (mg/Kg)	MS %Rec.	MSD %Rec.	RPD
A09926	120	14.3	162	177	123 *	136 *	10
A09936	115	18.9	140	140	105	105	0
A00344	146	204	400	406	134 *	138 *	3
A00348	118	71.7	200	208	109	116 *	6
A00351	117	115	246	237	112 *	104	7
A00382	149	20.8	119	98.2	66	52	24

Advisory
QC Limits
% Rec. 17 – 109
RPD 47

Table 2.7(Con't) Results of the Pentachlorophenol MS/MSD Analysis in Soil

WA # 0–026 Penta Wood Site

(Results are Based on Dry Weight)

Sample ID	Spike Added (mg/Kg)	Sample Conc. (mg/Kg)	MS Conc. (mg/Kg)	MSD Conc. (mg/Kg)	MS %Rec.	MSD %Rec.	RPD
A00344	29	249	309	300	207 *	176 *	16

Advisory
QC Limits
% Rec. 17 – 109
RPD 47

QA/QC for Chlorinated Phenols in Water

Results of the Surrogate Recoveries in Water

Surrogates phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol were added to the samples prior to extraction. The surrogate recoveries, listed in Table 2.8, range from 14 to 132. Thirty-two out of thirty-six recoveries are within QC limits.

Results of the Blank Spike Analysis in Water

The percent recoveries, listed in Table 2.9, range from 48 to 80. All fourteen recoveries are within the QC limits which are provided by the subcontract laboratory.

Results of the Chlorinated Phenols MS/MSD Analysis in Water

Sample D,E,F00368 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.10, range from 107 to 144. One out of four recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.10, are 2 and 19. Both RPDs are within QC limits.

Table 2.8 Results of the Surrogate Recoveries in Water

WA #0-026 Penta Wood Products Site

Sample ID	S1	S2	S3
	%Recovery		
Blank	74	75	71
Blank Spike	33	54	74
ABC00368MS	34	91	127 *
ABC00368MSD	46	87	132 *
B00364	53	70	90
B00365	51	76	95
B00366	44	54	82
B00367	50	65	107
ABC00368	14 *	21	18 *
B00369	52	76	83
B00370	65	80	100
B00371	63	79	105

	QC Limits
S1 = Phenol-d5	10- 110
S2 = 2-Fluorophenol	21- 110
S3 = 2,4,6-Tribromophenol	10-123

Table 2.9 Results of the Blank Spike Analysis In Water

WA #0-026 Penta Wood Products Site

Compound	Sample Conc. µg/L	Spike Conc. µg/L	%Rec.	QC Limits %Rec.
2-Chlorophenol	106	200	53	23-134
m,p-Chlorophenol	100	200	50	30-130
2,6-Dichlorophenol	116	200	58	30-130
2,4,5-Trichlorophenol	126	200	63	30-130
2,3-Dichlorophenol	95	200	48	30-130
2,5-Dichlorophenol	126	200	63	30-130
3,4-Dichlorophenol	118	200	59	30-130
2,4-Dichlorophenol	160	200	80	32-119
3,5-Dichlorophenol	114	200	57	30-130
2,3,6-Trichlorophenol	127	200	64	30-130
2,4,6-Trichlorophenol	119	200	60	37-144
2,3,5-Trichlorophenol	120	200	60	30-130
2,3,4,6-Tetrachlorophenol	114	200	57	30-130
Pentachlorophenol	126	200	63	5-112

Table 2.10 Results of the Chlorinated Phenols MS/MSD Analysis in Water

WA #0-026 Penta Wood Products Site

Sample ID: ABC00368

Compound	Sample Conc. µg/L	Spiked Added µg/L	MS Conc. µg/L	MSD Conc. µg/L	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec
2-Chlorophenol	ND	2000	2596	2143	130 *	107	19	40	27-123
Pentachlorophenol	ND	2000	2827	2884	141 *	144 *	2	50	9-103

QA/QC for Chlorinated Phenols in Soil

Results of the Surrogate Recoveries in Soil

Surrogates phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol were added in the samples prior to extraction. The surrogate recoveries, listed in Table 2.11, range from 48 to 108. All forty-five recoveries are within QC limits.

Results of the Blank Spike Analysis in Soil

The percent recoveries, listed in Table 2.12, range from 58 to 132. All fourteen recoveries are within the QC limits which are provided by the subcontract laboratory.

Results of the Chlorinated Phenols MS/MSD Analysis in Soil

Sample B00372 were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.13, range from 93 to 153. Two out of four recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.13, are 5 and 25. Both RPDs are within QC limits.

Table 2.11 Results of the Surrogate Recoveries in Soil

WA #0-026 Penta Wood Products Site

Sample ID	S1	S2	S3
	%Recovery		
Blank	90	91	86
Blank Spike	105	98	65
B00372MS	87	83	84
B00372MSD	82	81	48
B00372	92	102	84
B00373	93	94	75
B00374	92	92	90
B00375	91	99	88
B00376	108	105	89
B00377	103	94	82
B00378	99	94	74
B00379	97	95	93
B00380	87	85	78
B00381	104	98	101
B00382	95	91	91
B00383	83	98	83

	QC Limits
S1 = Phenol-d5	24-113
S2 = 2-Fluorophenol	25-121
S3 = 2,4,6-Tribromophenol	19-122

Table 2.12 Results of the Blank Spike Analysis in Soil

WA #0-026 Penta Wood Products Site

Compound	Sample Conc. µg/Kg	Spike Conc. µg/Kg	%Rec.	QC Limits %Rec.
2-Chlorophenol	34000	40000	85	12-89
m,p-Dichlorophenol	30800	40000	77	30-130
2,6-Dichlorophenol	30800	40000	77	30-130
2,3,5-Trichlorophenol	34600	40000	87	30-130
2,3-Dichlorophenol	22200	40000	56	30-130
2,5-Dichlorophenol	35600	40000	89	30-130
3,4-Dichlorophenol	27600	40000	69	30-130
2,4-Dichlorophenol	52800	40000	132 *	32-119
3,5-Dichlorophenol	25200	40000	63	30-130
2,3,6-Trichlorophenol	34000	40000	85	30-130
2,4,6-Trichlorophenol	32600	40000	82	37-144
2,3,5-Trichlorophenol	32400	40000	81	30-130
2,3,4,6-Tetrachlorophenol	23000	40000	58	30-130
Pentachlorophenol	24400	40000	61	9-103

Table 2.13 Results of the Chlorinated Phenols MS/MSD Analysis in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID: B00372

Compound	Sample Conc. µg/Kg	Spiked Added µg/Kg	MS Conc. µg/Kg	MSD Conc. µg/Kg	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec.
2-Chlorophenol	ND	40000	37181	39369	93	98	6	35	26-102
Pentachlorophenol	12709	40000	74003	60753	153 *	120 *	25	47	17-109

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

WESTON MANAGERS DESIGNERS/CONSULTANTS

General Physics Environmental
202 Perry Parkway
Gaithersburg, MD 20877

January 19, 1995

Attn: Marty Sadoughi
Project # 3347-040-001-0026, Penta Wood C

As per Weston REAC Purchase Order number 08-31519, dated 01/19/95, please analyze samples according to the following parameters:

Analysis/Method	Matrix	# of samples
PCP/Selective Ion Monitoring(SIM)	Soil	10
Data package as per attached Deliverables Requirements		

Samples are expected to arrive at your laboratory on January 20, 1995. All applicable QA/QC (MS/MSD) analysis will be performed on our sample matrix. Preliminary results tables including MS/MSD's plus a signed copy of our Chain of Custody is due at REAC 10 business days from time of sample receipt, with the complete data package due 21 business days from time of sample receipt. The complete data package must include all items on the deliverables checklist. Samples may be dioxin contaminated.

Extraction must be soxhlet extraction with a 20:80 acetone:methylene chloride mix. Sample weight should not exceed 10g and the sample should be homogeneously mixed with sodium sulfate prior to extraction.

Should any questions or problems arise concerning this project, please call **John Johnson at (908) 321-4248 or fax to (908) 494-4020**. Any contractual question, please call Cindy Snyder at (908) 321-4296. Thank you

Sincerely,

George Armstrong
Data Validation and Report Writing Group Leader
Roy F. Weston, Inc. / REAC Project

GA: jj Attachments

cc. R. Singhvi
H. Allen
Central File
0026\non\mem\9501\sub\0026co10
V. Kansal
Subcontracting File
M. Van Clef
C. Snyder
M.Mohn/Y.Lin
G. Armstrong

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

WESTON MANAGERS DESIGNERS/CONSULTANTS

Analab, Inc.
205 Campus Plaza I
Edison, NJ 08837

November 29, 1994

Attn: Joe Larusso
Project # 3347-040-001-0026, Penta Wood

As per Weston REAC Purchase Order number 08-31216, dated 11/28/94, please analyze samples according to the following parameters:

Analysis/Method	Matrix	# of samples
BNA/SW-846-8270 Table 5	Soil	10 one sampling only
Phenols/SW-846-8270 See Attached List	Water Soil	8/month for 5 months 12/month for 5 months
Data package as per attached Deliverables Requirements		

Samples are expected to arrive at your laboratory on December 2, 1994 and early January with subsequent sampling events resuming in late March 1995. All applicable QA/QC (MS/MSD) analysis will be performed on each of our sample matrix. Preliminary results tables including MS/MSD's plus a signed copy of our Chain of Custody is due at REAC 10 business days after each sample receipt, with the complete data package due 21 business days after each sample receipt. The complete data package must include all items on the deliverables checklist. Samples may be potenially dioxin contaminated.

ALL ORGANIC EXTRACTIONS ON SOLIDS IE: BNA, PEST/PCB MUST BE BY SOXHLET EXTRACTION

Should any questions or problems arise concerning this project, please call John Johnson at (908) 321-4248 or fax to (908) 494-4020. Any contractual question, please call Cindy Snyder at (908) 321-4296. Thank you

Sincerely,

George Armstrong
Data Validation and Report Writing Group Leader
Roy F. Weston, Inc. / REAC Project

GA: jj Attachments

cc. R. Singhvi
H. Allen
Central File
0026.CON7
V. Kansal
Subcontracting File
M. Van Clef
C. Snyder
M. Mohn/T. Mignone
G. Armstrong

0026\non\mem\9411\sub\0026.CON7

ENGINEERING - BIO - ANAEROBIC PWA 15 •

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 03613

SHEET NO. 1 OF ___

010695 —

Sample Identification | **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
453	A00364	DW1A-3	W	1/4/95	1	32 oz gl / —	X			
454	A00365	DW1B-3	↓	↓	↓	↓ ↓	↓			
	~~A00366~~	~~DW2C~~		MFM						
455	A00366	DW2A-3								
456	A00367	DW2B-3			↓					
457	A,B,C 00368	DW3A-3			3					
458	A00369	DW3B-3			1					
459	A00370	DW4A-3			1					
460	A00371	DW4B-3	↓	↓	1	↓ ↓	↓			

MFM

MFM

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Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
DO MS/MSD ON A,B,C 00368

CAUTION: SAMPLES SMELL BAD

Checked by: M. Talwar

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	1/5/95	Michael Van Cliff	1/6/95	0930	8/analysis	Michael Van Cliff	1/6/95	Amy Bauman	1-6-95	11:00

FORM #4 8/94

★ US GPO 1994-383-015

ENGINEERING - BIO - ANAERODIC

PWA 15

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 03614

SHEET NO. 1 OF 1

Sample Identification 95-01-124 **Analyses Requested**

	REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	*			
1		B00364	DW1A-3	W	1/4/95	1	32 oz g/l —	X			1 LTR
2		B00365	DW1B-3								"
3		B00366	DW2A-3								"
4		B00367	DW2B-3								"
5		DEF 00368	DW3A-3			3					3 LTRS
6		B00369	DW3B-3			1					1 LTR
7		B00370	DW4A-3			1					"
8		B00371	DW4B-3			1					"

MFM

MFM

All Samples Received
Temp. Cool °C Cool Yes No
Samples Intact Yes No
Properly Preserved Yes No

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
* = Chlorinated phenols
DO MS/MSD ON D,E,F 00368
CAUTION: SAMPLES SMELL BAD

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Checked by: M. Talbert

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	1/5/95					[illegible signature]	1/6/95	[illegible signature]	1/6/95	10:00

FORM #4 8/94

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BIO - ENGINEERING - ANAEROBIC

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

PWA 15

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 03615

SHEET NO.__OF___

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A00372	DS1A-3	S	1/4/95	1	4 oz gl / –	X			
	A00373	DS1B-3								
	A00374	DS1C-3								
	A00375	DS2A-3								
	A00376	DS2B-3								
	A00377	DS2C-3								
	A00378	DS3A-3								
	A00379	DS3B-3								
	A00380	DS3C-3								
	A00381	DS4A-3								
	A00382	DS4B-3								
	A00383	DS4C-3								

MEM

MEM

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
DO MS/MSD ON RANDOMLY SELECTED SAMPLES AT RATE OF 10%.

Checked by: M. Talevor

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All Analysis	M. Mohn	1/5/95	Jennyson	1/6/95	10:30						

FORM #4 8/94

E070012

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* US GPO 1994-383-015

ENGINEERING - BIO - ANAEROBIC

~~X~~ PWA 15

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 03616

SHEET NO. 1 OF 1

9501-123

Sample Identification **Analyses Requested**

	REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	*			
1		B00372	DS1A-3	S	1/4/95	1	4oz g/ / —				1-4oz
2		B00373	DS1B-3								"
3		B00374	DS1C-3								"
4		B00375	DS2A-3								"
5		B00376	DS2B-3								"
6		B00377	DS2C-3								"
7		B00378	DS3A-3								"
8		B00379	DS3B-3								"
9		B00380	DS3C-3								"
10		B00381	DS4A-3								"
11		B00382	DS4B-3								"
12		B00383	DS4C-3								"

MEM

MSM

All Samples Received
Temp. cool °C Cool Yes No
Samples Intact Yes No
Properly Preserved Yes No

Matrix:
SD - Sediment PW - Potable Water S - Soil
DS - Drum Solids GW - Groundwater W - Water
DL - Drum Liquids SW - Surface Water O - Oil
X - Other SL - Sludge A - Air

Special Instructions:
* = Chlorinated Phenols
DO MS/MSD ON RANDOMLY SELECTED SAMPLES AT RATE OF 10%

Checked by: M. Talbot

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	1/5/95					Federal Express	1/6/95	[illegible]	1/6/95	10:00

FORM #4 8/94

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ENGINEERING - BIO - COMPOST / DARAMEND

PWA 15

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 03617

SHEET NO. 1 OF 1

Sample Identification 95-01-122 Analyses Requested

	REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	BNA			
1		C00332	1A COMP4	S	1/4/95	1	4 oz gl / —	X			1-4oz
2		C00335	2A COMP4	↓	↓	↓	↓	↓			"
3		C00338	3A COMP4								"
4		C00341	4A COMP4								"
5		C00344	5A COMP4								"
6		C00347	6A COMP4								"
7		C00350	7A COMP4								"
8		C00353	8A COMP4								"
9		D09937	DT 1-9 COMP3								"
10		D09947	DC 1-9 COMP3	↓	↓	↓	↓	↓			"

MEM

MAM

All Samples Received
Temp. COOL °C Cool Yes No
Samples Intact Yes No
Properly Preserved Yes No

Matrix:
SD - Sediment PW - Potable Water S - Soil
DS - Drum Solids GW - Groundwater W - Water
DL - Drum Liquids SW - Surface Water O - Oil
X - Other SL - Sludge A - Air

Special Instructions:
RANDOMLY SELECT 1 SAMPLE FOR MS/MSD.

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

checked by: M. Talwar

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	1/5/95					FedEx Express	1/6/95	[illegible]	1/6/95	10:20

FO. 8/94

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[redacted]

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 03618

SHEET NO.__OF___

5
0106345

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
447	A,B,C 00358	BIO INFLUENT-4	W	1/4/95	3	32 oz gl / –	X			
448	A00359	BIO LEACHATE-4	↓	↓	↓	↓ ↓	↓			
449	A00360	GREEN TANK 1-4	↓	↓	↓	↓ ↓	↓			
450	A00361	WHITE TANK 2-4	↓	↓	↓	↓ ↓	↓			
451	A00362	WHITE TANK 3-4	↓	↓	↓	↓ ↓	↓			
452	A00363	SAWDUST JUICE-4	↓	↓	↓	↓ ↓	↓			

MEM

MEM

Matrix:
SD - Sediment PW - Potable Water S - Soil
DS - Drum Solids GW - Groundwater W - Water
DL - Drum Liquids SW - Surface Water O - Oil
X - Other SL - Sludge A - Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	1/5/95	Michael McCaf	1/6/95	07:30	6/analysis	Michael McCaf	1/6/95	Amy Bowman	1-6-95	1100

FORM #4 8/94

* US GPO 1994-383-015

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ENGINEERING - BIO - DATA

PWA 15.

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: ~~Mike~~ M. MOHN Phone: 908-321-4257

No: 03623,

SHEET NO. 1 OF 2 MFM

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A09928	DT1-3	S	1/3/95	1-4ozgl.	GLASS/ NONE				
	A09929	DT2-3								
	A09930	DT3-3								
	A09931	DT4-3								
	A09932	DT5-3								
	A09933	DT6-3								
	A09934	DT7-3								
	A09935	DT8-3						MFM		
	A09936	DT9-3								
	A09937	DT1-9Comp 3								
	A09938	DC1-3								
	A09939	DC 2-3								
	A09940	DC 3-3								
	A09941	DC 4-3								
	A09942	DC 5-3								
	A09943	DC 6-3								
	A09944	DC 7-3								
	A09945	DC 8-3								
	A09946	DC 9-3								
	A09947	DC1-9Comp 3								

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil		
DS -	Drum Solids	GW -	Groundwater	W -	Water		
DL -	Drum Liquids	SW -	Surface Water	O -	Oil		
X -	Other	SL -	Sludge	A -	Air		

Special Instructions:
PLEASE DO MS/MSD ON SAMPLES AT RATE OF 10%.

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Checked by: MFM

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
ALL/ANALYSIS	M. TALWAR	1/3/95	[illegible]	1/5/95	10:00am						

FORM #4 8/94

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* US GPO 1994-383-015

ENGINEERING - BIO - COMPOST

REAC, E...on, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHA.. OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4251

No: 03652

SHEET NO. 1 OF 1

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A00332	1A Comp 4	S	1/4/95	ONE	4oz GLASS/NONE				
	A00333	1B Comp 4								
	A00334	1C Comp 4								
	A00335	2A Comp 4								
	A00336	2B Comp 4								
	A00337	2C Comp 4								
	A00338	3A Comp 4								
	A00339	3B Comp 4								
	A00340	3C Comp 4								
	A00341	4A Comp 4								
	A00342	4B Comp 4								
	A00343	4C Comp 4								
	A00344	5A Comp 4								
	A00345	5B Comp 4								
	A00346	5C Comp 4								
	A00347	6A Comp 4								
	A00348	6B Comp 4								
	A00349	6C Comp 4								
	A00350	7A Comp 4								
	A00351	7B Comp 4								MT

E070010

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

RANDOMLY SELECT SAMPLES FOR ~~DUPLICATE~~ MS/MSD ANALYSES AT RATE OF 10%.

Checked by: MFM

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
ALL/ANALYSIS	M. TALWAR	1/4/95	Jenny	1/6/95	10:30am						

FORM #4 8/94

* US GPO 1994-383-015

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-026-01
RFW Contact: M, McHN Phone: 908-321-4251

No: 03653

SHEET NO. 2 OF 2

000046

E070009

Sample Identification | **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A00352	7C COMP 4	S	1/4/95	ONE	4OZ GLASS/NONE				
	A00353	8A COMP 4								
	A00354	8B COMP 4								
	A00355	8C COMP 4								
										M.T.

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
RANDOMLY SELECT SAMPLES FOR ~~DUPLICATE~~ MS/MSD ANALYSES AT RATE OF 10%

Checked by: MFM

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
ALL/ANALYSIS	M. TALWAR	1/4/95	Jenny Ji	1/6/95	10:30am						

FORM #4

8/94

★ U.S. GPO: 1994-383-015

U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4 TAT

CHAIN OF CUSTODY RECORD

ENVIRONMENTAL SERVICES DIVISION
COLLEGE STATION ROAD
ATHENS, GEORGIA 30613

Analyze for PCP as requested by REAC

PROJ. NO.

PROJECT NAME: Confirmation Samples

SAMPLERS (Signature): Yihua Lin

Circle/add Parameters Desired ( ) - Indicates Separate Containers

Water/Wastewater | Soil/Sed/Sldg | Waste | Misc

(Gal G (ext org. Pest) (EP) (herb) | 40 ml vial (VOA) | 250 ml G (TOX) | P (Bod, TSS, Cl, Fl, SO_4 etc) | 1LG (pheno) (O&G) (pest) | 1LP (met, hard) (Toc, COD, N, P, etc) | 0.5-1LP ($S^=$) | ½ gal or 1LP (CN) | 8 oz G (ext org. pest, herb) (met) (EP) | 4 oz G (VOA) | P or G (CN, $S^=$, N, P, COD, etc) | 8 oz G (ext org. pest, herb, VOA) | 8 oz G (EP) (met, CN, $S^=$, FP) (FP, BTU)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION		NO. OF CONTAINERS	REMARKS/TAG NUMBERS
This	column				1A Comp 4	A00332		
not	pertinent				2A Comp 4	A00335		
to this					3A Comp 4	A00338		
Analysis					4A Comp 4	A00341		
					5A Comp 4	A00344		
					6A Comp 4	A00347		
					7A Comp 4	A00350		
					8A Comp 4	A00353		
					DS1A-3	A00372		
					DS2A-3	A00375		

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
J. Syd	1/9/95 16:01				
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
					C. Lyons 1/10/95 9:35 AM

Remarks: These are not bogus CLP samples, so the stupid Lawyer driven CLP requirements do not apply. Just analyze using a solid performance based method as per Yihua Lin

DISTRIBUTION: Origi[redacted] 1 Pink copies accompany sample shipment to laboratory. Pink copy retained by laboratory.
[redacted] by s[redacted]. Blu[redacted] extra [redacted] need[redacted]

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T4-496

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

DATE: March 23, 1995

TO: R. Singhvi EPA/ERT

FROM: V. Kansal Analytical Section Leader Vinod Kansal

SUBJECT: DOCUMENT TRANSMITTAL UNDER WORK ASSIGNMENT # 0-026

Attached please find the following document prepared under this work assignment:

Penta Wood Products Site - Analytical Report

Central File WA # 0-026	(w/attachment)
T. Mignone	Task Leader
G. Armstrong	Data Validation and Report Writing Group Leader
H. Allen	Work Assignment Manager

ANALYTICAL REPORT

Prepared by
Roy F. Weston, Inc.

Penta Wood Products
Siren, Wisconsin

March 1995

EPA Work Assignment No. 0-026
WESTON Work Order No. 03347-040-001-0026-01
EPA Contract No. 68-C4-0022

Submitted to
H. Allen
EPA-ERT

T. Mignone 3/22/95
T. Mignone — Date
Task Leader

Vinod Kansal 3/22/95
V. Kansal — Date
Analytical Section Leader

RM Shapot 3/23/95
R. M. Shapot — Date
Program Manager

Analysis by:
REAC
REAC-HHL
Analab

Prepared by:
L. Sun

Reviewed by:
G. Armstrong

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Table of Contents

Appendices will be furnished on request.

INTRODUCTION

The REAC Laboratory, in response to ERT work assignment #0-026, provided analytical support for samples collected from the Penta Wood Products Site located in Siren, Wisconsin. This support included analysis and subcontracting of environmental samples as described in the following table. The support also included QA/QC, data review, and preparation of an analytical report containing a summary of the analytical methods, the results and the QA/QC results.

The samples were treated with procedures consistent with those described in SOP #1008 and are summarized in the following table:

COC #	Number of Samples	Sampling Date	Date Received	Matrix	Analysis	Laboratory
09711	20	2/7/95	2/09/95	Soil	Pentachlorophenol	REAC-HHL
09714	12	2/08/94	2/09/94			
09715	12	2/08/95	2/09/95	Soil	Chlorinated Phenols	Analab
09716	8	1/08/95	2/09/95	Water	Pentachlorophenol	REAC
09717	8	2/08/95	2/09/95	Water	Chlorinated Phenols	Analab
09720	20	2/08/95	2/11/95	Soil	Pentachlorophenol	REAC-HHL
09721	20	2/08/95	2/11/95			
09722	20	2/08/95	2/11/95			
09723	12	2/08/95	2/11/95			
09724	3	2/08/95	2/10/95	Water	Pentachlorophenol	REAC
09725	3	2/08/95	2/10/95	Soil		REAC-HHL

REAC-HHL REAC High Hazard Laboratory located in Brunswick, Georgia

CASE NARRATIVE

Pentachlorophenol Analysis in Water - Package E059

The surrogate recovery was outside the QC limits for samples A-C02284 MS and A-C02284 MSD. The data are not affected.

The surrogate was not recovered for samples A02286, A02292, and A02293 because of the large dilutions. The data are not affected.

Chlorinated Phenol Analysis in Soil - Package E084

In the dilution analysis, the amount of pentachlorophenol in sample DS1C-4 (B02274) exceeded the highest standard concentration in the calibration. The result should be considered as estimated.

SUMMARY of ABBREVIATIONS

B	The analyte was found in the blank
BFB	Bromofluorobenzene
BPQL	Below the Practical Quantitation Limit
C	Centigrade
D	(Surrogate Table) this value is from a diluted sample and was not calculated (Result Table) this result was obtained from a diluted sample
CLP	Contract Laboratory Protocol
COC	Chain of Custody
CONC	Concentration
CRDL	Contract Required Detection Limit
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
E	The value is greater than the highest linear standard and is estimated
EMPC	Estimated maximum possible concentration
J	The value is below the method detection limit and is estimated
HHL	High Hazard Laboratory, Brunswick, GA
IDL	Instrument Detection Limit
ISTD	Internal Standard
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MI	Matrix Interference
MS	Matrix spike
MSD	Matrix spike duplicate
MW	Molecular weight
NA	either Not Applicable or Not Available
NC	Not Calculated
ND	Not Detected
NS	Not Spiked
% D	Percent difference
% REC	Percent Recovery
PQL	Practical quantitation limit
PPBV	Parts per billion by volume
QL	Quantitation Limit
RPD	Relative percent difference
RSD	Relative Standard Deviation
SIM	Selected Ion Mode

m^3	cubic meter	kg	kilogram
l(L)	liter	g	gram
dl	deciliter	cg	centigram
ml	milliliter	mg	milligram
ul	microliter	ug	microgram
		ng	nanogram
		pg	picogram

* denotes a value that exceeds the acceptable QC limit

Abbreviations that are specific to a particular table are explained in footnotes on that table

Analytical Procedure for Pentachlorophenol in Water (SIM) (REAC)

Extraction Procedure

One liter of sample was spiked with 2,4,6-tribromophenol as a surrogate, and extracted with three 60 ml portions of methylene chloride according to Method 625, Section 10, as outlined in the Federal Register Vol. 49, #209, Friday, October 26, 1984. The extracts were combined, concentrated to 1.0 ml, an internal standard phenanthrene-d_{10} was added, and analyzed.

Analytical Procedure

An HP 5890 Gas Chromatograph, equipped with a 5970 Mass Selective Detector and controlled by an HP-1000 RTE/VM computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.25mm ID, 0.50 µm film thickness
Injection Temperature	260° C
Transfer Temperature	260° C
Temperature Program	100° C for 0.5 min 30 °C/min to 305° C hold for 5 min
Splitless Injection	Split time = 0.75 min
Injection Volume	2 µl

The GC/MS system was calibrated using 5 pentachlorophenol standards at 0.5, 1.0, 5.0, 10.0, and 25.0, µg/ml. All samples were quantified using the average response factor obtained from the calibration range. Before analysis each day, the system was tuned with 50 ng decafluorotriphenylphosphine (DFTPP).

The Pentachlorophenol results for water samples are listed in Table 1.1. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF (or RF_{ave}) x V_i x V_o}$$

where

C_u	=	Concentration of target analyte (µg/L)
DF	=	Dilution Factor
A_u	=	Area of target analyte
I_{is}	=	Mass of specific internal standard (ng)
V_t	=	Volume of extract (µl)
A_{is}	=	Area of specific internal standard
RF	=	Response Factor (unitless)
RF_{ave}	=	average Response Factor
V_i	=	Volume of extract injected (µl)
V_o	=	Volume of sample (ml)

The RF_{ave} is used when a sample is associated with an initial calibration curve. The RF is used when a sample is associated with a continuing calibration curve.

Response Factor calculation:

The RF for each specific analyte is quantitated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \ x \ I_{is}}{A_{is} \ x \ I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
I_{is}	=	Mass of the specific internal standard
A_{is}	=	Area of the specific internal standard
I_c	=	Mass of the analyte in the standard

$$RF_{ave} = \frac{RF_1 + ... + RF_n}{n}$$

and

n = number of Samples

Analytical Procedure for Pentachlorophenol in Soil (SIM)
(HHL)

Extraction Procedure:

Ten grams of sample was spiked with the surrogate 2,4,6-tribromophenol, mixed with 10 g anhydrous sodium sulfate, and shaker extracted three times with 40, 30, and 30 ml portions of 1:4 acetone:methylene chloride. A 1.0 ml aliquot was spiked with an internal standard phenanthrene-d_{10}, and analyzed.

Analytical Procedure:

An HP 5971A Mass Selection Detector equipped with a 5890 Series II GC, a 7673A autosampler and controlled by an HP-Chem Station/Window/DOS5.0 software driven IBM compatible computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.25mm ID, 0.50 µm film thickness
Injection Temperature	290° C
Transfer Temperature	315° C
Source Temperature	240° C
Analyzer Temperature	240° C
Temperature Program	100°C for 0.5 min 30° C/min to 305° C Hold for 2 min.
Splitless Injection	Split time = 0.88 min
Injection Volume	2 µl

The GC/MS system was calibrated using 6 pentachlorophenol standards at 0.5, 1.0, 5.0, 10.0, 25.0, and 50.0 µg/ml. Before analysis each day, the system was tuned with 50 ng decafluorotriphenylphosphine (DFTPP) and passed a continuing calibration check when analyzing a 5 µg/ml standard mixture in which the responses were evaluated by comparison to the average response of the calibration curve.

The pentachlorophenol results for soil samples, based on dry weight, are listed in Table 1.2. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF_{ave} x V_i x W x D}$$

where

DF	=	Dilution Factor
RF_{ave}	=	Average Response Factor (unitless)
A_u	=	Area of analyte
A_{is}	=	Area of internal standard
I_{is}	=	Mass of internal standard (ng)
C_u	=	Concentration of analyte (μg/Kg)
V_t	=	Volume of extract (μl)
V_i	=	Volume of extract injected (μl)
W	=	Weight of sample (g)
D	=	Decimal per cent solids

The average Response Factor is used to quantitate the analyses.

Response Factor calculation:

The response factor (RF) for each specific analyte is calculated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \ x \ I_{is}}{A_{is} \ x \ I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
A_{is}	=	Area of the internal standard in the standard
I_c	=	Mass of the analyte in the standard
I_{is}	=	Mass of the internal standard in the standard

$$RF_{ave} = \frac{RF_1 + \ldots + RF_n}{n}$$

and

n = number of Samples

Revision of 1/13/95

Analytical Procedure for Chlorinated Phenols in Water

The subcontract laboratory extracted the water samples by separatory funnel, according to U.S. EPA Method 3510 and analyzed the samples for chlorinated phenols, according to U.S. EPA Method 8270. These methods are outlined in "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", U.S. EPA, SW-846.

Results of the analyses are listed in Table 1.3.

Analytical Procedure for Chlorinated Phenols in Soil

The subcontract laboratory extracted the soil samples by soxhlet extraction, according to U.S. EPA Method 3540 and analyzed the samples for chlorinated phenols, according to U.S. EPA Method 8270. This method is outlined in "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", U.S. EPA, SW-846.

Results of the analyses are listed in Table 1.4.

Table 1.1 Results of the Analysis for Pentachlorophenol in Water

WA # 0-026 Penta Wood Products Site

Sample ID	Location	Conc. (µ/g/L)	MDL (µ/g/L)
WBLK021095	Water Blank #1	ND	0.5
A-C02284	DW1A-4	15	0.5
A02285	DW1B-4	15	0.5
A02286	DW2A-4	550	500
A02287	DW2B-4	17	5.0
A02288	DW3A-4	43	5.0
A02289	DW3B-4	11	0.5
A02290	DW4A-4	17	5.0
A02291	DW4B-4	8.0	5.0
WBLK021395	Water Blank #2	ND	0.5
A-C02294	Bio Influent-5	1.0	0.5
A02292	Bio Leachate-5	8400	560
A02293	White Tank 3-5	5100	530

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Table 1.2 Results of the Analysis for Pentachlorophenol in Soil

WA # 0-026 Penta Wood Products

(Results are Based on Dry Weight)

Sample ID	Location	Conc. (mg/Kg)	MDL (mg/Kg)
Blank 210	Sand Blank	ND	5.0
A02252	DT1-3A COMP4	12	6.2
A02253	DT1-3B COMP4	13	5.7
A02254	DT1-3C COMP4	15	6.2
A02255	DT4-6A COMP4	13	5.5
A02256	DT4-6B COMP4	13	5.9
A02257	DT4-6C COMP4	12	6.1
A02258	DT7-9A COMP4	22	6.0
A02259	DT7-9B COMP4	13	5.9
A02260	DT7-9C COMP4	13	5.9
A02261	DT1-9 COMP4	13	5.8
A02262	DC1-3A COMP4	18	5.2
A02263	DC1-3B COMP4	14	5.2
A02264	DC1-3C COMP4	19	4.9
A02265	DC4-6A COMP4	24	5.3
A02266	DC4-6B COMP4	16	5.2
A02267	DC4-6C COMP4	18	5.3
A02268	DC7-9A COMP4	13	5.1
A02269	DC7-9B COMP4	14	5.2
A02270	DC7-9C COMP4	11	5.2
A02271	DC1-9 COMP4	14	5.2
Blank 211	Sand Blank	ND	5.0
A02272	DS1A-4	15	6.5
A02273	DS1B-4	13	6.4
A02274	DS1C-4	22	6.0
A02275	DS2A-4	6.2 J	7.9
A02276	DS2B-4	8.9	7.8
A02277	DS2C-4	2.4 J	6.3
A02278	DS3A-4	15	6.3
A02279	DS3B-4	17	8.3
A02280	DS3C-4	16	8.0
A02281	DS4A-4	10	6.6
A02282	DS4B-4	11	10
A02283	DS4C-4	11	8.4

Table 1.2(Con't) Results of the Analysis for Pentachlorophenol in Soil

WA # 0-026 Penta Wood Products Site

(Results are Based on Dry Weight)

Sample ID	Location	Conc. (mg/Kg)	MDL (mg/Kg)
Blank 212	Sand Blank	ND	5.0
A02031	1A1 COMP5	64	6.1
A02032	1A2 COMP5	72	6.0
A02033	1A3 COMP5	62	6.3
A02034	1B1 COMP5	61	6.1
A02035	1B2 COMP5	76	6.1
A02036	1B3 COMP5	75	5.5
A02037	1C1 COMP5	79	6.0
A02038	1C2 COMP5	86	6.2
A02039	1C3 COMP5	76	6.0
A02040	2A1 COMP5	210	5.6
A02041	2A2 COMP5	220	5.5
A02042	2A3 COMP5	230	5.9
A02043	2B1 COMP5	200	5.4
A02044	2B2 COMP5	210	6.0
A02045	2B3 COMP5	200	5.7
A02046	2C1 COMP5	210	6.4
A02047	2C2 COMP5	210	6.3
A02048	2C3 COMP5	200	6.3
A02049	3A1 COMP5	270	7.4
A02050	3A2 COMP5	200	6.6
Blank 213	Sand Blank	ND	5.0
A02051	3A3 COMP5	230	7.3
A02052	3B1 COMP5	300	7.2
A02053	3B2 COMP5	260	7.3
A02054	3B3 COMP5	280	6.4
A02055	3C1 COMP5	270	5.9
A02056	3C2 COMP5	270	6.1
A02057	3C3 COMP5	290	7.1
A02058	4A1 COMP5	230	6.5
A02059	4A2 COMP5	240	6.8
A02060	4A3 COMP5	260	6.8
A02061	4B1 COMP5	260	5.8
A02062	4B2 COMP5	250	6.2
A02063	4B3 COMP5	260	5.7
A02064	4C1 COMP5	270	6.4
A02065	4C2 COMP5	240	6.0
A02066	4C3 COMP5	270	6.3
A02067	5A1 COMP5	250	7.2
A02066	5A2 COMP5	260	7.0
A02069	5A3 COMP5	250	6.4
A02070	5B1 COMP5	250	6.5

Table 1.2(Con't) Results of the Analysis for Pentachlorophenol in Soil

WA # 0-026 Penta Wood Products Site

(Results are Based on Dry Weight)

Sample ID	Location	Conc. (mg/Kg)	MDL (mg/Kg)
Blank 214	Sand Blank	ND	5.0
A02071	5B2 COMP5	270	7.5
A02072	5B3 COMP5	280	6.7
A02073	5C1 COMP5	330	7.1
A02074	5C2 COMP5	280	6.9
A02075	5C3 COMP5	330	6.5
A02076	6A1 COMP5	96	5.1
A02077	6A2 COMP5	80	6.2
A02078	6A3 COMP5	60	6.0
A02079	6B1 COMP5	67	6.0
A02080	6B2 COMP5	67	5.1
A02081	6B3 COMP5	69	5.4
A02082	6C1 COMP5	59	5.1
A02083	6C2 COMP5	57	6.0
A02084	6C3 COMP5	57	5.1
A02085	7A1 COMP5	130	5.4
A02086	7A2 COMP5	140	5.6
A02087	7A3 COMP5	130	5.8
A02088	7B1 COMP5	130	5.2
A02089	7B2 COMP5	120	5.7
A02090	7B3 COMP5	130	5.2
Blank 215	Sand Blank	ND	5.0
A02091	7C1 COMP5	120	6.0
A02092	7C2 COMP5	120	6.0
A02093	7C3 COMP5	110	5.5
A02094	8A1 COMP5	140	6.4
A02095	8A2 COMP5	120	5.8
A02096	8A3 COMP5	100	6.0
A02097	8B1 COMP5	97	6.4
A02098	8B2 COMP5	110	6.1
A02099	8B3 COMP5	110	6.3
A02100	8C1 COMP5	110	6.1
A02295	8C2 COMP5	100	6.1
A02296	8C3 COMP5	120	6.1
A02025	WR-A	32	6.1
A02026	WR-B	33	6.6
A02027	WR-C	35	6.7

Table 1.3 Results of the Analysis for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Sample ID / Location / Compound	Method Blank --- Conc. µg/L	MDL µg/L	D-F02284 DW1A-4 Conc. µg/L	MDL µg/L	B02285 DW1B-4 Conc. µg/L	MDL µg/L	B02286 DW2A-4 Conc. µg/L	MDL µg/L	B02287 DW2B-4 Conc. µg/L	MDL µg/L
2-Chlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
m,p-Chlorophenol	ND	20	ND	20	ND	20	ND	100	10 J	20
2,6-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
2,4,5-Trichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
2,3-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
2,5-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
3,4-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
2,4-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
3,5-Dichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
2,3,6-Trichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
2,4,6-Trichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
2,3,5-Trichlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
2,3,4,6-Tetrachlorophenol	ND	20	ND	20	ND	20	ND	100	ND	20
Pentachlorophenol	ND	20	6 J	20	11 J	20	ND	100	ND	20

Sample ID / Location / Compound	B02288 DW3A-4 Conc. µg/L	MDL µg/L	B02289 DW3B-4 Conc. µg/L	MDL µg/L	B02290 DW4A-4 Conc. µg/L	MDL µg/L	B02291 DW4B-4 Conc. µg/L	MDL µg/L
2-Chlorophenol	ND	20	ND	20	ND	20	ND	20
m,p-Chlorophenol	ND	20	ND	20	ND	20	4 J	20
2,6-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
2,4,5-Trichlorophenol	ND	20	ND	20	ND	20	ND	20
2,3-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
2,5-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
3,4-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
2,4-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
3,5-Dichlorophenol	ND	20	ND	20	ND	20	ND	20
2,3,6-Trichlorophenol	ND	20	ND	20	ND	20	ND	20
2,4,6-Trichlorophenol	ND	20	ND	20	ND	20	ND	20
2,3,5-Trichlorophenol	ND	20	ND	20	ND	20	ND	20
2,3,4,6-Tetrachlorophenol	ND	20	ND	20	ND	20	ND	20
Pentachlorophenol	ND	20	ND	20	ND	20	ND	20

Table 1.4 Results of the Analysis for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID Location %Solid Compound	Method Blank --- 100 Conc. µg/kg	 MDL µg/kg	B02272 DS1A-4 80 Conc. µg/kg	 MDL µg/kg	B02273 DS1B-4 82 Conc. µg/kg	 MDL µg/kg	B02274 DS1C-4 79 Conc. µg/kg	 MDL µg/kg	B02275 DS2A-4 75 Conc. µg/kg	 MDL µg/kg
2-Chlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
m,p-Chlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
2,6-Dichlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
2,4,5-Trichlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
2,3-Dichlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
2,5-Dichlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
3,4-Dichlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
2,4-Dichlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
3,5-Dichlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
2,3,6-Trichlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
2,4,6-Trichlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
2,3,5-Trichlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
2,3,4,6-Tetrachlorophenol	ND	330	ND	1300	ND	1200	ND	1300	ND	1300
Pentachlorophenol	ND	330	13000	1300	10000	1200	22000 E	1300	2600	1300

Sample ID Location %Solid Compound	B02276 DS2B-4 66 Conc. µg/kg	 MDL µg/kg	B02277 DS2C-4 82 Conc. µg/kg	 MDL µg/kg	B02278 DS3A-4 71 Conc. µg/kg	 MDL µg/kg	B02279 DS3B-4 59 Conc. µg/kg	 MDL µg/kg
2-Chlorophenol	ND	1500	ND	1200	ND	1400	ND	1700
m,p-Chlorophenol	5200	1500	ND	1200	ND	1400	ND	1700
2,6-Dichlorophenol	ND	1500	ND	1200	ND	1400	ND	1700
2,4,5-Trichlorophenol	ND	1500	ND	1200	ND	1400	ND	1700
2,3-Dichlorophenol	ND	1500	ND	1200	ND	1400	ND	1700
2,5-Dichlorophenol	1300 J	1500	ND	1200	ND	1400	ND	1700
3,4-Dichlorophenol	ND	1500	ND	1200	ND	1400	ND	1700
2,4-Dichlorophenol	ND	1500	ND	1200	ND	1400	ND	1700
3,5-Dichlorophenol	3600	1500	220 J	1200	5600	1400	5700	1700
2,3,6-Trichlorophenol	ND	1500	ND	1200	ND	1400	ND	1700
2,4,6-Trichlorophenol	ND	1500	ND	1200	ND	1400	ND	1700
2,3,5-Trichlorophenol	1200 J	1500	ND	1200	3800	1400	3600	1700
2,3,4,6-Tetrachlorophenol	2300	1500	ND	1200	780 J	1400	1300 J	1700
Pentachlorophenol	11000	1500	2500	1200	24000	1400	10000	1700

Sample ID Location %Solid Compound	B02280 DS3C-4 75 Conc. µg/kg	 MDL µg/kg	B02281 DS4A-4 77 Conc. µg/kg	 MDL µg/kg	B02282 DS4B-4 53 Conc. µg/kg	 MDL µg/kg	B02283 DS4C-4 60 Conc. µg/kg	 MDL µg/kg
2-Chlorophenol	ND	1300	ND	1300	ND	1900	ND	1700
m,p-Chlorophenol	290 J	1300	ND	1300	600 J	1900	ND	1700
2,6-Dichlorophenol	ND	1300	ND	1300	ND	1900	ND	1700
2,4,5-Trichlorophenol	ND	1300	ND	1300	ND	1900	ND	1700
2,3-Dichlorophenol	ND	1300	ND	1300	ND	1900	ND	1700
2,5-Dichlorophenol	ND	1300	ND	1300	ND	1900	ND	1700
3,4-Dichlorophenol	ND	1300	ND	1300	ND	1900	ND	1700
2,4-Dichlorophenol	ND	1300	ND	1300	ND	1900	ND	1700
3,5-Dichlorophenol	6100	1300	ND	1300	940 J	1900	ND	1700
2,3,6-Trichlorophenol	ND	1300	ND	1300	ND	1900	ND	1700
2,4,6-Trichlorophenol	ND	1300	ND	1300	ND	1900	ND	1700
2,3,5-Trichlorophenol	3400	1300	ND	1300	560 J	1900	ND	1700
2,3,4,6-Tetrachlorophenol	420 J	1300	3300	1300	8000	1900	4400	1700
Pentachlorophenol	20000	1300	8400	1300	27000	1900	15000	1700

QA/QC for Pentachlorophenol in Water

Results of the Surrogate Recoveries for PCP in Water

Surrogate 2,4,6-tribromophenol was added to samples prior to extraction. The surrogate recoveries, listed in Table 2.1, range from 58 to 129. Twelve out of fourteen surrogate recoveries are within the QC limits. Three additional surrogate recoveries were reported as diluted out (D) for samples A00286, A00292, and A00293.

Results of the MS/MSD Analysis for Pentachlorophenol in Water

Samples A-C02284 and A-C02294 were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.2, range from 63 to 98. All four recoveries are within the QC limits. The relative percent difference (RPD) are 5 and 26, also listed in Table 2.2. Both RPD values are within QC criteria.

Table 2.1 Results of the Surrogate Recoveries for PCP in Water

WA # 0-026 Penta Wood Products

Sample Number	2,4,6-Tribromophenol Percent Recovery
WBLK021095	67
A-C02284	112
A-C02284 MS	124 *
A-C02284 MSD	129 *
A02285	115
A02286	D
A02287	92
A02288	92
A02289	105
A02290	64
A02291	60
WBLK021395	61
A-C02294	58
A-C02294 MS	59
A-C02294 MSD	59
A02292	D
A02293	D

	Advisory QC Limits
2,4,6-Tribromophenol	10 - 123

Table 2.2 Results of the MS/MSD Analysis for Pentachlorophenol in Water

WA # 0-026 Penta Wood Products Site

Sample ID	Spike Added (mg/Kg)	Sample Conc. (mg/Kg)	MS Conc. (mg/Kg)	MSD Conc. (mg/Kg)	MS %Rec.	MSD %Rec.	RPD
A-C02284	5.30	15.20	19.20	20.40	76	98	26
A-C02294	5.10	0.98	4.37	4.20	67	63	5

Advisory
QC Limits
% Rec. 9 - 103
RPD 50

QA/QC for Pentachlorophenol in Soil

Results of the Surrogate Recoveries for PCP in Soil

Surrogate 2,4,6-tribromophenol was added to samples prior to extraction. The surrogate recoveries, listed in Table 2.3, range from 50 to 129. One hundred thirty-six out of 137 recoveries are within QC limits.

Results of the MS/MSD Analysis for Pentachlorophenol in Soil

Samples A02257, A02267, BLANK211, A02272, A02037, A02047, A02057, A02067, A02077, A02087, A02097 and A02027 were chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.4, range from 59 to 152. Nineteen out of 24 recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.4, range from 0 (zero) to 36. All twelve RPDs are within QC criteria.

Table 2.3 Results of the Surrogate Recoveries for PCP in Soil

WA # 0-026 Penta Wood Products Site

Sample Number	2,4,6-Tribromophenol Percent Recovery
BLANK210	96
A02252	97
A02253	105
A02254	106
A02255	109
A02256	117
A02257	115
A02257 MS	92
A02257 MSD	97
A02258	129 *
A02259	111
A02260	112
A02261	113
A02262	107
A02263	103
A02264	112
A02265	112
A02266	110
A02267	117
A02267 MS	99
A02267 MSD	101
A02268	109
A02269	114
A02270	95
A02271	96
BLANK211	84
BLANK211 MS	88
BLANK211 MSD	93
A02272	96
A02272 MS	100
A02272 MSD	97
A02273	90
A02274	102
A02275	96
A02276	91
A02277	90
A02278	86
A02279	94
A02280	76
A02281	90
A02282	72
A02283	84

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.3(con't) Results of the Surrogate Recoveries for PCP in Soil

WA # 0-026 Penta Wood Products

Sample ID	2,4,6-Tribromophenol Percent Recovery
Blank 212	52
A02031	62
A02032	64
A02033	68
A02034	68
A02035	77
A02036	72
A02037	76
A02037 MS	80
A02037 MSD	78
A02038	78
A02039	79
A02040	83
A02041	88
A02042	84
A02043	85
A02044	82
A02045	81
A02046	80
A02047	50
A02047 MS	79
A02047 MSD	74
A02048	80
A02049	96
A02050	77
Blank 213	96
A02051	94
A02052	97
A02053	90
A02054	91
A02055	91
A02056	88
A02057	87
A02057 MS	84
A02057 MSD	87
A02058	84
A02059	84
A02060	84
A02061	87
A02062	82
A02063	81
A02064	85
A02065	82
A02066	82
A02067	76
A02067 MS	81
A02067 MSD	78
A02068	77
A02069	81
A02070	74

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.3(Con't) Results of the Surrogate Recoveries for PCP in Soil

WA # 0-026 Penta Wood Products

Sample ID	2,4,6-Tribromophenol Percent Recovery
Blank 214	74
A02071	92
A02072	97
A02073	109
A02074	104
A02075	107
A02076	117
A02077	82
A02077 MS	66
A02077 MSD	68
A02078	74
A02079	79
A02080	78
A02081	80
A02082	79
A02083	81
A02084	76
A02085	77
A02066	81
A02087	78
A02087 MS	70
A02087 MSD	69
A02088	76
A02089	74
A02090	74
Blank 215	84
A02091	80
A02092	74
A02093	74
A02094	75
A02095	71
A02096	72
A02097	72
A02097 MS	69
A02097 MSD	68
A02096	79
A02099	82
A02100	77
A02295	78
A02296	77
A02025	77
A02026	74
A02027	73
A02027 MS	71
A02027MSD	77

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.4 Results of the MS/MSD Analysis for Pentachlorophenol in Soil

WA # 0-026 Penta Wood Products Site

(Results are Based on Dry Weight)

Sample ID	Spike Added (mg/Kg)	Sample Conc. (mg/Kg)	MS Conc. (mg/Kg)	MSD Conc. (mg/Kg)	MS %Rec.	MSD %Rec.	RPD
A02257	122	12.5	115	114	84	83	0
A02267	106	17.7	104	111	81	88	7
BLANK211	100	ND	64	65	64	65	2
A02272	130	15.4	149	148	102	102	0
A02037	119	78.5	206	196	107	99	8
A02047	125	207.0	348	305	113 *	78	36
A02057	143	288.7	457	505	118 *	152 *	25
A02067	143	252.7	448	424	136 *	120 *	13
A02077	123	80.1	155	153	61	59	3
A02087	117	128.8	225	215	83	73	12
A02097	103	96.9	205	204	105	105	0
A02027	134	34.5	151	160	87	93	8

Advisory
QC Limits
% Rec. 17 – 109
RPD 47

QA/QC for Chlorinated Phenols in Water

Results of the Surrogate Recoveries for Chlorinated Phenols in Water

Surrogates phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol were added to the samples prior to extraction. The surrogate recoveries, listed in Table 2.5, range from 23 to 118. All recoveries are within QC limits.

Results of the MS/MSD Analysis for Chlorinated Phenols in Water

Sample D-F02884 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.6, range from 24 to 90. All ten recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.6, range from 2 to 24. All five RPDs are within QC limits.

Results of the Blank Spike Analysis for Chlorinated Phenols in Water

The percent recoveries, listed in Table 2.7, range from 30 to 84. The CLP QC limits for pentachlorophenol, and 2-chlorophenol are given. All recoveries are within limits.

Table 2.5 Results of the Surrogate Recoveries for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Sample ID	S1	S2	S3
	%Recovery		
Blank	40	74	56
Blank Spike	37	54	55
D-F02284MS	37	70	68
D-F02284MSD	35	66	66
D-F02284	41	55	86
B02285	68	93	118
B02286	58	64	79
B02287	51	55	70
B02288	46	60	74
B02289	56	73	80
B02290	23	25	27
B02291	32	36	36

	QC Limits
S1 = Phenol-d5	10- 110
S2 = 2-Fluorophenol	21- 110
S3 = 2,4,6-Tribromophenol	10-123

Table 2.6 Results of the MS/MSD Analysis for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Sample ID: D-F02884

Compound	Sample Conc. µg/L	Spiked Added µg/L	MS Conc. µg/L	MSD Conc. µg/L	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec
2-Chlorophenol	6.0	2000	1359	1307	68	65	4	42	12- 89
Phenol	ND	2000	664	653	33	33	2	40	27-123
p-Chloro-m-creosol	ND	2000	1799	1409	90	70	24	42	23- 97
4-Nitrophenol	ND	2000	478	409	24	20	16	50	10- 80
Pentachlorophenol	ND	2000	1343	1251	67	63	7	50	9-103

Table 2.7 Results of the Blank Spike Analysis for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Compound	Sample Conc. µg/L	Spike Conc. µg/L	%Rec.	QC Limits %Rec.
2-Chlorophenol	252	400	63	27-123
2,4-Dichlorophenol	268	400	67	NA
2,5-Dichlorophenol	267	400	67	NA
2,3-Dichlorophenol	177	400	44	NA
2,6-Dichlorophenol	278	400	70	NA
m,p-Chlorophenol	270	400	68	NA
2,3,5-Trichlorophenol	258	400	64	NA
2,4,6-Trichlorophenol	231	400	58	NA
2,4,5-Trichlorophenol	227	400	57	NA
2,3,6-Trichlorophenol	232	400	58	NA
3,5-Dichlorophenol	265	400	66	NA
3,4-Dichlorophenol	276	400	69	NA
2,3,4,6-Tetrachlorophenol	278	400	70	NA
Pentachlorophenol	251	400	63	9-103

QA/QC for Chlorinated Phenols in Soil

Results of the Surrogate Recoveries for Chlorinated Phenols in Soil

Surrogates phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol were added in the samples prior to extraction. The surrogate recoveries, listed in Table 2.8, range from 60 to 113. All recoveries are within QC limits.

Results of the MS/MSD Analysis for Chlorinated Phenols in Soil

Sample B02272 was chosen for the matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.9, range from 73 to 107. All recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.9, range from 0 (zero) to 13. All ten RPDs are within QC limits.

Results of the Blank Spike Analysis for Chlorinated Phenols in Soil

The percent recoveries, listed in Table 2.10, range from 62 to 98. The CLP QC limits for pentachlorophenol, and 2-chlorophenol are given. All recoveries are within limits.

Table 2.8 Results of the Surrogate Recoveries for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Sample ID	S1	S2	S3
	%Recovery		
Blank	106	110	77
Blank Spike	73	77	68
B02272MS	92	77	67
B02272MSD	113	110	64
B02272	109	97	60
B02273	110	111	92
B02274	112	111	85
B02275	95	78	64
B02276	108	100	83
B02277	99	96	76
B02278	113	113	84
B02279	113	97	79
B02280	111	94	86
B02281	69	72	63
B02282	94	82	67
B02283	104	91	72

	QC Limits
S1 = Phenol-d5	24-113
S2 = 2-Fluorophenol	25-121
S3 = 2,4,6-Tribromophenol	19-122

Table 2.9 Results of the MS/MSD Analysis for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID: B02272

Compound	Sample Conc. µg/Kg	Spiked Added µg/Kg	MS Conc. µg/Kg	MSD Conc. µg/Kg	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec
2-Chlorophenol	ND	20000	16609	17369	83	87	5	50	25-102
Phenol	ND	20000	16805	16723	84	84	0	35	26- 90
p-Chloro-m-creosol	ND	20000	15103	14619	76	73	4	33	26-103
4-Nitrophenol	ND	20000	18779	21463	94	107	13	50	11-114
Pentachlorophenol	10000	20000	24533	25356	73	77	5	47	17-109

Table 2.10 Results of the Blank Spike Analysis for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Compound	Sample Conc. µg/Kg	Spike Conc. µg/Kg	%Rec.	QC Limits %Rec.
2-Chlorophenol	496	660	75	25-102
2,4-Dichlorophenol	618	660	94	NA
2,5-Dichlorophenol	598	660	91	NA
2,3-Dichlorophenol	593	660	90	NA
2,6-Dichlorophenol	551	660	83	NA
m,p-Chlorophenol	647	660	98	NA
2,3,5-Trichlorophenol	536	660	81	NA
2,4,6-Trichlorophenol	461	660	70	NA
2,4,5-Trichlorophenol	490	660	74	NA
2,3,6-Trichlorophenol	482	660	73	NA
3,5-Dichlorophenol	631	660	96	NA
3,4-Dichlorophenol	643	660	97	NA
2,3,4,6-Tetrachlorophenol	617	660	93	NA
Pentachlorophenol	668	660	101	17-109

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

Analab, Inc.
205 Campus Plaza I
Edison, NJ 08837

November 29, 1994

Attn: Joe Larusso
Project # 3347-040-001-0026, Penta Wood

As per Weston REAC Purchase Order number 08-31216, dated 11/28/94, please analyze samples according to the following parameters:

Analysis/Method	Matrix	# of samples
BNA/SW-846-8270 Table 5	Soil	10 one sampling only
Phenols/SW-846-8270 See Attached List	Water Soil	8/month for 5 months 12/month for 5 months
Data package as per attached Deliverables Requirements		

Samples are expected to arrive at your laboratory on December 2, 1994 and early January with subsequent sampling events resuming in late March 1995. All applicable QA/QC (MS/MSD) analysis will be performed on each of our sample matrix. Preliminary results tables including MS/MSD's plus a signed copy of our Chain of Custody is due at REAC 10 business days after each sample receipt, with the complete data package due 21 business days after each sample receipt. The complete data package must include all items on the deliverables checklist. Samples may be potenially dioxin contaminated.

ALL ORGANIC EXTRACTIONSON SOLIDS IE: BNA,PEST/PCBMUST BE BY SOXHLET EXTRACTION

Should any questions or problems arise concerning this project, please call John Johnson at (908) 321-4248 or fax to (908) 494-4020. Any contractual question, please call Cindy Snyder at (908) 321-4296. Thank you

Sincerely,

George Armstrong
Data Validation and Report Writing Group Leader
Roy F. Weston, Inc. / REAC Project

GA: jj Attachments

cc. R. Singhvi
H. Allen
Central File
0026.CON7
V. Kansal
Subcontracting File
M. Van Clef
C. Snyder
M. Mohn/T. Mignone
G. Armstrong

0026\non\mem\9411\sub\0026.CON7

AC, Edison, NJ
)8) 321-4200
'A Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 09711

SHEET NO. 1 OF ___

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A02252	DT 1-3A COMPY	S	2/7/95	1	4 oz g/l —	X			
	A02253	DT 1-3B COMPY								
	A02254	DT 1-3C COMPY								
	A02255	DT 4-6A COMPY								
	A02256	DT 4-6B COMPY								
	A02257	DT 4-6C COMPY								
	A02258	DT 7-9A COMPY								
	A02259	DT 7-9B COMPY								
	A02260	DT 7-9C COMPY								
	A02261	DT 1-9 COMPY							MFM	
	A02262	DC 1-3A COMPY								
	A02263	DC 1-3B COMPY								
	A02264	DC 1-3C COMPY								
	A02265	DC 4-6A COMPY								
	A02266	DC 4-6B COMPY								
	A02267	DC 4-6C COMPY								
	A02268	DC 7-9A COMPY								
	A02269	DC 7-9B COMPY								
	A02270	DC 7-9C COMPY								
	A02271	DC 1-9 COMPY								

Matrix:
SD - Sediment, DS - Drum Solids, DL - Drum Liquids, X - Other
PW - Potable Water, GW - Groundwater, SW - Surface Water, SL - Sludge
S - Soil, W - Water, O - Oil, A - Air

Special Instructions:
RANDOMLY SELECT SAMPLES FOR MS/MSD ANALYSIS AT RATE OF 10%.

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	2/8/95	[illegible]	2/8/95	1200						

FORM #4 8/94

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 09714

SHEET NO. 1 OF ___

00033

E540184

Sample Identification							Analyses Requested			
REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
•	A02272	DS1A-4	S	2/8/95	1	4 oz g/l —	X			
	A02273	DS1B-4								
	A02274	DS1C-4								
	A02275	DS2A-4								
	A02276	DS2B-4								
	A02277	DS2C-4								
	A02278	DS3A-4								
	A02279	DS3B-4								
	A02280	DS3C-4								
	A02281	DS4A-4								
	A02282	DS4B-4								
	A02283	DS4C-4								

MFM

MFM

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions: RANDOMLY SELECT SAMPLES FOR MS/MSD ANALYSIS AT RATE OF 10%.

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	2/8/95	[illegible]	2/9/95	1300						

FORM #4 8/94

* U.S. 1994-383-015

... 16 - ENGINEER ... - ... ANALYTIC ...

REAC, Ec n, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 09716

SHEET NO. 1 OF ___

02695

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
743	A-C02284	DW1A-4	W	2/8/95	3	32 oz gl / -	X			
744	A02285	DW1B-4	↓	↓	1	↓	↓			
745	A02286	DW2A-4	↓	↓	↓	↓	↓			
746	A02287	DW2B-4	↓	↓	↓	↓	↓			
747	A02288	DW3A-4	↓	↓	↓	↓	↓			
748	A02289	DW3B-4	↓	↓	↓	↓	↓			
749	A02290	DW4A-4	↓	↓	↓	↓	↓			
750	A02291	DW4B-4	↓	↓	↓	↓	↓			

MFM

MFM

000334

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

DO MS/MSD ON A-C02284

- MFM 2/8/95

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All Analysis	M. Mohn	2/8/95	[illegible]	2/8/95	2:00	10/ PCP	[illegible]		[illegible]	2/9/95	2:45

FORM #4 8/94

ENGINEERING - BIO

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

PWA 16

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 09720

SHEET NO. 1 OF 4

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A02031	1A1 COMP 5	S	2/8/95	1	4 oz gl / -	X			
	A02032	1A2 COMP 5								
	A02033	1A3 COMP 5								
	A02034	1B1 COMP 5								
	A02035	1B2 COMP 5								
	A02036	1B3 COMP 5								
	A02037	1C1 COMP 5								
	A02038	1C2 COMP 5								
	A02039	1C3 COMP 5								
	A02040	2A1 COMP 5								
	A02041	2A2 COMP 5								
	A02042	2A3 COMP 5								
	A02043	2B1 COMP 5								
	A02044	2B2 COMP 5								
	A02045	2B3 COMP 5								
	A02046	2C1 COMP 5								
	A02047	2C2 COMP 5								
	A02048	2C3 COMP 5								
	A02049	3A1 COMP 5								
	A02050	3A2 COMP 5								

MFM

00035

E540183

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
RANDOMLY SELECT SAMPLES FOR MS/MSD ANALYSIS AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	2/9/95	[illegible]	2/1/95	10:00						

ENGINEERING ... QUAL...

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA
Project Number: 0026
RFW Contact: MOHN Phone: 4257

No: 09721

SHEET NO. 2 OF 4

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		PCP			
	A02051	3A3 COMP 5	S	2/8/95	1	4 oz gl	—	X			
	A02052	3B1 COMP 5									
	A02053	3B2 COMP 5									
	A02054	3B3 COMP 5									
	A02055	3C1 COMP 5									
	A02056	3C2 COMP 5									
	A02057	3C3 COMP 5									
	A02058	4A1 COMP 5									
	A02059	4A2 COMP 5									
	A02060	4A3 COMP 5							MFM		
	A02061	4B1 COMP 5									
	A02062	4B2 COMP 5									
	A02063	4B3 COMP 5									
	A02064	4C1 COMP 5									
	A02065	4C2 COMP 5									
	A02066	4C3 COMP 5									
	A02067	5A1 COMP 5									
	A02068	5A2 COMP 5									
	A02069	5A3 COMP 5									
	A02070	5B1 COMP 5									

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
MS/MSD @ 10% RATE

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	2/9/95	[illegible]	2/9/95	10:00						

FORM #4 8/94

000036

E5401B2

ENGINEERING - BIO

PWA 16

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA
Project Number: 0026
RFW Contact: MOHN Phone: 4257

No: 09722

SHEET NO. 3 OF 4

00037

E540181

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		PCP				
	A02071	5B2 COMP 5	S	2/8/95	1	4 0z gl	—	X				
	A02072	5B3 COMP 5										
	A02073	5C1 COMP 5										
	A02074	5C2 COMP 5										
	A02075	5C3 COMP 5										
	A02076	6A1 COMP 5										
	A02077	6A2 COMP 5										
	A02078	6A3 COMP 5										
	A02079	6B1 COMP 5										
	A02080	6B2 COMP 5										
	A02081	6B3 COMP 5										
	A02082	6C1 COMP 5										
	A02083	6C2 COMP 5										
	A02084	6C3 COMP 5										
	A02085	7A1 COMP 5										
	A02086	7A2 COMP 5										
	A02087	7A3 COMP 5										
	A02088	7B1 COMP 5										
	A02089	7B2 COMP 5										
	A02090	7B3 COMP 5										

MFN

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
MS/MSD @ 10% RATE

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	2/9/95	[signature]	2/11/95	8:45						

FORM #4 8/94

* U.S. ... 1994 383-015

ENGINEERING BIO

REAC, E[illegible]n, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENIA
Project Number: 0026
RFW Contact: MOHN Phone: 321-4257

No: 09723

SHEET NO. 4 OF 4

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		PCP			
	A02091	7C1 COMP 5	S	2/8/95	1	4 oz gl	—	X			
	A02092	7C2 COMP 5									
	A02093	7C3 COMP 5									
	A02094	8A1 COMP 5									
	A02095	8A2 COMP 5									
	A02096	8A3 COMP 5									
	A02097	8B1 COMP 5									
	A02098	8B2 COMP 5									
	A02099	8B3 COMP 5									
	A02100	8C1 COMP 5									
MFM	~~A02101~~										
	A02295	8C2 COMP 5									
	A02296	8C3 COMP 5									

MFM

00028

E540180

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
MS/MSD @ 10% RATE

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	2/9/95	[signature]	2/11/95	[illegible]						

FORM #4 8/94

* US GPO 1994-383-015

ENGINEERING BIO

PWA #6

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA
Project Number: 0026
RFW Contact: MOHN Phone: 321-4257

No: 09724

SHEET NO. 1 OF

021095

00039

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
782	A02292	BIO LEACHATE-5	W	2/8/95	1	32 oz gl / -	X			
783	A02293	WHITE TANK3-5	↓	↓	1	↓ ↓	↓			
784	A-C02294	BIO INFLUENT-5	↓	↓	3	↓ ↓	↓			

MFM

MFM

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil		
DS -	Drum Solids	GW -	Groundwater	W -	Water		
DL -	Drum Liquids	SW -	Surface Water	O -	Oil		
X -	Other	SL -	Sludge	A -	Air		

Special Instructions:

DO MS/MSD ON A-C02294

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	2/9/95	B. Lewa	2/10/95	11:00	5/ PCP	B. Lewa	2/10/95	[illegible]	2/10/95	2:20

FORM #4 8/94

* US [illegible] 1994-383-015

ENGINEERING - 8/0

REAC, Ec .n, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAI F CUSTODY RECORD

PWA

Project Name: PENTA
Project Number: 0026
RFW Contact: MOHN Phone: 321-4257

No: 09725

SHEET NO. 1 OF ___

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A02025	WR-A	S	2/8/95	1	4 oz gl / —	X			
	A02026	WR-B	↓	↓	↓	↓ ↓	↓			
	A02027	WR-C								

MFM

MFM

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

DO MS/MSD AT RATE OF 10% - SELECT RANDOM SAMPLE

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All Analysis	M. Mohn	2/9/95	[illegible]	2/..95							

FORM #4 8/94

★ U S GPO. 1994-383-015

0004

E5401179

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

WESTON MANAGERS DESIGNERS/CONSULTANTS

DATE: April 25, 1995

TO: R. Singhvi EPA/ERT

FROM: V. Kansal Analytical Section Leader for VK

SUBJECT: DOCUMENT TRANSMITTAL UNDER WORK ASSIGNMENT # 0-026

Attached please find the following document prepared under this work assignment:

Penta Wood Products - Analytical Report

Central File WA # 0-026	(w/attachment)
H. Allen	Work Assignment Manager
T. Mignone	Task Leader
G. Armstrong	Data Validation and Report Writing Group Leader

0026\DEL\AR\9505\REPORT

ANALYTICAL REPORT

Prepared by
Roy F. Weston, Inc.

Penta Wood Products
Siren, Wisconsin

April 1995

EPA Work Assignment No. 0-026
WESTON Work Order No. 03347-040-001-0026-01
EPA Contract No. 68-C4-0022

Submitted to
H. Allen
EPA-ERT

	4/20/95
T. Mignone Task Leader	Date
	4/21/95
V. Kansal Analytical Section Leader	Date
	4/24/95
R. M. Shapot Program Manager	Date

Analysis by:
REAC
Analab
GP Environmental

Prepared by:
L. Sun

Reviewed by:
G. Armstrong

\026\DEL\AR\9505\Penta18&19

Table of Contents

Appendices will be furnished on request.

INTRODUCTION

The REAC Laboratories, in response to ERT work assignment #0-026, provided analytical support for samples collected from the Penta Wood Products Site, Siren, Wisconsin. This support included subcontracting of environmental samples as described in the following table. The support also included QA/QC, data review, and preparation of an analytical report containing a summary of the analytical methods, the results, and the QA/QC results.

The samples were treated with procedures consistent with those described in SOP #1008 and are summarized in the following table:

COC #	Number of Samples	Sampling Date	Date Received	Matrix	Analysis	Laboratory
09726	8	3/14/95	3/16/95	Water	Pentachlorophenol	REAC
09729	5	3/15/95	3/16/95	Water		
09727	8	3/14/95	3/16/95	Water	Chlorinated Phenols	Analab
09899	12	3/14/95	3/16/95	Soil		
10058	6	3/14/95	3/16/95	Soil	Ammonia, Anions Total Phosphorus, Ortho Phosphate, TOC, TKN, TPH Arsenic, Copper, Zinc Water Holding Capacity	GP Environmental
09730	9	3/15/95	3/16/95	Soil	Pentachlorophenol	REAC-HHL *
09898	12	3/14/95	3/16/95			
09902	20	N/A	3/17/95			
09904	20	3/15/95	3/16/95			
09905	20	3/15/95	3/16/95			
09906	20	3/15/95	3/16/95			
09907	12	3/15/95	3/16/95			

* REAC-HHL	REAC High Hazard Mobil Laboratory
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons

CASE NARRATIVE

Pentachlorophenol Analysis - Package E102

Surrogate 2,4,6-tribromophenol was not recovered for samples A00391, A00392, A00393, and A00394 because of large dilutions.

Pentachlorophenol Analysis - Package E107

The method blank (Blank 221) analyzed on 3/21/95 contains 1.9 mg/Kg pentachlorophenol because of carry-over from a previous sample. Since all samples analyzed after this blank contain pentachlorophenol concentrations greater than 9.5 mg/Kg, the data are not affected.

The surrogate recovery is outside QC limits for samples A02901MSD, A02902, A02904, A02908, A02935, A02927 MS, 02927MSD, A02933MS, and A02933MSD. The positive results will be considered as estimated for these samples.

The MS/MSD recoveries are outside QC limits for samples A02912, A02927, and A02933. The data are not affected.

Metals and Wet Chemistry Analysis - Package E113

There was insufficient sample for 00384 to perform both a duplicate and a matrix spike analysis. The matrix spike analysis for sulfate was performed on a non-REAC sample.

Chlorinated Phenols Analysis - Package E114

For sample B02234 (95-03-320-8) the internal standards d_{12}-chrysene, d_{10}-phenanthrene, and d_{12}-perylene were outside the QC limits. The associated compounds normally quantified by these standards will be considered as estimated.

For sample B02227 (95-03-320-1) MS/MSD, p-chloro-m-creosol was outside QC limits. 2-chlorophenol was also outside QC limits for the MS. The associated data for the unspiked sample is not affected.

Chlorinated Phenols Analysis - Package E124

The surrogate 2,4,6-tribromophenol was outside QC limits for sample B02226 (95-03-321-12). The data is not affected.

The internal standard, d_{12}-perylene, was outside the QC limits for samples B02171, B02221, B02222, B02223, B02225, B02170MS, B02170MSD, and B02226 because of sample matrix affect. Because no compounds are quantified by this standard, the sample data is not affected.

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The MS/MSD recoveries for phenol and 4-nitrophenol were outside the QC limits for B02170 (95-03-321-5). The results for the unspiked sample are not affected.

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SUMMARY of ABBREVIATIONS

B	The analyte was found in the blank
BFB	Bromofluorobenzene
BPQL	Below the Practical Quantitation Limit
C	Centigrade
D	(Surrogate Table) this value is from a diluted sample and was not calculated (Result Table) this result was obtained from a diluted sample
CLP	Contract Laboratory Protocol
COC	Chain of Custody
CONC	Concentration
CRDL	Contract Required Detection Limit
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
E	The value is greater than the highest linear standard and is estimated
EMPC	Estimated maximum possible concentration
J	The value is below the method detection limit and is estimated
HHL	High Hazard Laboratory, Brunswick, GA
IDL	Instrument Detection Limit
ISTD	Internal Standard
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MI	Matrix Interference
MS	Matrix spike
MSD	Matrix spike duplicate
MW	Molecular weight
NA	either Not Applicable or Not Available
NC	Not Calculated
U	Not Detected
NS	Not Spiked
% D	Percent difference
% REC	Percent Recovery
PQL	Practical quantitation limit
PPBV	Parts per billion by volume
QL	Quantitation Limit
RPD	Relative percent difference
RSD	Relative Standard Deviation
SIM	Selected Ion Mode

m^3	cubic meter	kg	kilogram
l(L)	liter	g	gram
dl	deciliter	cg	centigram
ml	milliliter	mg	milligram
ul	microliter	ug	microgram
		ng	nanogram
		pg	picogram

* denotes a value that exceeds the acceptable QC limit

Abbreviations that are specific to a particular table are explained in footnotes on that table

Revision 4/20/95

\026\DEL\AR\9505\Penta18&19

Analytical Procedure for Pentachlorophenol in Water (SIM)
(REAC)

Extraction Procedure:

One liter of sample was spiked with 2,4,6-tribromophenol as a surrogate and extracted with three 60 ml portions of methylene chloride according to Method 625, Section 10, as outlined in the Federal Register Vol. 49, #209, Friday, October 26, 1984. The extract portions were combined and concentrated to 1.0 ml. An internal standard, phenanthrene-d_{10}, was added to the extract prior to analysis.

Analytical Procedure:

An HP 5890 Gas Chromatograph, equipped with a 5995 Mass Selective Detector and controlled by an HP-1000 RTE/VM computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.32mm ID, 0.50 µm film thickness
Injection Temperature	290° C
Transfer Temperature	290° C
Temperature Program	100° C for 0.5 min 30 °C/min to 295° C hold for 9 min
Splitless Injection	Split time = 1.0 min
Injection Volume	2 µl

The GC/MS system was calibrated using 5 pentachlorophenol standards at 5.0, 10, 15, 25, and 50.0 µg/ml. All samples were quantified using the average response factor obtained from the calibration range. Before analysis each day, the system was tuned with 50 ng decafluorotriphenylphosphine (DFTPP) and passed a continuing calibration check by analyzing a 5.0 µg/ml standard mixture.

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The Pentachlorophenol results are listed in Table 1.1. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF (or RF_{ave}) x V_i x V_o}$$

where

C_u	=	Concentration of target analyte (µg/L)
DF	=	Dilution Factor
A_u	=	Area of target analyte
I_{is}	=	Mass of specific internal standard (ng)
V_t	=	Volume of extract (µl)
A_{is}	=	Area of specific internal standard
RF	=	Response Factor (unitless)
RF_{ave}	=	average Response Factor
V_i	=	Volume of extract injected (µl)
V_o	=	Volume of sample (ml)

The RF_{ave} is used when a sample is associated with an initial calibration curve. The RF is used when a sample is associated with a continuing calibration curve.

Response Factor calculation:

The RF for each specific analyte is quantitated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \; x \; I_{is}}{A_{is} \; x \; I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
I_{is}	=	Mass of the specific internal standard
A_{is}	=	Area of the specific internal standard
I_c	=	Mass of the analyte in the standard

$$RF_{ave} = \frac{RF_1 + ... + RF_n}{n}$$

and

n = number of Samples

Analytical Procedure for Pentachlorophenol in Soil (SIM)
(HHL)

Extraction Procedure:

Ten grams of sample was mixed with 10 g anhydrous sodium sulfate until a sandy consistency was obtained. The sample was then spiked with surrogate 2,4,6-tribromophenol. The sample was shaker extracted four times with 25 ml portions of 1:4 acetone:methylene chloride (v/v). A 1.0 ml aliquot of the extract was spiked with the internal standard solution containing phenanthrene-d_{10} prior to analysis.

Analytical Procedure:

An HP 5971A Mass Selective Detector equipped with a 5890 Series II GC, a 7673A autosampler and controlled by an HP-Chem Station/Windows/DOS 5.0 software driven IBM compatible computer was used to analyze the samples.

The instrument conditions were:

Column	Restek Rtx-5 (crossbonded SE-54) 30 meter x 0.25mm ID, 0.50 µm film thickness
Injection Temperature	290° C
Transfer Temperature	315° C
Source Temperature	240° C
Analyzer Temperature	240° C
Temperature Program	100°C for 0.5 min 30° C/min to 305° C Hold for 2 min.
Splitless Injection	Split time = 0.88 min
Injection Volume	2 µl

The GC/MS system was calibrated using 6 pentachlorophenol standards at 0.5, 1.0, 5.0, 10.0, 25.0, and 50.0 µg/ml. Before analysis each day, the system was tuned with 50 ng decafluorotriphenylphosphine (DFTPP) and passed a continuing calibration check when analyzing a 5 µg/ml standard mixture in which the responses were evaluated by comparison to the average response of the calibration curve.

The pentachlorophenol results, based on dry weight, are listed in Table 1.2. The concentration of the detected compounds was calculated using the following equation:

$$C_u = \frac{DF x A_u x I_{is} x V_t}{A_{is} x RF_{ave} x V_i x W x D}$$

where

DF	=	Dilution Factor
RF_{ave}	=	Average Response Factor (unitless)
A_u	=	Area of analyte
A_{is}	=	Area of internal standard
I_{is}	=	Mass of internal standard (ng)
C_u	=	Concentration of analyte (µg/Kg)
V_t	=	Volume of extract (µl)
V_i	=	Volume of extract injected (µl)
W	=	Weight of sample (g)
D	=	Decimal per cent solids

The average Response Factor is used when a sample is associated with an initial calibration curve. The Response Factor is used when a sample is associated with a continuing calibration.

Response Factor calculation:

The response factor (RF) for each specific analyte is quantitated based on the area response from the continuing calibration check as follows:

$$RF = \frac{A_c \ x \ I_{is}}{A_{is} \ x \ I_c}$$

where

RF	=	Response factor for a specific analyte
A_c	=	Area of the analyte in the standard
A_{is}	=	Area of the internal standard in the standard
I_c	=	Mass of the analyte in the standard
I_{is}	=	Mass of the internal standard in the standard

$$RF_{ave} = \frac{RF_1 + ... + RF_n}{n}$$

and

n = number of Samples

Revision of 4/20/95

\026\DEL\AR\9505\Penta18&19

Analytical Procedure for Chlorinated Phenols in Water

The subcontract laboratory extracted the water samples by separatory funnel, according to U.S. EPA Method 3510 and analyzed the samples for chlorinated phenols, according to U.S. EPA Method 8270. These methods are outlined in "Test Methods for Evaluating Solid Waste; Physical/Chemical Methods", U.S. EPA, SW-846.

Results of the analyses are listed in Table 1.3.

Analytical Procedure for Chlorinated Phenols in Soil

The subcontract laboratory extracted the soil samples by soxhlet extraction, according to U.S. EPA Method 3540 and analyzed the samples for chlorinated phenols, according to U.S. EPA Method 8270. This method is outlined in "Test Methods for Evaluating Solid Waste; Physical/Chemical Methods", U.S. EPA, SW-846.

Results of the analyses are listed in Table 1.4.

Analytical Procedure for Arsenic, Copper, and Zinc in Soil

The subcontract laboratory analyzed the soil samples for arsenic, copper and zinc, according to "Test Methods for Evaluating Solid Wastes", SW-846, September, 1987, Method 6010/7060.

Results of the arsenic, copper and zinc analyses in soil are listed in Table 1.5.

Analytical Procedure for Chloride in Soil

The subcontract laboratory analyzed the soil samples for chloride, according to "Test Methods for Evaluating Solid Wastes", SW-846, September, 1987, Method 9252.

Results of the chloride analyses are listed in Table 1.6.

Analytical Procedure for Ammonia as Nitrogen in Soil

The subcontract laboratory analyzed the soil samples for ammonia, according to U.S. EPA Method 350.2. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the ammonia analyses are listed in Table 1.6.

Analytical Procedure for Nitrate as Nitrogen in Soil

The subcontract laboratory analyzed the soil samples for nitrate, according to U.S. EPA Method 353.2. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the nitrate analyses are listed in Table 1.6.

Analytical Procedure for Total Phosphorus in Soil

The subcontract laboratory analyzed the soil samples for total phosphorus, according to U.S. EPA Method 365.3. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the total phosphorus analyses are listed in Table 1.6.

Analytical Procedure for Phosphate as Phosphorus in Soil

The subcontract laboratory analyzed the soil samples for phosphate, according to U.S. EPA Method 365.3. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the phosphate analyses are listed in Table 1.6.

Analytical Procedure for Total Organic Carbon

The subcontract laboratory analyzed the soil samples for total organic carbon, according to U.S. EPA Method 9060. This method is outlined in "Test Methods for Evaluating Solid Wastes", SW-846, September, 1987.

Results of the total organic carbon analyses are listed in Table 1.6.

Analytical Procedure for Sulfate in Soil

The subcontract laboratory analyzed the soil samples for sulfate, according to U.S. EPA Method 375.4. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the sulfate analyses are listed in Table 1.6.

Analytical Procedure for Total Kjeldahl Nitrogen in Soil

The subcontract laboratory analyzed the soil samples for total Kjeldahl nitrogen, according to U.S. EPA Method 351.3. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the total Kjeldahl nitrogen analyses are listed in Table 1.6.

Analytical Procedure for Total Petroleum Hydrocarbons in Soil

The subcontract laboratory analyzed the soil samples for total petroleum hydrocarbons, according to U.S. EPA Method 418.1. This method is outlined in "Method for Chemical Analysis of Water and Waste", 1983.

Results of the total petroleum hydrocarbons analyses are listed in Table 1.6.

Analytical Procedure for Water Holding Capacity in Soil

The subcontract laboratory analyzed the soil samples for water holding capacity, according to the method described in the paragraph 3.4.11.1from "Field and Laboratory Methods Applicable to Overburdens and Minesoils". This method is the resource of National Technical Information Service, U.S. Department of Commerce.

Results of the water holding capacity analyses are listed in Table 1.6.

Table 1.1 Results of the Analysis for Pentachlorophenol in Water

WA # 0-026 Penta Wood Products Site

Sample No.	Sampling Location	Conc. (µg/L)	MDL (µg/L)
WBLK031695	WATER BLANK	U	5.0
A02227	DW1A-5	33	5.4
A02228	DW1B-5	22	5.7
A02229	DW2A-5	13	5.3
A-C02230	DW2B-5	12	5.2
A02231	DW3A-5	8.6	5.1
A02232	DW3B-5	9.4	5.2
A02233	DW4A-5	12	5.1
A02234	DW4B-5	13	5.3
A-C00390	BIO INFLUENT-6	1.2	5.3
A00391	BIO LEACHATE-6	2400	1100
A00392	GREEN TANK 1-6	5500	1100
A00393	WHITE TANK 2-6	11000	1000
A00394	WHITE TANK 3-6	1200	1100

Table 1.2 Results of the Analysis for Pentachlorophenol in Soil

WA # 0-026 Penta Wood Products Site

(Results are Based on Dry Weight)

Sample Number	Location	Conc. (mg/Kg)	MDL (mg/Kg)
Blank 216	Sand Blank	U	5.0
A00395	WR A-2	15	6.4
A00396	WR B-2	31	6.4
A00397	WR C-2	29	6.4
A00398	STOCK SOIL 1A	290	5.6
A00399	STOCK SOIL 1B	250	5.3
A00400	STOCK SOIL 1C	230	5.4
A00401	STOCK SOIL 2A	23	5.3
A00402	STOCK SOIL 2B	23	5.3
A00403	STOCK SOIL 2C	22	5.4
A02166	DS1A-5	22	5.7
A02167	DS1B-5	20	6.0
A02168	DS1C-5	24	6.2
A02169	DS2A-5	11	7.2
A02170	DS2B-5	6.7 J	7.6
A02171	DS2C-5	9.8	6.4
A02221	DS3A-5	25	6.8
A02222	DS3B-5	26	7.7
A02223	DS3C-5	27	6.6
A02224	DS4A-5	17	7.4
A02225	DS4B-5	6.6	6.3
A02226	DS4C-5	7.5	6.2
Blank 217	Sand Blank	U	5.0
A02235	DT1-3A COMP5	17	6.2
A02236	DT1-3B COMP5	16	6.1
A02237	DT1-3C COMP5	13	6.3
A02238	DT4-6A COMP5	14	6.1
A02239	DT4-6B COMP5	12	5.9
A02477	DT4-6C COMP5	13	6.1
A02478	DT7-9A COMP5	14	6.0
A02479	DT7-9B COMP5	13	6.0
A02480	DT7-9C COMP5	10	5.9
A02481	DT1-9 COMP5	12	5.7
A02482	DT1-3A COMP5	15	5.2
A02483	DT1-3B COMP5	13	5.1
A02484	DT1-3C COMP5	14	5.1
A02485	DT4-6A COMP5	13	5.1
A02486	DT4-6B COMP5	10	5.2
A02487	DT4-6C COMP5	8.6	5.3
A02488	DT7-9A COMP5	15	5.2
A02489	DT7-9B COMP5	15	5.1
A02490	DT7-9C COMP5	13	5.0

Table 1.2(Con't) Results of the Analysis for Pentachlorophenol in Soil

WA # 0-026 Penta Wood Products Site

(Results are Based on Dry Weight)

Sample Number	Location	Conc. (mg/Kg)	MDL (mg/Kg)
Blank 218	Sand Blank	U	5.0
A02491	DC1-9 COMP5	16	5.2
A02492	1A1 COMP 6	94	6.0
A02493	1A2 COMP 6	110	5.8
A02494	1A3 COMP 6	95	5.9
A02495	1B1 COMP 6	92	6.0
A02496	1B2 COMP 6	100	6.0
A02497	1B3 COMP 6	86	5.9
A02498	1C1 COMP 6	82	5.9
A02499	1C2 COMP 6	110	6.2
A02500	1C3 COMP 6	92	6.1
A02873	2A1 COMP 6	240	6.3
A02874	2A2 COMP 6	240	6.4
A02875	2A3 COMP 6	230	6.4
A02876	2B1 COMP 6	230	6.4
A02877	2B2 COMP 6	230	6.4
A02876	2B3 COMP 6	220	6.3
A02879	2C1 COMP 6	200	6.3
A02880	2C2 COMP 6	200	6.4
A02881	2C3 COMP 6	200	6.4
Blank 219	Sand Blank	U	5.0
A02882	3A1 COMP6	170	7.0
A02883	3A2 COMP6	190	7.5
A02884	3A3 COMP6	170	7.5
A02885	3B1 COMP6	180	8.7
A02886	3B2 COMP6	190	8.0
A02887	3B3 COMP6	160	7.9
A02888	3C1 COMP6	180	7.8
A02889	3C2 COMP6	240	9.7
A02890	3C3 COMP6	210	8.4
A02891	4A1 COMP6	160	7.3
A02892	4A2 COMP6	150	7.3
A02893	4A3 COMP6	130	5.9
A02894	4B1 COMP6	180	7.0
A02895	4B2 COMP6	170	7.3
A02896	4B3 COMP6	170	7.2
A02897	4C1 COMP6	240	7.4
A02898	4C2 COMP6	240	7.0
A02899	4C3 COMP6	240	6.9
A02900	5A1 COMP6	200	7.5

Table 1.2(Con't) Results of the Analysis for Pentachlorophenol in Soil

WA # 0-026 Penta Wood Products Site

(Results are Based on Dry Weight)

Sample Number	Location	Conc. (mg/Kg)	MDL (mg/Kg)
Blank 220	Sand Blank	U	5.0
A02901	5A2 COMP6	220	7.3
A02902	5A3 COMP6	250	8.2
A02903	5B1 COMP6	280	8.2
A02904	5B2 COMP6	270	8.3
A02905	5B3 COMP6	250	7.9
A02906	5C1 COMP6	280	8.0
A02907	5C2 COMP6	260	8.0
A02908	5C3 COMP6	290	8.0
A02909	6A1 COMP6	110	8.1
A02910	6A2 COMP6	120	6.2
A02911	6A3 COMP6	120	6.0
A02912	6B1 COMP6	87	6.1
A02913	6B2 COMP6	83	6.0
A02914	6B3 COMP6	86	6.1
A02915	6C1 COMP6	84	6.0
A02916	6C2 COMP6	87	6.3
A02917	6C3 COMP6	93	6.0
A02918	7A1 COMP6	150	5.9
A02919	7A2 COMP6	110	6.0
A02920	7A3 COMP6	130	6.0
A02921	7B1 COMP6	170	5.9
A02922	7B2 COMP6	170	5.8
A02923	7B3 COMP6	190	5.9
A02924	7C1 COMP6	140	6.2
Blank 221	Sand Blank	1.9 J	5.0
A02925	7C2 COMP6	140	5.9
A02926	7C3 COMP6	150	6.2
A02927	8A1 COMP6	150	7.0
A02928	8A2 COMP6	150	6.5
A02929	8A3 COMP6	150	6.0
A02930	8B1 COMP6	160	6.9
A02931	8B2 COMP6	140	6.8
A02932	8B3 COMP6	140	6.5
A02933	8C1 COMP6	200	6.8
A02934	8C2 COMP6	200	6.9
A02935	8C3 COMP8	220	7.1

Table 1.3 Results of the Analysis for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Sample ID / Location	Method Blank / ---		B02227 / DW1A-5		B02228 / DW1B-5		B02229 / DW2A-5		D-F02230 / DW2B-5	
Compound	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L
2-Chlorophenol	U	20	U	20	U	20	U	100	U	100
m,p-Chlorophenol	U	20	U	20	U	20	U	100	U	100
2,6-Dichlorophenol	U	20	U	20	U	20	U	100	U	100
2,4,5-Trichlorophenol	U	20	U	20	U	20	U	100	U	100
2,3-Dichlorophenol	U	20	U	20	U	20	U	100	U	100
2,5-Dichlorophenol	U	20	U	20	U	20	U	100	U	100
3,4-Dichlorophenol	U	20	U	20	U	20	U	100	U	100
2,4-Dichlorophenol	U	20	U	20	U	20	U	100	U	100
3,5-Dichlorophenol	U	20	U	20	U	20	U	100	U	100
2,3,6-Trichlorophenol	U	20	U	20	U	20	U	100	U	100
2,4,6-Trichlorophenol	U	20	U	20	U	20	U	100	U	100
2,3,5-Trichlorophenol	U	20	U	20	U	20	U	100	U	100
2,3,4,6-Tetrachlorophenol	U	20	U	20	U	20	U	100	U	100
Pentachlorophenol	U	20	13 J	20	18 J	20	U	100	U	100

Sample ID / Location	B02231 / DW3A-5		B02232 / DW3B-5		B02233 / DW4A-5		B02234 / DW4B-5	
Compound	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L	Conc. µg/L	MDL µg/L
2-Chlorophenol	U	100	U	100	U	500	U	500
m,p-Chlorophenol	U	100	U	100	U	500	U	500
2,6-Dichlorophenol	U	100	U	100	U	500	U	500
2,4,5-Trichlorophenol	U	100	U	100	U	500	U	500
2,3-Dichlorophenol	U	100	U	100	U	500	U	500
2,5-Dichlorophenol	U	100	U	100	U	500	U	500
3,4-Dichlorophenol	U	100	U	100	U	500	U	500
2,4-Dichlorophenol	U	100	U	100	U	500	U	500
3,5-Dichlorophenol	U	100	U	100	U	500	U	500
2,3,6-Trichlorophenol	U	100	U	100	U	500	U	500
2,4,6-Trichlorophenol	U	100	U	100	U	500	U	500
2,3,5-Trichlorophenol	U	100	U	100	U	500	U	500
2,3,4,6-Tetrachlorophenol	U	100	U	100	U	500	U	500
Pentachlorophenol	U	100	U	100	U	500	U	500

Table 1.4 Results of the Analysis for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID	Method Blank		B02166		B02167		B02168		B02169	
Location	---		DS1A-5		DS1B-5		DS1C-5		DS2A-5	
%Solid	100		81		81		81		73	
Compound	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
2-Chlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
m,p-Chlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
2,6-Dichlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
2,4,5-Trichlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
2,3-Dichlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
2,5-Dichlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
3,4-Dichlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
2,4-Dichlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
3,5-Dichlorophenol	U	330	U	1200	U	1200	U	1200	640 J	1400
2,3,6-Trichlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
2,4,6-Trichlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
2,3,5-Trichlorophenol	U	330	U	1200	U	1200	U	1200	U	1400
2,3,4,6-Tetrachlorophenol	U	330	U	1200	U	1200	U	1200	1100 J	1400
Pentachlorophenol	U	330	19000	1200	17000	1200	22000	1200	7500	1400

Sample ID	B02170		B02171		B02221		B02222	
Location	DS2B-5		DS2C-5		DS3A-5		DS3B-5	
%Solid	75		69		73		87	
Compound	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
2-Chlorophenol	U	1300	U	1400	U	1400	U	1200
m,p-Chlorophenol	U	1300	4900	1400	U	1400	U	1200
2,6-Dichlorophenol	U	1300	U	1400	U	1400	U	1200
2,4,5-Trichlorophenol	U	1300	U	1400	U	1400	U	1200
2,3-Dichlorophenol	U	1300	U	1400	U	1400	U	1200
2,5-Dichlorophenol	U	1300	U	1400	U	1400	U	1200
3,4-Dichlorophenol	U	1300	U	1400	U	1400	U	1200
2,4-Dichlorophenol	U	1300	U	1400	U	1400	U	1200
3,5-Dichlorophenol	U	1300	2800	1400	10000	1400	U	1200
2,3,6-Trichlorophenol	U	1300	U	1400	U	1400	U	1200
2,4,6-Trichlorophenol	U	1300	U	1400	U	1400	U	1200
2,3,5-Trichlorophenol	U	1300	1100 J	1400	6100	1400	U	1200
2,3,4,6-Tetrachlorophenol	U	1300	2400	1400	7900	1400	1900	1200
Pentachlorophenol	8100	1300	12000	1400	17000	1400	34000	1200

Sample ID	B02223		B02224		B02225		B02226	
Location	DS3C-5		DS4A-5		DS4B-5		DS4C-5	
%Solid	65		77		63		63	
Compound	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg	Conc. µg/kg	MDL µg/kg
2-Chlorophenol	U	1500	U	1300	U	1600	U	1600
m,p-Chlorophenol	U	1500	U	1300	U	1600	U	1600
2,6-Dichlorophenol	U	1500	U	1300	U	1600	U	1600
2,4,5-Trichlorophenol	U	1500	U	1300	U	1600	U	1600
2,3-Dichlorophenol	U	1500	U	1300	U	1600	U	1600
2,5-Dichlorophenol	U	1500	U	1300	U	1600	U	1600
3,4-Dichlorophenol	U	1500	U	1300	U	1600	U	1600
2,4-Dichlorophenol	U	1500	U	1300	U	1600	U	1600
3,5-Dichlorophenol	3600	1500	U	1300	1800	1600	U	1600
2,3,6-Trichlorophenol	U	1500	U	1300	U	1600	U	1600
2,4,6-Trichlorophenol	U	1500	U	1300	760 J	1600	U	1600
2,3,5-Trichlorophenol	3200	1500	U	1300	U	1600	U	1600
2,3,4,6-Tetrachlorophenol	8100	1500	1300	1300	1500 J	1600	1100 J	1600
Pentachlorophenol	16000	1500	4800	1300	14000	1600	23000	1600

Table 1.5 Results of the Analysis for Arsenic, Copper and Zinc in Soil

WA # 0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID	Location	%Solid	Arsenic Conc. (mg/Kg)	Arsenic MDL (mg/Kg)	Copper Conc. (mg/Kg)	Copper MDL (mg/Kg)	Zinc Conc. (mg/Kg)	Zinc MDL (mg/Kg)
Method Blank	---	100	U	0.2	U	0.7	U	0.6
00384	DT1-3 COMP5	81	U	0.2	23	0.9	32	0.8
00385	DT4-6 COMP5	83	7.6	0.2	30	0.9	40	0.7
00386	DT7-9 COMP5	84	5.5	0.2	25	0.8	37	0.7
00387	DC1-3 COMP5	97	4.6	0.2	22	0.7	35	0.6
00388	DC4-6 COMP5	97	4.9	0.2	19	0.7	30	0.6
00389	DC7-9 COMP5	97	5.0	0.2	22	0.7	35	0.6

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Table 1.6 Results of the Analysis for Wet Chemistry in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID / Location / Analyte	Unit	Blank ** --- Result	MDL	00384 DT1-3 COMP5 Result	MDL	00385 DT4-6 COMP5 Result	MDL	00386 DT7-9 COMP5 Result	MDL	00387 DC1-3 COMP5 Result	MDL
Chloride	mg/Kg	U	0.5	U	55	330	55	240	59	180	44
Ammonia as Nitrogen	mg/Kg	U	0.1	200	5.6	320	5.5	160	5.7	22	5.1
Nitrate as Nitrogen	mg/Kg	U	0.05	300	23	360	23	310	22	1.8	1.3
Phosphorus	mg/Kg	U	0.01	140	12	150	12	560	12	33	5.2
Phosphate (Ortho)	mg/Kg	U	0.01	50	3.1	48	3.0	39	3.0	3.1	0.52
Sulfate	mg/Kg	U	1.0	13	11	U	11	U	11	U	9.4
Percent Solids	Percent	NA	NA	81	NA	83	NA	84	NA	97	NA
TKN	mg/Kg	U	0.1	1500	8.0	1400	5.3	1100	5.9	240	4.7
TOC	mg/Kg	U	100	14000	620	32000	930	19000	760	6200	260
TPH	mg/Kg	U	5.0	1100	150	1300	91	1100	89	724	64
Water Holding Capacity	Percent	NA	NA	4.9	NA	2.7	NA	3.1	NA	1.3	NA

Sample ID / Location / Analyte	Unit	00388 DC4-6 COMP5 Result	MDL	00389 DC7-9 COMP5 Result	MDL
Chloride	mg/Kg	U	46	210	51.0
Ammonia as Nitrogen	mg/Kg	16	5.2	15	4.6
Nitrate as Nitrogen	mg/Kg	U	1.3	U	1.3
Phosphorus	mg/Kg	120	10	77	5.2
Phosphate (Ortho)	mg/Kg	2.7	0.52	5.7	0.52
Sulfate	mg/Kg	U	8.8	11	9.8
Percent Solids	Percent	97	NA	97	NA
TKN	mg/Kg	210	4.4	250	5.5
TOC	mg/Kg	8100	310	6800	340
TPH	mg/Kg	1700	130	1300	100
Water Holding Capacity	Percent	0.95	NA	0.98	NA

** Blank expressed in mg/L

QA/QC for Pentachlorophenol

Results of the Surrogate Recoveries for PCP in Water

One surrogate compound, 2,4,6-tribromophenol, was added to the water samples prior to extraction. The surrogate recoveries, listed in Table 2.1, range from 32 to 86. Four recoveries are reported as D (diluted out) because of large dilutions. All fourteen calculated recoveries are within acceptable QC limits.

Results of the MS/MSD Analysis for PCP in Water

Samples A-C02230 and A-C00390 were chosen for matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.2, range from 19 to 57. All four recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.2, are 9 and 19. Both RPDs are within QC limits.

Results of the Surrogate Recoveries for PCP in Soil

One surrogate compound, 2,4,6-tribromophenol, was added to the soil samples prior to extraction. The surrogate recoveries, listed in Table 2.3, range from 59 to 144. One hundred and six out of 143 recoveries are within acceptable QC limits.

Results of the MS/MSD Analysis for PCP in Soil

Samples A00397, A02221, A02238, A02490, A02495, A02875, A02888, A02896, A02901, A02912, A02927 and A02933 were chosen for matrix spike duplicate analysis for soil samples. The percent recoveries, listed in Table 2.4, range from 85 to 179. Twenty out of 24 recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.4, range from 0 (zero) to 18. All twelve RPD values are within QC limits.

Table 2.1 Results of the Surrogate Recoveries for PCP in Water

WA # 0-026 Penta Wood Products Site

Sample No.	2,4,6-Tribromophenol % RECOVERY
WBLK031695	57
A02227	84
A02228	76
A02229	86
A-C02230	82
A-C02230 MS	70
A-C02230 MSD	78
A02231	71
A02232	82
A02233	32
A02234	39
A-C00390	48
A-C00390 MS	55
A-C00390 MSD	45
A00391	D
A00392	D
A00393	D
A00394	D

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.2 Results of the MS/MSD Analysis for PCP in Water

WA # 0-026 Penta Wood Products Site

Sample ID	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MSD Conc. (µg/L)	MS %Rec.	MSD %Rec.	% RPD
A-C02230	5.2	11.8	14.25	14.75	47	57	19
A-C00390	5.3	1.22	2.21	2.3	19	20	9

Advisory QC Limits:

RPD < 47
% Recovery = 17 - 109

Table 2.3 Results of the Surrogate Recoveries for PCP in Soil

WA #0-026 Penta Wood Products Site

Sample Number	2,4,6-Tribromophenol Percent Recovery
BLANK216	88
A00395	103
A00396	90
A00397	103
A00397MS	114
A00397MSD	105
A00398	102
A00399	95
A00400	92
A00401	102
A00402	102
A00403	96
A02166	104
A02167	101
A02168	109
A02169	90
A02170	79
A02171	92
A02221	101
A02221MS	98
A02221MSD	103
A02222	99
A02223	102
A02224	72
A02225	88
A02226	87
BLANK-217	111
A02235	119
A02236	109
A02237	115
A02238	107
A02238MS	100
A02238MSD	115
A02239	86
A02477	82
A02478	110
A02479	77
A02480	59
A02481	79
A02482	115
A02483	99
A02484	101
A02485	117
A02486	97
A02487	84
A02488	119
A02489	110
A02490	116
A02490MS	115
A02490MSD	99

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.3(Con't) Results of the Surrogate Recoveries for PCP in Soil

WA #0-026 Penta Wood Products Site

Sample Number	2,4,6-Tribromophenol Percent Recovery
BLANK 218	122
A02491	112
A02492	115
A02493	114
A02494	118
A02495	116
A02495MS	112
A02495MSD	112
A02496	114
A02497	116
A02498	110
A02499	117
A02500	117
A02873	116
A02874	121
A02875	112
A02875MS	117
A02875MSD	113
A02876	119
A02877	112
A02878	114
A02879	115
A02880	110
A02881	111
BLANK 219	100
A02882	108
A02883	105
A02884	99
A02885	93
A02886	108
A02887	96
A02888	104
A02888MS	98
A02888MSD	98
A02889	98
A02890	100
A02891	100
A02892	103
A02893	105
A02894	112
A02895	108
A02896	110
A02896MS	107
A02898MSD	113
A02897	106
A02898	113
A02899	108
A02900	111

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.3(Con't) Results of the Surrogate Recoveries for PCP in Soil

WA #0-026 Penta Wood Products Site

Sample Number	2,4,6-Tribromophenol Percent Recovery
BLANK 220	121
A02901	116
A02901MS	119
A02901MSD	124 *
A02902	126 *
A02903	122
A02904	123 *
A02905	119
A02906	118
A02907	114
A02908	128 *
A02909	131 *
A02910	132 *
A02911	141 *
A02912	129 *
A02912MS	142 *
A02912MSD	131 *
A02913	129 *
A02914	138 *
A02915	138 *
A02916	142 *
A02917	141 *
A02918	142 *
A02919	117
A02920	130 *
A02921	138 *
A02922	135 *
A02923	141 *
A02924	135 *
BLANK 221	130 *
A02925	136 *
A02926	144 *
A02927	133 *
A02927MS	136 *
A02927MSD	138 *
A02928	133 *
A02929	138 *
A02930	131 *
A02931	132 *
A02932	139 *
A02933	137 *
A02933MS	136 *
A02933MSD	134 *
A02934	134 *
A02935	134 *

	Advisory QC Limits
2,4,6-Tribromophenol	19 - 122

Table 2.4 Results of the MS/MSD Analysis for PCP in Soil

WA # 0-026 Penta Wood Products Site

(Results are Based on Dry Weight)

Sample number	Spike Added (mg/Kg)	Sample Conc. (mg/Kg)	MS Conc. (mg/Kg)	MSD Conc. (mg/Kg)	MS %Rec.	MSD %Rec.	RPD
A00397	129	29.1	224	211	151	141	7
A02221	137	25.6	191	201	121	128	6
A02238	124	14.7	144	158	105	116	10
A02490	103	13.7	126	107	110	91	18
A02495	120	92.0	269	270	148	149	1
A02875	127	225.4	402	377	139	119	16
A02888	155	174.7	306	313	85	90	5
A02896	143	175.0	326	353	105	124	17
A02901	145	224.3	453	444	157	151	4
A02912	123	87.3	307	282	179 *	159	12
A02927	140	146.9	381	381	168 *	168 *	0
A02933	137	202.9	434	415	169 *	154	9

Advisory
QC Limits
% Rec. 56 – 162
RPD 47

QA/QC for Chlorinated Phenols

Results of the Surrogate Recoveries for Chlorinated Phenols in Water

Three surrogates, phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol, were added to the water samples prior to extraction. The surrogate recoveries, listed in Table 2.5, range from 12 to 101. All 36 recoveries are within acceptable QC limits.

Results of the MS/MSD Analysis for Chlorinated Phenols in Water

Sample B02227 was chosen for matrix spike/matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table 2.6, range from 63 to 112. Seven out of 10 recoveries are within QC limits. The relative percent differences (RPDs) ,also listed in Table 2.6, are 2 and 12. All five RPDs are within QC limits.

Results of the Blank Spike Analysis for Chlorinated Phenols in Water

Out of fourteen spike compounds only 2-chlorophenol and pentachlorophenol have CLP QC limits available. The percent recoveries, listed in Table 2.7, range from 60 to 140. Only the recovery for pentachlorophenol is outside QC limits.

Results of the Surrogate Recoveries for Chlorinated Phenols in Soil

Three surrogates, phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol were added to the soil samples prior to extraction. The surrogate recoveries, listed in Table 2.8, range from 15 to 121. Forty-five out of 48 recoveries are within acceptable QC limits.

Results of the MS/MSD Analysis for Chlorinated Phenols in Soil

Sample B02170 was chosen for matrix spike duplicate analysis for soil samples. The percent recoveries, listed in Table 2.9, range from 85 to 133. Five out of 10 recoveries are within QC limits. The relative percent differences (RPDs), also listed in Table 2.9, range from 12 to 15. All five RPD values are within QC limits.

Results of the Blank Spike Analysis for Chlorinated Phenols in Soil

Out of fourteen spike compounds only 2-chlorophenol and pentachlorophenol have CLP QC limits available. The percent recoveries, listed in Table 2.10, range from 86 to 160. The recoveries for 2-chlorophenol and pentachlorophenol are outside QC limits.

Table 2.5 Results of the Surrogate Recoveries for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Sample ID	S1	S2	S3
	%Recovery		
Water Blank	49	82	93
Blank Spike	56	75	89
B02227MS	56	85	76
B02227MSD	58	91	81
B02227	63	85	109
B02228	57	77	105
B02229	55	61	88
B02230	55	59	79
B02231	49	67	84
B02232	55	70	86
B02233	41	44	24
B02234	12	64	101

	QC Limits
S1 = Phenol-d5	10- 110
S2 = 2-Fluorophenol	21- 110
S3 = 2,4,6-Tribromophenol	10-123

Table 2.6 Results of the MS/MSD Analysis for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Sample ID: B02227

Compound	Sample Conc. µg/L	Spiked Added µg/L	MS Conc. µg/L	MSD Conc. µg/L	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec
2-Chlorophenol	13.0	2000	1716	1833	85	96 *	12	42	12- 89
Phenol	U	2000	1324	1379	66	69	4	40	27-123
p-Chloro-m-creosol	U	2000	2238	2295	112 *	115 *	3	42	23- 97
4-Nitrophenol	U	2000	1251	1328	63	66	5	50	10- 80
Pentachlorophenol	U	2000	1926	1963	96	98	2	50	9-103

Table 2.7 Results of the Blank Spike Analysis for Chlorinated Phenols in Water

WA #0-026 Penta Wood Products Site

Compound	Sample Conc. µg/L	Spike Conc. µg/L	%Rec.	QC Limits %Rec.
2-Chlorophenol	359	400	90	27-123
2,4-Dichlorophenol	544	400	136	NA
2,5-Dichlorophenol	405	400	101	NA
2,3-Dichlorophenol	242	400	60	NA
2,6-Dichlorophenol	489	400	122	NA
m,p-Chlorophenol	457	400	114	NA
2,3,5-Trichlorophenol	426	400	106	NA
2,4,6-Trichlorophenol	379	400	95	NA
2,4,5-Trichlorophenol	496	400	124	NA
2,3,6-Trichlorophenol	425	400	106	NA
3,5-Dichlorophenol	399	400	100	NA
3,4-Dichlorophenol	383	400	96	NA
2,3,4,6-Tetrachlorophenol	455	400	114	NA
Pentachlorophenol	561	400	140 *	9-103

Table 2.8 Results of the Surrogate Recoveries for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Sample ID	S1	S2	S3
	%Recovery		
Soil Blank	91	99	101
Blank Spike	88	97	80
B02170MS	121 *	116	96
B02170MSD	116 *	98	62
B02166	83	48	28
B02167	107	91	76
B02168	87	64	47
B02169	108	74	48
B02170	111	85	64
B02171	113	100	86
B02221	111	108	100
B02222	92	107	51
B02223	109	99	88
B02224	104	48	23
B02225	73	109	48
B02226	109	109	15 *

	QC Limits
S1 = Phenol-d5	24-113
S2 = 2-Fluorophenol	25-121
S3 = 2,4,6-Tribromophenol	19-122

Table 2.9 Results of the MS/MSD Analysis for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID: B02170

Compound	Sample Conc. µg/Kg	Spiked Added µg/Kg	MS Conc. µg/Kg	MSD Conc. µg/Kg	MS %Rec.	MSD %Rec.	RPD	QC Limits RPD	QC Limits %Rec.
2-Chlorophenol	U	26700	28543	25083	107 *	94	13	50	25-102
Phenol	U	26700	32521	28825	122 *	108 *	12	35	26- 90
p-Chloro-m-creosol	U	26700	23147	20292	87	76	13	33	26-103
4-Nitrophenol	U	26700	41099	35494	154 *	133 *	15	50	11-114
Pentachlorophenol	8100	26700	34543	30762	99	85	15	47	17-109

Table 2.10 Results of the Blank Spike Analysis for Chlorinated Phenols in Soil

WA #0-026 Penta Wood Products Site

Compound	Sample Conc. µg/Kg	Spike Conc. µg/Kg	%Rec.	QC Limits %Rec.
2-Chlorophenol	7096	6667	106 *	25-102
2,4-Dichlorophenol	18313	16667	110	NA
2,5-Dichlorophenol	5710	6667	86	NA
2,3-Dichlorophenol	5019	6667	75	NA
2,6-Dichlorophenol	7883	6667	118	NA
m,p-Chlorophenol	10171	6667	153	NA
2,3,5-Trichlorophenol	8168	6667	123	NA
2,4,6-Trichlorophenol	7573	6667	114	NA
2,4,5-Trichlorophenol	9598	6667	144	NA
2,3,6-Trichlorophenol	7797	6667	117	NA
3,5-Dichlorophenol	7947	6667	119	NA
3,4-Dichlorophenol	8379	6667	126	NA
2,3,4,6-Tetrachlorophenol	8898	6667	133	NA
Pentachlorophenol	10675	6667	160 *	17-109

QA/QC for Arsenic, Copper, and Zinc

Results of the Sample Spike Analysis for Metals in Soil

Sample 00384 was chosen for the sample spike analysis. The percent recoveries, listed in Table 2.11, range from 89 to 98. All three percent recoveries are within the QC limits.

Results of the Sample Duplicate Analysis for Metals in Soil

Sample 00384 was chosen for the sample duplicate analysis. The relative percent differences (RPDs), listed in Table 2.12, are 13 and 20. The RPD for arsenic is not calculated (NC) because both the sample concentration and the duplicate concentration are reported as not detected. The RPD for zinc is outside the QC criteria; according to the U.S. EPA Method 6010, no further action is required.

Results of the Laboratory Control Sample Analysis for Metals in Soil

One set of laboratory control sample analysis was performed. The percent recoveries, listed in Table 2.13, range from 74 to 89. All three found concentrations are within QC limits. The laboratory control samples QC limits were provided by the subcontract laboratory.

Table 2.11 Results of the Sample Spike Analysis for Metals in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID: 00384

	Sample Result (mg/Kg)	Spike Added (mg/Kg)	Spike Sample Recovered (mg/Kg)	MS %Rec.	QC Limits %Rec.
Arsenic	U	4.93	4.41	89	75 - 125
Copper	23.27	30.83	53.69	99	75 - 125
Zinc	31.59	61.65	91.90	98	75 - 125

Table 2.12 Results of the Sample Duplicate Analysis for Metals in Soil

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID: 00384

	Sample Results (mg/Kg)	Duplicate Results (mg/Kg)	%RPD	QC Limits RPD
Arsenic	U	U	NC	20
Copper	23.27	26.42	13	20
Zinc	31.59	38.69	20 *	20

\026\DEL\AR\9505\Penta18&19

Table 2.13 Results of the Laboratory Control Sample Analysis for Metals in Soil

WA #0-026 Penta Wood Products Site

	True (mg/Kg)	Found (mg/Kg)	QC Limits (mg/Kg)	%Rec
Arsenic	65	56	32 - 97	86
Copper	146	130	69 - 205	89
Zinc	77	57	46 - 116	74

QA/QC for Wet Chemistry

Results of the Matrix Spike Analysis for Wet Chemistry

Samples 00384, 00389 and 95-03-031-01A (a non-REAC sample) were chosen for the matrix spike analysis. The percent recoveries, listed in Table 2.14, range from 79 and 122. There are no QC limits available.

Results of the Sample Duplicate Analysis for Wet Chemistry

Samples 00384 was chosen for the sample duplicate analysis. The relative percent differences (RPDs), listed in Table 2.15, range from 2 to 8. The RPD value for chloride is not calculated because either sample concentrations or duplicate concentrations are below detection limits. There are no QC limits available.

Results of the Laboratory Control Sample Analysis for Wet Chemistry

The percent recoveries of the laboratory control sample analysis, listed in Table 2.16, range from 93 to 109. All recoveries are within the 95% confidence interval criteria which were provided by the subcontract laboratory.

Table 2.14 Results of the Matrix Spike Analysis for Wet Chemistry

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Analysis	Sample ID	Sample Result mg/Kg	MS Spiked mg/Kg	MS Result mg/Kg	MS %Recovery
Ammonia	00384	197	1210	1400	99
Chloride	00384	U	1079	1320	122
TKN	00384	1490	826	2430	114
Sulfate	95-03-031-01A*	12.4	10	21	86
TOC	00384	14200	6490	20200	92
TPH	00389	1340	258	1545	79
Phosphate (Ortho)	00384	49.9	61.7	110	97
Phosphorus	00384	138	61.6	198	97
Nitrate	00384	299	30.8	334	114

* This sample is not a REAC sample and the unit is mg/L.

Table 2.15 Results of the Sample Duplicate Analysis for Wet Chemistry

WA #0-026 Penta Wood Products Site

Based on Dry Weight

Sample ID: 00384

Analysis	Sample Result mg/Kg	Duplicate Result mg/Kg	%RPD
Ammonia	197	207	5
Chloride	U	U	NC
TKN	1490	1660	11
Sulfate	12.5	12.1	3
TOC	14200	14500	2
TPH	1110	1130	2
Phosphate (Ortho)	49.9	50.7	2
Phosphorus	138	127	8
Nitrate	299	304	2

Table 2.16 Results of the Laboratory Control Sample Analysis for Wet Chemistry

WA #0-026 Penta Wood Products Site

Analysis	True mg/L	Found mg/L	95% Confidence Interval	%Recovery
Ammonia	4.43	4.33	3.72 - 5.14	98
Chloride	182	184	170 - 195	101
TKN	4.43	4.12	3.72 - 5.14	93
Sulfate	146	144	125 - 160	99
TOC	1000	1050	800 - 1200	105
TPH	33.9	32.2	28.8 - 38.9	95
Phosphate (Ortho)	7.64	7.47	6.49 - 8.79	98
Phosphorus	5.72	6.25	4.92 - 6.52	109
Nitrate	8.11	7.75	7.22 - 9.0	96

WESTON
MANAGERS DESIGNERS.CONSULTANTS

Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

General Physics Environmental
202 Perry Parkway
Gaithersburg, MD 20877

Attn: Ken Ives

March 16, 1995

Project # 3347-040-001-0026, Penta Wood Products, Engineering/Bioremediation

As per Weston REAC Purchase Order number 08-31884, dated 03/16/95, please analyze samples according to the following parameters:

Analysis/Method	Matrix	# of samples
Nitrogen, NH3/EPA 350.2	Soil	6 samples to be analyzed for each parameter; samples to be received 3/16/95.
Nitrogen, NO3/EPA 353.2	Soil	
Nitrogen, Total Kjeldahl/EPA 351.3	Soil	
Phosphate/EPA 365.3	Soil	
Phosphate, Total/EPA 365.3	Soil	24 additional samples to be analyzed for each parameter; samples to be received during May or June of 1995.
Metals: Cu,As,Zn/Series 6000 or 7000	Soil	
Chloride/SW-846-9252	Soil	
Sulfate/EPA 375.4	Soil	
Carbon, Total Organic/SW-846-9060	Soil	
TPH/418.1	Soil	
Water Holding Capacity/3.4.11.1	Soil	
Data package as per attached Deliverables Requirements		

Samples are expected to arrive at your laboratory on March 16, 1995. All applicable QA/QC (MS/MSD) analysis will be performed on each of our sample matrices. Preliminary results tables including MS/MSD's plus a signed copy of our Chain of Custody is due at REAC on March 30, 1995, with the complete data package by April 13, 1995. The complete data package must include all items on the deliverables checklist. Samples may be contaminated with low ppm levels of pentachlorophenol.

Please submit all reports and technical questions concerning this project to **John Johnson at (908) 321-4248 or fax to (908) 494-4020**. Any contractual question, please call Cindy Snyder at (908) 321-4296. Thank you

Sincerely,

George Armstrong
Data Validation and Report Writing Group Leader
Roy F. Weston, Inc. / REAC Project

GA:cs Attachments

cc.	R. Singhvi	V. Kansal	C. Snyder
	H. Allen	Subcontracting File	M. Mohn
	0026\non\mem\9503\sub\0026CO13	B. Lewan	G. Armstrong

WESTON
MANAGERS DESIGNERS/CONSULTANTS
Roy F. Weston, Inc.
GSA Raritan Depot
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey 08837-3679
908-321-4200 • Fax 908-494-4021

Analab, Inc.
205 Campus Plaza I
Edison, NJ 08837

November 29, 1994

Attn: Joe Larusso
Project # 3347-040-001-0026, Penta Wood

As per Weston REAC Purchase Order number 08-31216, dated 11/28/94, please analyze samples according to the following parameters:

Analysis/Method	Matrix	# of samples
BNA/SW-846-8270 Table 5	Soil	10 one sampling only
Phenols/SW-846-8270 See Attached List	Water Soil	8/month for 5 months 12/month for 5 months
Data package as per attached Deliverables Requirements		

Samples are expected to arrive at your laboratory on December 2, 1994 and early January with subsequent sampling events resuming in late March 1995. All applicable QA/QC (MS/MSD) analysis will be performed on each of our sample matrix. Preliminary results tables including MS/MSD's plus a signed copy of our Chain of Custody is due at REAC 10 business days after each sample receipt, with the complete data package due 21 business days after each sample receipt. The complete data package must include all items on the deliverables checklist. Samples may be potenially dioxin contaminated.

ALL ORGANIC EXTRACTIONS ON SOLIDS IE: BNA, PEST/PCB MUST BE BY SOXHLET EXTRACTION

Should any questions or problems arise concerning this project, please call John Johnson at (908) 321-4248 or fax to (908) 494-4020. Any contractual question, please call Cindy Snyder at (908) 321-4296. Thank you

Sincerely,

George Armstrong
Data Validation and Report Writing Group Leader
Roy F. Weston, Inc. / REAC Project

GA: jj Attachments

cc. R. Singhvi
H. Allen
Central File
0026.CON7
V. Kansal
Subcontracting File
M. Van Clef
C. Snyder
M. Mohn/T. Mignone
G. Armstrong

0026\non\mem\9411\sub\0026.CON7

REAC, E..on, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAI[redacted]STODY REC[redacted]

Project Name: PENTA WOOD PROD
Project Number: 03347-040-001-0026-01
RFW Contact: M. MUHN Phone: 908-321-4257

No: 09726

SHEET NO. 1 OF 1

031695

Sample Identification **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
354	A02227	DW1A-5	W	3/14/95	1	32oz gl / –	X			
355	A02228	DW1B-5	↓	↓	1	↓ ↓	↓			
356	A02229	DW2A-5			1					
357	A-C02230	DW2B-5			3					
358	A02231	DW3A-5			1					
359	A02232	DW3B-5			1					
360	A02233	DW4A-5			1					
361	A02234	DW4B-5	↓	↓	1	↓ ↓	↓			

MFM

MFM

00045

Matrix:

SD - Sediment PW - Potable Water S - Soil
DS - Drum Solids GW - Groundwater W - Water
DL - Drum Liquids SW - Surface Water O - Oil
X - Other SL - Sludge A - Air

Special Instructions:
DO MS/MSD ON A-C02230

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Moh	3/15/95	B. Lewis	3/16/95	10:45	All/PCP	B. Lewis	3/16/95	[illegible]	12:00	3/16/95

FORM #4 8/94

* US GPO 1994-383-015

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

FWA 18K

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PROD.
Project Number: 03377-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 09729

SHEET NO. 1 OF ___

03/695

Sample Identification | **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		PCP			
377	A-C00390	BIO INFLUENT-6	W	3/15/95	3	32 oz gl	-	X			
378	A00391	BIO LEACHATE-6	↓	↓	1	↓	↓	↓			
379	A00392	GREEN TANK 1-6	↓	↓	↓	↓	↓	↓			
380	A00393	WHITE TANK 2-6	↓	↓	↓	↓	↓	↓			
381	A00394	WHITE TANK 3-6	↓	↓	↓	↓	↓	↓			

MFM

MFM

000246

Matrix:

SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	3/15/95	B Lewa	3/16/95	10:45	5/PCP	B Lewa	3/16/95	[illegible]	3/16/95	12:40

FORM #4

8/94

U 1994-383-015

REA[redacted] NJ[redacted]
(908) 321-4200
EPA Contract 68-C4-0022

Project Name: [redacted]
Project Number: 03347-040-001-0026-01
RFW Contact: M MOHN Phone: 908-321-[redacted]

No: 09721
95-03-320
SHEET NO. 1 OF 1

E1140008

Sample Identification

Analyses Requested

	REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	*			
1		B02227	DW1A-5	W	3/14/95	1	32 oz g/l —				1LTR
2		B02228	DW1B-5			1					"
3		B02229	DW2A-5			1					"
4		D-F02230	DW2B-5			3					3LTRS
5		B02231	DW3A-5			1					1LTR
6		B02232	DW3B-5			1					"
7		B02233	DW4A-5			1					"
8		B02234	DW4B-5			1					"

MEM

MEM

0004

All Samples Received
Temp Cool :00 Yes No
Samples Intact Yes No
Properly Preserved Yes No

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
* CHLORINATED PHENOLS
DO MS/MSD ON D-F02230

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	3/15/95					Federal Express	3/16/95	[signature]	3/16/95	1100

02

FOR 8/9

* US GPO 1994 381

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

Project Name: AGNTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: (908) 321-4200

No: 09899

SHEET NO. 1 OF 1

Sample Identification

	REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	X			
1		B02166	DS1A-5	S	3/14/95	1	4oz glass/NONE	X			1-4oz
2		B02167	DS1B-5								"
3		B02168	DS1C-5								"
4		B02169	DS2A-5								"
5		B02170	DS2B-5								"
6		B02171	DS2C-5								"
7		B02221	DS3A-5								"
8		B02222	DS3B-5								"
9		B02223	DS3C-5								"
10		B02224	DS4A-5								"
11		B02225	DS4B-5								"
12		B02226	DS4C-5								"

3/16/95

Analyses Requested

All Samples Received
Temp. ... 4°C Yes No
Samples intact Yes No
Properly Preserved Yes No

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:
X - Chlorinated Phenols
perform ~~MS/SD~~ MS/MSD randomly for 10% of samples

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All Analysis	M. Mohn	3/15/95					Federal Express	3/16/95	[illegible]	3/16/95	11:00

FORM 8/94

U.S. GPO: 1994-383-01

002

000040

040004

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTH WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: (908) 321-4200

No: 10058

SHEET NO. 1 OF

SAMPLE IDENTIFICATION | ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/ Preservative	Nutrients X			
	00384	DT 1-3 COMPS	S	3/14/95	1	4oz g ss/none	X			
	00385	DT 4-6 COMPS								
	00386	DT 7-9 COMPS								
	00387	DC 1-3 COMPS								
	00388	DC 4-6 COMPS								
	00389	DC 7-9 COMPS								

EI130008

00053

gla 3/14/95

gla 3/14/95

DO MS/MSD ON 1 SAMPLE

OK MFM 3/15/95

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions: X Nutrients: NO_3, NH_3, TKN, PO_4^{-2}, total phosphorous, Arsenic, Copper, Zinc, Cl^-, SO_4^{-2}, TOC, TPH, water Holding Capacity + PHOSPHATE

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF
CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
6/Analysis	M. Mohn	3/15/95							[illegible]	3/16/95	9:20A

Temp 1.4°C

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

FWR 10K

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 09730

SHEET NO. 1 OF ___

Sample Identification							Analyses Requested			
REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A00395	WRA-2	S	3/15/95	1	4oz gl / —	X			
	A00396	WRB-2	↓	↓	↓	↓ ↓	↓			
	A00397	WRC-2								
	A00398	STOCK SOIL 1A								
	A00399	STOCK SOIL 1B								
	A00400	STOCK SOIL 1C								
	A00401	STOCK SOIL 2A								
	A00402	STOCK SOIL 2B								
	A00403	STOCK SOIL 2C								

MM

MM

00050

E1070009

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
DO MS/MSD ON RANDOMLY SELECTED SAMPLE

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	3/15/95	[illegible]	3/16/95	1030						

FORM #4

8/94

1994 383-015

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: (908)321-4200

No: 09898

SHEET NO. 1 OF 1

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	AP			
	A02166	DS1A-5	Soil	3/14/95	1	4 oz glass/none	X			
	A02167	DS1B-5								
	A02168	DS1C-5								
	A02169	DS2A-5								
	A02170	DS2B-5								
	A02171	DS2C-5								
	A02221	DS3A-5								
	A02222	DS3B-5								
	A02223	DS3C-5								
	A02224	DS4A-5								
	A02225	DS4B-5								
	A02226	DS4C-5								

JES 3/14/95

JES 3/14/95

Matrix:
SD - Sediment; DS - Drum Solids; DL - Drum Liquids; X - Other
PW - Potable Water; GW - Groundwater; SW - Surface Water; SL - Sludge
S - Soil; W - Water; O - Oil; A - Air

Special Instructions: Perform ~~MS/SD~~ MS/MSD randomly for 10% of samples

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	3/15/95	[illegible]	3/15/95	11:35						

FORM #4 8/94

★ US GPO 1994-383-015

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E1070011

ENGINEERING - BIO - LANDFARM -   PWA 18K

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN   Phone: (908) 321-4200

No: 09902

SHEET NO. 1 OF 1

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A02235	DT 1-3A COMPS	S		1	4oz glass/ none	X			
	A02236	DT 1-3B COMPS								
	A02237	DT 1-3C COMPS								
	A02238	DT 4-6A COMPS								
	A02239	DT 4-6B COMPS								
	A02477	DT 4-6C COMPS								
	A02478	~~DT 7-9~~ COMPS						DT 7-9A COMPS		
	A02479	DT 7-9B COMPS								
	A02480	DT 7-9C COMPS								
	A02481	DT 1-9 COMPS								
	A02482	DC 1-3A COMPS								
	A02483	DC 1-3B COMPS								
	A02484	DC 1-3C COMPS								
	A02485	DC 4-6A COMPS								
	A02486	DC 4-6B COMPS								
	A02487	DC 4-6C COMPS								
	A02488	DC 7-9A COMPS								
	A02489	DC 7-9B COMPS								
	A02490	DC 7-9C COMPS								
	A02491	DC 1-9 COMPS								

gu 3/17/95

gu 3/16/95

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
perform ~~MS/SD~~ MS/MSD randomly at rate of 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	3/15/95	[illegible]	3/15/95	1030						

FORM #4   8/94

00052

E1070013

* U.S. GPO 1994-383-015

ENGINEE[illegible] BIO COMPOST [illegible] TWA [illegible]

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MAHN Phone: (908) 321-4200

No: 09904

SHEET NO. 1 OF 4

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP				
	A02492	1A1 Comp6	S	3/15/95	1	4oz glass/none	X				
	A02493	1A2 Comp6									
	A02494	1A3 Comp6									
	A02495	~~1A4 Comp6~~ 1B1 COMP6									
	A02496	~~[illegible] COMP6~~ 1B2 Comp6									
	A02497	~~[illegible] COMP6~~ 1B3 COMP6									
	A02498	1C1 Comp6									
	A02499	1C2 Comp6									
	* A02800	1C3 COMP6									
	A02873	2A1 Comp6									
	A02874	2A2 Comp6									
	A02875	2A3 Comp6									
	A02876	2B1 Comp6									
	A02877	2B2 Comp6									
	A02878	2B3 Comp6									
	A02879	2C1 Comp6									
	A02880	2C2 Comp6									
	A02881	2C3 Comp6									
	A02882	3A1 Comp6									
	A02883	3A2 Comp6									

00053
E1070015

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

* Sample # should read A02500 not A02800 JA

Special Instructions:
Perform MS/MSD randomly at a rate of 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
			[illegible]	3/16/95	10:30						

FORM #4 8/94

* US GPO 1994-383-015

ENGINEERING - BIO - COMPOST - PWA 18K

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: (908) 321-4200

No: 09905

SHEET NO. 1 OF 4

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A02884	3A3 COMP6	S	3/15/95	1	4oz glass/none	X			
	A02885	3B1 COMP6								
	A02886	3B2 COMP6								
	A02887	3B3 COMP6								
	A02888	3C1 COMP6								
	A02889	3C2 COMP6								
	A02890	3C3 COMP6								
	A02891	4A1 COMP6								
	A02892	4A2 COMP6								
	A02893	4A3 COMP6								
	A02894	4B1 COMP6								
	A02895	4B2 COMP6								
	A02896	4B3 COMP6								
	A02897	4C1 COMP6								
	A02898	4C2 COMP6								
	A02899	4C3 COMP6								
	A02900	5A1 COMP6								
	A02901	5A2 COMP6								
	A02902	5A3 COMP6								
	A02903	5B1 COMP6								

Matrix:
SD - Sediment; DS - Drum Solids; DL - Drum Liquids; X - Other
PW - Potable Water; GW - Groundwater; SW - Surface Water; SL - Sludge
S - Soil; W - Water; O - Oil; A - Air

Special Instructions:
Perform ms/msd randomly at a rate of 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
			[illegible]	3/16/95	1030						

FORM #4 8/94

E1070018

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* U.S. G.P.O. 1994-383-015

REAC, E[redacted]on, NJ
(908) 321-4200
EPA Contract 68-C4-0022

[redacted]HA[redacted]F C[redacted]OD[redacted]EC[redacted]

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0076-01
RFW Contact: M. MOHN Phone: (908) 321-4200

No: 09906

SHEET NO 3 OF 4

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP				
	A02904	5B2 COMP6	S	3/15/95	1	4ozGLSS/None	X				
	A02905	5B3 COMP6									
	A02906	5C1 COMP6									
	A02907	5C2 COMP6									
	A02908	5C3 COMP6									
	A02909	6A1 COMP6									
	A02910	6A2 COMP6									
	A02911	6A3 COMP6									
	A02912	6B1 COMP6									
	A02913	6B2 COMP6									
	A02914	6B3 COMP6									
	A02915	6C1 COMP6									
	A02916	6C2 COMP6									
	A02917	6C3 COMP6									
	A02918	7A1 COMP6									
	A02919	7A2 COMP6									
	A02920	7A3 COMP6									
	A02921	7B1 COMP6									
	A02922	7B2 COMP6									
	A02923	7B3 COMP6									

3/15/95

00055

E1070020

Matrix:

SD - Sediment	PW - Potable Water	S - Soil
DS - Drum Solids	GW - Groundwater	W - Water
DL - Drum Liquids	SW - Surface Water	O - Oil
X - Other	SL - Sludge	A - Air

Special Instructions:

Perform MS/MSD randomly at a rate of 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
			[illegible]	3/16/95	1030						

FORM #4 8/94

* U S GPO. 1994-383-015

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-00026-01
RFW Contact: M. MOAN Phone: (908) 321-4700

No: 09907

SHEET NO. 4 OF 4

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	PCP			
	A02924	7C1 COMP6	S	3/15/95	1	4oz glass/none	X			
	A02925	7C2 COMP6								
	A02926	7C3 COMP6								
	A02927	8A1 COMP6								
	A02928	8A2 COMP6								
	A02929	8A3 COMP6								
	A02930	8B1 COMP6								
	A02931	8B2 COMP6								
	A02932	8B3 COMP6								
	A02933	8C1 COMP6								
	A02934	8C2 COMP6								
	A02935	8C3 COMP6								

JC 3/18/95

JC 3/18/95

Matrix:
SD - Sediment; DS - Drum Solids; DL - Drum Liquids; X - Other
PW - Potable Water; GW - Groundwater; SW - Surface Water; SL - Sludge
S - Soil; W - Water; O - Oil; A - Air

Special Instructions:
Perform MS/MSD randomly at a rate of 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
			[illegible]	3/17/95	1030						

FORM #4 8/94

★ U.S. G.P.O. 1994-383-015

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E1070022

Appendix B

APPENDIX B
Results from GDI
Penta Wood Products
May 1995

026\del\tm\9505\tm0026

GRACE Dearborn

DATE: September 30, 1994

PLEASE DELIVER TO: Mr. Ramu Demuri

COMPANY: REAC

TELECOPY NO.: (908) 494-~~4089~~ 4021

THIS TRANSMITTAL IS FROM: Paul G. Bucens

NUMBER OF PAGES INCLUDING THIS COVER PAGE: 2

If you experience problems in receiving, please call us at (905) 279-2222 and ask for: Eliza, ext. 378.

Dear Mr. Demuri,

Re: Penta Wood Products, Siren, WI - DARAMEND™ Demonstration
Grace Dearborn Project#: U10-835

As requested this afternoon, please find listed below the bullet point summary of goods and services to be provided by Grace Dearborn under the terms of the $US 5,500.00 (exclusive of taxes) quote detailed in the letter to Steve Faryan (September 13, 1994).

Specifically included in the $5,500.00 are:

- analytical costs incurred during the in-parallel laboratory optimization;
- travel and per diem expenses;
- material (except requisite DARAMEND amendments);
- material shipment costs;
- treatment area construction labour; and
- rental of tillage equipment.

Specifically excluded from the quote are goods and services to be provided by EPA for plot maintenance, including:

- semi-weekly tillage;
- irrigation as required by Grace Dearborn (not more than semi-weekly);

- moisture sampling and chemical analyses; and
- regular visual inspection and repair of damage to the treatment area.

Grace Dearborn will be providing in kind contributions comprised primarily of the in-parallel laboratory study, requisite DARAMEND amendments and personnel for project oversight.

With regard to the issue of publicly disseminating the data, the DARAMEND technology is currently patent pending and the technology is considered commercially confidential. The particulars of the DARAMEND technology may not be divulged, especially process conditions such as amendment makeup, rate of addition or optimal moisture content. The results of the technology application such as the change in concentration of the contaminant of concern and the time for the change may be divulged and attributed to the effects of DARAMEND.

I trust that these notes will be of assistance.

Sincerely,

Paul G. Bucens, M. Eng.
Project Manager

DARAMEND™ is a registered trademark of Grace Dearborn Inc.

cc. S. Faryan (ERT)
H. Allen (EPA)
A. Seech (GDI)

GRACE Dearborn

Grace Dearborn Inc.
Environmental/Engineering Group

November 23, 1994

Mr. Michael Mohn
REAC Program - U.S. EPA
Roy F. Weston, Inc.
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey
08837-3679

Dear Mike:

Re: Status of the DARAMEND™ Landfarm, Penta Wood Products Bioremediation GDI Project #: U10-832; P.O. No. 08-30981

This letter summarizes the work completed to date and the ongoing requirements for effective maintenance of Grace Dearborn Inc.'s (GDI) component of the Penta Wood field treatability demonstration being managed by Roy F. Weston under the U.S. EPA REAC Program. The demonstration is to provide a technical basis for selection of a full-scale remediation technology.

Work Completed:

Prior to any field activity, GDI initiated a laboratory treatability study on a sample of soil from the site that was to be representative of the soil treated at larger scale. One pail of soil was received September 24, 1994. The sample was air dried sieved to 4.75 mm and submitted for characterization of selected parameters. The characterization is summarized in Table 1.

On the basis of the characterization data and GDI's experience a soil treatment thought to be effective was defined by GDI (DARAMEND D6380 at 3% wt./wt.). The efficacy of this treatment and variations on this treatment were tested in five duplicated microcosms. Each microcosm contained approximately 100 g of the Penta Wood soil spiked with ^{14}C-PCP. Each microcosm contained a sodium hydroxide trap to solubilize all ^{14}C-CO_2 (one of the final products of complete biological oxidation of the ^{14}C-PCP) generated in the microcosm. By periodically submitting the sodium hydroxide to liquid scintillation counting the fraction of ^{14}C spiked as PCP that had been mineralized to CO_2 could be calculated.

After 22 days of treatment the extractable concentration of chlorophenols in the soil had been reduced to between 12 mg/kg and 17 mg/kg. Between 57% and 64% of the spiked ^{14}C was accounted for as ^{14}C-CO_2. This percentage effectively represents complete biological oxidation of the spiked PCP as a small percentage of the spike would remain in the soil and the remainder is typically incorporated as cell biomass. The best treatment (12 mg/kg residual PCP) was a combined treatment of 3% D6380 and 0.2% D6399.

Past experience has shown that additional evolution of $^{14}C-CO_2$ will gradually occur as the soil microorganisms undergo endogenous respiration. As additional information will not be gained by maintaining the microcosms through this release phase, the study has been terminated.

From October 21 through to October 24 a small pilot-scale facility was constructed at the Penta Wood site. The facility, sketched in Figure 1, consisted of a control plot 8'0"x7'6"x8" and a treatment plot 14'0"x8'0"x8". It was estimated that this volume of soil represented 2.6 tonnes (2.9 tons) and 1.4 tonnes (1.5 tons) of soil respectively. Once the soil had been placed and leveled it was thoroughly (twice in each direction along the lenght of the cells) tilled with the hand held roto-tiller. Note that the tiller could not mix soil approximately one foot from each end of the cell and approximately 6" from the sides of the cell.

The amendments (3% D6380 and 0.2% D6399) were incorporated and the plots irrigated. The treatment plot was tilled thoroughly during amendment addition and both treatment and control plots were tilled thoroughly following irrigation. The target moisture was 20.6% for the treatment and 16.8% (M. Mohn, 24 Oct., 94) for the control plots. The moisture content achieved for the treatment was likely near target, while the control plot moisture was likely 13.2% as the soil appeared too wet before all the irrigation water was added i.e. pools of water developed.

Following amendment and irrigation REAC took samples for PCP characterization. The samples obtained were analysed for various parameters by GDI. The results are summarized in Table 2 and values from the laboratory study are included for comparison.

The soil used in the pilot treatability is obviously quite different in character from that studied in the laboratory. The PCP concentration in the field is an order of magnitude less than that in the laboratory and the soil from the field is more acid.

Ongoing Requirements:

Following initiation of treatment through incorporation of the DARAMEND amendments, the key process control variables for the DARAMEND technology are moisture content and frequency of soil aeration and homogenization (tillage). The successful operation of the DARAMEND technology require samples for moisture characterization to be regularly taken and adjustments to soil moisture be made soon afterwards. In addition, the greater the tillage frequency, the better the performance as increased tillage increases the degree of aeration and the homogeneity of the soil (reducing contaminant hotspots and other localized biological stresses).

The agreed upon frequency of tillage and moisture sampling was every two weeks with irrigation occurring not more than once every two weeks. Samples were to be couriered to GDI for moisture characterization. It is recommended that the plots are tilled once in each direction along the length of the cells and care should be taken to avoid damage to the liner when tilling near to the cell walls.

I would appreciate it if you would confirm:

- the field PCP concentrations determined by REAC for the control and treatment plots;

- the continued relevance of the field study regarding DARAMEND as a potential high performance bioremediation technology for full-scale application at the Penta Wood site; and

- your continued commitment to upholding the treatment maintenance schedule for the treatment.

Given the extremely rapid destruction of PCP in the laboratory (greater than 90% in less than three weeks) I would strongly recommend sampling the treatment soils for PCP determination as soon as possible.

Please call me at (905) 279-2222 or fax me at (905) 279-0020 if you have any questions.

Regards,

Paul Bucens, M. Eng.
Project Manager

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cc. A. Seech

v:\proj\832\reac1.doc

Table 1: Selected physical and chemical characteristics of the Penta Wood soil sample treated in the laboratory treatability study.

Parameter[1]	Value
Sand content (%)	90.2
Silt content (%)	5.7
Clay content (%)	4.1
Available Phosphorous (mg/kg)	10
Total Kjeldhal Nitrogen (%)	0.015
Nitrate Nitrogen (mg/kg)	1.51
Ammonium Nitrogen (mg/kg)	2.62
Total Organic Carbon (%)	6.73
pH (-)	7.5
Arsenic (mg/kg)	<0.32
Chromium (mg/kg)	26
Copper (mg/kg)	65
Zinc (mg/kg)	37
2,3,4,6 Tetrachlorophenol (mg/kg)[2]	1.3
Pentachlorophenol (mg/kg)[2]	220

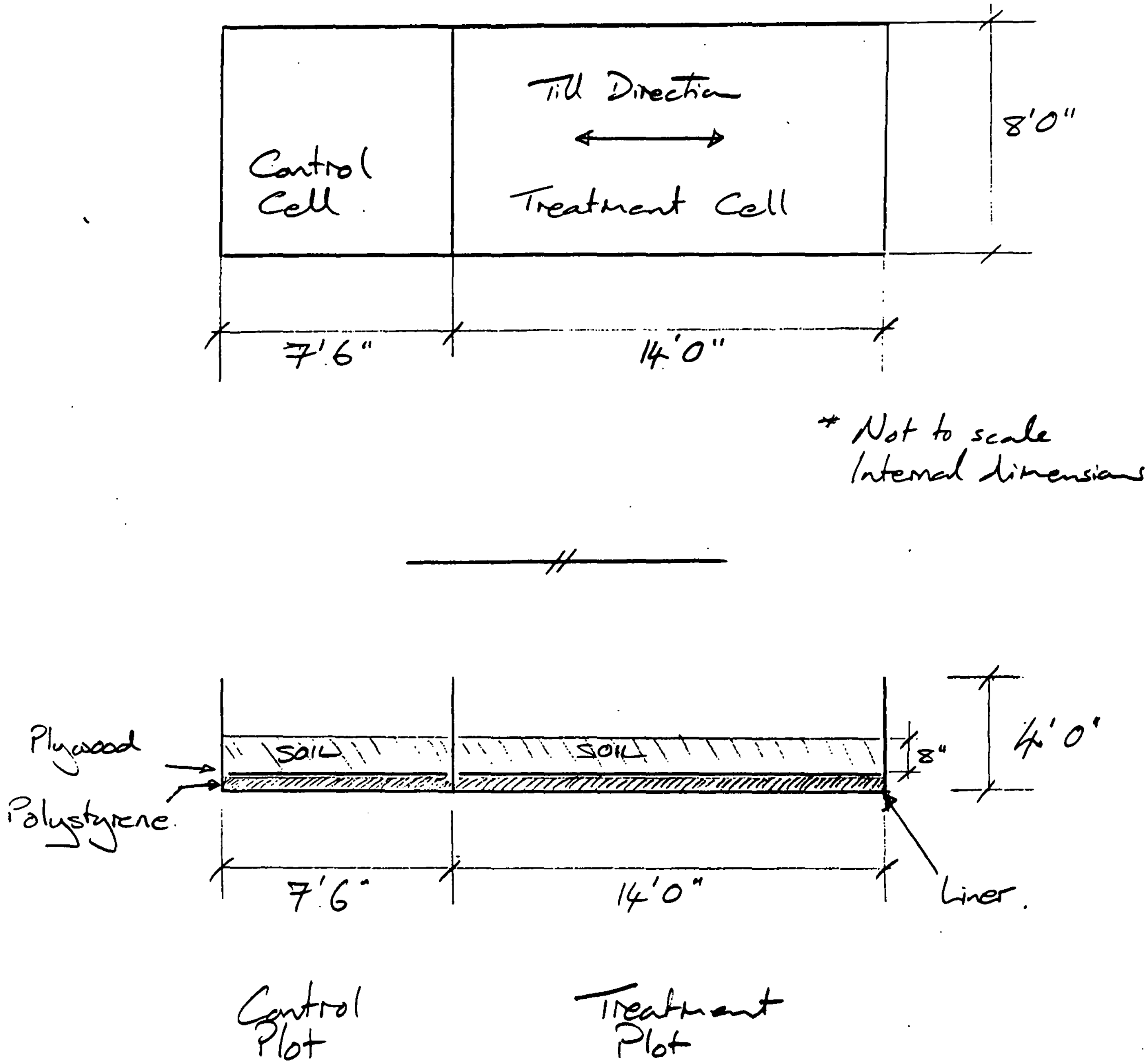
Note:
1. Concentrations of additional metals were quantified.
2. All other chlorophenol species were below detection limits of 0.6 mg/kg for mono- and di-chlorophenols and 0.3 mg/kg for tri-, tetra- and penta-chlorophenols.

Table 2: Selected characteristics of the treated and untreated soil at initiation of treatment.

Parameter	Control Comp. 1-9[1]	Treatment Comp. 1-3[2]	Treatment Comp. 4-6[2]	Treatment Comp. 7-9[2]	Lab. Sample
Water Holding Capacity (mL/g)	0.20	0.44[3,4]			0.17[4]
pH (-)	6.6	6.7[3]			7.5
Pentachlorophenol (mg/kg)	35	31	39	22	220

Note:
1. Composite sample of 9 defined subunits within the control plot.
2. Composite of 3 defined subunits within the treatment plot. Each of the three composite samples were split with REAC.
3. The three composites were composited to create a single sample representative of the treatment plot.
4. Note that the amended laboratory water holding capacity was 0.29 mL water/g soil.

Figure 1: Section and Plan of Treatment Cell at Penta Wood Site



Grace Dearborn Inc.
Environmental/Engineering Group

GRACE Dearborn

December 16, 1994

Mr. Michael Mohn
REAC Program - U.S. EPA
Roy F. Weston, Inc.
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey
08837-3679

RECEIVED
DEC 27 1994
WESTON/REAC

Dear Mike:

Re: **Status of the DARAMEND™ Landfarm, Penta Wood Products Bioremediation GDI Project #: U10-832; P.O. No. 08-30981**

Thank you for forwarding splits of the samples you collected November 29, 1994, from the DARAMEND treatment and control plots. Grace Dearborn Inc.'s analyses indicated that DT 1-9 Comp2 (treated plot composite) had a pH of 7.1 and a moisture content of 22 % and DC 1-9 Comp2 (control plot) had a pH of 6.4 and a moisture content of 11 %. Note that both pH and moisture has been revised since our conversation this morning.

Based on these analyses **250 L of water should be added to the treatment plot** as soon as possible. As discussed while I was at the site I will not be recommending any changes to the control plot and leave that to your discretion.

As the pH remains low could you please **incorporate 2.1 kg of CaO to the treatment plot**. It should be spread evenly over the surface then tilled thoroughly into the soil i.e. twice in each direction along the length of the cell. As mixing will occur more readily with a drier soil **add the requisite water after tilling in the CaO.**

Could you please advise me when you will next visit the site and when the water and CaO will be added.

I would also appreciate it if you would confirm:

- the field PCP concentrations determined by REAC for the control and treatment plots for the time zero samples;
- the continued relevance of the field study regarding DARAMEND as a potential high performance bioremediation technology for full-scale application at the Penta Wood site; and

- your continued commitment to upholding the treatment maintenance schedule for the treatment.

I hope that you have an enjoyable Christmas - please pass on my best wishes to Harry and Ramu. Call me at (905) 279-2222 or fax me at (905) 279-0020 if you have any questions.

Regards,

Paul Bucens, M. Eng.
Project Manager

DARAMEND™ is a registered trademark of Grace Dearborn Inc.

cc. A. Seech

v:\proj\832\reac2.doc

Grace Dearborn Inc.
Environmental/Engineering Group

GRACE Dearborn

December 23, 1994

Dr. Harry Allen
U.S. EPA/Environmental Response Team
2890 Woodbridge Avenue
Building #18 (MS101)
Edison, NJ
08837-3679

Dear Dr. Allen:

Re: Status of the DARAMEND™ Landfarm, Penta Wood Products Bioremediation GDI Project #: U10-832; P.O. No. 08-30981

I am very excited with the data that Grace Dearborn (GDI) has compiled to date for the Penta Wood demonstration. I have taken the initiative of summarizing the results below. This letter also serves to clarify our position regarding the control plot and restates some questions I have raised in the last two months.

- The laboratory work indicated that DARAMEND bioremediation of the Penta Wood soil was eminently feasible - <u>PCP concentrations were reduced from 220 mg/kg to between 12 and 17 mg/kg following 22 days of treatment</u>. As you know a ^{14}C-PCP isotope is spiked to the soil being treated as a tool to conclusively demonstrate the major fate of the PCP. Between 57% and 64% of the spiked ^{14}C-PCP was accounted for as $^{14}CO_2$ after 22 days of treatment. This percentage effectively represents <u>complete biological oxidation of the spiked PCP</u> as a small percentage of the spike would remain in the soil and the remainder is typically incorporated as cell biomass.

  In the field, our data indicates that the PCP concentration has been reduced to 6.5 mg/kg from an initial PCP concentration of 30.7 mg/kg following 36 days of treatment. The PCP concentration attained is likely near the remediation target for the site soils (typically 1 mg/kg to 5 mg/kg). It has been our experience with soils similar to Penta Wood's that the degradation will continue and a residual PCP concentration of less than 2 mg/kg will be attained in less than 150 days.

  The key point is that the <u>rapid reductions in PCP concentration achieved in the laboratory have been duplicated in the field</u>. Naturally the destruction and removal efficiency is less for the field data as the initial concentration was so much lower - obviously destruction and removal efficiency is not a fair means of comparing the two data sets.

- With regard to the control plot I do not believe that GDI should be providing advice for its optimal function. This reasoning is based on the philosophy that GDI offers a bioremediation package with DARAMEND that is comprised of the theoretical knowledge and practical experience of GDI's project personnel as well as the DARAMEND amendments. As such DARAMEND amendments have not been and are not projected to be sold purely as a product.

  The control plot should be a comparison of GDI's approach and industry standard practise. Standard practise should not be prescribed by GDI. Indeed, playing devil's advocate, such advice might constitute conflict of interest.

- I would also appreciate it if you would respond to the following questions:

  (i) What were the field PCP concentrations determined by REAC for the control and treatment plots for the samples analysed to date?

  (ii) Can you please confirm your continued commitment to upholding the treatment maintenance schedule for the treatment?

  (iii) Given the 30 mgPCP/kg starting concentration, is the information obtained from the field study still relevant regarding DARAMEND as a potential high performance bioremediation technology for full-scale application at the Penta Wood site? Obviously the destruction and removal efficiency will be significantly lower than if the treatment were to commence at 200 mg/kg as for the laboratory study.

  (iv) Given the volumetric advantage of DARAMEND relative to the compost piles and the high performance summarized above, can we "spike" the soil being treated with "hot" soil from the site to achieve initial PCP concentrations closer to those of the piles and provide a more reasonable basis for comparison? One of the unique features of DARAMEND is it's demonstrated effectiveness in treating soils contaminated by PCP at concentrations as high as ca. 700 mg/kg in the field and ca. 2,000 mg/kg in the laboratory.

I look forward to your timely response. Please call me at (905) 279-2222 or fax me at (905) 279-0020 if you have any questions. If more convenient please use my home telephone number (905) 891-5326.

Sincerely,

Paul Bucens, M. Eng.
Project Manager

DARAMEND™ is a registered trademark of Grace Dearborn Inc.

cc. A. Seech (GDI)
M. Mohn (REAC)
S. Faryan (U.S. EPA)
N. Friis (W.R. Grace)

v:\proj\832\reac3.doc

GRACE DEARBORN, INC.
P.O. Box 3060, Station A
Mississauga Ontario Canada L5A 3T5
Telephone: (905) 279-2222
Fax: (905) 279-0020

FAX TRANSMITTAL

This cover sheet is page 1 of 2 pages.

Date: 14 JAN 95 Fax No.: (908) 494-4021

Please distribute to: Mike Mahr - REAC

From: [illegible]

If you do not receive the correct number of pages listed above, please call ______________________

MESSAGE:

[illegible]

Regards,

[illegible]

ST806

GRACE Dearborn

Environmental/Engineering Group

January 14, 1995

Mr. Michael Mohn
REAC Program - U.S. EPA
Roy F. Weston, Inc.
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey
08837-3679

Dear Mike:

Re: Status of the DARAMEND™ Landfarm, Penta Wood Products Bioremediation
GDI Project #: U10-832; P.O. No. 08-30981

Thank you for forwarding splits of the samples you collected January 3, 1995 from the DARAMEND treatment and control plots. Grace Dearborn Inc.'s analyses indicated that DT 1-9 Comp3 (treated plot composite) had a pH of 7.0 and a moisture content of 14.6 % and DC 1-9 Comp3 (control plot composite) had a pH of 6.6 and a moisture content of 8.7 %.

Based on these analyses 375 L of water should be added to the treatment plot as soon as possible.

The pH appears to be ideal so no additional CaO will be required to be added to the treatment plot for now.

As discussed while I was at the site I will not be recommending any changes to the control plot and leave that to your discretion.

I will forward a note regarding the PCP levels that were determined by our laboratory for these samples as soon as the analyses are returned.

Call me at (905) 279-2222 or fax me at (905) 279-0020 if you have any questions.

Regards,

Paul Bucens, M. Eng.
Project Manager

DARAMEND™ is a registered trademark of Grace Dearborn Inc.

v:\proj\832\reac4.doc

GRACE DEARBORN INC.
3451 Erindale Station Road
P.O. Box 3060, Station A
Mississauga, Ontario, Canada L5A 3T5

Telephone: (905) 279-2222
Fax: (905) 279-0020

FAX TRANSMITTAL

This cover sheet is page 1 of 3 pages.

Date: 18 Jan 95 Fax No.: (908) 494-4021

Please distribute to: Mike Mohr - REAC

From: Paul Burns

If you do not receive the correct number of pages listed above, please call ______

MESSAGE: PCP data.

Hard copy not to follow.

Regards - Paul

ST806

GRACE Dearborn

Grace Dearborn Inc.
Environmental/Engineering Group

January 18, 1995

Mr. Michael Mohn
REAC Program - U.S. EPA
Roy F. Weston, Inc.
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey
08837-3679

Dear Mike:

Re: Status of the DARAMEND™ Landfarm, Penta Wood Products Bioremediation GDI Project #: U10-832; P.O. No. 08-30981

As promised, this letter summarizes the chlorophenol data for the treatment and control plots from the Penta Wood Products demonstration. The analyses were conducted in house on samples supplied by yourself (Control 1-9 Comp; DARAMEND 1-3 Comp, DARAMEND 4-6 Comp, DARAMEND 7-9 Comp, DC 1-9 Comp2, DT 1-9 Comp2, DC 1-9 Comp3, and DT 1-9 Comp3). The only chlorophenol detected has been pentachlorophenol (PCP).

DARAMEND 1-3 Comp, DARAMEND 4-6 Comp, DARAMEND 7-9 Comp were split samples. The remaining samples were unique, altough collected at the same time as REAC's samples.

Treatment Time (days)	DARAMEND Plot		Control Plot	
	Concentration (mg/kg)	DRE (%)	Concentration (mg/kg)	DRE (%)
0	30.7*	NA	35	NA
36	6.5	79	19	46
72	3.5	89	18	49

NA - Not Applicable
* The mathematical average of three samples (DARAMEND 1-3 Comp, DARAMEND 4-6 Comp, and DARAMEND 7-9 Comp).

../cont'd

I hope that this data is of interest to you and provides a reasonable basis for confirming that reasonable treatment criteria can be rapidly met with the DARAMEND technology.

Call me at (905) 279-2222 or fax me at (905) 279-0020 if you have any questions.

Regards,

Paul Bucens, M. Eng.
Project Manager

DARAMEND™ is a registered trademark of Grace Dearborn Inc.

cc. A. Seech

v:\proj\832\reac5.doc

GRACE Dearborn

Page 1/2

DATE: 13 Feb 95

SUBJECT: DACAMEN(?) treatment adjustment - Penta Wood

TO: Mike Mohn REAC (908) 494-4821

FROM: Paul Bruce

COPY TO:

Hard copy not to follow.

Paul.

GRACE Dearborn

Grace Dearborn Inc.
Environmental/Engineering Group

February 13, 1995

Mr. Michael Mohn
REAC Program - U.S. EPA
Roy F. Weston, Inc.
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey
08837-3679

Dear Mike:

Re: Status of the DARAMEND™ Landfarm, Penta Wood Products Bioremediation
GDI Project #: U10-832; P.O. No. 08-30981

Thank you for forwarding splits of the samples you collected February 7, 1995, from the DARAMEND treatment and control plots. Grace Dearborn Inc.'s (GDI's) analyses indicated that DT 1-9 Comp4 (treated plot composite) had a pH of 8.3 and a moisture content of 20.9 % and DC 1-9 Comp4 (control plot composite) had a pH of 8.6 and a moisture content of 5.9 %. These samples have also been submitted to GDI's Mississauga laboratory for chlorophenol analysis.

Based on these analyses, the following adjustments should be made to the **treatment plot**:

- **210 L of water should be added** as soon as possible; and
- No pH adjustment is required.

As discussed while I was at the site I will not be recommending any changes to the control plot and leave that to your discretion.

I will forward a note regarding the PCP levels that were determined by our laboratory for these samples as soon as the analyses are returned.

Call me at (905) 279-2222 ext. 2502 or fax me at (905) 279-0020 if you have any questions.

Regards,

Paul Bucens, M. Eng.
Project Manager

DARAMEND™ is a registered trademark of Grace Dearborn Inc.

cc. A. Seech (GDI)

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GRACE Dearborn

Grace Dearborn Inc.
Environmental/Engineering Group

February 13, 1995

RECEIVED
FEB 21 1995
WESTON/REAC

Dr. Harry Allen
U.S. EPA/Environmental Response Team
2890 Woodbridge Avenue
Building #18 (MS101)
Edison, NJ
08837-3679

Dear Dr. Allen:

Re: Status of the DARAMEND™ Landfarm, Penta Wood Products Bioremediation GDI Project #: U10-832; P.O. No. 08-30981

Thank you for taking the time to discuss some of my concerns when I called in the last week of January. I look forward to receiving the letter that you were drafting to me at that time.

Given the possibility of participating in a large scale project at the Penta Wood site this year I have summarized three key points of our conversation below to ensure that there is no confusion.

- The demonstration using GDI's DARAMEND technology is relevant compared to the other technologies being tested at the Penta Wood site. You noted that the performance evaluation for the technologies will be based on kinetics of PCP residual concentration reductions. The destruction and removal efficiencies <u>will not</u> be the criteria used to evaluate technology performance.

  Hence you felt that it was not an issue that the PCP concentration in the DARAMEND demonstration was initially much lower than those in the biopiles and comparison between technologies was fair.

- The trend in GDI's analytical data (my letter dated January 18,1995) is confirmed by the analyses obtained by REAC however the REAC concentrations are marginally higher than GDI's. REAC had found very low variability in the concentrations reported for samples that were laterally separated in the DARAMEND treatment plot. On the other hand, the variability from the biopiles was substantial and hypothesized to be due to the less vigorous mixing of the soil being treated.

- It is likely that field activity at the Penta Wood site in 1995 will be funded by the Environmental Response Team rather than the Region. This activity is likely to constitute larger scale testing of a technology on the concrete pad constructed during 1994.

GDI is eager to pursue the large scale field project in 1995. I would like to take this opportunity to note that the resources of GDI and our parent company W.R. Grace would be firmly committed to the project were we to proceed. The technology performance, considered with the low amendment requirements (less than 5% wt/wt) and the simple maintenance requirements poise DARAMEND as a leading biological technology in an evaluation based on economics, implementability and contaminant reduction performance.

With regard to your use of kinetics for technology evaluation, I would ask you to use caution and to evaluate the kinetics of the other technologies over the same concentration range as the DARAMEND technology. The kinetics of biological reactions often decrease as low contaminant concentrations are approached as the residual contaminants are hypothesized to be more tightly bound and less bioavailable than the bulk of the contamination.

The ultimate residual achieved also requires consideration. If a technology cannot achieve the requisite site-specific cleanup criteria, its utility at the site is limited.

Please call me at (905) 279-2222 or fax me at (905) 279-0020 if you have any questions. If more convenient please use my home telephone number (905) 891-5326.

Sincerely,

Paul Bucens, M. Eng.
Project Manager

cc. A. Seech (GDI)
M. Mohn (REAC)
S. Faryan (U.S. EPA)
N. Friis (W.R. Grace)

v:\proj\832\reac7.doc

GRACE Dearborn

2451 Erindale Station Road, Mississauga, Ontario, Canada L5A 3T5

To:	Mr. Michael F. Mohn
Fax:	908-494-4021
Company:	Roy F. Weston, Inc./REAC
COPIES	
To:	
Fax:	
Company:	
From:	Paul G. Bucens
Company:	Grace Dearborn Inc., Mississauga, Canada
Phone:	(905) 279-2222
Fax:	(905) 279-0020
Date:	March 20, 1995
Pages including cover page:	3

If you have problems receiving this fax, please call Eliza Pereira ext. 7463

Grace Dearborn Inc.
Environmental/Engineering Group

GRACE Dearborn

March 20, 1995

Mr. Michael Mohn
REAC Program - U.S. EPA
Roy F. Weston, Inc.
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey
08837-3679

Dear Mike:

Re: Status of the DARAMEND™ Landfarm, Penta Wood Products Bioremediation GDI Project #: U10-832; P.O. No. 08-30981

I appreciate you calling last week and updating me on the status of work at Penta Wood. I understand that the small-scale trial (P.O. No. 08-30981) is essentially over and that the following is planned beginning in May, 1995.

- Emptying out the small cell currently supporting Grace Dearborn Inc.'s (GDI's) DARAMEND landfarm test and using the cell to test the ability of the DARAMEND bioremediation technology to remediate a highly contaminated soil. The soil would be characterized by high concentrations of PCP (ca. 1,500 mg/kg) and percent levels of metals - potentially including arsenic, chromium, copper and zinc; and

- Conducting a large scale (ca. 170 tonnes) field trial using the DARAMEND technology (as a bench-mark technology) and at least one other bioremediation technology. All technologies would likely be run as landfarm operations.

As discussed, the tilling implement that is used during DARAMEND landfarm applications, is essentially a large agricultural roto-tiller. It has a width of approximately 7' and an active till depth of at least 2'.

I will discuss with Alan Seech the potential for use of the tiller for maintenance of the DARAMEND technology as well as the other technology(ies). At this point I cannot provide you with any guarantee that GDI will allow this dual use given the commercially confidential nature of tiller.

I look forward to receiving a scope of work for the larger scale trial and will put together a brief technical and cost proposal at that time. I also remain committed to assisting you in the generation of a final report for the small scale trial.

Call me at (905) 279-2222 ext. 2502 or fax me at (905) 279-0020 if you have any questions.

Regards,

Paul Bucens, M. Eng.
Project Manager

cc. A. Seech (GDI)
H. Allen (REAC)
S. Faryan (U.S. EPA)
N. Friis (W.R. Grace)

v:\proj\832\reac8.doc

GRACE Dearborn

1 of 1.

DATE: 20 March 95

SUBJECT: DARAMEND treated plot.

TO: Mike Mohn - REAC (908) 494-4021

FROM: Paul Rucens.

COPY TO: Outgoing U10-852.

Mike,

If you are going back to the field please add 200 L of water to the DARAMEND plot.

Thanks.

Paul

GRACE Dearborn

Grace Dearborn Inc.
Environmental/Engineering Group

April 7, 1995

Mr. Michael Mohn
REAC Program - U.S. EPA
Roy F. Weston, Inc.
Building 209 Annex (Bay F)
2890 Woodbridge Avenue
Edison, New Jersey
08837-3679

Dear Mike:

Re: On-site Bioremediation Test Using Grace Dearborn DARAMEND™ Technology, Penta Wood Products, Siren, WI

I received and reviewed the Statement of Work you faxed me April 5. As mentioned to you this morning, I discussed the project scope with Alan Seech and other members of Grace Dearborn. Our collective thoughts are summarized below.

I understand that the principal reason for conducting the bioremediation test program at the Penta Wood Products site ("the site") is to determine the effectiveness of bioremediation treatments (technologies) as remedial alternatives for site soils contaminated with pentachlorophenol (PCP). The data generated in such a study would be used to conduct a technical and cost analysis to select the best technology for full scale application at the site.

Given this objective it is very important to compare technologies as they may be applied at full-scale. Grace Dearborn's DARAMEND technology consists of:

- the DARAMEND amendment;
- the expertise of Grace Dearborn staff (with respect to setting of operating parameters such as moisture content); and
- specialized tillage equipment capable of tilling to a depth of two feet.

All applications of the DARAMEND technology to 100 tons or greater of soil have been as two foot deep landfarms. The only deviation has been small-scale biopiles (i.e. 35 tons) and small-scale landfarms (hand tilled as in the initial application at Penta Wood).

Hence, I feel strongly that demonstration of the DARAMEND technology as a one foot landfarm to determine cost and technical effectiveness is highly inappropriate and represents a less than optimal application. As Grace Dearborn is extremely enthusiastic at the prospect of participating in the piloting and remediation projects at Penta Wood we would make the following counter-proposals, in order of preference:

Vancouver, British Columbia • Fort Saskatchewan, Alberta • Regina, Saskatchewan • Winnipeg, Manitoba • Mississauga, Ontario
Montreal, Quebec • Fredericton, New Brunswick • Halifax, Nova Scotia • St. John's, Newfoundland
HEAD OFFICE: 3451 Erindale Station Road, Mississauga, Ontario L5C 2S9 Phone (416) 279-2222 Fax (416) 279-0020

GRACE Dearborn

ENVIRONMENTAL/ENGINEERING GROUP
3451 Brindale Station Road, Mississauga, Ontario, Canada L5A 3T5, Tel: (905) 279-2222 Fax: (905) 279-0020

To: Mr. Michael Mohn
Company: REAC Program - U.S. EPA
Fax: (908) 494-4021
Copies: Harry Allen, REAC - (908) 494-4021
Steve Faryan, U.S. EPA - (312) 353-9176
Nils Friis, W.R. Grace - (407) 362-1865
From: Paul Bucens
Date: April 7, 1995
Pages including cover page: 3

REPLY REQUIRED ☑ **ORIGINAL TO FOLLOW** ☐

SUBJECT: PCP Soil Remediation - Penta Wood, Siren, WI

If you have problems receiving this fax, please call Eliza Pereira ext. 7463

Mike:

As discussed this morning.

Regards,

Paul

Paul Bucens

1. that the Grace Dearborn DARAMEND technology be implemented as a two foot deep landfarm and tilled using Grace Dearborn's commercially confidential tiller and the other technologies be implemented using equipment sourced and supplied by REAC;

2. that all technologies be implemented using Grace Dearborn's commercially confidential tiller (two foot deep landfarms) with the understanding that the tiller may be applied in ensuing projects only as an integral part of the DARAMEND technology; or

3. that all technologies be implemented using commercially available standard agricultural roto-tiller (maximum one foot deep landfarms) with the understanding that written acknowledgment is provided by REAC in advance of project initiation to the effect that "the Grace Dearborn DARAMEND technology is being maintained in a less than optimal manner, against the recommendation of Grace Dearborn. A technical and cost evaluation will include an adjustment based on DARAMEND technical performance and cost data generated in past projects as provided by Grace Dearborn".

For each of the three options listed above, Grace Dearborn would specify operating parameters such as tilling frequency, irrigation requirements and addition of other amendments (i.e. pH adjusting chemicals and inorganic nutrients) for the Grace Dearborn landfarm. REAC may apply the same operating parameters to their landfarms as specified and applied to Grace Dearborn's, however Grace Dearborn in no way suggests that these parameters would be optimal for REAC's landfarms and would take no responsibility for the performance of those landfarms

Please review these options with Harry Allen and call me back at (905) 279-2222 ext. 2502 to discuss any or all of them. I look forward to working with you on this project.

Regards,

Paul Bucens, M. Eng.
Project Manager

cc. A. Seech (GDI)
H. Allen (REAC)
S. Faryan (U.S. EPA)
N. Friis (W.R. Grace)

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FACSIMILE COVER PAGE

To:	Michael Mohn - REAC	From:	Paul Bucens
Time:	10:24:38	Date:	5/16/95
Pages (including cover):	3		

Mike,

Followup to last week.

Regards,

Paul

Title: [illegible]
Creator: [illegible]
CreationDate: [illegible]

ENVIRONMENTAL/ENGINEERING GROUP
3451 Erindale Station Road, Mississauga, Ontario, Canada L5A 3T5, Tel: (905) 279-2222 Fax: (905) 279-0020

To:	Mike Mohn
Company:	REAC Program (Roy F. Weston)
Fax:	908-494-4021
Copies:	Alan Seech (Dearborn)/Harry Allen (REAC)
From:	Paul Bucens
Date:	May 16, 1995
Pages including cover page:	2

REPLY REQUIRED ☐ **ORIGINAL TO FOLLOW** ☐

SUBJECT: GDI Project No.: U10-832; Project Status

If you have problems receiving this fax, please call Paul Bucens at (905) 891-5326

Mike:

I spoke with Harry Allen last week and he informed me that he was eager to see DARAMEND™ included in the large-scale field trial at the Penta Wood site and that the third option outlined in my letter to you (April 7, 1995) was acceptable to him. He acknowledged that this approach would not represent optimal application of the DARAMEND technology and agreed to include a qualifying statement in the project report. Harry told me that a cost proposal would be requested from Dearborn in the near future.

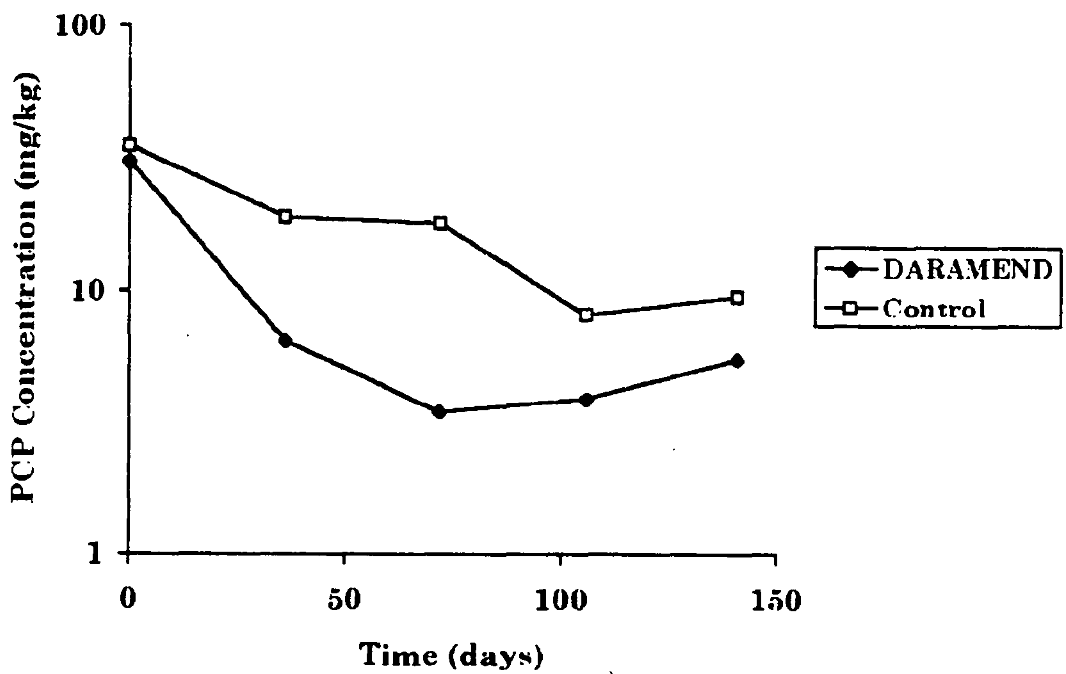
With regard to description of the small-scale project, my letters and faxes, addressed to you, Ramu and Harry, dated September 30, 1994; November 23, 1994; December 16, 1994; 23 Dec 94; December 23, 1994; January 14, 1995; January 18, 1995; February 13, 1995; and 20 March 95 provide a description of the tasks completed by Dearborn and the maintenance requested to be conducted by Roy F. Weston.

As requested last week, the table shown below represents the most up-to-date summary of PCP analyses conducted by Dearborn on soil samples sent to Dearborn's Mississauga facility by Roy F. Weston. I have also graphed the data, using a logarithmic concentration axis, in the accompanying figure.

While it is apparent that significant PCP decreases occurred in both plots, the rate of decrease and ultimate residual concentration in the study period was fastest and lowest, respectively, for the DARAMEND plot. I was surprised to hear from Harry that the DARAMEND plot was frozen, while the control plot was not - suggesting the control plot temperatures may always have been more elevated. It is quite possible, given similar temperature conditions in the two plots, that the DARAMEND plot would have performed even better.

Treatment Time (days)	DARAMEND Plot		Control Plot	
	Concentration (mg/kg)	DRE (%)	Concentration (mg/kg)	DRE (%)
0	30.7*	NA	35	NA
36	6.5	79	19	46
72	3.5	89	18	49
106	3.9	87	8.1	77
141	5.5	82	9.5	73

NA - Not applicable
* The mathematical average of three samples.



I look forward to receiving the revised scope of work for the larger scale pilot. If you require clarification of this fax please call me at (905) 279-2222 ext. 2502.

Regards,

Paul.

DARAMEND™ is a registered trademark of Grace Dearborn Inc.

Appendix C

APPENDIX C
Additional Data and Notes
Penta Wood Products
May 1995

026\del\tm\9505\tm0026

WESTON

MANAGERS DESIGNERS/CONSULTANTS

SHEET 1 of ___

CLIENT/SUBJECT PWP W.O. NO. ___

TASK DESCRIPTION Mass of PCP in Leachate TASK NO. ___

PREPARED BY MFM DEPT ___ DATE 5/23/95

MATH CHECK BY ___ DEPT ___ DATE ___

METHOD REV. BY ___ DEPT ___ DATE ___

APPROVED BY ___ DEPT ___ DATE ___

1) 1350 gal of 32 mg/L (avg) PCP conc.

= 5110 L of 32 mg/L

= 5110 (32) = ~~16,3512~~ 163,520 mg = 163 g PCP

2) 1500 gal of 9.2 mg/L (avg) PCP conc.

= 5677 L of 9.2 mg/L

= 5677 (9.2) = 52,228 mg = 52 g PCP

3) 575 gal of 4.2 mg/L (Avg) PCP conc

~~216~~ = 2176 L of 4.2 mg/L

= 2176 (4.2) = 9,140 mg = 9 g PCP

tot = 224 g PCP

WESTON
MANAGERS DESIGNERS/CONSULTANTS

CLIENT/SUBJECT	PWP			SHEET 2 of	
				W.O. NO.	
TASK DESCRIPTION				TASK NO.	
PREPARED BY	MFM	DEPT	DATE 3/23	APPROVED BY	
MATH CHECK BY		DEPT	DATE		
METHOD REV. BY		DEPT	DATE	DEPT	DATE

Total of 224 g PCP in ~~35~~ 3425 gal leachate.

Is this a significant fraction of the amt PCP lost from the soil?

A) Assume that 8 piles each had ~ 2 tons soil.

∴ contribution of all 8 piles was = .

∴ only need to take average initial PCP ~~sss~~ value.

B) Avg [PCP] of biopiles (initial):

PILE #	PCP conc (mg/kg)
1	460
2	210
3	240
4	160
5	230
6	170
7	230
8	220
	240 = Avg PCP conc.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

SHEET 3 of ____

CLIENT/SUBJECT PWP W.O. NO. ____
TASK DESCRIPTION ____ TASK NO. ____
PREPARED BY MFM DEPT ____ DATE 5/23
MATH CHECK BY ____ DEPT ____ DATE ____
METHOD REV. BY ____ DEPT ____ DATE ____

APPROVED BY
DEPT ____ DATE ____

There are 8 piles of soil with an avg of 240 mg/kg PCP.

~~∴ 1 pile~~ =

How many mg of PCP in entire mass of soil ?

8×2 tons $= 8 \times \cancel{2,000}$ 4,000 lb $= \cancel{16,000}$ 32,000 lb $= \cancel{14.5 \times 10^6}$

$= \cancel{70,400}$ 14545 kg soil ~~14,545~~

$\therefore \frac{240 \text{ mg } \cancel{kg} \text{ PCP}}{1 \text{ kg soil}} = \frac{x}{\cancel{70,400}\ 14545 \text{ kg soil}}$

$x = 240 \left(\cancel{70,400}\ 14545 \right) = 16.9 \times 10^6$ mg PCP

in the total mass of soil in 8 piles.

$= \cancel{16,896}$ ~~3,491~~ 3491 g ~~in~~ PCP in soil

Amt removed ~~by water~~ in leachate = 224 g

$\therefore \frac{224 \text{ g (in leachate)}}{\cancel{16896}\ 3491 \text{ g (total available)}} = \cancel{1.37\%}$ 6.4% of avail PCP was removed in leachate.

What is the amount of dilution in each biopile as a result of adding amendments?

Assumptions:

1) Soil in each pile = 2 yd^3 = 2.6 tons = 5200 lb.
(1 yd^3 = 1.35 tons)

2) Wood chips in each pile = 2 yd^3 = 2345 lb
(1 yd^3 = 1173 lbs)
density = ~~.7 g/cc~~ 43 lb/ft^3

∴ Each pile without addition of anything else besides soil + wood chips = 5200 + 2345
= 7545 lb

Since the control pile (#1) had soil + wood chips, the combined wt of soil + wood chips will be the "standard". – the concentration (initial) of the control pile (soil + wood chips) was 460 mg/kg.

M. Mohr 5/23/95

3) Sawdust → same density as wood chips
= ~~0.7 g/cc~~ = 586 lb in 1/2 yd^3
43 lb/ft^3 1172 lb in 1 yd^3

4) Ammonium NO_3 → bag is 100 lb

5) turkey manure (assume density similar to water) = 1 g/cc = 62 lb/ft^3
∴ 1 yd^3 = ~ 1674 lb

EXPECTED DILUTIONS IN BIOPILES

PILE 2 $\frac{1674 \text{ lb turkey manure}}{7545 \text{ lb (soil + wood)}} \times 100 = 22\%$

PILE 3 $\frac{1674 \text{ lb turkey manure} + 100 \text{ lb } NH_4NO_3}{7545 \text{ lb soil + wood}}$

$= \frac{1774}{7545} \times 100 = 24\%$

PILE 4 $\frac{3348 \text{ lb turkey manure}}{7545 \text{ lb soil + wood}} = 44\%$

PILE 5 $\frac{1674 \text{ lb turkey manure} + 586 \text{ lb sawdust} + 100 \text{ lb } NH_4NO_3}{7545 \text{ lb wood + soil}}$

$= \frac{2360 \text{ lb}}{7545} \times 100 = 31\%$

PILE 6 $\frac{1674 \text{ lb turkey manure} + 586 \text{ lb sawdust}}{7545 \text{ lb soil + wood}}$

$= \frac{2260}{7545} \times 100 = 30\%$

M. Mohn 5/23/95

PILE 7 $\dfrac{1172 \text{ lb sawdust} + 100 \text{ lb } NH_4NO_3}{7545 \text{ lb soil + wood}}$

$$= \frac{1272 \text{ lb}}{7545 \text{ lb}} \times 100 = 17\%$$

PILE 8 $\dfrac{{}^{*}100 \text{ lb } NH_4NO_3}{7545} \times 100 = 1\%$

* does not include sawdust extract - all soil samples are expressed in mg/kg dry wt - this means that no solids contribution to pile 8 from sawdust extract.

Note: The weights of the amendments (as added) were on a wet weight basis. This means that the amt added was partially water (turkey manure was not 100% solids). - thus the dilution effect would be even less than what the calculations above indicate.

Also - screening prior to collecting sample ~~may~~ removed some of the wood chips. - may have affected the calculations.

— MFM 5/23/95

COMPARISON OF ACTUAL INITIAL PCP CONC. VALUES WITH EXPECTED DILUTION FACTORS DUE TO AMENDMENT ADDITION

PILE No.	INITIAL [PCP] (mg/kg)	(100 - %) OF INITIAL VALUE FOR PILE 1	CALCULATED DILUTION FACTOR
1	460	—	—
2	210	54	22
3	240	48	24
4	160	65	44
5	230	50	31
6	170	63	30
7	230	50	17
8	220	52	1

M. Mohn
5/23/95

~~10/21/95~~ MFM 10/21/94

Daramend

DC1	0.5	28.2	27.7	6.5	24.8	24.3	~~1%~~	12.3
2	0.4	24.2	23.8	6.2	21.4	21.0	~~1%~~	11.8
	0.3	24.5	24.2	6.1	21.7	21.4		11.6
	0.4	31.8	31.4	6.4	27.5	27.1		13.7
(new)	0.4	29.0	28.6	6.2	25.9	25.5		10.8
	0.4	29.7	29.3	6.3	26.5	26.1		10.9
	0.4	32.6	32.2	6.3	28.7	28.3		12.1
	0.4	38.8	38.4	6.5	34.0	33.6		12.5
	0.4	33.3	32.9	6.2	29.3	28.9		12.2
				6.3 Avg				12.0 Avg

DT1	0.4	30.5	30.1	6.7	24.1	23.7	~~20.9~~	21.3
Lost to LYS2	0.7	32.4	31.7	6.5	25.1	24.4		23.0
	0.4	37.6	37.2	6.6	29.5	29.1		21.8
	0.4	30.4	30.0	6.9	24.8	24.4		18.7
	0.4	27.0	26.6	6.7	22.5	22.1		16.9
	0.4	31.4	31.0	6.9	25.2	24.8		20.0
	0.4	29.3	28.9	6.6	24.0	23.6		18.3
	0.4	29.6	29.2	6.5	23.8	23.4		19.9
	0.4	30.7	30.3	6.4	23.7	23.3	~~22.8~~	23.1
				6.6 Avg				20.3 Avg

~~2ND BIOPILE EVENT~~

INITIAL DARAMEND EVENT

Checked OK
MFM
5/17/95

Biopiles

~~Sa.~~ Pile 1

$20.7 - 17$

Sample	Wt. of Tin	wt. of Tin foil + sample	wt of sample	wt. after incubation		pH	MC
		x (20.7)	x	x	x		
1A	0.6	20.7	20.1	17.0 -.6 =	16.4	6.3	~~17.9~~ 18.4
1B	0.6	21.0	20.4	17.0	16.4	6.2	~~19.0~~ 19.6
1C	0.6	20.7	20.1	17.2	16.6	6.2	~~16.9~~ 17.4
				Avg		6.2	18.5
Pile 2							
2A	0.6	24.0	23.4	19.5	18.9	8.5	~~18.8~~ 19.9
2B	0.6	20.9	20.3	16.7	16.1	8.5	~~20.00~~ 20.7
2C	0.6	18.6	18.0	14.6	14.0	8.6	~~21.50~~ 22.2
				Avg		8.5	20.9
— 9/12/94 Pile 3							
3A	1.4	41.9	40.5	31.8	30.4	8.8	~~24.1~~ 24.9
3B	1.2	42.1	40.9	31.9	~~19.9~~ 30.7	8.7	~~24.2~~ 24.9
3C	1.0	41.1	40.1	31.3	30.3	8.7	~~23.8~~ 24.4
				Avg			24.7
Pile 4							
4A	1.0	41.2	40.2	32.0	31	8.2	~~22.3~~ 22.9
4B	0.9	41.1	40.2	32.7	31.8	8.2	~~20.4~~ 20.9
4C	0.9	41.2	40.3	33.3	32.4	8.3	~~19.2~~ 19.6
							21.1
Pile 5							MC
5A	1.3	41.5	40.2	31.3	V.R 30	8.2	~~24.6~~ 25.4
5B	1.4	43.6	42.2	V.R ~~33.0~~ ~~30.1~~ 32.1	30.7	8.2	~~26.4~~ 27.3
5C	1.4	41.6	40.2	30.7	29.3	8.1	~~26.9~~ 27.1
							26.6

9/11/94

Pile 6

							M.C
6A	1.2	41.7	40.5	35.0	33.8	8.1	16.5 ~~16.1~~
6B	1.4	44.9	43.5	39.0	37.6	7.9	13.6 ~~13.1~~
6C	1.2	42.2	41	37.2	36	8.0	12.2 ~~11.8~~
							14.1

Pile 7

7A	1.2	42.3	41.1	35.6	34.4	6.6	16.3 ~~15.0~~
7B	1.8	45.1	43.3	37.7	35.9	6.7	17.1 ~~16.4~~
7C	1.2	43.8	42.6	36.6	35.4	6.6	16.9 ~~16.4~~
							16.8

Pile 8

8A	1.2	42.3	41.1	33.3	32.1	6.7	21.9 ~~21.3~~
8B	1.2	43.5	42.3	34.9	33.7	7.0	20.3 ~~19.8~~
8C	1.4	42.8	41.4	34.4	33	6.9	20.3 ~~19.[illegible]~~
							20.8

~~pH data~~

2ND BIOPILE EVENT - MOISTURE/pH

REAC FIELD DATA SHEET

Moisture Content, pH, Temperature

Fax: (908)494-4021

10/24/94

S.No	Sample Description	Cup Weight	Cup + Wet	Wet	Cup + Dry	Dry	Moisture	pH	Temperature	
	Pile & Location	gram	gram	gram	gram	gram	Percent		Location/Pile	Reading
1	1A	0.4	28.0	27.6	21.4	21.0	23.9	6.5		
2	1B	~~0.5~~	30.0	29.5	22.9	22.4	24.1 } 25.1	7.6	6.8	
3	1C	0.4	30.9	30.5	22.6	22.2	27.2	7.0		
	2A	~~0.5~~ 0.4	29.4	29.0	20.7	20.3	30.0	8.5		
	2B	0.4	29.4	29.0	20.3	19.9	31.4 } 31.4	8.4	8.5	
	2C	0.4	28.7	28.3	19.4	19.0	32.9	8.7		
	3A	0.4	31.8	31.4	21.0	19.6	37.6	8.3		
	3B	0.4	31.8	31.4	19.3	18.9	39.8 } 37.6	7.9	8.1	
	3C	0.4	30.3	29.9	19.7	19.3	35.4	8.1		
	4A	0.4	28.6	28.2	17.7	17.3	38.7	8.6		
	4B	0.4	31.1	30.7	~~27.8~~ 18.6	18.2	40.7 } 37.5	8.1	8.5	
	4C	0.4	36.7	36.3	24.5	24.1	33.6	8.7		
	5A	0.4	28.3	27.9	17.0	~~17~~ 16.6	40.5	8.8		
	5B	0.5	33.0	32.5	19.9	19.4	40.3 } 40.2	8.3	8.6	
	5C	0.7	34.1	33.4	20.8	20.1	39.8	8.6		
	6A	0.4	36.0	35.6	28.3	27.9	21.6	8.2		
	6B	0.4	33.1	32.7	27.8	27.4	16.2 } 19.5	8.0	8.0	
	6C	0.7	34.0	33.3	27.1	26.4	20.7	7.9		
	7A	0.4	35.4	35.1	27.6	27.2	22.5	7.0		3.8 ×10
	7B	0.4	33.8	33.4	27.2	26.8	19.8 } 21.6	6.9	6.8	36.8
	7C	0.7	35.2	34.5	27.4	26.7	22.6	6.6		
	8A	0.5 340	~~35.0~~ ~~34.0~~	33.5	24.7	24.2	27.8	6.3		= 10%
	8B	0.5	34.9	34.4	25.2	24.7	28.2 } 27.6	7.5	7.1	
	8C	0.4	36.8	36.4	27.0	26.6	26.9	7.5		
	LF1	0.4	38.3	37.9	35.0	34.				
	LF2				31.6					

OK
MFM
5/17/95

WESTON
MANAGERS DESIGNERS/CONSULTANTS

SHEET ___ of ___

CLIENT/SUBJECT PWP - EVENT 3 - 11/29/~~1994~~ 97 W.O. NO. ______

TASK DESCRIPTION Bio Piles - Calc'd averages TASK NO. ______

PREPARED BY MFM DEPT ______ DATE ______

MATH CHECK BY ______ DEPT ______ DATE ______

METHOD REV. BY ______ DEPT ______ DATE ______

APPROVED BY ______

DEPT ______ DATE ______

Pile	% H_2O	pH
1	20.4	6.2
2	28.3	7.1
3	32.9	6.9
4	33.3	6.8
5	33.8	7.0
6	15.5	6.7
7	17.7	6.3
8	23.6	6.5

RFW 10-05-003/A-5/85

Date : 11/29/94 (2ND point on graph)

SAMPLE	pH	% H_2O
CT 1-2	6.5	10.2 ~~11.4~~
2-2	6.4/6.4	8.6 / 8.5 ~~9.3/9.4~~
3	6.4	9.5 ~~10.5~~
4	6.4	9.4 ~~10.4~~
5	6.4	9.5 ~~10.5~~
6	6.4	9.6 ~~10.6~~
7	6.2	10.5 ~~11.7~~
8	6.4	11.1 ~~12.5~~
9	6.4	11.2 ~~12.6~~
Avg	6.4	9.8 ~~10.9~~
DT 1-2	7.4	20.3 ~~25.0~~
2	6.4	19.2 ~~23.7~~
3	6.7	19.4 ~~24.0~~
4	7.0/7.0	15.6 / 15.9 ~~19.0/18.5~~
5	6.5	18.0 ~~22.0~~
6	7.1	20.1 ~~25.1~~
7	7.8	16.1 ~~19.2~~
8	6.9	15.9 ~~18.9~~
9	7.1	19.6 ~~24.4~~
Avg	7.0	18.0 ~~22.0~~

% H_2O - wet - OK MFM 2/16/95

DARAMEND - pH / % H_2O VS TIME

Roy F. Weston, Inc.
Environmental Technology Laboratory
254 Welsh Pool Road
Lionville, Pennsylvania 19341-1345
610-701-6174 • Fax 610-701-6175

14 December 1994

Mr. Mike Mohn
Roy F. Weston, Inc.
REAC
Edison, New Jersey 088373616

Re: Physical Testing Results for Penta Wood Products Soil Samples
WESTON Job No. 9412X001

Dear Mr. Mohn:

Attached are the results of physical testing conducted on the forty-seven soil samples received by WESTON on 1 December 1994. The following geotechnical tests were performed in accordance with the cited methods:

ASTM-D-2216	Natural Moisture Content
ASTM-D-4974	Soil pH

If you have any questions concerning these results, please call Russell Frye at (610) 701-6173.

Very truly yours,

ROY F. WESTON, INC.

Joseph F. Martino, P.E.
Senior Section Manager
Environmental Technology Laboratory

JFM/cab
attachments

Table 1 Geotechnical Tests Performed, Reference Methods and Test Numbers		
Test Parameter	**Method[1]**	**Test Numbers**
Natural Moisture Content	D 2216	47
Soil pH	D4974	47

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9412X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	12/01/94	DATE COMPLETED	12/14/94

SAMPLE DATA								
ETL Sample Number	001	002	003	004	005	006	007	008
Project Sample I. D.	B00136	B00137	B00138	B00139	B00140	B00141	B00142	B00143
MOISTURE CONTENT								
Total Solids, %	78.8	78.8	81.1	72.9	72.2	69.9	67.2	67.1
Moisture Content, % wet	21.2	21.2	18.9	27.1	27.8	30.1	32.8	32.9
Moisture Content, % dry	26.9	26.9	23.3	37.1	38.4	43.0	48.8	49.0
SOIL pH								
Soil pH	6.7	5.7	6.2	7.0	7.1	7.1	6.4	7.1
	1A COMP 3	1B COMP 3	1C COMP 3	2A Comp 3	2B Comp 3	2C Comp 3	3A Comp 3	3B Comp 3

$\underbrace{\text{1A COMP 3, 1B COMP 3, 1C COMP 3}}$
Hw: 20.4
pH: 6.2

$\underbrace{\text{2A Comp 3, 2B Comp 3, 2C Comp 3}}$
Hw: 28.3
pH: 7.1

$\underbrace{\text{3A Comp 3, 3B Comp 3}}$
Hw: 32.9
pH: 6.9

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9412X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	12/01/94	DATE COMPLETED	12/14/94

SAMPLE DATA								
ETL Sample Number	009	010	011	012	013	014	015	016
Project Sample I. D.	B00144	B00145	B00146	B00147	B00148	B00149	B00150	B00151
MOISTURE CONTENT								
Total Solids, %	67.1	67.7	66.4	66.1	68.2	65.5	65.0	84.0
Moisture Content, % wet	32.9	32.3	33.6	33.9	31.8	34.5	35.0	16.0
Moisture Content, % dry	49.0	47.7	50.6	51.3	46.6	52.7	54.0	19.0
SOIL pH								
Soil pH	7.1	6.3	7.1	7.1	6.9	7.1	7.1	6.7
	3C Comp 3	4A Comp 3	4B Comp 3	4C Comp 3	5A Comp 3	5B Comp 3	5C Comp 3	6A Comp 3

H_2O : 33.3
pH : 6.8

H_2O : 33.8
pH : 7.0

POR1.XLS

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9412X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	12/01/94	DATE COMPLETED	12/14/94

SAMPLE DATA								
ETL Sample Number	017	018	019	020	021	022	023	024
Project Sample I. D.	B00152	B00153	B00154	B00155	B00160	B00161	B00162	B00163

MOISTURE CONTENT								
Total Solids, %	84.8	83.6	83.4	82.7	89.8	91.5	90.5	90.6
Moisture Content, % wet	15.2	16.4	16.6	17.3	10.2	8.5	9.5	9.4
Moisture Content, % dry	17.9	19.6	20.0	20.9	11.4	9.3	10.5	10.4

SOIL pH								
Soil pH	6.9	6.5	6.1	6.7	6.5	6.4	6.4	6.4
	6B Comp 3	6C Comp 3	7A Comp 3	7B Comp 3	~~7C Comp 3~~			

Hw = 15.9
pH = 6.7

Hw: 17.7
pH: 6.3

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9412X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	12/01/94	DATE COMPLETED	12/14/94

SAMPLE DATA								
ETL Sample Number	025	026	027	028	029	030	031	032
Project Sample I. D.	B00164	B00165	B00166	B00167	B00179	B00168	B00169	B00170

MOISTURE CONTENT								
Total Solids, %	90.5	90.4	89.5	88.9	88.8	79.7	80.8	80.6
Moisture Content, % wet	9.5	9.6	10.5	11.1	11.2	20.3	19.2	19.4
Moisture Content, % dry	10.5	10.6	11.7	12.5	12.6	25.4	23.7	24.0

SOIL pH								
Soil pH	6.4	6.4	6.2	6.4	6.4	7.4	6.4	6.7

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH					
PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9412X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	12/01/94	DATE COMPLETED	12/14/94

SAMPLE DATA								
ETL Sample Number	033	034	035	036	037	038	039	040
Project Sample I. D.	B00171	B00172	B00173	B00174	B00175	B00176	B00156	B00157
MOISTURE CONTENT								
Total Solids, %	84.1	82.0	79.9	83.9	84.1	80.4	80.7	76.1
Moisture Content, % wet	15.9	18.0	20.1	16.1	15.9	19.6	19.3	23.9
Moisture Content, % dry	19.0	22.0	25.1	19.2	18.9	24.4	23.8	31.5
SOIL pH								
Soil pH	7.0	6.5	7.1	7.8	6.9	7.1	6.2	6.1
							7C Comp 3	~~7C Comp 3~~ 8A Comp 3

Hw = 23.6

pH = 6.5

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9412X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	12/01/94	DATE COMPLETED	12/14/94

SAMPLE DATA								
ETL Sample Number	041	042	043	044	045	046	047	
Project Sample I. D.	B00158	B00159	B00151 DUP	B00152 DUP	B00161 DUP	B00171 DUP	B00159 DUP	

MOISTURE CONTENT								
Total Solids, %	75.5	77.5	84.4	84.9	91.4	84.4	76.8	
Moisture Content, % wet	24.5	22.5	15.6	15.1	8.6	15.6	23.2	
Moisture Content, % dry	32.5	29.0	18.5	17.7	9.4	18.5	30.1	

SOIL pH								
Soil pH	7.0	6.5	6.7	6.8	6.4	7.0	6.5	
	8B Comp 3	8C Comp 3	6A Comp 3 DUP	6B Comp 3 DUP	CT 2-2 DUP	DTY-2 DUP	8C Comp 3 DUP	

9411X012 9412X001

ENGINEERING - BIO - PWA 13

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-02
RFW Contact: M. MOHN Phone: 908-321-4237

No: 10053

SHEET NO. ____ OF ____

SAMPLE IDENTIFICATION | **ANALYSES REQUESTED**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		% H2O/pH			
001	AB00136	1A COMP 3	S	11/29/94	1	4 oz gl	—	X			
002	B00137	1B									
003	B00138	1C									
004	B00139	2A									
005	B00140	2B									
006	B00141	2C									
007	B00142	3A									
008	B00143	3B									
009	B00144	3C									
010	B00145	4A									
011	B00146	4B									
012	B00147	4C									
013	B00148	5A									
014	B00149	5B									
015	B00150	5C									
016	B00151	6A									
017	B00152	6B									
018	B00153	6C									
019	B00154	7A									
020	B00155	7B									

Matrix:
SD - Sediment; DS - Drum Solids; DL - Drum Liquids; X - Other
PW - Potable Water; GW - Groundwater; SW - Surface Water; SL - Sludge
S - Soil; W - Water; O - Oil; A - Air

Special Instructions:
DO RANDOMLY SELECTED DUPLICATES AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	11/30/94	[illegible signature]	12/1	1300						

9412X001

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

ENGINEERING BIO - PWA 13

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0076-01
RFW Contact: M. MOON Phone: 908-321-4257

No: 10054

SHEET NO. ____ OF ____

SAMPLE IDENTIFICATION | ANALYSES REQUESTED

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	% H_2O/pH			
039	B00156	7C COMP 3	S	11/29/94	1	4 oz gl / —				
040	B00157	8A	↓	↓	↓	↓	↓			
041	B00158	8B	↓	↓	↓	↓	↓			
042	B00159	8C	↓	↓	↓	↓	↓			
043	B00151 DUP	6A COMP 3	S	11/29/94	1	4 oz gl —	%H2O/pH	Randomly Selected Duplicates		
044	B00152 DUP	6B COMP 3	↓	↓	↓	↓	↓	↓		
045	B00161 DUP	CT2-2	↓	↓	↓	↓	↓	↓		
046	B00171 DUP	DT4-2	↓	↓	↓	↓	↓	↓		
047	B00159 DUP	8C Comp 3	↓	↓	↓	↓	↓	↓		

MFM

MFM

Matrix:
SD - Sediment
DS - Drum Solids
DL - Drum Liquids
X - Other
PW - Potable Water
GW - Groundwater
SW - Surface Water
SL - Sludge
S - Soil
W - Water
O - Oil
A - Air

Special Instructions:

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Moon	11/30/94	[signature]	12/1	1300						

94RX001

ENGINEERING - BIO - PWA 13

Roy F. Weston, Inc.
REAC, Edison, N.J.
EPA Contract 68-03-3482

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 10055

SHEET NO. ____ OF ____

SAMPLE IDENTIFICATION | **ANALYSES REQUESTED**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	% H2O/pH			
021	BA00160	CT1-2	S	11/29/94	1	4 oz gl / —	X			
022	BA00161	CT2-2								
023	BA00162	CT3-2								
024	B00163	CT4-2								
025	B00164	CT5-2								
026	B00165	CT6-2								
027	B00166	CT7-2								
028	B00167	CT8-2								
029	B00179	CT9-2								
030	B00168	DT1-2						MFM		
031	B00169	DT2-2								
032	B00170	DT3-2								
033	B00171	DT4-2								
034	B00172	DT5-2								
035	B00173	DT6-2								
036	B00174	DT7-2								
037	B00175	DT8-2								
038	B00176	DT9-2								
				MFM						

Matrix:
SD - Sediment; DS - Drum Solids; DL - Drum Liquids; X - Other; PW - Potable Water; GW - Groundwater; SW - Surface Water; SL - Sludge; S - Soil; W - Water; O - Oil; A - Air

Special Instructions:
DO RANDOMLY SELECTED DUPLICATES AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY
FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All / Analysis	M. Mohn	11/30/94	[signature]	12/1	1300						

WESTON
MANAGERS DESIGNERS/CONSULTANTS

SHEET ____ of ____

CLIENT/SUBJECT PWP W.O. NO. ________

TASK DESCRIPTION Averages for Event 4 - 1/4/95 TASK NO. ________

PREPARED BY MFM DEPT ________ DATE ________

MATH CHECK BY ________ DEPT ________ DATE ________

METHOD REV. BY ________ DEPT ________ DATE ________

APPROVED BY ________
DEPT ________ DATE ________

Pile	% Hw	pH
1	20.5	5.2
2	25.1	7.1
3	32.0	7.0
4	30.5	7.1
5	31.9	7.3
6	15.8	6.6
7	14.3	6.2
8	23.2	6.7

Date: 1/3/95
3rd Daramend sampling event

SAMPLE	pH	% H2O (wet) OK - MFM
DT 1-3	5.6	18.0 ~~22.0~~
2	5.7	16.9 ~~26.3~~
3	6.4	16.2 ~~19.3~~
4	5.9	11.7 ~~13.3~~
5	6.0	11.9 ~~13.5~~
6	6.2	17.3 ~~20.9~~
7	5.9/6.0	10.9 ~~12.2~~
8	5.5	13.1 ~~15.1~~
9	6.2	13.3 ~~15.9~~
AVG	5.9	14.4
DT 1-9 comp 3	5.9	13.7 ~~15.9~~
DC 1-3	6.3	7.4 ~~7.9~~
2	6.2	6.2 ~~6.6~~
3	6.3	7.0 ~~7.5~~
4	6.5	7.5 ~~8.1~~
5	6.1	8.1 ~~8.8~~
6	6.2	8.3 ~~9.1~~
7	6.3	9.0 ~~9.9~~
8	6.4	9.9 ~~11.0~~
9	6.3	10.3 ~~11.5~~
AVG	6.3	~~8.5~~ 8.2
DC 1-9 comp 3	6.2	8.5

OK MFM 2/1/9[illegible]

Roy F. Weston, Inc.
Environmental Technology Laboratory
254 Welsh Pool Road
Lionville, Pennsylvania 19341-1345
610-701-6174 • Fax 610-701-6175

16 January 1995

RECEIVED
JAN 17 1995
WESTON/REAC

Mr. Mike Mohn
Roy F. Weston, Inc.
REAC
Edison, New Jersey 088373616

Re: Physical Testing Results for Penta Wood Products Soil Samples
WESTON Job No. 9412X001

Dear Mr. Mohn:

Attached are the data sheets and the results of physical testing conducted on the nine soil samples received by WESTON on 6 January 1995. The following geotechnical tests were performed in accordance with the cited methods:

ASTM-D-2216	Natural Moisture Content
ASTM-D-4974	Soil pH

If you have any questions concerning these results, please call Russell Frye at (610) 701-6173.

Very truly yours,

ROY F. WESTON, INC.

Joseph F. Martino, P.E.
Senior Section Manager
Environmental Technology Laboratory

JFM/ag
attachments

ENGINEERING - BIO - DARA

PWA 15

REAC, E[illegible]on, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHA[illegible] OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: ~~[illegible]~~ M. MOHN Phone: 908-321-4257

No: 03624

SHEET NO ~~2~~ 1 OF ~~2~~ 1 MFM MFM

9501X001

Sample Identification | **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	pH	% MOISTURE		
001	B09928	DT1-3	S	1/3/95	ONE	4oz GLASS/None	✓	✓		
002	B09929	DT2-3								
003	B09930	DT3-3								
004	B09931	DT4-3								
005	B09932	DT5-3								
006	B09933	DT6-3								
007	B09934	DT7-3								
008	B09935	DT8-3								
009	B09936	DT9-3								
010	B09937	DT1-9 COMP3								
011	B09938	~~DC1-3~~ DC1-3								
012	B09939	DC2-3								
013	B09940	DC3-3								
014	B09941	~~DC4-4~~ DC4-3								
015	B09942	DC5-3								
016	B09943	DC6-3								
017	B09944	DC7-3								
018	B09945	DC8-3								
019	B09946	DC9-3								
020	B09947	DC1-9 COMP3								

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
RANDOMLY SELECT SAMPLES FOR DUPLICATE ANALYSES AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Checked by: MFM

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
ALL/ANALYSIS	M. TALWAR	1/3/95	[illegible signature]	6 JAN 95	1130						

[redacted] PW#75

REAC, Ec[illegible]n, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHA[illegible]F CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4251

No: 03654

SHEET NO. 1 OF 2

9501X001

Sample Identification **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	pH	% MOISTURE		
021	B00332	1A COMP4	S	1/4/95	ONE	4OZ GLASS/NONE	✓	✓		
022	B00333	1B COMP4								
023	B00334	1C COMP4								
024	B00335	2A COMP4								
025	B00336	2B COMP4								
026	B00337	2C COMP4								
027	B00338	3A COMP4								
028	B00339	3B COMP4								
029	B00340	3C COMP4								
030	B00341	4A COMP4								
031	B00342	4B COMP4								
032	B00343	4C COMP4								
033	B00344	5A COMP4								
034	B00345	5B COMP4								
035	B00346	5C COMP4								
036	B00347	6A COMP4								
037	B00348	6B COMP4								
038	B00349	6C COMP4								
039	B00350	7A COMP4								MT
040	B00351	7B COMP4								

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

RANDOMLY SELECT SAMPLES FOR DUPLICATE ANALYSES AT RATE OF 10%.

Checked by: MFM

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
ALL/ANALYSIS	M. TALWAR	1/4/95	S. M[illegible]	1130	6 JAN 95						

FORM #4 8/94

* U.S. GPO: 1994-383-015

ENGINEERING - BIO

PWA 15

REAC, Ed[illegible]n, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHA[illegible] OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4251

No: 03655

SHEET NO. 2 OF 2

9501X001

Sample Identification | **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	pH	% MOISTURE		
041	B00352	7C COMP 4	S	1/4/95	ONE	4OZ GLSS/NONE	✓	✓		
042	B00353	8A COMP 4	↓	↓	↓	↓	↓	↓		
043	B00354	8B COMP 4								
044	B00355	8C COMP 4								
045	B00[illegible] Dup									
046	B00337 Dup									
047	B00339 Dup									
048	B00345 Dup									
049	B00353 Dup									

MIT

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:

RANDOMLY SELECT SAMPLES FOR DUPLICATE ANALYSES AT RATE OF 10%

Checked by: MFM

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
ALL/ANALYSIS	M. TALWAR	1/4/95	[illegible signature]	6JAN95	1130						

FORM #

8/94

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9501X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	01/06/95	DATE COMPLETED	01/16/95

SAMPLE DATA								
ETL Sample Number	001	002	003	004	005	006	007	008
Project Sample I. D.	B09928	B09929	B09930	B09931	B09932	B09933	B09934	B09935

MOISTURE CONTENT								
Total Solids, %	82.0	83.1	83.8	88.3	88.1	82.7	89.1	86.9
Moisture Content, % wet	18.0	16.9	16.2	11.7	11.9	17.3	10.9	13.1
Moisture Content, % dry	22.0	20.3	19.3	13.3	13.5	20.9	12.2	15.1

SOIL pH								
Soil pH	5.6	5.7	6.4	5.9	6.0	6.2	5.9	5.5

~~TA Copy~~

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9501X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	01/06/95	DATE COMPLETED	01/16/95

SAMPLE DATA								
ETL Sample Number	009	010	011	012	013	014	015	016
Project Sample I. D.	B09936	B09937	B09938	B09939	B09940	B09941	B09942	B09943

MOISTURE CONTENT								
Total Solids, %	86.7	86.3	92.6	93.8	93.0	92.5	91.9	91.7
Moisture Content, % wet	13.3	13.7	7.4	6.2	7.0	7.5	8.1	8.3
Moisture Content, % dry	15.4	15.9	7.9	6.6	7.5	8.1	8.8	9.1

SOIL pH								
Soil pH	6.2	5.9	6.3	6.2	6.3	6.5	6.1	6.2

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9501X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	01/06/95	DATE COMPLETED	01/16/95

SAMPLE DATA								
ETL Sample Number	017	018	019	020	021	022	023	024
Project Sample I. D.	B09944	B09945	B09946	B09947	B00332	B00333	B00334	B00335
MOISTURE CONTENT								
Total Solids, %	91.0	90.1	89.7	92.1	78.0	79.9	80.7	75.2
Moisture Content, % wet	9.0	9.9	10.3	7.9	22.0	20.1	19.3	24.8
Moisture Content, % dry	9.9	11.0	11.5	8.5	28.3	25.1	23.9	33.0
SOIL pH								
Soil pH	6.3	6.4	6.3	6.2	5.2	5.3	5.2	7.1
					1A Comp 4	~~1A~~ 1B Comp 4	1C Comp 4	2A Comp 4

% Hw = 20.5

pH = ~~25.8~~ 5.2

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR		
JOB NUMBER	9501X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105		
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	01/06/95	DATE COMPLETED	01/16/95		

SAMPLE DATA								
ETL Sample Number	025	026	027	028	029	030	031	032
Project Sample I. D.	B00336	B00337	B00338	B00339	B00340	B00341	B00342	B00343
MOISTURE CONTENT								
Total Solids, %	74.4	75.1	67.9	67.5	68.5	66.8	68.3	73.3
Moisture Content, % wet	25.6	24.9	32.1	32.5	31.5	33.2	31.7	26.7
Moisture Content, % dry	34.5	33.1	47.3	48.2	46.1	49.6	46.4	36.4
SOIL pH								
Soil pH	7.1	7.2	7.1	7.0	7.0	6.8	7.1	7.3
	2B Comp 4	2C Comp 4	3A Comp 4	3B Comp 4	3C Comp 4	4A Comp 4	4B Comp 4	4C Comp 4

%H₂O = 25.1
pH = 7.1

%H₂O : 32.0
pH : 7.0

%H₂O = 30.5
pH = 7.1

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9501X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	01/06/95	DATE COMPLETED	01/16/95

SAMPLE DATA								
ETL Sample Number	033	034	035	036	037	038	039	040
Project Sample I. D.	B00344	B00345	B00346	B00347	B00348	B00349	B00350	B00351
MOISTURE CONTENT								
Total Solids, %	67.9	67.7	68.7	84.4	83.7	84.5	84.4	84.4
Moisture Content, % wet	32.1	32.3	31.3	15.6	16.3	15.5	15.6	15.6
Moisture Content, % dry	47.3	47.7	45.6	18.5	19.4	18.4	18.5	18.4
SOIL pH								
Soil pH	7.3	7.2	7.3	6.7	6.7	6.3	6.1	6.0
	5A Comp 4	5B Comp 4	5C Comp 4	6A Comp 4	6B Comp 4	6C Comp 4	7A Comp 4	7B Comp 4

$\underbrace{\text{5A, 5B, 5C}}$: Hw : 31.9, pH : 7.3

$\underbrace{\text{6A, 6B, 6C}}$: Hw = 15.8, pH = 6.6

$\underbrace{\text{7A, 7B}}$: Hw = 14.3, pH = 6.2

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH

PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9501X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	01/06/95	DATE COMPLETED	01/16/95

SAMPLE DATA								
ETL Sample Number	041	042	043	044	045	046	047	048
Project Sample I. D.	B00352	B00353	B00354	B00355	B09934 DUP	B00334 DUP	B00339 DUP	B00345 DUP
MOISTURE CONTENT								
Total Solids, %	88.2	77.7	75.9	76.8	89.1	81.0	67.3	66.7
Moisture Content, % wet	11.8	22.3	24.1	23.2	10.9	19.0	32.7	33.3
Moisture Content, % dry	13.4	28.6	31.7	30.2	12.2	23.5	48.7	49.9
SOIL pH								
Soil pH	6.4	6.5	7.2	6.5	6.0	5.3	6.9	7.3
	7C Comp 4	8A Comp 4	8B Comp 4	8C Comp 4				

H_2O = 23.2

pH = 6.7

POR1.XLS

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

NATURAL MOISTURE CONTENT AND SOIL pH					
PROJECT	REAC-Penta Wood Products	PROJECT ANALYST	SPM	OVEN MODEL	VWR
JOB NUMBER	9501X001	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-02	DATE RECEIVED	01/06/95	DATE COMPLETED	01/16/95

SAMPLE DATA									
ETL Sample Number	049								
Project Sample I. D.	B00353 DUP								

MOISTURE CONTENT									
Total Solids, %	78.4								
Moisture Content, % wet	21.6								
Moisture Content, % dry	27.5								

SOIL pH									
Soil pH	6.6								

WESTON
MANAGERS DESIGNERS/CONSULTANTS

SHEET ____ of ____

CLIENT/SUBJECT PWP W.O. NO. ________

TASK DESCRIPTION Sampling Event 5 - Avg Calcs TASK NO. ________

PREPARED BY MFM DEPT ________ DATE ________

MATH CHECK BY ________ DEPT ________ DATE ________

METHOD REV. BY ________ DEPT ________ DATE ________

APPROVED BY ________

DEPT ________ DATE ________

Pile	% H_2O	pH (su.)
1	17.3	5.4
2	17.8	7.2
3	32.3	7.1
4	24.7	7.3
5	34.6	7.4
6	18.7	6.6
7	15.8	6.2
8	22.5	6.8

Date: 2/7/95

4th Daramend Sampling Event

Sample	pH	% H_2O (wet)
DT 1-3A Comp 4	7.86 ~~7.86 7.9~~	21.1
DT 1-3B Comp 4	8.27	21.3
DT 1-3C Comp 4	8.34	22.1
DT 4-6 A Comp 4	8.25	20.1
DT 4-6 B Comp 4	8.37	19.7
DT 4-6 C Comp 4	8.28	19.4
DT 7-9 A Comp 4	7.92	17.2
DT 7-9 B Comp 4	7.79	17.2
DT 7-9 C Comp 4	7.95	17.0
AVG	~~8.11~~ 8.1	19.5
DT 1-9 Comp 4	~~8.08~~ 8.1 / 8.16 8.1	18.2 / 18.1
DC 1-3 A Comp 4	8.46	5.6
DC 1-3 B Comp 4	8.59	5.8
DC 1-3 C Comp 4	8.64	5.6
DC 4-6 A Comp 4	8.27	6.1
DC 4-6 B Comp 4	8.31	6.2
DC 4-6 C Comp 4	8.35	6.0
DC 7-9 A Comp 4	8.46	5.2
DC 7-9 B Comp 4	8.44	5.1
DC 7-9 C Comp 4	8.36	5.2
AVG	~~8.43~~ 8.4	~~5.64~~ 5.6
DC 1-9 Comp 4	8.64/8.62 = 8.6/8.6	5.7/5.9

Inter-Office Memorandum

WESTON
MANAGERS DESIGNERS/CONSULTANTS

TO: Mike Mohn

FROM: Russell Frye JDT

DATE: 23 February 1995

PROJECT: Penta Wood Products

W.O. NO.: 03347-040-001-0026-01

SUBJECT: **Geotechnical Testing Results**

ACTION:

Geotechnical testing results for the Penta Wood Products project are attached. Twenty (20) soil samples, job number 9502X003 were submitted to WESTON's Environmental Technology Laboratory (ETL) on 9 February 1995 for geotechnical testing. Two (2) randomly selected duplicate samples were also analyzed (project sample numbers B02261 and B02271, ETL sample number 021 and 022, respectively).

The geotechnical tests requested are presented in the attached custody transfer/work request.

The geotechnical tests performed including reference method and test number are presented in Table 1.

If you require additional information or have any questions, please call me at (610) 701-6173.

Table 1 Geotechnical Tests Performed, Reference Methods and Test Numbers		
Test Parameter	**Method[1]**	**Test Numbers**
Natural Moisture Content	D 2216	22
Soil pH	D 4974	22

1 All analytical methods derived from the Annual Book of ASTM Standards, Section 4, Volume 4.08, Soil and Rock; Building Stones; Geotextiles, American Society of Testing Materials, Philadelphia, PA, 1991 unless noted otherwise.

9502X003

PWA 16 - ENGINEERING - BIO - DARA

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0028-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 09712

SHEET NO. 1 OF ___

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative		% H2O	pH		
001	B02252	DT 1-3A COMP 4	S	2/7/95	1	4 oz g/	—	X	X		
002	B02253	DT 1-3B COMP 4									
003	B02254	DT 1-3C COMP 4									
004	B02255	DT 4-6A COMP 4									
005	B02256	DT 4-6B COMP 4									
006	B02257	DT 4-6C COMP 4									
007	B02258	DT 7-9A COMP 4									
008	B02259	DT 7-9B COMP 4								MM	
009	B02260	DT 7-9C COMP 4									
010	B02261	DT 1-9 COMP 4									
011	B02262	DC 1-3A COMP 4									
012	B02263	DC 1-3B COMP 4									
013	B02264	DC 1-3C COMP 4									
014	B02265	DC 4-6A COMP 4									
015	B02266	DC 4-6B COMP 4									
016	B02267	DC 4-6C COMP 4									
017	B02268	DC 7-9A COMP 4									
018	B02269	DC 7-9B COMP 4									
019	B02270	DC 7-9C COMP 4									
020	B02271	DC 1-9 COMP 4									

Matrix:
SD - Sediment; DS - Drum Solids; DL - Drum Liquids; X - Other
PW - Potable Water; GW - Groundwater; SW - Surface Water; SL - Sludge
S - Soil; W - Water; O - Oil; A - Air

021 B02224 DT-19 Comp DUP
022 B02271 DC-19 Comp DUP

Special Instructions:
RANDOMLY SELECT SAMPLES FOR DUPLICATE ANALYSIS AT RATE OF 10%.

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	2/8/95	[illegible]	2/9/95	Noon						

FORM #4 8/94

* U.S. GPO 1994 783-015

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9502X003	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	02/09/95	DATE COMPLETED	02/10/95

SAMPLE DATA								
ETL Sample Number	001	002	003	004	005	006	007	008
Project Sample I. D.	B02252	B02253	B02254	B02255	B02256	B02257	B02258	B02259
MOISTURE CONTENT								
Total Solids, %	78.9	78.7	77.9	79.9	80.3	80.6	82.8	82.8
Moisture Content, % wet	21.1	21.3	22.1	20.1	19.7	19.4	17.2	17.2
Moisture Content, % dry	26.7	27.1	28.4	25.2	24.5	24.0	20.8	20.8
pH								
pH, standard units	7.86	8.27	8.34	8.25	8.37	8.28	7.92	7.79
	DT 1-3A Comp 4	DT 1-3B Comp 4	DT 1-3C Comp 4	DT 4-6A Comp 4	DT 4-6B Comp 4	DT 4-6C Comp 4	DT 7-9A Comp 4	DT 7-9B Comp 4

POR1.XLS

SENT BY: 2-23-95 ; 1:50PM ; WESTON- ROY F. WESTON INC.;# 6/15

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9502X003	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	02/09/95	DATE COMPLETED	02/10/95

SAMPLE DATA								
ETL Sample Number	009	010	011	012	013	014	015	016
Project Sample I. D.	B02260	B02261	B02262	B02263	B02264	B02265	B02266	B02267

MOISTURE CONTENT								
Total Solids, %	83.0	81.8	94.4	94.2	94.4	93.9	93.8	94.0
Moisture Content, % wet	17.0	18.2	5.6	5.8	5.6	6.1	6.2	6.0
Moisture Content, % dry	20.5	22.3	5.9	6.2	6.0	6.5	6.6	6.4

pH								
pH, standard units	7.95	8.08	8.46	8.59	8.64	8.27	8.31	8.35
	DT 7-9C Comp 4	DT 1-9 Comp 4	DC 1-3A Comp 4	DC 1-3B Comp 4	DC 1-3C Comp 4	DC 4-6A Comp 4	DC 4-6B Comp 4	DC 4-6C Comp 4

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9502X003	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	02/09/95	DATE COMPLETED	02/10/95

SAMPLE DATA								
ETL Sample Number	017	018	019	020	021	022		
Project Sample I. D.	B02268	B02269	B02270	B02271	B02261 Dup	B02271 Dup		
MOISTURE CONTENT								
Total Solids, %	94.8	94.9	94.8	94.3	81.9	94.1		
Moisture Content, % wet	5.2	5.1	5.2	5.7	18.1	5.9		
Moisture Content, % dry	5.5	5.3	5.5	6.0	22.1	6.2		
pH								
pH, standard units	8.46	8.44	8.36	8.64	8.10	8.62		
	DC 7-9A Comp 4	DC 7-9B Comp 4	DC 7-9C Comp 4	DC 1-9 Comp 4	DT 1-9 COMP 4 (DUP)	DC 1-9 COMP 4 (DUP)		

POR1.XLS

Inter-Office Memorandum

WESTON MANAGERS DESIGNERS/CONSULTANTS

TO: Mike Mohn

FROM: Russell Frye

DATE: 23 February 1995

PROJECT: Penta Wood Products

W.O. NO.: 03347-040-001-0026-01

SUBJECT: **Geotechnical Testing Results**

ACTION:

Geotechnical testing results for the Penta Wood Products project are attached. Twenty-four (24) soil samples, job number 9502X006 were submitted to WESTON's Environmental Technology Laboratory (ETL) on 10 February 1995 for geotechnical testing. Three (3) randomly selected duplicate samples were also analyzed (project sample numbers A02010, A02020, and A02024, ETL sample number 025, 026 and 027, respectively).

The geotechnical tests requested are presented in the attached custody transfer/work request.

The geotechnical tests performed including reference method and test number are presented in Table 1.

If you require additional information or have any questions, please call me at (610) 701-6173.

Table 1 Geotechnical Tests Performed, Reference Methods and Test Numbers		
Test Parameter	**Method[1]**	**Test Numbers**
Natural Moisture Content	D 2216	27
Soil pH	D 4974	27

1 All analytical methods derived from the Annual Book of ASTM Standards, Section 4, Volume 4.08, Soil and Rock; Building Stones; Geotextiles, American Society of Testing Materials, Philadelphia, PA, 1991 unless noted otherwise.

ENGINEERING- BIO

PWA 16

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: Penta Wood Products
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 09719

SHEET NO. 2 OF 2

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	pH	% moisture		
021	A02021	7C1-3-Comp S	S	2/8/95	1	4oz gl	x	x		
022	A02022	8A1-3-Comp S								
023	A02023	8B1-3-Comp S								
024	A02024	8C1-3-Comp S								
025	A02010	A1-3 Comp S	DUP OF 010							
026	A02020	#7B1-3-Comp S	DUP OF 020							
027	A02024	8B1-3-Comp S	DUP OF 024							

MEN

3/87

Matrix:
SD - Sediment; DS - Drum Solids; DL - Drum Liquids; X - Other
PW - Potable Water; GW - Groundwater; SW - Surface Water; SL - Sludge
S - Soil; W - Water; O - Oil; A - Air

Special Instructions:
DUPLICATES @ 10% RATE.

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All Analysis	M. Mohn	2/9/95									

FORM #4 8/94

9502X006

ENGINEERING - BIO

PWA 16

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

CHAIN OF CUSTODY RECORD

Project Name: Penta Wood Products
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: 908-321-4257

No: 09718

SHEET NO. 1 OF 2

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	pH	% moisture		
001	A02001	1A1-3-Comp5	S	2/8/95	1	4 oz gl/ –	x	x		
002	A02002	1B1-3-Comp5								
003	A02003	1C1-3-Comp5								
004	A02004	2A1-3-Comp5								
005	A02005	2B1-3-Comp5								
006	A02006	2C1-3-Comp5								
007	A02007	3A1-3-Comp5								
008	A02008	3B1-3-Comp5								
009	A02009	3C1-3-Comp5								
010	A02010	4A1-3-Comp5								
011	A02011	4B1-3-Comp5								
012	A02012	4C1-3-Comp5								
013	A02013	5A1-3-Comp5								
014	A02014	5B1-3-Comp5								
015	A02015	5C1-3-Comp5								
016	A02016	6A1-3-Comp5								
017	A02017	6B1-3-Comp5								
018	A02018	6C1-3-Comp5								
019	A02019	7A1-3-Comp5								
020	A02020	7B1-3-Comp5								

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

Special Instructions:
RANDOMLY SELECT SAMPLES FOR DUPLICATE ANALYSIS AT RATE OF 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
All/Analysis	M. Mohn	2/9/95									

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR		
JOB NUMBER	9502X006	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105		
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	02/10/95	DATE COMPLETED	02/14/95		

SAMPLE DATA								
ETL Sample Number	001	002	003	004	005	006	007	008
Project Sample I. D.	A 02001	A 02002	A 02003	A 02004	A 02005	A 02006	A 02007	A 02008
MOISTURE CONTENT								
Total Solids, %	82.2	81.9	84.1	83.5	82.7	80.4	67.1	68.3
Moisture Content, % wet	17.8	18.1	15.9	16.5	17.3	19.6	32.9	31.7
Moisture Content, % dry	21.6	22.2	18.9	19.7	20.9	24.4	49.1	46.4
pH								
pH, standard units	5.41	5.34	5.42	7.13	7.19	7.14	7.12	7.14
	1A1-3 COMPS	~~1B~~ 1B1-3	1C1-3	2A1-3	2B1-3	2C1-3	3A1-3	3B1-3

Hw: 17.3
pH: 5.4

Hw: 17.8
pH: 7.2

Hw = 32.3
pH = 7.1

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9502X006	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	02/10/95	DATE COMPLETED	02/14/95

SAMPLE DATA								
ETL Sample Number	009	010	011	012	013	014	015	016
Project Sample I. D.	A 02009	A 02010	A 02011	A 02012	A 02013	A 02014	A 02015	A 02016
MOISTURE CONTENT								
Total Solids, %	67.8	72.2	78.1	75.5	67.5	64.1	64.6	81.2
Moisture Content, % wet	32.2	27.8	21.9	24.5	32.5	35.9	35.4	18.8
Moisture Content, % dry	47.6	38.6	28.1	32.4	48.1	56.1	54.9	23.1
pH								
pH, standard units	7.17	7.17	7.35	7.34	7.32	7.36	7.53	6.61
	3C 1-3	4A 1-3	4B 1-3	4C 1-3	5A 1-3	5B 1-3	5C 1-3	6A 1-3

H_2O: 24.7
pH: 7.3

H_2O: 34.6
pH: 7.4

POR1.XLS

SENT BY: 2-20-95 ; 1:41PM ; WESTON- ROY F. WESTON INC.;#14/15

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9502X006	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	02/10/95	DATE COMPLETED	02/14/95

SAMPLE DATA								
ETL Sample Number	017	018	019	020	021	022	023	024
Project Sample I. D.	A 02017	A 02018	A 02019	A 02020	A 02021	A 02022	A 02023	A 02024
MOISTURE CONTENT								
Total Solids, %	81.1	81.6	84.3	85.6	82.7	77.9	77.2	77.4
Moisture Content, % wet	18.9	18.4	15.7	14.4	17.3	22.1	22.8	22.6
Moisture Content, % dry	23.2	22.5	18.7	16.9	20.9	28.4	29.5	29.1
pH								
pH, standard units	6.67	6.44	6.29	6.34	5.96	6.52	6.87	7.04
	6B1-3	6C1-3	7A1-3	7B1-3	7C1-3	8A1-3	8B1-3	8C1-3

Hw = 18.7
pH = 6.6

Hw = 15.8
pH = 6.2

Hw = 22.5
pH = 6.8

FOR1.XLS

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR		
JOB NUMBER	9502X006	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105		
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	02/10/95	DATE COMPLETED	02/14/95		

SAMPLE DATA								
ETL Sample Number	025	026	027					
Project Sample I. D.	A 02010 Dup	A 02020 Dup	A 02024 Dup					

MOISTURE CONTENT								
Total Solids, %	72.2	85.5	77.1					
Moisture Content, % wet	27.8	14.5	22.9					
Moisture Content, % dry	38.5	17.0	29.8					

pH								
pH, standard units	7.20	6.32	6.99					

POR1.XLS

WESTON

MANAGERS DESIGNERS/CONSULTANTS

SHEET ____ of ____

CLIENT/SUBJECT PWP W.O. NO. ____

TASK DESCRIPTION Event 6 - Average calcs. TASK NO. ____

PREPARED BY MFM DEPT ____ DATE ____

MATH CHECK BY ____ DEPT ____ DATE ____

METHOD REV. BY ____ DEPT ____ DATE ____

APPROVED BY
DEPT ____ DATE ____

Pile	% H_2O	pH
1	17.5	5.2
2	22.3	5.9
3	33.1	~~6.85~~ 6.9
4	25.9	6.2
5	36.1	7.6
6	20.7	6.5
7	17.5	6.5
8	24.4	6.8

Sampling Event 5
Daramend

SAMPLE	% H_2O	pH
DT 1-3A	19.7	8.6
1-3B	18.9	8.5
1-3C	19.0	8.6
4-6A	17.8	8.3
4-6B	17.9	8.3
4-6C	17.4	8.2
7-9A	17.2	7.7
7-9B	17.2	~~7.8~~ 7.9
7-9C	17.4	7.9
Average	18.1	8.2
DT 1-9 comps	18.5/18.6	8.5/8.6

DC 1-3A	3.5	8.4
1-3B	3.5	8.3
1-3C	3.3	8.3
4-6A	3.8	8.3
4-6B	4.1	8.3
4-6C	3.8	8.4
7-9A	3.3	8.4
7-9B	3.0	8.3
7-9C	3.1	8.6
Average	3.5	8.4
DC 1-9 comps	3.0/3.2	8.7/8.7

Inter-Office Memorandum

WESTON
MANAGERS DESIGNERS/CONSULTANTS

RECEIVED
8 1995
WESTON/REAC

TO: Mike Mohn

FROM: Russell Frye RF 6173

DATE: 10 April 1995

PROJECT: Penta Wood Products

W.O. NO.: 03347-040-001-0006-01

SUBJECT: **Geotechnical Testing Results**

ACTION:

Geotechnical testing results for the Penta Wood Products project are attached. Twenty-Seven (27) soil samples, job number 9503X006 were submitted to WESTON's Environmental Technology Laboratory (ETL) on 16 March 1995 for geotechnical testing.

The geotechnical tests requested are presented in the attached custody transfer/work request.

The geotechnical tests performed including reference method and test number are presented in Table 1.

If you require additional information or have any questions, please call me at (610) 701-6173.

c:\wp51\geotech\restmpl.mem 04/10/95

Table 1 Geotechnical Tests Performed, Reference Methods and Test Numbers		
Test Parameter	**Method[1]**	**Test Numbers**
Natural Moisture Content	D 2216	22
Soil pH	D 4974	22

1 All analytical methods derived from the Annual Book of ASTM Standards, Section 4, Volume 4.08, Soil and Rock; Building Stones; Geotextiles, American Society of Testing Materials, Philadelphia, PA, 1991 unless noted otherwise.

ENGINEERING - BIO - COMPOST PWA 18R

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

95034006
~~95?4271~~

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: (908) 321-4200

No: 09998

SHEET NO. 1 OF 2

Sample Identification / **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	pH	% moisture		
001	A02936	1A1-3 COMP6	S	3/14/95	1	4oz glass / none	X	X		
002	A02937	1B1-3 COMP6								
003	A02938	1C1-3 COMP6								
004	A02939	2A1-3 COMP6								
005	A02940	2B1-3 COMP6								
006	A02941	2C1-3 COMP6								
007	A02942	3A1-3 COMP6								
008	A02943	3B1-3 COMP6								
009	A02944	3C1-3 COMP6								
010	A02945	4A1-3 COMP6								
011	A02946	4B1-3 COMP6								
012	A02947	4C1-3 COMP6								
013	A02948	5A1-3 COMP6								
014	A02949	5B1-3 COMP6								
015	A02950	5C1-3 COMP6								
016	A02951	6A1-3 COMP6								
017	A02952	6B1-3 COMP6								
018	A02953	6C1-3 COMP6								
019	A02954	7A1-3 COMP6								
020	A02955	7B1-3 COMP6								

OW 3/16/95

Matrix:
SD - Sediment PW - Potable Water S - Soil
DS - Drum Solids GW - Groundwater W - Water
DL - Drum Liquids SW - Surface Water O - Oil
X - Other SL - Sludge A - Air

temp 5.6

Special Instructions:
Perform duplicate analyses randomly at rate of 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
all/Analysis	D. Eacher	3/15/95	R. Altham	3/16/95	1500		Fed Ex	3-16-95	I. Benias	3-16-95	5:30

FORM #4 8/94

ENGINEERING - BIO - COMPOST - PWA 18R

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

9503X006
~~9503X271~~

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: (908) 321-4200

No: 09009

SHEET NO. 2 OF 2

Sample Identification | **Analyses Requested**

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	pH	% moisture		
021	A02956	7C1-3 COMP6	S	3/14/95	1	4oz glass/none	X	X		
022	A02957	8A1-3 COMP6	↓	↓	↓	↓	↓	↓		
023	A02958	8B1-3 COMP6	↓	↓	↓	↓	↓	↓		
024	A02959	8C1-3 COMP6	↓	↓	↓	↓	↓	↓		

9/13/95

9/13/95

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

temp 5.6

Special Instructions:
perform duplicate analyses randomly at a rate of 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
all/Anlysis	[illegible]	3/15/95	[illegible]	3/16/95	1500		Fed Ex	3-16-95	I. Sevin	3-16-95	950

FORM #4 8/94

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH					
PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9503X006	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	03/16/95	DATE COMPLETED	04/04/95

SAMPLE DATA								
ETL Sample Number	001	002	003	004	005	006	007	008
Project Sample I. D.	AO2936	AO2937	AO2938	AO2939	AO2940	AO2941	AO2942	AO2943

MOISTURE CONTENT								
Total Solids, %	82.7	82.5	82.3	77.8	77.2	78.0	68.9	65.9
Moisture Content, % wet	17.3	17.5	17.7	22.2	22.8	22.0	31.1	34.1
Moisture Content, % dry	21.0	21.2	21.5	28.5	29.5	28.2	45.2	51.8

pH								
pH, standard units	5.31	5.07	5.10	5.89	6.00	5.82	6.83	6.90
	1A1-3	1B1-3	1C1-3	2A1-3	2B1-3	2C1-3	3A1-3	3B1-3

Comp 6

Hw = 17.5
pH = 5.2

Hw = 22.3
pH = 5.9

Hw = 33.1
pH = 6.85

POR1.XLS

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9503X005	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	03/16/95	DATE COMPLETED	04/04/95

SAMPLE DATA								
ETL Sample Number	009	010	011	012	013	014	015	016
Project Sample I. D.	AO2944	AO2945	AO2946	AO2947	AO2948	AO2949	AO2950	AO2951
MOISTURE CONTENT								
Total Solids, %	66.0	75.3	73.9	73.1	66.3	63.8	61.5	77.7
Moisture Content, % wet	34.0	24.7	26.1	26.9	33.7	36.2	38.5	22.3
Moisture Content, % dry	51.4	32.8	35.2	36.8	50.9	56.8	62.5	28.8
pH								
pH, standard units	6.82	6.03	6.30	6.29	7.41	7.67	7.65	6.53
	3C 1-3	4A 1-3	4B 1-3	4C 1-3	5A 1-3	5B 1-3	5C 1-3	6A 1-3

Hw = 25.9
pH = 6.2

Hw = 36.1
pH = 7.6

POR1.XLS

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH					
PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9503X005	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	03/16/95	DATE COMPLETED	04/04/95

SAMPLE DATA								
ETL Sample Number	017	018	019	020	021	022	023	024
Project Sample I. D.	AO2952	AO2953	AO2954	AO2955	AO2956	AO2957	AO2958	AO2959

MOISTURE CONTENT								
Total Solids, %	79.9	80.2	82.9	84.0	80.6	74.4	75.6	76.8
Moisture Content, % wet	20.1	19.8	17.1	16.0	19.4	25.6	24.4	23.2
Moisture Content, % dry	25.2	24.7	20.7	19.1	24.1	34.4	32.3	30.1

pH								
pH, standard units	6.48	6.38	6.31	6.47	6.29	6.63	6.77	7.09
	6B1-3	6C1-3	7A1-3	7B1-3	7C1-3	8A1-3	8B1-3	8C1-3

H_2O = 20.7
pH = 6.5

H_2O = 17.5
pH = 6.5

H_2O = 24.4
pH = 6.8

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9503X005	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	03/16/95	DATE COMPLETED	04/04/95

SAMPLE DATA								
ETL Sample Number	025	026	027					
Project Sample I. D.	AO2945 Dup	AO2955 Dup	AO2959 Dup					

MOISTURE CONTENT								
Total Solids, %	73.6	84.3	76.4					
Moisture Content, % wet	26.4	15.7	23.6					
Moisture Content, % dry	35.9	18.6	30.8					

pH								
pH, standard units	6.05	6.46	7.09					

Inter-Office Memorandum

WESTON MANAGERS DESIGNERS/CONSULTANTS

RECEIVED
APR 14 REC'D
GEOSCIENCES DEPT.

TO: Mike Mohn

FROM: Russell Frye

DATE: 10 April 1995

PROJECT: Penta Wood Products

W.O. NO.: 03347-040-001-0006-01

SUBJECT: **Geotechnical Testing Results**

ACTION:

Geotechnical testing results for the Penta Wood Products project are attached. Twenty-Two (22) soil samples, job number 9503X005 were submitted to WESTON's Environmental Technology Laboratory (ETL) on 16 March 1995 for geotechnical testing.

The geotechnical tests requested are presented in the attached custody transfer/work request.

The geotechnical tests performed including reference method and test number are presented in Table 1.

If you require additional information or have any questions, please call me at (610) 701-6173.

Table 1 Geotechnical Tests Performed, Reference Methods and Test Numbers		
Test Parameter	**Method[1]**	**Test Numbers**
Natural Moisture Content	D 2216	22
Soil pH	D 4974	22

1 All analytical methods derived from the Annual Book of ASTM Standards, Section 4, Volume 4.08, Soil and Rock; Building Stones; Geotextiles, American Society of Testing Materials, Philadelphia, PA, 1991 unless noted otherwise.

... LANDFARM - PWA 18R

REAC, Edison, NJ
(908) 321-4200
EPA Contract 68-C4-0022

9503X005
~~9503CI70~~

CHAIN OF CUSTODY RECORD

Project Name: PENTA WOOD PRODUCTS
Project Number: 03347-040-001-0026-01
RFW Contact: M. MOHN Phone: (908) 321-4200

No: 0991[illegible]

SHEET NO. 1 OF 1

Sample Identification / Analyses Requested

REAC #	Sample No.	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	pH	% moisture		
001	B02235	DT 1-3A COMPS	S	3/14/95	1	4oz glass/none	X	X		
002	B02236	DT 1-3B COMPS								
003	B02237	DT 1-3C COMPS								
004	B02238	DT 4-6A COMPS								
005	B02239	DT 4-6B COMPS								
006	B02477	DT 4-6C COMPS								
007	B02478	DT 7-9A COMPS								
008	B02479	DT 7-9B COMPS								
009	B02480	DT 7-9C COMPS								
010	B02481	DT 1-9 COMPS								
011	B02482	DC 1-3A COMPS								
012	B02483	DC 1-3B COMPS								
013	B02484	DC 1-3C COMPS								
014	B02485	DC 4-6A COMPS								
015	B02486	DC 4-6B COMPS								
016	B02487	DC 4-6C COMPS								
017	B02488	DC 7-9A COMPS								
018	B02489	DC 7-9B COMPS								
019	B02490	DC 7-9C COMPS								
020	B02491	DC 1-9 COMPS								3/16/95

Matrix:

SD -	Sediment	PW -	Potable Water	S -	Soil
DS -	Drum Solids	GW -	Groundwater	W -	Water
DL -	Drum Liquids	SW -	Surface Water	O -	Oil
X -	Other	SL -	Sludge	A -	Air

temp 5.6

Special Instructions:

Perform duplicate analyses randomly at rate of 10%

FOR SUBCONTRACTING USE ONLY

FROM CHAIN OF CUSTODY #

Items/Reason	Relinquished By	Date	Received By	Date	Time	Items/Reason	Relinquished By	Date	Received By	Date	Time
20/Analysis	[illegible]	3/15/95	[illegible]	3/16/95	1500		Fed Ex	3-16-95	I. Devine	3-16-95	9:30

FORM #4 8/94

★ U.S. GPO: 1994-383-01[illegible]

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9503X005	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	03/16/95	DATE COMPLETED	04/04/95

SAMPLE DATA								
ETL Sample Number	001	002	003	004	005	006	007	008
Project Sample I. D.	BO2235	BO2236	BO2237	BO2238	BO2239	BO2477	BO2478	BO2479

MOISTURE CONTENT								
Total Solids, %	80.3	81.1	81.0	82.2	82.1	82.6	82.8	82.8
Moisture Content, % wet	19.7	18.9	19.0	17.8	17.9	17.4	17.2	17.2
Moisture Content, % dry	24.5	23.4	23.4	21.6	21.8	21.1	20.8	20.8

pH								
pH, standard units	8.56	8.50	8.57	8.33	8.30	8.20	7.71	7.87
	DT 1-3A Comp 5	DT 1-3 B	DT 1-3C	DT 4-6A	DT 4-6 B	DT 4-6C	DT 7-9A	DT 7-9 B

POR1.XLS

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9503X005	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	03/16/95	DATE COMPLETED	04/04/95

SAMPLE DATA								
ETL Sample Number	009	010	011	012	013	014	015	016
Project Sample I. D.	BO2480	BO2481	BO2482	BO2483	BO2484	BO2485	BO2486	BO2487
MOISTURE CONTENT								
Total Solids, %	82.6	81.5	96.5	96.5	96.7	96.2	95.9	96.2
Moisture Content, % wet	17.4	18.5	3.5	3.5	3.3	3.8	4.1	3.8
Moisture Content, % dry	21.1	22.7	3.6	3.6	3.4	4.0	4.3	4.0
pH								
pH, standard units	7.94	8.54	8.43	8.34	8.30	8.30	8.32	8.38
	DT 7-9 C	DT 1-9 comps	DC 1-3A	DC 1-3B	DC 1-3 C	DC 4-6 A	DC 4-6 B	DC 4-6 C

PORI.XLS

ROY F. WESTON, INC. ENVIRONMENTAL TECHNOLOGY LABORATORY

MOISTURE CONTENT AND pH

PROJECT	Penta Wood Products	PROJECT ANALYST	RJA	OVEN MODEL	VWR
JOB NUMBER	9503X005	QA/QC ANALYST	RWF	OVEN TEMPERATURE, C	105
W. O. NUMBER	03347-040-001-0026-01	DATE RECEIVED	03/16/95	DATE COMPLETED	04/04/95

SAMPLE DATA								
ETL Sample Number	017	018	019	020	021	022		
Project Sample I. D.	BO2488	BO2489	BO2490	BO2491	BO2481 Dup	BO2491 Dup		

MOISTURE CONTENT								
Total Solids, %	96.7	97.0	96.9	97.0	81.4	96.8		
Moisture Content, % wet	3.3	3.0	3.1	3.0	18.6	3.2		
Moisture Content, % dry	3.4	3.1	3.2	3.1	22.9	3.3		

pH								
pH, standard units	8.44	8.34	8.61	8.70	8.55	8.68		
	DC 7-9 A	DC 7-9 B	DC 7-9 C	DC 1-9 Comp 5	DT 1-9 comp 5	DT 1-9 comp 5		

POR1.XLS

Pile	9/11/95			10/22/95			11/28/95			01/03/95			2/8/95			3/14/95		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
1	ND	ND	ND	13.1	14.0	13.6	10.1	10.4	10.2	4.4	5.5	5.0	8.4	9.1	8.8	16.5	16.8	16.7
2	ND	ND	ND	13.5	14.1	13.7	14.0	14.0	14.0	7.5	8.3	7.9	11.3	12.2	11.8	17.3	18.4	18.1
3	ND	ND	ND	12.4	13.8	13.3	12.7	12.7	12.7	4.2	4.2	5.4	10.5	10.4	10.5	16.4	17.1	16.9
4	ND	ND	ND	12.7	14.1	13.6	11.7	11.7	11.7	4.8	5.7	5.2	8.1	8.5	8.3	14.3	15.1	14.9
5	ND	ND	ND	12.1	13.4	12.8	14.6	14.8	14.7	7.6	8.2	7.9	10.7	11.2	11.0	15.7	16.9	16.5
6	ND	ND	ND	12.3	13.2	12.8	13.7	13.9	13.8	8.0	8.5	8.3	10.2	10.9	10.6	15.9	16.1	16.0
7	ND	ND	ND	12.0	13.0	12.6	10.9	11.1	11.0	7.1	8.2	7.5	11.7	12.2	12.0	15.7	16.0	15.9
8	ND	ND	ND	12.4	12.9	12.7	13.3	13.7	13.5	6.5	7.1	6.8	7.8	8.3	8.0	14.4	15.3	14.6
Blg Ambient	ND	ND	ND	12.3	13.6	13.2	11.0	12.4	11.6	7.0	17.1	12.2	-2.6	14.8	7.5	12.7	21.9	15.7
utside Ambie	ND	ND	ND	ND	ND	ND	ND	ND	ND	-19.3	-11.0	-16.0	-17.7	-5.9	-10.7	9.8	14.5	12.3

Biopile temperature data

Note: these data are from the day before each sampling event. Since the thermocouples were removed from the piles on sampling days - the daily average would be affected. The temperature of the piles on the day before sampling days is expected to be similar.

M.F. [illegible] 5/24/95

026-temp.wk4

Date	Pile 1			Pile 2			Pile 3			Pile 4			Pile 5			Pile 6			Pile 7			Pile 8			Bldg Ambient			Outside Ambient		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
40	8.53	13.95	10.58	8.67	15.33	11.03	8.59	16.4	11.22	9.53	18.72	12.7	8.67	17.26	11.63	9.25	15.98	11.52	9.91	13.67	11.17	-51.7	15.16	-8.87	8.39	16.14	11.12	ND	ND	ND
	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
113	2.78	3.8	3.363	6.5	7.14	6.92	2.8	3.83	3.398	-102	52.84	-15.4	6.82	7.43	7.098	7.2	7.8	7.455	6.21	7.26	6.783	5.88	6.35	6.108	9.12	13.52	11.38	-22.8	-18.2	-20.4
147	8.4	9.1	8.82	11.3	12.2	11.78	10.4	10.7	10.54	-97.3	0	-39.7	10.7	11.2	10.96	10.2	10.9	10.56	11.7	12.2	11.96	7.8	8.3	8.04	-2.6	14.8	7.54	-17.7	-5.9	-10.7
184	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Each # represents a complete depth core
This core will be ~~composited~~ MFR well
mixed + then divided into 4 samples.
(3 samples for PCP + 1 for other parameters).

This protocol will result in:

PCP: 9 samples per pile × 8 piles = 72

Other: 3 samples/pile × 8 piles = 24

1400 I told D. Crowe the results of our
discussion with H. Allen.

1700 Gave D. Crowe my memo on S/S to correct -
he said he will read it over the
weekend + let me know if OK. I
gave Ruth H. the disk + hard copy
of the memo as is.

1730 Left REAC

M. Mol 9/9/94

9/11/94 0600 - Got picked up by Arrow
Service - started to Edison to pick
up R. Venne to go ~~to~~ to Newark
Airport → PWP site -

1100 Arrived at Minn/St Paul airport.

MFR
~~13~~

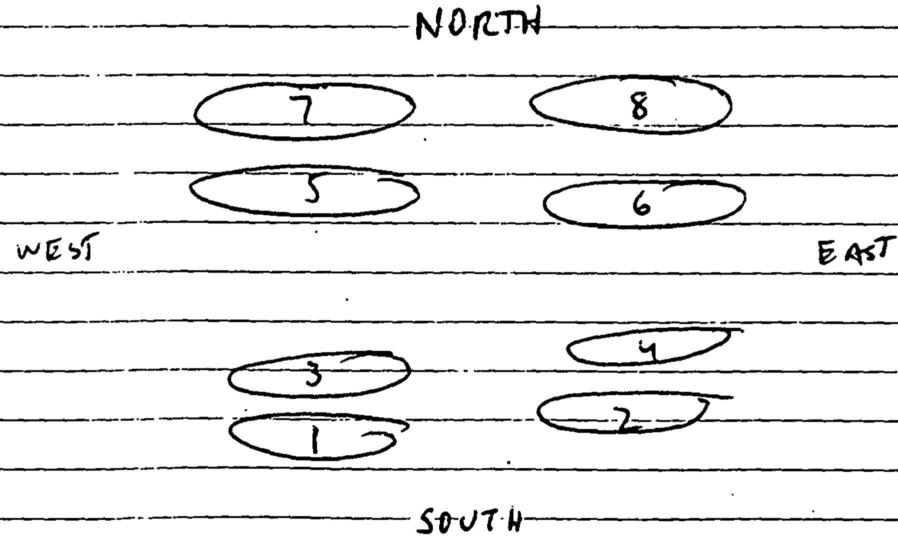
1130 Took ½ hr lunch

1200 Started towards Siren, WI.

~1345 Arrived at Wood River Inn & checked in. We will now go to PWP site.

1430 Got to Wood River site — no one there. Went to town to see if we could purchase equipment. Went back to PWP site — met M. Dreger, S. Butler, & K. Cowan there. They had been in the lower part of the site earlier & did not see us.

~1600 Started to do sampling of bio piles. Layout of piles:



Sampling procedure:

1) Divide compost pile into 3 equal sections by length.

2) Use 4" hand auger - obtain core sample down to chips at bottom.

3) Remove all soil & place into 5 gal plastic bucket. Screen w/ 1/4" screen.

4) ~~Composite m~~ MEM Mix up sample well & place into 4 x 4 oz glass jars & 1 x 8 oz glass jar.

5) Sample: this will provide, for each pile:

a) 3 sets of 3 ~~con~~ equal (replicate) samples for PCP analysis.

b) 3 sets of $\left.\begin{array}{l} 1 \times 4\,oz \\ 1 \times 8\,oz \end{array}\right\}$ for other parameters
(To be sent to S/C lab)

Pile 1 (control - 2 yd³ soil + 2 yd³ wood chips) - samples called:

1C1	1B1	1) 1A1 Comp.	}	GIVEN DISCRETE SAMPLE NAMES
1C2	1B2	2) 1A2 Comp	}	
1C3	1B3	3) 1A3 Comp.	}	
1C4	1B4	4) 1A4 Comp	{	1 x 4 oz - S/C lab 1 x 8 oz

In all cases, a sample for pH was grabbed, & also for % moisture. These samples will be tested tomorrow.

Pile 2 - 2 yd^3 soil & 2 yd^3 wood chips & 1 yd^3 turkey manure.

Samples:

1)	2A1	2B1	2C1
	2A2	2B2	2C2
	2A3	2B3	2C3
	2A4	2B4	2C4

"A" sample was obtained from Western side of pile, "B" from middle, & "C" from Eastern side of pile.

MFR 1900 ~~1930~~ ~~Left PWP site~~ Finished sampling piles 1 & 2 - started to decon all buckets & sampling tools.

MFR 1945 ~~1730~~ Left PWP site w/ NAAV.

2000 Got to hotel - went to dinner

2100 Wrote up notes & plan tomorrow - we will finish sampling tomorrow & ship samples. We will then set up system to run manually if needed.

2130

M. [signature] 9/11/94

9/12/94 0730 Arrived at PWP site.

Talked to Brad Stumpke (TAT) – he asked us if we could do a PCP in water test sample – I said OK. I asked RAMU to do it. This water sample is from MW 6 (shallow) well.

Brad said the pump test is scheduled for ~~the~~ 9/27. They still have to get a liner for the storage lagoon.

0900 Ramu started to prep samples for pH, + % H_2O.

I started to pack samples for shipment to H.H. Lab in Brunswick, GA.

1200 We sampled bio piles 3 + 4

Pile 3: 2 yd^3 soil + 2 yd^3 wood chips + 1 yd^3 turkey manure + 1 bag NH_3NO_3.

Pile 4: 2 yd^3 soil + 2 yd^3 wood chips + 2 yd^3 turkey manure.

3A1	3B1	3C1	4A1	4B1	4C1
3A2	3B2	3C2	4A2	↓	↓
3A3	3B3	3C3	4A3		
3A4	3B4	3C4	4A4	4B4	4C4

1530 Went to lunch

1600 Called H. Allen at ERT – told him we plan to finish grabbing samples today. Tomorrow we will manually add H_2O to piles – to get 60% H_2O. How much we add will be based on % H_2O figures from samples in oven now.

Told him we are monitoring pH + temp.

I also said we should add the water slowly – not in 1 dose. He agreed with me. He also said that my E-mail regarding the postponing of my project report was OK.

He also said that I could give my copy of the S/S memo to Wally – even though I told him that nobody had read through it + reviewed it. He ~~a~~ said don't worry about it.

1610 Started to get samples from piles 5-8.

Pile 5: 2 yd^3 soil + 2 yd^3 wood chips + 1 yd turkey manure + 0.5 yd^3 expanded sawdust.

Pile 6: 2 yd^3 soil + 2 yd^3 wood
chips + 1 yd^3 turkey manure +
0.5 yd^3 expanded sawdust

Pile 7: 2 yd^3 soil + 2 yd^3 wood
chips + 1 yd^3 sawdust
+ 1 bag $NH_3 NO_3$

Pile 8: 2 yd^3 soil + 2 yd^3 wood
chips + 1 yd^3 expanded sawdust
+ 1 bag NH_3NO_3

All samples were obtained. We also
got samples ~~from~~ for pH, % H_2O, + temp
readings.

Note: I also held a wet pH paper
above piles 1-4. Pile 1 - paper
did not change ∴ no NH_3 given off.
Piles 2-4. - paper turned to pH 10-11.
∴ NH_3 given off.

Left site ~ 8:10 pm.

9/13/94 0730 Went to PWP site

Started doing paperwork on all PCP samples. Packed up remaining PCP samples for shipment to HHL. Packed up samples for other parameters. Sent all samples out.

Called JoANN BOYD at SRI - told her we are going to send out TPH as an additional parameter for the soil samples.

Also called John Johnson - told him I was going to add TPH to PWA # 8R. He said OK. I also said that the PWA for the soil flushing study - which included 22 TPH. I said the TPH slots were still open. He said OK

Shipped all samples out by Fed Ex.

Added 10 gal of H_2O to each of the 8 piles - just to start the wetting process.

Cleaned up lab area & packed materials & equipment up to ship back to Rome

Left site at

9/14/94 0730 arrived at PWP site

Started to get piles ready - Wally told me that he would send me a worker to help me.

Todd — (TAT) came to help me set up the water distribution system for the piles.

Water in 7000 gal tank

↓

850 gal day tank — 2 SUBMERSIBLES (INDEPENDENT)

PILES 1-4 PILES 5-8

I hooked up air distribution system.

4 air blowers - used - ~~2 per pile~~
2 piles per blower

Problem w/ overload of current?
Fuse blew - we need to get new fuses. + Power strips.

Only 2 air blowers were hooked up.

left site at 2000

M. Mok 9/14/94

9/15/94 0730 Arrived at site

Having pump &/or electrical problem. No pumps are working.

Rama will do porosity of samples.

I will grab sample of soil blend used to make piles – for geotech analysis. Went to area where Brad Stringle (TAT) told me it is located – could not find it. – it looks like ~~its~~ only 2 piles of 1) sawdust & 2) sand are there. (they are the ingredients). MPM

~0900 Got message from H. Compton about Evendale – he wants to know what the status is. I called & left him a voice mail – told him that:

1) Eliminated SEM & EDAX

2) We are only doing MEP on 4 samples (see p. 160).

Worked on water distribution system – got everything set up. Used electricity from the lab (for sump pump).

9/16/94 Arrived at 0731 to site

Talked to Walter Neils (OSC - Pierce Wood Prod) - showed him the line pile layout - he said it looked good. He asked me to give him a list of things for them to do as far as operating the system.

I made up a list of items & left it on Willy's desk. We left the site at ~ 2:00 pm & went to the airport.

2400 ~~1200~~ am I got home at 12:00 pm (midnight).

M. [signature] 9/16/94

9/19/94 0730 Arrived REAC

Worked on memo for H. Allen - ~~made~~ made table corrections.

Called Brad Stemple (TAT- 715-349-7798) & Willy Neils - left message with each - told them we need a place to put the computer. We also need a phone line to connect the computer up with.

Brad asked me to check with H. Allen

10/19/94 0730 Arrived REAC

Started to pack for PWP trip - went over manifest w/ R. Vemuri. We then went to Bay to start packing.

We will send sampling equipment, H+S stuff, tarps, string, to arrive at Wood River dam on 10/20. The rest of the material will be shipped to PWP site on Fri, 10/21/94.

H. Allen said the keys will be shipped to Wood River dam on 10/20/94.

1200 Lunch

1215 Worked on soil flushing memo - gave to D. Crowne to review.

1300 Went over manifest - made sure that we are not forgetting anything.

1630 Left REAC

M. [illegible] 10/19/94

10/20/94 Got picked up by Arrow limo at 5:00 am. Picked up P. Sarnick, R. Lewis + R. Vemuri, - went to Newark Airport.

0840 Got on flight to Minneapolis

1100 Arrived at Minneapolis airport

Went to Hertz - got rental car

1200 lunch

~1230 Drove to A to Z rental - picked up Bobcat, truck, & Rototiller.

Started to drive to Grantsburg

~1400 Checked in at hotel

Heard a grinding noise in car on way to hotel - sounded like grinding - only lasted ~1 sec each time. At hotel - called Hertz - spoke to Sue at 1-800-654-4173. Told her about noise. She said she would put a note in computer.

She said if I had further trouble, call up & she might get another car delivered. I said OK.

~1410 Called YI WAH LIN - he said I could ship samples on Mon rather than tomorrow. (I will collect Sun & Mon).

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~1415 Called C. Snyder - asked her about Ferrell Gas Co. - she said it is OK to call - I will call Wade Clarin - set up schedule

1920 Called Wade Clarin at Ferrell Gas Co - 715-866-4311. He said he will deliver the tanks on Monday morning. Heaters will probably arrive Mon or Tues I said OK.

Started to pack up items left on site previously - to send back to REAC.

1900 Left PWP site

M Mol 10/20/97

10/21/97 0730 Arrived at PWP site

MFM, R. Lewis, P. Sassick, R. Vemuri

P. Sassick worked on computer control of piles.

M. Mohn + R. Vemuri - collected samples of bio pile. Procedure: Collected 3 individual cores from each pile. Pile 1 had 1A (west end), 1B, + 1C (east end). Each core was composited ~~+ then the sample was grabbed.~~ MFM

Each composite was screened through a 1/4" screen. Then the sample was grabbed from the screened material. Samples for pH + % moisture were also taken.

pH measurements were obtained + moisture samples were put in the oven.

10/22/99

10/22/99
~~10/23/99~~
SATURDAY

through
the
ed

moisture

10/22/99

MFM

10/22/99
~~10/23/99~~ Arrived PWP site at 0730.
SATURDAY

MFM, P.S, RL, RV.

Worked on sewing together giant 50' x 80' tarp. Installed in bio bldg.

R Vemuri started to put together new ~~anaerobic~~ anaerobic dechlorination reactor.

Fixed sump pump - leachate hose was below surface level of liquid in tank - it was siphoning back + making pump work more often. - Raised hose to prevent siphoning. OK.

P. Burns - working on Daramend study set up Made set up to hold Daramend / soil mixture + control soil.

~~2000~~ 2030 - Left site. M. Mol 10/23/94

10/~~24~~ 23/94 MFM SUNDAY 0730 Arrived PWP site - MFM, P. Sarnel, R. Lewis, R. Vemuri. P. Burns also arrived.

R Lewis went to work w/ P. Burns to help him w/ Daramend work. P. Burns said he will be done tomorrow (Mon).

P. Sarnel - working on computer control of piles

R. Vemuri - string anaerobic dechlorination samples. He is then going to obtain samples

2000 Left PWP site.

2115 Worked on plan for activities at PWP tomorrow

2140 Worked on Everdan final report -

2310 Stopped working on Everdan report

M. Mol 10/23/94

Monday 10/24/94

1)

2

Monday
10/24/99 0730 Arrived PWP site

Packed samples for YI HUA LIN - sent samples from Bio piles to High Hazard Lab.

~~Talked to Wally Nick~~ MFA

Heater company (Ferrell Gas in Webster) came to site to install 3 x 1000 gal tanks. Also installed 2 x 350,000 BTU torpedo heaters. One heater does not turn on. - I will call them back. They are coming tomorrow to fill tanks with propane.

Talked to Wally - He told me:
He asked me
1) ~~OK~~ to drain large 7000 gal tank. I told him I would put a submersible pump in the tank & let it drain onto the ground. He said OK. I (+ Brad Stimple) told him that the groundwater in it had ~~a~~ very low levels of PCP. He said OK.

2) I told him that I gave the Ferrell gas man the site key. He said he would rather not give it out. He asked me to get it back. I said OK. He said to tell them to

call him up to arrange a site visit when they need to check things out.

3) He asked me what the water temperature is. I said I would find out.

4) He asked me what the pile temperature was. I said it didn't look like it had changed much.

5) He said he would send people up if I needed them to help look after things, etc.

They may be able to help with:

1) Roto tilling (every 2 weeks)

2) Collecting % H_2O samples (every 2 weeks)

3) Getting leachate, feed water, & sawdust juice readings (whenever at site).

He seemed like he was very agreeable to ~~[illegible]~~ us being there & was willing to help us.

Col

La

DARAMEND TEST PLOT (8x16)

S

CONTROL TEST PLOT (8x8)

Sa

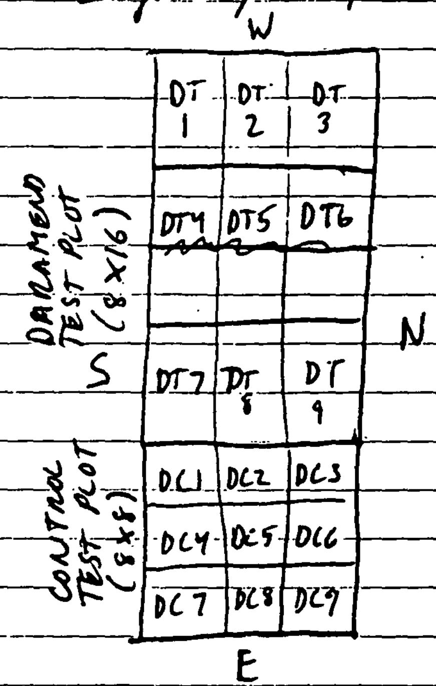
PC

a

No

Collected sample from Daramend piles.

Layout of samples was:



Samples were taken as shown above (for PCP). Other parameters were taken as composites:

DT 1-3 Comp
DT 4-6 Comp
DT 7-9 Comp
DC 1-3 Comp
DC 4-6 Comp
DC 7-9 Comp

DT 1-3 Comp Un
DT 4-6 Comp Un
DT 7-9 Comp UN

Note: all samples were first screened

through a 1/4" screen before
collecting the sample.

10/26/99 07

10/26/99 0730 Went to Pinto site

Drained out 7000 gal tank.

Filled day tank & half filled extra leachate tank.

Finished building metal cages to put over the heaters for protection.

Set heaters at ~65 °F.

Set day tank water heater at ~65-70 °F. It was set at ~60 °F.

Left PWP site at ~ 14:30.

Went to Wood River elm to check out.

Drove to airport -

Got home at 12:30 am (00 30 on 10/27/99).

M. Mol 10/26/99

be an order for > $20K ∴ may have to go to Cincinnatti to be checked + approved

1400 Talked to F Miller — he said it is OK to kill samples w/ formaldehyde, then send later.

1410 Talked w/ Paul Burns from W.R. Grace - about Daramend pile - he said he would like to maintain ~ 25-30% H_2O in the pile. I said OK

1630 left REAC

M. Mol 11/25/94

11/28/94 0500 Got picked up by Arrow Limo service - got taken to Newark Airport - for trip (#6) to P.enta.

~1030 Arrived at Minneapolis / St Paul Airport.

~1040 Called Cindy Snyder - told her I would need a lab to do analyses of chlorinated phenols. She said OK but it may be a different lab than what is chosen for additional analyses of these samples in the future. I said OK

Hot car, drove to A-2 to pick up auger & coring machine. Then drove to Penta site.

~1430 Arrived at Penta site w/ R. Lewis + P. Sarsiel. Put away items shipped by Fed Ex - Then started to grab anaerobic dechlorination test samples - water + soil samples. All samples will be tested for both PCP + chlorinated phenols.

The lab to do the analyses for chlorinated phenols is:

ANALAB
205 CAMPUS PLAZA I
RARITAN CENTER
EDISON NJ 08837
ATTN: JOE LA RUSSO

908-225-4111

(Should put on COC when need results by)

~1500 Noted oven was broken - I will most likely send oven back to REAC + send % H_2O / pH samples to ETC for testing.

1900 Left Penta site w/ R. Lewis + P. Sarsiel.

2115 Started to write out labels & COC sheets for anaerobic dechlorination samples.

Also filled in notes + made list of things to do tomorrow at PWP site.

HRS for 11/28:
5am – 8 pm = 15 – 1 = 14 hrs
+ ~~9 pm~~ 9:15 pm – 11:20 pm = 2 hrs
= 16 hrs

M. Mol 11/28/94

Tues ~~WED~~
11/29/94 0730 Arrived PWP site.

Started to pack anaerobic dechlor. sample in coolers to ship out.

Talked to Wally Neills – about groundwater pump – he said to go to the ~~p~~ Biotrol building & turn on the switch for the well pump. Then turn on the switch for the well pump in the bio bldg.

We tried this – it worked. Filled up the 850 gal day tank (influent) with H_2O. P. Sarsick worked on computer control of piles.

~1200 Collected bio pile samples - 3 samples from each pile - ex - 1a, 1b, 1c - comp 3. Samples for PCP + H_2O/pH

Collected samples for Daramend land-farming area.

DT	1	2	3	DARAMEND
	4	5	6	
	7	8	9	
	1	2	3	
CT	4	5	6	CONTROL
	7	8	9	

All samples were first screened by a 1/4" screen. From each test area - (Daramend + control) - a small amt of screened soil was saved + composited to get 2 samples:

1) DT 1-9 Comp 2 (composite of sections 1-9 in the Daramend plot.

2) CT 1-9 Comp 2 - (composite of sections 1-9 in the Control plot).

These 2 samples were sent to P. Bucens:

GRACE DEARBORN
3451 ERINDALE STN. RD
PO BOX 3060, STATION A
MISSISSAUGA, ONTARIO L5A 3T5

1900 Left PWP site -

2000 Worked on writing out labels for samples, cleaning bottles of samples, & getting samples ready to ship out tomorrow.

Note: also collected 10 samples of soil for BNA analysis (duplicates) as per Raj Singhvi. Samples were:

1) 1A Comp 3
2) 2A
3) 3A
4) 4A
5) 5A
6) 6A
7) 7A
8) 8A
9) ~~9~~ DT 1-9 Comp 2
10 CT 1-9 Comp 2

MFM
~~11~~ 2300 Stopped writing out labels + filling out field data sheets.

Note: forgot to fill in - while working in the landfarming area - noted that control area was very cold + wet looking - underside of lid was covered w/ dripping moisture.

6:45 pm (1845)

In contrast, Daramend plot was drier & was warm to the touch. - Also there was a lot of mold & bio activity obviously growing there

Temperatures were monitored: a thermocouple was used to grab a temp measurement for each plot section:

	Section	Temperature (°C)	
6:45 pm (1845)	DT 1	16.4	
	2	17.6	
	3	17.4	
	4	17.5	
	5	17.7	
	6	16.6	Avg = 17.2
	7	16.2	
	8	18.8	
	9	16.4	
	CT 1	4.9	
	2	5.3	
	3	5.3	
	4	4.5	
	5	4.9	
	6	5.2	Avg = 5.0
	7	4.9	
	8	5.2	
	9	5.1	

Ambient temp: -3 °C
Outside temp: 21 °F = -6 °C

Total hours for 11/~~28~~29/94 : MFM

7:30 am – 7:00 pm (did not take break for lunch) = 11.5 hrs

+ 8:00 pm – 11:00 pm = 3 hrs

= 14.5 hrs.

M. Mol 11/29/94

11/30/94 0730 Arrived at PWP site w/ R. Lewis + P. Sassail. Met G. Prince at gate.

Started to pack samples for shipment.

also collected the following water samples:

1) Bio influent 3
2) Bio leachate 3
3) Green leachate tank 1 - 3
4) White leachate tank 2 - 3
5) White leachate tank 3 - 3

Note: Tank 3 had ~ 500 gal of H2O in it prior to adding the leachate.

The following volumes were noted for the tanks:

Green leachate tank - (1)
White leachate tank 2 -
White leachate tank 3 -

Rototilled landfarming plots with rototiller - first had to put rototiller together

Went to cement pad with H. Allen - ~~went~~ determined strength measurement of randomly selected area on pad - ~ 7000 psi. Measurement was taken by Concrete test hammer.
Reading was 42
2ND reading was 40

1800 Left PWP site.

Hours: 9.5

M. Mok 11/30/94

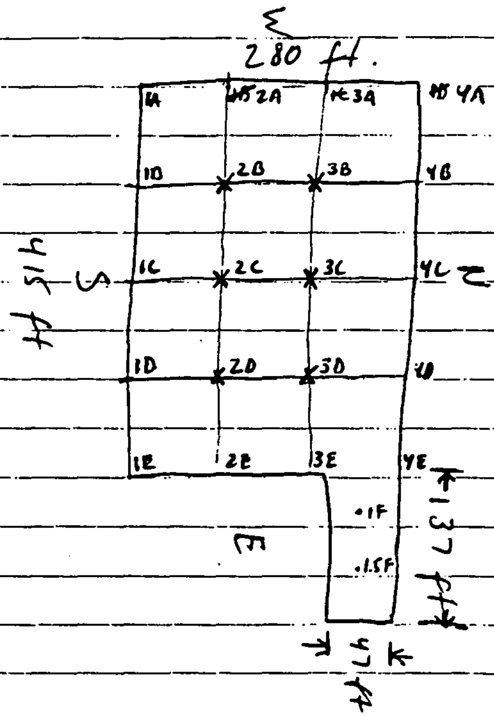
12/1/94 0730 Arrived at PWP site with P. Sarsiel & R Lewis.

Started to ship out items to REAC.

Went to concrete pad to get measurements of physical strength. The in place concrete test hammer was used to get the measurements

The cement pad was divided up into

a grid layout:



The coring machine was used to obtain cement cores from the pad surface. Cores were ~6" long. Six cores were obtained — they were collected from: 2B
3B
2C
3C
2D
3D

The cores all looked reasonably sound - no visible cracks, or chunks missing.

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It took several hours to collect the cores because the vacuum attachment did not work - I called A-Z Rental Center - 612-890-8990 - to see if they could help me. - they could not tell me anything that I could use

I collected the cores without any vacuum.

The bio piles were turned by hand - This took several hours + 2 men.

1800 Left site MPN ~~ft~~ w/ P. Sarsiel + R. Lewis.

2000 Worked in hotel - on data sheets for in-place strength measurements

2100 Stopped working.

Hours: 7:30 - 6:00 pm = 10.5 - 1 = 9.5
+ 8:00 - 9:00 pm = 1

TOTAL → 10.5

M. Mol 12/1/99

12/2/94 0730 Went to PWP site w/
R. Lewis & P. [illegible]

Collected readings & levels of tanks & all meters:

1) Feed tank - Vol = ~500 gal

Pump 1 vol -> 831.9 gal
Pump 2 vol -> 457.8 gal

2) Leachate minute clock = 13029.9 min

Tank 1 (green) - 1200 gal
2 (white) - 1500 gal
3 (white) - 250 gal

3) Sawdust juice - ~~2220~~ 220 gal

Flowmeter - 275.3 gal

Note: there were 6 x 55 gal drums of leachate from tank #2. Each drum was 2/3 full.

~0930 Left PWP site - went to hotel to check out. Headed for airport.

1930 Arr...
Arr...

1/3/95 0500 Got picked up at home by Arrow limo service → drove to Newark airport for trip to PWP site (trip #7). Picked up Mandeep Talwar on way.

~1030 Arrived at airport in MN – got car – drove to ~~hotel~~ man – got lunch

1130 lunch

1200 Started to go to Siren –

~1340 Arrived at hotel – Wood River Inn –

1400 Drove to site – started to transport supplies into bldg at PWP site –

~1430 Drove to Siren 66 gas station – Talked to guy there – he said stop back tomorrow morning – they may be able to move tank.

I measured tank at site:

4 ft high x 5 ft wide x 16 ft long

= 320 ft^3
= 2394 gal

~1500 Called Ferrell gas co – told Carol that I will be at site this week.

She will send someone out to check gas level.

Measured ~~volumes of~~ flow volumes that were on pumps, etc:

1) PUMP 1

2) PUMP 2

3) Sawdust juice

4) leachate clock.

~1530 Started to collect soil samples from Diamond plots. Collected 9 samples from heated & control plots. Also measured temperatures:

1) DT1	~~6.7C~~, 17.4
2) DT2	~~11.3~~, 17.0
3) DT3	~~11.9~~, 17.1
4) DT4	16.0
5) DT5	17.8
6) DT6	17.0
7) DT7	23.1
8) DT8	21.6
9) DT9	19.9

Avg = 18.2

1) DC 1 12.9
2) DC 2 13.6
3) DC 3 12.9
4) DC 4 ~~12.220~~ 12.0
5) DC 5 13.3
6) DC 6 12.8
7) DC 7 11.5
8) DC 8 11.6
9) DC 9 10.9 Avg = 12.4

Ambient = - 14.5 °C

~1900 Finished sampling Daramend piles

~1930 Left PWP site.

2130 Worked on notes & telling M. Talbum how to prep samples for shipment - he filled out sample paperwork - FOS, COC, etc.

2230 Stopped working

Total hours for 1/3/94:

5:00 am (EST) → 7:30 pm (CST)
= 8:30 pm (EST)
- 1/2 hour lunch
+ 1 hour at hotel = 16 hrs

M. Mol 1/3/95

7=

W

1/4/95 0700 Started to check samples & COC's, FDS, etc. (M. Talum did samples) to make sure they were OK

We will send out PCP (Darammd) & samples to HHL + P. Buccus today.

0830 Went to PWP site. Measured temperature - outside -: − 24 °C = − 10 °F
Thermocouple used.

0900 Purchased H2S drinks, cat litter, etc.

Went to SIREN 66 gas station - talked to Mike - he came to site with us to check out tank. He said they can do it this afternoon or tomorrow. I said OK.

0930 Called SMWT site 301-373-2470. Talked to JOHN BOURRET from ETI (ERCS) He said:

1) They have a trailer & power available.

2) May have to set up in bldg (they have torpedo heater there now). They are planning to heat the bldg. - but may not be in time.

3) They have a waste generator number

4) S...

4) Start up date is still 1/17 although there is still uncertainty about / vendor. He will keep me posted.

Voice mail # of John BOURET:
804 - 358 - 5858
BOX 129

Collected soil samples for Bio Piles. Collected an extra bottle for each XA Comp 4 sample EX: 1A Comp 4 - to send to Analab for soxhlet extraction. H. Allen called me - told me to do the same 10 samples that we did last time for BNA. I said OK.

Collected soil + H_2O samples for anaerobic dechlorination study.

~~Prepared all~~ MFA Tried to pump well water - did not pump - lines probably frozen. We need more water.

Measured large rectangular box tank - 4' high x 5' wide x 16 ft long = 320 ft^3 = ~ 2400 gal.

Went to Sirin 66 gas station - got in touch with Scott Thomas at Southside Auto (715) 349-2626.

South side auto direction:

Go E on 70, make R at Sinon 66 gas station. Go ~1/4 mile - on L side -

He came w/ truck to move tank - he could not - it was frozen to ground

Got call from G. Pierce - get H_2O level measurements in wells. Ordered well keys + oil/H_2O interface probe.

11:55 a.m. Following measurements were obtained from the meters for the bio pile:

1) PUMP 1 - 853.3 gal

2) PUMP 2 496.0 gal

3) SAWDUST JUICE 280.45 gal

4) leachate 13048 min

Tank 1		1200 gal
	2	1500 gal
	3	~350 gal

~~800~~ 2000

2100 ↓ 2400

Th

1/5/95

~1000

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get
wells.
interface

obtained
piles :

Worked on collecting samples almost entire day.

~~800~~ 2000 Left PWP site.

2100 ↓ 2400 Worked on COC & FDS, labels for samples in order to ship out for tomorrow.

Total hours worked = 12.5 + 3
= 15.5 hrs.

M. Mok 1/4/95

Th 1/5/95

0700 Started to check labels, COC, FDS, etc filled out by M. Tolman, & he checked my paperwork & labels.

~1000 Went to site after talking on phone w/ D. Crowe, H. Allen, S. Taggart, etc. Smr

Started to pack samples for Fed Ex.

Forgot to enter: on Wed (1/4/95) - added CaO to Diamond & Control piles: 2.1 kg for Diamond, 1.2 kg for control piles. It was sprinkled on top of the piles.

Started to manually turn bio pile with shovels.

Rototilled Daramend + control plots, then added H_2O. Added ~60 gallons to Daramend plot, + ~15 gal to control plot.

Seirn Fire Dept delivered H_2O to site. (1200 gal into 7000 gal tank). We then filled up 850 gal dry tank + several 35 gal containers.

~~Gotta~~ Had to re-rototill after ~~even~~ adding H_2O to ~~pot~~ landfarm. ~~that the soil samples~~

Forgot to enter above (before rototilling again) – collected core samples (4) from Dara. plot – composited + mixed – took pH – of 2 samples:

1) Dara – 9.7
2) Dara (DUP) – 9.6

Same with control (4 randomly collected cores):

1) Control 9.5
2) Control (Dup) – 9.5

10

2230

1/6/95

07

~ bio pile

tal plots
~60 gallons
15 gal to

H_2O to site
tank)
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samples (4)
ited & mixed -

viously collected

in conversation w/ H. Allen - he said CaO may make pH go up to high. - he was right.

10 BNA'S - sent to Analab -

2230 Left PWP site (finished up bio pile turning).

M. Mol 1/5/95

1/6/95 0700 Got time sheets - started to call in hours.

0730 Went to PWP site after buying flat sprinkler hose - to replace old hose (clogged up). Also - got 2 water filters - to remove solids from H_2O to prevent clogging -

Mandeep T. installed plumbing changes, M. Mol - collected soil sample from Stain 1-5. (otherwise known as a line extending from Stain 10 - to Stain 12) Sample consisted of surface soil from Stain 11 & Stain 12) - Composite.

Sample was sent to F. Miller by Fed Ex.

Helped M. Tolman to change over hoses + filter on water feed. Removed vacuum breakers.

One new hose did not work - we must get another one

~~Left~~ H_2O/oil interface probe - arrived - Following readings taken:

* 1) MW 3 — 105.85 ft (H_2O level)

* 2) MW 4 — 106.60

3) MW 19 — 104.30

* * inserts ~~adapter~~ tape guide used - subtract 2/10 ft. MFM

Did not enter:

1/4/95 - @ 1730:	# 1/5/95 @ 1350
Pump 1 - 853.35 gal	892.2
Pump 2 - 496.05 gal	541.90

MFM

~~# - Done after Sawdust juice 280.45~~ MFM

2030

2100

2300

arge over
lead

-

work - we

rolle -
taken;

(1hr lunch)

- subtract

)

1/5/95 @1350

892.2

541.90

2030 Left site to check hardware store opening time tomorrow: 7:45 am - We will get new hose

2100 Started working on oil/water interface probe - tried to fix - (it gave continuous beep + both lights lit).

Cleaned probe -
Changed batteries
Cleaned connection in top of probe - this worked

Probe is OK.

Filled in notebook -

2300 Stopped for night.

M. M.

Tot hours: 7:00 am - 8:30 pm
(no lunch)
= 13.5
+ 2 hours at hotel
= 15.5

8 hrs already charged:

∴ fill out supplemental for 7.5 hrs.

M. Mod 1/6/95

1/7/95 MFM 0700 Met w/ Mandeep Talwar – planned what to do today – we are going to get a new hose (sprinkler) + water filters for the feed system

0745 Got connection + filters for water feed system. Started to put new hoses on + ~~replace~~ MFM place filters in line. Finished – system worked OK – also
~~~1030 Started~~ MFM removed vacuum breaker + elevated ~~hoses for~~ MFM pumps from bottom of tank to prevent picking up debris + solids.

~1030 Started to measure well levels of water – all wells on site – (separate paper) –

~~~~ MFM 1415 Finished ~~about~~ MFM measuring well levels.

Made arrangements to return home on 1/7/95 as originally scheduled

1430 ~~Returned~~ left PWP site – went to hotel + checked out. Went to airport –

1230 pm Arrived home

Total hrs for 1/7/95 – 17.5

M McL 1/7/95

1)
2)
3)
4)
5)

1/9/95

$359/WK – UNLIM MILAGE
59.99/DAY EXTRA
BACK SEATS ARE REMOVABLE

um - planned
un going to
2) + water
ten

water feed
new hoses
in line.
OK - also
breakers &
from bottom
up debris +

lucks of
-

all levels.

home on 1/17/95

site -
out. Went

7.5

n Mol 1/7/95

Note: Before leaving PWP site -
obtained following data on ~~flowmtr~~ MFM flows:
Sat, 2:00 pm 1/7/95:

1) Feed tank - 600 gal

2) PUMP 1 - 925.6 gal

3) PUMP 2 - 571.1 gal

4) Sawdust juice - 283.7 gal

5) Leachate - 13062.1 gal

— M. Mol 1/7/95

1/9/95 0730 Arrived REAC

Started to get ready for SMWT job.

Dave Escolani will be going with me.

Called Enterprise Car Rental in Langhorne - 750-1200. Arranged to ~~have~~ rent a mini van on 1/16/95 - they will pick me up at 4:30 pm. I did not give credit card #. - They gave me a confirmation #: 469830.

They will pick me up at 4:30 pm at my house on Mon, 1/16/95. Talked to RICK.

$3.57/WK - UNLIM MILAGE
59.95/DAY EXTRA
BACK SEATS ARE REMOVABLE

Solomons
for myself
$58.00
ate.
for
Calvert
not accept

called them
...
tax free

the Holiday

is

Note: forgot to enter - on 1/6/95 at
PWP site - 1200 gal H_2O delivered by
Siren Fire Dept.
7732 State Rt 70
(715) 349-2466

Water was used for influent feed
to bio piles.

M. Mol 1/9/95

1/10/95 0730 Arrived REAC

Worked on SMWT prep for trip.

Brought water level indicator (Solo...
Model 121 Interface Meter) to ...
+ packed to ship to Rental Respo...

Called D. Brady - told her that ...
hotel in Solomons, MD will accept
tax exempt form.

Talked to Brett Pasapane today.
Enpirate by phone (1-610-701-73...
regarding doing ground penetrating radar
at SMWT site to locate a buried
well casing of PVC. I said it
may be next week - he said he
may be available - he will also
check to see if the instrument is available

Forgot to enter data collected at PWP site (see p. 78).

pH of Daramend + Control plot soil:

DATE - 1/7

Sample	pH (meter)	pH (paper)
Control	8.7	6-7
Control (Dup)	8.5	7
Daramend	8.8	7-8
Daramend (Dup)	8.8	7-8
Control (after H_2O addition)	8.4	6-7
Daramend (after H_2O addition)	8.5	6-7

Note: first 4 samples collected before CaO addition + H_2O addition.

Added 15 gal H_2O to control plot & 60 gal to Daramend plot (see p.
Rototilled following addition of CaO, then again after adding H_2O.

M. Mol 1/10/95

2/3/95 0730 Arrived REAL

Worked on concrete memo containing new analytical results for cement core.

Gave to R. Tolin, S. Finnelli, + D. Crown to review.

1200 lunch

1215 Worked on memo

1400 Went to bay to make sure job was packed for PWP site.

1630 Left REAL

M. Mol 2/3/95

2/6/95 M 0445 Picked up at home by Arrow - then picked up P. Sansal & D. Molnar. Flight at 0745.

Checked in at hotel ~ 1:00 pm. Got to PWP site ~ 1330.

Worked on ripping apart biopiles - also roto tilled biopiles & then rebuilt the piles.

Note: took 1/2 hour lunch after getting to Minneapolis.

1900 Lef

Tot

2/7/95 T 073

0800

Ver

ser

1100 -

Also

dec

1200 Went

1300 Also

pile

Da

also

Note

con

dry

1800 Lef

1915 Work

dec

1900 Left site at 7:00 pm.

Total hours for 2/6/95 = 14-1/2 = 13.5

M. Mol 2/6/95

2/7/95 T 0730 Arrived PWP site - MFM, PS, GM.

0800 Started to take well level measurements. Very cold - ~ -10 °C - had to come in several times to get warm

1100 - Completed well measurements.

Also collected Daramend & anaerobic dechlorination samples.

1200 Went to lunch - met H. Allen. (lunch = 1 hr)

1300 Also collected temperatures from Daramend piles. N.B.: Control piles were hotter than Daramend piles. H. Allen noted this also. We were all surprised.

Note: We will add H_2O to Daramend & control piles next month - Control looked dry.

1800 Left site.

1915 - Worked on paperwork for anaerobic dechlorination samples + Daramend

samples – COC, FOS, labels, etc.
Prepped for shipment next day.

2200 Stopped work. –

Total hours for 2/7/95 = ~~9.5 7~~

10.5 – 1 + 3 = 12.5 hrs.

M. Mol 2/7/95

2/8/95 0730 Went to PWP site –

Packed samples collected on 2/7/95
for Fed Ex shipment.

P.S. + GM collected bio pile samples.

Method of collection: 9 samples per pile.
Similar to initial sampling event:

Three cores were taken. Each core was
placed in a separate 5 gallon bucket
+ mixed well, then screened w/ a ~~¼~~ nom
¼ inch screen. The screened soil
was then used to collect 4 separate
(identical) jars of soil. Jars were
labeled:
1) 1A1 comp 5 (PCP)
2) 1A2 comp 5 (PCP)
3) 1A3 comp 5 (PCP)
4) 1A1-3 Comp 5 (% H2O / pH)

This resulted in 9 PCP samples per pile + 3 % H₂O/pH samples per pile.

The total # of samples was 72 PCP + 24 % H₂O/pH samples.

This method was per H. Allen request.

Note: when we grabbed the Daramend samples, the following procedure was used: (as per H. Allen):

Take cores from sections 1-3, mix up into a composite, then screen through a 1/4 inch screen. Then collect ~~24~~ 3 soil samples: MFM MFM

1) DT 1-3 A Comp 4
2) DT 1-3 B Comp 4
3) DT 1-3 C Comp 4

2 bottles of each sample were collected - one for PCP, one for % H₂O/pH.
~~In addition a total of~~ MFM MFM

The same method was used for sections 4-6, + 7-9 in both Daramend + control plots. A total of 9 samples from each plot was obtained.

In addition, 2 composite samples (DT 1-9 Comp 4, DC 1-9 Comp 4) were collected. These will be sent to WR Grace for ~~for~~ MRM as a split sample

H. Allen asked us to re do the well level measurement numbers on MW 3, 4, + any other well. - P.S. + GM re did the numbers on these wells + GS. The numbers were very similar (see separate sheet log of well data).

1300 K. Glatz came to PWP site - spoke to him briefly about activities at PWP site.

Also - placed a metal corrugated strip on top of pile #7 - North side - to protect it from the heat of the heater - this pile appeared to be the driest.

Note: sump pump was not working - appeared to be burnt out. Replaced with new pump. - New pump checked out - it worked. - time minute clock functioned OK.

P.S. got the computer working OK.

~1700 Left site - P.S., GM, + MM went to MM hotel room to work on labels, FDS, + COC for samples. Worked on labels + paperwork until 1900.

1900 Went

2030 Came
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+ a
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3
1) W
2) W
3) W

Then

2200 ~~Stopp~~
pape

Total

11 1/2

1900 Went to dinner

2030 Came back to room & finished filling out COC for all bio pile samples & checking all work done prior. Also - filled out paperwork for 3 H_2O samples collected from the influent, leachate, & tank #3.

Also - forgot to enter - HA, GM, & PS collected 3 white rot samples. Samples were collected from 3 different spots as follows: 3 different cores were collected, & all 3 cores were placed in a bucket. This soil was mixed, then ~~placed in~~ MFM screened w/ a 1/4 inch screen. The screened soil was then used to collect 3 identical soil samples called:

1) WR-A
2) WR-B
3) WR-C

These samples were sent for PCP analysis.

2200 ~~Stopped working on~~ MFM Finished working on paperwork & notes in notebook.

Total hrs for 2/8/95:

$11\frac{1}{2} - \frac{1}{2} + 1\frac{1}{2} = 12\frac{1}{2}$.

M. Mol 2/8/95

2/9/95 073 arrived PWP site.

Packed up all samples for shipment to labs for analysis.

Inspected bio setup.

P.S. collected data for volumes & gallons in flowmeters. (see P.S. notes).

Sprayed ~ 15 gallons of sawdust juice on pile #8.

Note: MMP Feed tank has only ~ 200 gal H_2O left in it.

Note: on Tues - went to Seven Fire Dept - spoke to Chris (delivered H_2O to us during Jan trip to PWP). - asked him if they would deliver H_2O to PWP site again for donation. He said he would ask - he said last time the fire chief, etc, was were not too thrilled that the truck was driven to PWP site - they had understood that we would bring our own truck (?).

He said he would get back to me & let me know if they could deliver the H_2O. I said OK

[redacted]

On Wed - Chris called + said that due to politics - the fire dept would not deliver the H2O to the site.

He suggested I call Doris at the village offices - (349-2273). I called - she told me to call JACK HUNTER at 349-2493.

Called Jack Hunter - he told me we could buy the H2O - but they could not deliver it - I told him I did not have a way to get it - he suggested Burnett Co. Dairy Coop -

However, at end of conversation - he said they might be able to send out a fire truck - I told him they already did + that they did not want to again.
He said the fire chief sometimes acts like he is better than others. (?) (This must be the politics Chris spoke of) -

He told me to call him when I am ready to come up - maybe we can work something out.

Called Dale Olsen at Burnett Co. Dairy Coop - he said they would not be able to divert a truck to get water for us.

Made sure everything was OK at PWP site - 2/13/95

0900 Left site. Drove to hotel to check out.

1000 Left hotel - drove to Minneapolis - 1000

Dropped off samples at Fed Ex - got done at 1200.

1200 lunch - at Mall of America 1100

1300 Had to wait for flight - stayed at Mall of America until ~ 3:00 pm - 1130

Drove to Minneapolis airport for flight

Returned auto, checked into airport.

1200 Got home at 12:00 pm.

M. Mol 2/9/95

2/10/95 0730 Arrived REAC

Worked on expense report for PWP trip.

Worked on cement memo. - got comments back from 1ST review. - started to incorporate comments. 1200

1630 Left REAC 1300

M. Mol 2/10/95

3/13/95 0400 Got picked up at home by Arrow Limo service. Picked up D. Ercoliani & G. Molan - to go to PWP site.

0900 Arrived in Minneapolis, MN - drove to Grantsburg, WI - checked in hotel (Wood River Inn) - ~ 1100

Went to PWP site - started to check systems - ~~started~~ checked MW#6 pump - did not pump H_2O - still frozen

~ 1400 Started to break down bio piles & rototill them - added ~ 2 lb of NH_4NO_3 fertilizer to each pile after being broken down, & before rototilling.

1300 Talked to H. Allen ~ - before doing rototilling - he said to ~~do~~ add ~ 2 lb fertilizer to the compost piles - OK.

1700 Collected composite sample of Stain Area 1-9 soil from in between Stain Areas 11+12 - for F. Miller - I will send it tomorrow.

1730 Left site

M. Mal 3/13/95

1930 Worked on notes + looked at new water-oil interface meter

2100 Stopped working

Total hours for 3/13/95:

4:00 am → 5:30 pm (= 6:30 PA TIME)
= 14.5 − 1 hr lunch = 13.5

+ 7:30 pm − 9:00 pm = 1.5

= 15 hr

M. Mol 3/13/95

3/14/95 0700 Picked up U Haul truck at West 70 Sales office. Went to PWP site + loaded 2 × 250 gal white plastic cubes on truck. Sent D.E. + G.M for H_2O at Town of Grantsburg garage. No problem. Water was then transferred by submersible pump into day tank.

~1000 D. E + G M collected bio pile samples, MFM collected anaerobic dechlorination samples.

~0630 Talked to excavation contractor at breakfast – asked him to look at tank to see if he could move it.

~1100 Evaporation contractor stopped by & looked at tank - he said he would like to buy it.

1400 lunch - 1 hr

1500 Second H2O trip - 2 more H2O cubes - filled up 850 gal tank

MPA 15 1600 Started to collect Daramend samples & control samples - control pile was very dry.

Temperature readings:

1)	DT 1	~~2.2~~ -0.2 °C	
2)	2	-0.1 °C	
3)	3	1.5	
4)	4	0.0	
5)	5	-0.3	
6)	6	0.5	
7)	7	1.2	
8)	8	4.5	
9)	9	0.2	

Avg = 0.81 °C

1)	DC 1	14.8 °C	
2)	2	17.1	
3)	3	20.6	
4)	4	16.6	
5)	5	18.4	
6)	6	20.1	
7)	7	17.0	
8)	8	17.2	
9)	9	18.5	Avg = 17.8 °C

Ambient = 13.3 °C

Samples DT 1 - DT 3 were composited together & screened. Then 3 samples were collected: DT 1-3A Comp 5
DT 1-3B Comp 5
DT 1-3C Comp 5

This procedure was also used for DT 4-6 & DT-7-9.

Also, nutrient & other parameter samples were collected: DT 1-3 Comp 5
DT 4-6 Comp 5
DT 7-9 Comp 5

The control plot was also sampled for corresponding samples.

Also collected composite: DT 1-9
DC-1-9

for P. Burns.

Added moisture to Daramend piles:
~60 gallons to Daramend pile &
~20-30 gallons to the control pile.

The piles were then rototilled &
recovered.

~1700 GM & DE returned truck to U-Haul
I have to get a receipt.

~1730 Collected soil samples from stock
soil piles from outside storage pile.

STOCK Soil #1 - Large pile near
west side of Daramend bldg.

STOCK SOIL #2 - small pile
near 1000 N 600 E marker.

H. Allen was present at the time.

~1800 Cleaned up building, put labels on
anaerobic dechlorination samples.

1900 Left PWP site.

2100 Worked on notes & plans for 3/15/95.

2200 Called B. Stringle (312-886-0406) -
left message - no problems w/ storage
tanks - sounds like something in N tank,

~~2300~~
2230

2300

not S task.

Got address of lab (slc) to send nutrient samples (soil) to:

GP Environmental
202 Perry Parkway
Gaithersburg, MD 20877
Attn: Ken Elver

Phone: 301-926-6802

~~2300~~ ~~Stopped working~~ MFM
2230 Filled out shipping papers for samples for tomorrow. Also corrected field data sheets.

2300 Stopped working

Tot. hrs for 3/14/94:

0700 to 1900 − 1 = 11

+ ~~1900~~ MFM 2100 − 2300 = 2

TOT = 11 + 2 = 13 hr

M. Mol 3/14/95

3/15/95 0730 Arrived at PWP site

Started to pack coolers with samples to ship to labs. All soil + water samples went out by Fed Ex.

1400 lunch (1 hr)

1500 Started to take well level measurements.

Collected oil sample from MW 19. Lowered SS bailer (with bottom taped) into well + pulled out sample. Got ~ 200-300 ml. Oil was dark brown - black in appearance + ~~was~~ appeared thicker than #2 oil.

1930 Left PWP site.

M. Mork 3/15/95

Hrs for 3/15/95: 11

3/16/95 0730 Arrived at PWP site.

Packed up water level measurement device + oil sample to go to Fed Ex.

0800 Obtained volumes + flow measurements of all tanks:

~~0930~~

0930

1000

2100

Influent feed H2O tank : 800 gal

Green Tank 1 : 1350 gal

White Tank 2 : 1500 gal

White Tank 3 : 575 gal

White cube : 80 gal

Pump 1 : 990.4 gal

Pump 2 : 767.1 gal

~~0930 Left PWP~~ MFC

Checked sump pump to make sure it works. OK

0930 Left PWP site, went to hotel to check out.

1000 Drove to MN airport - made it - flight was delayed to 2:00 pm.

2100 Arrived at home - dropped off by Arrow Line.

3/16/95 M. Mob

Total HRS for 3/16/95 = 12.5

2/6/95 Flow meter 1 - 949.2
Flow " 2 - 735.2
3 285.2
Tank 3 450
Pay Tank 200
Minute Clock - 49725.2

[illegible] 12 = 3r
Air Temp -9.8°C

DT 1 - ~~5.5°F~~	1.2°C
DT 2	1.2°C
DT 3	1.2°C
DT 4	1.2°C
DT 5	1.6°C
DT 6	1.6°C
DT 7	3.7°C
DT 8	4.3°C
DT 9	3.4°C
DC 1	16.5°C
DC 2	17.7°C
DC 3	16.3°C
DC 4	20.4°C
DC 5	19.2°C
DC 6	17.7°C
DC 7	21.6°C
DC 8	20.9°C
DC 9	19.0°C

PS

2/8/95 Fl

49.2
85.2
79725.2

2/8/95 Flow meter 1 - 982.65
Flow Meter 2 - 757.75
Flow meter 3 - ———

Tank 3 - 515
Day Tank - 180