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**ALTERNATIVE TECHNOLOGY
FOR SEDIMENT REMEDIATION
DEMONSTRATION PLANT**

FINAL REPORT

for

**Detroit District of the U.S. Army Corps of Engineers
Contract DACW35-00-C-0010**

By

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COLERAINE MINERALS RESEARCH LABORATORY

Final Report

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Detroit District of the U. S. Army Corps of Engineers
Contract #DACW35-00-C-0010

April 16, 2001

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SUMMARY

Duluth-Superior Harbor is a major port on Lake Superior located between the cities of Duluth, Minnesota, and Superior, Wisconsin. The harbor and the lower Saint Louis River that discharges into the harbor area have a history of water quality problems resulting primarily from municipal and industrial discharges in and upstream of the harbor. The port is a major debarking point for grain shipments overseas and for taconite pellets for the lower Great Lakes ports. To allow navigation, the shipping channels must be dredged annually. The dredged material has been stored in a confined disposal area developed at the Erie Pier location in Duluth. This facility is nearing its capacity and other methods for handling the dredged material must be found. The Coleraine Minerals Research Laboratory, a division of the Natural Resources Research Institute of the University of Minnesota – Duluth, has been studying the application of mineral processing techniques for treating contaminated soils. The laboratory sampled the Erie Pier site and designed a demonstration plant to treat about 50 tph of material from the site. Based on the previous work and the plant design, the U.S. Army Corps of Engineers awarded the laboratory a contract to construct and operate the demonstration plant.

The plant consisted of a feeder followed by a grizzly screen to remove large rocks and miscellaneous junk. The grizzly undersize was conveyed to a double deck screen equipped with water sprays. The screen undersize flowed to a sump and pump. The slurry was then pumped to an agitated tank. Material from the tank was pumped to two cyclones to make a size separation. Cyclone overflows were collected and channeled to settling ponds to allow the solids to settle and to provide water for the plant. Cyclone underflow was stockpiled as a sand product. In addition to sending the cyclone overflow to the settling ponds, a belt filter press was tested for about two weeks to treat a portion of the overflow to produce a cake that could be easily handled and a clear filtrate that could be recycled.

The objective of the program was to treat different types of materials found at the Erie Pier site to produce a coarse product (cyclone underflow) that contained less than 12 percent by weight particles finer than 200 mesh (75 microns). The underflow should be free draining so that it could be moved by loaders. The distribution of solids, water, inorganic compounds and organic compounds would be monitored. The settling characteristics of the cyclone overflow would be determined.

A total of four separate samples were processed in the plant. Sample 1 was a sandy feed containing between 13 and 32 percent in the passing 200 mesh fraction. Sample 2 was a finer material that was removed from the site during construction of the settling ponds. Sample 2 contained between 30 and 52 percent in the passing 200 mesh fraction. Sample 3 was a fine sample dug from the north end of the site where the finest material should have been. Sample 3 was only run for one day due to a break down of the front-end loader used to transport the feed to the plant. The fourth sample was the drained cyclone underflow from the processing of samples 2 and 3.

Maintaining a consistent feed to the plant was a continual problem. Clay material in the feed was difficult to disagglomerate and the material tended to form balls, which rolled down the screen decks. Additional water sprays and belting on the top screen deck improved the break up of the clay material but did not eliminate the problem. Another feed problem was the amount of vegetation in the feed. This material tended to bridge in the feeder and to plug the two screen decks, reducing screening capacity, at times significantly. Compounding the feed problem was the loss of the variable frequency drives on the two pumps. Loss of the drives effectively

eliminated the ability to make any significant changes in the flowrate to the cyclones and, hence, the ability to affect the cyclone split. Attempts were made to control the cyclone feed by installing a by-pass line to return some of the cyclone feed back to the cyclone feed sump. These attempts were unsuccessful and on numerous occasions resulted in overloading the cyclone feed pump motor causing the motor to stop.

Samples of the cyclone feed, overflow and underflow, as well as belt filter press cake and filtrate, when operating, were taken hourly. These samples were saved for future analysis. In addition to the saved hourly samples, a grab sample of each stream was taken hourly and made into a daily composite. The daily composites were filtered with a portion of the filtercake being used for size analysis and the remainder being air dried for chemical analysis.

Sample 1 was processed at feed rates up to about 63 tph with no loss in performance. In all tests with Sample 1, the cyclone underflow contained less than 10 percent in the passing 200 mesh fraction. Weight recovery to the underflow ranged between 73.3 and 92.6 percent. In general, the heavy metals and organic material were concentrated in the cyclone overflow, but since the total weight recovery in the cyclone underflow was high, the majority of the heavy metals and organics in the feed remained with the cyclone underflow.

The processing of Samples 2 and 3 were more difficult due to the large amount of vegetation contained in the feed. Plant feed rates were generally between 7 and 14 tph. The low feed rates were caused by the vegetation problem and by the need to feed the cyclone a low percent solids to try to make the desired size split. But even at the low percent solids in the feed, the cyclone underflow contained between 18 and 29 percent in the passing 200 mesh fraction. Weight recovery to the underflow ranged from 55 to 72 percent. Despite the high minus 200 content, the cyclone underflow was easy to dewater and formed into a steep sided conical pile. As with Sample 1, the heavy metals and organics were concentrated in overflow sample, which, due to the higher weight recovery, contained the majority of the heavy metals and organics from the feed.

Since the cyclone underflows from Samples 2 and 3 still contained too many fines, the cyclone underflow pile was reprocessed through the plant. Resultant cyclone underflow contained between 10.9 and 14.7 percent in the minus 200 mesh fractions and recovered over 90 percent of the feed weight. Again the heavy metals and organics concentrated in the cyclone overflow.

Performance of the belt filter press was very impressive. The resultant filtercake was very easy to handle by conveyor belts and would be very easy to haul by truck. The filtercake was almost dry to the touch. Filtrate from the belt filter press was very clean, with turbidity measurements less than 5 ntu. To produce these results required about 1.5 pounds of polymer flocculant for every 3900 gallons of cyclone overflow treated. Analysis of the filtrate indicated no residual polymer in the water.

BACKGROUND

Duluth-Superior Harbor is a major port of the Great Lakes located at the extreme southwestern end of Lake Superior between the cities of Duluth, Minnesota and Superior, Wisconsin. The harbor occupies roughly 32 square miles and has about 100 miles of waterfront. The harbor and the lower Saint Louis River that discharges into the harbor area have a history of water quality problems resulting primarily from municipal and industrial discharges in and upstream of the harbor. The harbor has been listed by the International Joint Commission for the

Great Lakes as an Area of Concern (AOC) within the Great Lakes ecosystem. The 1995 progress report on the Remedial Action Plan (RAP) for the area identified sediment contamination as the major cause of many impaired uses in the St. Louis Estuary. Contaminants of concern include nitrogen, phosphorus, heavy metals, polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PAHs). Contaminated sediments may have detrimental effects on water quality, the diversity and abundance of aquatic and benthic organisms, human health, and disposal options for material dredged during harbor maintenance.

Because of the Duluth-Superior Harbor's position as a major Great Lakes port and the flow of the St. Louis River into the harbor, the main shipping channels have to be dredged annually to allow for navigation. Dredged material is currently being stored in a Confined Disposal Facility (CDF) at the Erie Pier in Duluth. The CDF is nearing its capacity and additional space will be required for future storage of dredged material from the harbor. Additional storage can be obtained by either constructing a new CDF or by treating the dredged material along with the material stored in the CDF to extend its useful life.

The Coleraine Minerals Research Laboratory (CMRL) of the University of Minnesota - Duluth's Natural Resources Research Institute (NRRI) has conducted several research programs¹⁻³ to investigate the use of mineral processing techniques to treat harbor sediments. These studies indicated that a size separation can be used to produce a non-contaminated sand product that can be utilized as a construction material and thereby, reduce the volume of material to be stored in the CDF. The Erie Pier CDF is an excellent site to be used for demonstrating the technology, since previous investigations as part of the Dredged Material Management Plan (DMMP) and by NRRI have indicated that the metal concentrations in the sediments were comparable to those found in the regional soils and that PCBs, PAHs and pesticides were generally non-detectable.

CMRL conducted a study⁴ funded by the US Army Corps of Engineers (USACE) to design a treatment plant for the CDF. Based on that study, the USACE contracted with CMRL to construct and operate a demonstration treatment plant at the Erie Pier CDF. This program was conducted in response to Section 541 of the Water Resource Development Act of 1996, initiated by Congressman Jim Oberstar, which states: "The Secretary shall develop and implement methods for decontamination and disposal of contaminated dredge material at the Port of Duluth, Minnesota."

The main objectives of the project were: To demonstrate that various materials with in the CDF could be processed to produce a coarse material containing less than 12 percent in the minus 200 mesh (75micron) fractions. To determine the distribution of solids, inorganic compounds and organic compounds during processing. To evaluate the use of a belt filter press to treat the cyclone overflow to produce a clean filtrate and an easily handled filtercake.

PLANT CONSTRUCTION

The plant was to be constructed at CMRL's facility in Coleraine, Minnesota and then trucked to the CDF where it was to be operated for several months with different feed materials. To reduce costs, equipment available at CMRL was to be used for the plant with no new equipment being purchased.

Process Flow sheet

The plant flow sheet is shown schematically in Figure 1. A backhoe was used to feed material from the CDF to the plant. Material first passed over a grizzly screen with 6-inch by 4 foot slots to remove any large rocks or other large tramp material. The grizzly undersize went via a series of conveyor belts to a double deck vibrating screen equipped with a one-inch square mesh top screen and a ¼-inch square mesh bottom deck. The screen conveyor belt was equipped with a weightometer to measure the amount of material fed to the screen. The main purpose of the double deck screen was to break up clay balls and to remove rocks and vegetation. Water sprays were added to the top deck to assist in breaking up the clay balls. Oversize materials from the two decks were combined and were treated as a waste product. Screen undersize and the bulk of the water flowed to a sump where the slurry was pumped to an agitated tank. From the tank, the slurry was pumped to two parallel 10-inch diameter Krebbs hydrocyclones equipped with a 1-1/2 inch apex and a 3-1/2 inch vortex finder. The cyclone feed pipe was equipped with a magnetic flowmeter to measure the volume of feed to the cyclones. Variable frequency drives (VFDs) were installed on both the screen undersize and the cyclone feed pumps. Cyclone underflows were combined in a sampling box, as were the cyclone overflows. The plan called for the cyclone overflow to be channeled to a series of settling ponds to remove suspended solids, and the clear water was to be returned to the plant. The cyclone underflow was to be stockpiled.

Water (600 to 700 gpm) was supplied via a trailer mounted diesel pump, which could be moved to provide either fresh water or recycled water. Electrical power was provided by a trailer mounted diesel generator. Power was fed to a main breaker on the electrical panel mounted on the platform. From the main panel, power was distributed to the seven motor starters. The entire plant had a total of 110 installed horsepower, with the two pumps accounting for 80 hp, 40 hp each.

Plant Assembly

The design called for the plant to be modular in construction so that it could be disassembled and trucked to the site. The original test plan also envisioned the plant being moved to different locations within the CDF; therefore, the plant was compact and built on a frame that could be skidded from place to place. To facilitate removal of the cyclone underflow, the cyclones were mounted horizontally above the platform and the underflow from the two cyclones flowed down a long discharge pipe to get the underflow away from the plant. All plant components were assembled and tested at CMRL before shipment to the CDF. Figure 2 shows the assembled plant at Coleraine prior to shipment to the CDF.

Site Preparation

While the plant was being fabricated and assembled, site preparation was started at the Erie Pier CDF. In cooperation with the USACE in Duluth, a site for the plant was chosen along the road on top of the dike used to contain the dredged material. This site was on the southeastern side of the CDF. Two settling ponds were excavated, with the material removed being stockpiled to be used as feed to the plant. The settling ponds were about 150 feet by 40 feet with a shallow connecting channel between the two ponds at their west ends. A feed

channel was dug from the plant site to the east end of the first pond. The ponds were designed to have the sand and the majority of silt settle out in the first pond, with the second pond being used to clarify the water. The water from the east end of the second pond would then be recycled to the plant, resulting in a contained system. The general location of the plant and the ponds within the CDF are shown schematically in Figure 3.

In addition to the material from the settling ponds being stockpiled as feed, a sample of sandy material was stockpiled next to the plant site to be used as the initial feed material.

PLANT OPERATION

The plant was delivered to the CDF on July 6, 2000. It was reassembled at the site from July 6th through July 13th. The generator used to provide all of the electrical power, and the water pump to supply water from either the harbor or from the settling ponds arrived on July 11th. A complete daily log is given in Appendix I. The remainder of July was spent "debugging" the plant. Serious problems developed with the variable frequency drives on the screen undersize and the cyclone feed pumps. The VFD on the screen undersize pump was replaced with a motor starter and the VFD was sent in for repairs. The estimated lead time for parts was 5 months. The VFD for the cyclone feed pump was run in by-pass mode, which was the same as a motor starter. A by-pass line with a manual control valve was added to the cyclone feed line below the flow meter in an attempt to control the amount of feed to the cyclone. This proved to be very difficult to control and resulted in the pump motor being overloaded on several occasions, which shut down the plant. Problems also developed with the weightometer, which precluded having measurement of the amount of material that was fed to the double deck screen. These equipment failures resulted in the amount of feed to the plant being estimated from the numbers of buckets of feed being dumped by the backhoe. The amount of feed to the cyclones was calculated from the flowmeter reading and the percent solids in the cyclone feed. The cyclone split was based on the screen and chemical analyses of the feed, undersize and oversize daily composite samples.

The first day of operation with sampling was August 1st. Samples were taken every hour during operation, with individual hourly samples and daily composites being taken. The feed tank and the cyclone underflow and overflow were sampled. The feed sample was taken from a pipe placed in the side of the agitated feed tank at the same level as pump inlet. Previous work on mineral processing pilot plants has shown this to be a representative sample of the material being fed to the pump. Samples were taken back to CMRL at the end of each shift, where the hourly samples were stored in a walk-in cooler as backup and the daily composites were weighed wet and filtered. A portion of the filtercake from the feed and underflow samples was dried to determine percent solids and for screen analysis. The remainder of those samples, along with the overflow filtercake, were air dried in preparation for chemical analysis. This procedure was used for the entire program. In addition to the above samples, a sample of pond 2 water near the east end (where recycled water would be taken) was taken at the beginning and end of each shift to measure the change in water turbidity. The plant was to be operated six days a week with two crews working 13 hour shifts, which included transportation time to and from CMRL. With this schedule, it was hoped that the plant could be operated 8 hours a day. In reality, it was difficult to get more than 6 hours a day of operating time, due to start up and shut down time and maintenance on the mobile equipment.

The test plan was to process three different samples. The initial sandy sample stockpiled by the plant; the finer material removed when making the settling ponds, and a very fine sample taken from the north side of the CDF. From the beginning it was obvious that the plant could not be moved from feed pile to feed pile; therefore, the various feed materials would have to be brought to the plant. This also required that the cyclone underflow (product) pile be moved periodically to avoid burying the plant. To assist in moving the feed samples, the USACE in Duluth supplied a front-end loader, and contractors working for the USACE in the CDF would provide a large backhoe when necessary.

Maintaining consistent feed to the plant was a constant problem. The clay balls contained in the feed proved to be more difficult to disagglomerate than expected. Additional wash water sprays and belting placed over the upper screen deck improved the break up of the clay balls but did not solve the problem. Figure 4 shows material being fed to the screen along with the belting and water sprays. The clay balls were collected in the bucket of the front-end loader where the solids were raked to a uniform and measured depth so the amount of oversize material could be estimated. Grab samples of the oversize were also taken. Figure 5 shows the screen oversize being discharged into the bucket of the front-end loader and Figure 6 shows a close-up view of the discarded screen oversize with a coffee mug being used for scale. Another feed problem was the vegetation associated with the material removed from the CDF. This vegetation plugged the feed hopper resulting in feed interruptions until the material could be cleaned. The vegetation produced no hang-ups on the grizzly. The vegetation either went through the grizzly or over the top with no plugging. The vegetation that went through the grizzly tended to blind the double deck screen, which increased the amount of oversize and limited the feed rate. Vegetation build-up on the middle deck was difficult to see and to remove.

The vegetation problem was variable, with as much as 20 percent down time on some days caused by screen plugging. On other days there was no down time attributed to vegetation. Overall, only about 5 percent of the operating time was lost to problems with vegetation. The vegetation problem could be significantly reduced by removing surface brush prior to excavating the material and by clearing an area to store the excavated material. With proper site preparation and care in excavating the material, there should be little problem with vegetation.

Water to the plant for dilution and for the water sprays was provided by a diesel pump, which initially took the water from the St. Louis River. After two weeks of operation, the pump was moved to the settling ponds, where the plant water was taken from the east end of the second pond. The plant was operated with recycled water for three days until the arrival of the belt filter press. The manufacturer of the belt filter recommended fresh water for the belt sprays to avoid plugging the nozzles. Since the pump was the only supply of water, it had to be moved back to the river to allow the belt filter press to be tested. In a production application, the filtrate from the belt filter could be recycled as spray water and plant water.

PLANT TEST RESULTS

The tests results will be divided into sections describing the four feed materials tested, the belt filter press, organic analyses and sampling of the settling ponds shortly after operations were completed.

Sample 1 - Sandy Material

The initially stockpiled sandy material was run through the plant from August 1st until the 18th. The weight percent solids, solids tons and weight recoveries to the cyclone underflows for the daily composite samples are given in Table I. The cyclone feed weight was calculated from the cyclone feed flow rate and the feed percent solids. The cyclone weight splits were calculated using a mass balancing program incorporating the coarse screen fractions, chemical analysis and percent solids in the feed and products. The total cubic yards of material fed to the plant and the amount of screen oversize for each day's operation beginning August 8th are given in Table II. Due to the feed problems discussed above, the average feed rates calculated from the composite samples ranged from a low of 8.79 tons per hour (tph) to a high of 63.11 tph. Weight recovery to the underflow ranged from 73.3 to 92.6 percent. All of the cyclone underflow materials were free draining and formed a steep sided conical pile. Figure 7 shows the plant in operation with the cyclone overflow being discharged from the large blue pipe and the cyclone underflow being discharged from the high pipe at a much lower flow rate. Also visible in the picture is the yellow water line, which was recycling water from the settling ponds. Figure 8 is a closer view of the plant showing the conical cyclone underflow pile at the right side of the photo.

During the processing of sample 1, very little material was rejected by the grizzly. The material that was rejected by the grizzly consisted of large rounded rocks and the occasional piece of wood. No junk, such as old tires or tramp metal, was seen. The grizzly oversize was not removed until almost all of sample 1 was processed. The operating crew estimates that only between 2 and 3 cubic yards of grizzly oversize was obtained from the processing of sample 1.

The screen oversize from the processing of sample 1 consisted primarily of clay balls, rocks, vegetation, pieces of wood, pieces of coal and taconite pellets. There were a few fishing lures and line in the oversize, but very few bottles or cans. Based on a rough screen analysis of several grab samples of screen oversize, it appears that about 65 percent of the oversize was misplaced material contained in the clay balls.

The screen analyses for the feed and cyclone underflow daily composite samples are given in Table III. The minus 200 mesh content of the feed ranged from about 13 percent to about 32 percent. All of the cyclone underflow samples contained less than 10 percent minus 200 mesh material. The recycling of pond water to the plant (8/15-18) did not have any significant effect on cyclone performance or size distributions. The recycled water was obtained from natural settling in the ponds with no chemicals being added to improve settling.

The daily composite samples were analyzed for iron, nickel, barium, lead, copper, zinc, chromium, mercury, cadmium, and total organic carbon (TOC). The analyses are given in Table IV. In general, the cyclone overflow samples contained the highest concentrations of all elements. Three of the overflow samples contained detectable levels (>0.2 ppm) of mercury. No mercury was detected in the feed or underflow samples. Cadmium was detected in samples from 5 of the days with the highest concentration being in the overflow samples.

Sample 2 - Fine Material from Settling Ponds

About half way through the day on August 18th, the feed material was changed from the sandy material to the fine material that had been removed in the building of the settling ponds. Due to the large amount of vegetation incorporated in this sample, the feed rates to the plant were greatly reduced. The percent solids, tons of solids, and weight recovery to the cyclone

underflow for the daily composite samples are given in Table V. In general, the feed rate ranged between about 7 and 14 tph. Weight recovery to the cyclone underflow generally ranged between 57 and 77 percent. A notable exception was the short run on August 30th, where the feed rate was close to 58 tph and the weight recovery to the underflow was reduced to 44.7 percent. The screen analyses for the daily composite feed and underflow samples are given in Table VI, along with any daily composite filtercake samples from when the belt filter press was in operation. This sample was significantly finer than the sandy sample. The minus 200 mesh content in this sample ranged from about 30 percent to 52 percent compared to 13 to 32 percent for the sandy sample. This finer feed was reflected in more minus 200 mesh material in the cyclone underflow. The percent minus 200 mesh in the cyclone underflow ranged from 18.4 to 29.4. Although the cyclone underflow contained more minus 200 mesh material, its drainage characteristics were similar to the cyclone underflow from the sandy material.

Like with the processing of sample 1, there was very little grizzly oversize produced during the processing of sample 2. The majority of the grizzly oversize from sample 2 was vegetation from the surface of the CDF. There were fewer rocks in the oversize with sample 2 than with sample 1. Again no tramp metal or tires were seen.

The screen oversize from the processing of sample 2 was again primarily clay balls with a relatively large amount of vegetation in the form of sticks branches and leaves. There were some rocks, coal and taconite pellets. Again there were almost no cans or bottles. It is possible that some pieces of broken bottles could have been mixed in with the clay balls, but none was observed. Again, a rough screen analysis of several grab samples of the oversize from processing sample 2 indicated that about 75 percent of the material were misplaced clay balls.

The same chemical analyses were run on the daily composites from the second sample as were run on the sandy sample. These analyses are given in Table VII. The chemical analyses for the second sample are similar to the sandy sample and the same trend of the overflow samples having the highest concentrations of the various elements was observed. In general, the TOC values for the second sample were slightly higher than for the sandy sample. The increased amount of vegetation with the second sample may be the main cause of the increased TOC. Again, mercury and cadmium were detected in only a few samples.

Sample 3 – Material from Northern Portion of CDF

After the exhaustion of the second sample, the USACE arranged for the dredge contractors to dig some fresh fine material from the northern part of the CDF in an area where the finest material dredged would be deposited. The contractor placed the material on the road along the top of the dike and the front-end loader was used to haul the material to the plant site. The third feed sample was brought to the plant beginning on September 6th. Unfortunately the front-end loader broke down on September 7th and we were unable to bring any more feed to the plant. The third sample was very fine, as shown in the daily composite screen analyses in Table VIII. The plant was operated at a feed rate of 11.36 tph with 55.9 percent of the material reporting to the cyclone underflow, as shown in Table IX. Chemical analyses of the daily composites, Table X, indicated that sample 3 was comparable to sample 2 in chemistry.

Sample 4 – Cyclone Underflow from Sample 2 and 3 Tests

Since we could not bring any more feed to the plant due to the break down of the front-end loader, it was decided to rerun the cyclone underflow pile that was produced from samples 2 and 3. It was thought that rerunning the cyclone underflow might reduce the amount of minus 200 mesh material to less than 12 percent, which was the stated goal of the project. Tests with sample 4 were run on September 11, 12 and 13th. The rates and percent solids of the daily composite samples are given in Table XI. Screen analyses of the daily composite feed and underflow samples are given in Table XII. Cyclone underflows ranged from 14.7 to 10.9 percent passing 200 mesh, which was close to the goal of 12 percent passing 200 mesh. Chemical analyses of the daily composite underflows and overflows are presented in Table XIII.

Belt Filter Press

One objective of the test program was to evaluate the use of a belt filter press to treat the cyclone overflow to remove the solids in a form that could be easily handled and to produce clean water for recycle. The USACE leased a trailer-mounted 1.2-meter belt filter press equipped with feed pump, polymer mixing tanks, polymer feed pump, filtercake discharge conveyor and filtrate removal hoses. The belt filter press arrived on August 21st and was operational by August 23rd. The feed to the press was about 65 gpm maximum. This required taking a small stream from the main cyclone overflow. This was accomplished by discharging the cyclone overflow into a conical sump from which the press feed pump could procure its feed and the remainder of the cyclone overflow could overflow the sump and flow to the settling ponds.

The belt filter press operates as follows: Polymer is mixed with the feed material in the feed pipe. A small tank is installed inline to provide additional residence time for the polymer to flocculate the solids. The feed with the flocculated solids is distributed across the belt filter. The flocculated solids are “windrowed” by a series of plows to form rows of flocculated solids with clear water running between the rows. The rows are formed parallel to the length of the belt allowing the water to run off the end of the belt and be collected. The rows at the edges of the belt acted as dams to prevent the water from flowing over the sides of the belt. The flocculated solids drop onto another belt and are squeezed between two belts. The two belts with the solids sandwiched between them pass over a series of rolls where the majority of the water is squeezed from the solids, much as an old wringer washer would squeeze water from clothes. The resultant filter cake was about ¼-inch thick and was dry to the touch and could be easily handled by conveyor belts. Figure 8 shows the filtercake discharging onto the product conveyor belt.

Polymer was mixed daily in two tanks. About 4.5 pounds of polymer was added to each tank with about 45 minutes of mixing being required before the polymer was ready for use. The mixed polymer-water solution was pumped into the feed pump discharge line in sufficient quantities to allow rapidly settling flocs to be produced. In general, each tank lasted 3 hours, so the polymer was being added at the rate of 1.5 pounds per hour. Attempts to lower the polymer dosage resulted in slower settling of flocs. This resulted in less dense rows of solids, which allowed water and solids to overflow the sides of the belt and contaminate the filtrate.

Filtrate from the belt filter press was very clear. Turbidity measurements on the daily composite filtrates, Table XIV, were all less than 5 ntu. Distilled water from the CMRL lab has a turbidity of about 1.4 ntu.

Screen analyses of the daily composite filtercake samples are included in Tables VI and VIII with the cyclone feed and underflow. The screen analyses indicate a surprisingly large amount of plus 150 mesh material in the filtercake. The amount of plus 150 mesh material ranges from 17.5 to 42.6 percent. Some of this coarse material is vegetation, which helps to produce a stronger cake. Also visible in the filter cake were relatively large pieces of what appeared to be coal. The low specific gravity coal and pieces of vegetation along with clean sand made up the bulk of the plus 150 mesh material in the filtercake samples. Chemical analyses were also run on the filtercake daily composites as shown in Table XV. Five of the eight filtercake composites had detectable levels of mercury, compared to only three of the cyclone overflow samples for the same time period, Tables VI and IX. The TOC analyses on the filtercake were essentially the same as on the corresponding cyclone overflows, indicating no detectable polymer being present in the filtercake.

In general, the operation of the belt filter press was very smooth. There were no problems in handling variations in feed material or percent solids. The unit operated with minimal supervision. There was no evidence of filter cloth blinding during the operation.

Organic Analysis (PCBs, PAHs)

One of the project objectives was to determine the quantity of organic contaminants and their distribution during processing. The TOC analyses of the daily composite samples indicated that the organics were being concentrated in the cyclone overflow. Due to equipment malfunctions, we were unable to run TOX and oil and grease analysis. To compensate for this, more intensive PCB and PAH analysis were conducted. These analyses looked at 9 PCB and 18 PAH compounds.

Because of the low solids content of the cyclone overflow samples, both chemical and PCB/PAH analyses could not be run on the individual daily composites. Individual daily composites were analyzed for inorganic compounds and TOC. Splits of the daily composite samples were combined as follows to produce sufficient sample for PCB and PAH analysis. Feed samples from August 1-5 were composited as feed 1. Likewise the corresponding cyclone underflows and overflows were made into underflow 1 and overflow 1. The second set of composites combined the samples from August 7-10. The third set combined samples from August 13-18. The first three sets of composites covered the time when sandy material was being processed. Since the finer material, Samples 2 and 3, based on TOC analysis appeared to have more organic material, fewer samples were combined in each composite. Composite set 4 combined the samples from August 22 and 23. Set 5 used the samples from August 24 and 25. Composite group 6 contained the samples from August 30 and 31. The seventh set of composites covered the samples from September 1-5. The eighth set were the samples from September 6 (feed Sample 3). The final set of composites contained the underflow and overflows from September 11- 13.

PCB analysis: PCB analyses of the feed, underflow and overflow composites described above are presented in Table XVI, with the official analyses sheets being given in Appendix II. It should be noted that most of the analysis are listed as less than some value. The value listed is the analyzing laboratory's reporting limit. A value shown as <20 ug/kg could be 19.9 or 0. Generally with analysis in the low parts per billion (ug/kg) range, the numbers are not absolute, i.e., a reading of 25 and 30 ug/kg are probably the same value. Therefore, these numbers cannot be used as one might use numbers in the percent range to make material balances.

PCB-1260 was found in all of the overflow composites and PCB 1254 was found in 8 of the 9 overflow composites. PCB 1260 was found in 4 of the 8 feed composites with PCB 1254 being found in only one of the feed composites, that being the one from September 6. That feed is Sample 3 from the north end of the CDF. Only two underflow composites contained any PCBs and they were PCB 1260. (The value of 216 ug/kg shown for PCB 1260 for the underflow from September 11 - 13 appears to be a mistake. Either the sample was contaminated or there was an analytical error.) Therefore, it appears that the PCBs are being concentrated in the fine fraction as indicated from the TOC analyses.

PAH analysis: PAH analyses of the feed, underflow, and overflow composites are given in Table XVII, with the laboratory analysis sheets for all of the PAHs being given in Appendix III. For comparison purposes the individual PAH analysis for each sample are summed to produce total PAH values. As with the PCB analysis, the PAH values are more relative than absolute. Therefore it is not surprising that individual PAH analysis cannot be balanced between the feed, underflow and overflow. If the individual PAH values cannot be balanced, then the sums of the individual values should not be expected to be in balance.

With the exception of Acenaphthylene being absent in some of the underflow samples, all of the PAHs were detected in all of the samples. Again, the PAH content of the overflow samples was significantly higher than the underflow. In some cases, the total PAH content of the overflow was about 11 times greater than the corresponding underflow sample (composite 7). The average total PAH content from the Sample 1 (sandy sample) feed was 1998 ug/kg (ppb), the underflow was 1950 ug/kg and the overflow was 4788 ug/kg. However, since the average overflow from the sandy sample was only about 17 percent of the feed rate, the overflow contains about 33 percent of the PAHs in the feed, with the remaining 67 percent being in the underflow. For the finer Sample 2, the average PAH content of the feed was 4025, the underflow was 1580 and the overflow was 8055 ug/kg. Using the average weight recovery of 34.5 percent in the overflow from feed Sample 2, the overflow contained about 72.9 percent of the PAHs in the feed. Feed Sample 3, the fine material from the northern portion of the CDF, was similar to feed Sample 2 in that about 73.7 percent of the PAHs in the feed reported to the overflow.

In addition to the above composites, PAH analyses were run on the daily filtercake composites, since they represented a larger portion of the solids contained in the cyclone overflow. Results of the PAH analyses are given in Table XVIII. Total PAH analyses were fairly consistent, ranging from 6637.5 to 9134.3 ug/kg (about 6.6 to 9.1 ppm) and are consistent with the corresponding overflow composites.

Water Quality

As mentioned earlier, turbidity samples were taken from the east side of the second settling pond at the beginning and end of each work shift starting on August 9. The turbidity measurements are given in Table XIX. The values indicated that there was a slight increase in turbidity during an operating shift. The three days of using recycled water in the plant (August 16-18) indicated no progressive increase in turbidity. The drop in turbidity on August 24 is probably the result of using the belt filter press. The combination of clean filtrate and possible excess polymer helped to reduce the turbidity.

Chemical and PAH analyses were run on composite water samples. Composite 1 was the filtered turbidity samples from August 9 through 12 (no water recycle), composite 2 was the

filtered turbidity samples from August 16 through 18 (water recycled to plant), composite 3 was belt filter press filtrate from August 24 through 30, and composite 4 was belt filter press filtrate from September 1 through 6. Results are given in Table XX.

All of the values are quite low. Recycling of the water did not result in any build up of dissolved solids or PAHs. Use of the polymer and the filter press reduced the iron content of the filtrate water by about 70 percent compared to the recycled water. Based on the TOC and PAH analyses, there was no detectable polymer in the filtrate water.

Solids from the Settling Ponds

Twelve days after the last material was processed in the plant, core samples were taken in two places in settling pond 1 and in one place in settling pond 2. Figure 10 shows the location of the sampling within the ponds. Samples were taken at different depths below the water surface at each location. For location 1 in pond 1, cores were taken at the following depths: 4.0 to 5.5 feet; 5.5 to 6.5 feet; and 6.5 to 7.5 feet. For location 2 in pond 1, cores were taken at 3.5 to 4.75 feet; 4.8 to 5.0 feet and 5.0 to 7.0 feet. In pond two, samples were taken from 7.2 to 7.7 feet and 7.7 to 9.5 feet. In all cases, the bottom sample appeared to represent natural material and not material that had settled during the testing.

The core samples were screened with size distributions being given in Table XXI. As would be expected, the uppermost material was very fine in all of the locations, essentially all minus 500 mesh. The middle layer from both locations in pond 1 was considerably coarser than the bottom sample of natural material

The weight percent solids of each core sample were determined, and the samples were analyzed for the same element as the daily plant composites and for PAHs. Results are given in Table XXII. The results indicate that only about the top 1.5 feet of settled material had not compacted to its ultimate density. After the top 1.5 feet, the material had essentially the same percent solids as the natural bottom material. Another way to evaluate the solids settling is to compare the amount of solids added to the ponds to the amount removed to make the ponds. As a first approximation, the total volume of solids being sent to the settling ponds can be calculated from the volume of material processed through the plant, Table II, (assuming an average volume processed for the first four days of operation before the volumes were recorded); the volume of screen oversize, neglecting the small amount of grizzly oversize; and the average cyclone weight splits for the four samples, Tables I, V, IX and XI. Using the above assumptions, a total of 2880 cubic yards of material was processed through the plant producing about 214 cubic yards of screen oversize, 614 cubic yards of cyclone overflow solids and 2052 cubic yards of cyclone underflow solids. Since sample 2 was the material removed to make the settling ponds, the volume of sample 2 processed in the plant, 951 cubic yards from Table II, is the volume of the settling ponds. Since the initial feed volume estimates were made using the natural bulk density of material removed from the CDF, the calculated volumes of cyclone underflow and overflow solids are at the same bulk density as the material removed from the CDF. Therefore, if the cyclone density material compacted to the same bulk density as the original material, the settling ponds would be about 60 percent full of solids. This is not too far from what was seen with the core samples from the ponds. What this indicates is that even with the sand fraction removed, the cyclone overflow material will compact to about the same bulk density as the material already in the CDF.

The PAH analyses are surprising, in that the finest material at each location had the lowest total PAH content and that the natural bottom material at each location had the highest total PAH content. The same trends are true for all 18 individual PAH analyses. These results suggest that the PAH content is mainly in some intermediate size fraction, since the coarse fraction, cyclone underflow, had the lowest PAH content and the very fine material, top layer in the settling ponds, also had low PAH content.

Since the natural bottom material had higher PAH content, it may be that some of the PAHs may have been removed during processing. However, since the PAH content of the water samples, Table XX, were low, the PAHs were not scrubbed into the water. It is possible that some may have been released into the air during cycloning, but it is doubtful that enough would have volatilized to account for the difference seen in the natural bottom material and the settled material. Perhaps excavating and storing the material from the ponds for several months would allow some of the PAHs to volatilize. Another possibility is that the PAHs concentrated in the clay balls that were rejected as screen oversize. Grab samples of screen oversize taken on August 18, August 23, August 25, and September 6 were screened on 65 mesh, and the minus 65 mesh material was pulverized and submitted for PAH analysis. Results of the PAH analyses of the screen oversize grab sample are shown in Table XXIII. One sample, August 25, had a very high PAH content in all species analyzed, but the other three had PAH contents in the range of the cyclone overflow composites. What these results indicate is that there appear to be pockets of high PAH content within the CDF.

CONCLUSION

Overall, the project demonstrated that the fines-rich Duluth harbor dredge material could be processed with typical mineral processing equipment to make a fines/coarse separation and a saleable coarse product. The project also demonstrated that the fine overflow fraction could be treated and processed, e.g., with a flocculent and belt filter press, to produce a de-watered and potentially saleable soil-type product.

The technology that was used to make the final fine/coarse separation (hydrocyclones) is fundamentally sound, and could be optimized relatively easily in a full-scale working plant. For example, some of the difficulties encountered during the project were largely a function of a lack of control over hydrocyclone feed pump pressure and feed flow. Failure of the demonstration plant's variable frequency drives early on necessitated that pump pressure and flow be controlled manually for the duration of the project. If the controllers had not failed, better plant performance on the final product end would have been realized.

Performance shortcomings were also encountered on the raw material feed end of the plant. As planned, the stockpiled dredge spoils were fed via backhoe through a small feeder bin and grizzly, and then to a conveyor belt that fed directly onto the plant's inclined shaking screen. It was anticipated that the shaking action of the screens, combined with water spray action, would sufficiently disaggregate the material before it entered the plant's sump and mixing tanks. However, it quickly became apparent that the very plastic clay fraction within the dredge spoils tended to agglomerate/ball up on the coarse screens, and be rejected entirely. To address this problem, more water sprays were added, and strips of conveyor belting were hung over the screens. The hung belting prevented the oversize clay clumps from prematurely rolling off the screens, which allowed the shaking motion of the screen and additional water sprays to improve

clay clump breakdown. These modifications helped, but did not address the root cause of the problem.

It was apparent that the raw material needed to be disaggregated/slurried before being fed to the plant, not after. That way, only the truly large and hard fragments would be rejected. Because the vast majority of the CDF's material has a relatively high clay content, the agglomeration problem will always be present. Discussions among various project participants and aggregate industry representatives led to a consensus that a combination of grizzlies, shredders, scrubbers, and/or log washers might be a good addition to any future sediment treatment plant set-up. The major point of agreement was that the feed material needed some degree of pre-processing before entering the plant. This is true only if both a sand and a fines product are to be produced. If the desire is to only remove the sand and to allow the fines to resettle in the CDF, then there is no advantage to completely breaking up the clay balls. In fact, allowing the clay to remain as balls will greatly reduce the amount of settling area needed.

Pre-processing Options for a Future Plant

Feeders and Shredders

Providing feed to a plant at a relatively uniform size, and at a steady rate, would seem to be a logical first step. Information on two pieces of equipment that may work well together was considered this past summer. First, Bill McGiffert of the Hallett Dock Co., Duluth, (McGiffert, pers. comm., 2000) suggested using a portable screening/shredding plant as a first step in preprocessing the CDF materials. Hallett uses a piece of equipment manufactured by Ohio Central Steel Co. called "The Screen Machine - Developer" (details can be found at the following web address: www.screenmachine.com). This piece of equipment leases for about \$8,000 per month. An optional shredder hammer mill would break the larger chunks of material before continuing to a conveyor belt. A hammer mill is also used by Minnesota's only brick manufacturer, Ochs Brick and Tile Company of Springfield, Minnesota, to pulverize its raw brick clays to a -8 mesh size. The natural moisture content of the clays Ochs uses is in the 15 to 20 percent range.

A possible, front-end modification to this set-up would be a vibrating automatic feeder with a grizzly attachment, similar to one manufactured by Del Zotto Products, Inc., of Wrenshall, Minnesota. The product, called the "Versa-Feeder", has a 12 cubic yard capacity, an adjustable feed opening, and is capable of a throughput of up to 200 tons per hour. A \$14,950 price quote for the "Versa-Feeder" was provided by Bill Del Zotto on August 2, 2000. The large capacity would allow a backhoe or loader operator to fill the hopper intermittently rather than continuously. Potential problems could occur with bridging at the feeder throat, especially with the type of material present at Erie Pier. This situation would have to be addressed in any future plant design.

To summarize, the main function of the pieces of equipment just described would be to:

- 1) eliminate most of the potentially deleterious oversize materials (large rocks, pieces of metal, wood, branches, etc.) found at Erie Pier before they proceeded to the next processing step;

- 2) produce a relatively uniformly sized feed that can be safely handled by the next processing step; and
- 3) provide a steady downstream feed rate.

If a size reduction in the neighborhood of -1/2 inch were achieved with this equipment, then there would be much less reliance on subsequent washing and screening to do the sizing and attrition, as was the case with the prototype plant. Clayey material often backed up on the screens simply because the screens could not reduce the oversize fast enough. If pre-shredded or pulverized feed were available, then the washing and screening step would act more to prepare, i.e., screen out vegetation and saturate with water, the feed material prior to the turbulent attrition that occurs in the sump and hydrocyclone pump tanks.

Scrubbers and/or Log Washers

Scrubbers and/or log washers are another possible option for pre-processing Erie Pier-type harbor sediments. Both types of equipment are similar in that they are used most often for handling aggregates that contain tough, plastic clays. However, more and more producers are using log washers because some materials are beyond the scrubbing abilities of coarse material screw washers and scrubbers⁶. Log washers, however, operate most effectively when enough coarse material is present in the feed, because the principal of the log washer is the rock-on-rock washing. It is normally recommended that a log washer not be fed more than 15 percent clay in order to ensure that enough coarse material is present⁵. Conversely, any rock oversize that is larger than the log washer's recommended maximum can jam and quickly wreck the equipment.

Because the Erie Pier-type materials have a minimal coarse aggregate content, yet contain tough plastic clays, a traditional log washer may not be the best option. On August 9, 2000, Eagle Iron Works of Des Moines, Iowa, was contacted about log washers. Eagle Iron Works manufactures log washers, and the situation encountered at Erie Pier was described to them. It was suggested that the raw material be first screened to $-2 \frac{1}{2}$ " , then conveyed to a blade mill, i.e., coarse material washer, where one-third water (by weight) is added. The blade mill then "churns the snot out of" (Lawson, pers. comm., 2000) the mixture, which can then be further processed.

Log washer or no, the basic premise appears to remain the same. If the goal is to achieve the most efficient sand/fines separation with equipment like density separators, hydrocyclones, or centrifuges, then the problematic clay-bearing materials must first be subjected to vigorous attrition in order to break down the large clay clumps into a more manageable slurry-type form prior to that final separation process.

Commercial Plant Options

There are two main options for building a commercial operation based on the processes tested in this study. The major difference in the two options is how the cyclone overflow is handled. Figure 11 shows the flow sheet for the option where the cyclone overflow is not treated and is sent back to the CDF. A front-end loader and/or a backhoe would be used for feeding the plant. The feed would be passed over a grizzly to remove large rocks and tramp material. The grizzly undersize would discharge into the hopper or a large variable speed feeder. The feeder would supply a controlled rate of material to a series of double deck screens to which a minimal

amount of water would be applied. The objective is to wash the sand through the screen and not necessarily to break up the clay balls. Screen oversize discharges onto a "walled" conveyor. Solids in the screen oversize would be stockpiled and returned to the CDF as necessary. Undersize from the dewatering screen would flow to an agitated holding tank to be mixed with the sizing screen undersize. The slurry would then be pumped to a cyclone cluster. The cyclone underflow would be stockpiled as the sand product and the overflow would be sent to a series of settling ponds. The water from the last settling pond would be used as the process water in the plant.

The equipment sizing for the Figure 11 flowsheet is based on processing 100,000 cubic yards of material per operating season. The assumption is made that the material has an average bulk density of 3500 lb/yd³ (wet sand). With this bulk density, a plant processing 250 short tons per hour (stph) operating 7 hours a day will require 100 days of operation to process the material. With a 5 day per week operation, 20 weeks will be needed to process that amount of material. It is also assumed that only settled material and no freshly dredged will be processed

The major pieces of equipment needed are as follows: A 36-inch wide by 10 foot long belt feeder with a variable speed drive on belt scale; a 34-inch wide by 70 foot feed conveyor; a 6-foot by 16-foot double deck vibrating screen; a 12-inch wide by 40-foot "walled" conveyor for the oversize; a 9000 gallon agitated cyclone feed tank; an 8-inch cyclone feed pump with a 100 hp motor; four 10-inch diameter cyclones; and a 6-inch water pump with a 75 hp motor. The estimated costs for this equipment are given in Table XXIV. The total purchased equipment cost is \$181,000. The USIMPAC computer cost model was used to estimate installation, piping, instrumentation, site development, engineering, auxiliary and contingency costs as shown in Table XXIV. The total fixed capital cost is estimated to be \$547,344. This cost does **not** include any earth moving equipment needed to excavate the material from the CDF, to feed the plant or to move the oversize. It is assumed that this equipment is either available or will be leased as needed. The total installed horsepower should be about 250 hp. It is estimated that 3 people will be required to run the plant. Main operating costs will be labor, fuel for the earth moving equipment, equipment rental (if needed) and power.

With the above plant it is estimated that about 65,000 yd³ of sand product will be produced with about 10,000 yd³ of screen oversize. The remainder of the material will be cyclone overflow which will settle to a volume of slightly more than 25,000 yd³.

The second option, shown on Figure 12, is similar to the first option in that the tramp material is removed with a grizzly and the grizzly undersize goes to a variable speed feeder. This would control the feed to a blade mill or a log washer. The objective in this option is to break up all of the false particles (clay balls). The discharge from the blade mill is screened to remove rocks and tramp material. The screen oversize is conveyed to a stockpile prior to disposal. The screen undersize goes to an agitated holding tank. The slurry in the holding tank is pumped to cyclone clusters with the underflow being stocked piled as the sand product. The cyclone overflow is sent to a belt filter press where it is mixed with flocculent and separated into filter cake and clean filtrate (water). The filtrate is sent to a holding tank (not shown) where it is used as process water. The filter cake might be useful as top soil or it can be landfilled.

Which of the two options is the best can only be determined by a detailed economic evaluation, which is beyond the scope of this project. The capital cost for each option will depend on the amount of material to be processed. Also whether the material dredged each year will be processed as received or will be sent to the CDF as normal to be processed later, will affect the placement of the plant and hence the costs. It is recommended that several size plants

be evaluated for each option, to determine the optimum size. Also to be considered is whether the plant should be of a modular design, so that one module could treat the annual dredging while the other module could be used to clean up the existing CDF and then be moved to another site. This modular approach may have significant benefits for the belt filter press option where essentially all of the solids are being removed from the CDF. The costs for electricity, water and labor should be very similar for both options. The belt filter press option will have significantly higher costs for the flocculent. Based on the conditions in this test program of 65 gpm feed to the belt press, 1.5 pound per hour of flocculent added, and a cost of \$1.85 per pound of flocculent, the cost for flocculent would be about \$0.71 per 1,000 gallons of cyclone overflow treated. While the flocculent addition was not optimized in this program and some saving may be realized by more testing, it should be noted that decreasing the rate of flocculent addition in this test program resulted in poor performance by the belt filter press.

Final Comments

The project demonstrated that the technology exists to process the sandy/silty/clayey material from the Erie Pier CDF, and make potentially useable products like washed coarse sand and a fine sand/silt/clay filter cake soil. Since a major goal of the U.S. Army Corps of Engineers (USACE) is to prolong the operational life of the Erie Pier facility (and other similar facilities around the country) by at least achieving no net volumetric gain over time, the question that needs answering is the following: will this technology meet this goal?

The discussions with Mr. Scott Lawson at Eagle Iron Works were instructive on this point, not only from the equipment and processing side, but also from the practical side of merely dealing with the type of material present at the Erie Pier CDF. There is little doubt that fines make up a large proportion of Erie Pier's volume. There is also little doubt that fines are traditionally the most difficult type of material for any industrial mineral operation to handle, both technologically and economically. The former issue has been addressed by this project, and the latter issue is one that the USACE must wrestle with in assessing their short- and long-term options at Erie Pier. Fines, simply put, are tough to get rid of unless they are in a form that can be obtained and transported easily (relatively dry) and are of little or no cost to the end-user. Fines from CDF's like Erie Pier are an even tougher problem, because cleanliness perceptions surrounding harbor dredge spoils exist. However, the project's analytical work should address those perceptions.

From his perspective as an outsider, Mr. Lawson asked the most obvious question: why go through the effort of treating the material with techniques that use large volumes of process water that, in the end, may not make much of a dent in reducing the overall volume of the CDF? Instead, why not get rid of the material as-is, perhaps as fill, a soil amendment, or a binder for coarser aggregate?

Using the material as-is for mine land reclamation projects has been discussed. This option seems to provide the greatest potential for achieving tangible and rapid volumetric reductions at Erie Pier, purple loosestrife notwithstanding. But what are the economics of excavating, loading, transporting, unloading, transporting again, and spreading this material? To make this option work, a strong and creative effort in coordination and cooperation would have to be made by all potential parties, including the USACE, the Seaway Port Authority of Duluth-Superior, the railroad(s), the mine(s), government, and the regulatory agencies. Perhaps some sort of cost sharing or economic incentive program could be put together. For example, perhaps

the mining companies could be given a tax credit based on the volume of CDF material they accept for mine land reclamation projects, or maybe the railroads could get a similar tax break for providing low-cost transportation. This should not be an intractable problem.

In the final analysis, it comes down to cost. To find, permit, and open a new CDF to replace Erie Pier would cost approximately \$30 million. This is the potential cost of doing nothing, and should be the starting point for weighing future options. Again, the mineral processing techniques used during this project show that CDF materials can be effectively segregated by size. It is clear that some modifications to the process would be needed if a permanent treatment plant were in place, plus a scaling up of plant capacity. An analysis of the cost of such a treatment plant that makes bonafide useable and saleable(?) products, and also prolongs the life of the CDF indefinitely, will have to be made and compared to the cost and difficulties (political and otherwise) associated with perhaps using larger volumes of the CDF's material as-is. Perhaps a combination of the two is the best solution.

References

1. CMRL Staff, Treatment Technologies for Removal of Toxic Metal and Organic Pollutants from Bottom Sediments, Phase I Project Report Under Co-op Agreement CR-818727-01, CMRL/TR 93-01, April 30, 1993.
2. Wu, C., Niles, H.B., and Bleifuss, R. L., Design of a Sediment Treatment Plant at the Duluth-Superior Harbor Erie Pier, A Report for the Great Lakes National Program Office Project Assistance ID No. GL985132-01-0, CMRL/TR-97-02, February 1997.
3. CMRL Staff, Treatment Technologies for Removal of Toxic Metal and Organic Pollutants from Bottom Sediments, Project Report Under Co-op Agreement CR-81 8727-01, CMRL/TR98-27, December 31, 1998.
4. Wu, C., Alternative Technology for Sediment Remediation, Final Report for Detroit District of the USACE Contract DACW35-99-P-0158, CMRL/TR-00-19, November 2,2000.
5. Kuhar, M. S., and Dorn, C. A., 2000, Choosing & using log washers and sand screws: Pit & Quarry, v. 92, no. 9, pp. 58-62.
6. Wellgoss, B., 2000, The coming of age of fines handling - part 1: Aggregates Manager, v. 5, no. 3, p. 23-27.

Table I - Percent Solids and Weight Splits for Sample 1

Date	Sample	% Solids	tph solids	% wt un'flo
8/1/00	Underflow	71.70	36.06	92.56
	Feed	18.26	38.96	
	Overflow	0.66	2.90	
8/2/00	Underflow	70.97	9.44	80.75
	Feed	6.15	11.69	
	Overflow	1.22	2.25	
8/3/00	Underflow	74.77	29.74	91.19
	Feed	15.79	32.61	
	Overflow	0.76	2.87	
8/4/00	Underflow	74.61	13.35	80.84
	Feed	8.27	16.52	
	Overflow	1.74	3.16	
8/5/00	Underflow	70.90	12.70	80.31
	Feed	8.01	15.82	
	Overflow	2.52	3.11	
8/7/00	Underflow	72.01	47.66	75.53
	Feed	30.93	63.11	
	Overflow	1.94	15.44	
8/8/00	Underflow	74.79	39.61	76.91
	Feed	25.94	51.51	
	Overflow	8.17	11.89	
8/9/00	Underflow	78.65	19.06	73.31
	Feed	14.33	26.00	
	Overflow	1.74	6.94	
8/10/00	Underflow	76.10	11.15	76.35
	Feed	8.59	14.61	
	Overflow	1.12	3.45	
8/14/00	Underflow	70.97	8.99	84.57
	Feed	6.34	10.63	

Table II - Cubic Yards* of Feed and Screen Oversize
by Days and Samples

Date	Cubic Yards		% Oversize
	Feed	Oversize	
Sample 1			
08-Aug	115	7.0	6.1
09-Aug	157	11.5	7.3
10-Aug	103	10.0	9.7
12-Aug	126	10.0	7.9
14-Aug	147	13.0	8.8
16-Aug	153	12.0	7.8
17-Aug	167	13.5	8.1
18-Aug	44	5.0	11.4
Average**	138.28	11.00	7.56
Std Dev**	22.06	2.06	1.05
Sample 2			
18-Aug	26	2.0	7.7
22-Aug	55	5.5	10.0
23-Aug	120	9.5	7.9
24-Aug	65	6.5	10.0
25-Aug	60	5.5	9.2
29-Aug	222	12.0	5.4
30-Aug	48	2.5	5.2
31-Aug	88	9.0	10.2
01-Sep	80	8.5	10.6
02-Sep	112	9.0	8.0
05-Sep	75	6.5	8.7
Average**	92.50	7.30	8.52
Std Dev**	48.57	2.64	1.83
Sample 3			
06-Sep	75	4.5	6.0
Sample 4			
11-Sep	145	5.0	3.4
12-Sep	80	2.5	3.1
13-Sep	115	1.0	0.9
Average	113.33	2.83	2.47
Std Dev	26.56	1.65	1.11

*Volumes estimated from number of buckets of feed and screen oversize recorded.

** Averages and standard deviations do not include Aug 18 data since both samples 1 and 2 were run on that day.

Table III - Screen Analyses of Daily Composites from Sample 1

Size, Mesh	Percent Passing							
	8/1/00		8/2/00		8/3/00		8/4/00	
	Feed	Underflow	Feed	Underflow	Feed	Underflow	Feed	Underflow
35	87.5	93.2	90.9	93.5	97.1	96.1	86.0	85.1
48	78.0	83.3	84.2	84.4	92.3	89.9	74.3	71.9
65	55.0	48.4	64.3	52.1	71.3	59.8	48.9	40.2
100	40.2	29.1	51.3	32.4	45.4	35.2	35.0	24.6
150	26.8	11.5	37.3	12.6	19.4	13.8	18.3	9.8
200	22.0	5.6	31.7	5.0	10.3	5.3	13.1	4.6
270	20.1	3.5	29.1	2.0	7.5	2.7	10.8	2.8
325	19.3	2.8	28.1	0.9	7.0	1.9	10.3	2.4

Size, Mesh	8/5/00		8/7/00		8/8/00		8/9/00	
	Feed	Underflow	Feed	Underflow	Feed	Underflow	Feed	Underflow
	35	89.7	80.1	71.6	84.8	83.2	85.0	71.1
48	80.7	67.6	62.7	72.8	72.8	70.5	60.6	74.1
65	57.5	39.2	44.8	45.2	47.5	39.7	41.2	50.6
100	42.5	26.2	33.2	30.3	33.5	26.1	31.0	34.8
150	27.8	12.9	22.8	16.7	19.8	12.2	19.9	18.9
200	22.0	8.2	18.7	9.8	15.6	7.0	15.7	9.6
270	19.6	6.3	16.9	6.0	14.0	4.6	14.0	5.1
325	18.9	5.8	16.3	5.0	13.5	3.6	13.4	3.4

Size, Mesh	8/10/00		8/12/00		8/14/00		8/16/00	
	Feed	Underflow	Feed	Underflow	Feed	Underflow	Feed	Underflow
	35	89.4	92.2	92.6	92.5	90.3	91.8	90.4
48	80.5	81.9	84.8	84.1	79.5	82.7	79.7	79.6
65	58.4	48.2	64.6	56.1	54.4	54.2	54.9	48.1
100	42.2	32.2	49.3	35.2	39.7	32.8	40.6	31.8
150	29.1	15.2	33.0	16.2	23.5	14.3	25.6	14.4
200	23.3	8.1	27.4	8.2	18.1	6.8	20.8	7.8
270	20.7	5.3	25.3	5.2	16.1	4.1	18.9	5.3
325	19.8	4.2	24.7	4.2	15.5	3.3	18.2	4.4

Size, Mesh	8/17/00		8/18/00		Feed		Underflow	
	Feed	Underflow	Feed	Underflow	Average	Range	Average	Range
	35	89.9	87.2	89.9	93.0	87.11	97.1-71.1	89.30
48	81.1	76.8	82.0	83.7	78.09	92.3-60.6	78.81	89.9-67.6
65	55.9	48.9	61.7	53.7	55.74	71.3-41.2	48.89	59.8-39.2
100	37.9	31.9	49.1	35.8	40.78	49.3-26.1	31.31	35.8-24.6
150	25.9	14.8	31.6	14.3	25.77	33.0-19.8	14.11	18.9-9.8
200	20.5	8.7	25.3	6.0	20.32	27.4-10.3	7.19	9.8-4.6
270	18.5	6.2	22.7	2.7	18.16	29.1-7.5	4.41	6.3-2.0
325	17.9	5.3	21.8	1.6	17.48	28.1-7.0	3.49	5.8-0.9

Table IV – Chemical Analyses for Daily Composites – Sample 1

Description	% Fe	Ni ppm	Ba ppm	Pb ppm	Cu ppm	Zn ppm	Cr ppm	Hg ppm	Cd ppm	% TOC
8-1-00 feed	1.20	<0.0	57.30	24.70	<0.0	36.72	57.10	<.20	<0.0	0.45
8-1-00 un'flow	0.89	<0.0	17.90	11.00	<0.0	<0.0	85.60	<.20	<0.0	0.27
8-1-00 o'flow	4.75	15.70	131.20	76.20	23.10	149.19	26.10	0.40	<0.0	2.90
8-2-00 feed	1.61	<0.0	59.90	14.90	<0.0	35.30	70.40	<.20	<0.0	0.73
8-2-00 un'flow	0.82	<0.0	43.90	0.00	<0.0	6.15	70.20	<.20	<0.0	0.38
8-2-00 o'flow	4.26	10.70	144.50	52.20	25.80	139.70	27.80	0.52	<0.0	2.52
8-3-00 un'flow	0.89	<0.0	71.90	0.00	<0.0	24.46	85.20	<.20	<0.0	0.24
8-3-00 o'flow	4.41	15.60	148.10	48.90	82.50	153.09	44.70	0.23	<0.0	3.03
8-4-00 un'flow	0.86	<0.0	48.30	0.00	<0.0	15.44	86.60	<.20	<0.0	0.25
8-4-00 o'flow	3.90	7.70	100.40	45.10	31.50	103.45	35.10	<.20	<0.0	2.47
8-5-00 feed	1.56	<0.0	56.00	3.00	<0.0	32.28	66.90	<.20	<0.0	0.83
8-5-00 un'flow	0.99	<0.0	33.60	22.50	<0.0	2.60	87.70	<.20	<0.0	0.55
8-5-00 o'flow	4.41	7.20	119.80	76.20	12.80	122.44	24.00	<.20	<0.0	2.62
8-7-00 feed	1.71	<0.0	50.30	35.40	<0.0	33.71	58.60	<.20	<0.0	0.72
8-7-00 un'flow	0.95	<0.0	35.20	6.20	<0.0	4.57	79.50	<.20	<0.0	0.18
8-7-00 o'flow	4.24	9.80	95.53	75.27	8.30	100.85	22.40	<.20	<0.0	2.64
8-8-00 feed	1.45	<0.0	31.80	27.60	<0.0	18.40	48.30	<.20	<0.0	0.72
8-8-00 un'flow	1.06	<0.0	18.70	6.40	<0.0	<0.0	83.50	<.20	<0.0	0.41
8-8-00 o'flow	1.46	<0.0	31.30	19.60	<0.0	13.24	58.80	<.20	<0.0	0.75
8-9-00 feed	1.54	<0.0	31.80	19.80	<0.0	13.24	56.40	<.20	<0.0	0.65
8-9-00 un'flow	1.10	6.27	56.03	0.00	13.63	41.90	84.27	<.20	0.18	0.30
8-9-00 o'flow	4.28	29.00	155.70	31.05	47.72	145.65	27.30	<.20	0.76	2.71
8-10-00 feed	1.91	9.90	97.30	0.00	23.46	83.42	75.60	<.20	0.00	0.91
8-10-00 un'flow	1.23	7.10	67.70	0.00	12.67	58.48	97.70	<.20	0.00	0.18
8-10-00 o'flow	4.69	27.90	160.20	24.96	52.95	159.20	24.40	<.20	0.63	2.82
8-12-00 un'flow	0.96	5.20	76.50	0.00	8.63	52.28	76.40	<.20	0.00	0.25
8-14-00 feed	1.51	8.50	78.40	0.00	17.29	68.25	74.20	<.20	0.00	0.78
8-14-00 un'flow	1.14	5.80	70.60	0.00	10.37	52.01	97.50	<.20	0.00	0.28
8-14-00 o'flow	4.42	28.60	164.40	67.96	64.81	171.98	18.90	<.20	0.73	2.69

Table IV (cont'd) – Chemical Analyses for Daily Composites – Sample 1

Description	% Fe	Ni ppm	Ba ppm	Pb ppm	Cu ppm	Zn ppm	Cr ppm	Hg ppm	Cd ppm	% TOC
8-16-00 feed	1.37	9.80	71.10	12.43	15.15	70.61	46.80	<.20	0.08	0.65
8-16-00 o'flow	4.52	41.93	109.90	71.21	50.41	142.55	27.60	<.20	1.35	2.58
8-17-00 feed	1.41	16.00	29.70	0.00	11.81	39.34	47.90	<.20	0.00	0.56
8-17-00 un'flow	0.96	11.00	17.20	0.00	6.92	20.54	76.50	<.20	0.00	0.29
8-17-00 o'flow	3.76	40.50	101.60	43.73	41.88	131.91	17.80	<.20	0.95	2.79
8-18-00 feed	1.15	17.70	24.70	0.00	9.54	33.14	65.60	<.20	0.00	0.40
8-18-00 un'flow	0.88	15.00	22.50	0.00	6.73	22.75	65.60	<.20	0.00	0.52
8-18-00 o'flow	3.94	33.80	105.30	0.00	43.69	122.37	21.10	<.20	0.00	3.13

Table V - Percent Solids and Weight Splits for Sample 2

Date	Sample	% sol	tph solids	% wt unflo
8/18/00	Underflow	72.66	4.47	67.21
	Feed	3.39	6.66	
	Overflow	1.12	2.18	
8/22/00	Underflow	74.23	5.35	72.06
	Feed	4.46	7.42	
	Overflow	1.59	2.07	
8/23/00	Underflow	73.39	4.69	66.87
	Feed	4.25	7.01	
	Overflow	2.77	2.32	
8/24/00	Underflow	73.89	4.14	57.04
	Feed	4.38	7.25	
	Overflow	1.84	3.12	
8/25/00	Underflow	81.15	9.02	75.78
	Feed	7.01	11.91	
	Overflow	1.91	2.88	
8/29/00	Underflow	73.46	6.14	71.01
	Feed	5.10	8.64	
	Overflow	1.55	2.51	
8/30/00	Underflow	76.80	25.88	44.71
	Feed	28.53	57.88	
	Overflow	16.60	32.00	
8/31/00	Underflow	73.90	7.35	63.29
	Feed	7.06	11.61	
	Overflow	0.58	4.26	
9/1/00	Underflow	74.24	7.29	59.41
	Feed	7.11	12.26	
	Overflow	3.39	4.98	
9/2/00	Underflow	74.11	9.55	71.11
	Feed	7.85	13.43	
	Overflow	0.61	3.88	
9/5/00	Underflow	73.44	10.08	73.32
	Feed	8.02	13.74	
	Overflow	1.58	3.67	
Average	Underflow	74.66	8.54	65.62
	Feed	7.92	14.35	
	Overflow	3.05	5.62	
Range	Underflow	72.77-81.15	4.47-25.88	44.71-75.78
	Feed	3.39-28.53	6.66-57.88	
	Overflow	0.58-16.60	2.07-32.00	

Table VI - Screen Analyses of Daily Composites Sample 2

Size, Mesh	Percent Passing									
	8/18/00		8/22/00		8/23/00		8/24/00		8/24/00	
	Feed	Underflow	Feed	Underflow	Feed	Underflow	Feed	Underflow	filtercake	
35	97.2	97.7	96.0	93.7	96.7	93.7			95.1	
48	95.2	95.1	93.3	89.2	93.5	88.5			89.9	
65	88.7	82.9	84.7	74.7	82.9	69.9			66.9	
100	83.5	66.1	74.6	60.6	74.0	53.1			50.2	
150	64.1	42.7	60.6	42.4	55.7	32.6			30.3	57.4
200	52.8	25.5	49.9	28.1	45.8	19.5			18.4	45.0
270	44.4	15.1	42.4	17.1	39.2	11.9			11.2	36.7
325	40.5	11.0	38.9	12.3	36.2	9.0			8.5	32.2
400										30.5
500										26.6

Size, Mesh	8/25/00			8/29/00			8/30/00			8/31/00	
	Feed	Underflow	filtercake	Feed	Underflow	filtercake	Feed	Underflow	filtercake	Feed	Underflow
35		95.6		94.0	94.3		92.5	97.3		97.5	95.0
48		92.3		89.6	89.9		84.5	94.4		94.6	90.9
65		77.2		76.8	69.6		62.0	82.5		84.6	75.3
100		64.1		66.9	52.3		49.5	68.1		73.6	58.3
150		41.8	65.3	46.8	35.6	74.3	37.0	47.3	70.8	54.5	33.1
200		26.0	62.7	37.1	23.5	72.5	31.1	29.3	68.5	43.2	20.1
270		15.4	59.8	31.0	14.8	70.2	27.4	16.7	65.0	35.6	12.1
325		11.3	57.8	28.4	11.0	67.9	25.8	12.0	61.9	32.4	8.8
400			55.8			61.1			58.7		
500			50.3			50.3			52.0		

Table VI (cont'd)

Size, Mesh	9/1/00			9/2/00			9/5/00		
	Feed	Underflow	Filtercake	Feed	Underflow	Filtercake	Feed	Underflow	Filtercake
35	97.5	98.8		96.8	98.6		95.7	95.8	
48	95.7	97.4		94.2	96.7		89.4	90.4	
65	89.0	90.7		82.7	87.9		70.1	71.0	
100	80.2	80.7		67.1	73.0		55.9	52.9	
150	64.1	52.0	82.5	47.9	42.9	79.9	38.9	30.5	63.1
200	52.1	28.5	77.8	37.2	22.0	74.4	32.7	19.7	60.4
270	43.2	13.7	69.0	30.7	10.8	65.7	29.5	13.0	58.3
325	39.3	8.8	62.2	28.0	7.4	59.4	28.2	10.2	57.0
400			56.8			54.6			55.4
500			35.6			44.9			50.7

Size, Mesh	Feed	Average Underflow	Filtercake	Range		
				Feed	Underflow	Filtercake
35	95.99	95.96		92.5-97.5	93.7-98.8	
48	92.22	92.25		84.5-95.7	88.5-97.4	
65	80.17	77.15		62.0-89.0	66.9-90.7	
100	69.48	61.76		49.5-83.5	50.2-80.7	
150	52.18	39.20	70.47	37.0-64.1	30.3-52.0	57.4-82.5
200	42.43	23.69	65.90	31.1-52.8	18.4-29.3	45.0-77.8
270	35.39	13.80	60.67	27.4-44.4	10.8-17.1	36.7-70.2
325	33.08	10.03	56.91	25.8-40.5	7.4-12.3	32.2-67.9
400			53.27			30.5-61.1
500			44.34			26.6-52.0

Table VII – Chemical Analyses for Daily Composites – Sample 2

Description	% Fe	Ni ppm	Ba ppm	Pb ppm	Cu ppm	Zn ppm	Cr ppm	Hg ppm	Cd ppm	% TOC
8-18-00 un'flow	0.83	7.00	17.30	0.00	5.22	18.12	63.70	<.20	0.00	0.29
8-18-00 o'flow	2.93	21.70	80.90	0.00	46.63	114.16	11.50	<.20	0.27	4.30
8-22-00 feed	1.20	8.79	29.70	0.00	12.80	0.00	84.40	<.20	0.00	0.75
8-22-00 un'flow	0.79	21.72	18.70	0.00	7.59	0.00	66.40	<.20	0.00	0.56
8-22-00 o'flow	2.43	8.49	81.80	3.76	37.68	63.59	22.70	<.20	0.00	4.18
8-23-00 feed	1.12	9.16	31.20	0.00	11.62	0.00	49.40	<.20	0.00	1.07
8-23-00 un'flow	0.83	19.78	17.10	0.00	7.21	0.00	65.80	<.20	0.00	0.55
8-23-00 o'flow	1.56	12.13	52.90	0.00	26.51	38.50	32.60	<.20	0.00	2.51
8-24-00 feed	1.46	8.10	38.20	0.00	20.39	15.27	46.10	<.20	0.00	1.66
8-24-00 un'flow	0.74	23.60	19.10	0.00	6.48	0.00	73.30	<.20	0.00	0.27
8-24-00 o'flow	2.19	42.13	78.60	8.53	39.05	71.55	49.20	<.20	0.00	3.87
8-25-00 feed	1.29	11.78	33.80	0.00	16.14	10.28	60.00	0.35	0.00	1.25
8-25-00 un'flow	0.81	8.05	18.80	0.00	7.62	0.00	71.30	<.20	0.00	0.52
8-25-00 o'flow	2.82	26.75	111.90	17.26	61.44	108.99	52.00	0.29	0.00	3.65
8-29-00 un'flow	0.72	7.66	43.20	0.00	7.35	0.00	49.00	<.20	0.00	0.33
8-29-00 o'flow	2.42	23.17	113.55	0.00	40.79	128.60	20.75	0.41	0.00	3.15
8-30-00 feed	1.25	9.77	56.50	0.00	11.79	32.87	49.00	<.20	0.00	1.12
8-30-00 un'flow	0.80	7.28	63.50	0.00	7.86	10.85	61.90	<.20	0.00	0.35
8-30-00 o'flow	1.47	12.13	130.50	0.00	25.35	72.77	55.80	<.20	0.00	1.83
8-31-00 feed	1.21	8.38	108.90	0.00	13.62	48.36	61.60	<.20	0.00	1.16
8-31-00 un'flow	0.77	6.12	93.70	0.00	6.53	25.33	75.80	<.20	0.00	0.56
8-31-00 o'flow	1.51	13.15	127.30	0.00	18.83	65.55	39.70	<.20	0.00	4.68
9-1-00 feed								<.20		1.44
9-1-00 un'flow								<.20		0.26
9-1-00 o'flow								0.29		3.34
9-2-00 feed								<.20		1.48
9-2-00 un'flow								<.20		0.29
9-2-00 o'flow	2.64	28.66	124.90	14.48	70.24	176.70	27.25	0.23	0.48	4.41
9-5-00 feed	1.45	13.19	53.75	0.00	13.95	55.4	83.215	<.20	0.00	1.40
9-5-00 un'flow	0.9	9.55	42.35	8.68	6.2	64.5	80.91	<.20	0.00	0.37
9-5-00 o'flow	2.92	30.63	121.1	12.78	44.87	173.5	24.59	<.20	0.00	4.31

Samples lost during analysis

Table VIII - Screen Analysis for Daily Composites Sample 3

Size, Mesh	Percent Passing		
	Feed	Underflow	filtercake
35	94.8	95.4	
48	90.6	91.4	
65	79.8	79.3	
100	70.5	66.3	
150	54.9	46.5	58.7
200	47.3	31.2	56.1
270	42.3	19.4	53.9
325	40.0	14.3	52.5
400			51.0
500			46.9

Table IX - Percent Solids and Weight Splits for Sample 3

Date	Sample	% sol	tph solids	% wt unflo
9/6/00	Underflow	72.88	6.35	55.90
	Feed	6.68	11.36	
	Overflow	3.03	5.01	

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Table X – Chemical Analyses for Daily Composites – Sample 3

Description	% Fe	Ni ppm	Ba ppm	Pb ppm	Cu ppm	Zn ppm	Cr ppm	Hg ppm	Cd ppm	% TOC
9-6-00 feed	1.65	17.56	72.50	0.00	0.00	78.60	45.98	<.20	0.00	2.27
9-6-00 un'flow	0.81	7.00	10.10	10.60	6.70	18.90	65.00	<.20	0.00	0.76
9-6-00 o'flow	2.81	30.00	89.60	62.70	34.00	172.00	32.40	<.20	0.07	3.95

Table XI – Percent Solids and Weight Splits for Sample 4

Date	Sample	% sol	tph solids	% wt unflo
9/11/00	unflo	76.35	8.90	82.41
	feed	6.41	10.80	
	oflo	1.21	1.90	
9/12/00	unflo	75.48	11.23	94.33
	feed	6.98	11.91	
	oflo	0.43	0.68	
9/13/00	unflo	76.71	12.77	93.11
	feed	7.85	13.71	
	oflo	0.60	0.94	
Average	unflo	76.18	10.96	89.95
	feed	7.08	12.14	
	oflo	0.75	1.17	

Table XII - Screen Analyses of Daily Composites Sample 4

Size, Mesh	9/11/00		9/12/00		9/13/00	
	Feed	Underflow	Feed	Underflow	Feed	Underflow
35	94.4	94.9	97.1	95.5	93.3	91.2
48	89.1	89.6	94.3	90.7	86.5	84.4
65	73.3	70.3	73.8	73.4	66.3	62.1
100	58.9	48.6	53.3	53.6	46.9	41.3
150	33.0	26.2	33.9	31.0	26.6	21.1
200	22.9	14.1	17.4	14.7	16.8	10.9
270	17.2	8.1	10.0	9.0	11.5	6.0
325	15.2	5.9	8.3	6.2	9.5	4.2
Size, Mesh	Average					
	Feed	Underflow				
35	94.93	93.87				
48	89.97	88.23				
65	71.13	68.60				
100	53.03	47.83				
150	31.17	26.10				
200	19.03	13.23				
270	12.90	7.70				
325	11.00	5.43				

Table XIII – Chemical Analyses of Daily Composites – Sample 4

Description	% Fe	Ni ppm	Ba ppm	Pb ppm	Cu ppm	Zn ppm	Cr ppm	Hg ppm	Cd ppm	% TOC
9-11-00 un'flow	0.97	8.90	22.70	13.20	4.10	48.50	66.70	<.20	0.00	0.19
9-11-00 o'flow	3.13	30.80	129.70	63.70	43.80	164.20	38.60	<.20	0.00	2.69
9-12-00 un'flow	0.73	9.30	23.30	8.30	5.70	36.20	60.00	<.20	0.00	0.35
9-12-00 o'flow	2.60	28.10	90.60	54.30	54.00	150.50	34.60	<.20	0.00	2.60
9-13-00 un'flow	0.88	7.40	14.10	21.20	2.60	38.20	68.50	<.20	0.00	0.17
9-13-00 o'flow	2.41	21.30	68.60	47.10	45.20	123.00	59.30	<.20	0.00	2.44

Table XIV -Turbidity Reading for Filtrate

Date	Turbidity, NTU
24-Aug	3.4
25-Aug	2.3
29-Aug	1.5
30-Aug	4.3
1-Sep	4.1
2-Sep	3.7
5-Sep	3.8
6-Sep	2.9

Table XV - Chemical Analyses of Daily Composite Filtercake Samples

Date	% Fe	Ni ppm	Ba ppm	Pb ppm	Cu ppm	Zn ppm	Cr ppm	Hg ppm	Cd ppm
24-Aug	1.94	16.10	44.70	40.60	14.90	96.50	44.20	<.20	0.00
25-Aug	2.35	22.70	85.80	53.70	27.80	135.30	13.80	0.23	0.00
29-Aug	2.44	25.40	94.40	47.20	25.40	141.20	29.30	<.20	0.00
30-Aug	2.66	21.60	91.60	45.60	22.30	141.20	25.40	0.29	0.00
1-Sep	2.18	23.70	52.10	38.00	17.40	99.50	21.40	0.29	0.00
2-Sep	2.05	18.40	40.90	34.50	16.80	90.20	19.90	0.29	0.00
5-Sep	2.33	20.50	94.80	40.70	26.50	134.10	30.00	<.20	0.00
6-Sep	2.63	23.00	94.57	43.37	26.10	150.07	25.93	0.41	0.20

Table XVI - Results of PCB Analyses
on Composites of Daily Composites

PCB	8/1-5			8/7-10			8/13-18		
	Feed	Underflow	Overflow	Feed	Underflow	Overflow	Feed	Underflow	Overflow
1016	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
1221	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
1232	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
1242	<40.0	<40.0	45.3	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
1248	<40.0	<40.0	<40.1	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
1254	<30.0	<30.0	104.0	<30.0	<30.0	64.1	<30.0	<30.0	64.3
1260	<20.0	35.1	85.3	23.8	<20.0	54.9	<20.0	<20.0	56.0
1262	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
1268	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0

PCB	8/22-23			8/24-25			8/30-31		
	Feed	Underflow	Overflow	Feed	Underflow	Overflow	Feed	Underflow	Overflow
1016	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
1221	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
1232	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
1242	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
1248	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
1254	<30.0	<30.0	50.1	<30.0	<30.0	61.8	<30.0	<30.0	<30.1
1260	26.1	<20.0	50.2	<20.0	<20.0	56.8	<20.0	<20.0	29.3
1262	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
1268	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0

Table XVI (cont'd) - Results of PCB Analyses
on Composites of Daily Composites

PCB	9/1-5			9/6			9/11-13		
	Feed	Underflow	Overflow	Feed	Underflow	Overflow	Underflow	Overflow	
1016	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	
1221	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	
1232	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	
1242	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	
1248	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	
1254	<30.0	<30.0	134.0	40.0	<30.0	38.8	<30.0	33.2	
1260	42.8	<20.0	81.9	27.3	<20.0	27.5	216.0	33.9	
1262	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	
1268	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	

Table XVII - PAH Analyses for Daily Composites of Plant Feed, Underflow and Overflow

	ug/kg number 1 (8/1-8/5)			ug/kg number 2 (8/7-8/10)		
	Feed	Underflow	Overflow	Feed	Underflow	Overflow
1-Methyl Naphthalene	158.0	214.0	159.0	112.0	138.0	124.0
2-Methyl Naphthalene	292.0	431.0	425.0	212.0	235.0	286.0
Acenaphthene	26.5	29.8	42.2	36.4	22.5	32.1
Acenaphthylene	91.3	240.0	336.0	113.0	<84.0	336.0
Anthracene	28.1	49.7	106.0	27.0	15.1	61.0
Benzo(a)anthracene	55.5	26.2	221.0	78.9	23.3	131.0
Benzo(a)pyrene	60.8	34.6	247.0	88.0	28.1	146.0
Benzo(b)fluoranthene	80.1	38.8	291.0	98.7	31.9	167.0
Benzo(ghi)perylene	81.6	81.9	337.0	110.0	19.4	198.0
Benzo(k)fluoranthrene	29.9	13.0	126.0	39.0	11.4	72.9
Chrysene	57.7	29.4	207.0	79.7	30.2	125.0
Dibenzo(ah)anthracene	5.7	46.3	42.9	11.0	5.7	20.9
Fluoranthene	395.0	460.0	1010.0	405.0	185.0	530.0
Fluorene	31.8	110.0	113.0	39.0	20.2	58.8
Indeno(1,2,3-cd)pyrene	92.5	12.8	355.0	119.0	34.8	236.0
Naphthalene	273.0	635.0	478.0	177.0	202.0	334.0
Phenanthrene	182.0	222.0	617.0	247.0	110.0	292.0
Pyrene	162.0	121.0	518.0	216.0	73.3	292.0
Total PAH	2103.5	2795.5	5631.1	2208.7	1185.9	3442.7

Table XVII (cont'd) – PAH Analyses for Daily Composites of Plant Feed, Underflow and Overflow

	number 3 (8/13-8/18)			number 4 (8/22-8/23)		
	Feed	Underflow	Overflow	Feed	Underflow	Overflow
1-Methyl Naphthalene	103.0	186.0	190.0	94.5	68.8	243.0
2-Methyl Naphthalene	196.0	374.0	445.0	203.0	125.0	555.0
Acenaphthene	22.8	24.6	46.8	28.6	23.2	113.0
Acenaphthylene	149.0	<84.0	596.0	96.0	<84	557.0
Anthracene	25.2	38.7	110.0	58.0	20.4	194.0
Benzo(a)anthracene	48.9	22.5	172.0	117.0	24.4	386.0
Benzo(a)pyrene	56.9	28.1	187.0	117.0	24.1	366.0
Benzo(b)fluoranthene	67.2	31.7	227.0	131.0	31.7	374.0
Benzo(ghi)perylene	68.5	18.2	256.0	124.0	24.1	370.0
Benzo(k)fluoranthrene	27.5	10.7	97.0	58.1	12.2	189.0
Chrysene	19.2	24.1	165.0	115.0	31.2	343.0
Dibenzo(ah)anthracence	8.9	5.7	28.7	10.8	6.1	71.9
Fluoranthene	286.0	260.0	843.0	534.0	212.0	1670.0
Fluorene	25.1	63.3	119.0	46.2	17.7	145.0
Indeno(1,2,3-cd)pyrene	81.4	20.5	291.0	160.0	21.4	475.0
Naphthalene	187.0	461.0	597.0	224.0	136.0	789.0
Phenanthrene	178.0	197.0	514.0	247.0	123.0	822.0
Pyrene	132.0	102.0	408.0	270.0	74.2	759.0
Total PAH	1682.6	1868.1	5292.5	2634.2	975.5	8421.9

Table XVII (cont'd) – PAH Analyses for Daily Composites of Plant Feed, Underflow and Overflow

	number 5 (8/24-8/25)			number 6 (8/30-8/31)		
	Feed	Underflow	Overflow	Feed	Underflow	Overflow
1-Methyl Naphthalene	212.0	238.0	319.0	113.0	47.6	209.0
2-Methyl Naphthalene	479.0	528.0	746.0	240.0	85.7	480.0
Acenaphthene	75.4	50.9	116.0	36.3	20.4	78.9
Acenaphthylene	664.0	327.0	356.0	179.0	<84	270.0
Anthracene	206.0	110.0	209.0	64.8	20.7	136.0
Benzo(a)anthracene	250.0	81.2	411.0	129.0	31.0	372.0
Benzo(a)pyrene	223.0	79.6	382.0	126.0	30.3	248.0
Benzo(b)fluoranthene	215.0	61.4	328.0	131.0	34.3	232.0
Benzo(ghi)perylene	231.0	65.0	376.0	131.0	28.0	249.0
Benzo(k)fluoranthrene	109.0	31.3	191.0	64.9	15.1	123.0
Chrysene	416.0	73.2	375.0	118.0	33.0	248.0
Dibenzo(ah)anthracene	37.4	13.9	68.0	23.7	5.3	31.0
Fluoranthene	1240.0	504.0	2040.0	569.0	189.0	1240.0
Fluorene	151.0	150.0	182.0	48.1	15.8	109.0
Indeno(1,2,3-cd)pyrene	289.0	83.0	475.0	164.0	33.8	310.0
Naphthalene	613.0	641.0	801.0	271.0	94.0	509.0
Phenanthrene	813.0	374.0	1360.0	294.0	190.0	737.0
Pyrene	577.0	253.0	822.0	261.0	71.8	558.0
Total PAH	6800.8	3664.5	9557.0	2963.8	945.8	6139.9

Table XVII (cont'd) – PAH Analyses for Daily Composites of Plant Feed, Underflow and Overflow

	number 7 (9/1-9/5)			number 8 (9/6)		
	Feed	Underflow	Overflow	Feed	Underflow	Overflow
1-Methyl Naphthalene	142.0	52.8	301.0	242.0	154.0	293.0
2-Methyl Naphthalene	316.0	103.0	612.0	463.0	294.0	513.0
Acenaphthene	40.0	8.2	74.0	59.4	36.0	61.7
Acenaphthylene	195.0	<84	<840	<840	<84	<840
Anthracene	92.6	18.0	244.0	147.0	40.1	206.0
Benzo(a)anthracene	172.0	23.4	415.0	215.0	33.0	290.0
Benzo(a)pyrene	176.0	24.8	420.0	223.0	42.6	314.0
Benzo(b)fluoranthene	179.0	32.8	514.0	261.0	44.4	391.0
Benzo(ghi)perylene	204.0	41.5	592.0	280.0	50.3	471.0
Benzo(k)fluoranthrene	86.0	12.7	233.0	121.0	18.3	176.0
Chrysene	166.0	24.3	374.0	244.0	65.0	323.0
Dibenzo(ah)anthracence	75.9	16.6	231.0	158.0	21.8	206.0
Fluoranthene	450.0	63.9	949.0	447.0	230.0	608.0
Fluorene	54.0	11.8	151.0	82.4	21.3	109.0
Indeno(1,2,3-cd)pyrene	157.0	35.0	355.0	281.0	39.3	235.0
Naphthalene	344.0	111.0	831.0	550.0	232.0	671.0
Phenanthrene	440.0	92.0	915.0	587.0	256.0	614.0
Pyrene	411.0	62.7	892.0	494.0	146.0	635.0
Total PAH	3700.5	734.5	8103.0	4854.8	1724.1	6116.7

Table XVII (cont'd) – PAH Analyses for Daily Composites of Plant Feed, Underflow and Overflow

	Feed	number 9 (9/11-9/13) Underflow	Overflow
1-Methyl Naphthalene		82.8	262.0
2-Methyl Naphthalene		140.0	445.0
Acenaphthene		13.6	59.4
Acenaphthylene		<84	<840
Anthracene		12.7	131.0
Benzo(a)anthracene		15.6	222.0
Benzo(a)pyrene		17.8	243.0
Benzo(b)fluoranthene		21.8	321.0
Benzo(ghi)perylene		25.8	355.0
Benzo(k)fluoranthrene		8.7	134.0
Chrysene		17.1	200.0
Dibenzo(ah)anthracence		8.3	124.0
Fluoranthene		77.3	582.0
Fluorene		8.3	92.9
Indeno(1,2,3-cd)pyrene		12.1	183.0
Naphthalene		110.0	564.0
Phenanthrene		90.8	529.0
Pyrene		47.9	481.0
Total PAH		710.5	4928.3

Table XVIII - PAH Analyses for Daily Filtercake Composites

	ug/kg							
Date	8/24	8/25	8/29	8/30	9/1	9/2	9/5	9/6
1-Methyl Naphthalene	310.0	345.0	194.0	268.0	420.0	292.0	359.0	427.0
2-Methyl Naphthalene	595.0	679.0	480.0	680.0	589.0	754.0	465.0	637.0
Acenaphthene	78.5	82.6	72.4	90.3	203.0	93.5	155.0	182.0
Acenaphthylene	<840	<840	468.0	508.0	<840	<84	<924	<840
Anthracene	186.0	200.0	173.0	214.0	247.0	229.0	203.0	220.0
Benzo(a)anthracene	321.0	368.0	345.0	434.0	381.0	428.0	321.0	360.0
Benzo(a)pyrene	338.0	390.0	400.0	462.0	367.0	472.0	334.0	368.0
Benzo(b)fluoranthene	384.0	444.0	453.0	541.0	398.0	534.0	344.0	411.0
Benzo(ghi)perylene	473.0	531.0	480.0	522.0	491.0	512.0	460.0	422.0
Benzo(k)fluoranthrene	179.0	211.0	207.0	245.0	206.0	240.0	189.0	211.0
Chrysene	281.0	306.0	392.0	510.0	351.0	520.0	294.0	310.0
Dibenzo(ah)anthracene	174.0	245.0	188.0	219.0	286.0	240.0	246.0	186.0
Fluoranthene	753.0	833.0	743.0	1180.0	769.0	175.0	792.0	868.0
Fluorene	133.0	152.0	97.2	124.0	124.0	117.0	99.3	108.0
Indeno(1,2,3-cd)pyrene	321.0	377.0	339.0	459.0	328.0	349.0	287.0	302.0
Naphthalene	770.0	883.0	662.0	1090.0	966.0	1170.0	725.0	917.0
Phenanthrene	673.0	744.0	654.0	845.0	954.0	916.0	749.0	848.0
Pyrene	668.0	752.0	606.0	743.0	842.0	721.0	721.0	794.0
Total PAH	6637.5	7542.6	6953.6	9134.3	7922.0	7762.5	6743.3	7571.0

Table XIX - Turbidity Readings for Settling Pond

Date	Turbidity, NTU	
	Start	Finish
9-Aug	590	631
10-Aug	569	581
12-Aug	540	569
14-Aug	523	595
16-Aug	572	589
17-Aug	585	581
18-Aug	586	563
24-Aug	513	426
25-Aug	492	462
29-Aug	421	449
30-Aug	476	440
31-Aug	409	517
1-Sep	514	548
2-Sep	535	551
5-Sep	439	465
6-Sep	543	534
11-Sep	417	403
12-Sep	532	545
13-Sep	523	543

Table XX - Inorganic and PAH Analyses of Water Samples
From Overflow and Filtrate

Element	Cyclone Overflow		Filtrate	
	8/9-12	8/16-18	8/24-30	9/1-6
Fe, %	2.46	2.73	0.75	0.54
Ni, ppm	0.07	0.07	0.06	0.06
Ba, ppm	0.10	0.09	0.06	0.00
Pb, ppm	0.07	0.07	0.07	0.06
Cu, ppm	0.03	0.03	0.03	0.03
Zn, ppm	0.01	0.01	0.01	0.01
Cr, ppm	0.13	0.08	0.09	0.07
Hg, ppm	<0.20	<0.20	<0.20	<0.20
Cd, ppm	0	0	0	0
TOC, %	14.6	14.8	8.1	14.4
PAH	ug/L			
1-Methyl Naphthalene	<0.040	<0.048	<0.040	<0.052
2-Methyl Naphthalene	<0.034	<0.041	<0.034	<0.044
Acenaphthene	<0.041	<0.049	<0.041	<0.053
Acenaphthylene	<0.600	<0.720	<0.600	<0.780
Anthracene	<0.029	<0.035	<0.029	<0.038
Benzo(a)anthracene	<0.008	<0.010	<0.008	<0.010
Benzo(a)pyrene	<0.061	<0.073	<0.061	<0.079
Benzo(b)fluoranthene	<0.062	<0.074	<0.062	<0.081
Benzo(ghi)perylene	<0.024	<0.029	<0.024	<0.031
Benzo(k)fluoranthrene	<0.071	<0.085	<0.071	<0.092
Chrysene	<0.005	<0.006	<0.005	<0.006
Dibenzo(ah)anthracene	<0.023	<0.028	<0.023	<0.030
Fluoranthene	<0.040	<0.048	<0.040	<0.052
Fluorene	<0.071	<0.085	<0.071	<0.092
Indeno(1,2,3-cd)pyrene	<0.046	<0.055	<0.046	<0.060
Naphthalene	<0.038	<0.046	<0.038	<0.049
Phenanthrene	0.193	<0.038	<0.032	<0.042
Pyrene	0.048	<0.012	<0.010	<0.013

Table XXI - Screen Analysis of Core Samples
from Settling Ponds

Size, Mesh	Percent Passing							
	Pond 1 location 1			Pond 1 location 2			Pond 2	
	4.0-5.5'	5.5-6.5'	6.5-7.5'	3.5-4.75'	4.8-5.0'	5.0-7.0'	7.2-7.7'	7.7-9.5'
200	100.0	70.5	86.6	100.0	46.5	66.4	100.0	63.8
270	100.0	61.7	80.5	100.0	35.0	55.7	100.0	48.5
400	100.0	55.7	76.2	99.1	30.1	49.5	99.1	47.3
500	99.0	49.4	72.3	95.6	26.1	43.9	98.2	45.5

Table XXII - Inorganic and PAH Analyses of Samples
from the Settling Ponds

	Pond 1- location 1			Pond 1- location 2			Pond 2		
	4.0-5.5'	5.5-6.5'	6.5-7.5'	3.5-4.75'	4.8-5.0'	5.0-7.0'	7.2-7.7'	7.7-9.5'	
Percent Solids	34.20	65.10	68.00	34.50	64.10	64.30	25.00	69.10	
Iron, percent	3.22	2.24	0.00	3.46	0.02	1.71	3.77	1.93	
Nickel, ppm	33.84	18.68	0.00	33.25	5.35	16.01	35.53	135.06	
Barium, ppm	203.50	136.50	18.70	222.75	60.65	105.40	305.20	223.80	
Lead, ppm	30.62	20.70	0.00	28.40	0.00	0.00	15.96	70.58	
Copper, ppm	45.40	26.00	0.00	62.50	0.00	26.20	53.70	136.50	
Zinc, ppm	261.70	159.20	0.00	205.50	22.00	106.50	276.30	101.80	
Chromium, ppm	28.35	58.26	0.00	28.68	0.00	47.62	32.05	38.04	
Mercury, ppm	0.23	<0.20	0.23	<0.20	0.35	<0.20	<0.20	<0.20	
Cadmium, ppm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.70	
TOC, percent	2.71	2.89	3.56	2.60	1.53	2.50	1.77	2.78	
				PAH, ug/kg					
1-Methyl Naphthalene	77.9	223.0	318.0	78.6	170.0	216.0	102.0	397.0	
2-Methyl Naphthalene	172.0	566.0	776.0	162.0	287.0	335.0	192.0	500.0	
Acenaphthene	40.4	72.9	111.0	41.2	23.1	26.9	19.7	72.6	
Acenaphthylene	247.0	744.0	818.0	195.0	350.0	275.0	172.0	<1110	
Anthracene	67.4	210.0	266.0	64.0	87.5	126.0	65.3	232.0	
Benzo(a)anthracene	128.0	317.0	483.0	129.0	179.0	264.0	131.0	451.0	
Benzo(a)pyrene	145.0	356.0	390.0	149.0	195.0	273.0	175.0	440.0	
Benzo(b)fluoranthene	141.0	306.0	585.0	159.0	228.0	299.0	190.0	507.0	
Benzo(ghi)perylene	206.0	512.0	563.0	219.0	450.0	693.0	495.0	940.0	
Benzo(k)fluoranthrene	76.5	171.0	197.0	78.0	103.0	140.0	98.1	232.0	
Chrysene	118.0	249.0	625.0	120.0	299.0	425.0	174.0	553.0	
Dibenzo(ah)anthracene	104.0	215.0	359.0	91.4	55.7	74.1	63.7	146.0	
Fluoranthene	258.0	841.0	1380.0	231.0	526.0	670.0	336.0	1240.0	
Fluorene	42.2	118.0	148.0	42.9	61.7	81.7	63.6	175.0	
Indeno(1,2,3-cd)pyrene	156.0	300.0	380.0	160.0	208.0	307.0	206.0	356.0	
Naphthalene	260.0	735.0	1260.0	226.0	390.0	645.0	280.0	1110.0	
Phenanthrene	268.0	812.0	861.0	247.0	381.0	460.0	260.0	742.0	
Pyrene	273.0	778.0	855.0	280.0	415.0	389.0	252.0	671.0	
Total PAH	2780.4	7525.9	10375.0	2673.1	4409.0	5699.7	3275.4	8764.6	

Table XXIII –PAH Analyses of the minus 65 Mesh Portion
of the Screen Oversize

	ug/kg			
	Aug 18	Aug 23	Aug 25	Sept 6
1-Methyl Naphthalene	187.0	198.0	524.0	209.0
2-Methyl Naphthalene	184.0	210.0	794.0	211.0
Acenaphthene	44.8	38.1	239.0	38.1
Acenaphthylene	<84.0	<84.0	<84.0	<84.0
Anthracene	<84.2	<84.2	668.0	<84.2
Benzo(a)anthracene	238.0	177.0	1020.0	133.0
Benzo(a)pyrene	337.0	279.0	925.0	172.0
Benzo(b)fluoranthene	531.0	474.0	965.0	308.0
Benzo(ghi)perylene	1110.0	1030.0	1870.0	553.0
Benzo(k)fluoranthrene	204.0	170.0	455.0	103.0
Chrysene	389.0	282.0	1110.0	212.0
Dibenzo(ah)anthracene	155.0	139.0	204.0	84.1
Fluoranthene	791.0	702.0	2890.0	499.0
Fluorene	46.9	47.4	368.0	51.3
Indeno(1,2,3-cd)pyrene	490.0	468.0	951.0	239.0
Naphthalene	374.0	436.0	1480.0	475.0
Phenanthrene	607.0	554.0	2440.0	446.0
Pyrene	387.0	311.0	1840.0	210.0
Total PAH	6075.7	5515.5	18743.0	3943.5

Table XXIV - Cost Estimate for Plant to Process 100,000 yd³ per year
from the Erie Pier CDF

Items	Percentage	Costs, \$	Cumulated Costs, \$
Main Equipment			
Feeder		30,000	
Feed Conveyor		8,500	
Screen		35,000	
O'size conveyor		6,500	
Agitated Tank		15,000	
Cyclone Pump		40,000	
Cyclones		16,000	
Water Pump		30,000	
Total Equipment			181,000
Installation	40	72,400	
Installed Equip			253,400
Process piping	10	25,340	
Instrumentation	5	12,670	
Site Development	35	88,690	
Auxiliary	10	25,340	
Total Plant			405,440
Engineering	25	101,360	
Contingency	10	40,544	
Total Fixed Capital			547,344

FIGURE 1 – SCHEMATIC PROCESS FLOW SHEET

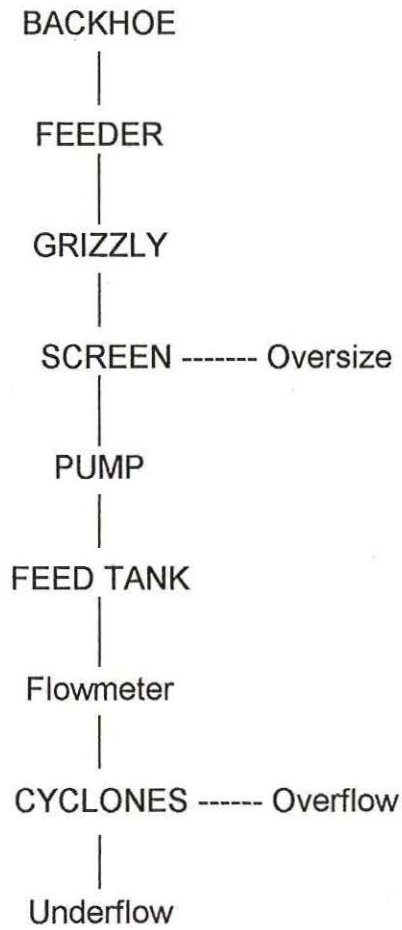




FIGURE 2 – Assembled Plant at Coleraine Prior to Shipment

St.Louis River

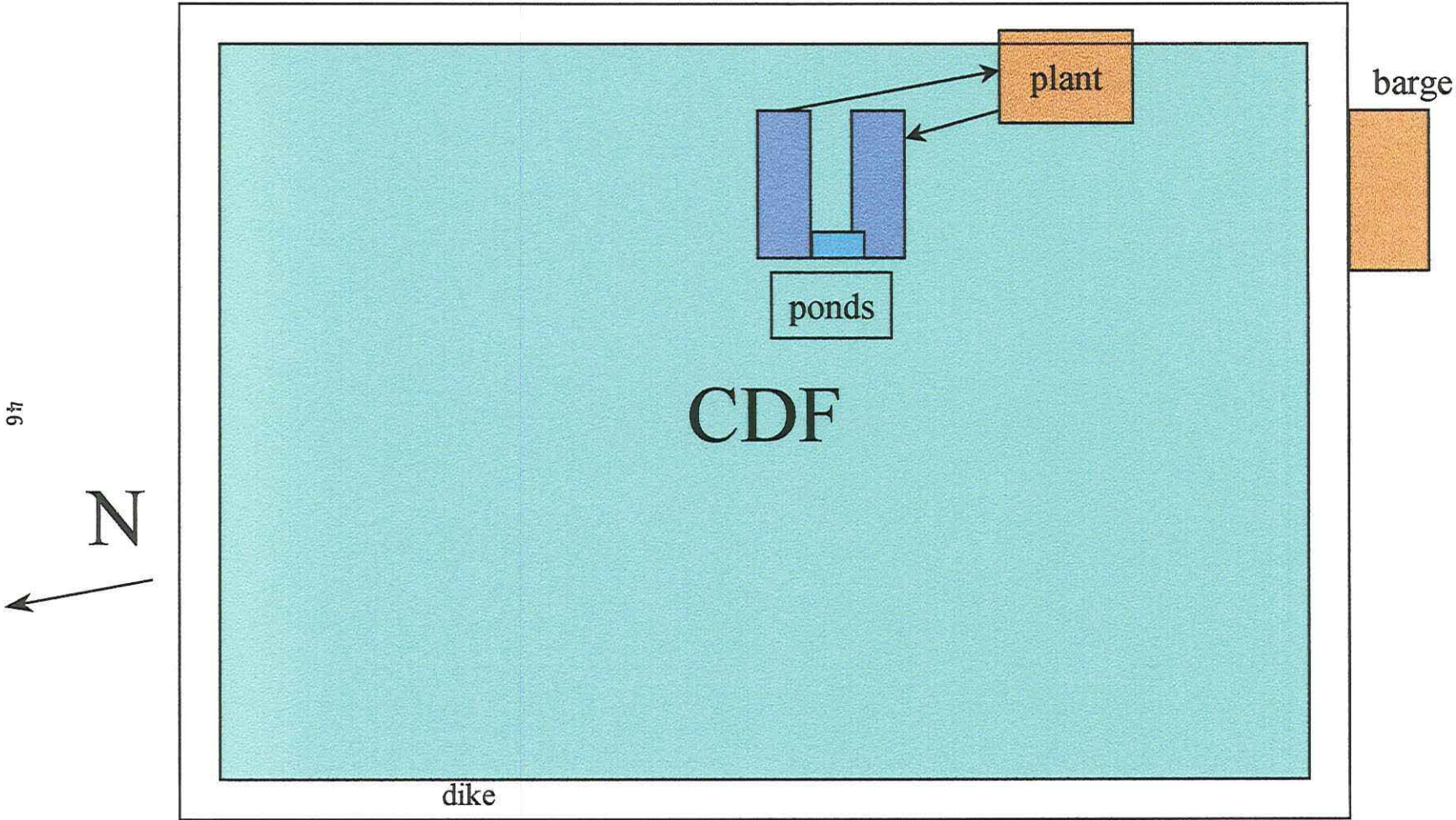


Figure 3 - Schematic of Erie Pier CDF Showing General Location of Plant and Ponds



FIGURE 4 – Screening Showing Water Sprays and Belting

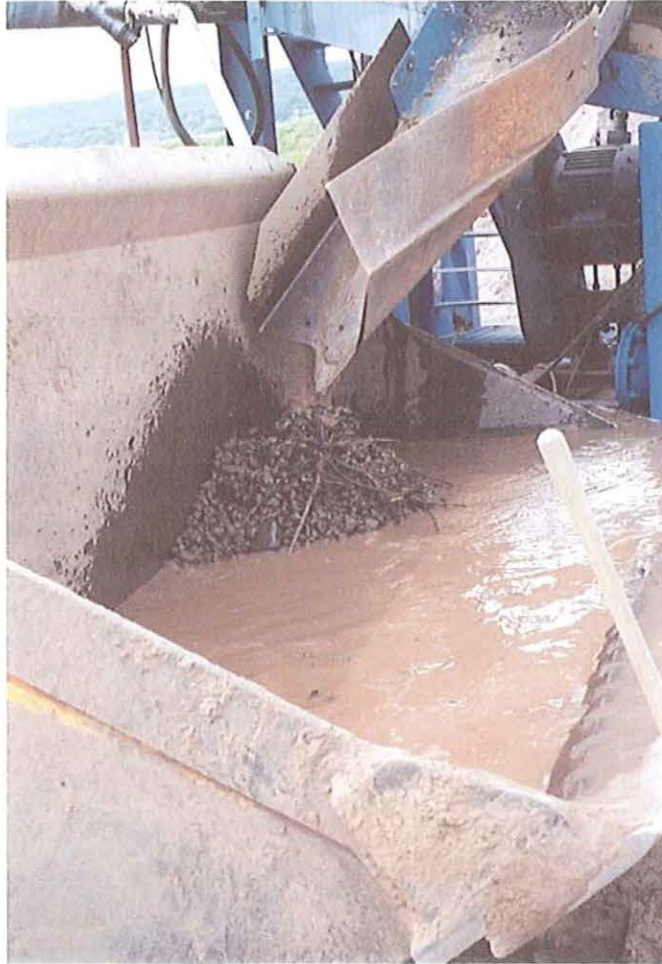


FIGURE 5 – Screen Oversize Discharging into Loader Bucket

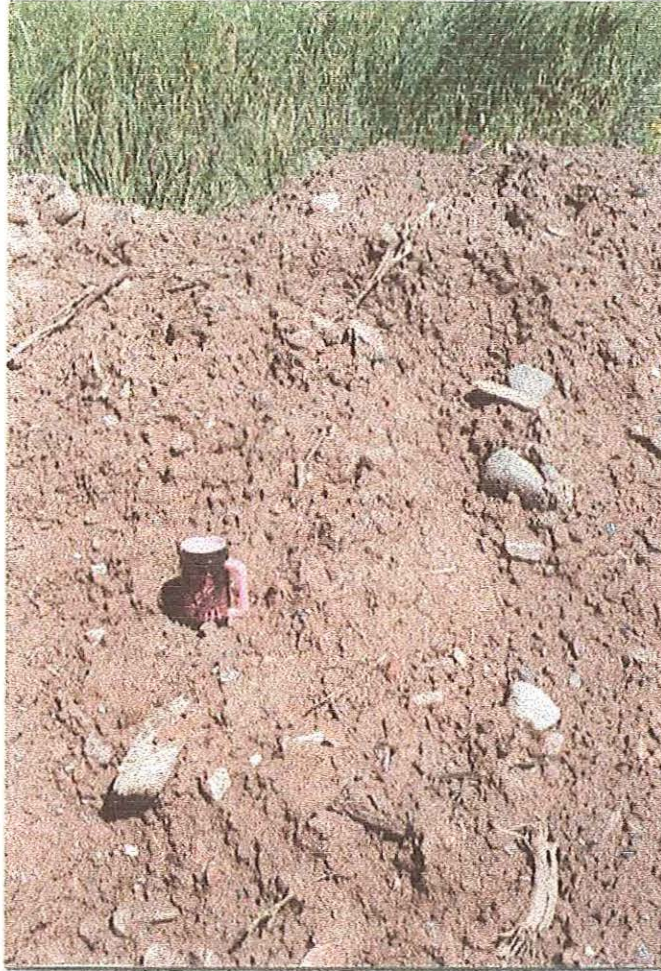


FIGURE 6 – View of Discarded Screen Oversize



FIGURE 7 – Plant in operation at CDF



FIGURE 8 – Plant with Conical Cyclone Underflow Pile



FIGURE 9 - Filtercake Discharging onto Product Belt

PLANT OVERFLOW SETTLING POOL INFORMATION ERIE PIER PROJECT: AUGUST-SEPTEMBER, 2000

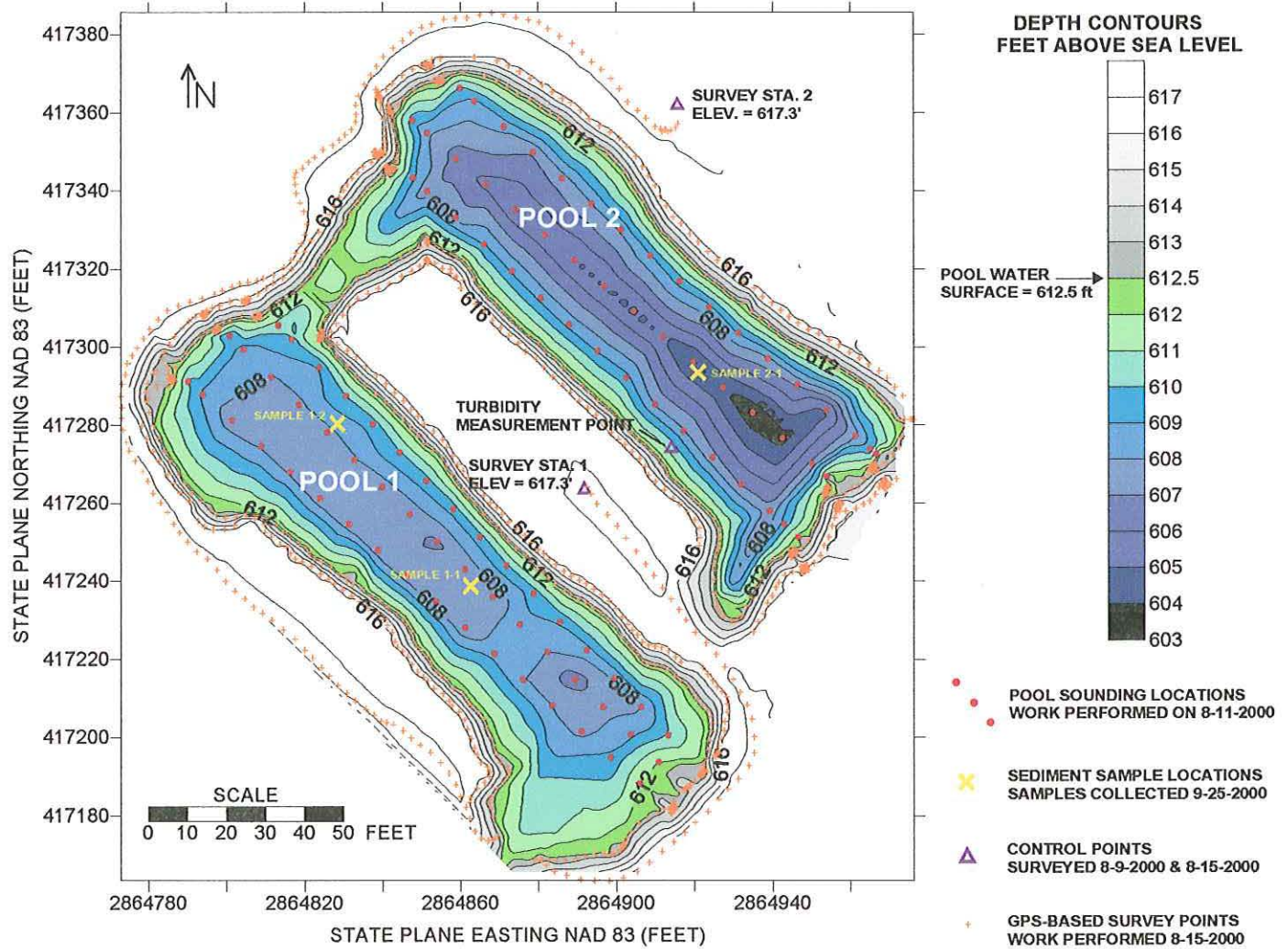


FIGURE 10

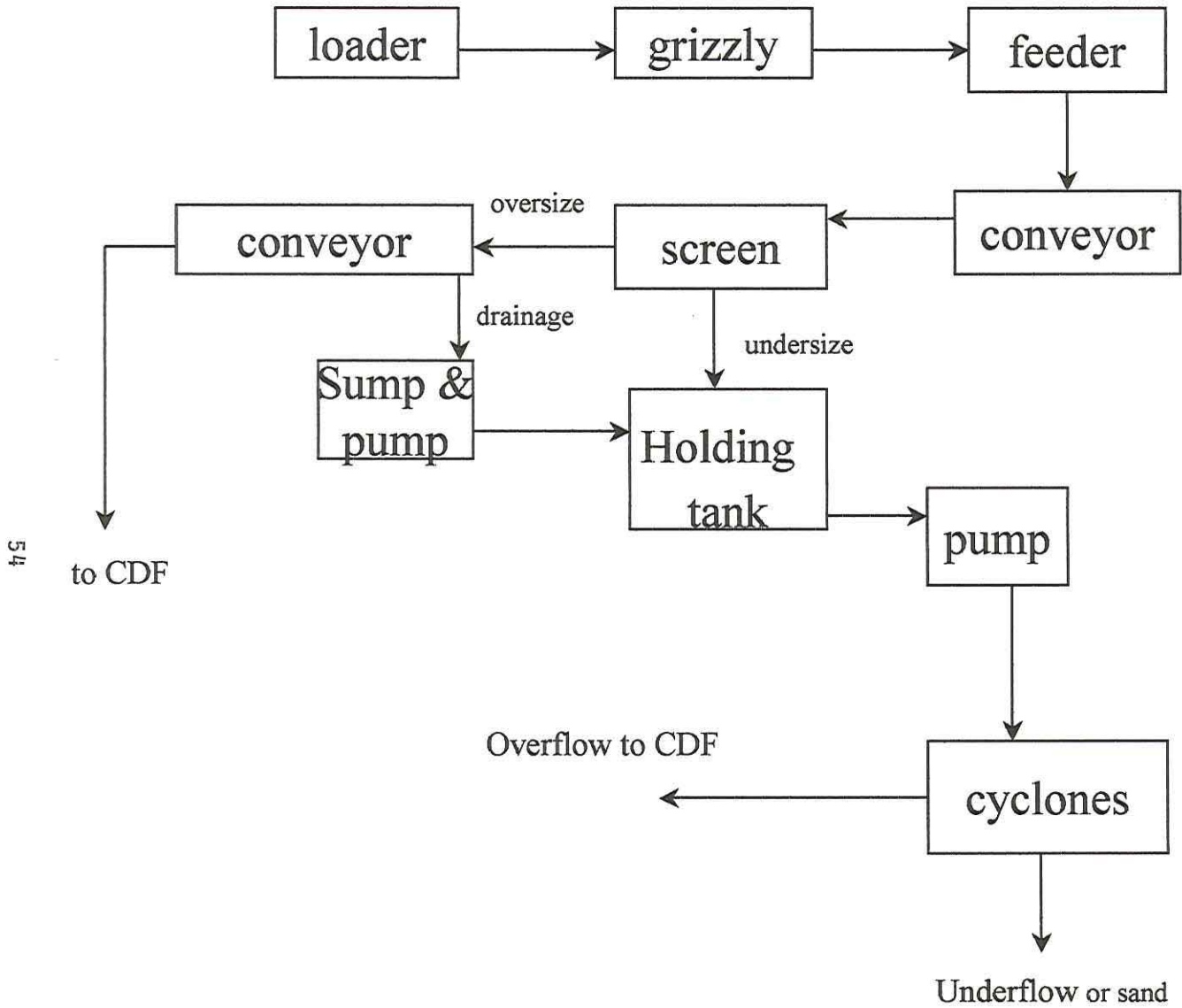


Figure 11 - Flowsheet for Treating Dredge Material and Returning Fines to the CDF

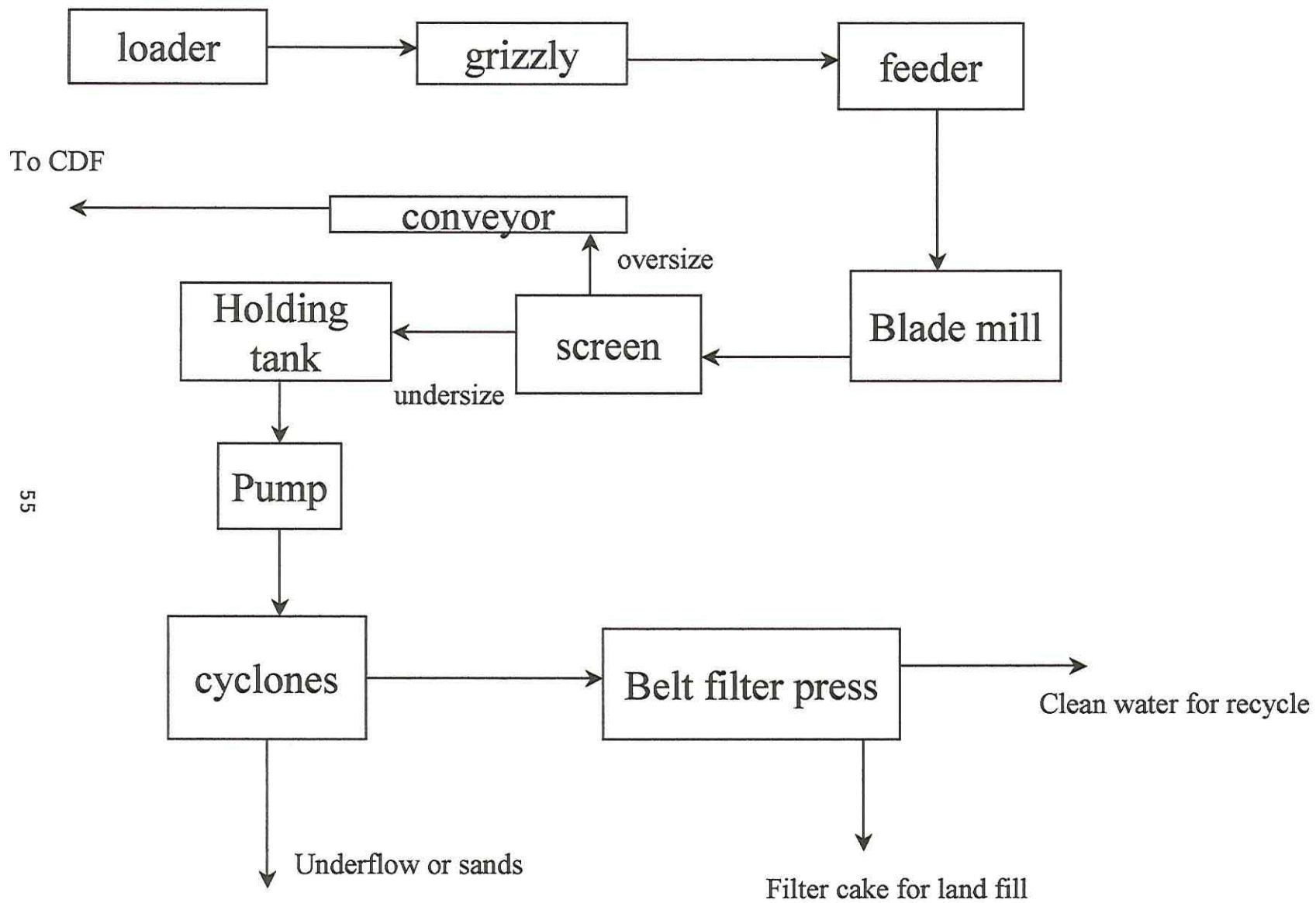


Figure 12 - Flowsheet for Treating Dredge Material without Returning Material to the CDF

APPENDIX I - COPY OF FIELD LOG BOOK

How to

5/22/00
5/25

DATE
30th/33

5/30 Greased check o.
Checked Fluids
Shoed TRACK

5/31 Greased
Checked Fluids
Refueled BACKHOE.

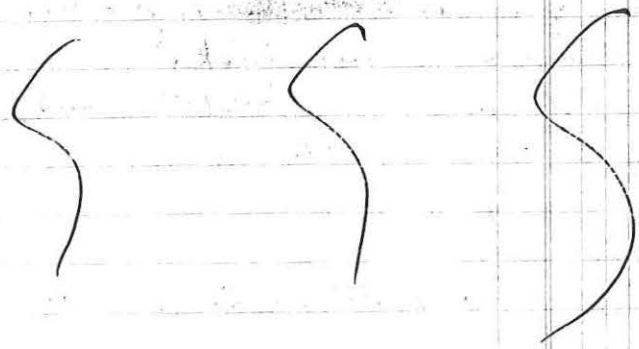
15/used
GALLONS we Figure

6/1 Forklift Training

6/2 Greased
Checked Fluids

6/5 Greased } Loader Arrived
Checked Fluids }

6/6 Greased
Check Fluids
Refueled
Shoed TRACK out.



7/6/00

Delivered plant on 2 flatbed trucks
Serviced Backhoe & loader
Brought them over from Hallett Park.

7/7

Started Assembling plant.

7/10

Plant Assembly
Serviced Backhoe

7/11

Plant Assembly
* Generator & Pump Arrived
Serviced Equip.
* left rear taillight lens
Broke on pump trailer

7/12

✓ Refueled Backhoe
Plant Assembly
Serviced Equipment

7/13

Pumping water in pond. oil & checked Equip. (hydraulics on backhoe) OK
Plug Missing in mixer tank.
Started up plant - needs work
* (Start of 13hr. Shifts)

7/17

Serviced Equip
Remodified Plant
Made New Water Baffle & Brought down.

7/18

7/19

7/20?

7/20

7/26

7/18 Serviced Equip.
installed Water Baffle
trip guard protectors
Ran plant with minor water leaks
(Ran Good)

7/19 Serviced Equip.
Repair minor water leaks
Fix feed hopper

7/20 ? Serviced Equip.
installed Underdrain Trough
fixed side boards for belts 1 + 2
installed plate by feed hopper
Ran plant for 2 hours + sampled.
✓ refueled backhoe

7/20 Replaced Broken Fan on SALA Pump Motor
RAN PLANT for 3 1/2 hrs.

7/20 Replaced 4 Fuses on the
Feed pump. Ran Fan 2 1/2 hrs and
the welds on the lower deck
of screen broke. Will have to
re-weld tomorrow.

backhoe)
OK

7/27 Serviced Equip.
Moved To A 90 degree (feed Belts)
Fixed Belts on Mixing tank
Spray Bars installed

3
8-~~1~~-00

8-4-00

~~8-5-00~~

7/28 Fixed Cribbing on Belt one
Fixed Bolt in backhoe
Piled up bank and set feeder + hopper
Welded railing on Cyclone Sample point

7/31 ~~Fixed~~ Backhoe
Fixed Broken wire on feeder
Reversed Motor on Pump.
Hauled Seed.
Ran for 1 1/2 hrs.

8-5-
~~8-5-00~~

8/1 Fixed hopper on belt 1
Serviced Equip
~~Fixed~~ Backhoe with fuel
RAN 4 hrs + Sampled

8-7-00

8/2 Greased Backhoe
Ran + Sampled 6 hrs.
Rebuild Feed pile

8-8-00

3
8-~~3~~-00 SERVICED BACKHOE, GENERATOR & WATER PUMP
RAN PLANT WITH NO SUCCESS MOTOR RUNNING
HOT. (52-56 AMPS) WAITING FOR SMALLER
(7/2 in) pulley to put on. TOOK PUMP APART.

8-4-00

~~8-4-00~~

CHANGED MIXER SWITCH AWAY FROM WATER
AREA. NEW PUMP PARTS THAT CAME IN WERE
NOT THE RIGHT ONES. LOCATED CORRECT PUMP
PARTS IN DUCOTA AND INSTALLED THEM.
PUMP NOW DRAWING 33-36 AMPS AND NOT KICKING
OUT. RAN PLANT FOR 1 1/2 HOURS WITH NO
PROBLEMS.

8-5-00
~~8-5-00~~

SERVICED BACKHOE, FRONT END LOADER, GENERATOR
& LAKE WATER PUMP. ADDED OIL TO GENERATOR.
CHANGED SCREEN SWITCH WITH AN NEW BOX.
RAN PLANT FOR 5 HRS WITH NO PROBLEMS.

8-7-00

WORK ON WEIGHTMETER ON #2 BRECT.
CLEANED SCREEN AND MIXING TANK OUT,
RAN PLANT 5 1/2 HOURS. NO PROBLEMS

8-8-00

FIXED CLAY BALL SHOOT. DRILLED AND PUT
IN BOLTS TO HOLD IT TOGETHER. ART ADJUSTED
WEIGHTMETER. WELDED 1/2 VALVE ON
CIRCULATING PIPE TO TAKE FEED SAMPLER.
HUNG BLACK RUBBER BRECTING ON SPRAY
BARS TO HOLD CLAY BALL DOWN ON SCREEN.
ADDED WATER SPOUTS ON SPRAYS TO
STAGGER WATER SPRAY POINTS. (OVAR)

8-8-00 PUT NEW BELTING ALL THE WAY
IN FRONT OF SCREEN DISCHARGE END
FOR PROTECTION FROM ROCKS COMING OFF
OF SCREEN. CRANED CLAY BUILD UP OF
TAIL PULLEYS OF #1 & #2 FEED BELTS.
FUEL TRUCK IS HERE 10:30 A.M.
SHOT PLANT DOWN AT 2:30 FOR BAD
STORM. START PLANT AGAIN AT 3:15.
RAN PLANT FOR 4 1/2 - 5 HRS. WITH
NO PROBLEMS.

8-10-00

8
8-9-00

TOOK TURBIDITY SAMPLE. SERVICED LOADER
AND BACKHOE. CHECKED OIL ON GENERATOR
AND PUMP. STOPPED AT MENARDS AND GOT
POWER CORD (50 FT) FOR FLOW METER. STARTED
PLANT AT 9:25 A.M. STOP TO
MAKE ROOM ON PRODUCT PILE WITH
BACKHOE. START PLANT AT 11:15 A.M.

8-11-00

1/2 FEED BELT KICKED OUT 2 TIMES DUE
TO HEAVY FEED RATE. LET COOL OFF
AND SHOUVE EXCESS AND STARTED GOOD
AGAIN BOTH TIMES

8-12-00

(TOTAL RUNNING TIME 7 HRS)

8-14-00

END
OFF
D OF
2 BELTS.
AD
HT 3:15.
WITIT

8-10-00 Wiper on Grizzly
Valve on Mixing Tank
Moved Product Pile
ReArrange Feed Pile
Greased #2 Belt
Took Turbidity Sa.
4 hrs Running - Ran Good

8-11-00 Moved Product Pile +
Added more Feed to Pile. - Per Blair
Checked depth in Both Ponds.
Larry had Small Boat.
Loader leaking Anti-Freeze out of heater Core.
Contracted Ed + Service man coming out
on Mon. Will be able to run it enough to
move Clay balls on Sat. (Needs Anti Freeze.)
Will Bring + Add. on Sat.
Surveyed Ponds with Larry

ED LOADER
ERRATOR
AND GOT
STARTED
D
TH
M

8-12-00 Turbidity Sa.
~~But~~ Built up platform for Backhoe
✓ fluids
Sped up #2 Belt -
(6 hrs Running time)

DUB
OFF
GOOD

8-14-00 Turbidity Sa Am + Pm.
Moved Product
" Feed.
5 1/2 hrs. Running
Bad Storm

* Anti Freeze leak Fixed in loader - Corp People
Came + disconnect
Heater Core

8-17-00

8/15

✓ fluids in Backhoe
Stocked Feed
Fueled Backhoe
Moved pump To 2nd pond.
Got 2 more Sections of hose for pump From Ziegler's
Test Pump - 1300 RPM's OK
Moved pile Away from Ponds (John)

8/16

*

✓ fluids
Pumping Water from #2 pond
Screen Making noise every once in a while
Don't know if its coming from Motor,
Bearing or Belts
Turbidity Sample
Greased Counter weight.
Added ~ 15 gal of fuel to pump.
Greased other Side of Screen
Moved Product pile, to make room.
6 hrs Cont. Running

8-18-00

8-17-00

CHECK OIL ON GENERATOR. CHECKED FLUIDS AND
GRASED FRONT END LOADER AND BACK HOLE.
CHECKED OIL IN POND PUMP. MOVED MATERIAL
WITH FRONT END LOADER CLOSE TO BACK HOLE.
CHECKED A.M.P. DRAW ON SCREEN DRIVE MOTOR.
DRAWING WITHIN RECOMMENDED POWER RANGE.
CLEAN STICKS AND DEBRIS FROM SCREENS.
TOOK 9:00 A.M. TURBIDITY SAMPLE
STARTED PLANT AT 10:15.

SCREEN THUMPING NOISE IS CAUSED BY OVERLOAD
OF MATERIAL ON FEED END, LET CLEAN OUT
FOR 2-3 MINUTRS AND IT IS FINE.

BELTS ARE SLIPPING BAD ON SCREEN DRIVE
MOTOR. NEW BELTS ARE TO BE PICKED
UP TOMMORROW FOR INSTALLATION.

RAN PLANT FOR 5 1/2 HRS.

8-18-00 CLEAN SCREEN DRCK. CHECK OIL IN POND PUMP LOW
(ADDED 1 1/2 QTS). MOVE PRODUCT PILE BACK
WITH BACK HOLE. SERVICED BACK HOLE AND FRONT END
LOADER (OIL LEAK DEVELOPED IN REAR OF LOADER)
KEEPING AN EYE ON THAT DAY BY DAY. MOVE SECOND
SAMPLE FEED PILE WITH FRONT END LOADER UP TO
BACK HOLE TO START RUNNING SCREEN PLANT AGAIN.
RAN PLANT UNTIL 3:15. SHUT DOWN TO WORK
ON SCREEN DRIVE BELTS AND CYCLONE FEED
PUMP PACKING. (5 HRS RUNNING TIME)

OPEN

8-21-
DID NOT

8-22-C

8-18-00 NRRI CREW CAME DOWN FROM DULUTH TO
SEE OPERATION. 1/2 HR. OF WALK AROUND
AND PICTURE TAKING. THEY WATCHED PLANT
RUN FOR ABOUT 45 MINUTES TOOK ALOT OF
PICTURES AND LEFT ABOUT 11:00 A.M.

8-19-00

DID NOT RUN PLANT. DOWN FOR MAINTENANCE

INSTALL NEW DRIVE BELTS ON SCREEN
GREASE COUNTER WRIGHT DRIVE BEARINGS (BOTH SIDES)

8-22-C

BRING DOWN AND UNLOAD BELT SIZER SUMP

PUT WATER PUMP FROM HOLDING POND BACK DOWN
TO RIVER.

REPACK CYCLONE FEED PUMP.

SERVICED BACKHOE + FRONT END LOADER

BROUGHT OIL CRACK TO BIG JOHN'S ATTENTION
HE SAID TO CONTINUE TO OPERATE BUT
TO CHECK OIL OFTEN.

8-24-00

ADD FUEL TO FRESH WATER PUMP (FULL)

CLEAN ALL STICKS AND DEBRIS FROM BOTH
DECKS OF SCREEN.

X

8-21-00
DID NOT RUN PLANT

Set up BELT PRESS

17A TO
AROUND
PLANT
A LOT OF
1.

8-22-00

SET UP BACK PRESS UNTIL 12:30

RAN PLANT FOR 4 HRS.

TRUCK

INSTALLED OVERRFLOW SUMP.

(BOTH SIDES)

8-22-00

WELD OFF SHOOT ON FEED SUMP
FOR BELT FILTER.

UMP

K STAIN

CLEAN OFF DEBRIS AND STICKS OFF SCREENS.
PUT CRIBBING AND ROCKS UNDER FEED SUMP
TO PREVENT IT FROM WASHING OUT, CUT
LOGS WITH CHAIN SAW FOR CRIBBING.
DID ELECTRICAL REPAIR ON BELT FILTER
TRAILER, MOVED FEED PILE FOR START
UP IN MORNING, GREASED ALL
EQUIPMENT, RAN PLANT 5 HOURS

2

STONK
BUT

8-24-00 ✓ Equipment

Turbidity Sa.

Training on Belt press

Ran 4 hours

Moved product & feed.

X Refueled everything but green tank.

(FULL)

BOTH

- | | | | |
|---------|---|--------|------------------|
| 8/25/00 | Turbidity Sa. + Moved Feed
Start plant + Press 9:15
Ran 3 hours + Screen quit.
Bearing Seized? | 9-1-00 | C
C
O
U |
| 8/26/00 | Take Screen apart, + plumbing
Bearing Bad on platform Bed.
Couldnt get Shaft out, had to cut
out Bearings | 9-2-00 | C
U
A
C |
| 8/28/00 | Assembled Bearing + Screen | | |
| 8/29/00 | Ran 6 hours
Media Day, Corps people, Jim Oberstar
✓ Equipment | 9-5-00 | |
| 8/30/00 | Ran 3 hours
Greased loader + Added oil + Anti Freeze
✓ Generator added oil.
* Shovel is located by fuel gauge in Generator
Went + picked up more oil for generator
at Ziegler.
Hauled Feed for next crew. | | |
| 8/31/00 | RAN 3 HOURS
DEMONSTRATION for Mike Lolich + JASON DAVIS
moved The rest of The feed Pile
moved The Product Pile | | |

9-1-00 INSTALL VARIABLE SPEED CONTROL FOR FILTER CAKER,
C CAME IN BOX WITHOUT FUSE AND MOTOR RESISTOR.
(Lucky we had spare ones on BAD CONTROL)
SERVICED EQUIPMENT, CHECKED OIL AND FUEL
ON ALL EQUIPMENT, RAN PLANT UNTIL 3:30. BAD
VIBRATION IN SALA Pump. (PROBABLY A ROCK).

9-2-00 SERVICED MOBIC EQUIPMENT, ADDED OIL TO FRONT END
LOADER. (CRACKING SOUND) TOOK DISCHARGE PIPE OFF
SALA pump. FOUND ROCK IN IMPPELLER (CAUSE OF NOISE
AND VIBRATION). PUT BACK TOGETHER IT WORKS
GOOD AGAIN RAN PLANT 6 1/2 HRS RAN GOOD!

9-5-00 WANT TO ZENITH RENTAL (ZIGLAR) TO
GET MORE OIL FOR FRONT END LOADER
CLEANED DEBRIS OFF BOTH DECKS OF SCREEN,
GREASED BOTH SIDES DRIVE BEARINGS ON
SCREEN. UNPLUGGED FRONT WATER SCREEN
FOR BREATHER FILTER. SHOOKED OUT OIL
SUMP, SAND ALMOST TO 4" FARD LINE
FOR FILTER BELT,
PUT UHOU ON FOR CHANNEL KOLCH 3
2 HRS. RAN PLANT FOR 5 HRS,
RAN GOOD!!
START OF PLANT DECAVED 1 HR
DUE TO ZENITH RENTAL SERVICING
BACK HOR.

9-6-00 HAULING FEED FROM EAST SAMPLER POINT
ON FAR EAST SIDE OF DISPOSAL SITE.

CLEANED DEBRIS OFF BOTH DECKS OF SCREENS
SERVICED CONDRM AND BACKHOLE.

RAN PLANT FOR 4 HRS. RAN GOOD.

FOUNDED UP FRONT END CONDRM AND BACKHOLE.
MOVED PRODUCT PILE ON CYCLONE DISCHARGE
PIPE. MOVED PRODUCT PILE ON END
OF FILTER CAKER BELT.

HAULING MORE SAMPLER PILE FROM EAST SITE
TO BACKHOLE FOR NEXT CREW.

9-7-00 ✓ fluids +
Started hauling feed from Northeast
corner of diked + loader started
leaking anti-freeze + oil (Big Time)
Didn't run plant
Moved Underflow Sand to be used for feed.
Started cleaning up belt press.
Mechanic checked out loader, needs to
be hauled to shop.

9-8-00 Reassemble Belt press + hoses,
Ready to go.

Moved Sump out of Oilflow hole +
realigned pipe to be used without
belt press.

Hauled fuel oil to generator + pump. Trying
to use up fuel out of green tank.

9-11-00

9-12-00

9-13-00

ST
FR.
FRANK

9-11-00 Ran 3 Hrs.
Move in NEW Feed
Roll up HOSES

Bring 6 Hoses Back To ZIEGLER

ACK HORN
USCHARGE
END

9-12-00 Ran 5 Hrs
Move NEW Feed
Help Hookup Belt Sizer Trailer

ST STAK

9-13-00 Ran 4 1/2 Hrs
Picked up Blue Sump PIPE Wires
Drain Fuel Oil Tank

the
ted
Time)
in feed,
t

Trying
ink.

DATE, 5/16/00

BACKHOE Delivered 8:15 A.M.

MAINTANCE DONE.

Portable John Here 10:30 A.M.

5/17/00 Grease 307 CAT

Check Fluids everything Good!

Fuel oil Delivered 300 gallon Tank

~~and 100 gallon Tank~~

Bolt for Hoist. Missing (replaced it) 3 HR Delay

5/18/00 ~~Backhoe Delivered 8:15 A.M.~~

Refueled AT END OF DAY

oil check good

Hydraulics good

Grease Bucket FINE

5/19/00

Greased Bucket AND Rotation

part Check Fluids good shape

Hydraulics a little low

Contacted BIRK matter

TAKEN care of: 6

DATE ^{5/}22/00
22/25

5/20/00 Greased zirc's
Cleared TRACKS
Check Huides

5/23/00 Checked Fluids
Refueled

5/29/00 Greased
Check Fluids
Cleared TRACK
Washed windows

5/25/00 Grease
Check Fluids

DATE
30th/3

5/30 Gr
C
S

5/31 C
C
X

6/1

6/2 C
C

6/5 C
C

6/6 C
C
P
S

APPENDIX II - LABORATORY PCB ANALYSIS REPORT



MINNESOTA VALLEY TESTING LABORATORIES, INC.

1126 N. Front St. - New Ulm, MN 56073 - 800-782-3557 - Fax 507-359-2890
1411 S. 12th St. - Bismarck, ND 58502 - 800-279-6885 - Fax 701-258-9724
710 S. 14th St. - Grand Forks, ND 58201 - 800-272-7645 - Fax 701-772-0028
35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4553

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 21 Nov 2000

Date Analyzed: 2 Jan 2001

Sample Description: FEED 1

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	< 20.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 138 %

DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 131 %

RI = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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710 S. 14th St. - Grand Forks, ND 58201 - 800-272-7645 - Fax 701-772-0028
35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4554
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 21 Nov 2000
Date Analyzed: 2 Jan 2001

Sample Description: UNDERFLOW 1

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	35.1	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 114 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 114 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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710 S. 14th St. - Grand Forks, ND 58201 - 800-272-7645 - Fax 701-772-0028
35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4555

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 21 Nov 2000

Date Analyzed: 2 Jan 2001

Sample Description: OVERFLOW 1

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	45.3	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	104.0	ug/Kg	30.0
PCB-1260	85.3	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 180 %

DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 135 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4556
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 21 Nov 2000
Date Analyzed: 2 Jan 2001

Sample Description: FEED 2

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	23.8	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 149 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 151 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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710 S. 14th St. - Grand Forks, ND 58201 - 800-272-7645 - Fax 701-772-0028
35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4557

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 21 Nov 2000

Date Analyzed: 2 Jan 2001

Sample Description: UNDERFLOW 2

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	< 20.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 121 %

DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 122 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4558
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRT BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 21 Nov 2000
Date Analyzed: 2 Jan 2001

Sample Description: OVERFLOW 2

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	64.1	ug/Kg	30.0
PCB-1260	54.9	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 155 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 141 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4559

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 21 Nov 2000

Date Analyzed: 2 Jan 2001

Sample Description: FEED 3

PCB's	Result	Units	RI
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	< 20.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 124 %

DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 129 %

RI = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4560
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 21 Nov 2000
Date Analyzed: 2 Jan 2001

Sample Description: UNDERFLOW 3

Table with 3 columns: PCB's, Result, Units RL. Rows include PCB-1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, PCB-1262, PCB-1268.

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 117 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 121 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVT L Laboratory Management..



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4561

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 21 Nov 2000

Date Analyzed: 2 Jan 2001

Sample Description: OVERFLOW 3

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	64.3	ug/Kg	30.0
PCB-1260	56.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 141 %

DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 121 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4562
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRT BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 21 Nov 2000
Date Analyzed: 2 Jan 2001

Sample Description: FEED 4

Table with 3 columns: PCB's, Result, Units RL. Rows include PCB-1016 through PCB-1268 with results like < 40.0 ug/Kg and 26.1 ug/Kg.

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 142 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 145 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4563

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 28 Nov 2000

Date Analyzed: 22 Dec 2000

Sample Description: UNDERFLOW 4

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	< 20.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 62 %

DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 53 %

Comment: PCB surrogate recovery out of acceptable range
due to matrix interference.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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710 S. 14th St. - Grand Forks, ND 58201 - 800-272-7645 - Fax 701-772-0028
35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4564
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 28 Nov 2000
Date Analyzed: 22 Dec 2000

Sample Description: OVERFLOW 4

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	50.1	ug/Kg	30.0
PCB-1260	50.2	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 124 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 89 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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710 S. 14th St. - Grand Forks, ND 58201 - 800-272-7645 - Fax 701-772-0028
35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4565

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 28 Nov 2000

Date Analyzed: 22 Dec 2000

Sample Description: FEED 5

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	< 20.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 127 %

DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 113 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

1126 N. Front St. - New Ulm, MN 56073 - 800-782-3557 - Fax 507-359-2890
1411 S. 12th St. - Bismarck, ND 58502 - 800-279-6885 - Fax 701-258-9724
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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4566
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRJ BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 28 Nov 2000
Date Analyzed: 22 Dec 2000

Sample Description: UNDERFLOW 5

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	< 20.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 73 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 64 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4567

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRR1 BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 28 Nov 2000

Date Analyzed: 22 Dec 2000

Sample Description: OVERFLOW 5

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	61.8	ug/Kg	30.0
PCB-1260	56.8	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 118 %

DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 95 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4568
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 28 Nov 2000
Date Analyzed: 22 Dec 2000

Sample Description: FEED 6

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	< 20.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 132 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 114 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4569

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRJ BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 28 Nov 2000

Date Analyzed: 22 Dec 2000

Sample Description: UNDERFLOW 6

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	< 20.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 110 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 99 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4570
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 28 Nov 2000
Date Analyzed: 22 Dec 2000

Sample Description: OVERFLOW 6

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	29.3	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 107 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 92 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4587

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 29 Nov 2000

Date Analyzed: 26 Dec 2000

Sample Description: FEED 7

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	42.8	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 115 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 92 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4588
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 29 Nov 2000
Date Analyzed: 26 Dec 2000

Sample Description: UNDERFLOW 7

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	< 20.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 120 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 96 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management..



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Report Date: 5 Jan 2001

Lab Number: 00-S4589

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 29 Nov 2000

Date Analyzed: 26 Dec 2000

Sample Description: OVERFLOW 7

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	134.0	ug/Kg	30.0
PCB-1260	81.9	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 163 %

DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 88 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4590
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 29 Nov 2000
Date Analyzed: 26 Dec 2000

Sample Description: BL-00885

Table with 3 columns: PCB's, Result, Units RL. Rows include PCB-1016, PCB-1221, PCB-1232, PCB-1242, PCB-1248, PCB-1254, PCB-1260, PCB-1262, PCB-1268.

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 83 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 61 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVT L Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4591

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 29 Nov 2000

Date Analyzed: 26 Dec 2000

Sample Description: BL-00886

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	< 20.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 114 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 98 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4592
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 29 Nov 2000
Date Analyzed: 26 Dec 2000

Sample Description: BL-00887

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	38.8	ug/Kg	30.0
PCB-1260	27.5	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 93 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 68 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4593

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRJ BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 29 Nov 2000

Date Analyzed: 26 Dec 2000

Sample Description: UNDERFLOW 9

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	< 30.0	ug/Kg	30.0
PCB-1260	216.0	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 91 %

DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 72 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4594
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8082

Date Extracted: 29 Nov 2000
Date Analyzed: 26 Dec 2000

Sample Description: OVERFLOW 9

PCB's	Result	Units	RL
PCB-1016	< 40.0	ug/Kg	40.0
PCB-1221	< 40.0	ug/Kg	40.0
PCB-1232	< 40.0	ug/Kg	40.0
PCB-1242	< 40.0	ug/Kg	40.0
PCB-1248	< 40.0	ug/Kg	40.0
PCB-1254	33.2	ug/Kg	30.0
PCB-1260	33.9	ug/Kg	20.0
PCB-1262	< 30.0	ug/Kg	30.0
PCB-1268	< 30.0	ug/Kg	30.0

2,4,5,6-TETRACHLO-m-XYLENE (SURROGATE) RECOVERY: 54 %
DECACHLOROBIPHENYL (SURROGATE) RECOVERY: 40 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.

APPENDIX III - LABORATORY PAH ANALYSIS REPORT



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4553
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: FEED 1

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	158	ug/Kg	2.84
2-Methyl Naphthalene	292	ug/Kg	3.26
Acenaphthene	26.5	ug/Kg	2.80
Acenaphthylene	91.3	ug/Kg	84.0
Anthracene	28.1	ug/Kg	8.42
Benzo(a)anthracene	55.5	ug/Kg	0.86
Benzo(a)pyrene	60.8	ug/Kg	2.60
Benzo(b)fluoranthene	80.1	ug/Kg	2.96
Benzo(ghi)perylene	81.6	ug/Kg	2.94
Benzo(k)fluoranthrene	29.9	ug/Kg	2.74
Chrysene	57.7	ug/Kg	0.94
Dibenzo(ah)anthracene	5.70	ug/Kg	2.66
Fluoranthene	395	ug/Kg	7.06
Fluorene	31.8	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	92.5	ug/Kg	2.34
Naphthalene	273	ug/Kg	3.06
Phenanthrene	182	ug/Kg	4.36
Pyrene	162	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

1126 N. Front St. - New Ulm, MN 56073 - 800-782-3557 - Fax 507-359-2890
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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4553

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 1 Dec 2000

Dilution Factor: 2

Sample Description: FEED 1

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL

=====

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Comment: PCB surrogates out of acceptable range due to matrix interference.
PAH surrogate data not available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4554

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 1 Dec 2000

Dilution Factor: 2

Sample Description: UNDERFLOW 1

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	214	ug/Kg	2.84
2-Methyl Naphthalene	431	ug/Kg	3.26
Acenaphthene	29.8	ug/Kg	2.80
Acenaphthylene	240	ug/Kg	84.0
Anthracene	49.7	ug/Kg	8.42
Benzo(a)anthracene	26.2	ug/Kg	0.86
Benzo(a)pyrene	34.6	ug/Kg	2.60
Benzo(b)fluoranthene	38.8	ug/Kg	2.96
Benzo(ghi)perylene	81.9	ug/Kg	2.94
Benzo(k)fluoranthrene	13.0	ug/Kg	2.74
Chrysene	29.4	ug/Kg	0.94
Dibenzo(ah)anthracene	46.3	ug/Kg	2.66
Fluoranthene	460	ug/Kg	7.06
Fluorene	110	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	12.8	ug/Kg	2.34
Naphthalene	635	ug/Kg	3.06
Phenanthrene	222	ug/Kg	4.36
Pyrene	121	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4554
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRR1 BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: UNDERFLOW 1

POLYNUCLEAR AROMATIC HYDROCARBONS
=====

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4555
Work Order #: 22-548
Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: OVERFLOW 1

POLYNUCLEAR AROMATIC HYDROCARBONS

=====	Result	Units	RL
=====	=====	=====	=====
1-Methyl Naphthalene	159	ug/Kg	2.84
2-Methyl Naphthalene	425	ug/Kg	3.26
Acenaphthene	42.2	ug/Kg	2.80
Acenaphthylene	336	ug/Kg	84.0
Anthracene	106	ug/Kg	8.42
Benzo(a)anthracene	221	ug/Kg	0.86
Benzo(a)pyrene	247	ug/Kg	2.60
Benzo(b)fluoranthene	291	ug/Kg	2.96
Benzo(ghi)perylene	337	ug/Kg	2.94
Benzo(k)fluoranthrene	126	ug/Kg	2.74
Chrysene	207	ug/Kg	0.94
Dibenzo(ah)anthracene	42.9	ug/Kg	2.66
Fluoranthene	1010	ug/Kg	7.06
Fluorene	113	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	355	ug/Kg	2.34
Naphthalene	478	ug/Kg	3.06
Phenanthrene	617	ug/Kg	4.36
Pyrene	518	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-84555

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 1 Dec 2000

Dilution Factor: 2

Sample Description: OVERFLOW 1

POLYNUCLEAR AROMATIC HYDROCARBONS

Result	Units	RL
=====	=====	=====

Comment: PCB surrogates out of acceptable range due to matrix interference.
PAH surrogate data not available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4556

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRR1 BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 1 Dec 2000

Dilution Factor: 2

Sample Description: FEED 2

POLYNUCLEAR AROMATIC HYDROCARBONS

=====	Result	Units	RL
=====	=====	=====	=====
1-Methyl Naphthalene	112	ug/Kg	2.84
2-Methyl Naphthalene	212	ug/Kg	3.26
Acenaphthene	36.4	ug/Kg	2.80
Acenaphthylene	113	ug/Kg	84.0
Anthracene	27.0	ug/Kg	8.42
Benzo(a)anthracene	78.9	ug/Kg	0.86
Benzo(a)pyrene	88.0	ug/Kg	2.60
Benzo(b)fluoranthene	98.7	ug/Kg	2.96
Benzo(ghi)perylene	110	ug/Kg	2.94
Benzo(k)fluoranthrene	39.0	ug/Kg	2.74
Chrysene	79.7	ug/Kg	0.94
Dibenzo(ah)anthracene	11.0	ug/Kg	2.66
Fluoranthene	405	ug/Kg	7.06
Fluorene	39.0	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	119	ug/Kg	2.34
Naphthalene	177	ug/Kg	3.06
Phenanthrene	247	ug/Kg	4.36
Pyrene	216	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTl Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4556
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: FEED 2

POLYNUCLEAR AROMATIC HYDROCARBONS
=====

Result Units RL
=====

Comment: PCB surrogates out of acceptable range due to matrix interference.
PAH surrogate data not available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4557
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: UNDERFLOW 2

POLYNUCLEAR AROMATIC HYDROCARBONS	Result	Units	RL
1-Methyl Naphthalene	138	ug/Kg	2.84
2-Methyl Naphthalene	235	ug/Kg	3.26
Acenaphthene	22.5	ug/Kg	2.80
Acenaphthylene	< 84.0	ug/Kg	84.0
Anthracene	15.1	ug/Kg	8.42
Benzo(a)anthracene	23.3	ug/Kg	0.86
Benzo(a)pyrene	28.1	ug/Kg	2.60
Benzo(b)fluoranthene	31.9	ug/Kg	2.96
Benzo(ghi)perylene	19.4	ug/Kg	2.94
Benzo(k)fluoranthrene	11.4	ug/Kg	2.74
Chrysene	30.2	ug/Kg	0.94
Dibenzo(ah)anthracene	5.68	ug/Kg	2.66
Fluoranthene	185	ug/Kg	7.06
Fluorene	20.2	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	34.8	ug/Kg	2.34
Naphthalene	202	ug/Kg	3.06
Phenanthrene	110	ug/Kg	4.36
Pyrene	73.3	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4557

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: UNDERFLOW 2

POLYNUCLEAR AROMATIC HYDROCARBONS
=====

Result Units RL
=====

p-TERPHENYL (SURROGATE) RECOVERY: 92 %
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4558

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 1 Dec 2000

Dilution Factor: 2

Sample Description: OVERFLOW 2

POLYNUCLEAR AROMATIC HYDROCARBONS

-----	Result	Units	RL
1-Methyl Naphthalene	124	ug/Kg	2.84
2-Methyl Naphthalene	286	ug/Kg	3.26
Acenaphthene	32.1	ug/Kg	2.80
Acenaphthylene	336	ug/Kg	84.0
Anthracene	61.0	ug/Kg	8.42
Benzo(a)anthracene	131	ug/Kg	0.86
Benzo(a)pyrene	146	ug/Kg	2.60
Benzo(b)fluoranthene	167	ug/Kg	2.96
Benzo(ghi)perylene	198	ug/Kg	2.94
Benzo(k)fluoranthrene	72.9	ug/Kg	2.74
Chrysene	125	ug/Kg	0.94
Dibenzo(ah)anthracene	20.9	ug/Kg	2.66
Fluoranthene	530	ug/Kg	7.06
Fluorene	58.8	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	236	ug/Kg	2.34
Naphthalene	334	ug/Kg	3.06
Phenanthrene	292	ug/Kg	4.36
Pyrene	292	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4558
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: OVERFLOW 2

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Comment: PCB surrogates out of acceptable range due to matrix interference.
PAH surrogate data not available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4559

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 1 Dec 2000

Dilution Factor: 2

Sample Description: FEED 3

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	103	ug/Kg	2.84
2-Methyl Naphthalene	196	ug/Kg	3.26
Acenaphthene	22.8	ug/Kg	2.80
Acenaphthylene	149	ug/Kg	84.0
Anthracene	25.2	ug/Kg	8.42
Benzo(a)anthracene	48.9	ug/Kg	0.86
Benzo(a)pyrene	56.9	ug/Kg	2.60
Benzo(b)fluoranthene	67.2	ug/Kg	2.96
Benzo(ghi)perylene	68.5	ug/Kg	2.94
Benzo(k)fluoranthrene	27.5	ug/Kg	2.74
Chrysene	19.2	ug/Kg	0.94
Dibenzo(ah)anthracene	8.87	ug/Kg	2.66
Fluoranthene	286	ug/Kg	7.06
Fluorene	25.1	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	81.4	ug/Kg	2.34
Naphthalene	187	ug/Kg	3.06
Phenanthrene	178	ug/Kg	4.36
Pyrene	132	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4559

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRJ BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: FEED 3

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Comment: PCB surrogate data out of acceptable range due to matrix interference.
PAH surrogate data not available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4560

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 1 Dec 2000

Dilution Factor: 2

Sample Description: UNDERFLOW 3

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	186	ug/Kg	2.84
2-Methyl Naphthalene	374	ug/Kg	3.26
Acenaphthene	24.6	ug/Kg	2.80
Acenaphthylene	< 84.0	ug/Kg	84.0
Anthracene	38.7	ug/Kg	8.42
Benzo(a)anthracene	22.5	ug/Kg	0.86
Benzo(a)pyrene	28.1	ug/Kg	2.60
Benzo(b)fluoranthene	31.7	ug/Kg	2.96
Benzo(ghi)perylene	18.2	ug/Kg	2.94
Benzo(k)fluoranthrene	10.7	ug/Kg	2.74
Chrysene	24.1	ug/Kg	0.94
Dibenzo(ah)anthracene	5.70	ug/Kg	2.66
Fluoranthene	260	ug/Kg	7.06
Fluorene	63.3	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	20.5	ug/Kg	2.34
Naphthalene	461	ug/Kg	3.06
Phenanthrene	197	ug/Kg	4.36
Pyrene	102	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTl Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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710 S. 14th St. - Grand Forks, ND 58201 - 800-272-7645 - Fax 701-772-0028
35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-94560
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: UNDERFLOW 3

POLYNUCLEAR AROMATIC HYDROCARBONS
=====

Result Units RL
=====

p-TERPHENYL (SURROGATE) RECOVERY: 96 %
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4561
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: OVERFLOW 3

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	190	ug/Kg	2.84
2-Methyl Naphthalene	445	ug/Kg	3.26
Acenaphthene	46.8	ug/Kg	2.80
Acenaphthylene	596	ug/Kg	84.0
Anthracene	110	ug/Kg	8.42
Benzo(a)anthracene	172	ug/Kg	0.86
Benzo(a)pyrene	187	ug/Kg	2.60
Benzo(b)fluoranthene	227	ug/Kg	2.96
Benzo(ghi)perylene	256	ug/Kg	2.94
Benzo(k)fluoranthrene	97.0	ug/Kg	2.74
Chrysene	165	ug/Kg	0.94
Dibenzo(ah)anthracene	28.7	ug/Kg	2.66
Fluoranthene	843	ug/Kg	7.06
Fluorene	119	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	291	ug/Kg	2.34
Naphthalene	597	ug/Kg	3.06
Phenanthrene	514	ug/Kg	4.36
Pyrene	408	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4561

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310; Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 1 Dec 2000

Dilution Factor: 2

Sample Description: OVERFLOW 3

POLYNUCLEAR AROMATIC HYDROCARBONS

Result	Units	RL
=====	=====	=====

Comment: PCB surrogate out of acceptable range due to matrix interference.
PAH surrogate data not available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4562

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: FEED 4

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	94.5	ug/Kg	2.84
2-Methyl Naphthalene	203	ug/Kg	3.26
Acenaphthene	28.6	ug/Kg	2.80
Acenaphthylene	96.0	ug/Kg	84.0
Anthracene	58.0	ug/Kg	8.42
Benzo(a)anthracene	117	ug/Kg	0.86
Benzo(a)pyrene	117	ug/Kg	2.60
Benzo(b)fluoranthene	131	ug/Kg	2.96
Benzo(ghi)perylene	124	ug/Kg	2.94
Benzo(k)fluoranthrene	58.1	ug/Kg	2.74
Chrysene	115	ug/Kg	0.94
Dibenzo(ah)anthracene	10.8	ug/Kg	2.66
Fluoranthene	534	ug/Kg	7.06
Fluorene	46.2	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	160	ug/Kg	2.34
Naphthalene	224	ug/Kg	3.06
Phenanthrene	247	ug/Kg	4.36
Pyrene	270	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4562
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 1 Dec 2000
Dilution Factor: 2

Sample Description: FEED 4

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Comment: PCB surrogates out of acceptable range due to matrix interference.
PAH surrogate data not available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4563

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 7 Dec 2000

Dilution Factor: 2

Sample Description: UNDERFLOW 4

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	68.8	ug/Kg	2.84
2-Methyl Naphthalene	125	ug/Kg	3.26
Acenaphthene	23.2	ug/Kg	2.80
Acenaphthylene	< 84.0	ug/Kg	84.0
Anthracene	20.4	ug/Kg	8.42
Benzo(a)anthracene	24.4	ug/Kg	0.86
Benzo(a)pyrene	24.1	ug/Kg	2.60
Benzo(b)fluoranthene	31.7	ug/Kg	2.96
Benzo(ghi)perylene	24.1	ug/Kg	2.94
Benzo(k)fluoranthrene	12.2	ug/Kg	2.74
Chrysene	31.2	ug/Kg	0.94
Dibenzo(ah)anthracene	6.11	ug/Kg	2.66
Fluoranthene	212	ug/Kg	7.06
Fluorene	17.7	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	21.4	ug/Kg	2.34
Naphthalene	136	ug/Kg	3.06
Phenanthrene	123	ug/Kg	4.36
Pyrene	74.2	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4563

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 7 Dec 2000

Dilution Factor: 2

Sample Description: UNDERFLOW 4

POLYNUCLEAR AROMATIC HYDROCARBONS
=====

Result Units RL
=====

p-TERPHENYL (SURROGATE) RECOVERY: 110 %

Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-84564

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRR1 BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 7 Dec 2000

Dilution Factor: 4

Sample Description: OVERFLOW 4

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
=====	=====	=====	=====
1-Methyl Naphthalene	243	ug/Kg	5.68
2-Methyl Naphthalene	555	ug/Kg	6.52
Acenaphthene	113	ug/Kg	5.60
Acenaphthylene	557	ug/Kg	168
Anthracene	194	ug/Kg	16.8
Benzo(a)anthracene	386	ug/Kg	1.72
Benzo(a)pyrene	366	ug/Kg	5.20
Benzo(b)fluoranthene	374	ug/Kg	5.92
Benzo(ghi)perylene	370	ug/Kg	5.88
Benzo(k)fluoranthrene	189	ug/Kg	5.48
Chrysene	343	ug/Kg	1.88
Dibenzo(ah)anthracene	71.9	ug/Kg	5.32
Fluoranthene	1670	ug/Kg	14.1
Fluorene	145	ug/Kg	4.28
Indeno(1,2,3-cd)pyrene	475	ug/Kg	4.68
Naphthalene	789	ug/Kg	6.12
Phenanthrene	822	ug/Kg	8.72
Pyrene	759	ug/Kg	1.60

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4564
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 7 Dec 2000
Dilution Factor: 4

Sample Description: OVERFLOW 4

POLYNUCLEAR AROMATIC HYDROCARBONS
=====

Result Units RL
=====

Comment: No PAH surrogate data available due to matrix interference. Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-84565
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 7 Dec 2000
Dilution Factor: 2

Sample Description: FEED 5

POLYNUCLEAR AROMATIC HYDROCARBONS

-----	Result	Units	RL
-----	-----	-----	-----
1-Methyl Naphthalene	212	ug/Kg	2.84
2-Methyl Naphthalene	479	ug/Kg	3.26
Acenaphthene	75.4	ug/Kg	2.80
Acenaphthylene	664	ug/Kg	84.0
Anthracene	206	ug/Kg	8.42
Benzo(a)anthracene	250	ug/Kg	0.86
Benzo(a)pyrene	223	ug/Kg	2.60
Benzo(b)fluoranthene	215	ug/Kg	2.96
Benzo(ghi)perylene	231	ug/Kg	2.94
Benzo(k)fluoranthrene	109	ug/Kg	2.74
Chrysene	416	ug/Kg	0.94
Dibenzo(ah)anthracene	37.4	ug/Kg	2.66
Fluoranthene	1240	ug/Kg	7.06
Fluorene	151	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	289	ug/Kg	2.34
Naphthalene	613	ug/Kg	3.06
Phenanthrene	813	ug/Kg	4.36
Pyrene	577	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4565

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 7 Dec 2000

Dilution Factor: 2

Sample Description: FEED 5

POLYNUCLEAR AROMATIC HYDROCARBONS

Result	Units	RL
=====	=====	=====

Comment: PCB surrogate out of acceptable range due to matrix interference.
No PAH surrogate data available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-84566

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 7 Dec 2000

Dilution Factor: 2

Sample Description: UNDERFLOW 5

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
=====	=====	=====	=====
1-Methyl Naphthalene	238	ug/Kg	2.84
2-Methyl Naphthalene	528	ug/Kg	3.26
Acenaphthene	50.9	ug/Kg	2.80
Acenaphthylene	327	ug/Kg	84.0
Anthracene	110	ug/Kg	8.42
Benzo(a)anthracene	81.2	ug/Kg	0.86
Benzo(a)pyrene	79.6	ug/Kg	2.60
Benzo(b)fluoranthene	61.4	ug/Kg	2.96
Benzo(ghi)perylene	65.0	ug/Kg	2.94
Benzo(k)fluoranthrene	31.3	ug/Kg	2.74
Chrysene	73.2	ug/Kg	0.94
Dibenzo(ah)anthracene	13.9	ug/Kg	2.66
Fluoranthene	504	ug/Kg	7.06
Fluorene	150	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	83.0	ug/Kg	2.34
Naphthalene	641	ug/Kg	3.06
Phenanthrene	374	ug/Kg	4.36
Pyrene	253	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-84566
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 7 Dec 2000
Dilution Factor: 2

Sample Description: UNDERFLOW 5

POLYNUCLEAR AROMATIC HYDROCARBONS
=====

Result Units RL
=====

Comment: PCB surrogate recovery out of acceptable range due to matrix
interference. No PAH surrogate data available due to matrix.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4567

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 7 Dec 2000

Dilution Factor: 5

Sample Description: OVERFLOW 5

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	319	ug/Kg	7.10
2-Methyl Naphthalene	746	ug/Kg	8.15
Acenaphthene	116	ug/Kg	7.00
Acenaphthylene	356	ug/Kg	210
Anthracene	209	ug/Kg	21.0
Benzo(a)anthracene	411	ug/Kg	2.15
Benzo(a)pyrene	382	ug/Kg	6.50
Benzo(b)fluoranthene	328	ug/Kg	7.40
Benzo(ghi)perylene	376	ug/Kg	7.35
Benzo(k)fluoranthrene	191	ug/Kg	6.85
Chrysene	375	ug/Kg	2.35
Dibenzo(ah)anthracene	68.0	ug/Kg	6.65
Fluoranthene	2040	ug/Kg	17.6
Fluorene	182	ug/Kg	5.35
Indeno(1,2,3-cd)pyrene	475	ug/Kg	5.85
Naphthalene	801	ug/Kg	7.65
Phenanthrene	1360	ug/Kg	10.9
Pyrene	822	ug/Kg	2.00

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4567

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 7 Dec 2000

Dilution Factor: 5

Sample Description: OVERFLOW 5

POLYNUCLEAR AROMATIC HYDROCARBONS

Result	Units	RL
=====	=====	=====

Comment: No PAH surrogate data available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4568

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 7 Dec 2000

Dilution Factor: 2

Sample Description: FEED 6

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	113	ug/Kg	2.84
2-Methyl Naphthalene	240	ug/Kg	3.26
Acenaphthene	36.3	ug/Kg	2.80
Acenaphthylene	179	ug/Kg	84.0
Anthracene	64.8	ug/Kg	8.42
Benzo(a)anthracene	129	ug/Kg	0.86
Benzo(a)pyrene	126	ug/Kg	2.60
Benzo(b)fluoranthene	131	ug/Kg	2.96
Benzo(ghi)perylene	131	ug/Kg	2.94
Benzo(k)fluoranthrene	64.9	ug/Kg	2.74
Chrysene	118	ug/Kg	0.94
Dibenzo(ah)anthracene	23.7	ug/Kg	2.66
Fluoranthene	569	ug/Kg	7.06
Fluorene	48.1	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	164	ug/Kg	2.34
Naphthalene	271	ug/Kg	3.06
Phenanthrene	294	ug/Kg	4.36
Pyrene	261	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-84568
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 7 Dec 2000
Dilution Factor: 2

Sample Description: FEED 6

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Comment: PCB surrogate out of acceptable range due to matrix interference.
No PAH surrogate data available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4569
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 7 Dec 2000
Dilution Factor: 2

Sample Description: UNDERFLOW 6

POLYNUCLEAR AROMATIC HYDROCARBONS	Result	Units	RL
1-Methyl Naphthalene	47.6	ug/Kg	2.84
2-Methyl Naphthalene	85.7	ug/Kg	3.26
Acenaphthene	20.4	ug/Kg	2.80
Acenaphthylene	< 84.0	ug/Kg	84.0
Anthracene	20.7	ug/Kg	8.42
Benzo(a)anthracene	31.0	ug/Kg	0.86
Benzo(a)pyrene	30.3	ug/Kg	2.60
Benzo(b)fluoranthene	34.3	ug/Kg	2.96
Benzo(ghi)perylene	28.0	ug/Kg	2.94
Benzo(k)fluoranthrene	15.1	ug/Kg	2.74
Chrysene	33.0	ug/Kg	0.94
Dibenzo(ah)anthracene	5.26	ug/Kg	2.66
Fluoranthene	189	ug/Kg	7.06
Fluorene	15.8	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	33.8	ug/Kg	2.34
Naphthalene	94.0	ug/Kg	3.06
Phenanthrene	109	ug/Kg	4.36
Pyrene	71.8	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4569

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 7 Dec 2000

Dilution Factor: 2

Sample Description: UNDERFLOW 6

POLYNUCLEAR AROMATIC HYDROCARBONS

Result	Units	RI
=====	=====	=====

Comment: No PAH surrogate data available due to matrix interference. Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RI = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4570

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000

Date Analyzed: 7 Dec 2000

Dilution Factor: 2

Sample Description: OVERFLOW 6

POLYNUCLEAR AROMATIC HYDROCARBONS

-----	Result	Units	RL
-----	-----	-----	-----
1-Methyl Naphthalene	209	ug/Kg	2.84
2-Methyl Naphthalene	480	ug/Kg	3.26
Acenaphthene	78.9	ug/Kg	2.80
Acenaphthylene	270	ug/Kg	84.0
Anthracene	136	ug/Kg	8.42
Benzo(a)anthracene	273	ug/Kg	0.86
Benzo(a)pyrene	248	ug/Kg	2.60
Benzo(b)fluoranthene	232	ug/Kg	2.96
Benzo(ghi)perylene	249	ug/Kg	2.94
Benzo(k)fluoranthrene	123	ug/Kg	2.74
Chrysene	248	ug/Kg	0.94
Dibenzo(ah)anthracene	31.0	ug/Kg	2.66
Fluoranthene	1240	ug/Kg	7.06
Fluorene	109	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	310	ug/Kg	2.34
Naphthalene	509	ug/Kg	3.06
Phenanthrene	737	ug/Kg	4.36
Pyrene	558	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4570
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310; Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 20 Nov 2000
Date Analyzed: 7 Dec 2000
Dilution Factor: 2

Sample Description: OVERFLOW 6

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Comment: No PAH surrogate data available due to matrix interference. Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4587
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 2

Sample Description: FEED 7

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	142	ug/Kg	2.84
2-Methyl Naphthalene	316	ug/Kg	3.26
Acenaphthene	40.0	ug/Kg	2.80
Acenaphthylene	195	ug/Kg	84.0
Anthracene	92.6	ug/Kg	8.42
Benzo(a)anthracene	172	ug/Kg	0.86
Benzo(a)pyrene	176	ug/Kg	2.60
Benzo(b)fluoranthene	179	ug/Kg	2.96
Benzo(ghi)perylene	204	ug/Kg	2.94
Benzo(k)fluoranthrene	86.0	ug/Kg	2.74
Chrysene	166	ug/Kg	0.94
Dibenzo(ah)anthracene	75.9	ug/Kg	2.66
Fluoranthene	450	ug/Kg	7.06
Fluorene	54.0	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	157	ug/Kg	2.34
Naphthalene	344	ug/Kg	3.06
Phenanthrene	440	ug/Kg	4.36
Pyrene	411	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-84587

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000

Date Analyzed: 19 Dec 2000

Dilution Factor: 2

Sample Description: FEED 7

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL

=====
Comment: No PAH surrogate data available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

=====
=====
=====

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4588

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000

Date Analyzed: 19 Dec 2000

Dilution Factor: 2

Sample Description: UNDERFOW 7

POLYNUCLEAR AROMATIC HYDROCARBONS

=====

	Result	Units	RL
	=====	=====	=====
1-Methyl Naphthalene	52.8	ug/Kg	2.84
2-Methyl Naphthalene	103	ug/Kg	3.26
Acenaphthene	8.17	ug/Kg	2.80
Acenaphthylene	< 84.0	ug/Kg	84.0
Anthracene	18.0	ug/Kg	8.42
Benzo(a)anthracene	23.4	ug/Kg	0.86
Benzo(a)pyrene	24.8	ug/Kg	2.60
Benzo(b)fluoranthene	32.8	ug/Kg	2.96
Benzo(ghi)perylene	41.5	ug/Kg	2.94
Benzo(k)fluoranthrene	12.7	ug/Kg	2.74
Chrysene	24.3	ug/Kg	0.94
Dibenzo(ah)anthracene	16.6	ug/Kg	2.66
Fluoranthene	63.9	ug/Kg	7.06
Fluorene	11.8	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	35.0	ug/Kg	2.34
Naphthalene	111	ug/Kg	3.06
Phenanthrene	92.0	ug/Kg	4.36
Pyrene	62.7	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTl Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4588
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 2

Sample Description: UNDERFLOW 7

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

p-TERPHENYL (SURROGATE) RECOVERY: 124 %
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4589
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 20

Sample Description: OVERFOW 7

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	301	ug/Kg	28.4
2-Methyl Naphthalene	612	ug/Kg	32.6
Acenaphthene	74.0	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	244	ug/Kg	84.2
Benzo(a)anthracene	415	ug/Kg	8.60
Benzo(a)pyrene	420	ug/Kg	26.0
Benzo(b)fluoranthene	514	ug/Kg	29.6
Benzo(ghi)perylene	592	ug/Kg	29.4
Benzo(k)fluoranthrene	233	ug/Kg	27.4
Chrysene	374	ug/Kg	9.40
Dibenzo(ah)anthracene	231	ug/Kg	26.6
Fluoranthene	949	ug/Kg	70.6
Fluorene	151	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	355	ug/Kg	23.4
Naphthalene	831	ug/Kg	30.6
Phenanthrene	915	ug/Kg	43.6
Pyrene	892	ug/Kg	8.00

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4589

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000

Date Analyzed: 19 Dec 2000

Dilution Factor: 20

Sample Description: OVERFOW 7

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL

Comment: PCB surrogate out of QC range due to matrix interference.
No PAH surrogate data available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4590
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 20

Sample Description: BL-00885

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	242	ug/Kg	28.4
2-Methyl Naphthalene	463	ug/Kg	32.6
Acenaphthene	59.4	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	147	ug/Kg	84.2
Benzo(a)anthracene	215	ug/Kg	8.60
Benzo(a)pyrene	223	ug/Kg	26.0
Benzo(b)fluoranthene	261	ug/Kg	29.6
Benzo(ghi)perylene	280	ug/Kg	29.4
Benzo(k)fluoranthrene	121	ug/Kg	27.4
Chrysene	244	ug/Kg	9.40
Dibenzo(ah)anthracene	158	ug/Kg	26.6
Fluoranthene	447	ug/Kg	70.6
Fluorene	82.4	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	281	ug/Kg	23.4
Naphthalene	550	ug/Kg	30.6
Phenanthrene	587	ug/Kg	43.6
Pyrene	494	ug/Kg	8.00

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTl Laboratory Management.



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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4590
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRR1 BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 20

Sample Description: BL-00885

POLYNUCLEAR AROMATIC HYDROCARBONS
=====

Result Units RL
=====

Comment: PCB surrogate out of QC range due to matrix interference.
No PAH surrogate data available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4591
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 2

Sample Description: BL-00886

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	154	ug/Kg	2.84
2-Methyl Naphthalene	294	ug/Kg	3.26
Acenaphthene	36.0	ug/Kg	2.80
Acenaphthylene	< 84.0	ug/Kg	84.0
Anthracene	40.1	ug/Kg	8.42
Benzo(a)anthracene	33.0	ug/Kg	0.86
Benzo(a)pyrene	42.6	ug/Kg	2.60
Benzo(b)fluoranthene	44.4	ug/Kg	2.96
Benzo(ghi)perylene	50.3	ug/Kg	2.94
Benzo(k)fluoranthrene	18.3	ug/Kg	2.74
Chrysene	65.0	ug/Kg	0.94
Dibenzo(ah)anthracene	21.8	ug/Kg	2.66
Fluoranthene	230	ug/Kg	7.06
Fluorene	21.3	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	39.3	ug/Kg	2.34
Naphthalene	232	ug/Kg	3.06
Phenanthrene	256	ug/Kg	4.36
Pyrene	146	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-84591

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000

Date Analyzed: 19 Dec 2000

Dilution Factor: 2

Sample Description: BL-00886

POLYNUCLEAR AROMATIC HYDROCARBONS

Result	Units	RL
=====	=====	=====

Comment: No PAH surrogate data available due to matrix interference. Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4592

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000

Date Analyzed: 19 Dec 2000

Dilution Factor: 20

Sample Description: BL-00887

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	293	ug/Kg	28.4
2-Methyl Naphthalene	513	ug/Kg	32.6
Acenaphthene	61.7	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	206	ug/Kg	84.2
Benzo(a)anthracene	290	ug/Kg	8.60
Benzo(a)pyrene	314	ug/Kg	26.0
Benzo(b)fluoranthene	391	ug/Kg	29.6
Benzo(ghi)perylene	471	ug/Kg	29.4
Benzo(k)fluoranthrene	176	ug/Kg	27.4
Chrysene	323	ug/Kg	9.40
Dibenzo(ah)anthracene	216	ug/Kg	26.6
Fluoranthene	608	ug/Kg	70.6
Fluorene	109	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	235	ug/Kg	23.4
Naphthalene	671	ug/Kg	30.6
Phenanthrene	614	ug/Kg	43.6
Pyrene	635	ug/Kg	8.00

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4592
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 20

Sample Description: BL-00887

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Comment: No PAH surrogate data available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4593

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRJ BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 22 Nov 2000

Date Analyzed: 19 Dec 2000

Dilution Factor: 2

Sample Description: UNDERFLOW 9

POLYNUCLEAR AROMATIC HYDROCARBONS

=====	Result	Units	RL
1-Methyl Naphthalene	82.8	ug/Kg	2.84
2-Methyl Naphthalene	140	ug/Kg	3.26
Acenaphthene	13.6	ug/Kg	2.80
Acenaphthylene	< 84.0	ug/Kg	84.0
Anthracene	12.7	ug/Kg	8.42
Benzo(a)anthracene	15.6	ug/Kg	0.86
Benzo(a)pyrene	17.8	ug/Kg	2.60
Benzo(b)fluoranthene	21.8	ug/Kg	2.96
Benzo(ghi)perylene	25.8	ug/Kg	2.94
Benzo(k)fluoranthrene	8.67	ug/Kg	2.74
Chrysene	17.1	ug/Kg	0.94
Dibenzo(ah)anthracene	8.29	ug/Kg	2.66
Fluoranthene	77.3	ug/Kg	7.06
Fluorene	8.28	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	12.1	ug/Kg	2.34
Naphthalene	110	ug/Kg	3.06
Phenanthrene	90.8	ug/Kg	4.36
Pyrene	47.9	ug/Kg	0.80

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTl Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-84593

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 22 Nov 2000

Date Analyzed: 19 Dec 2000

Dilution Factor: 2

Sample Description: UNDERFLOW 9

POLYNUCLEAR AROMATIC HYDROCARBONS
=====

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4594

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 20

Sample Description: OVERFLOW 9

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	262	ug/Kg	28.4
2-Methyl Naphthalene	445	ug/Kg	32.6
Acenaphthene	59.4	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	131	ug/Kg	84.2
Benzo(a)anthracene	222	ug/Kg	8.60
Benzo(a)pyrene	243	ug/Kg	26.0
Benzo(b)fluoranthene	321	ug/Kg	29.6
Benzo(ghi)perylene	355	ug/Kg	29.4
Benzo(k)fluoranthrene	134	ug/Kg	27.4
Chrysene	200	ug/Kg	9.40
Dibenzo(ah)anthracene	124	ug/Kg	26.6
Fluoranthene	582	ug/Kg	70.6
Fluorene	92.9	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	183	ug/Kg	23.4
Naphthalene	564	ug/Kg	30.6
Phenanthrene	529	ug/Kg	43.6
Pyrene	481	ug/Kg	8.00

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4594
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 20

Sample Description: OVERFLOW 9

POLYNUCLEAR AROMATIC HYDROCARBONS
=====

Result Units RL
=====

Comment: PCB surrogates out of QC range due to matrix interference.
No PAH surrogate data available due to matrix interference.
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-84595

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
 5013 MILLER TRUNK HIGHWAY
 ACCOUNTING OFFICE - 380 NRRI BLDG
 DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
 determined according to 40CFR, Appendix B,
 Part 136, 1992.

Date Extracted: 22 Nov 2000

Date Analyzed: 19 Dec 2000

Dilution Factor: 20

Sample Description: BL00 902

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	310	ug/Kg	28.4
2-Methyl Naphthalene	595	ug/Kg	32.6
Acenaphthene	78.5	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	186	ug/Kg	84.2
Benzo(a)anthracene	321	ug/Kg	8.60
Benzo(a)pyrene	338	ug/Kg	26.0
Benzo(b)fluoranthene	384	ug/Kg	29.6
Benzo(ghi)perylene	473	ug/Kg	29.4
Benzo(k)fluoranthrene	179	ug/Kg	27.4
Chrysene	281	ug/Kg	9.40
Dibenzo(ah)anthracene	174	ug/Kg	26.6
Fluoranthene	753	ug/Kg	70.6
Fluorene	133	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	321	ug/Kg	23.4
Naphthalene	770	ug/Kg	30.6
Phenanthrene	673	ug/Kg	43.6
Pyrene	668	ug/Kg	8.00

Comment: No PAH surrogate data available due to matrix interference.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4595
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRR1 BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 20

Sample Description: BL00 902

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4596

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 22 Nov 2000

Date Analyzed: 19 Dec 2000

Dilution Factor: 20

Sample Description: BLOO 903

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	345	ug/Kg	28.4
2-Methyl Naphthalene	679	ug/Kg	32.6
Acenaphthene	82.6	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	200	ug/Kg	84.2
Benzo(a)anthracene	368	ug/Kg	8.60
Benzo(a)pyrene	390	ug/Kg	26.0
Benzo(b)fluoranthene	444	ug/Kg	29.6
Benzo(ghi)perylene	531	ug/Kg	29.4
Benzo(k)fluoranthrene	211	ug/Kg	27.4
Chrysene	306	ug/Kg	9.40
Dibenzo(ah)anthracene	245	ug/Kg	26.6
Fluoranthene	833	ug/Kg	70.6
Fluorene	152	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	377	ug/Kg	23.4
Naphthalene	883	ug/Kg	30.6
Phenanthrene	744	ug/Kg	43.6
Pyrene	752	ug/Kg	8.00

Comment: No PAH surrogate data available due to matrix interference.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTl Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4596
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 22 Nov 2000
Date Analyzed: 19 Dec 2000
Dilution Factor: 20

Sample Description: BLOO 903

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4597

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRJ BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 21 Dec 2000

Dilution Factor: 2

Sample Description: BLOO 904

POLYNUCLEAR AROMATIC HYDROCARBONS

=====	Result	Units	RL
=====	=====	=====	=====
1-Methyl Naphthalene	194	ug/Kg	2.84
2-Methyl Naphthalene	480	ug/Kg	3.26
Acenaphthene	72.4	ug/Kg	2.80
Acenaphthylene	468	ug/Kg	84.0
Anthracene	173	ug/Kg	8.42
Benzo(a)anthracene	345	ug/Kg	0.86
Benzo(a)pyrene	400	ug/Kg	2.60
Benzo(b)fluoranthene	453	ug/Kg	2.96
Benzo(ghi)perylene	480	ug/Kg	2.94
Benzo(k)fluoranthrene	207	ug/Kg	2.74
Chrysene	392	ug/Kg	0.94
Dibenzo(ah)anthracene	188	ug/Kg	2.66
Fluoranthene	743	ug/Kg	7.06
Fluorene	97.2	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	339	ug/Kg	2.34
Naphthalene	662	ug/Kg	3.06
Phenanthrene	654	ug/Kg	4.36
Pyrene	606	ug/Kg	0.80

Comment: No PAH surrogate data available due to matrix interference.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTl Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4597
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 2

Sample Description: BLOO 904

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL

=====
Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

=====
=====

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4598

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 21 Dec 2000

Dilution Factor: 2

Sample Description: BL00 905

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	268	ug/Kg	2.84
2-Methyl Naphthalene	680	ug/Kg	3.26
Acenaphthene	90.3	ug/Kg	2.80
Acenaphthylene	508	ug/Kg	84.0
Anthracene	214	ug/Kg	8.42
Benzo(a)anthracene	434	ug/Kg	0.86
Benzo(a)pyrene	462	ug/Kg	2.60
Benzo(b)fluoranthene	541	ug/Kg	2.96
Benzo(ghi)perylene	522	ug/Kg	2.94
Benzo(k)fluoranthrene	245	ug/Kg	2.74
Chrysene	510	ug/Kg	0.94
Dibenzo(ah)anthracene	219	ug/Kg	2.66
Fluoranthene	1180	ug/Kg	7.06
Fluorene	124	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	459	ug/Kg	2.34
Naphthalene	1090	ug/Kg	3.06
Phenanthrene	845	ug/Kg	4.36
Pyrene	743	ug/Kg	0.80

Comment: No PAH surrogate data available due to matrix interference.
RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4598
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 2

Sample Description: BL00 905

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL

=====

Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

=====

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4599

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 20

Sample Description: BLOO 906

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	420	ug/Kg	28.4
2-Methyl Naphthalene	589	ug/Kg	32.6
Acenaphthene	203	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	247	ug/Kg	84.2
Benzo(a)anthracene	381	ug/Kg	8.60
Benzo(a)pyrene	367	ug/Kg	26.0
Benzo(b)fluoranthene	398	ug/Kg	29.6
Benzo(ghi)perylene	491	ug/Kg	29.4
Benzo(k)fluoranthrene	206	ug/Kg	27.4
Chrysene	351	ug/Kg	9.40
Dibenzo(ah)anthracene	286	ug/Kg	26.6
Fluoranthene	769	ug/Kg	70.6
Fluorene	124	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	328	ug/Kg	23.4
Naphthalene	966	ug/Kg	30.6
Phenanthrene	954	ug/Kg	43.6
Pyrene	842	ug/Kg	8.00

Comment: No PAH surrogate data available due to matrix interference.
RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTl Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4599
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 20

Sample Description: BLOO 906

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4600

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 21 Dec 2000

Dilution Factor: 2

Sample Description: BLOO 907

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	292	ug/Kg	2.84
2-Methyl Naphthalene	754	ug/Kg	3.26
Acenaphthene	93.5	ug/Kg	2.80
Acenaphthylene	< 84.0	ug/Kg	84.0
Anthracene	229	ug/Kg	8.42
Benzo(a)anthracene	428	ug/Kg	0.86
Benzo(a)pyrene	472	ug/Kg	2.60
Benzo(b)fluoranthene	534	ug/Kg	2.96
Benzo(ghi)perylene	512	ug/Kg	2.94
Benzo(k)fluoranthrene	240	ug/Kg	2.74
Chrysene	520	ug/Kg	0.94
Dibenzo(ah)anthracene	240	ug/Kg	2.66
Fluoranthene	175	ug/Kg	7.06
Fluorene	117	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	349	ug/Kg	2.34
Naphthalene	1170	ug/Kg	3.06
Phenanthrene	916	ug/Kg	4.36
Pyrene	721	ug/Kg	0.80

Comment: No PAH surrogate data available due to matrix interference.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4600
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 2

Sample Description: BLOO 907

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4601

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 21 Dec 2000

Dilution Factor: 22

Sample Description: BL00 908

POLYNUCLEAR AROMATIC HYDROCARBONS

=====	Result	Units	RL
=====	=====	=====	=====
1-Methyl Naphthalene	359	ug/Kg	31.2
2-Methyl Naphthalene	465	ug/Kg	35.9
Acenaphthene	155	ug/Kg	30.8
Acenaphthylene	< 924	ug/Kg	924
Anthracene	203	ug/Kg	92.6
Benzo(a)anthracene	321	ug/Kg	9.46
Benzo(a)pyrene	334	ug/Kg	28.6
Benzo(b)fluoranthene	344	ug/Kg	32.6
Benzo(ghi)perylene	460	ug/Kg	32.3
Benzo(k)fluoranthrene	189	ug/Kg	30.1
Chrysene	294	ug/Kg	10.3
Dibenzo(ah)anthracene	246	ug/Kg	29.3
Fluoranthene	792	ug/Kg	77.7
Fluorene	99.3	ug/Kg	23.5
Indeno(1,2,3-cd)pyrene	287	ug/Kg	25.7
Naphthalene	725	ug/Kg	33.7
Phenanthrene	749	ug/Kg	48.0
Pyrene	721	ug/Kg	8.80

Comment: No PAH surrogate data available due to matrix interference.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4601
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 22

Sample Description: BLOO 908

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4602

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 21 Dec 2000

Dilution Factor: 20

Sample Description: BLOO 909

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	427	ug/Kg	28.4
2-Methyl Naphthalene	637	ug/Kg	32.6
Acenaphthene	182	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	220	ug/Kg	84.2
Benzo(a)anthracene	360	ug/Kg	8.60
Benzo(a)pyrene	368	ug/Kg	26.0
Benzo(b)fluoranthene	411	ug/Kg	29.6
Benzo(ghi)perylene	422	ug/Kg	29.4
Benzo(k)fluoranthrene	211	ug/Kg	27.4
Chrysene	310	ug/Kg	9.40
Dibenzo(ah)anthracene	186	ug/Kg	26.6
Fluoranthene	868	ug/Kg	70.6
Fluorene	108	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	302	ug/Kg	23.4
Naphthalene	917	ug/Kg	30.6
Phenanthrene	848	ug/Kg	43.6
Pyrene	794	ug/Kg	8.00

Comment: No PAH surrogate data available due to matrix interference.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4602
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 20

Sample Description: BLOO 909

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4603

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 21 Dec 2000

Dilution Factor: 2

Sample Description: BLOO 975

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	77.9	ug/Kg	2.84
2-Methyl Naphthalene	172	ug/Kg	3.26
Acenaphthene	40.4	ug/Kg	2.80
Acenaphthylene	247	ug/Kg	84.0
Anthracene	67.4	ug/Kg	8.42
Benzo(a)anthracene	128	ug/Kg	0.86
Benzo(a)pyrene	145	ug/Kg	2.60
Benzo(b)fluoranthene	141	ug/Kg	2.96
Benzo(ghi)perylene	206	ug/Kg	2.94
Benzo(k)fluoranthrene	76.5	ug/Kg	2.74
Chrysene	118	ug/Kg	0.94
Dibenzo(ah)anthracene	104	ug/Kg	2.66
Fluoranthene	258	ug/Kg	7.06
Fluorene	42.2	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	156	ug/Kg	2.34
Naphthalene	260	ug/Kg	3.06
Phenanthrene	268	ug/Kg	4.36
Pyrene	273	ug/Kg	0.80

p-TERPHENYL (SURROGATE) RECOVERY: 100 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4603
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 2

Sample Description: BLOO 975

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RI = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4604

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 21 Dec 2000

Dilution Factor: 3

Sample Description: BLOO 976

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	223	ug/Kg	4.26
2-Methyl Naphthalene	566	ug/Kg	4.89
Acenaphthene	72.9	ug/Kg	4.20
Acenaphthylene	744	ug/Kg	126
Anthracene	210	ug/Kg	12.6
Benzo(a)anthracene	317	ug/Kg	1.29
Benzo(a)pyrene	356	ug/Kg	3.90
Benzo(b)fluoranthene	306	ug/Kg	4.44
Benzo(ghi)perylene	512	ug/Kg	4.41
Benzo(k)fluoranthrene	171	ug/Kg	4.11
Chrysene	249	ug/Kg	1.41
Dibenzo(ah)anthracene	215	ug/Kg	3.99
Fluoranthene	841	ug/Kg	10.6
Fluorene	118	ug/Kg	3.21
Indeno(1,2,3-cd)pyrene	300	ug/Kg	3.51
Naphthalene	735	ug/Kg	4.59
Phenanthrene	812	ug/Kg	6.54
Pyrene	778	ug/Kg	1.20

Comment: No PAH surrogate data available due to matrix interference.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4604
Work Order #: 22-548
Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310; Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 3

Sample Description: BLOO 976

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4605

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 21 Dec 2000

Dilution Factor: 3

Sample Description: BLOO 977

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	318	ug/Kg	3.83
2-Methyl Naphthalene	776	ug/Kg	4.40
Acenaphthene	111	ug/Kg	3.78
Acenaphthylene	818	ug/Kg	113
Anthracene	266	ug/Kg	11.4
Benzo(a)anthracene	483	ug/Kg	1.16
Benzo(a)pyrene	390	ug/Kg	3.51
Benzo(b)fluoranthene	585	ug/Kg	4.00
Benzo(ghi)perylene	563	ug/Kg	3.97
Benzo(k)fluoranthrene	197	ug/Kg	3.70
Chrysene	625	ug/Kg	1.27
Dibenzo(ah)anthracene	359	ug/Kg	3.59
Fluoranthene	1380	ug/Kg	9.53
Fluorene	148	ug/Kg	2.89
Indeno(1,2,3-cd)pyrene	380	ug/Kg	3.16
Naphthalene	1260	ug/Kg	4.13
Phenanthrene	861	ug/Kg	5.89
Pyrene	855	ug/Kg	1.08

Comment: No PAH surrogate data available due to matrix interference.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4605
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 3

Sample Description: BL00 977

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-34606

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 21 Dec 2000

Dilution Factor: 2

Sample Description: BLOO 978

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	78.6	ug/Kg	2.84
2-Methyl Naphthalene	162	ug/Kg	3.26
Acenaphthene	41.2	ug/Kg	2.80
Acenaphthylene	195	ug/Kg	84.0
Anthracene	64.0	ug/Kg	8.42
Benzo(a)anthracene	129	ug/Kg	0.86
Benzo(a)pyrene	149	ug/Kg	2.60
Benzo(b)fluoranthene	159	ug/Kg	2.96
Benzo(ghi)perylene	219	ug/Kg	2.94
Benzo(k)fluoranthrene	78.1	ug/Kg	2.74
Chrysene	120	ug/Kg	0.94
Dibenzo(ah)anthracene	91.4	ug/Kg	2.66
Fluoranthene	231	ug/Kg	7.06
Fluorene	42.9	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	160	ug/Kg	2.34
Naphthalene	226	ug/Kg	3.06
Phenanthrene	247	ug/Kg	4.36
Pyrene	280	ug/Kg	0.80

p-TERPHENYL (SURROGATE) RECOVERY: 111 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4606
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 21 Dec 2000
Dilution Factor: 2

Sample Description: BL00 978

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4607

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 29 Dec 2000
Dilution Factor: 2

Sample Description: BL00 979

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	170	ug/Kg	2.84
2-Methyl Naphthalene	287	ug/Kg	3.26
Acenaphthene	23.1	ug/Kg	2.80
Acenaphthylene	350	ug/Kg	84.0
Anthracene	87.5	ug/Kg	8.42
Benzo(a)anthracene	179	ug/Kg	0.86
Benzo(a)pyrene	195	ug/Kg	2.60
Benzo(b)fluoranthene	228	ug/Kg	2.96
Benzo(ghi)perylene	450	ug/Kg	2.94
Benzo(k)fluoranthrene	103	ug/Kg	2.74
Chrysene	299	ug/Kg	0.94
Dibenzo(ah)anthracene	55.7	ug/Kg	2.66
Fluoranthene	526	ug/Kg	7.06
Fluorene	61.7	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	208	ug/Kg	2.34
Naphthalene	390	ug/Kg	3.06
Phenanthrene	381	ug/Kg	4.36
Pyrene	415	ug/Kg	0.80

Comment: No PAH surrogate data available due to matrix interference.
RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4607
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 29 Dec 2000
Dilution Factor: 2

Sample Description: BL00 979

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4608

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 29 Dec 2000

Dilution Factor: 2

Sample Description: BLOO 980

POLYNUCLEAR AROMATIC HYDROCARBONS

-----	Result	Units	RL
-----	-----	-----	-----
1-Methyl Naphthalene	216	ug/Kg	2.84
2-Methyl Naphthalene	335	ug/Kg	3.26
Acenaphthene	26.9	ug/Kg	2.80
Acenaphthylene	275	ug/Kg	84.0
Anthracene	126	ug/Kg	8.42
Benzo(a)anthracene	264	ug/Kg	0.86
Benzo(a)pyrene	273	ug/Kg	2.60
Benzo(b)fluoranthene	299	ug/Kg	2.96
Benzo(ghi)perylene	693	ug/Kg	2.94
Benzo(k)fluoranthrene	140	ug/Kg	2.74
Chrysene	425	ug/Kg	0.94
Dibenzo(ah)anthracene	74.1	ug/Kg	2.66
Fluoranthene	670	ug/Kg	7.06
Fluorene	81.7	ug/Kg	2.14
Indeno(1,2,3-cd)pyrene	307	ug/Kg	2.34
Naphthalene	654	ug/Kg	3.06
Phenanthrene	460	ug/Kg	4.36
Pyrene	389	ug/Kg	0.80

Comment: No PAH surrogate data available due to matrix interference.
RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4608
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 29 Dec 2000
Dilution Factor: 2

Sample Description: BL00 980

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4609

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 29 Dec 2000

Dilution Factor: 3

Sample Description: BL00 981

POLYNUCLEAR AROMATIC HYDROCARBONS

-----	Result	Units	RL
-----	-----	-----	-----
1-Methyl Naphthalene	102	ug/Kg	4.26
2-Methyl Naphthalene	192	ug/Kg	4.89
Acenaphthene	19.7	ug/Kg	4.20
Acenaphthylene	172	ug/Kg	126
Anthracene	65.3	ug/Kg	12.6
Benzo(a)anthracene	131	ug/Kg	1.29
Benzo(a)pyrene	175	ug/Kg	3.90
Benzo(b)fluoranthene	190	ug/Kg	4.44
Benzo(ghi)perylene	495	ug/Kg	4.41
Benzo(k)fluoranthrene	98.1	ug/Kg	4.11
Chrysene	174	ug/Kg	1.41
Dibenzo(ah)anthracene	63.7	ug/Kg	3.99
Fluoranthene	336	ug/Kg	10.6
Fluorene	63.6	ug/Kg	3.21
Indeno(1,2,3-cd)pyrene	206	ug/Kg	3.51
Naphthalene	280	ug/Kg	4.59
Phenanthrene	260	ug/Kg	6.54
Pyrene	252	ug/Kg	1.20

p-TERPHENYL (SURROGATE) RECOVERY: 98 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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Report Date: 5 Jan 2001

Lab Number: 00-S4609
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRR1 BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 29 Dec 2000
Dilution Factor: 3

Sample Description: BLOO 981

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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710 S. 14th St. - Grand Forks, ND 58201 - 800-272-7645 - Fax 701-772-0028
35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4610

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 29 Dec 2000

Dilution Factor: 26

Sample Description: BLOO 982

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	397	ug/Kg	37.6
2-Methyl Naphthalene	500	ug/Kg	43.2
Acenaphthene	72.6	ug/Kg	37.1
Acenaphthylene	< 1110	ug/Kg	1110
Anthracene	232	ug/Kg	112
Benzo(a)anthracene	451	ug/Kg	11.4
Benzo(a)pyrene	440	ug/Kg	34.4
Benzo(b)fluoranthene	507	ug/Kg	39.2
Benzo(ghi)perylene	940	ug/Kg	39.0
Benzo(k)fluoranthrene	232	ug/Kg	36.3
Chrysene	553	ug/Kg	12.5
Dibenzo(ah)anthracene	146	ug/Kg	35.2
Fluoranthene	1240	ug/Kg	93.5
Fluorene	175	ug/Kg	28.4
Indeno(1,2,3-cd)pyrene	356	ug/Kg	31.0
Naphthalene	1110	ug/Kg	40.5
Phenanthrene	742	ug/Kg	57.8
Pyrene	671	ug/Kg	10.6

Comment: No PAH surrogate data available due to matrix interference.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTl Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885



Report Date: 5 Jan 2001

Lab Number: 00-S4610
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 29 Dec 2000
Dilution Factor: 26

Sample Description: BL00 982

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 5 Jan 2001

Lab Number: 00-S4611

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 29 Dec 2000

Dilution Factor: 20

Sample Description: SCREEN OVERSIZE 1

POLYNUCLEAR AROMATIC HYDROCARBONS

-----	Result	Units	RL
-----	-----	-----	-----
1-Methyl Naphthalene	187	ug/Kg	28.4
2-Methyl Naphthalene	184	ug/Kg	32.6
Acenaphthene	44.8	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	< 84.2	ug/Kg	84.2
Benzo(a)anthracene	238	ug/Kg	8.60
Benzo(a)pyrene	337	ug/Kg	26.0
Benzo(b)fluoranthene	531	ug/Kg	29.6
Benzo(ghi)perylene	1110	ug/Kg	29.4
Benzo(k)fluoranthrene	204	ug/Kg	27.4
Chrysene	389	ug/Kg	9.40
Dibenzo(ah)anthracene	155	ug/Kg	26.6
Fluoranthene	791	ug/Kg	70.6
Fluorene	46.9	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	490	ug/Kg	23.4
Naphthalene	374	ug/Kg	30.6
Phenanthrene	607	ug/Kg	43.6
Pyrene	387	ug/Kg	8.00

p-TERPHENYL (SURROGATE) RECOVERY: 88 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4611
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 29 Dec 2000
Dilution Factor: 20

Sample Description: SCREEN OVERSIZE 1

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4612

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRR1 BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 29 Dec 2000

Dilution Factor: 20

Sample Description: SCREEN OVERSIZE 2

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	198	ug/Kg	28.4
2-Methyl Naphthalene	210	ug/Kg	32.6
Acenaphthene	38.1	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	< 84.2	ug/Kg	84.2
Benzo(a)anthracene	177	ug/Kg	8.60
Benzo(a)pyrene	279	ug/Kg	26.0
Benzo(b)fluoranthene	474	ug/Kg	29.6
Benzo(ghi)perylene	1030	ug/Kg	29.4
Benzo(k)fluoranthrene	170	ug/Kg	27.4
Chrysene	282	ug/Kg	9.40
Dibenzo(ah)anthracene	139	ug/Kg	26.6
Fluoranthene	702	ug/Kg	70.6
Fluorene	47.4	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	468	ug/Kg	23.4
Naphthalene	436	ug/Kg	30.6
Phenanthrene	554	ug/Kg	43.6
Pyrene	311	ug/Kg	8.00

p-TERPHENYL (SURROGATE) RECOVERY: 90 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4612
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 29 Dec 2000
Dilution Factor: 20

Sample Description: SCREEN OVERSIZE 2

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4613

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 29 Dec 2000

Dilution Factor: 20

Sample Description: SCREEN OVERSIZE 3

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	524	ug/Kg	28.4
2-Methyl Naphthalene	794	ug/Kg	32.6
Acenaphthene	239	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	668	ug/Kg	84.2
Benzo(a)anthracene	1020	ug/Kg	8.60
Benzo(a)pyrene	925	ug/Kg	26.0
Benzo(b)fluoranthene	965	ug/Kg	29.6
Benzo(ghi)perylene	1870	ug/Kg	29.4
Benzo(k)fluoranthrene	455	ug/Kg	27.4
Chrysene	1110	ug/Kg	9.40
Dibenzo(ah)anthracene	204	ug/Kg	26.6
Fluoranthene	2890	ug/Kg	70.6
Fluorene	368	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	951	ug/Kg	23.4
Naphthalene	1480	ug/Kg	30.6
Phenanthrene	2440	ug/Kg	43.6
Pyrene	1840	ug/Kg	8.00

Comment: No PAH surrogate data available due to matrix interference.
RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4613
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 29 Dec 2000
Dilution Factor: 20

Sample Description: SCREEN OVERSIZE 3

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection. Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4614

Work Order #: 22-548

Account #: 004064

Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000

Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 27 Nov 2000

Date Analyzed: 29 Dec 2000

Dilution Factor: 20

Sample Description: SCREEN OVERSIZE 4

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	209	ug/Kg	28.4
2-Methyl Naphthalene	211	ug/Kg	32.6
Acenaphthene	38.1	ug/Kg	28.0
Acenaphthylene	< 840	ug/Kg	840
Anthracene	< 84.2	ug/Kg	84.2
Benzo(a)anthracene	133	ug/Kg	8.60
Benzo(a)pyrene	172	ug/Kg	26.0
Benzo(b)fluoranthene	308	ug/Kg	29.6
Benzo(ghi)perylene	553	ug/Kg	29.4
Benzo(k)fluoranthrene	103	ug/Kg	27.4
Chrysene	212	ug/Kg	9.40
Dibenzo(ah)anthracene	84.1	ug/Kg	26.6
Fluoranthene	499	ug/Kg	70.6
Fluorene	51.3	ug/Kg	21.4
Indeno(1,2,3-cd)pyrene	239	ug/Kg	23.4
Naphthalene	475	ug/Kg	30.6
Phenanthrene	446	ug/Kg	43.6
Pyrene	210	ug/Kg	8.00

p-TERPHENYL (SURROGATE) RECOVERY: 93 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 5 Jan 2001

Lab Number: 00-S4614
Work Order #: 22-548
Account #: 004064
Purchase Order Number: 18761862932

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 17 Nov 2000
Temperature at Receipt: AMBIENT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 27 Nov 2000
Date Analyzed: 29 Dec 2000
Dilution Factor: 20

Sample Description: SCREEN OVERSIZE 4

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
=====

Sample matrix interfered with U.V. detection but not Fluorescence detection.
Quantified using Fluorescence detector only.

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



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Report Date: 20 Dec 2000

Lab Number: 00-L33249

Work Order #: 22-581

Account #: 004064

Purchase Order Number: 18761862941

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 13 Dec 2000

Date Sampled: 12 Dec 2000

Temperature at Receipt: 8.0 C

Project Name: DULUTH HARBOR PROJECT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 15 Dec 2000

Date Analyzed: 18 Dec 2000

Dilution Factor: 1

Sample Description: SAMPLE 1 -RECYCLE 1

POLYNUCLEAR AROMATIC HYDROCARBONS

=====

	Result	Units	RL
	=====	=====	=====
1-Methyl Naphthalene	< 0.040	ug/L	0.040
2-Methyl Naphthalene	< 0.034	ug/L	0.034
Acenaphthene	< 0.041	ug/L	0.041
Acenaphthylene	< 0.600	ug/L	0.600
Anthracene	< 0.029	ug/L	0.029
Benzo(a)anthracene	< 0.008	ug/L	0.008
Benzo(a)pyrene	< 0.061	ug/L	0.061
Benzo(b)fluoranthene	< 0.062	ug/L	0.062
Benzo(ghi)perylene	< 0.024	ug/L	0.024
Benzo(k)fluoranthrene	< 0.071	ug/L	0.071
Chrysene	< 0.005	ug/L	0.005
Dibenzo(ah)anthracene	< 0.023	ug/L	0.023
Fluoranthene	< 0.040	ug/L	0.040
Fluorene	< 0.071	ug/L	0.071
Indeno(1,2,3-cd)pyrene	< 0.046	ug/L	0.046
Naphthalene	< 0.038	ug/L	0.038
Phenanthrene	0.193	ug/L	0.032
Pyrene	0.048	ug/L	0.010

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 20 Dec 2000

Lab Number: 00-L33249

Work Order #: 22-581

Account #: 004064

Purchase Order Number: 18761862941

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 13 Dec 2000

Date Sampled: 12 Dec 2000

Temperature at Receipt: 8.0 C

Project Name: DULUTH HARBOR PROJECT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 15 Dec 2000

Date Analyzed: 18 Dec 2000

Dilution Factor: 1

Sample Description: SAMPLE 1 -RECYCLE 1

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL

=====

p-TERPHENYL (SURROGATE) RECOVERY: 103 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

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35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885



Report Date: 20 Dec 2000

Lab Number: 00-L33250

Work Order #: 22-581

Account #: 004064

Purchase Order Number: 18761862941

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 13 Dec 2000

Date Sampled: 12 Dec 2000

Temperature at Receipt: 8.0 C

Project Name: DULUTH HARBOR PROJECT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 15 Dec 2000

Date Analyzed: 18 Dec 2000

Dilution Factor: 1

Sample Description: SAMPLE 3 - FILTRATE 1

POLYNUCLEAR AROMATIC HYDROCARBONS

=====

	Result	Units	RL
	=====	=====	=====
1-Methyl Naphthalene	< 0.040	ug/L	0.040
2-Methyl Naphthalene	< 0.034	ug/L	0.034
Acenaphthene	< 0.041	ug/L	0.041
Acenaphthylene	< 0.600	ug/L	0.600
Anthracene	< 0.029	ug/L	0.029
Benzo(a)anthracene	< 0.008	ug/L	0.008
Benzo(a)pyrene	< 0.061	ug/L	0.061
Benzo(b)fluoranthene	< 0.062	ug/L	0.062
Benzo(ghi)perylene	< 0.024	ug/L	0.024
Benzo(k)fluoranthrene	< 0.071	ug/L	0.071
Chrysene	< 0.005	ug/L	0.005
Dibenzo(ah)anthracene	< 0.023	ug/L	0.023
Fluoranthene	< 0.040	ug/L	0.040
Fluorene	< 0.071	ug/L	0.071
Indeno(1,2,3-cd)pyrene	< 0.046	ug/L	0.046
Naphthalene	< 0.038	ug/L	0.038
Phenanthrene	< 0.032	ug/L	0.032
Pyrene	< 0.010	ug/L	0.010

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

All data for this report has been approved by MVTL Laboratory Management.



MINNESOTA VALLEY TESTING LABORATORIES, INC.

1126 N. Front St. - New Ulm, MN 56073 - 800-782-3557 - Fax 507-359-2890
1411 S. 12th St. - Bismarck, ND 58502 - 800-279-6885 - Fax 701-258-9724
710 S. 14th St. - Grand Forks, ND 58201 - 800-272-7645 - Fax 701-772-0028
35 W. Lincoln Way - Nevada, IA 50201 - 800-362-0855 - Fax 515-382-3885



Report Date: 20 Dec 2000

Lab Number: 00-L33250

Work Order #: 22-581

Account #: 004064

Purchase Order Number: 18761862941

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 13 Dec 2000

Date Sampled: 12 Dec 2000

Temperature at Receipt: 8.0 C

Project Name: DULUTH HARBOR PROJECT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 15 Dec 2000

Date Analyzed: 18 Dec 2000

Dilution Factor: 1

Sample Description: SAMPLE 3 - FILTRATE 1

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL

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p-TERPHENYL (SURROGATE) RECOVERY: 101 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

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35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885



Report Date: 20 Dec 2000

Lab Number: 00-L33355

Work Order #: 22-581

Account #: 004064

Purchase Order Number: 18761862941

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 14 Dec 2000

Temperature at Receipt: AMBIENT

Project Name: DULUTH HARBOR PROJECT

EPA SW-846 Method 8310: Method Detection Limits determined according to 40CFR, Appendix B, Part 136, 1992.

Date Extracted: 15 Dec 2000

Date Analyzed: 18 Dec 2000

Dilution Factor: 1

Sample Description: SAMPLE 2 RECYCLE 2

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	< 0.048	ug/L	0.048
2-Methyl Naphthalene	< 0.041	ug/L	0.041
Acenaphthene	< 0.049	ug/L	0.049
Acenaphthylene	< 0.720	ug/L	0.720
Anthracene	< 0.035	ug/L	0.035
Benzo(a)anthracene	< 0.010	ug/L	0.010
Benzo(a)pyrene	< 0.073	ug/L	0.073
Benzo(b)fluoranthene	< 0.074	ug/L	0.074
Benzo(ghi)perylene	< 0.029	ug/L	0.029
Benzo(k)fluoranthrene	< 0.085	ug/L	0.085
Chrysene	< 0.006	ug/L	0.006
Dibenzo(ah)anthracene	< 0.028	ug/L	0.028
Fluoranthene	< 0.048	ug/L	0.048
Fluorene	< 0.085	ug/L	0.085
Indeno(1,2,3-cd)pyrene	< 0.055	ug/L	0.055
Naphthalene	< 0.046	ug/L	0.046
Phenanthrene	< 0.038	ug/L	0.038
Pyrene	< 0.012	ug/L	0.012

RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

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Report Date: 20 Dec 2000

Lab Number: 00-L33355

Work Order #: 22-581

Account #: 004064

Purchase Order Number: 18761862941

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 14 Dec 2000

Temperature at Receipt: AMBIENT

Project Name: DULUTH HARBOR PROJECT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 15 Dec 2000

Date Analyzed: 18 Dec 2000

Dilution Factor: 1

Sample Description: SAMPLE 2 RECYCLE 2

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL

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p-TERPHENYL (SURROGATE) RECOVERY: 106 %

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RL = Reporting Limits

MINNESOTA LAB # 027-015-125

WISCONSIN LAB ID # 999447680

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Report Date: 20 Dec 2000

Lab Number: 00-L33356
Work Order #: 22-581
Account #: 004064
Purchase Order Number: 18761862941

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 14 Dec 2000
Temperature at Receipt: AMBIENT

Project Name: DULUTH HARBOR PROJECT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 15 Dec 2000
Date Analyzed: 18 Dec 2000
Dilution Factor: 1

Sample Description: SAMPLE 4 FILTRATE 2

POLYNUCLEAR AROMATIC HYDROCARBONS

	Result	Units	RL
1-Methyl Naphthalene	< 0.052	ug/L	0.052
2-Methyl Naphthalene	< 0.044	ug/L	0.044
Acenaphthene	< 0.053	ug/L	0.053
Acenaphthylene	< 0.780	ug/L	0.780
Anthracene	< 0.038	ug/L	0.038
Benzo(a)anthracene	< 0.010	ug/L	0.010
Benzo(a)pyrene	< 0.079	ug/L	0.079
Benzo(b)fluoranthene	< 0.081	ug/L	0.081
Benzo(ghi)perylene	< 0.031	ug/L	0.031
Benzo(k)fluoranthrene	< 0.092	ug/L	0.092
Chrysene	< 0.006	ug/L	0.006
Dibenzo(ah)anthracene	< 0.030	ug/L	0.030
Fluoranthene	< 0.052	ug/L	0.052
Fluorene	< 0.092	ug/L	0.092
Indeno(1,2,3-cd)pyrene	< 0.060	ug/L	0.060
Naphthalene	< 0.049	ug/L	0.049
Phenanthrene	< 0.042	ug/L	0.042
Pyrene	< 0.013	ug/L	0.013

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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Report Date: 20 Dec 2000

Lab Number: 00-L33356
Work Order #: 22-581
Account #: 004064
Purchase Order Number: 18761862941

UNIVERSITY OF MINNESOTA-DULUTH
5013 MILLER TRUNK HIGHWAY
ACCOUNTING OFFICE - 380 NRRI BLDG
DULUTH MN 55811

Date Received: 14 Dec 2000
Temperature at Receipt: AMBIENT

Project Name: DULUTH HARBOR PROJECT

EPA SW-846 Method 8310: Method Detection Limits
determined according to 40CFR, Appendix B,
Part 136, 1992.

Date Extracted: 15 Dec 2000
Date Analyzed: 18 Dec 2000
Dilution Factor: 1

Sample Description: SAMPLE 4 FILTRATE 2

POLYNUCLEAR AROMATIC HYDROCARBONS

Result Units RL
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p-TERPHENYL (SURROGATE) RECOVERY: 94 %

RL = Reporting Limits

MINNESOTA LAB # 027-015-125
WISCONSIN LAB ID # 999447680

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