SUPPLEMENTAL GROUNDWATER INVESTIGATION
FINAL REPORT
for
NORTHERN STATES POWER COMPANY
ASHLAND, WISCONSIN

August 7, 1996

DAMES & MOORE

Dames & Moore Project No. 05644-071

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EXECUTIVE SUMMARY

Dames & Moore performed a supplemental groundwater investigation for Northern States Power Company (NSP) at its Ashland, Wisconsin facility. A previous groundwater investigation (Dames & Moore's Site Investigation Report and Remedial Action Plan, August 1, 1995) focuses on the former ravine fill and associated perched aquifer above the Miller Creek clay at the NSP property. The purpose of the investigation described in this report is to evaluate the nature and extent of groundwater contamination that exists below the Miller Creek clay. With this additional information, groundwater flow and contaminant migration within the perched ravine aquifer were more fully defined. The conclusions from this investigation follow:

Perched Ravine Aquifer

- Groundwater flow from the perched ravine aquifer at the mouth of the former ravine is toward the seep located immediately north of NSP's property. As a result of this flow direction, this aquifer is hydraulically separate from the wood waste fill aquifer found beneath most of Kreher Park.

- Contaminant concentrations within the perched ravine aquifer decrease over an order of magnitude downgradient from TW-13 (located within St. Clair St.). This reduction is likely caused by a strong downward vertical component of groundwater flow over this portion of the aquifer which results in flow lines that intersect the underlying Miller Creek clay aquitard. This groundwater flow direction results in contaminant attenuation and head dissipation through the underlying aquitard. Over the lower reaches of the ravine fill (i.e., at MW-5 located at the northwest corner of NSP's storage yard), where groundwater flow is nearly horizontal, lower contaminant concentrations are measured in the deeper portion of the aquifer.

- Contaminant concentrations within the perched ravine aquifer, together with those measured at the seep, indicate another source of contamination. An order of magnitude difference between samples from MW-5 and samples from the seep have been measured, where MW-5 is upgradient from the seep. This source is likely beneath Wisconsin Central Limited property immediately upgradient from the seep.

- The planned trench and cap proposed as the interim remedial action is appropriate to contain and treat contaminated groundwater associated with the perched ravine aquifer on NSP's property.

Copper Falls Aquifer

- The source of contamination for the aquifer sands below the Miller Creek clay (i.e., Copper Falls aquifer) is potentially DNAPL material. Such source materials are suggested by high contaminant concentrations in the MW-13B deep piezometer that occur within a strong upward groundwater flow regime. The likely migration pathway for this material is from the perched ravine aquifer through a discontinuity in the Miller Creek clay aquitard. This discontinuity does not affect the confined nature of the Copper Falls aquifer (see Figures 5, 6, and 7).

- A vertically oriented contaminant plume containing VOCs and SVOCs is present within the Copper Falls aquifer beneath NSP's property. This plume is of limited vertical and lateral extent. It is limited vertically to the uppermost portion of the Copper Falls aquifer by a strong upward vertical gradient. This groundwater flow direction results in contaminant attenuation and head dissipation through the overlying Miller Creek clay aquitard. This plume has not been previously identified by earlier studies. It is limited to an area northwest of the NSP property, and beneath the Miller Creek formation in the area of the ravine. As suggested by the prior drilling results by Northern Environmental Technologies and groundwater analytical results from flowing artesian wells at Kreher Park, lateral contaminant plume migration northwest of MW-7A is limited. Calculations of groundwater advective flow (65 ft/yr), estimates of time since contaminant source migration (as much as 100 years), and the approximate downgradient extent of the plume (450-500 ft) suggest that the plume is at steady state conditions.

- The contaminant plume within the Copper Falls aquifer is separate from the contaminated wood waste fill aquifer at Kreher Park. These aquifers are hydraulically separated by the continuous Miller Creek clay aquitard. This separation is confirmed by observations during drilling, differences in sample contaminant constituent concentrations, and hydraulic head measurements.

1.0 INTRODUCTION

The purpose of this supplemental groundwater investigation was to evaluate the nature and extent of groundwater contamination beneath the Northern States Power (NSP) property located in Ashland, Wisconsin. Contamination was found in samples from aquifer sands below the Miller Creek clay. This clay is present at the base of the former ravine located on NSP's property. This report documents and presents conclusions concerning the results of this supplemental investigation. Field activities, including the installation and sampling of water table monitor wells and piezometers, took place from May 20, 1996 to June 5, 1996. These activities were conducted in accordance with the Supplemental Investigation Work Plan dated April 30, 1996. This work plan proposed the installation of two water table wells and five piezometers on and adjacent to NSP property. The work plan was conditionally approved by the Wisconsin Department of Natural Resources (WDNR) in correspondence dated May 9, 1996. Two additional conditions the WDNR required following a review of the work plan included installation of an additional well nest located at the corner of Prentice and St. Claire Streets, and documentation concerning the 1995 underground storage tank (UST) removal. The requested well nest installation (MW-8 and MW-8A) was included in the field activities performed during this investigation. The 1995 UST removal documentation is included as part of this report (see Appendix A).

1.1 BACKGROUND

A comprehensive site background is presented in Section 1.1 of the Site Investigation and Remedial Action Plan prepared for NSP by Dames & Moore on August 1, 1995. This background includes discussions concerning the following: the site's former usage as a Manufactured Gas Plant (MGP) facility, the historical filling of the former ravine, the results of environmental assessments conducted on adjacent property (i.e., to the north at Kreher Park), and the work plan submitted by NSP to the WDNR in response to a Responsible Party (ARP@) Letter issued pursuant to the Wisconsin Spill Law.

The August 1995 Dames & Moore Report was performed to characterize the extent of contamination in the fill soils placed in the former ravine. Contaminated unsaturated and saturated zone soils were found within the ravine fill. Coal tar contaminated soil was found across the base of the ravine fill. Analytical results indicated that contaminants predominately consist of volatile organic compounds (VOCs), semi-volatile compounds (SVOCs) and metals. Many of the SVOCs

PRODUCT

are typical of coal tar (i.e., naphthalene and benzo (a) pyrene), but the BTEX constituents are more indicative of petroleum contamination. MPG WASTE

Contaminated groundwater was characterized within the perched ravine aquifer. The primary source of groundwater contaminants is the coal tar ~~contaminated soil~~ found at the base of the ravine fill. Groundwater VOCs and SVOCs from this aquifer appear to discharge off-site at a point downgradient from the mouth of the former ravine (i.e., the seep location). An additional source of SVOC and VOC contamination downgradient from the NSP site appear to contribute to the groundwater impacts found at the seep. Additionally, numerous other potential sources of SVOC and VOC appear to contribute to the groundwater impacts found beneath Kreher Park.

PRODUCT

A variety of remediation alternatives for that portion of the groundwater contamination originating from the NSP property were evaluated in the Dames & Moore August 1995 Report. The results of this analysis indicated that a groundwater interceptor trench across the mouth of the former ravine together with a groundwater collection and treatment system would most effectively remediate contaminant migration. This system would be coupled with the installation of a low permeability cap above the ravine fill soils to limit infiltration. Together these systems comprised the proposed Interim Remedial Action for this site.

Conditional approval of the proposed Interim Remedial Action was granted by the WDNR in a letter dated September 29, 1995 to NSP. Following this approval, design specifications and bidding for the proposed installation was conducted by Dames and Moore for NSP. Withdrawal of this approval, based on an understanding that NSP was no longer planning on the implementation of the Interim Remedial Action, was made in a letter dated March 1, 1996 from the WDNR to NSP. Subsequent correspondence from NSP to the WDNR dated March 4, 1996 clarified the cause for deferral in this implementation. The deferral, which was based on discussions with WDNR personnel, has been made until the results of the Chequamegon Bay sediment investigation are available and evaluated. Additionally, modifications to the Interim Remedial Action could be assessed pending the recommendations of this supplemental investigation. To determine the depth of excavation required for the interceptor trench a series of borings were advanced in October 1995 along the proposed trench (see boring GP-1 through GP-9 on Figure 1). Additionally, the MW-5/-5A/-5B well nest (see Figure 1), was installed at that time to assess the thickness of the Miller Creek clay beneath the proposed interceptor trench, and assess the potential for underflow beneath this proposed structure. Results indicate a thin (1

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foot) silty sand of limited aerial extent present within the Miller Creek clay beneath a portion of the proposed interceptor trench. The location of this sand coincides with the axis of the former ravine. From water level information, the limited areal extent of this sand, and the nature of the contaminant concentrations, it is likely that this sand is isolated from both the perched ravine aquifer above and the Copper Falls sand aquifer below. The proposed depth of the interceptor trench is sufficient to collect water from this Miller Creek sand. This sand is separated from the Copper Falls sand aquifer below (i.e., MW-5B completion) by a laterally continuous three-feet ? thick clay interval. The Copper Falls sand aquifer is found under confined conditions and its piezometric surface is approximately ½ foot higher than the Miller Creek sand. This suggests the lowermost Miller Creek clay interval is an effective aquitard.

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This supplemental groundwater investigation is a response to issues discussed at the meeting between NSP and WDNR representatives on March 26, 1996, and WDNR correspondence dated April 15, 1996, concerning contamination detected in samples from piezometers MW-5A and MW-5B. Analytical groundwater results for samples collected from the MW-5, -5A and -5B wells were reported in correspondence from Dames & Moore to WDNR dated October 26, 1995. The impacted groundwater is from aquifer sands within and beneath the lacustrine clays of the Miller Creek Formation. The aquifer sands beneath the Miller Creek clays are within the glacial till and outwash sediments of the Copper Falls Formation. The impacted aquifers are beneath and separate from the fill associated with the former ravine. ?

Comments in this report make reference to information from the following previous reports:

- Environmental Assessment - City of Ashland, Wisconsin Wastewater Treatment Plant Site - Revision 2, Northern Environmental Technologies, August 21, 1989.

- Existing Conditions Report - Ashland Lakefront Property - Ashland, Wisconsin, Short Elliott Hendrickson, February 1995

- Final Report - Ashland Lakefront/Northern States Power Project - Ashland, Wisconsin, Dames & Moore, March 17, 1995.

- Site Investigation Report and Remedial Action Plan - Northern States Power - Ashland, Wisconsin, Dames & Moore, August 1, 1995.

- Design Report, Bidding Document, Plans and Specifications for Interim Remedial Action - Northern States Power - Ashland, Wisconsin, Dames and Moore, October 4, 1995.

- Draft Remediation Action Options Feasibility Study - Ashland Lakefront Property - Ashland, Wisconsin, Short Elliott Hendrickson, February 1996

2.0 SITE ACTIVITIES

2.1 WELL INSTALLATION AND DEVELOPMENT ACTIVITIES

Figure 1 shows the present site conditions including the location of all existing and recently installed monitor wells and piezometers. Locations and elevations of these wells are based on surveying conducted by Nelson Surveying and Engineering of Ashland, Wisconsin. This survey references the survey performed by Short Elliot and Hendrickson (SEH) at Kreher Park, located north of the NSP property, in their February 1995 Existing Conditions Report.

Field activities at the NSP site included installing three water table monitor wells and eight piezometers, development of these wells and one round of groundwater sampling from each of the installed wells. In addition, water levels were measured in all newly installed and existing monitor wells. Existing wells include those previously advanced by Dames & Moore on NSP's property (MW-1, MW-2, MW-3, and MW-4), the temporary monitor well (TW-13) advanced by SEH on St. Claire Street, and the permanent water table monitor wells (MW-1, MW-2 and MW-3) installed at Kreher Park by Northern Environmental Technologies (NET).

All borings advanced during this site investigation were continuously sampled with a two inch split spoon sampler over those intervals not previously characterized. Boring logs for all installed monitor wells are included in Appendix B. Previously logged borings include those for MW-4 and TW-13, which are included in the Dames and Moore's August 1995 Report, and SEH's February 1995 Report, respectively. These two water table monitor wells were advanced to the base of the former ravine. Additionally, as described in Section 1.1 of this report, MW-5, MW-5A and MW-5B were previously advanced by Dames and Moore. Soil Boring Logs, Monitor Well Construction Forms, and Well Development Forms for the wells at the MW-5 well nest are included in Appendix B of this report.

Piezometers MW-4A, MW-4B, MW-5C, MW-13A and MW-13B , all of which are located along the axis of the former ravine, were advanced to a depth sufficient to complete screened intervals within the Copper Falls sand aquifer. The MW-5C boring was advanced to a depth sufficient to complete a screened interval 22 feet below the base of the screened interval in MW-5B. The MW-4A and MW-13A borings were advanced to depths sufficient to complete screened intervals in the sand aquifer found immediately below the base of the Miller Creek clay interval.

In both cases, on-site soil boring sample descriptions indicated contamination in these uppermost Copper Falls sands. Consequently, deeper piezometers (MW-4B and MW-13B) were advanced to depths sufficient to complete screened intervals 24 and 20 feet, respectively, below the base of the screened interval in the shallower piezometers.

During this investigation, temporary 10 inch casing was set through the ravine fill interval for all piezometer borings advanced along the axis of the former ravine. This temporary casing was used to prevent cross contamination to deeper intervals. In the case of the -B and -C piezometer borings, temporary casing was set through the contaminated uppermost Copper Falls sand interval. After setting temporary casing the borings were then advanced by 6 inch mud rotary drilling. Drilling equipment was decontaminated prior to advancing the boring below the cased depth. Decontamination water was contained in temporary storage tanks and is presently stored on-site.

Temporary casing was not utilized for the well nests installed both outside the axis of the former ravine (MW-7 and MW-8), and upgradient from known ravine fill contamination (MW-6). These wells were advanced by 6 inch rotary drilling with the exception of the water table monitor well at MW-7, which was advanced with a 8d inch hollow stem auger. Cuttings from installed wells during this investigation were drummed and are presently stored on-site.

Three Shelby tubes were collected from the MW-4A and MW-13A borings. In the MW-4A boring these tube samples were collected from the 14 to 16 foot and the 20 to 22 foot depth intervals. In the MW-13A boring the tube sample was collected from the 24 to 26 foot depth interval. A Shelby tube sample was attempted in the MW-13A boring at a depth of 28 feet; however, the soil was too hard. Shelby tube samples were collected to characterize the permeability of the Miller Creek clay aquitard interval.

All the monitor wells and piezometers were installed according to ch. NR 141 Wisconsin Administrative Code (WAC) requirements. Most installed monitor wells were developed by removing ten well volumes of water. This was impractical in certain cases (i.e., wells were bailed dry). For these cases (MW-4A, MW-6, MW-7, MW-8, and MW-8A) the wells were bailed dry between 5 and 8 times. Completed Monitor Well Construction Forms and Well Development Forms are included in Appendix B. A summary of monitor well and piezometer

construction details is presented on Table 1. All newly installed monitor wells and piezometers are equipped with surface flush mounts. Exceptions to this are the MW-7 and MW-7A wells which are equipped with casing above the ground surface. Due to the artesian flow encountered in MW-7A, this well is equipped with a pressure gauge. The reference point for water level measurements in this piezometer is based on the surveyed elevation of the pressure gauge (MW-7 well is located immediately adjacent to and at the same elevation as the surface seep - see Figure 1).

2.2 GROUNDWATER SAMPLING, PERMEABILITY TESTING AND LABORATORY ACTIVITIES

One round of water level measurements were taken from all existing and newly installed water table monitor wells and piezometers located on or adjacent to NSP's property. This includes the previously installed water table monitor wells within the perched ravine aquifer (i.e., MW-1, MW-2, MW-3, and MW-4). Additionally, water level measurements were taken from the three permanent water table monitor wells at Kreher Park. Results of this round of water level measurements are summarized on Table 2.

Slug test or bail recovery testing was performed on all newly installed monitor wells following well development. Bail recovery test information was obtained on those wells that were bailed dry during well development (i.e., MW-4A, MW-6, MW-7, MW-8, and MW-8A). Individual well data logger output files and respective time/displacement plots are included in Appendix C. Hydraulic conductivity measurements calculated from these well test results are summarized on Table 4.

Soil sample analytical testing, which includes sieve gradation analyses, Atterberg limits analyses and back pressure permeability testing, were performed at Dames & Moore's soils laboratory. Six soil samples were selected from sand and silty sand intervals to be analyzed for grain size distributions. Two soil samples were selected from clay intervals to be analyzed for Atterberg limits. These analyses were used to quantify soil classifications described in the field. Three of these selected soil samples were collected with Shelby tubes. Sieve gradation and Atterberg limits analysis results are included in Appendix D and are summarized on Table 3. Shelby tube samples were collected from Miller Creek clay intervals in the MW-4A and MW-13A borings. Back pressure constant head permeameter testing was performed on these samples to determine vertical

permeability in these aquitard samples. Results of this testing are included in Appendix D, and are summarized on Table 4.

Groundwater samples were collected from all newly installed monitor wells. These samples were analyzed by Northern Lake Laboratories, a WDNR certified laboratory. Tests performed on each sample included Method 8021 for VOCs, Method 8270 for SVOCs, and analyses for selected metals (e.g., arsenic, calcium, chromium, copper, iron, lead, zinc, and selenium). This suite of analytical tests is the same as that used by Dames & Moore for the May and June 1995 groundwater sampling events.

2.3 DATA BASE SEARCH

A database search was conducted for all publicly listed facilities in proximity to the NSP property that handle or store wastes and/or products that potentially could be sources for contamination. Spill history information was also included in this search. Results of this search is included in Appendix F.

A total of 16 sites are located within ½ mile of NSP's property. Most of these sites are located toward the south and southwest. Of the 16 sites located, eight are leaking registered storage tank sites (LRSTs), six are registered storage tank (RSTs) sites and two are RCRA small quantity generators. Additional sites are listed that are not plottable based on location information provided in the database. No spills requiring reporting to the Emergency Response Notification System (ERNS), including petroleum related spills, were reported in the vicinity of NSP's property.

Of the eight LRSTs located, six are found within 0.2 to 0.4 miles of NSP's property in an upgradient direction (i.e., toward the south). The clean groundwater analytical results for samples from the upgradient MW-6 well nest (see Figure 1) suggests that off-site migration of petroleum contaminants onto NSP's property is not likely. Consequently, no further investigation regarding the nearby LRSTs was performed.

2.4 TANK CLOSURE REPORT

The tank closure report performed for NSP by Tank Removal Specialists is included in Appendix A. This closure involved removal of a 10,000-gallon underground fiberglass gasoline

storage tank on NSP's property in April 1995 (see Figure 1 for location). The reported condition of the tank and piping was good and no obvious leaks were observed. Results from the analyzed soil sample, reportedly taken ½ foot above the water table along the south wall of the excavation, indicate DRO, GRO, and individual BETX constituent concentrations significantly above the NR 720.09 residual contaminant. Additionally, high concentrations of certain PAH constituents were detected in the sample. A petroleum sheen and odor were observed in free standing water within the excavation. Based on the history of this site, the source for this contamination could not be confirmed (please see further discussion in Section 4.1).

3.0 INVESTIGATION RESULTS

3.1 HYDROGEOLOGICAL RESULTS

3.1.1 Perched Ravine Aquifer Results

Based on the results of the borings advanced during this investigation, the contoured configuration of the base of the former ravine has been updated (see Figure 2). This update also includes the results from the GP-1 through GP-9 series of borings located across the former ravine near its mouth. The ravine fill encountered while boring the southern most piezometer, MW-6A, results in extending the former ravine approximately 120 feet further south than previously mapped. This extension coincides with the location of the former ravine as shown on the 1886 Sanborn Map. The Sanborn Map shows this location as the southernmost extent of the former ravine.

Water level measurements are summarized on Table 2. These measurements include both the results from this investigation and previous water level measurements made by Dames & Moore. Using the most recent (June 1996) measurements, water levels within the perched ravine aquifer are contoured on Figure 3.

Groundwater flow within the perched aquifer within the northern portion of the ravine is toward the northwest, which coincides with the ravine axis. The horizontal gradient across this portion of the perched ravine aquifer as measured between the TW-13 and MW-5 is 0.13 ft/ft. A water table mound is prominent between MW-3 and MW-4. This mound affects the groundwater flow direction in the southern portion of the perched ravine aquifer. Groundwater flow south of the mound is toward the southeast. The horizontal gradient in this direction is approximately 0.04 ft/ft. This flow direction is opposite to the regional groundwater flow (i.e. northwest toward Chequamegon Bay). For the June 1996 measurement round, MW-4 is approximately 1 foot higher than MW-3. However, for both the April and June 1995 measurement rounds, MW-3 was higher than MW-4 by approximately 2½ feet and ¼ foot, respectively. Water levels in MW-4 are approximately 5 feet higher than MW-6. Unsaturated conditions were found in the ravine fill at the MW-6 location. The water table measurement in this well reflects a water level within the Miller Creek interval (i.e., unconfined aquifer conditions beneath the ravine fill). Likewise, the water level measurements shown on Figure 3 for MW-7 and MW-2 (NET), are not from the perched ravine aquifer. These levels reflect water table conditions associated with the wood waste

fill interval. This interval, based on borings reported by SEH in their February 1995 Report, is found beneath many portions of Kreher Park. The horizontal gradient measured between MW-7 and MW-2 (NET), which is located toward the northwest in Kreher Park is 0.01 ft/ft. Based on the previous water level measurements performed by SEH at Kreher Park, the horizontal gradient in the wood waste fill aquifer is extremely small. Consequently, most of the change in head observed between MW-7 and MW-2 (NET) is likely found immediately north of MW-7.

The elevation of the seep (approximately 610 feet) is over five feet above the water table level in MW-7, which is located immediately adjacent to the seep. Unsaturated sediments were encountered in MW-7A above the wood waste fill water table. The seep, therefore, likely results from the intersection of the ground surface with a perched water table. The 610 elevation contour on Figure 3 is oriented such that it only intersects the 610 ground surface contour at the seep location. The horizontal gradient in this portion of the perched aquifer (i.e., between the seep and MW-5) is 0.05 ft/ft. This is significantly less than that calculated for this aquifer further to the south (0.13 ft/ft). This reduced gradient likely results from the lack of lateral confinement (i.e., sides of the ravine) for this aquifer north of the ravine mouth. At this location, the aquifer is beneath the Wisconsin Central Limited (WCL) property.

3.1.2 Site Geology Results

Figure 4 shows cross sections along and across the former ravine (cross sections A-A' and B-B', respectively). Sediment sample sieve gradation and Atterberg Limit results are integrated into these sections. The results of these analyses are summarized on Table 3. These results indicate that the Miller Creek aquitard is a low plasticity, slightly silty clay and the Copper Falls aquifer is a silty sand.

Section A-A' includes the descriptions of borings advanced at Kreher Park by NET in their August 1989 Report. These borings were advanced through the Miller Creek clay interval into the underlying Copper Falls glacial till and outwash sediments. The depths at which these borings encountered artesian flow are shown on Figure 4. Samples from these borings were screened with a PID instrument. There were no reported Copper Falls sand intervals which showed high PID values or were described as contaminated.

The Miller Creek clay aquitard interval is thickest (i.e., up to 40 feet thick) at the northern end of Section A-A' (i.e., nearest Chequamegon Bay). In this area, the clay interval is described as a lacustrine clay and is laterally continuous. In addition to thinning towards the south, the Miller Creek clay becomes generally more silty changing from a plastic clay (CH) to a lower plasticity, silty clay (CL). Minor thin discontinuous silty sand beds are present within the clay interval. The Miller Creek clay thins to six feet thick in the MW-7A boring. This thinning is due to an inclined base of clay surface. This surface most likely represents clay to sand transitions within individual beds of the Miller Creek Formation that progressively occur within shallower beds toward the south. South of the MW-7A boring, the clay interval generally becomes thicker. Immediately south of MW-7A, this thickening is attributed to the location of the former Chequamegon Bay shoreline prior to historical lakefront filling (i.e., southern edge of wood waste fill). Further south, a 1 foot thick silty sand of limited areal extent is found within the Miller Creek clay in the MW-5A boring. This sand is found in several nearby borings (GP-4, GP-5, and GP-7) at similar elevations, but is not present in the nearby GP-6 or B-19 borings. Based on boring log information beyond this immediate area, the lateral extent of this silty sand is not known. However, hydraulic head and contaminant concentration values suggest that this silty sand is isolated from both the perched ravine aquifer above and confined Copper Falls sand aquifer below.

Continued thickening of the clay toward the south is caused by the increase in elevation for the base of the ravine. This increase is greater than the increase due to the inclined base of the Miller Creek clay. The thickest Miller Creek clay interval was measured in the MW-13 well nest (13 feet thick). South of the MW-13 well nest, the Miller Creek clay changes its depositional pattern. In the MW-4 well nest borings, located 170 feet south of MW-13, a mostly silty interval is laterally equivalent to the clay. Within this overall silty interval are thin permeable silty to clean sands that grade laterally into the clay toward the north.

The transition in the Miller Creek clay is shown on the generalized fence diagram on Figure 4. This fence diagram also serves to show the correlation between the MW-4 well nest and the MW-8 well nest located toward the north on St. Claire Street. South of MW-4, this silty interval becomes progressively more sandy. Above this interval, the Miller Creek contains an upper clay that is found immediately below the base of the ravine fill in both MW-4 and MW-6. Note that Figure 4 incorporates the results of the previous borings advanced in locations between the MW-13 and MW-4 well nests (i.e., B-13, B-14, B-15, and B-17). Based on these intervening borings

a dashed line, as shown on Figure 4, shows the maximum ravine depth in the area between MW-4A and TW-13. Additionally, the nature of the sediments encountered beneath the base of the ravine fill, although limited to the bottom of these borings, are incorporated on this figure.

The transition in the Miller Creek Formation from a mostly clay unit to a silt to sand interval unit produces an area at the base of the former ravine where more permeable, relatively clean sands are in potential contact with the ravine fill (i.e., hydraulic conductivity measured in MW-4A is 8.5×10^{-5} cm/sec). This potential is greatest in the axis of the ravine between B-13 and B-17. The location of the above-described Miller Creek aquitard transition is also generally coincident with the location of the former underground storage tanks as shown on Figure 1.

The Copper Falls formation includes glacial till and glacial outwash sediments. Figure 4 shows a greater preponderance of outwash sediments (i.e, clean sands and occasional gravel intervals) beneath Kreher Park. This is in contrast to the mostly silty sands beneath NSP's property. Bedding within sediments deposited in a glacial till environment would tend not to be laterally extensive. Consequently, the clay and silt intervals shown on Figure 4 within the Copper Falls Formation beneath NSP's property are interpreted to be laterally discontinuous. The discontinuous nature of these beds is shown by the 2-foot thick clay lens found immediately below the base of the Miller Creek clay in the MW-5B well. This interval is laterally discontinuous based on the nearby GP-4 through GP-7 boring results.

3.1.3 Hydraulic Conductivity Results

Permeability information obtained from well tests and laboratory permeability tests are summarized on Table 4. This information is also annotated on the cross-sections of Figure 4.

In general, the hydraulic conductivity of the Copper Falls sand aquifer varies over a small range of values (i.e. from 3.7×10^{-4} cm/sec to 1.5×10^{-3} cm/sec in MW-13B and MW-5B, respectively). The exception to this is MW-8A, where bail recovery information indicates a hydraulic conductivity measurement of 1.4×10^{-6} cm/sec. Review of the soil samples from the screened interval in this well indicate no greater silt content or sample penetration rate change that would account for the low recovery rate. Consequently, the low hydraulic conductivity measured in this well may reflect a partially plugged screen (i.e., less effective filter pack installation).

The hydraulic conductivity measurement for the perched ravine aquifer in the MW-5 monitor well (5.0×10^{-3} cm/sec) is higher than the geometric mean of values for this aquifer as reported in the Dames & Moore August 1995 Report (3.0×10^{-4} cm/sec). This average was based on slug test results from the four previously installed water table monitor wells.

Vertical hydraulic conductivity measurements were obtained for the Miller Creek clay and silt units by back pressure permeameter analyses that were performed on the Shelby tube samples collected from the MW-4A and MW-13A borings. These results indicate a vertical hydraulic conductivity for the clay aquitard that is between 4.6×10^{-8} cm/sec to 6.9×10^{-8} cm/sec. The silt unit collected in the Shelby tube sample from 20-25 feet in the MW-4A boring has a similar hydraulic conductivity value to that of the clay aquitard (4.5×10^{-8} cm/sec). Hydraulic conductivity measurements of the Miller Creek silts and sands south of the clay to sand transition are generally lower than the Copper Falls sand aquifer below. Slug and bail recovery tests from MW-4A and MW-6 result in hydraulic conductivity values for the SP/SM sand intervals in these wells of 7.4×10^{-5} cm/sec and 6.7×10^{-5} cm/sec, respectively.

3.1.4 Vertical Gradient Results

Table 5 summarizes the vertical groundwater gradients calculated between the various aquifer units. The vertical gradient between the perched ravine aquifer and the shallowest (A-series) piezometers indicate a wide range of downward flow conditions. The smallest downward gradient is seen in the MW-5/-5A interval (-0.06 ft/ft), whereas a strong downward gradient of -0.52 ft/ft is seen in the TW-13/MW-13A interval. Vertical gradients within the Miller Creek silts and sands south of the clay to sand transition indicate strong to moderate downward flow conditions (MW-4/-4A and MW-6/-6A intervals measured at -0.42 ft/ft and -0.16 ft/ft, respectively). Vertical gradients within the Copper Falls sand aquifer indicate strongly upward flow conditions (MW-5B/-5C and MW-13A/-13B intervals measured at 0.40 ft/ft and 0.41 ft/ft, respectively). The vertical gradient measured in the MW-7 well nest between the wood waste fill aquifer and the underlying Copper Falls sand aquifer is strongly upward (0.42 ft/ft). Likewise, a vertical gradient is likely present beneath Kreher Park since artesian flow was reported in several of the NET borings advanced to the Copper Falls sand aquifer.

3.1.5 Flow Net Diagram

Figure 5 shows flow net profiles for cross sections A-A' and B-B'. These profiles are constructed by contouring potentiometric surface elevations (i.e., equipotential lines) across the contacts between the major aquifer and aquitard units. The equipotential lines extrapolated beneath Kreher Park are estimated based on values required to produce artesian flow in the respective NET borings. Note that on Figure 4 a potentiometric surface elevation is reported for AW-1, an artesian well located north of NSP's property. The 624 foot elevation for this surface was estimated by NET in their August 1989 Report based on pressure gauge information. No information is available concerning the depth of this well or the zone from which the artesian flow is occurring.

Based on the location of the 620 foot equipotential contour line at elevation 590 feet at points between the MW-4, MW-8 and MW-13 well nests, the horizontal component of groundwater flow direction within the Copper Falls sand aquifer is shown to be toward the northwest. This direction and the estimated equipotential contours for this elevation within the confined aquifer is shown on Figure 3. The horizontal gradient calculated from these contours varies between 0.03 ft/ft and 0.07 ft/ft. These horizontal gradients are approximately an order of magnitude less than the vertical gradients measured in this aquifer.

3.2 ANALYTICAL RESULTS

Table 6 summarizes the results for detected VOCs in groundwater samples collected during this investigation and those collected from the MW-5 well nest during the October 1995 sampling event. Groundwater enforcement standards (ESs) and preventative action limits (PALs) based on ch. NR 140 WAC standards are shown for each detected analyte. Sample concentration values that exceed the ES are highlighted. Nine analytes were found to be in exceedance of their respective ES in one or more groundwater samples. Two of these analytes, bromodichloromethane and chloroform, were found at low to trace concentrations in samples from MW-6A and MW-8 only. No significant level of contamination is associated with these two analytes. Seven analytes (benzene, ethylbenzene, naphthalene, toluene, 1,2,4-trimethylbenzene, o-xylene and m+p-xylene) occur in multiple samples. The analytes of most concern are the BTEX constituents and naphthalene. Total BTEX constituents for each sample are summed along the last row of Table 6. Of these, benzene consistently shows the highest concentration. Groundwater samples from

MW-4A, MW-5A, MW-5B, MW-7A, MW-8A, MW-13A, and MW-13B exceed the ES for benzene by greater than three orders of magnitude. Groundwater samples from MW-6 and MW-6A display no exceedances for any of the analytes of concern. Note that the o-xylene concentrations detected in these samples (2.2 μg/L and 2.3 mg/L, respectively) is approximately the concentration detected in the field blank (2.7 μg/L) for this analyte. Therefore, the detects in groundwater samples from these two wells is likely caused by field contamination.

Table 7 summarizes the results for detected SVOCs in groundwater samples collected during this investigation and those collected from the MW-5 well nest during the October 1995 sampling event. Groundwater ESs and PALs based on ch NR 140 WAC, are shown for those SVOC analytes for which standards have been established. Sample concentration values that exceed the ES are highlighted. Of the SVOC analytes for which an ES has been established, naphthalene consistently yields high concentrations. Groundwater samples from MW-4A, MW-4B, MW-13A, and MW-13B yield concentrations that exceed the ES by more than two orders of magnitude. Total SVOC (i.e., PAHs) constituents for each sample are summed along the last row of Table 7. Groundwater samples from MW-6, MW-6A, and MW-8 yielded no detected levels of SVOCs.

Table 8 summarizes the results for metals detected in groundwater samples collected during this investigation. No significant levels of metals contamination, with the exception of iron found in two samples, are present in the groundwater sampled.

Table 9 provides a summary of previous groundwater analytical results for benzene, naphthalene, total BTEX, and total PAHs. These sample events were performed by Dames & Moore and SEH and are reported in their August 1995 and February 1995 reports, respectively. This summary allows for ease of comparison between wells and sampling events used to contour the isoconcentration profiles (Figures 6 and 7) in this report.

3.2.1 Isoconcentration Profiles

Figure 6 shows the isoconcentration profile for total BTEX. This profile incorporates the analytical results from samples collected during this investigation, the October 1995 sample event (MW-5, MW-5A, and MW-5B) and the May 1995 sample event (MW-4, TW-13, MW-2 (NET), and TW-9). The May 1995 concentration values were chosen because the seep showed the highest contaminant concentrations as compared to other sampling events.

High concentrations of total BTEX are seen in samples from the deep piezometers at MW-5B, MW-13A and MW-13B within the Copper Falls sand aquifer. These values occur within a groundwater flow regime that shows a strong upward vertical component. Downgradient from these values (i.e., north) concentrations diminish significantly both laterally, toward MW-7A, and with depth, toward MW-5C. Likewise, in an upgradient direction total BTEX values diminish significantly toward MW-4B and effectively yield non-detect levels at MW-6A. From a sidegradient position, groundwater samples from MW-8A show a total BTEX concentration that is more than one-third less than that measured in MW-13A. These concentration values define a groundwater contaminant plume beneath the NSP property. The long axis of this plume is oriented toward the northwest in the direction of advective groundwater flow.

In the area of the Miller Creek clay to sand transition, BTEX concentrations in TW-13 and MW-4A are similar (32,700 µg/L and 32,600 µg/L, respectively) and occur in an area with a strong downward vertical component of groundwater flow. These concentrations suggest that this transition area is a potential migration pathway for contaminants from the shallow perched ravine aquifer to the deeper Copper Falls sand aquifer.

Concerning the perched ravine aquifer, total BTEX concentrations in samples from MW-5 are less than either the upgradient TW-13 sample or downgradient seep sample. Groundwater sampled from near the top of the groundwater mound (MW-3) have significantly lower BTEX concentrations than those taken at TW-13. The total BTEX concentrations measured in the sample from the wood waste interval (3,520 mg/L) at MW-7 is within the range of total BTEX values measured from other wood waste fill aquifer monitor wells at Kreher Park (see Table 9). A discussion concerning this information and how it relates to contaminant flow in the perched ravine aquifer is found in Section 4.2 of this report.

Figure 7 shows the isoconcentration profile for total PAHs. As on Figure 6 this profile incorporates the analytical results from samples collected during this investigation and the May 1995 sample round information. This figure shows the same general configuration of contaminants and concentration gradients as those that occur on Figure 6. Two exceptions to this are the comparison of contaminant levels between shallow and deep aquifers and the relative concentrations of contaminants sampled at the seep. Total PAH concentrations within the most contaminated portion of the Copper Falls sand aquifer (22,584 mg/L from MW- 13A) are similar to those collected from the perched ravine aquifer (22,530 µg/L from TW- 13). The relative

concentrations of SVOCs in the contaminant plume likely results from the lower solubility of these compounds as compared to VOCs. Total PAH concentrations from samples collected at the seep are significantly higher (i.e., 50 times higher) than those sampled upgradient in the MW-5 water table monitor well. This relationship suggests the presence of an additional source of SVOC contamination. This source is located downgradient from the MW-5 well, likely beneath the WCL property.

4.0 DISCUSSION

4.1 UST REMOVAL

The contaminated soil sample that was collected during the UST tank removal was taken only slightly above the reported water level within the excavation (i.e., sample collected at 6.5 feet and water level reported at 7 feet). Fluctuations in the level of the groundwater mound (see Section 3.1.1), which has developed over this portion of the perched ravine aquifer, would likely cause the sampled soil interval in the excavation to periodically be under saturated conditions (i.e., at times below a higher water table or within the capillary fringe). Consequently, it is possible that the soil contaminants measured in this sample reflect matrix interference from groundwater contaminants found in the saturated zone. The sheen reportedly observed on water in the excavation may be attributable to groundwater movement though other contaminated portions of the ravine fill. However, a portion of the groundwater and ravine fill contamination characterized in the Dames and Moore August 1995 Report as an apparent fuel source may be attributed to potential leakage from this tank or other tanks previously located on NSP's property (see Figure 1).

Shallow fill with a strong petroleum odor was indicated above the water table over the upper reaches of the ravine fill (i.e., upgradient from St. Claire Street). High groundwater BETX concentrations were measured over this same portion of the perched ravine aquifer. Based on the history of this site and the condition of the fiberglass tank as reported in the Tank Removal Site Report (i.e., tank and piping in good condition), the indicators of leakage from this underground storage tank are not conclusive. A more likely source of the shallow fill contamination (i.e., as shallow as 1-2 feet below the surface in the B-15 and B-17 borings) are the gasoline storage tanks formerly located immediately north of MW-4. These tanks which are shown on the 1946 and 1951 Sanborn Maps are not noted as being below grade. Consequently, they potentially may have served as surface sources of petroleum contamination.

4.2 PERCHED RAVINE AQUIFER

Groundwater flow over the southern portion of the perched ravine aquifer is affected by the water table mound and strong downward gradients. This water table mound is prominently shown on both flow net cross sections (see Figure 5). The cause of this groundwater mound is unknown.

The source area contributing to this mound is closer to MW-3 than to MW-4. MW-4 is in a regionally upgradient position relative to MW-3. Historical measurements made in 1995 yielded elevation values in MW-4 lower than MW-3. Although MW-4 was measured at an elevation higher than MW-3 most recently, both measurements were higher than MW-6. A natural source of this water is not likely from the silts or sands exposed along the edge of the former ravine. No significant silt and/or sand interval was reportedly logged in the clay interval while drilling the MW-3 well. This well is located along the slope on the western edge of the former ravine. As reported in the Dames and Moore August 1995 report, the screened interval for this well is across the low permeability Miller Creek clay (i.e., base of fill at 5 feet; screened interval from 5 to 15 feet). The relatively high permeability (3.7×10^{-3} cm/sec) measured in this well suggests that the uppermost portion of the screen and filter pack are likely in communication with the more permeable ravine fill. Preferential natural infiltration is also an unlikely source since much of the area of the mound is overlain by facility buildings and parking lot surfaces (see Figure 1). Also, ground surface elevation contours indicate no areas of potential ponding. Consequently, a more likely source of the water causing the mound would be from another source of infiltration. Some possible sources would include underground storm drainage lines, roof drainage lines and/or cisterns, sanitary sewer lines, and water supply lines. Figure 1 shows the location of a 24 inch sanitary sewer line along St. Clair Street immediately north of MW-3. This potential as a source of flux for the groundwater mound has not been investigated.

The strong downward gradient present in the perched ravine aquifer over most of the ravine fill results in flow lines that intersect the underlying Miller Creek aquitard. Flow lines immediately downgradient from TW-13 flow vertically downward into the underlying Miller Creek clay. This downward flow explains the significant decrease in total BTEX and total PAH concentrations in the downgradient (i.e., horizontally) groundwater samples from MW-5 (see Figures 5 and 6). Contaminated groundwater found deep within the former ravine (TW-13) flows into the underlying clay aquitard where attenuation by adsorption and degradation occur. Meanwhile the relatively clean groundwater that occurs at the top of the groundwater mound (MW-3) flows above the more contaminated deeper groundwater, progressively moving horizontally until reaching MW-5. Relative to the depth of the perched ravine aquifer, shallow groundwater samples taken from the upper edge of the ravine (i.e., MW-1 and MW-2) also show very low total BTEX and total PAH concentrations (see Table 9).

Flow lines through the Miller Creek interval south of the clay to sand transition (i.e., between MW-4 and MW-13) flow downward from the perched ravine aquifer to the Copper Falls sand aquifer. Further discussion of this potential flow path is provided in Section 4.3.

As shown on Figure 5 the northernmost portion of the perched ravine aquifer shows nearly horizontal groundwater flow. Flow at the seep is interpreted to be connected to this aquifer. The relatively high hydraulic conductivity of the nearby wood waste fill and ravine fill (1.6×10^{-4} cm/s and 5.4×10^{-3} cm/s in MW-7 and MW-5, respectively) together with water levels observed between MW-7 and the seep, makes it likely that an unsaturated zone of relatively low permeability fill is present beneath the seep. This separation is necessary, otherwise flow from the perched ravine aquifer would directly discharge to the wood waste fill aquifer at Kreher Park. Such a direct discharge would likely eliminate the surface seep. This low permeability fill is interpreted on Figure 5 to occur south of the seep and beneath the WCL property.

Total PAH isoconcentration profile contours (Figure 7) also support separation of the seep from the wood waste fill aquifer at Kreher Park. PAH concentrations for samples from the seep are more than 28 times higher than those measured in MW-7. The high total PAH concentrations analyzed in samples from the seep are likely due to a contaminant source immediately beneath and to the south of the seep (i.e., beneath WCL property).

The high measured hydraulic conductivity of the perched ravine aquifer at MW-5 (5.4×10^{-3} cm/s) is more than an order of magnitude greater than the average hydraulic conductivity (3.0×10^{-4} cm/s) previously utilized in the August 1995 Dames and Moore report. This average value, based on wells installed at that time, was used to calculate the advective flux through the cross section of the ravine fill at the proposed interceptor trench location (i.e. mouth of the ravine). The previously calculated advective flux discharge from the perched ravine aquifer at this point was 0.02 gpm. Using a cross sectional area of the ravine mouth that is larger based on the results of the GP series of borings, a higher hydraulic conductivity as noted above, and a hydraulic gradient that is larger based on water level measurements at MW-5, the total discharge through the mouth is calculated to be 2.0 gpm. This further justifies the interpreted connection between the lower perched ravine aquifer and the seep as shown on Figure 5. Regardless, this higher estimated flow rate is within the design capacity of the interceptor trench system.

4.3 MILLER CREEK AQUITARD

Permeability measurements of the Miller Creek clay (average laboratory vertical hydraulic conductivity of 5.7 X 10^{-8} cm/sec) reflect the nature of this interval as a confining aquitard. Given the vertical hydraulic gradient contoured at the MW-13 well nest (see Figure 5) and an assumed effective porosity in this silty clay interval of 50%, the approximate downward vertical advective velocity through the aquitard is 0.10 ft/yr. Figures 6 and 7 show that the concentrations of contaminants are comparatively low in the clay aquitard. This assumes that due to the increased retardation effects caused by the clay mineralogy, attenuation of the contaminants is occurring by adsorption and degradation at some short distance beyond the aquifer-aquitard boundary.

The laterally continuous nature of the Miller Creek clay is disrupted by a clay to sand transition south of the MW-13A piezometer. This transition potentially provides an area of preferred downward groundwater flow from the perched ravine aquifer to the Copper Falls sand aquifer. The most likely area for such flow is at the axis of the former ravine immediately north of the MW-4 piezometer. In this area, either erosion or an unnatural breech (e.g. excavation) along the base of the former ravine may have exposed the relatively permeable silty sand across which the MW-4A screened interval is completed. Other potential pathways for preferred downward flow in this area would include the shallower silty sand encountered in the MW-4A boring (16 to 17 feet) and other silty sands, as yet undefined, that may occur in the area of the clay to sand transition. Based on the sampled silt (ML) interval in this transition area (MW-4B boring at depth of 20-22 feet), advective groundwater flow rates are similar to the clay aquitard. However, the ability of the silt interval to retard the flow of contaminants is less effective due to lower adsorptive capacities.

Contaminant concentrations for total BTEX and total PAHs are similar in MW-4A and MW-13. This similarity is likely the result of preferred downward contaminant migration through the clay to sand transition area. Such a connection would provide a means to connect the shallower contamination found in the perched ravine aquifer to contamination found in samples from the deeper Copper Falls sand aquifer. This connection is shown by the isoconcentration contours on Figures 6 and 7.

Upgradient wells MW-6 and MW-6A both show a lack of contamination. Consequently, the contamination found in the Copper Falls aquifer beneath this site is likely not from any of the potential off-site sources listed in the ERIIS Database (Appendix F). The contaminant concentrations yielded from the MW-8A well likely reflect the lateral edge of the contaminant plume. All LRST sites located near NSP's property are toward the south and southwest. The MW-6 well nest is downgradient from these sites and shows no groundwater quality impacts. Consequently, it is unlikely that these sites are contributing to the contaminant plume present beneath NSP's property.

The Miller Creek clay interval is an effective aquitard between the wood waste fill aquifer at Kreher Park and the underlying Copper Falls sand aquifer. The aquitard becomes thin at the MW-7 well nest location. However, based on water level information it acts as an effective aquitard.

The Miller Creek silty sand that occurs in the MW-5 well nest between 30.5 and 32 feet appears to be a separated isolated sand lens. The depositional environment of this sand would be similar to the discontinuous silty sand lens known to occur within the Miller Creek clay beneath Kreher Park (see NET borings 88-2 and 88-4). Groundwater and contaminant migration pathways to this isolated sand likely occur from either the overlying or underlying aquifers. In either case migration would be through the Miller Creek clay aquitard. Another possibility, as shown by the interpreted contours on Figures 6 and 7, is that a discontinuous connection to the underlying Copper Falls sand aquifer occurs in a slightly more permeable (i.e., silt or silty sand) layer which is stratigraphically equivalent to the sand lens. In either case, groundwater flow and the contaminant concentrations associated with this sand lens would be contained and treated by the proposed intercepter trench system.

4.4 COPPER FALLS SAND AQUIFER

The silty sands of the Copper Falls sand aquifer beneath NSP's property are consistently permeable and show a strong upward vertical component of groundwater flow. Horizontal groundwater flow is toward the northwest based on the equipotential flow lines interpreted on Figure 5. Given an average hydraulic conductivity of 8 X 10^{-4} cm/sec, an average horizontal gradient of 0.03 ft/ft as measured between the MW-13B and MW-7A piezometers (see Figure 3), and an effective aquifer porosity of 35%, the horizontal component of advective flow is approximately 65 feet/yr.

A contaminant plume which extends toward the northwest from the area of highest contamination (i.e., MW-13A) is shown for total BTEX and total PAHs on Figures 6 and 7. Contaminant concentrations within the plume are highest near the top of the aquifer (i.e., comparison of MW-5B and MW-5C concentrations) due to the strong upward vertical component of flow beneath the plume. Plume concentrations progressively diminish toward the northwest, downgradient from MW-13A, with the MW-7A piezometer showing the lowest upper Copper Falls sand piezometer concentrations in this direction. A further decline in plume concentrations are suggested by the clean Copper Falls sand aquifer borings advanced by NET in 1989 at Kreher Park. No contamination was described in soil samples in these borings and, where measured, PID values yielded low levels. The NET boring most proximal to the MW-7 well nest is the 88-4 boring. This boring, located approximately 220 feet northwest of MW-7, yielded no reported soil sample contamination. Consequently, the contaminant plume is likely not to be present as far downgradient as the NET borings. Also, analytical tests for groundwater samples from AW-1 show that this artesian flowing well, located in a sidegradient position to the plume, consistently yielded non-detects for VOC and SVOCs , as reported in SEH's February 1995 report. Given the horizontal advective flow velocity calculated above, it is likely that the plume is under steady state conditions. This means that contaminant migration from the area of highest concentration is balanced by contaminant attenuation due to adsorption and degradation. This attenuation may be caused by vertical groundwater movement into the lower boundary of the Miller Creek clay aquitard.

The deeper piezometer groundwater sample from MW-13B has similarly high contaminant concentrations as those detected in MW-13A. This relationship occurs despite a strongly upward vertical gradient. Consequently, the source for such high concentrations is possibly from a location immediately south and beneath the MW-13B piezometer. The location of such a source, together with the lack of a continuous Miller Creek clay coincident with the location of various former underground storage tanks possibly suggests that the contaminant distribution in the MW-13 well nest is the result of a nearby downward migrating dense non-aqueous phase liquid (DNAPL). This DNAPL would likely have resulted from a previous period of DNAPL migration from the shallow perched ravine aquifer to the Copper Falls sand aquifer through the Miller Creek clay to sand transition (see Section 4.3). The relatively low contaminant concentrations in the groundwater samples from the MW-4B piezometer result from relatively clean upwardly migrating groundwater.

According to published geological maps (Skinner, 1974) the depth to bedrock at this site is between 150 and 200 feet. The bedrock consists of Precambrian sandstones. The dip on the bedrock-sediment surface is toward the southeast. This dip appears to be caused by a blind extension of the Douglas Thrust Fault interpreted to exist south of the City of Ashland.

Of those analytes detected in high concentrations in the MW-13 piezometer nest, naphthalene shows a concentrations that is highest relative to its solubility. Measured benzene concentrations are as high as 79 ppm, which is 20 times less than the published aqueous solubility of 1780 ppm (Fetter, 1993). Naphthalene concentrations, while only as high as 21 ppm, are approximate to the published solubility value of 31 ppm. Similar to benzene, toluene, ethylbenzene and xylene solubilities are over 13, 150 and 21 times less than their respective measured concentrations. Although this discussion does not account for temperature considerations, it provides a qualitative comparison. These solubility relationships suggest that the DNAPL material, which is potentially the source of the deep Copper Falls sand aquifer contamination, possibly is characterized as a naphthalene-rich product. Such materials would include heavy weight bunker oil, coal tar, etc.

The present contaminant distribution appears to be at steady state conditions. This is suggested by the following combination of factors: the strong downward vertical gradients measured between the shallow perched ravine aquifer and the deeper Copper Falls sand aquifer; a preferred contaminant migration pathway through the Miller Creek aquitard; in the area of the clay to silt transition the calculated horizontal groundwater advective flow velocities within the Copper Falls sand aquifer; and as much as 100 years of time for contaminant migration. If steady state conditions were not the case, it would seem likely that the extent of downgradient contaminant migration would be considerably greater than is shown on Figures 6 and 7.

5.0 CONCLUSIONS

As requested by the WDNR, documentation concerning the 1995 UST removal has been included in this report. That documentation indicated that the condition of the tank at the time of removal was sound. Consequently, groundwater contaminated by the ravine fill is likely to have contributed to the contaminated soil sample and water sheen observed during the tank removal action. All other historical storage tanks as presented on Sanborn Maps over NSP's property are included on Figure 1 of this report.

A prominent groundwater mound is present over the southern portion of the perched ravine aquifer. This mound affects local horizontal groundwater flow directions and contributes to a strong downward vertical gradient in this aquifer. The source of groundwater causing this mound is likely contributing significantly to the overall flow associated with this aquifer. The source of the mound is not presently known. Possible sources could include storm drainage lines, roof drainage cisterns, sanitary sewer lines, water supply lines, etc.

The strong downward vertical component of flow over portions of the perched ravine aquifer (i.e., immediately north of TW-13) result in flow lines that intersect the underlying Miller Creek clay aquitard. Flow into the clay aquitard likely results in attenuation of contaminants due to adsorption and degradation. This flow explains the confinement of high contaminant levels to the lower portion of this aquifer near TW-13, and the lack of these same levels in the downgradient MW-5 well.

The seep is connected hydraulically to the lower, northernmost portion of the perched ravine aquifer. North of the mouth of the former ravine this aquifer is no longer confined by the sides of the former ravine (i.e., no longer flowing through ravine fill). Groundwater flow through the ravine fill in the vicinity of the proposed interceptor trench is greater than previously calculated because of well test and water level data from MW-5. A flow of 2.0 gpm has been calculated from this data. The significantly increased contaminant concentrations measured in samples from the seep result from a source within the fill beneath WCL's property. The perched aquifer associated with the seep is hydraulically separate from the underlying wood waste fill aquifer that is found beneath most of Kreher Park.

The lack of a continuous Miller Creek clay aquitard in the area between the MW-4 and MW-13 well nests (see Figure 5) provides a pathway for contaminant migration from the shallow to deep aquifers. Such a pathway is suggested by the strong downward vertical gradients and contaminant distributions found in this area. Prior downward DNAPL migration through this pathway and the subsequent residual material caused by such a migration would explain high contaminant concentrations in the presence of a strong upward groundwater flow regime (i.e., MW-13B piezometer completion). The nature of this DNAPL is suggested by solubility relationships and the water quality data to be naphthalene rich product.

A contaminant plume, limited vertically to the uppermost portion of the Copper Falls aquifer, is located downgradient from the potential source area described above. The amount of time available for contaminant migration far exceeds the downgradient extent of this plume (i.e., downgradient extent of the plume is approximately 450-500 feet, the estimated horizontal advective groundwater flow velocity for the aquifer is approximately 65 ft/yr, and the estimated time since contaminant source migration is as much as 100 years). This suggests that the present contaminant plume is at steady state conditions. The amount of contaminants migrating from the source area is mitigated by the rate of attenuation of these contaminants within the plume. This attenuation may include adsoprtion and degradation within the Copper Falls aquifer and base of Miller Creek aquitard.

6.0 RECOMMENDATIONS

The source of the groundwater mound over the southern portion in the perched ravine aquifer (i.e., near MW-3) should be investigated. This may include investigation by the appropriate city utilities to confirm the location and integrity of past and present storm sewer, water supply and sanitary sewer lines. Identification and control of this mound should be attempted. The affects of this remedy, if any, should be determined by a round of water level measurements. Changes in water table elevations in the perched aquifer and vertical gradients between aquifers should be determined prior to installation of the proposed interceptor trench and clay cap. A more southerly location for the interceptor trench should be considered to investigate the potential for a thicker Miller Creek clay section. Any soil contamination found downgradient from the interceptor trench not located at the mouth of the ravine would have the potential of impacting groundwater quality. However, the anticipated reduction in water levels due to the trench and cap would reduce this potential. The trench should be constructed to a depth sufficient to intercept contaminated groundwater flow associated with the Miller Creek silty sand found in the MW-5A completion. A significant reduction in groundwater flow from the perched ravine aquifer downgradient from the interceptor trench would have the beneficial effect of potentially reducing or eliminating groundwater flow to the seep. This would eliminate the current level of groundwater contaminant impacts likely being added to this flow from sources beneath WCL's property.

Following installation of the interceptor trench, annual groundwater sampling and analytical testing should be conducted to determine the distribution of VOC and SVOC contaminants from water table monitor wells within the perched ravine aquifer. Groundwater samples from MW-7 (wood waste fill aquifer) and the seep, if present, should be included.

Semi-annual groundwater sampling and analytical testing should be conducted to confirm the steady state nature of the contaminant plume in the Copper Falls sand aquifer. Testing of these samples would include those VOCs and SVOCs analyzed during this investigation. However, due to the low level of metal contaminants measured during this and previous groundwater sampling rounds, analytical testing for metals is not recommended.

If contaminant concentrations from these sampling rounds suggest downgradient movement of the contaminant plume, a remedial action plan will be submitted to the WDNR. Such a plan would include investigating the implementability, effectiveness and costs associated with contaminant

source and plume control. Contaminant source control would include elimination of the likely downward contaminant migration pathway through the Miller Creek aquitard (i.e., area of clay to sand transition), and the capture of DNAPL sources, if any, within the Copper Falls sand aquifer. Source containment relative to the downward migration pathway should be assessed after installation of the interim action (interceptor trench) to determine the effects on groundwater flow and contaminant migration within the perched ravine aquifer.

7.0 REFERENCES

Fetter, C.W., 1993, *Contaminant Hydrogeology*, Macmillan Publishing Co., New York.

Skinner, E.L., and Young H.L., 1974, *Water Resources of Wisconsin Lake Superior Basin*, Hydrologic Investigations Atlas HA-524, U.S. Geological Survey.

TABLES

TABLE 1
Summary of Monitor Well and Piezometer Construction

Well Number	Type	Elevation PVC (Ft. MSL)	Elev. Ground (Ft. MSL)	Total Borehole Depth (Ft.)	Screened Interval (Ft. below surface)	Depth Top of Filter Pack (Ft.)	Elev. Top of Filter Pack (Ft. MSL)	Depth Bottom of Filter Pack (Ft.)	Elev. Bottom of Filter Pack (Ft. MSL)	Midpoint Filter Pack Interval
MW-1	Water Table	634.18	634.7	21.5	11 - 21	9.0	625.7	21.5	613.2	619.45
MW-2	Water Table	634.85	635.1	21.0	10 - 20	8.0	627.1	21.0	614.1	620.6
MW-3	Water Table	637.74	638.2	16.0	5 - 15	3.0	635.2	16.0	622.2	628.7
MW-4	Water Table	641.03	641.7	15.5	5 - 15	4.0	637.7	15.5	626.2	631.95
MW-4A	Piezometer	641.22	641.6	35.0	21 - 26	19.0	622.6	27.0	614.6	618.6
MW-4B	Piezometer	640.98	641.5	55.5	50 - 55	48.0	593.5	55.5	586	589.75
MW-5	Water Table	633.82	634.3	28.5	18 - 28	16.0	618.3	28.5	605.8	612.05
MW-5A	Piezometer	633.72	634.2	34.0	31.5 - 33.5	30.5	603.7	34.0	600.2	601.95
MW-5B	Piezometer	633.89	634.3	51.0	44 - 49	42.0	592.3	49.0	585.3	588.8
MW-5C	Piezometer	634.33	634.6	76.0	71 - 76	69.0	565.6	76.0	558.6	562.1
MW-6	Water Table	644.88	645.2	18.0	3 - 18	2.5	642.7	18.0	627.2	634.95
MW-6A	Piezometer	644.79	645.2	48.0	42.3 - 47.3	40.8	604.4	47.5	597.7	601.05
MW-7	Water Table	612.60	610.6	15.0	5 - 15	4.5	606.1	15.0	595.6	600.85
MW-7A	Piezometer	613.31	610.1	35.5	30 - 35	28.0	582.1	35.5	574.6	578.35
MW-8*	Water Table	635.54	635.9	16.0	6 - 16	5.0	630.9	16.0	619.9	625.4
MW-8A	Piezometer	635.50	635.9	50.0	45 - 50	43.0	592.9	50.0	585.9	589.4
TW-13	Water Table	635.81	636.3	22.0	9 - 19	7.0	629.3	19.0	617.3	623.3
MW-13A	Piezometer	635.94	636.3	50.0	40 - 45	38.0	598.3	46.0	590.3	594.3
MW-13B	Piezometer	635.90	636.3	70.0	65 - 70	63.0	573.3	70.0	566.3	569.8
Kreher Park Monitor Wells										
MW-1	Water Table	608.40	605.6	16.0	4 - 14	3.0	602.6	16.0	589.6	596.1
MW-2	Water Table	608.23	605.3	16.0	3.5 - 13.5	2.5	602.8	16.0	589.3	596.05
MW-3	Water Table	612.10	609.5	16.0	5 - 15	4.0	605.5	16.0	593.5	599.5

TABLE 2
Goundwater Elevations
Ravine Fill and Deeper Piezometer Monitor Wells

		April 29, 1995		June 29, 1995		October 19, 1995		June 5, 1996	
NSP Property Monitor Wells									
Well Number	Top Casing Elev. (ft.)	DTW (ft.)	Water Level Elev. (ft.)	DTW (ft.)	Water Level Elev. (ft.)	DTW (ft.)	Water Level Elev. (ft.)	DTW (Ft.)	Water Level Elev. (Ft.)
MW-1	634.18	14.75	619.43	15.24	618.94	---	---	14.95	619.23
MW-2	634.85	13.75	621.1	14.92	619.93	---	---	14.35	620.5
MW-3	637.74	1.94	635.8	2.49	635.25	---	---	2.52	635.22
MW-4	641.03	7.58	633.45	5.55	635.48	---	---	4.78	636.25
MW-4A	641.22	---	---	---	---	---	---	13.06	628.16
MW-4B	640.98	---	---	---	---	---	---	15.46	625.52
MW-5	633.82	---	---	---	---	19.29	614.53	18.69	615.13
MW-5A	633.72	---	---	---	---	19.70	614.02	19.32	614.4
MW-5B	633.89	---	---	---	---	19.30	614.59	19.08	614.81
MW-5C	634.33	---	---	---	---	---	---	8.86	625.47
MW-6	644.88	---	---	---	---	---	---	13.59	631.29
MW-6A	644.79	---	---	---	---	---	---	18.82	625.97
MW-7	612.60	---	---	---	---	---	---	7.77	604.83
MW-7A	613.31	---	---	---	---	---	---	-0.92	614.23
MW-8	635.54	---	---	---	---	---	---	14.32*	621.22
MW-8A	635.50	---	---	---	---	---	---	15.07	620.43
TW-13	635.81	4.88	630.93	9.92	625.89	---	---	5.63	630.18
MW-13A	635.94	---	---	---	---	---	---	20.75	615.19
MW-13B	635.90	---	---	---	---	---	---	10.56	625.34
Kreher Park Monitor Wells [1]									
MW-1	608.40	---	---	---	---	---	---	6.55	601.85
MW-2	608.23	---	---	---	---	---	---	6.40	601.83
MW-3	612.10	---	---	---	---	---	---	10.62	601.48

* Note: Water level measurement in MW-8 still rising.
Survey information for Kreher Park wells are from February 1995 SEH Report
[1] Wells installed in 1989 by NET

TABLE 3
Soil Sample Laboratory Results

Sample Location	Sample Depth (ft)	Gradation Analysis			Atterberg Limits			USCS	Formation
		% Gravel	% Sand	% Silt & Clay	Liquid Limit	Plastic Limit	Plasticity Index		
MW-4A*	15.75	1.1	51.3	47.6				SM-SC	Miller Creek
MW-4A	22 - 24	14.0	75.3	10.7	—	—	—	SP-SM	Miller Creek
MW-4A	26 - 48	1.1	66.7	32.2	—	—	—	SM	Miller Creek
MW- 4B*	21.75	1.5	49.5	49.0				SM-SC	Miller Creek
MW-4B	39 - 41	—	—	—	21	13	8	CL	Copper Falls
MW-5C	71 - 73	12.8	73.7	13.5	—	—	—	SM	Copper Falls
MW-13A*	25	—	—	—	26	12	14	CL	Miller Creek
MW-13A	38 - 40	0.0	84.6	15.4	—	—	—	SM	Copper Falls

Note: *Sample from base of shelby tube.

TABLE - 4
Hydraulic Conductivity Measurement Results

Well Number	Filter Pack Interval/Depth (ft.)	Hydraulic Conductivity - Slug Test/Bail Recovery Test (cm/sec)	Hydraulic Conductivity- Shelby Tube Sample (cm/sec)
MW-4A	15.75		4.6×10^{-8}
MW-4A	19 - 27	7.4×10^{-5}	
MW-4B	21.5		4.5×10^{-8}
MW-4B	48 - 55.5	7.2×10^{-4}	
MW-5	16 - 28.5	5.4×10^{-3}	
MW-5A	30.5 - 34	1.1×10^{-4}	
MW-5B	42 - 49	1.5×10^{-3}	
MW-5C	69 - 76	6.6×10^{-4}	
MW-6	2.5 - 18	6.7×10^{-5}	
MW-6A	40.8 - 47.5	6.7×10^{-4}	
MW-7	4.5 - 15	1.6×10^{-4}	
MW-8	5 - 16	2.5×10^{-6}	
MW-8A	43 - 50	1.4×10^{-6}	
MW-13A	25		6.9×10^{-8}
MW-13A	38 - 46	9.4×10^{-4}	
MW-13B	63 - 70	3.7×10^{-4}	

Notes: 1- No slug test performed on MW-7A; artesian flow.
2- MW-4A, MW-6, MW-7, MW-8 and MW-8A were bail recovery tests; all other well hydraulic conductivity measurements were slug tests.
3- Permeability tests performed on Shelby tube samples utilized back pressure constant head method.

TABLE 5
Summary of Water Level and Vertical Groundwater Gradients

Interval	MW-4 / MW-4A	MW-4A / MW-4B	MW-5 / MW-5A	MW-5A / MW-5B	MW-5B / MW-5C	MW-6 / MW-6A	MW-7 / MW-7A	MW-8 / MW-8A	TW-13 / MW-13A	MW-13A/ MW-13B
October 19, 1995										
Water Level Elev. (ft.)	---	---	614.53	614.02	---	---	---	---	---	---
	---	---	614.02	614.59	---	---	---	---	---	---
Vertical Distance (ft.)	---	---	614.53	601.95	---	---	---	---	---	---
	---	---	601.95	588.80	---	---	---	---	---	---
Gradient (ft./ft.)	---	---	-0.04	0.04	---	---	---	---	---	---
June 5, 1996										
Water Level Elev. (ft.)	635.22	628.16	615.13	614.40	614.81	631.29	604.83	621.22	630.18	615.19
	628.16	625.52	614.40	614.81	625.47	625.97	614.23	620.43	615.19	625.34
Vertical Distance (ft.)	635.22	618.60	615.13	601.95	588.80	634.95	600.85	625.40	623.30	594.30
	618.60	589.75	601.95	588.80	562.10	601.05	578.35	589.40	594.30	569.80
Gradient (ft./ft.)	-0.42	-0.09	-0.06	0.03	0.40	-0.16	0.42	-0.02	-0.52	0.41

TABLE - 6
Groundwater Analytical Results - Detected VOCs Constituents (µg/L)

		October 19, 1995			June 4, 1996													
Analyte	Units	MW-5	MW-5A	MW-5B	MW-4A	MW-4B	MW-5C	MW-6	MW-6A	MW-7	MW-7A	MW-8	MW-8A	MW-13A	MW-13B	Field Blank	Trip Blank	ES	PAL
Benzene	µg/L	24	13,000	31,000	12,000	430	8.3	*<0.28*	*<0.28*	1,500	6,600	38	25,000	79,000	62,000	1.4	*<0.28*	5	1
Bromodichloromethane	µg/L	*<14*	*<14*	*<14*	*<320*	*<12*	*<1.8*	*<0.32*	1.2	*<71*	*<60*	1.3	*<43*	<110	*<160*	*<0.32*	*<0.32*	0.6	0.06
n-Butylbenzene	µg/L	22	14	38	*<340*	770	19	*<0.34*	*<0.34*	200	2,900	30	*<67*	440	450	<0.34	*<0.34*		
sec-Butylbenzene	µg/L	*<9.3*	*<9.3*	*<9.3*	1,400	150	5.6	*<0.27*	*<0.27*	*<63*	610	7.6	230	970	980	1.2	*<0.27*		
tert-Butylbenzene	µg/L	*<14*	*<14*	*<14*	*<360*	*<58*	*<1.5*	*<0.36*	*<0.36*	*<59*	*<290*	*<2.9*	*<72*	600	600	*<0.36*	*<0.36*		
tert-Butylmethyl ether	µg/L	*<13*	*<13*	16	*<260*	<94	<2.2	*<0.26*	*<0.26*	*<89*	*<470*	*<4.7*	*<52*	*<130*	*<130*	*<0.26*	*<0.26*	60	12
Chloroform	µg/L	*<45*	*<45*	*<45*	*<290*	*<64*	<0.54	*<0.29*	9.3	*<22*	*<320*	4.7	*<57*	*<140*	*<140*	*<0.29*	*<0.29*	6	0.6
Ethylbenzene	µg/L	140	1,600	500	2,100	110	<1.4	*<0.26*	*<0.26*	930	970	*<2.8*	340	970	950	1.4	*<0.26*	700	140
Isopropylbenzene	µg/L	36	38	12	<260	96	<1.2	*<0.26*	*<0.26*	*<50*	*<290*	*<2.9*	*<53*	*<130*	*<130*	*<0.26*	*<0.26*		
Isopropyl ether	µg/L	*<13*	16	*<13*	*<260*	*<12*	*<2.6*	*<0.26*	*<0.26*	*<100*	*<62*	*<0.62*	*<53*	*<130*	*<130*	*<0.26*	*<0.26*		
Naphthalene	µg/L	6,700	1,900	3,800	10,000	1,800	53	0.86	*<0.32*	3,800	5,500	93	7,500	21,000	13,000	11	0.70	40	8
n-Propylbenzene	µg/L	*<22*	*<22*	30	*<280*	*<54*	5.3	*<0.28*	*<0.28*	*<62*	2,200	*<2.7*	*<56*	*<140*	*<140*	*<0.31*	<0.28		
Tetrachloroethene	µg/L	*<21*	*<21*	*<21*	*<210*	*<54*	*<1.4*	*<0.21*	1.4	*<57*	*<270*	*<2.7*	*<43*	*<110*	*<110*	*<0.21*	*<0.21*	5	0.5
Toluene	µg/L	120	1,600	18,000	8,800	580	13	*<0.22*	*<0.22*	290	4,600	22	8,000	36,000	30,000	1.8	<0.22	343	69
1,2,3-Trichlorobenzene	µg/L	*<18*	*<18*	*<18*	*<310*	*<29*	*<1.9*	*<0.31*	*<0.31*	*<78*	*<150*	2.9	*<62*	*<160*	*<160*	*<0.31*	<0.31		
Trichloroethene	µg/L	*<9.6*	*<9.6*	*<9.6*	*<250*	*<69*	*<1.3*	*<0.25*	1.0	*<52*	*<340*	*<3.4*	*<50*	*<2*	*<120*	*<0.25*	*<0.25*	5	0.5
Trichlorofluoromethane	µg/L	*<11*	*<11*	*<11*	*<200*	*<62*	*<1.7*	*<0.20*	0.21	*<67*	*<310*	*<3.1*	*<41*	*<100*	*<100*	*<0.20*	*<0.20*	3490	698
1,2,4-Trimethylbenzene	µg/L	62	130	460	1,500	190	7.4	*<0.28*	<0.28	260	720	7.0	250	860	870	1.2	<0.28	70	14
1,3,5-Trimethylbenzene	µg/L	30	44	140	2,400	170	*<1.9*	*<0.56*	<0.56	*<76*	*<570*	*<5.7*	*<110*	1,100	1,100	2.2	<0.56		
o-Xylene	µg/L	290	410	6,800	5,500	580	16	2.2	2.3	330	2,100	18	1,600	8,000	7,700	2.7	<0.41	620	124
m+p-Xylene	µg/L	90	890	2,900	4,200	390	13	*<0.52*	<0.52	470	1,700	14	*<110*	3,500	350	2.7	<0.52		
Total BTEX:	µg/L	664	17,500	59,200	32,600	2,090	50.3	2.20	2.30	3,520	15,970	92.0	34,940	127,470	101,000	10	ND		

Note: Enforcement sandard (ES) and preventative action limit (PAL) as per Wisconsin Admin. Code NR140

TABLE - 6

TABLE - 7
Groundwater Analytical Results - Detected SVOCs Constituents (µg/L)

		October 19, 1995			June 4, 1996												
Analyte	Units	MW-5	MW-5A	MW-5B	MW-4A	MW-4B	MW-5C	MW-6	MW-6A	MW-7	MW-7A	MW-8	MW-8A	MW-13A	MW-13B	Field Blank	ES	PAL
Acenaphthene	µg/L	340	<2.0	<2.0	17	11	<1.8	<1.4	<2.1	180	14	<1.5	<1.4	9.9	13	<1.2		
Acenaphthylene	µg/L	<2.0	13	200	<1.4	<2.5	<1.8	<1.4	<2.1	<1.7	<1.3	<1.5	<1.4	<1.5	<1.3	<1.2		
Aniline	µg/L	<2.0	15	<2.0	<1.2	<2.1	<1.5	<1.2	<1.7	<1.4	<1.1	<1.3	<1.2	89	<1.1	<1.0		
Anthracene	µg/L	84	8.7	54	18	4.5	<1.5	<1.2	<1.7	29	<1.1	<1.3	<1.2	<1.2	12	<1.0		
Benzo(a)anthracene	µg/L	41	<2.0	23	3.1	<2.0	<1.5	<1.1	<1.7	9.4	<1.0	<1.2	<1.1	<1.2	<1.1	<0.97		
Benzo(a)pyrene	µg/L	36	<2.0	<2.0	3.4	<2.2	<1.6	<1.3	<1.9	11	<1.2	<1.4	<1.3	<1.3	<1.2	<1.1	0.2	0.02
Benzo(b)fluoranthene	µg/L	25	<2.0	<2.0	5.4	<6.6	<4.8	<3.8	<5.5	8.8	<3.4	<4.1	<3.8	<3.9	3.7	<3.2		
Benzo(g,h,i)perylene	µg/L	<2.0	<2.0	<2.0	<1.6	<2.7	<2.0	<1.6	<2.3	3.2	<1.4	<1.7	<1.6	<1.6	<2.4	<1.3		
bis (2-ethylhexyl) phthalate	µg/L	<10	<10	<10	<1.6	20	13	<1.6	<2.4	<1.9	<1.5	<1.8	<1.6	40	17	<1.4	6	0.6
1-Chloronaphthalene	µg/L	—	—	—	<1.2	<2.1	<1.5	<1.2	<1.7	<1.4	2.4	<1.3	<1.2	<1.2	<1.1	<1.0		
Chrysene	µg/L	37	<2.0	20	3.0	<2.4	<1.7	<1.4	<2.0	9.6	<1.2	<1.5	<1.4	<1.4	<1.3	<1.2		
Dibenzofuran	µg/L	<2.0	<2.0	<2.0	26	20	<1.8	<1.4	<2.0	7.2	15	<1.5	<1.4	15	20	<1.2		
2,4-Dichlorophenol	µg/L	<2.0	<2.0	<2.0	<1.5	370	<2.0	<1.5	<2.2	<1.8	<1.4	<1.7	<1.5	<1.6	<1.4	<1.3		
2,4-Dimethylphenol	µg/L	<2.0	180	1,100	<1.0	<1.8	<1.3	<1.0	<1.5	160	110	<1.1	570	3,400	3,400	<0.87		
Dimethylphthalate	µg/L	<2.0	<2.0	<2.0	<1.5	<2.7	<2.0	<1.5	<2.2	13	<1.4	<1.7	<1.5	<1.6	<1.4	<1.3		
Fluoranthene	µg/L	100	<2.0	41	12	<2.1	<1.5	<1.2	<1.7	29	<1.1	<1.3	<1.2	<1.2	3.1	<1.0		
Fluorene	µg/L	110	4.0	72	52	46	<1.6	<1.2	<1.8	74	33	<1.3	<1.2	32	43	<1.0	400	80
2-Methylnaphthalene	µg/L	350	79	770	1,500	1,300	<1.7	<1.4	<2.0	500	1,200	<1.5	<1.4	930	990	<1.2		
2-Methylphenol	µg/L	<2.0	160	450	<1.5	<2.7	<1.9	<1.5	<2.2	100	39	<1.6	600	2,800	1,700	<1.3		
3 & 4-Methylphenol	µg/L	<2.0	59	750	820	530	<3.3	<2.6	<3.8	400	150	<2.8	1,200	6,300	3,100	<2.2		
Naphthalene	µg/L	1,100	650	2,200	8,800	7,200	<2.2	<1.8	<2.6	3,100	3,900	<1.9	560	7,000	7,600	<1.5	40	8
1-Naphthylamine	µg/L	—	—	—	<0.86	<1.5	<1.1	<0.86	<1.2	<1.0	<0.77	<0.92	<0.86	16	22	<0.73		
2-Naphthylamine	µg/L	—	—	—	<1.3	<2.3	<1.7	<1.3	<1.9	<1.5	<1.2	<1.4	<1.3	9.3	18	<1.1		
Phenanthrene	µg/L	350	8.3	180	74	55	<1.6	<1.3	<1.8	130	16	<1.4	<1.3	23	54	<1.1		
Phenol	µg/L	<2.0	<2.0	270	240	<1.6	<1.1	<0.90	<1.3	36	14	<0.97	390	1,900	150	<0.76	6,000	1,200
Pyrene	µg/L	150	<2.0	58	19	7.9	<1.5	<1.2	<1.7	49	<1.1	<1.3	<1.2	<1.2	8.1	<1.0		
Pyridine	µg/L	—	—	—	24	18	<7.9	<6.2	<9.0	<7.3	<5.6	<6.7	<6.2	20	19	<5.3		
Total PAHs:	µg/L	2,723	1,177.0	6,188	11,596	9,582	13	0	0	4,849.2	5,493.4	0	3,320	22,584.2	17,172.9	ND		

TABLE - 8
Groundwater Analytical Results - Detected Metals (µg/L)

		October 19, 1995			June 4, 1996													
Analyte	Units	MW-5	MW-5A	MW-5B	MW-4A	MW-4B	MW-5C	MW-6	MW-6A	MW-7	MW-7A	MW-8	MW-8A	MW-13A	MW-13B	Field Blank	ES	PAL
Arsenic	µg/L	<1.1	1.9	2.5	4.4	<1.6	<1.6	<1.6	2.2	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	50	5
Cadmium	µg/L	<0.23	<0.16	<0.16	0.69	<0.12	<0.12	0.31	<0.12	0.19	0.14	<0.12	<0.12	<0.12	<0.12	<0.12	5	0.5
Chromium	µg/L	<0.60	<0.61	<0.61	1.4	<0.26	<0.26	0.41	0.87	0.50	<0.26	8.3	<0.26	<0.26	<0.26	<0.26	100	10
Copper	µg/L	1.4	1.7	<1.7	3.3	3.1	<0.54	6.8	3.9	0.88	<0.54	3.9	0.91	1.5	1.0	<0.54	1300	130
Iron[1]	mg/L	2.5	0.083	0.046	2.3	0.011	0.043	0.046	0.0046	0.22	0.024	0.086	0.027	0.11	0.011	0.013	0.3	0.15
Lead[1]	µg/L	1.3	2.2	3.3	<1.5	<1.5	<1.5	1.8	1.8	1.5	<1.5	<1.5	<1.5	<1.5	3.1	<1.5	15	1.5
Selenium	µg/L	<1.4	<1.5	<1.5	<1.8	<1.8	<1.8	<18	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	50	10
Zinc	µg/L	840	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	5000	2500

Note: Iron units reported in mg/L

[1] ES and PAL for iron and zinc are based on public welfare groundwater quality standards

TABLE - 8

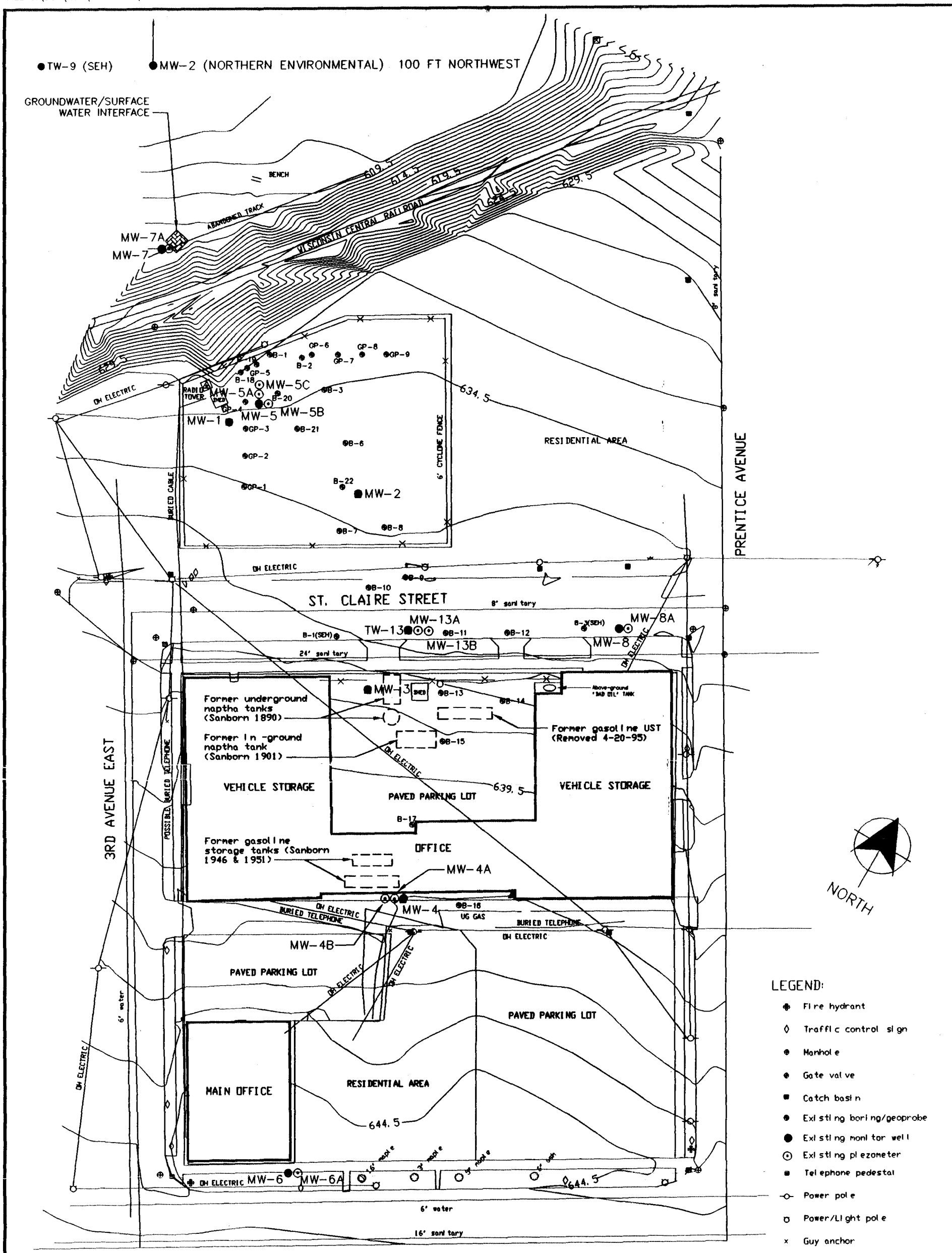
TABLE - 9
Previous Groundwater Analytical Results

		NSP Property					Kreber Park					
Parameter	Units	MW-1	MW-2	MW-3	MW-4	TW-13	MW-1 (NET)	MW-2 (NET)	MW-3 (NET)	TW-6	TW-9	SEEP
September 1994[1]												
Benzene	µg/L	—	—	—	—	—	2,440	236	1.2	3,150	833	1,640
Napthalene (VOC)	µg/L	—	—	—	—	—	2,360	1,000	1.4	3,600	8,740	1,300
Total BETX	µg/L	—	—	—	—	—	2,732	464	1.2	5,725	2,003	1,640
Total PAH	µg/L	—	—	—	—	—	1,068	16.1	1,473	22,671	138,872	250,358
October 1994[1, 3]												
Benzene	µg/L	—	—	—	—	20,500	3,340	659	2.55	3,400	1,590	3,250
Napthalene (VOC)	µg/L	—	—	—	—	8,760	1,930	1,020	1.15	4,050	18,600	2,590
Total BETX	µg/L	—	—	—	—	38,800	4,136	1,045	2.55	6,101	6,320	4,111
Total PAH	µg/L	—	—	—	—	58,378	1,049	1,051	415	17,041	62,032	214,127
May 1995[2]												
Benzene	µg/L	0.34	0.30	6.2	490	16,000	—	370	—	—	600	3,500
Napthalene (VOC)	µg/L	0.41	ND	74	ND	13,000	—	1,300	—	—	12,000	6,700
Total BETX	µg/L	0.79	2.09	59.5	8,630	32,700	—	1,139	—	—	2,487	5,210
Total PAH	µg/L	19	124	519	5,682	22,530	—	520	—	—	9,751	139,600
June 1995[2]												
Benzene	µg/L	0.43	34	7.8	430	22,000	4,100	950	4.4	1,500	710	3,200
Napthalene (VOC)	µg/L	1.6	20	840	1,100	5,000	1,700	210	52	1,200	9,300	5,100
Total BETX	µg/L	1.04	104	113	1,850	42,400	5,120	2,386	8.7	3,630	2,867	7,310
Total PAH	µg/L	ND	15	617	6,900	54,130	1,629	1,764	109	2,910	9,660	63,030

Note: [1] Collected by SEH
[2] Collected by Dames & Moore
[3] SEH collected sample from TW-13 on 12/2/94
(NET): monitor wells installed by Northern Environmental Technologies

FIGURES

FILE: C:\DCA\NSP\05644071\6-96FIG1



NOTES

Contour interval - one foot

Elevations are based on Ashland Geodetic Survey information, and continued from a survey of the Sunset Park boat landing

Location of former storage tanks using Sanborn maps are approximate

Locations of sanitary sewer and water lines are approximate from city of ashland maps

0 60 120

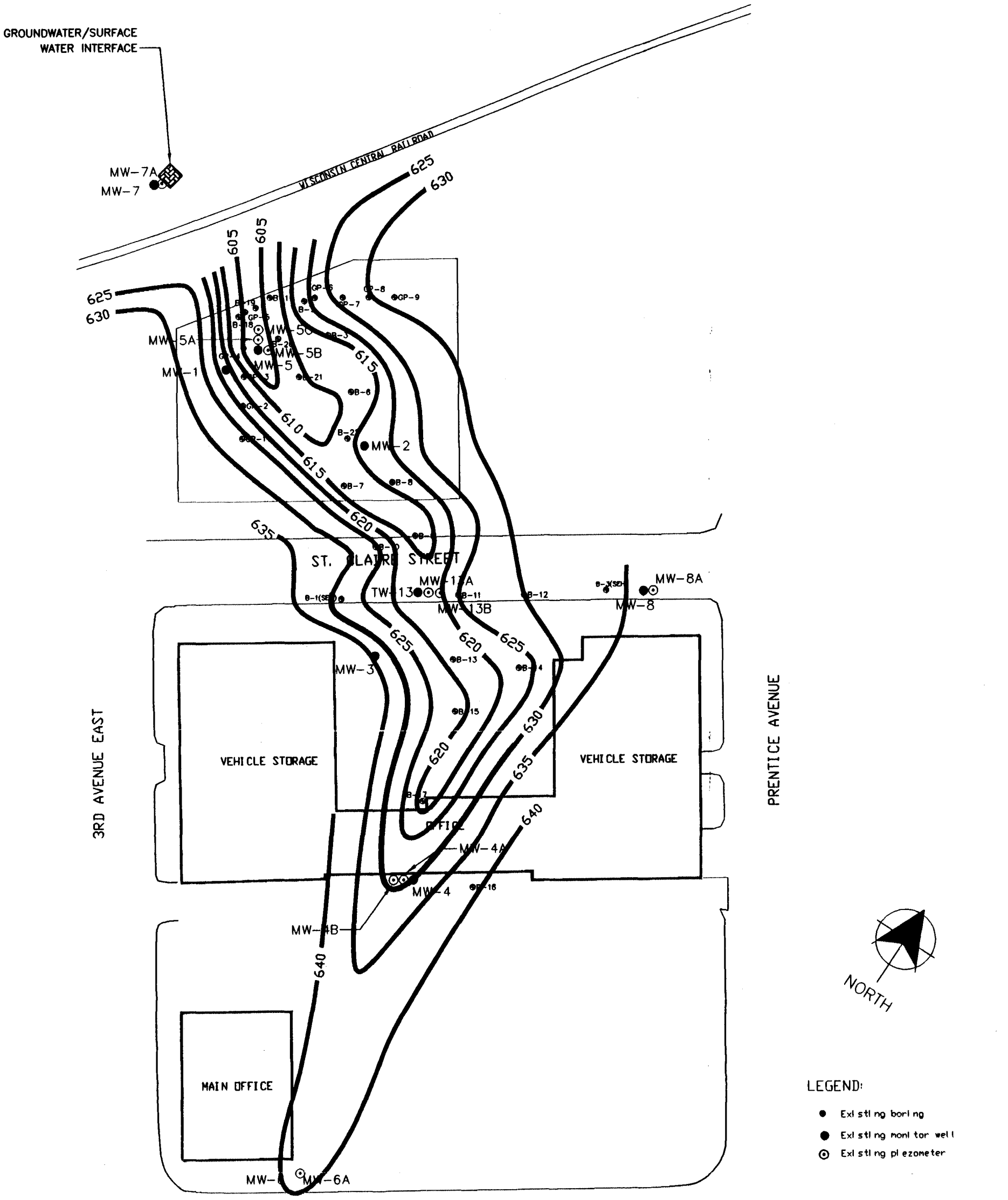
SCALE: 1" = 60'

NORTHERN STATES POWER
ASHLAND, WISCONSIN

FIGURE 1
PRESENT SITE CONDITIONS

DRN. BY JMN	PROJ. NO. 05644-071
DATE AUGUST 1996	DAMES & MOORE

FILE: C:\DCA\NSP\05644071\6-96FIG2



NOTES

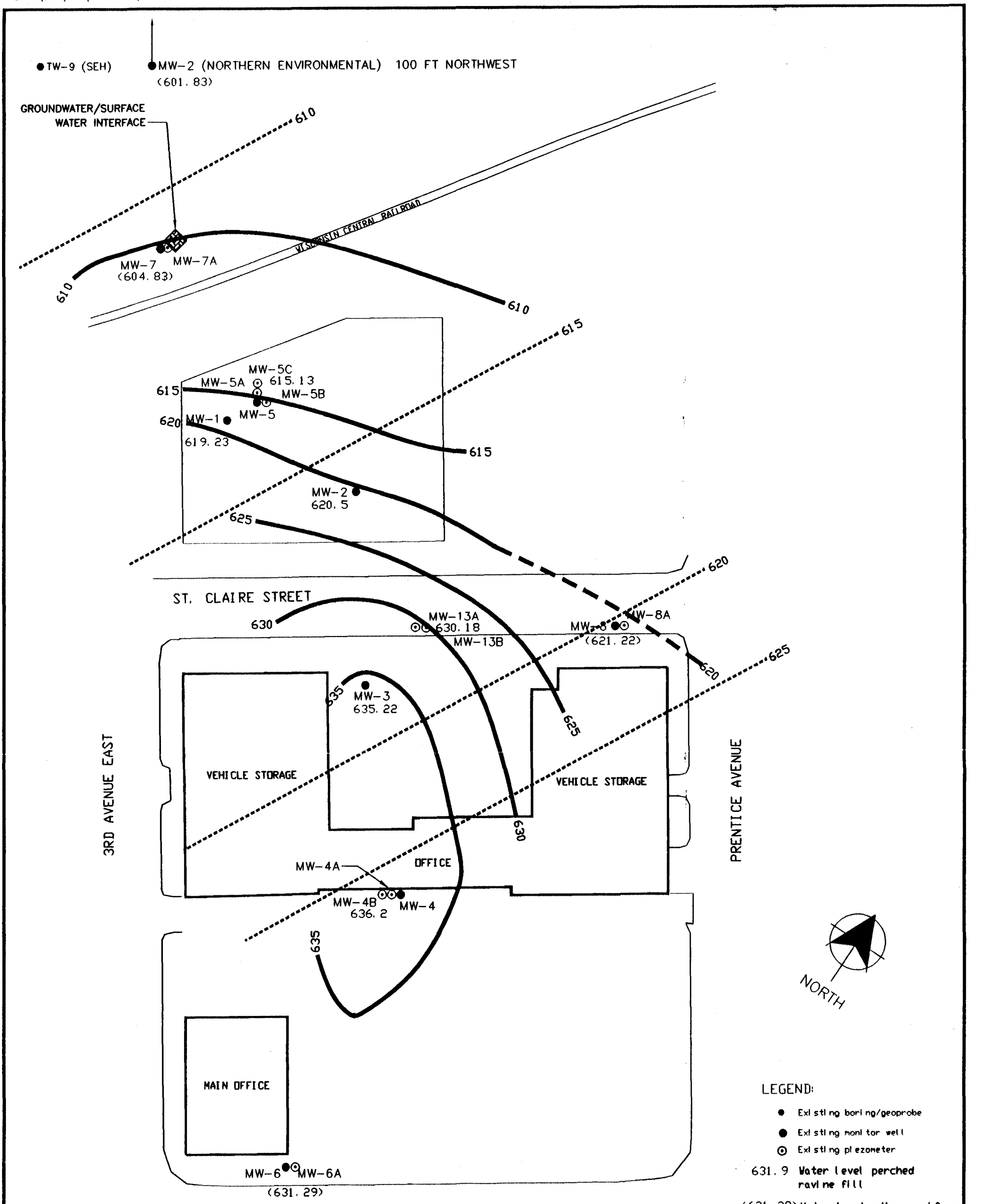
Contour interval - five foot

0 60 120

SCALE: 1" = 60'

NORTHERN STATES POWER ASHLAND, WISCONSIN	
FIGURE 2 BASE OF RAVINE FILL CONTOUR MAP	
DRN. BY JMN	PROJ. NO. 05644-071
DATE AUGUST 1996	DAMES & MOORE

FILE: C:\DCA\NSP\05644071\6-96FIG3



LEGEND:

- ● Existing boring/geoprobe
- ● Existing monitor well
- ⊙ Existing piezometer
- 631.9 Water level perched ravine fill
- (631.29) Water level other aquifers
- ▬▬ Perched Ravine Water Table Contour
- ▪▪▪▪▪▪▪▪▪ Copper Falls Sand Aquifer Potentiometric Surface Contour @ 590' Elevation

NOTES

Contour interval - five foot

Groundwater flow direction for Copper Falls sand quifer based on 620' equipotential line (figure 5) at 590 foot elevation

Water levels measured June, 1996

0 60 120

SCALE: 1" = 60'

NORTHERN STATES POWER
ASHLAND, WISCONSIN

FIGURE 3-WATER TABLE CONTOURS
PERCHED RAVINE AQUIFER

DRN. BY JMN	PROJ. NO. 05644-071
DATE AUGUST 1996	DAMES & MOORE

APPENDICES

APPENDIX A
TANK REMOVAL SITE REPORT - TANK REMOVAL SPECIALISTS

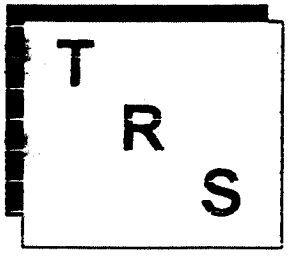
SITE REPORT FOR U.S.T.

FOR

NSP - ASHLAND

BRETT C. MEGAL
ENVIRONMENTAL CONSULTANT
SITE ASSESSMENT CERTIFICATION #06581

TANK REMOVAL SPECIALISTS
"The Affordable Professionals"
P.O. Box 90, Phillips, WI 54555 1-800-321-2710



PERSON COMPILING ASSESSMENT: *BRETT C. MEGAL*

9/88-12/92:	B.S. from the University of Wisconsin - Stevens Point. Major: Watershed Management Minor: Geology
8/94-Present	Environmental Consultant for Tank Removal Specialists, Phillips, WI.
3/95	Certified by DILHR as a Site Assessor and Tank Remover/Cleaner. Certification # 06581.

STATIC INFORMATION FOR SITE ASSESSMENT

PERSON DOING ASSESSMENT: *KANDI GABRIELSEN*

12/94	Trained for Site Assessment, Soil Sampling and Tank Removal/Cleaning.
3/95	Certified in Site Assessment and Tank Removal/Cleaning. Certification # - 06578

TABLE OF CONTENTS

ON-SITE REPORT FOR ASSESSMENT

GENERAL INFORMATION

1. JOB NAME: NSP - Ashland
2. SITE ADDRESS: 301 E. Lakeshore Dr.
3. COUNTY: Ashland
4. DATE OF REMOVAL: 4/20/95 9:00 a.m.
5. OWNER'S NAME: NSP
6. OWNER'S ADDRESS: 100 N. Barstow St., Eau Claire, WI 54702
7. OWNER'S PHONE NUMBER: 715-839-4649
8. CONTACT PERSON: Dave Welder
9. CONTACT PERSON'S PHONE NUMBER: 715-839-4649
10. U.S.T. OPERATOR'S NAME: NSP
11. U.S.T. OPERATOR'S PHONE NUMBER: 715-839-4649
12. GENERAL CONTRACTOR'S NAME: TRS A DIVISION OF TJC INC.
13. GENERAL CONTRACTOR'S PHONE NUMBER: 715-339-4919
14. EXCAVATOR'S NAME: TRS A DIVISION OF TJC INC.
15. EXCAVATOR'S PHONE NUMBER: 715-339-4919
16. SITE ASSESSOR'S NAME: Kandi Gabrielsen
17. SITE ASSESSOR'S PHONE NUMBER: 715-339-4919
18. DILHR REPRESENTATIVE'S NAME ON SITE: Kevin Tamke
19. DILHR REPRESENTATIVE'S PHONE NUMBER: 715-682-7052
20. PERSONS PRESENT ON SITE: Rob Seimers, Frank Kulpa, Don Koerner, Kandi Gabrielsen, Vickie Kedrowski, Kevin Tampke, Dave Welder (NSP), Leroy Wilder (NSP), Pete Erickson (NSP).
21. TEMPERATURE: 35 degrees
22. WEATHER CONDITIONS: Cloudy
23. PRECIPITATION: None

24. METHOD OF CLOSURE: Tank Removal

25. SOIL TYPES: Clay - OL

26. U.S.T. REMOVER'S CERTIFICATE NUMBER: 06578

27. U.S.T. CLEANER'S CERTIFICATE NUMBER: 06578

28. U.S.T. SITE ASSESSMENT NUMBER: 06578

29. EXCAVATION DEPTHS: TANK #1: 8' TANK # 2
TANK # 3 TANK #4 TANK # 5

30. FREE-STANDING WATER? Yes

31. ANY VISUAL LEAK INDICATORS? Yes, Sheen on water, odor.

32. ANY OTHER TANKS OR STATIONS NEARBY? 1 above ground waste oil tank on site.

33. DEPTH TO GROUND WATER? 7 ft.

TANK PRODUCT

1. WHO TRANSPORTED: N/A
2. TRANSPORTER'S ADDRESS: N/A
3. WHERE TRANSPORTED: N/A
4. TYPE OF PRODUCT: N/A
5. VOLUME OF PRODUCT: N/A

TANK SLUDGE

1. WHO PUMPED: T.R.S. HOW PUMPED: Air Pump
2. TYPE OF SLUDGE: Gas
3. VOLUME OF SLUDGE: 70 gallon
4. NAME OF TRANSPORTER: LEFT AT SITE
5. TRANSPORTER'S ADDRESS: N/A
6. DESTINATION OF SLUDGE: OWNER'S DECISION
7. WHERE STORED: ON SITE
8. HOW STORED: 55 GALLON - D.O.T. BARREL
9. HOW LABELED: HAZARDOUS WASTE
10. TESTING FOR HAZARDS: OWNER
11. MANIFEST REQUIRED: N/A , ONLY IF MOVED
12. COPY OF MANIFEST: N/A
13. EPA AND GENERATOR ID #: N/A

TANK CLEANING WATER

1. VOLUME USED: N/A
2. WHO PUMPED: N/A
3. WHO transported: N/A
4. DESTINATION: N/A

TANK INFORMATION

1. NUMBER OF TANKS: 1
2. DESCRIPTION OF TANK USE: On premise use - for company vehicles
3. VOLUME OF TANKS: 1 - 10,000 gallon
4. PRODUCT HISTORY: Gas
5. ANY TANKS PREVIOUSLY MOVED: NO
6. NUMBER OF TANKS STILL ON SITE: 1- above ground waste oil tank
7. TANK CONDITION: Good
8. TANK AGE: 1974 - 21 years
9. PIPING CONDITION: Good
10. ANY PREVIOUS CONTAMINATION: Unk
11. ANY PREVIOUS LEAKS OR SPILLS: Unk
12. ANY PREVIOUS TIGHTNESS TESTING OR MONITORING: Unk

TANK CLEANING-INERTING-PURGING

1. NAME OF CLEANING FIRM: TRS A DIVISION OF TJC INC.
2. ADDRESS OF CLEANING FIRM: P.O. BOX 90, PHILLIPS, WI 54555
3. METHOD OF CLEANING: WIPE DOWN WITH OIL DRY
4. NAME OF INERTING FIRM: TRS A DIVISION OF TJC INC.
5. METHOD OF INERTING-PURGING: CO2
6. LEL READING AFTER INERTING: TANK #1: <10% TANK #2
   TANK #3 TANK #4 TANK # 5
7. LOCATION OF CLEANING: ON SITE
8. ~~TANK~~ TRANSPORTER: T.R.S.
9. ADDRESS OF TRANSPORTER: P.O. Box 90, Phillips, WI 54555
10. METHOD OF TRANSPORTING: Hauled by truck

11. TANK DISPOSAL DESTINATION: Samuel's Recycling, Green Bay, WI

12. TANK WAS LABELED WITH: DATE, CONTENT, VAPOR STATE, METHOD OF INERTING, WARNING OF USE -- YES.

13. TANK CAPPED, 1/8" HOLE: YES

CONTAMINATED SOIL (IF FOUND)

1. VOLUME: Unk

2. SOIL TYPE: Clay - OL

3. FIELD READING: N/A

4. LAB SAMPLES TAKEN: One confirmation sample

5. WHERE STORED: Back in excavation

6. HOW STORED: Properly

7. WHO WILL TRANSPORT: Owner's Decision

8. PLAN TO DISPOSE OR REMEDIATE: Owner's Decision

FIELD SAMPLES

1. PERSON SAMPLING: KANDI K. GABRIELSEN
2. QUALIFICATIONS (IF DIFFERENT): SEE STATIC INFORMATION
3. CLEANING METHODS (IF DIFFERENT): SEE STATIC INFORMATION
4. TYPE OF METER USED (IF DIFFERENT): SEE STATIC INFORMATION
5. FIELD CALIBRATION DATE: 4/20/95 AND TIME: 10:30 P.M.
6. METHOD OF CALIBRATION: ZERO GAS
7. ANY ODORS: YES
8. ANY FREE PRODUCT: YES
9. ANY STAINED SOIL: YES
10. METHODS USED (IF DIFFERENT): SEE STATIC INFORMATION
11. TOOLS USED (IF DIFFERENT): SEE STATIC INFORMATION
12. SAMPLE TEMPERATURE: 35 Degrees
13. SAMPLE AGITATION TIME: 30 Seconds
14. SAMPLE EQUILIBRIUM TIME

CHART
< 40 DEGREES - 40 MINUTES
41-55 DEGREES - 20 MINUTES
56-69 DEGREES - 10 MINUTES
> 70 DEGREES - 5 MINUTES

LAB SAMPLES

1. METHOD USED (IF DIFFERENT): SEE STATIC INFORMATION
2. PRESERVATION METHOD (IF DIFFERENT): SEE STATIC INFO.
3. DATE SENT TO LAB: 4/21/95
4. LABEL ALL SAMPLE BOTTLES: YES, PROPERLY
5. LAB SAMPLE DEPTHS #1: 6.5' #2 #3 #4
   #5 #6 #7 #8

JOB SITE: NSP ASHLAND DATE: 4/20/95

LABORATORY AND FIELD SCREENING RESULTS

SOIL SAMPLE NUMBER	SAMPLE LOCATION	SAMPLE DEPTH (FEET)	SOIL TYPE	MOISTURE CONTENT	DATE COLLECTED	TIME COLLECTED	SAMPLE ODOR?	FIELD READING (I.U.)	LAB RESULTS	ANALYSIS PREFORMED
1	CONFIRMATION	6'	OL	DAMP	4/20/95	3:00 P.M.	YES			
	(SOUTH SIDE WALL)									

PPM - PARTS PER MILLION
ND - NOT DETECTED
N/A - NOT ANALYZED
A,B,C,... - USED TO LABLE FIELD SAMPLES
1,2,3,... - USED TO LABLE LAB SAMPLES
I.U. - INSTRUMENT UNITS AS ISOBUTYLENE

CENTRAL WISCONSIN ENVIRO LAB, INC.

To: Tank Removal Specialists
P.O. Box 90
Phillips, WI 54555
Phone: 715-339-4392
Fax: 715-339-4314
Attn: Brett

Date: May 2, 1995

Wisconsin Certification No. 737125510

PROJECT: NSP Ashland

LAB BATCH ID: 9504026

PROJECT NUMBER: N/A

METHODOLOGIES:

GRO concentration was determined by the Wisconsin WDNR LUST Analytical Guidance PUBL-SW-140 93 REV.

REMARKS:

CENTRAL WISCONSIN ENVIRO LAB, INC.

David L. Schumacher
Lab Director

Date: 5-2-95

a:\reports\lrs.wk!

CENTRAL WISCONSIN ENVIRO LAB, INC.

5707 Schofield Ave., Schofield, WI 54476 Wisconsin Certification No. 737125510

Sample I.D.:	Confirmation	Date Received:	04/21/95
Sample Matrix:	Soil	Lab Batch ID:	9504026
Date Collected:	04/20/95	Lab Sample ID:	008185
Project:	NSP Ashland		
Project #:	N/A	Reviewed By:	DCS

Parameter	*MDL*	*PQL*	*Result (Dry Wt.)*	*Units*	*Comments*	*Date Analyzed*	*Prep Date*	*Analytical Method*
GRO	20	50	960	mg/kg	2,4,5	05/01/95	04/28/95	WI LUST
Dry Weight			79	%	None	04/28/95	04/27/95	SM-2540B

Comments

1. Significant early eluting peaks before window.
2. Significant late eluting peaks after window.
3. Majority of compounds in early portion of window.
4. Majority of compounds in later portion of window.
5. Window shows a raised baseline.
6. See Remarks Section on cover page.

Result Flags:

B Detected in method blank.
J Estimated concentration.
E Exceeded calibration curve.
C Confirmed by second analysis.

Soils results are expressed on a dry weight basis.

F:9504026W

CENTRAL WISCONSIN ENVIRO LAB, INC.

5707 Schofield Ave., Schofield, WI 54476 Wisconsin Certification No. 737125510

Sample I.D.:	Trip Blank	**Date Received:**	04/21/95
Sample Matrix:	Water – Methanol	**Lab Batch ID:**	9504026
Date Collected:	04/20/95	**Lab Sample ID:**	008186
Project:	NSP Ashland		
Project #:	N/A	**Reviewed By:**	DJS

Parameter	*MDL*	*PQL*	*Result Result*	*Units*	*Comments*	*Date Analyzed*	*Prep Date*	*Analytical Method*
GRO	500	1,500	ND	µg/l	None	04/28/95	04/28/95	WI LUST

Comments

1. Significant early eluting peaks before window.
2. Significant late eluting peaks after window.
3. Majority of compounds in early portion of window.
4. Majority of compounds in later portion of window.
5. Window shows a raised baseline.
6. See Remarks Section on cover page.

Result Flags:

B Detected in method blank.
J Estimated concentration.
E Exceeded calibration curve.
C Confirmed by second analysis.

Soils results are expressed on a dry weight basis.

F:9504026W

CWEL 5707 Schofield Ave. • Schofield, Wisconsin 54476 • (715) 355-7988 • FAX (715) 355-4199

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Company Name: TRS

Project No.:

Project Name: NSP Ashland

Sampler: Kandi Gabrielsen

Bottle Size/Preservative: 2 oz Amber / 2 oz / None

GRO

No.: 2012

CWEL Batch No: 950426

Lab Use Only ID Number

Date	Time	Sample I.D./Description	No. of Bottles	Total	*Sample Type	ANALYSIS REQUESTED	Remarks	Lab Use Only ID Number
4/20	3:00	Confirmation	1	1	S	1		008185
"	3:05	Trip Blank	1	1		1		86
"	3:10	Dry Weight	1	1	S			

COMMENTS/SPECIAL INSTRUCTIONS: Contamination Suspected Please Fax Results

*Sample Type: GW - Groundwater, WW - Wastewater, S - Soil, SO - Solid, O - Oil, A - Air, SW - Surface Water, DW - Drinking Water, SE - Sediment, H - Hazardous Liquid, X - Other

To Be Completed by Client ☐ RUSH (approved by lab)

Packed By:

Sealed For Shipping By: Seal #

Quotation#:

Purchase Order #:

Results To: T.R.S.
P.O. Box 90
Phillips WI 54555

Attention:

Phone: 715-339-4919 Fax: 715-339-4314

Billing Address: SAME

Attention:

Phone: Fax:

CUSTODY TRANSFERS

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
1 Britt C Mozal BB 4/24/95	4/21/95	10:00PM			
2.					

Received for Laboratory: 4-21-95 1905

Shipping Details - To Be Completed by CWEL

Seal Intact Upon Receipt by Laboratory: ☒ Yes ☐ No ☐ NA

Method of Shipment: ☐ Hand Del. ☐ UPS ☐ FEDEX ☒ Land

Contents Temperature: ☒ On Ice ☐ ____ °C Refrig. #

Date Received: 4-21-95

Date Due: 2 wks

STATIC
FIELD SAMPLING TECHNIQUES

In addition to data specific to this job, samples are head space type utilizing new zip-lock polyethylene bags, filled to a line one-half full. All samples are agitated for 30 seconds, and held in equilibrium according to temperature.

GUIDELINES USED FOR EQUILIBRIUM

< 40 degrees Fahrenheit - 40 minutes
41 - 55 degrees Fahrenheit - 20 minutes
56 - 69 degrees Fahrenheit - 10 minutes
> 70 degrees Fahrenheit - 5 minutes

Headspace samples are kept out of direct sunlight. A photoionization detector is used (see meter description). A hole is then cut in the upper right-hand corner of the polyethylene sample bag, one-half inch in length. The meter is placed so the probe is half-way between the top of the bag and top of the soil inside. A reading is taken and the highest value is recorded.

LAB SAMPLES

Lab samples are taken by using new sample bottles provided by a DNR certified lab located in Milwaukee, Wisconsin. Lab samples are taken in the same area and at the same time as the field samples. For GRO samples, 25 grams of soil are collected in lab bottles with pre-measured, pre-weighed amounts of methanol. In addition a methanol blank and one dry weight sample is prepared. For DRO samples, two 25 grams of soil are collected in bottles along with one dry weight sample. All samples collected on site are sent to our lab and are received within four days. All samples are immediately packed in ice and kept at 4 degrees Celsius from the time they are collected to the time they arrive at the lab. All DNR rules and guidelines are strictly adhered to in the collection of soil and water samples.

LAB & FIELD SAMPLE PROCEDURES

All samples are collected by trowel or syringe method. A detergent solution rinsed by distilled water is used to clean sample tools. Sample containers are not cleaned on site as all new containers are used for each sample.

STATIC METER SPECIFICATIONS

MAKE:	M.S.A. Photon Gas Detector
MODEL:	Excited Electrodeless Discharge Tube
FACTORY CALIBRATION:	March 27, 1992
DETECTOR:	Photoionization, by-pass type
LAMP ENERGY VOLTS:	10.6
DISPLAY:	2-line, 16-character dot matrix, liquid crystal with switchable backlighting, for alphanumeric and bar graph readouts
BATTERY TYPE:	Sealed lead-acid, field replaceable pack
CHARGE / DISCHARGE TIME:	8 hours / 6 hours
MATERIALS IN SAMPLE STREAM:	Stainless Steel, Tefloe, Vitone
INLET FLOW RATE:	Exceeds 500ml / minute
OPERATING TEMPERATURE RANGE:	0 TO 40 Degrees Centigrade (32 to 105 Degrees Fahrenheit)
OPERATING HUMIDITY RANGE:	0 - 100% relative humidity (non-condensing)
OPERATING CONCENTRATION RANGE:	0.1 TO 2000 PPM isobutylene equivalent

STATIC METER SPECIFICATIONS (CONTINUED)

ACCURACY:

Isobutylene: (after calibration with
Gas and 100 ppm isobutylene Span Gas)
within +/-2 ppm or +/-10% for 0 to 100 ppm
within +/-15% for 100 to 1000 ppm
within +/-20% for 1000 to 2000 ppm

Acetone: (after calibration with Zero Gas
and 100 ppm acetone Span Gas)
within +/-4 ppm or +/-10% for 0 to 100 ppm
within +/-15% for 100 to 1000 ppm
within +/-20% for 1000 to 2000 ppm

Benzene: (after calibration with Zero Gas
and 100 ppm benzene Span Gas)
within +/-4 ppm or +/-10 for 0 to 100 ppm
within +/-20% for 100 to 1000 ppm
within +/-25% for 1000 to 2000 ppm

Toluene: (after calibration with Zero Gas
and 100 ppm toluene Span Gas)
within +/-2 ppm or +/-10% for 0 to 100 ppm
within +/-20% for 100 to 1000 ppm
within +/-25% for 1000 to 2000 ppm

Trichloroethylene: (after calibration with
Zero Gas and 100ppm trichoroethylene Span Gas)
within +/-5 ppm or +/-10% for 0 to 100 ppm
within +/-25% for 100 to 1000 ppm
within +/-35% for 1000 to 2000 ppm

PRECISION: +/- 1% (100 ppm isobutylene)

RESPONSE: Less than 3 seconds

DETECTION LIMIT: 0.1 ppm isobutylene

No erratic instrument readings, cleanings, or repairs were noted or conducted unless specifically mentioned.

NARRATIVE

13.0 INTRODUCTION

T.R.S. was retained by NSP of Eau Claire to perform a tank closure assessment. The site was located at 301 Lakeshore Dr., in the city of Ashland, WI. The legal description of the property is T48N, R4W, Sec 33, NW 1/4 of the SW 1/4.

14.0 PURPOSE

The purpose was to document technical findings on for a Petroleum Tank Closure Assessment associated with the removal of one underground storage tank containing Gasoline. Included in this report is a discussion of soil sampling procedures, laboratory analysis results, conclusions and recommendation results related to the aforementioned site. The site assessment was conducted by T.R.S. personnel, who are certified under Wisconsin Administrative Code ILHR 10 "Flammable and Combustible Liquids" Guidelines for Site Assessment.

15.0 PROPERTY USE (PAST AND PRESENT)

The property has been used as a utility company.

16.0 CONCLUSIONS

Based on the information gathered during the assessment, the following conclusion can be made regarding this site.

A. Residual petroleum contamination was found to be above the WDNR Remedial Action Guideline of 10 ppm DRO and GRO in all sample locations tested.

17.0 RECOMMENDATION

This site should be considered contaminated and the site should be cleaned in accordance with WDNR guidelines.

18.0 STANDARD OF CARE

This Tank Closure Site Assessment Report is based on data produced by T.R.S. through the collection and analysis of soil samples. Soil qualities reported herein apply only to the specific locations and times at which this work was performed. Variations may occur at other locations between the soil samples. Conclusions and recommendations made represent our professional judgment in Environmental Consulting in interpreting this data.

Wisconsin Department of Industry, Labor and Human Relations

CHECKLIST FOR UNDERGROUND TANK CLOSURE

Complete one form for each site closure.

The information you provide may be used by other government agency programs. (Privacy Law, s. 15.04 (1) (m))

RETURN COMPLETED CHECKLIST TO:
Safety & Buildings Division
Fire Prevention & Underground Storage Tank Section
P.O. Box 7869, Madison, WI 53707

A. IDENTIFICATION (Please Print) — Indicate whether closure is for: ☑ Tank System ☐ Tank Only ☐ Piping Only

1. Site Name	2. Owner Name
Site Street Address (not P.O. Box)	Owner Street Address
☐ City ☐ Village ☐ Town of	☐ City ☐ Village ☐ Town of / State / Zip Code
State / Zip Code / County	County / Telephone No. (include area code)

3. Closure Company Name (Print)	Closure Company Street Address
Closure Company Telephone No. (include area code)	Closure Company City, State, Zip Code

4. Name of Company Performing Closure Assessment	Assessment Company Street Address, City, State, Zip Code
Telephone # (include area code) / Certified Assessor Name (Print)	Assessor Signature / Assessor Certification No.

Tank ID #	Closure	Temp. Closure	Closure in Place	Tank Capacity	Contents	Closure Assessment
1.	☐ M	☐	☐			☐ Y ☐ N
2.	☐	☐	☐			☐ Y ☐ N
3.	☐	☐	☐			☐ Y ☐ N
4.	☐	☐	☐			☐ Y ☐ N
5.	☐	☐	☐			☐ Y ☐ N
6.	☐	☐	☐			☐ Y ☐ N

Indicate which product by numeric code: 01-Diesel; 02-Leaded; 03-Unleaded; 04-Fuel Oil; 05-Gasohol; 06-Other; 09-Unknown; 10-Premix; 11-Waste oil; 13-Chemical (indicate the chemical name(s) or numbers(s)); 14-Kerosene; 15-Aviation.

Written notification was provided to the local agent 15 days in advance of closure date. ☐ Y ☐ N ☐ NA

All local permits were obtained before beginning closure. ☐ Y ☐ N ☐ NA

Check applicable box at right in response to all statements in Sections B - E.

	Remover Verified	Inspector Verified	NA
B. TEMPORARILY OUT-OF-SERVICE			
Written inspector approval of temporary closure obtained which			
is effective until (provide date)	☐ Y ☐ N	☐	☐
1. Product Removed			
a. Product lines drained into tank (or other container) and resulting liquid removed, AND	☐ Y ☐ N	☐	☐
b. All product removed to bottom of suction line, OR	☐ Y ☐ N	☐	☐
c. All product removed to within 1" of bottom	☐ Y ☐ N	☐	☐
2. Fill pipe, gauge pipe, tank truck vapor recovery fittings, and vapor return lines capped	☐ Y ☐ N	☐	☐
3. All product lines at the islands or pumps located elsewhere are removed and capped, OR	☐ Y ☐ N	☐	☐
4. Dispensers/pumps left in place but locked and power disconnected	☐ Y ☐ N	☐	☐
5. Vent lines left open	☐ Y ☐ N	☐	☐
6. Inventory form filed indicating temporary closure	☐ Y ☐ N	☐	☐
C. CLOSURE BY REMOVAL			
1. Product from piping drained into tank (or other container)	☐ Y ☐ N	☐	☐
2. Piping disconnected from tank and removed	☐ Y ☐ N	☐	☐
3. All liquid and residue removed from tank using explosion proof pumps or hand pumps	☐ Y ☐ N	☐	☐
4. All pump motors and suction hoses bonded to tank or otherwise grounded	☐ Y ☐ N	☐	☐
5. Fill pipes, gauge pipes, vapor recovery connections, submersible pumps and other fixtures removed	☐ Y ☐ N	☐	☐
NOTE: DROP TUBE SHOULD NOT BE REMOVED IF THE TANK IS TO BE PURGED THROUGH THE USE OF AN EDUCTOR			
6. Vent lines left connected until tanks purged	☐ Y ☐ N	☐	☐
7. Tank openings temporarily plugged so vapors exit through vent	☐ Y ☐ N	☐	☐
8. Tank atmosphere reduced to 10% of the lower flammable range (LEL) - see Section F	☐ Y ☐ N	☐	☐
9. Tank removed from excavation after PURGING/INERTING, placed on level ground and blocked to prevent movement	☐ Y ☐ N	☐	☐
10. Tank cleaned before being removed, being removed from site	☐ Y ☐ N	☐	☐

CONTINUE ON NEXT PAGE

	Remover Verified	Inspector Verified	NA
C. CLOSURE BY REMOVAL (continued)			
11. Tank labeled in 2" high letters after removal but before being moved from site. NOTE: COMPLETE TANK LABELING SHOULD INCLUDE WARNING AGAINST REUSE; FORMER CONTENTS; VAPOR STATE; VAPOR FREEING TREATMENT; DATE	X Y	N	
12. Tank vent hole (1/8" min) in uppermost part of tank installed prior to moving the tank from site.	X Y	N	
13. Inventory form filed by owner with Safety and Buildings Division indicating closure by removal.	X Y	N	
14. Site security is provided while the excavation is open.	X Y	N	
D. CLOSURE IN PLACE			
NOTE: CLOSURES IN PLACE ARE ONLY ALLOWED WITH THE PRIOR WRITTEN APPROVAL OF THE DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS OR LOCAL AGENT			
1. Product from piping drained into tank (or other container).	Y	N	
2. Piping disconnected from tank and removed.	Y	N	
3. All liquid and residue removed from tank using explosion-proof pumps or hand pumps.	Y	N	
4. All pump motors and suction hoses bonded to tank or otherwise grounded.	Y	N	
5. Fill pipes, gauge pipes, vapor recovery connections, submersible pumps and other fixtures removed.	Y	N	
NOTE: DROP TUBE SHOULD NOT BE REMOVED IF THE TANK IS TO BE PURGED THROUGH THE USE OF AN EDUCTOR - EDUCTOR OUTPUT 12 FT ABOVE GRADE			
6. Vent lines left connected until tanks purged.	Y	N	
7. Tank openings temporarily plugged so vapors exit through vent.	Y	N	
8. Tank atmosphere reduced to 10% of the lower flammable range (LEL) - see Section F.	Y	N	
9. Tank properly cleaned to remove all sludge and residue.	Y	N	
10. Solid inert material (sand, cyclone boiler slag, pea gravel recommended) introduced and tank filled.	Y	N	
11. Vent line disconnected or removed.	Y	N	
12. Inventory form filed by owner with Safety and Buildings Division indicating closure in place.	Y	N	
E. CLOSURE ASSESSMENTS			
NOTE: DETERMINE IF A CLOSURE ASSESSMENT IS REQUIRED BY REFERRING TO ILHR 10.			
1. Individual conducting the assessment has a closure assessment plan (written) which is used as the basis for their work on the site.	X Y	N	
2. Do points of obvious contamination exist?	X Y	N	
3. Are there strong odors in the soils?	X Y	N	
4. Was a field screening instrument used to pre-screen soil sample locations?	Y	N	
5. Was a closure assessment omitted because of obvious contamination?	Y	X N	
6. Was the DNR notified of suspected or obvious contamination?	X Y	N	
Agency, office and person contacted:			
7. Contamination suspected because of: Odor, Soil Staining, Free Product, Sheen On Groundwater, Field Instrument Test			
F. METHOD OF ACHIEVING 10% LEVEL DESCRIPTION			
X Eductor Or Diffused Air Blower			
Eductor driven by compressed air, bonded and drop tube left in place; vapors discharged minimum of 12 feet above ground.			
Diffused air blower bonded and drop tube removed. Air pressure not exceeding 5 psig.			
Dry Ice			
Dry ice introduced at 1.5 pounds per 100 gallons of tank capacity. Dry ice crushed and distributed over the greatest possible tank area. Dry ice evaporated before proceeding.			
X Inert Gas (CO2 or N2) NOTE: INERT GASSES PRODUCE AN OXYGEN DEFICIENT ATMOSPHERE. THE TANK MAY NOT BE ENTERED IN THIS STATE WITHOUT SPECIAL EQUIPMENT.			
Gas introduced through a single opening at a point near the bottom of the tank at the end of the tank opposite the vent.			
Gas introduced under low pressure not to exceed 5 psig to reduce static electricity. Gas introducing device grounded.			
Tank atmosphere monitored for flammable or combustible vapor levels.			
Calibrate combustible gas indicator. Drop tube removed prior to checking atmosphere. Tank space monitored at bottom, middle and upper portion of tank. Readings of 10% or less of the lower flammable range (LEL) obtained before removing tank from ground.			
G. NOTE SPECIFIC PROBLEMS OR NONCOMPLIANCE ISSUES BELOW			
H. REMOVER/CLEANER INFORMATION			
Remover Name (print)	Remover Signature	Remover Certification No.	Date Signed
I. INSPECTOR INFORMATION			
Kevin Tomke		0046	
Inspector Name (print)	Inspector Signature	Inspector Certification No.	
DID For Location Where Inspection Performed	Inspector Telephone Number	Date Signed	

REMOVER

Wisconsin Department of Industry, Labor and Human Relations

For Office Use Only:
Tank ID #

UNDERGROUND PETROLEUM PRODUCT TANK INVENTORY

our copy

Information Required By Sec. 102.142, Wis. Stats.

Send Completed Form To:
Safety & Buildings Division
P.O. Box 7969
Madison, WI 53707
Telephone: (608) 267-5280

Underground tanks in Wisconsin that have stored or currently store petroleum or regulated substances must be registered. Please see the reverse side for additional information on this program. An underground storage tank is defined as any tank with at least 10 percent of its total volume (included piping) located below ground level. A separate form is needed for each tank. Send each completed form to the agency designated in the top right corner. Have you previously registered this tank by submitting a form? ☐ YES ☐ NO If yes, are you correcting/updating information only? ☐ Yes ☐ No
The information you provide may be used by other government agency programs [Privacy Law, s. 15.04 (1) (m)].

This registration applies to a tank that is (check one):
1A. ☐ In Use or 1B. ☐ Newly Installed
2. ☐ Abandoned With Product
3. ☐ Abandoned No Product (empty) or With Water
4. ☐ Closed - Tank Removed
6. ☐ Closed - Filled With Inert Material
7. ☐ Out of Service - Provide Date: _____
8. ☐ Changed Ownership (Indicate new owner below)

Fire Department Providing Fire Coverage Where Tank Located:

IDENTIFICATION: (Please Print)

1. Tank Site Name	Site Address	Site Telephone No.
NSP-Ashland	301 E. E. Lakeshore Dr.	(800) 895-4999

City	☐ Village	☐ Town of:	State	Zip Code	County
Ashland			WI	54806	Ashland

2. Owner Name (mail sent here unless indicated otherwise in #3 below)	Owner Mailing Address (mail sent here unless indicated otherwise in #3)
Globe Industries	100 Mill St.

City	☐ Village	☐ Town of:	State	Zip Code	County
Ironwood			MI	49938	

3. Alternate Mailing Name If Different Than #2	Alternate Mailing Street Address If Different From #2

City	☐ Village	☐ Town of:	State	Zip Code	County

4. Tank Age (date installed, if known: or years old)	5. Tank Capacity (gallons)	6. Tank Manufacturer's Name (if known)
[redacted] 1974	10,000	Owens/Corning

TYPE OF USER (check one):
1. ☐ Gas Station
2. ☐ Bulk Storage
3. ☒ Utility
4. ☐ Mercantile
5. ☐ Industrial
6. ☐ Government
7. ☐ School
8. ☐ Residential
9. ☐ Agricultural
10. ☐ Other (specify): _____

TANK CONSTRUCTION:
1. ☐ Bare Steel
2. ☐ Cathodically Protected and Coated Steel (A. ☐ Sacrificial Anodes or B. ☐ Impressed Current)
3. ☐ Coated Steel
4. ☒ Fiberglass
5. ☐ Other (specify): _____
6. ☐ Relined - Date _____
7. ☐ Steel - Fiberglass Reinforced Plastic Composite
9. ☐ Unknown

Approval: 1. ☐ Nat'l Std. 2. ☒ UL 3. ☐ Other:
Is Tank Double Walled? ☐ Yes ☒ No

Overfill Protection Provided? ☐ Yes ☒ No If yes, identify type:
Spill Containment? ☐ Yes ☒ No

Tank leak detection method: 1. ☐ Automatic tank gauging 2. ☐ Vapor monitoring 3. ☐ Groundwater monitoring 4. ☐ Inventory control and tightness testing 5. ☐ Interstitial monitoring 6. ☒ Not required at present 7. ☐ Manual Tank Gauging (only for tanks of 1,000 gallons or less)

PIPING CONSTRUCTION
1. ☐ Bare Steel
2. ☐ Cathodically Protected and Coated or Wrapped Steel (A. ☐ Sacrificial Anodes or B. ☐ Impressed Current)
3. ☒ Coated Steel
4. ☐ Fiberglass
5. ☐ Other (specify): _____
9. ☐ Unknown

Piping System Type: 1. ☐ Pressurized piping with: A. ☐ auto shutoff; B. ☐ alarm; or C. ☐ flow restrictor 2. ☐ Suction piping with check valve at tank 3. ☒ Suction piping with check valve at pump and inspectable

Piping leak detection method: used if pressurized or check valve at tank: 1. ☐ Vapor monitoring 2. ☐ Interstitial monitoring 3. ☐ Groundwater monitoring 4. ☐ Tightness testing 5. ☐ Line Leak Detector 6. ☒ Not Required

Approval: 1. ☐ Nat'l Std 2. ☒ UL 3. ☐ Other:
Double Walled: ☒ Yes ☐ No

TANK CONTENTS
1. ☐ Diesel
2. ☐ Leaded
3. ☒ Unleaded
4. ☐ Fuel Oil
5. ☐ Gasohol
6. ☐ Other
7. ☐ Empty
8. ☐ Sand/Gravel/Slurry
9. ☐ Unknown
10. ☐ Premix
11. ☐ Waste Oil
12. ☐ Propane
13. ☐ Chemical * _____ _____ _____
14. ☐ Kerosene
15. ☐ Aviation

* If #13 is checked, indicate the chemical name(s) or number(s) of the chemical or waste.

Tank Closed, Give Date (mo/day/yr): 4-20-95

Has a site assessment been completed? (see reverse side for details) ☐ Yes ☐ No

If installation of a new tank is being reported, indicate who performed the installation inspection:
1. ☐ Fire Department
2. ☐ DILHR
3. ☐ Other (identify) _____

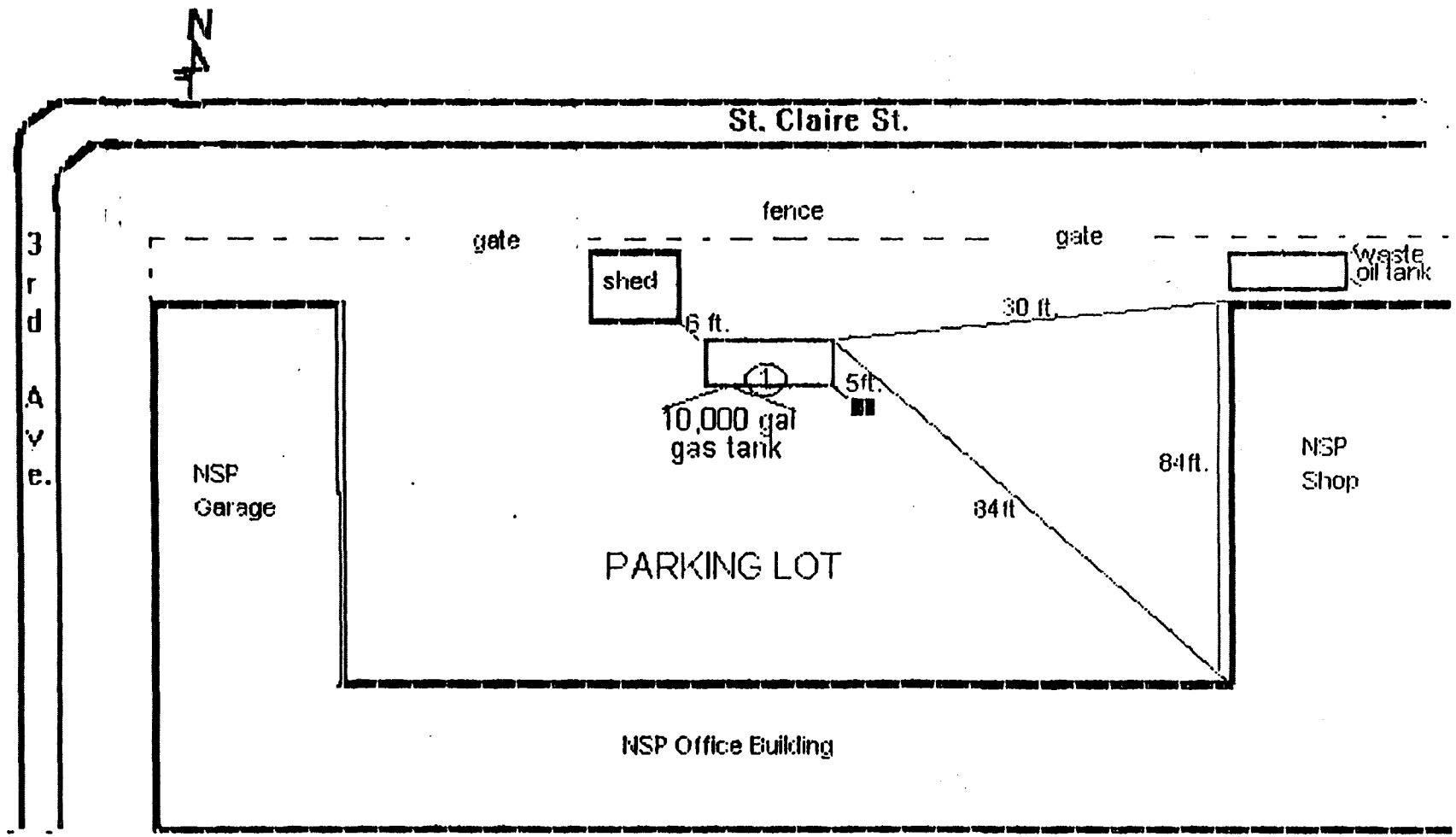
Name of Owner or Operator (please print): David K. Welder

Indicate Whether: ☐ Owner or ☐ Operator

Signature of Owner or Operator: David K. Welder for NSP

Date Signed: 4/20/95

BD-7437 (R. 05/94) IMPORTANT: Complete as many items on this form as possible. Failure to provide sufficient



Legend

(1) = Confirmation Sample

Tank dimensions: 30' L x 8' W

Lab sample taken at 6.5 ft.

FROM SOUTH SIDE WALL OF EXCAVATION

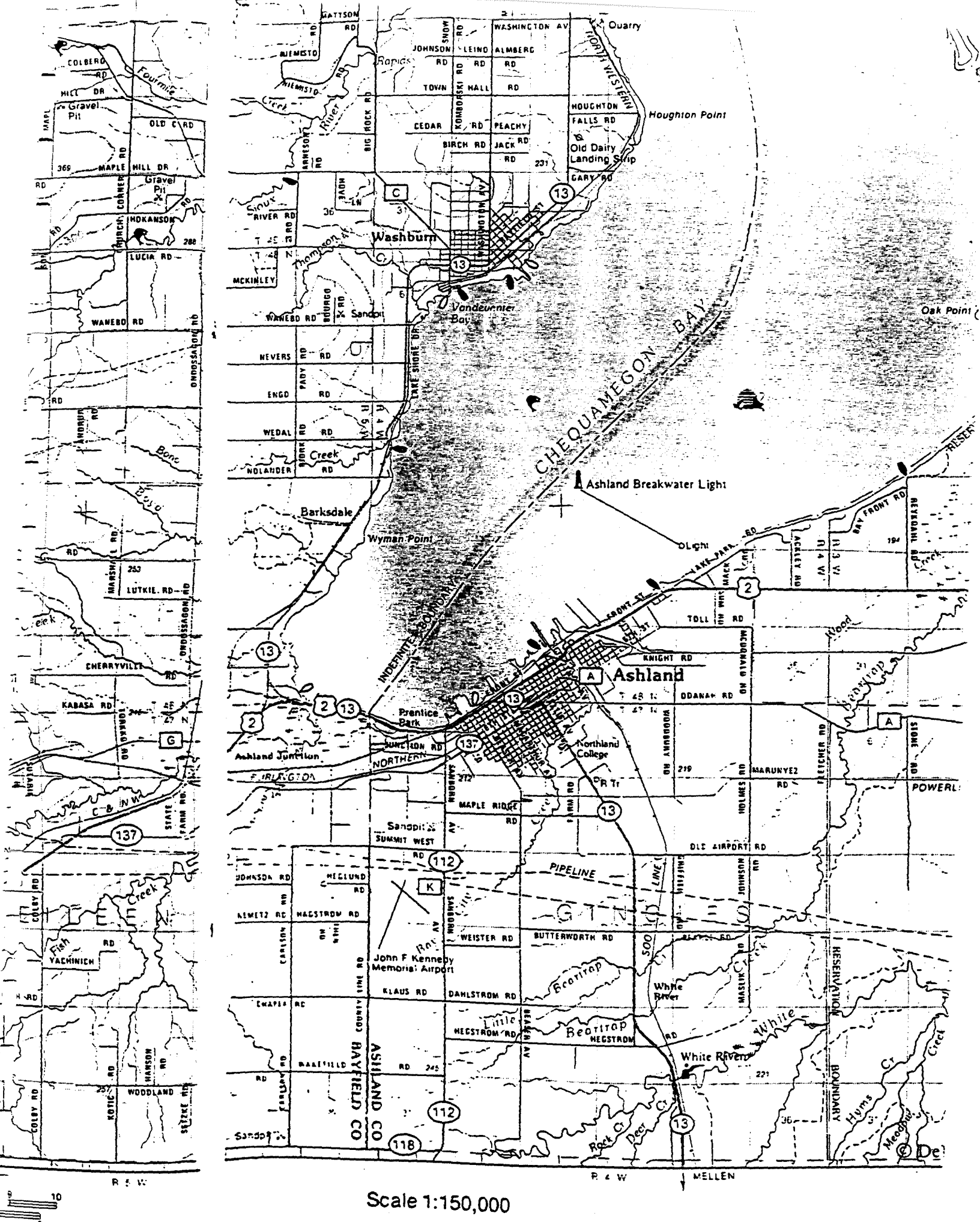
DRAWING TITLE: NSP ASHLAND

SCALE: 1" = 10'	APPROVED BY: DONALD P. CHARTIER, JR.	DRAWN BY DPC, JR
DATE:		REVISED

TRS Tank Removal Specialists

A DIVISION OF T.J.C., INC.

DRAWING NUMBER 042695.01


Ashland
Washburn
Barksdale
Wyman Point
Vandeburnier Bay
Houghton Point
Old Dairy Landing Strip
Ashland Breakwater Light
Oak Point
Prentice Park
Northland College
Ashland Junction
John F Kennedy Memorial Airport
Sandpit
Gravel Pit
CHEQUAMEGON BAY
INDEFINITE BOUNDARY
ASHLAND CO
BAYFIELD CO
Scale 1:150,000

CENTRAL WISCONSIN ENVIRO LAB, INC.

To: Tank Removal Specialists
P.O. Box 90
Phillips, WI 54555
Phone: 715-339-4392
Fax: 715-339-4314
Attn: Brett

Date: May 15, 1995

Wisconsin Certification No. 737125510

PROJECT: NSP - Ashland

LAB BATCH ID: 9504027

PROJECT NUMBER: N/A

METHODOLOGIES:

DRO concentration was determined by the Wisconsin WDNR LUST Analytical Guidance PUBL-SW-141 93 REV.

PVOC compounds were determined by modified EPA Method 8020.

REMARKS:

PAH results under CWEL Batch 9504038 due to resample.

CENTRAL WISCONSIN ENVIRO LAB, INC.

David L. Schumacher
Lab Director

Date: 5-15-95

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CENTRAL WISCONSIN ENVIRO LAB, INC.

To: Tank Removal Specialists
P.O. Box 90
Phillips, WI 54555
Phone: 715-339-4392
Fax: 715-339-4314
Attn: Brett

Date: May 15, 1995

Wisconsin Certification No. 737125510

PROJECT: NSP – Ashland

LAB BATCH ID: 9504038

PROJECT NUMBER: N/A

METHODOLOGIES:

PAH determined by modified EPA Method 8310.

REMARKS:

CENTRAL WISCONSIN ENVIRO LAB, INC.

David L. Schumacher
Lab Director

Date: 5-15-95

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CENTRAL WISCONSIN ENVIRO LAB, INC.

Wisconsin Certification No. 737125510

LABORATORY ANALYSIS RESULTS

Sample I.D.:	Replacement PAH Samp.	Date Received:	04/27/95
Sample Matrix:	Soil	Lab Batch ID:	9504038
Date Collected:	04/27/95	Lab Sample ID:	008261
Project:	NSP – Ashland	Extraction Date:	05/01/95
Project #:	N/A	Reviewed By:	DCS

Parameter	Detection Limit	Concen-tration	Units	Date Analyzed
Acenaphthene	1,300	4,200	µg/kg	05/02/95
Acenaphthylene	64,000	ND	µg/kg	
Anthracene	1,300	4,100	µg/kg	
Benzo (a) anthracene	1,600	5,300	µg/kg	
Benzo (a) pyrene	1,300	1,700	µg/kg	
Benzo (b) fluoranthene	1,300	2,200	µg/kg	
Benzo (ghi) perylene	1,900	ND	µg/kg	
Benzo (k) fluoranthene	1,300	ND	µg/kg	
Chrysene	1,600	3,000	µg/kg	
Dibenzo (a,h) anthracene	1,300	ND	µg/kg	
Fluoranthene	1,300	6,700	µg/kg	
Fluorene	6,400	ND	µg/kg	
Indeno (1,2,3–cd) pyrene	1,300	3,200	µg/kg	
1–Methylnaphthalene	1,300	4,500	µg/kg	
2–Methylnaphthalene	1,300	5,90	µg/kg	
Naphthalene	1,300	5,300	µg/kg	
Phenanthrene	6,400	16,000	µg/kg	
Pyrene	6,400	13,000	µg/kg	

ND: Not Detected
J: Detected but below PQL. Estimated concentration
PQL: Practical Quantitation Limit
CONCENTRATION: Results on dry weight basis
PAH: Analyzed by EPA Method 8310.

CENTRAL WISCONSIN ENVIRO LAB, INC.

5707 Schofield Ave., Schofield, WI 54476 Wisconsin Certification No. 737125510

Sample I.D.:	Trip Blank	Date Received:	04/21/95
Sample Matrix:	Water – Methanol	Lab Batch ID:	9504027
Date Collected:	04/20/95	Lab Sample ID:	008188
Project:	NSP – Ashland		
Project #:	N/A	Reviewed By:	DCS

Parameter	MDL	PQL	Result Result	Units	Comments	Date Analyzed	Prep Date	Analytical Method
MTBE	25	60	ND	µg/l	None	04/28/95	04/28/95	8020
Benzene	25	60	ND	µg/l		04/28/95	04/28/95	8020
Toluene	25	60	ND	µg/l		04/28/95	04/28/95	8020
Ethylbenzene	25	60	ND	µg/l		04/28/95	04/28/95	8020
o-Xylene	25	60	ND	µg/l		04/28/95	04/28/95	8020
m&p Xylene	25	60	ND	µg/l		04/28/95	04/28/95	8020
1,3,5-Trimethylbenzene	25	60	ND	µg/l		04/28/95	04/28/95	8020
1,2,4-Trimethylbenzene	25	60	ND	µg/l		04/28/95	04/28/95	8020

Comments

1. Significant early eluting peaks before window.
2. Significant late eluting peaks after window.
3. Majority of compounds in early portion of window.
4. Majority of compounds in later portion of window.
5. Window shows a raised baseline.
6. See Remarks Section on cover page.

Result Flags:

B Detected in method blank.
J Estimated concentration.
E Exceeded calibration curve.
C Confirmed by second analysis.

Soils results are expressed on a dry weight basis.

j:\soiltb

CWEL 5707 Scholfield Ave. • Schofield, Wisconsin 54476 • (715) 355-7988 • FAX (715) 355-4199

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Company Name: TRS

Project No.: NSP-Ashland

Project Name:

Sampler: Kandi Gabrielson

No.: 1986

CWEL Batch No. 9504038

Date	Time	Sample I.D./Description	Bottle Size/Preservative: 40z-none	Total	*Sample Type	ANALYSIS REQUESTED: PAH	Remarks	Lab Use Only ID Number
4/27	8:20am	Replacement PAH Samp.	1	1	S	X		OD8261

COMMENTS/SPECIAL INSTRUCTIONS: This is a replacement PAH Sample. Please fax results

*Sample Type: GW - Groundwater; WW - Wastewater; S - Soil; SO - Solid; O - Oil; A - Air; SW - Surface Water; DW - Drinking Water; SE - Sediment; H - Hazardous Liquid; X - Other

To Be Completed by Client ☐ RUSH (approved by lab)

Packed By: Brett

Sealed For Shipping By: Brett Seal #

Quotation#:

Purchase Order #:

Results To: TRS
P.O. Box 90
Phillips, WI 54555
Attention: Brett
Phone: 715-339-4919 Fax: 715-339-4314

Billing Address: Same
Attention:
Phone: Fax:

CUSTODY TRANSFERS

	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
1.	Brett C. Meyd	4/27/95	8:20am			
2.						

Received for Laboratory: [signature] 4/27/95 1:10p

Shipping Details - To Be Completed by CWEL

Seal Intact Upon Receipt by Laboratory ☐ Yes ☐ No ☒ N/A

Method of Shipment: ☒ Hand Del. ☐ UPS ☐ FEDEX ☐

Contents Temperature: ☒ On Ice ☐ ____ °C Refrig. # W1

Date Received: 4/27

Date Due: 24hrs

CENTRAL WISCONSIN ENVIRO LAB, INC.

5707 Schofield Ave., Schofield, WI 54476 Wisconsin Certification No. 737125510

Sample I.D.:	South Sidewall	**Date Received:**	04/21/95
Sample Matrix:	Soil	**Lab Batch ID:**	9504027
Date Collected:	04/20/95	**Lab Sample ID:**	008187
Project:	NSP – Ashland		
Project #:	N/A	**Reviewed By:**	DCS

Parameter	*MDL*	*PQL*	*Result (Dry Wt.)*	*Units*	*Comments*	*Date Analyzed*	*Prep Date*	*Analytical Method*
MTBE	50	120	ND	µg/kg	2,4,5	05/01/95	05/01/95	8020
Benzene	50	120	2,300	µg/kg		05/01/95	05/01/95	8020
Toluene	50	120	2,700	µg/kg		05/01/95	05/01/95	8020
Ethylbenzene	50	120	15,000	µg/kg		05/01/95	05/01/95	8020
m&p Xylene	50	120	12,000	µg/kg		05/01/95	05/01/95	8020
o–Xylene	50	120	11,000	µg/kg		05/01/95	05/01/95	8020
1,3,5–Trimethylbenzene	50	120	13,000	µg/kg		05/01/95	05/01/95	8020
1,2,4–Trimethylbenzene	50	120	17,000	µg/kg		05/01/95	05/01/95	8020
DRO	45	150	3,000	mg/kg	5	04/28/95	04/21/95	WI LUST
Dry Weight			79	%	None	04/28/95	04/27/95	SM–2540B

Comments

1. Significant early eluting peaks before window.
2. Significant late eluting peaks after window.
3. Majority of compounds in early portion of window.
4. Majority of compounds in later portion of window.
5. Window shows a raised baseline.
6. See Remarks Section on cover page.

Result Flags:

B Detected in method blank.
J Estimated concentration.
E Exceeded calibration curve.
C Confirmed by second analysis.

Soils results are expressed on a dry weight basis.

f:9504027w

APPENDIX B
SOIL BORING LOBS, MONITOR WELL CONSTRUCTION FORMS, AND MONITOR WELL DEVELOPMENT FORMS

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response
☐ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

SOIL BORING LOG INFORMATION

Form 4400-122 7-91

Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - ASHLAND		MW-4A

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOART LONGYEAR Jon Weeks	05 / 20 / 96 (MM DD YY)	05 / 20 / 96 (MM DD YY)	0-20 6.25" HSA 20-34 6" Mud Rotary

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-4A	____ Feet MSL	____ Feet MSL	10.25/6 inches

Boring Location
State Plane ____ N. ____ E S/C/N | Lat ___ ___ ___ | Long ___ ___ ___
SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W

Local Grid Location (If Applicable)
____ Feet ☐ N ☐ E ____ Feet ☐ S ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
			10	Blind drilled to 10 ft. Start sampling @ 10 ft.										
1	7	4 3 3 4	11	FILL, CLAY, silty, some gravel, moist, firm, low plasticity, wood chips, cinders, red-brown, strong odor.	CL				6					
2	17	8 10 12 8	12 13	CLAY, silty, little gravel, moist, very stiff, low plasticity, strong petroleum odor, reddish brown.	CL				22					
3	18		14 15	SILT, non-plastic, moist, strong odor, little gravel (Shelby tube sampled interval 14-16, description from lower tip.	ML									
			16	SAND, fine grained, trace silt, wet, very dense, poorly graded, slight odor, reddish brown.	SM									
4	20	37 32 20 64	17	SILT, little clay, trace gravel, hard, non-plastic, no odor, reddish brown.	ML				52					
			18	18.6 - 19 ft - some clay in silt.										
5	18	38 26 41 40	19 20						67					

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature | Firm: Dames and Moore, Madison, WI

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a seperate offense, pursuant to ss 144.99 and 162.06, Wis. Stats

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-4A Use only as an attachment to Form 4400-122.

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
6	16		21	(Shelby tube sampled interval) SILT as above with little gravel at lower the tip.	ML									
			22											
7	12	21 22 37 46	23	SAND, mdeium to fine grained, poorly graded, trace gravel, very hard, wet, extreme odor, petroleum sheen on surfaces.	SP-SM				79	12.0			10.7	14.0/75.3/10.7
			24	Little grave in sand.										
8	8	42 50/5"	25						92					
			26											
9	2	50/3"	27	SAND, silty sand, trace gravel, very hard, non-plastic, wet, reddish brown, strong odor.	SM				200	8.8			32.2	1.1/66.7/32.2
			28											
10	1	50/2"	29	SILT, very poor recovery - one fragment.	ML				300					
			30											
11	3	50/3"	31	SILT, little sand, trace gravel, hard, non-plastic, wet, reddish brown, strong odor.					200					
			32											
12	14	28 37 47 47	33	Slight odor.					84					
			34											
13	0	50/0"		No recovery, very hard. Backfill with bentonite to 27 ft. Set MW-4A @ 26 ft.					00					

s:\wep-0596\mw-4a-2.gem

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Route To: ☐ Solid Waste ☐ Wastewater ☐ Emergency Response ☒ Haz. Waste ☐ Underground Tanks ☐ Water Resources ☐ Other

Form 4400-122 7-91

Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - ASHLAND		MW-4B

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOART LONGYEAR Jon Weeks	05 / 21 / 96 MM DD YY	05 / 21 / 96 MM DD YY	6" Mud Rotary

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-4B	____ Feet MSL	____ Feet MSL	6 inches

Boring Location
State Plane ____ N. ____ E S/C/N | Lat ____ ____ ____ | Long ____ ____ ____
SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W

Local Grid Location (If Applicable)
____ Feet ☐ N ☐ S ____ Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
				Blind drilled to 35 ft. Begin continuous sampling @ 35 ft.										
1	9	20 50/4	35	SILT, little sand, trace gravel, very hard, slightly moist, reddish brown, moderate odor.	ML				82					
			36	@ 37.5 ft: SAND, poorly graded, medium to fine grained, trace silt, trace gravel, wet, very dense, reddish brown stained black with product, extreme odor.	SM									
2	8	58 27 41 49	37 38	- Increase in silt.					68					
			39	SILT, little sand, trave gravel, very hard, non-plastic, slightly moist, slight odor.	ML									
3	21	21 26 35 49	40	CLAY, some sand, little silt, trace gravel, very hard, low plasticity, 21" seams of sand, wet, moderate odor.	CL				61	13	21	13		
			41	SAND, trace silt, trace gravel, very dense, wet, poorly graded, extreme odor, black staining, increase in silt and clay content from 41 ft to 43 ft.	SM									
4	23	21 36 40 38	42						76					
5	12	28 35 41 44	43 44											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature | Firm Dames and Moore, Madison, WI

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a seperate offense, pursuant to ss 144.99 and 162.06, Wis. Stats

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-4B Use only as an attachment to Form 4400-122. Page 2 of 2

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
6	8	41 50/3	45 46	SAND, fine grained, little silt, trace gravel, poorly graded, very dense, strong odor, reddish brown.	SM				141					
7	16	21 31 28 50/2"	47 48						59					
8	10	29 32 18 23	49 50						50					
9	5	18 23 50/2	51 52	- Increase in silt from 51 ft to 53 ft.					173					
10	2	50/3"	53 54						200					
			55 56	TD @ 55.5 ft. Set MW-4B @ 55 ft.										

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State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response
☒ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

SOIL BORING LOG INFORMATION

Form 4400-122 7-91

Page 1 of 1

Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - Ashland		MW-5

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOARDT LONGYEAR Scott Bottke	10 / 16 / 95 MM DD YY	10 / 16 / 95 MM DD YY	6.25" HSA

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-5	____ Feet MSL	____ Feet MSL	10.3 inches

Boring Location
State Plane ____ N. ____ E S/C/N | Lat ___ ___ ___ | Long ___ ___ ___
SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W

Local Grid Location (If Applicable)
____ Feet ☐ N ☐ S ____ Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
			1 2 3 4 5 6 7 8 9 10 11 12	See MW-5A log for geologic information. Drilled to 28.5 feet. Set well @ 28 feet.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature | Firm: Dames and Moore, Madison, WI

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a seperate offense, pursuant to ss 144.99 and 162.06, Wis. Stats

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State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response
☒ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

SOIL BORING LOG INFORMATION

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Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - Ashland		MW-5A

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOARDT LONGYEAR Scott Bottke	10 / 17 / 95 MM DD YY	10 / 17 / 95 MM DD YY	6.25" HSA to 28 ft. Water Rotary to 34 ft.

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-5A	____ Feet MSL	____ Feet MSL	6.0 inches

Boring Location
State Plane ____ N ____ E S/C/N | Lat ___ ___ ___ | Long ___ ___ ___
SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W

Local Grid Location (If Applicable)
____ Feet ☐ N ☐ S ____ Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
			24	Blind drilled to 24 ft. Began continuous sampling @ 24 ft.										
1	12	7 9 9 11	25	FILL, clay, little sand, little silt, dark brown, gray ooze in bottom four inches, pieces of pottery, moist, reddish brown.	Fill				18					
2	14	9 13 21 33	26 27						34					
3	24	10 15 19 28	28 29	CLAY, some silt, trace sand, trace gravel, hard, medium plasticity, wet, reddish brown.	CL				34					
4	12	14 19 7 12	30 31	SAND, medium grained, trace silt, trace clay, trace gravel, poorly graded, hard, wet, reddish brown.	SM				26					
5	18	12 10 10 22	32 33	CLAY, some silt, trace sand, trace gravel, hard, medium plasticity, wet, reddish brown.	CL				20					
			34 35	EOB @ 34 ft. Set well from 33.5 - 31.5 ft.										

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Signature | Firm Dames and Moore, Madison, WI

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response
☒ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

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Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - Ashland		MW-5B

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOARDT LONGYEAR Scott Bottke	10 / 17 / 95 (MM DD YY)	10 / 18 / 95 (MM DD YY)	4.25" HSA to 28 ft. Water Rotary to 51 ft.

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-5B	Feet MSL	Feet MSL	6.3 inches

Boring Location
State Plane N E S/C/N
SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W
Lat Long
Local Grid Location (If Applicable)
Feet ☐ N ☐ S Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	02	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
			1	No samples taken. Augered to 28 feet. Set casing to 29 feet.										
			2	FILL/CLAY contact 15-18 feet, based on color of augers.										
			3	Lower sand seam at 37-38 feet, based on increase in ROP.										
			4	Lower sand layer @ 40-41 feet, based on increase in ROP.										
			5	Strong petroleum odor appears in circulating water @ 44-45 feet.										
			6	Drilled to 51 feet. Set well @ 49 feet.										
			7											
			8											
			9											
			10											
			11											
			12											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature | Firm Dames and Moore, Madison, WI

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State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response
☐ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

SOIL BORING LOG INFORMATION

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Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - ASHLAND		MW-5C

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOART LONGYEAR Jon Weeks	05 / 30 / 96 (MM DD YY)	05 / 30 / 96 (MM DD YY)	6" Mud Rotary

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-5C	____ Feet MSL	____ Feet MSL	6 inches

Boring Location
State Plane ____ N. ____ E S/C/N | Lat ___ ___ ___ | Long ___ ___ ___
SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W

Local Grid Location (If Applicable)
____ Feet ☐ N ☐ E ____ Feet ☐ S ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
			65	Blind drilled to 63 ft. Set casing to 65 ft. Began sampling @ 65 ft.										
1	8	34 37 42 50	66	SAND, fine grained, trace silt, trace gravel, poorly graded, very dense, wet, reddish brown, slight odor.	SM				79					
2	12	16 19 22 24	67 68	2" clay seam @ 68.6 ft.					41					
3	18	16 18 20 23	69 70	Same as above, slight increase in silt, trace clay.					88					
4	5	50/5	71 72	Same as above.					120	13.0			13.5	12.8/73.7/13.5
5	12	18 26 24 37	73 74	- less silt, trace gravel					50					
			75 76	TD @ 75 ft. Set MW-5C @ 75 ft.										

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Signature | Firm Dames and Moore, Madison, WI

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State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response
☒ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

SOIL BORING LOG INFORMATION

Form 4400-122 7-91

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Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - ASHLAND		MW-6

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOART LONGYEAR Jon Weeks	05 / 23 / 96 MM DD YY	05 / 23 / 96 MM DD YY	6" Mud Rotary

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-6	____ Feet MSL	____ Feet MSL	6 inches

Boring Location
State Plane ____ N. ____ E S/C/N | Lat ___ ___ ___
SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W | Long ___ ___ ___

Local Grid Location (If Applicable)
____ Feet ☐ N ☐ S ____ Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
				Blind drilled to 18 ft. Set well @ 18 ft. See log of MW-6A for geologic information.										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature | Firm Dames and Moore, Madison, WI

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State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response
☒ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

SOIL BORING LOG INFORMATION

Form 4400-122 7-91

Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - ASHLAND		MW-6A

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOART LONGYEAR Jon Weeks	05 / 20 / 96 (MM DD YY)	05 / 20 / 96 (MM DD YY)	6" Water Rotary

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-6A	____ Feet MSL	____ Feet MSL	10.25/6 inches

Boring Location
State Plane ____ N ____ E S/C/N | Lat ___ ___ ___ | Long ___ ___ ___

SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W

Local Grid Location (If Applicable)
____ Feet ☐ N ☐ S ____ Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
			1	0 to 2 ft - Top Soil.										
1	12	2 4 4 5	2 3 4	FILL, CLAY, little silt, little sand, moist, firm, low plasticity, reddish brown, very slight odor, few brick fragments. - No odor.	CL				8					
2	5	4 6 6 8	5 6						12					
3	20	1 2 2 2	7 8	CLAY, little silt, soft, low plasticity, moist, no odor, reddish brown. - Wet split spoon.	CL				4					
4	14	2 1 1 3	9 10						2					
5	18	5 8 11 21	11 12	Same as above with some silt, trace sand, trace gravel, wet, very slight odor.					19					

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Signature | Firm: Dames and Moore, Madison, WI

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-6A Use only as an attachment to Form 4400-122.

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
6	14	4 5 5 6	13		CL				10					
7	18	18 21 28 35	14 15 16	SILT, trace clay, trace sand, trace gravel, non-plastic, wet, no odor, reddish brown. - Silt becomes hard.	ML				49					
8	19	38 35 50/3	17 18	SAND, fine grained, trace gravel, trace silt, poorly graded, wet, very dense, reddish brown, no odor.	SM				135					
9	9	42 50/3	19 20	SILT, little sand, trace gravel, non-plastic, very hard, wet, no odor, reddish brown.	ML				142					
10	9	28 50/3	21 22	SAND, fine grained, some silt, trace gravel, poorly graded, very dense, wet, reddish brown, no odor.	SM				128					
11	10	33 50/4	23						100					
12	8	28 50/3	24 25	- Decrease in silt content to little silt.					128					
13	8	33 50/2	26 27						186					
14	10	46 47 50/2	28 29 30						160					

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-6A Use only as an attachment to Form 4400-122.

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
					SM									
15	14	33 45 50/3	31	SILT, some sand, trave gravel, very hard, non-plastic, wet.	ML									
			32											
16	8	41 50/2	33	SAND, fine grained, some silt, trave gravel, very dense, wet, poorly graded, reddish brown, no odor.	SM				191					
17	8	45 50/2	34						195					
			35											
			36	Trace silt from 36 to 37 ft, grading back to some silty @ 38 ft.										
18	22	24 36 44 48	37						80					
			38											
19	22	28 35 36 42	39						71					
			40											
20	19	29 41 43 49	41						84					
			42											
21	14	31 36 48 49	43						84					
			44											

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State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response
☒ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

SOIL BORING LOG INFORMATION

Form 4400-122 7-91

Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - ASHLAND		MW-7A

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOART LONGYEAR Pat Jenson	06 / 01 / 96 MM DD YY	06 / 01 / 96 MM DD YY	6" Mud Rotary

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-7A	____ Feet MSL	____ Feet MSL	6 inches

Boring Location
State Plane ____ N. ____ E S/C/N | Lat ___ ___ ___ | Long ___ ___ ___

SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W

Local Grid Location (If Applicable)
____ Feet ☐ N ☐ S ____ Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
1	12	2 3 3 3	1	FILL, cinders, wood chips, earthen, sandy, clay, black oily zones, strong odor.					6					
2	8	3 3 2 1	2 3						5					
3			4 5	- No sample, wood.										
4	9	1 1 3 5	6 7	FILL, wet, predominantely wood, petroleum shean covers the sample, strong odor. (Wood Waste Fill)					4					
5	10	1 2 3 11	8 9						5					
6	1	60/6	10 11 12						100					

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature | Firm Dames and Moore, Madison, WI

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-7A Use only as an attachment to Form 4400-122.

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
7	16	2 4 4 5	13 14	CLAY, some silt, trace clay, trace gravel, low plasticity, firm, reddith brown, wet, strong odor.	CL				8					
8	16	2 5 5 6	15 16						10					
9	20	3 4 5 7	17 18						9					
10	0		19 20	SAND, fine grained, little silt, trace gravel, poorly graded, wet, medium dense, reddish brown, strong odor. 18-20 ft. - no sample, driller drove casing to 20 ft.	SM									
11	15	6 8 12 12	21 22	SAND, fine to medium grained, trace silt, trace gravel, poorly graded, wet, medium dense, very strong odor, black staining of sample, reddish brown otherwise.					20					
12	20	8 13 15 25	23 24						28					
13	3	4 3 12 16	25 26	SAND, fine grained, little silt, poorly graded, wet medium dense, reddish brown, strong odor. Poor recovery 24-26 ft., rock in top of split spoon.					15					
14	20	10 14 17 22	27 28						31					
15	12	18 16 16 17	29 30	SAND, fine grained, trace silt, little gravel, poorly graded, wet, dense, reddish brown, strong odor.					32					

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-7A Use only as an attachment to Form 4400-122.

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
16	12	12 22 26 30	31 32	SAND, fine grained, trace silt, poorly graded, wet, dense, reddish brown, stong odor.	SM				48					
17	14	7 8 14 28	33 34	SAND, fine grained, trace clay, little silt, little gravel, poorly graded, medium dense, reddish brown, strong odor.					22					
18	12	10 11 15 29	35 36	TD @ 36 ft. Set well MW-7A @ 35 ft.					26					

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State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response
☒ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

SOIL BORING LOG INFORMATION

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Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - ASHLAND		MW-8A

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOART LONGYEAR Jon Weeks	05 / 31 / 96 (MM DD YY)	05 / 31 / 96 (MM DD YY)	6" Water Rotary

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-8A	____ Feet MSL	____ Feet MSL	6 inches

Boring Location
State Plane ____ N. ____ E S/C/N | Lat ___ ___ ___
SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W | Long ___ ___ ___

Local Grid Location (If Applicable)
____ Feet ☐ N ☐ E
____ Feet ☐ S ____ Feet ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
			1											
1	1	11 14 18 21	2 3	CLAY, little silt, trace sand, trace gravel, moist, low plasticity, hard, reddish brown, no odor.	CL				31					
			4	Clay becomes softer.										
2	13	4 6 6 7	5											
			6											
3	24	6 8 9 13	7						17					
			8											
4	24	4 6 6 7	9						12					
			10	Increase in silt content and hardness.										
5	24	12 18 27 36	11						45					
			12											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature | Firm Dames and Moore, Madison, WI

This form is authorized by Chapters 144.147 and 162, Wis. Stats. Completion of this report is mandatory. Penalties: Forfeit not less than $10 nor more than $5,000 for each violation. Fined not less than $10 or more than $100 or imprisoned not less than 30 days, or both for each violation. Each day of continued violation is a separate offense, pursuant to ss 144.99 and 162.06, Wis. Stats

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-8A Use only as an attachment to Form 4400-122.

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
6	22	14 18 28 44	13–14	SILT, some clay, little sand, trace gravel, non-to very slightly plastic, wet, hard, reddish-brown, no odor.	ML				46					
7	18	17 22 25 46	15–16	As above with trace clay, some sand.					57					
8	15	15 17 26 29	17–18						34					
9	15	11 14 26 29	19–20						40					
10	20	10 15 19 28	21–22	As above with three 1-2" seams of sand.					34					
11	14	12 17 20 22	23–24	CLAY, some silt, little sand, trace gravel, hard.	CL				37					
12	18	14 16 19 24	25–26						35					
13	21	17 22 25 29	27–28	- Increase in sand content.					47					
14	11	8 14 18 27	29–30						32					

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-8A Use only as an attachment to Form 4400-122.

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
15	12	20 24 27 37	31	SAND, fine grained, little silt, trace clay, trace gravel, poorly graded, wet, dense, reddish brown, no odor.	SM				51					
			32	As above, with fine to medium grained, little gravel, trace silt, very dense.										
16	6	31 36 47 52	33						83					
			34											
17	10	26 38 50/6	35	CLAY, some silt, little sand, trace gravel, low plasticity, very hard, wet reddish brown, no odor.	CL				88					
			36	SAND, fine grained, some silt, trace clay, trace gravel, poorly graded, dense, wet, reddish brown, no odor.	SM									
18	10	24 37 50/6	37						87					
			38	- Decrease in silt, no clay										
19	20	36 41 45 48	39						86					
			40	- Increase in silt content.										
20	12	15 26 24 41	41	SILT, some sand, trace gravel, wet, very hard, non-plastic, reddish brown, no odor.	ML				52					
			42											
21	12	17 20 24 30	43						44					
			44											
22	12	24 30 43 50	45	SAND, fine grained, little silt, trace gravel, poorly graded, wet, very dense, reddish brown, no odor.	SM				73					
			46											
23	20	21 24 32 44	47						56					
			48											

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-8A Use only as an attachment to Form 4400-122.

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
24	24		49 50 51		SM									
				TD @ 51 ft. Set well MW-8A @ 50 ft.										

State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response
☒ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

SOIL BORING LOG INFORMATION

Form 4400-122 7-91

Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - ASHLAND		MW-13A

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOART LONGYEAR Jon Weeks	05 / 24 / 96 (MM DD YY)	05 / 24 / 96 (MM DD YY)	6" Mud Rotary

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-13A	Feet MSL	Feet MSL	6 inches

Boring Location
State Plane N E S/C/N | Lat Long
SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W

Local Grid Location (If Applicable)
Feet ☐ N ☐ S Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
				Blind drilled to 19 ft. with augers. Pounded casing to 24 ft. Based on clay covered augers, the fill/clay contact is 16-17 ft.										
1	1	N/A	24–25	CLAY, some silt, trace sand, trace gravel, low plasticity, wet, reddish brown, no odor. (from Shelby tube interval 24-26)	CL					12	26	12		
2	9	3 16 38 31	26–27						54					
3	20	18 24 38 39	28–29	Formation too hard to collect a Shelby tube.					62					
4	20	8 16 38 36	30–31						42					
5	24	18 15 19 21	32–33	SAND, fine grained, little silt, trace clay, trace gravel, poorly graded, wet, dense, reddish brown, moderate odor.	SM				34					

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature | Firm Dames and Moore, Madison, WI

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-13A Use only as an attachment to Form 4400-122.

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
			34	Same as above with very dense, moderate to strong odor.	SM									
6	10	18 21 50/3	35						121					
			36	Decrease in silt content, strong odor, scum forms on mud tub.										
7	7	32 50/2	37						182					
			38	SAND becomes medium to fine grained.										
8	8	41 50/2	39						191	14.8			15.4	-/84.6/15.4
			40	SAND, medium to fine grained, little gravel, poorly graded, very dense, wet, reddish brown, extreme odor, petroleum sheen on sample.										
9	6	36 41 50/3	41						141					
			42	Trace gravel, trace silt										
10	11	36 41 48 50/2	43						89					
			44	3" SAND, as above, petroleum sheen on sample, seam with some silt and trace clay.										
11	12	29 32 41 50	45						73					
			46	SILT, some clay, trace sand, trace gravel, non-plastic, moist, very hard, moderate odor, reddish brown.	ML									
12	2	50/2	47						300					
			48	Trace clay.										
13	5	27 38 42 49	49						80					
			50	Little sand, strong odor.										
14	6	50/6	51	TD @ 51 ft. Backfill with bentonite to 46 ft. Set well MW-13A @ 45 ft.					100					

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State of Wisconsin
Department of Natural Resources

Route To:
☐ Solid Waste
☐ Wastewater
☐ Emergency Response

☒ Haz. Waste
☐ Underground Tanks
☐ Water Resources
☐ Other

SOIL BORING LOG INFORMATION

Form 4400-122 7-91

Facility / Project Name	License/Permit/Monitoring Number	Boring Number
NORTHERN STATES POWER - ASHLAND		MW-13B

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
BOART LONGYEAR Jon Weeks	05 / 28 / 96 MM DD YY	05 / 28 / 96 MM DD YY	6" Water Rotary

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		MW-13B	____ Feet MSL	____ Feet MSL	6 inches

Boring Location
State Plane ____ N. ____ E S/C/N | Lat ____ ____ ____ | Long ____ ____ ____

SW 1/4 of NW 1/4 of Section 33 T 48 N, R 4 W

Local Grid Location (If Applicable)
____ Feet ☐ N ☐ S ____ Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
ASHLAND	0 2	CITY OF ASHLAND

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plastic Limit	P 200	RQD/ Comments
				Blind drilled to 48 ft. Set casing to 50 ft. See MW-13A log for geologic information above 50 ft.										
1	0	100/6	50	No recovery. Assume silt as in MW-13A.	ML									
2	8	47 50/2	51 52	SILT, little sand, trace gravel, very hard, moist, non-plastic, reddish brown, moderate odor.					197					
3	12	17 19 24 28	53 54	SAND, fine grained, little silt, little gravel, poorly graded, wet, very dense, reddish brown, extreme odor, petroleum sheen on sands.	SM				43					
4	18	31 36 42 50	55 56 57	Same as above, some silt, trace clay, trace gravel, strong odor.					78					
5	16	21 24 28 30	58 59 60	Sand becoming medium to coarse grained, some gravel, trace silt, poorly graded, wet, very hard, reddish brown, strong odor, possible sloughing from shallower intervals.					52					

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature | Firm Dames and Moore, Madison, WI

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State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A 7-91

Boring Number MW-13B Use only as an attachment to Form 4400-122.

Sample Number	Sample Length Recovered (in)	Blow Counts (N)	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plastic Limit	Soil Properties: P 200	RQD/ Comments
6	16	25 27 34 40	61	Sand becoming fine grained,, trace gravel, little silt, poorly graded, wet, very hard, reddish brown, strong odor.	SM				61					
			62											
7	12	19 34 38 44	63						72					
			64	No recovery, rock in top										
8	0	24 27 33 36	65						60					
			66	Same as above with trace silt.										
9	12	16 24 26 31	67						50					
			68											
10	10	28 35 40 35	69						76					
			70	TD @ 70 ft. Set well MW-13B @ 70 ft.										

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State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION

Form 4400-113A Rev. 4-90

Facility/Project Name: NSP Ashland	Local Grid Location of Well: _____ ft. ☐N ☐S _____ ft. ☐E ☐W	Well Name: MW-4A
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.	Wis. Unique Well Number: _____ DNR Well Number: _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☒ 12	Section Location of Waste/Source: SW 1/4 of NW 1/4 of Sec. 33, T. 48 N, R. 4 ☐E ☒W	Date Well Installed: 05/21/96 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Location of Well Relative to Waste/Source: u ☐ Upgradient; s ☐ Sidegradient; d ☐ Downgradient; n ☒ Not Known	Well Installed By: (Person's Name and Firm) Jon Wells, Boart Longyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 641.62 ft. MSL
C. Land surface elevation 641.6 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☒ No

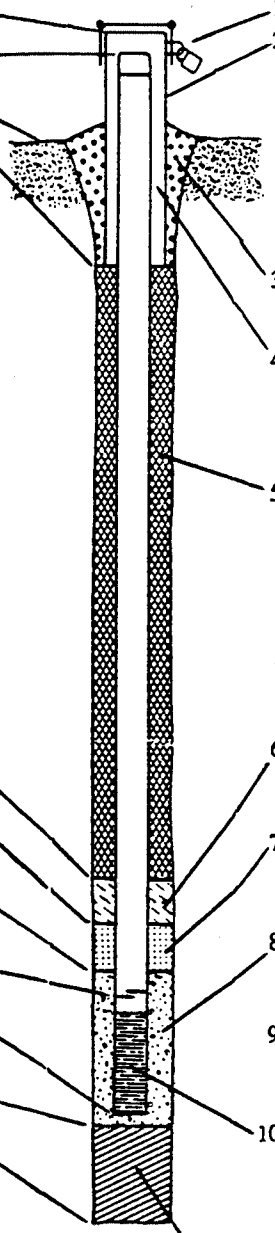
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☐ 41; Other ☐ __

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☒ 03; None ☐ 99

16. Drilling additives used? ☒ Yes ☐ No
Describe Bentonite for mud

17. Source of water (attach analysis):
City of Ashland

E. Bentonite seal, top _____ ft. MSL or 2.0 ft.
F. Fine sand, top _____ ft. MSL or 17.0 ft.
G. Filter pack, top _____ ft. MSL or 19.0 ft.
H. Screen joint, top _____ ft. MSL or 21.0 ft.
I. Well bottom _____ ft. MSL or 26.0 ft.
J. Filter pack, bottom _____ ft. MSL or 27.0 ft.
K. Borehole, bottom _____ ft. MSL or 35.0 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.0 ft.
c. Material: Steel ☒ 04; Other ☐ __
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ __
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ __; Other ☐ __
5. Annular space seal: a. ~~Granular~~ chips Bentonite ☒ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. _____ Ft^3 volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ☐3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Red Flint Sands & Gravel Sand #30
b. Volume added 200 lbs ft^3
8. Filter pack material: Manufacturer, product name and mesh size
a. Badger Mining Corp. #70
b. Volume added 50 lbs ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ __
b. Manufacturer Boart Longyear
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): Bentonite — None ☐ 14; Other ☒ __

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James D Schick | Firm: Dames & Moore

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-9(

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐N. ☐S. _____ ft. ☐E. ☐W.	Well Name: MW-4B
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. ____ ____ ____ Long. ____ ____ ____ or	Wis. Unique Well Number: _____ DNR Well Number: _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☒ 12	St. Plane _____ ft. N, _____ ft. E.	Date Well Installed: 5/22/96 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Section Location of Waste/Source: SW 1/4 of NW 1/4 of Sec. 33, T. 48 N, R. 4 ☐E. ☒W.	Well Installed By: (Person's Name and Firm): John Boart longyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient; d ☐ Downgradient n ☒ Not Known	

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 640.98 ft. MSL
C. Land surface elevation 641.5 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

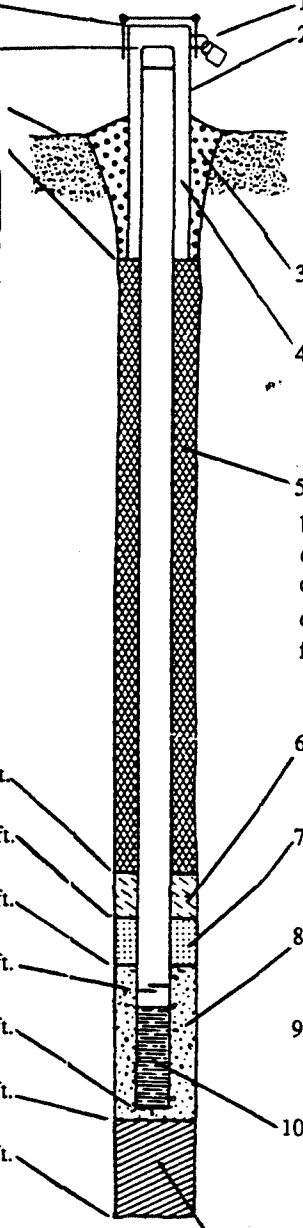
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☐ 41; Other ☐ __

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☒ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis):

E. Bentonite seal, top _____ ft. MSL or 43.0 ft.
F. Fine sand, top _____ ft. MSL or 46.0 ft.
G. Filter pack, top _____ ft. MSL or 48.0 ft.
H. Screen joint, top _____ ft. MSL or 50.0 ft.
I. Well bottom _____ ft. MSL or 55.0 ft.
J. Filter pack, bottom _____ ft. MSL or 55.5 ft.
K. Borehole, bottom _____ ft. MSL or 55.5 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.2 ft.
c. Material: Steel ☒ 04; Other ☐ __
d. Additional protection? ☐ Yes ☐ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ __
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ __; Other ☐ __
5. Annular space seal: a. Granular Bentonite ☐ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. 1 Lbs/gal mud weight . . . . . Bentonite slurry ☒ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. 55 gal Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☒ 02; Gravity ☐ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ☐3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. Bentonite Chips Other ☒ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Mining Corp #70
b. Volume added 50 lbs ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Red Flint Sand & Gravel
b. Volume added 200 lbs ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☐ 11; Continuous slot ☐ 01; Other ☐ __
b. Manufacturer Boart longyear
c. Slot size: 0.01 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ☒ 14; Other ☐ __

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James D Schick | Firm: Dames & Moore

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION

Form 4400-113A Rev. 4-90

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐N ☐S _____ ft. ☐E ☐W	Well Name: MW-5
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. ___ ___ ___ Long. ___ ___ ___ or	Wis. Unique Well Number: _____ DNR Well Number: _____
Type of Well: Water Table Observation Well ☒ 11; Piezometer ☐ 12	St. Plane _____ ft. N. _____ ft. E.	Date Well Installed: 10/16/95 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Section Location of Waste/Source: ___1/4 of ___1/4 of Sec. ___, T. ___ N, R. ___ ☐E ☐W	Well Installed By: (Person's Name and Firm) Boart Longyear; Scott
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient; d ☒ Downgradient n ☐ Not Known	

A. Protective pipe, top elevation _____ ft. MSL

B. Well casing, top elevation 633.62 ft. MSL

C. Land surface elevation 634.3 ft. MSL

D. Surface seal, bottom _____ ft. MSL or 1.5 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☒ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☒ 41; Other ☐ __

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis):

E. Bentonite seal, top _____ ft. MSL or 1.5 ft.

F. Fine sand, top _____ ft. MSL or 14.0 ft.

G. Filter pack, top _____ ft. MSL or 16.0 ft.

H. Screen joint, top _____ ft. MSL or 18.0 ft.

I. Well bottom _____ ft. MSL or 28.0 ft.

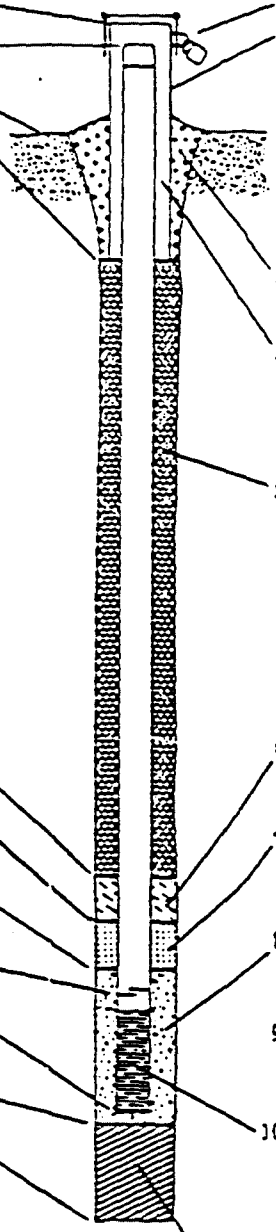
J. Filter pack, bottom _____ ft. MSL or 28.5 ft.

K. Borehole, bottom _____ ft. MSL or 28.5 ft.

L. Borehole, diameter 8.3 in.

M. O.D. well casing 2.3 in.

N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.2 ft.
c. Material: Steel ☒ 04; Other ☐ __
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____

3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ __

4. Material between well casing and protective pipe:
Bentonite ☐ 30; Annular space seal ☐ __; #30 Red Flint Filter Sand Other ☒ __

5. Annular space seal: a. Granular Bentonite (Chips) ☒ 33
b. _____ Lbs/gal mud weight ... Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight ..... Bentonite slurry ☐ 31
d. _____ % Bentonite ..... Bentonite-cement grout ☐ 50
e. 250 lbs ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08

6. Bentonite seal: a. Bentonite (Chips) granules ☒ 33
b. ☐1/4 in. ☐5/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐ __

7. Fine sand material: Manufacturer, product name & mesh size
a. #40-60 Red Flint Filter Sand
b. Volume added 50 lbs ft³

8. Filter pack material: Manufacturer, product name and mesh size
a. #30 Red Flint Filter Sand
b. Volume added 350 lbs ft³

9. Well casing: Flush threaded PVC schedule 40 ☒ 25; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __
Sch 40 PVC

10. Screen material:
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 09; Other ☐ __
b. Manufacturer Northern Air
c. Slot size: 0.010
d. Slotted length: 10.0

11. Backfill material (below filter pack): None ☒ 14; Other ☐ __

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James D. Schick | Firm: Dames & Moore

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats. and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: NSP Ashland	Local Grid Location of Well: ___ ft. ☐N ☐S ___ ft. ☐E ☐W	Well Name: MW-5A
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. ___ Long. ___ or	Wis. Unique Well Number: _____ DNR Well Number: _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☒ 12	St. Plane ___ ft. N, ___ ft. E.	Date Well Installed: 10/17/95 (m m d d y y)
Distance Well Is From Waste/Source Boundary: ___ ft.	Section Location of Waste/Source: ___ 1/4 of ___ 1/4 of Sec. ___, T. ___ N, R. ___ ☐E ☐W	Well Installed By: (Person's Name and Firm) Boart Longyear; Scott
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient; d ☒ Downgradient n ☐ Not Known	

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 633.22 ft. MSL
C. Land surface elevation 634.7 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.5 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

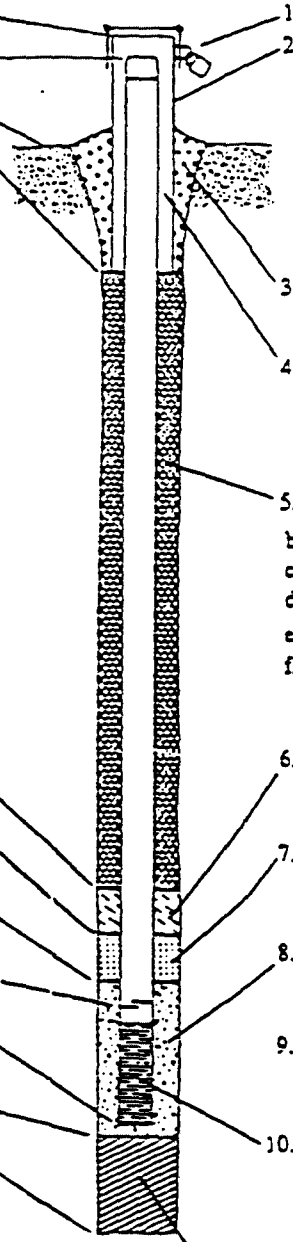
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☒ 41; Other ☐ __

15. Drilling fluid used: Water ☒ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis):
City of Ashland

E. Bentonite seal, top _____ ft. MSL or 29.0 ft.
F. Fine sand, top _____ ft. MSL or 30.0 ft.
G. Filter pack, top _____ ft. MSL or 30.5 ft.
H. Screen joint, top _____ ft. MSL or 31.5 ft.
I. Well bottom _____ ft. MSL or 33.5 ft.
J. Filter pack, bottom _____ ft. MSL or 34.0 ft.
K. Borehole, bottom _____ ft. MSL or 34.0 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.2 ft.
c. Material: Steel ☒ 04; Other ☐ __
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ __
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ __; #30 Red Flint Filter Sand; Other ☒ __
5. Annular space seal: a. Granular/Chips Bentonite ☐ 33
b. ___ Lbs/gal mud weight ... Bentonite-sand slurry ☐ 35
c. 10/40 Lbs/gal mud weight ..... Bentonite slurry ☒ 31
d. ___ % Bentonite ..... Bentonite-cement grout ☐ 50
e. 50 gal. Ft³ volume added for any of the above
f. How installed: + 150 lbs chips Tremie ☐ 01; Tremie pumped ☒ 02; Gravity ☐ 08
6. Bentonite seal: a. Bentonite granules/chips ☒ 33
b. ☐1/4 in. ☐3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. #40-60 Red Flint Filter Sand
b. Volume added 25 lbs ft³
8. Filter pack material: Manufacturer, product name and mesh si
a. #30 Red Flint Filter Sand
b. Volume added 50 lbs ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 2; Flush threaded PVC schedule 80 ☐ 2; Other ☐ __
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ 1; Continuous slot ☐ 0; Other ☐ __
b. Manufacturer Northern Air
c. Slot size: 0.01
d. Slotted length: 2.0
11. Backfill material (below filter pack): None ☒ 1; Other ☐ __

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James D. Achiele | Firm: Dames & Moore

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State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION

Form 4400-113A Rev. 4-90

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐N ☐S _____ ft. ☐E ☐W	Well Name: MW-5B
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. ___ ___ ___ Long. ___ ___ ___ or: St. Plane _____ ft. N. _____ ft. E.	Wis. Unique Well Number: _____ DNR Well Number: _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☒ 12	Section Location of Waste/Source: ___1/4 of ___ 1/4 of Sec. ___, T. ___ N. R. ___ ☐E ☐W	Date Well Installed: 10/18/95 (m m / d d / y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Location of Well Relative to Waste/Source: u ☐ Upgradient; s ☐ Sidegradient; d ☒ Downgradient; n ☐ Not Known	Well Installed By: (Person's Name and Firm): Boart Longyear; Scott
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 633.89 ft. MSL
C. Land surface elevation 634.2 ft. MSL
D. Surface seal, bottom _____ ft. MSL or _____ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

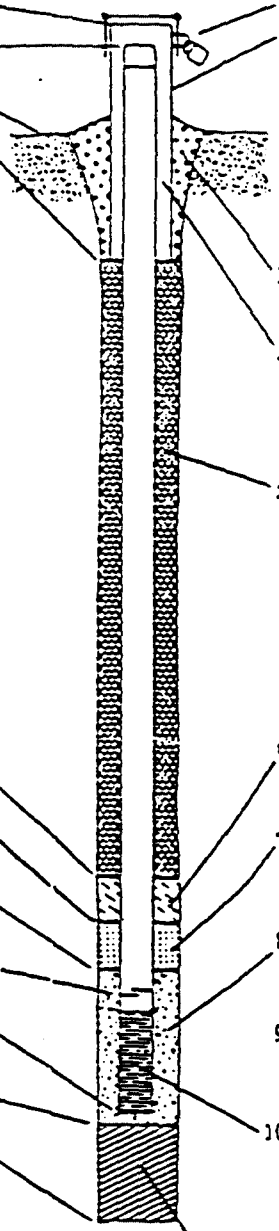
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☒ 41; Other ☐ __

15. Drilling fluid used: Water ☒ 02; Air ☐ 01; Drilling Mud ☒ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis):
Ashland Town Water

E. Bentonite seal, top _____ ft. MSL or 30.0 ft.
F. Fine sand, top _____ ft. MSL or 40.0 ft.
G. Filter pack, top _____ ft. MSL or 42.0 ft.
H. Screen joint, top _____ ft. MSL or 44.0 ft.
I. Well bottom _____ ft. MSL or 49.0 ft.
J. Filter pack, bottom _____ ft. MSL or 49.0 ft.
K. Borehole, bottom _____ ft. MSL or 51.0 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.2 ft.
c. Material: Steel ☐ 04; Other ☐ __
d. Additional protection? ☐ Yes ☐ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ __
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ __; Other ☒ #30 Red Flint Filter Sand
5. Annular space seal: a. Granular Bentonite ☐ 33; b. _____ Lbs/gal mud weight ... Bentonite-sand slurry ☐ 35; c. 40/40 Lbs/gal mud weight ..... Bentonite slurry ☒ 31; d. _____ % Bentonite ..... Bentonite-cement grout ☐ 50; e. 50 gal ft³ volume added for any of the above; f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☐ 08
6. Bentonite seal: a. ~~Bentonite~~ chips granules ☐ 33; b. ☐1/4 in. ☐3/8 in. ☐1/2 in. Bentonite pellets ☐ 34; c. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size: a. #40-60 Red Flint Filter Sand; b. Volume added _____ ft³
8. Filter pack material: Manufacturer, product name and mesh size: a. #30 Red Flint Filter Sand; b. Volume added _____ ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 25; Flush threaded PVC schedule 80 ☐ 26; Other ☐ __
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 09; Other ☐ __
b. Manufacturer: Northern Air
c. Slot size: 0.010
d. Slotted length: 5.0
11. Backfill material (below filter pack): None ☐ 14; Other ☒ Native formation

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature | Firm

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State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐ N. ☐ S. _____ ft. ☐ E. ☐ W.	Well Name: MW-5C
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.	Wis. Unique Well Number / DNR Well Number: _____ / _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☒ 12	Section Location of Waste/Source: SW 1/4 of NW 1/4 of Sec. 33, T. 48 N, R. 4 ☐ E. ☒ W.	Date Well Installed: 5/31/96 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient; d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name and Firm): Jon Wells / Boart Longyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 634.33 ft. MSL
C. Land surface elevation 633.6 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.5 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

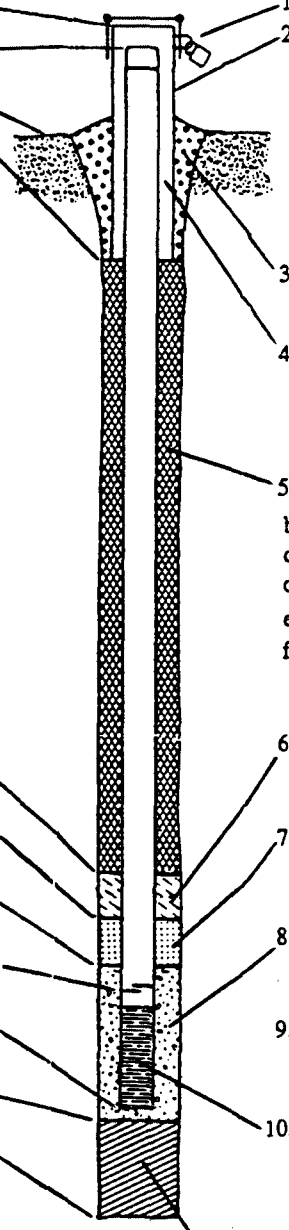
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☐ 41; Other ☐ __

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☒ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☒ No
Describe _____

17. Source of water (attach analysis): _____

E. Bentonite seal, top _____ ft. MSL or 65.0 ft.
F. Fine sand, top _____ ft. MSL or 67.0 ft.
G. Filter pack, top _____ ft. MSL or 69.0 ft.
H. Screen joint, top _____ ft. MSL or 71.0 ft.
I. Well bottom _____ ft. MSL or 76.0 ft.
J. Filter pack, bottom _____ ft. MSL or 76.0 ft.
K. Borehole, bottom _____ ft. MSL or 76.0 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.2 ft.
c. Material: Steel ☒ 04; Other ☐ __
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ __
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ __; Other ☐ __
5. Annular space seal: a. Granular Bentonite ☐ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. 1.1 Lbs/gal mud weight . . . . . Bentonite slurry ☒ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. 180 gal ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☒ 02; Gravity ☐ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒ 32
c. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Mining Corp #50
b. Volume added _____ ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Red Flint Sands & Gravels #30
b. Volume added _____ ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ __
b. Manufacturer Boart Longyear
c. Slot size: 0.01 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ☒ 14; Other ☐ __

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James D Ahlich | Firm: Dames & Moore

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State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☒
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: NSP Ashland	Local Grid Location of Well: _____ ft. ☐N. ☐S. _____ ft. ☐E. ☐W.	Well Name: MW-6
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.	Wis. Unique Well Number: _____ DNR Well Number: _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☐ 12	Section Location of Waste/Source: ___1/4 of ___ 1/4 of Sec. ___, T. ___ N, R. ___ ☐E. ☐W.	Date Well Installed: 5/23/96 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient; d ☐ Downgradient n ☐ Not Known	Well Installed By: (Person's Name and Firm): Jon Wells, Boart longyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 622.89 ft. MSL
C. Land surface elevation 619.2 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☒ MH ☐ CL ☒ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

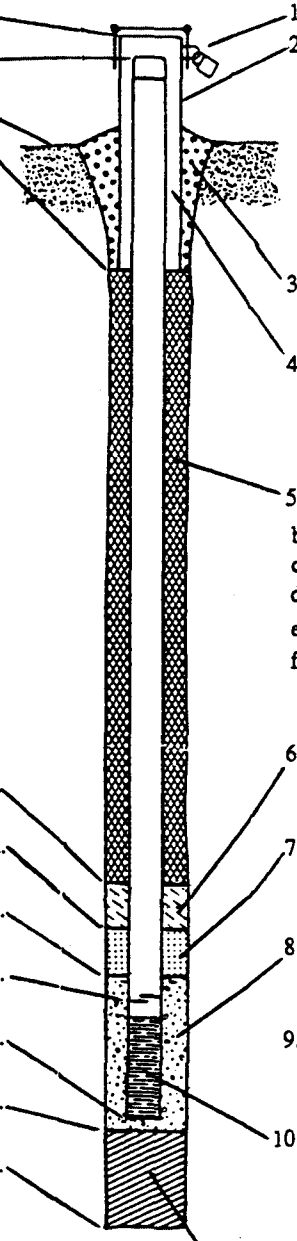
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☐ 41; Other ☐ __

15. Drilling fluid used: Water ☒ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☒ No
Describe _____

17. Source of water (attach analysis): _____

E. Bentonite seal, top _____ ft. MSL or 1.0 ft.
F. Fine sand, top _____ ft. MSL or 2.0 ft.
G. Filter pack, top _____ ft. MSL or 2.5 ft.
H. Screen joint, top _____ ft. MSL or 3.0 ft.
I. Well bottom _____ ft. MSL or 18.0 ft.
J. Filter pack, bottom _____ ft. MSL or 18.0 ft.
K. Borehole, bottom _____ ft. MSL or 18.0 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.2 ft.
c. Material: Steel ☒ 04; Other ☐ __
d. Additional protection? ☐ Yes ☐ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ __
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ __; Sand; Other ☒ __
5. Annular space seal: a. Granular/chips Bentonite ☒ 33
b. _____ Lbs/gal mud weight ... Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight ..... Bentonite slurry ☐ 31
d. _____ % Bentonite ..... Bentonite-cement grout ☐ 50
e. 30 lbs ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ☒3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Mining Corp #70
b. Volume added 25 lbs ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Red Flint Sand & Gravel #30
b. Volume added _____ ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ __
b. Manufacturer Boart longyear
c. Slot size: 0.01 in.
d. Slotted length: 15. ft.
11. Backfill material (below filter pack): None ☒ 14; Other ☐ __

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James D Schick | Firm: Dames & Moore

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐N ☐S _____ ft. ☐E ☐W	Well Name: MW-6A
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. ____ ____ ____ Long. ____ ____ ____ or	Wis. Unique Well Number: _____ DNR Well Number: _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☒ 12	St. Plane _____ ft. N, _____ ft. E.	Date Well Installed: 5/23/96 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Section Location of Waste/Source: SW1/4 of NW1/4 of Sec. 33, T. 48 N, R. 4 ☐E ☒W	Well Installed By: (Person's Name and Firm) Jon Wells, Boartlongyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source: u ☒ Upgradient s ☐ Sidegradient; d ☐ Downgradient n ☐ Not Known	

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 644.79 ft. MSL
C. Land surface elevation 645.2 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

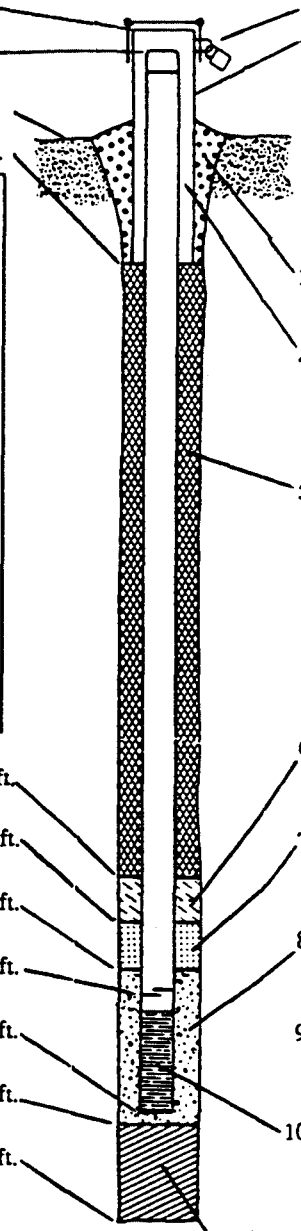
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☐ 41; Other ☐ __

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☒ 03; None ☐ 99

16. Drilling additives used? ☒ Yes ☐ No
Describe Bentonite

17. Source of water (attach analysis):

E. Bentonite seal, top _____ ft. MSL or 2.0 ft.
F. Fine sand, top _____ ft. MSL or 38.0 ft.
G. Filter pack, top _____ ft. MSL or 40.8 ft.
H. Screen joint, top _____ ft. MSL or 42.3 ft.
I. Well bottom _____ ft. MSL or 47.3 ft.
J. Filter pack, bottom _____ ft. MSL or 47.5 ft.
K. Borehole, bottom _____ ft. MSL or 48.0 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 5.0 in.
b. Length: 1.3 ft.
c. Material: Steel ☒ 04; Other ☐ __
d. Additional protection? ☐ Yes ☐ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ __
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ __; Other ☐ __
5. Annular space seal: a. ~~Granular~~ Chipped Bentonite ☒ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. 650 lbs ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08
6. Bentonite seal: a. ~~Bentonite granules~~ Chips ☒ 33
b. ☐1/4 in. ☐3/8 in. ☐1/2 in. Bentonite pellets ☐ 32
c. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Mining Corp #70 Sand
b. Volume added 50 lbs ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Red Flint Sand & Gravel #30
b. Volume added 200 lbs ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ __
b. Manufacturer Boart longyear
c. Slot size: 0.01 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ☐ 14; Other ☒ __
Native Sand

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
James D Schiele	Dames & Moore

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐N ☐S _____ ft. ☐E ☐W	Well Name: MW-7
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. ____ ____ ____ Long. ____ ____ ____ or	Wis. Unique Well Number: _____ DNR Well Number: ____
Type of Well: Water Table Observation Well ☒ 11; Piezometer ☐ 12	St. Plane _____ ft. N, _____ ft. E.	Date Well Installed: 6/03/96 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Section Location of Waste/Source: ___1/4 of ___ 1/4 of Sec. ___, T. ___ N, R. ___ ☐E ☐W	Well Installed By: (Person's Name and Firm) Pat Jenson, Boart longyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient; d ☐ Downgradient n ☐ Not Known	

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 612.60 ft. MSL
C. Land surface elevation 612.6 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.5 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☒ CH ☐
~~Bedrock~~ ☒ wood waste

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 50; Hollow Stem Auger ☒ 41; Other ☐ __

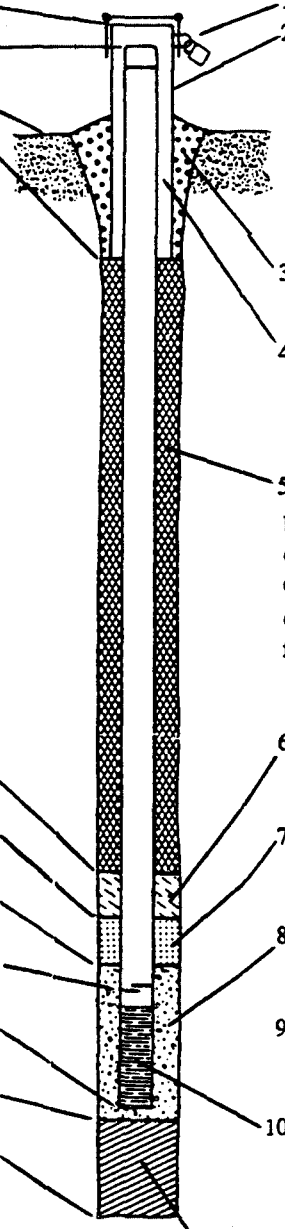
15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☒ 99

16. Drilling additives used? ☐ Yes ☒ No

Describe _____

17. Source of water (attach analysis): _____

E. Bentonite seal, top _____ ft. MSL or 1.5 ft.
F. Fine sand, top _____ ft. MSL or 4.0 ft.
G. Filter pack, top _____ ft. MSL or 4.5 ft.
H. Screen joint, top _____ ft. MSL or 5.0 ft.
I. Well bottom _____ ft. MSL or 15.0 ft.
J. Filter pack, bottom _____ ft. MSL or 15.0 ft.
K. Borehole, bottom _____ ft. MSL or 15.0 ft.
L. Borehole, diameter 8.3 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.0 ft.
c. Material: Steel ☒ 04; Other ☐ __ _____
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____
3. Surface seal: Bentonite ☒ 30; Concrete ☐ 01; Other ☐ __ _____
4. Material between well casing and protective pipe: Bentonite ☒ 30; Annular space seal ☐ __; Other ☒ __ #50 Sand
5. Annular space seal: a. Granules ~~Bentonite~~ chips ☒ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. 100 lbs Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒ 32
c. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Mining Corp #50 __
b. Volume added 25 lbs ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Red Flint Sands & Gravel #30 __
b. Volume added 450 lbs ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __ _____
10. Screen material: Sch 40 PVC __
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ __ _____
b. Manufacturer Boart longyear
c. Slot size: 0.010 in.
d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☒ 14; Other ☐ __ _____

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James D Schick Firm: Dames & Moore

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐ N. ☐ S. _____ ft. ☐ E. ☐ W.	Well Name: MW-7A
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. _____ Long. _____ or St. Plane _____ ft. N, _____ ft. E.	Wis. Unique Well Number: _____ DNR Well Number: _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☒ 12	Section Location of Waste/Source: SW 1/4 of NW 1/4 of Sec. 33, T. 48 N, R. 4 ☐ E. ☒ W.	Date Well Installed: 6/03/96 (m m / d d / y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	Well Installed By: (Person's Name and Firm) Pat Jenson, Boart longyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No		

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 613.31 ft. MSL
C. Land surface elevation 610.1 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

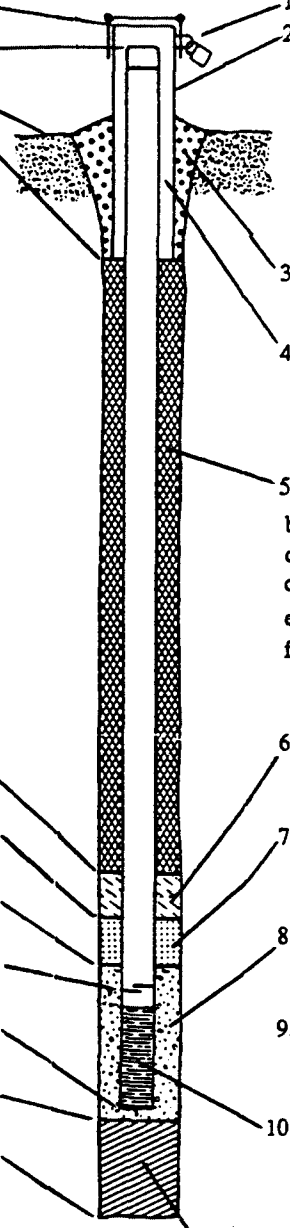
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☐ 41; Other ☐ __

15. Drilling fluid used: Water ☐ 02; Air ☐ 01; Drilling Mud ☒ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis): _____

E. Bentonite seal, top _____ ft. MSL or 24.0 ft.
F. Fine sand, top _____ ft. MSL or 26.0 ft.
G. Filter pack, top _____ ft. MSL or 28.0 ft.
H. Screen joint, top _____ ft. MSL or 30.0 ft.
I. Well bottom _____ ft. MSL or 35.0 ft.
J. Filter pack, bottom _____ ft. MSL or 35.5 ft.
K. Borehole, bottom _____ ft. MSL or 35.5 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 6.0 in.
b. Length: 7.0 ft.
c. Material: Steel ☒ 04; Other ☐ __ _____
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____
3. Surface seal: Bentonite ☒ 30; Concrete ☐ 01; Other ☐ __ _____
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ __; Other ☒ __ Sand
5. Annular space seal: a. Granular Bentonite ☒ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. 502 lbs ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☒ 32
c. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Mining Corp #70 __
b. Volume added 50 lbs ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Red Flint Sand & Gravel #30 __
b. Volume added 150 lbs ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __ _____
10. Screen material: sch 40 PVC __
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ __ _____
b. Manufacturer Boart longyear
c. Slot size: 0.01 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ☒ 14; Other ☐ __ _____

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James O Schield | Firm: Dames & Moore

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐N ☐S _____ ft. ☐E ☐W	Well Name: MW-8
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. _____ Long. _____ or	Wis. Unique Well Number: _____ DNR Well Number: _____
Type of Well: Water Table Observation Well ☒ 11; Piezometer ☐ 12	St. Plane _____ ft. N, _____ ft. E.	Date Well Installed: 5/30/96 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Section Location of Waste/Source: SW 1/4 of NW 1/4 of Sec. 33, T. 48 N, R. 4 ☐E ☒W	Well Installed By: (Person's Name and Firm) Jon Weeks; Boart longyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☒ Sidegradient; d ☐ Downgradient n ☐ Not Known	

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 635.54 ft. MSL
C. Land surface elevation 635.9 ft. MSL
D. Surface seal, bottom _____ ft. MSL or _____ ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☒ MH ☐ CL ☒ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

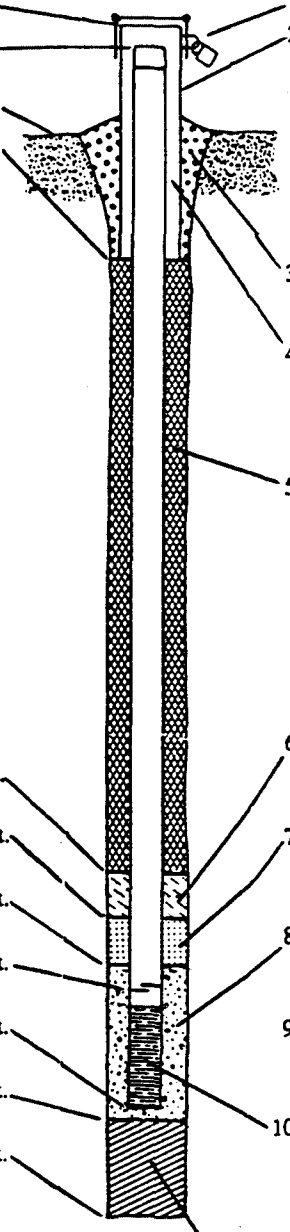
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☐ 41; Other ☐ ___
_____

15. Drilling fluid used: Water ☒ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis):
_____

E. Bentonite seal, top _____ ft. MSL or 15 ft.
F. Fine sand, top _____ ft. MSL or 4.0 ft.
G. Filter pack, top _____ ft. MSL or 5.0 ft.
H. Screen joint, top _____ ft. MSL or 6.0 ft.
I. Well bottom _____ ft. MSL or 16.0 ft.
J. Filter pack, bottom _____ ft. MSL or 16.0 ft.
K. Borehole, bottom _____ ft. MSL or 16.0 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.2 ft.
c. Material: Steel ☒ 04; Other ☐ ___
_____
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ ___
_____
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ ___; Other ☒ ___
#30 Sand
5. Annular space seal: a. ~~Granular~~ Chips Bentonite ☒ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. 100 lbs Ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ☒3/8 in. ☐1/2 in. Bentonite pellets ☒ 32
c. _____ Other ☐ ___
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Mining Corp #50
b. Volume added 50 lbs ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Red Flint Sand & Gravel #30
b. Volume added 300 lbs ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ ___
_____
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ ___
_____
b. Manufacturer Boartlongyear
c. Slot size: 0.01 in.
d. Slotted length: 10. ft.
11. Backfill material (below filter pack): None ☒ 14; Other ☐ ___
_____

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James D Achuck | Firm: Dames & Moore

Please complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Ad. Code. In accordance with ch.144, Wis Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5000 for each day of violation. In accordance with ch. 147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for more information including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐N ☐S _____ ft. ☐E ☐W	Well Name: MW-8A
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. ____ ____ ____ Long. ____ ____ ____ or	Wis. Unique Well Number: _____ DNR Well Number: ____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☒ 12	St. Plane _____ ft. N, _____ ft. E.	Date Well Installed: 5/30/96 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Section Location of Waste/Source: SW 1/4 of NW 1/4 of Sec. 33, T. 48 N, R. 4 ☐E ☒W	Well Installed By: (Person's Name and Firm): Jon Weeks; Boart longyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☒ Sidegradient; d ☐ Downgradient n ☐ Not Known	

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 635.50 ft. MSL
C. Land surface elevation 635.9 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

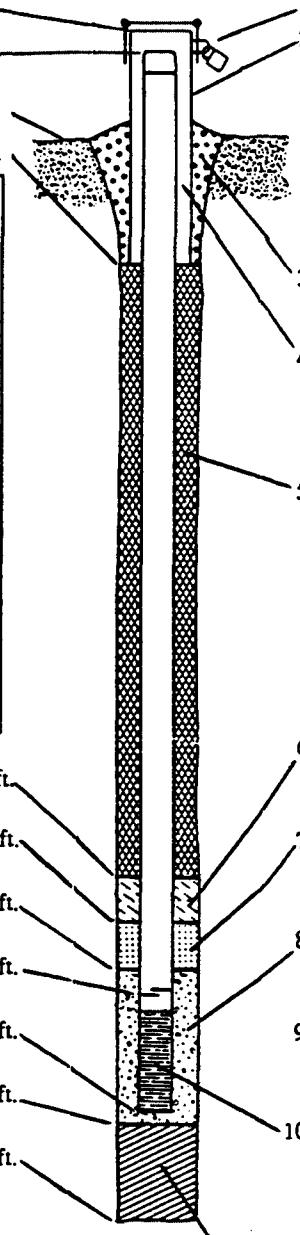
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☐ 41; Other ☐ __

15. Drilling fluid used: Water ☒ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis):
_____

E. Bentonite seal, top _____ ft. MSL or 2.0 ft.
F. Fine sand, top _____ ft. MSL or 41.0 ft.
G. Filter pack, top _____ ft. MSL or 43.0 ft.
H. Screen joint, top _____ ft. MSL or 45.0 ft.
I. Well bottom _____ ft. MSL or 50.0 ft.
J. Filter pack, bottom _____ ft. MSL or 50.0 ft.
K. Borehole, bottom _____ ft. MSL or 50.0 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.3 ft.
c. Material: Steel ☒ 04; Other ☐ __
d. Additional protection? ☐ Yes ☐ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ __
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ __; Other ☒ __
#30 Sand
5. Annular space seal: a. ~~Granular~~ cutted Bentonite ☒ 33
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 31
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. 6.50 lbs/ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☒ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ☒3/8 in. ☐1/2 in. Bentonite pellets ☒ 32
c. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Mining Corp #50
b. Volume added 50 lbs ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Red Flint Sand & Gravel #30
b. Volume added 100 lbs ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ __
b. Manufacturer Boart longyear
c. Slot size: 0.010 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ☒ 14; Other ☐ __
_____

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James D Schmick | Firm: Dames & Moore

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State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTI
Form 4400-113A Rev. 4

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐N ☐S _____ ft. ☐E ☐W	Well Name: MW-13A
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. ____ ____ ____ Long. ____ ____ ____ or	Wis. Unique Well Number: _____ DNR Well Num: _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☒ 12	St. Plane _____ ft. N, _____ ft. E.	Date Well Installed: 5/24/96 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Section Location of Waste/Source: SW 1/4 of NW 1/4 of Sec. 33, T. 48 N, R. 4 ☐E ☐W	Well Installed By: (Person's Name and Firm): Jon Wells; Boart longyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient; d ☒ Downgradient n ☐ Not Known	

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 635.94 ft. MSL
C. Land surface elevation 636.3 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☐ 41; Other ☐ ___

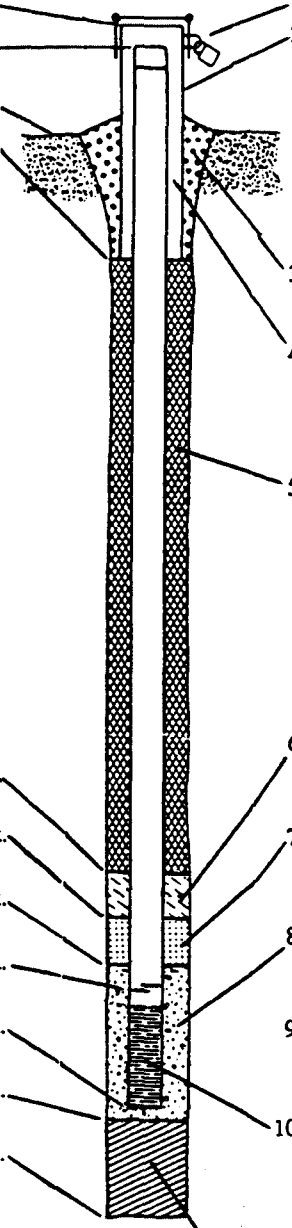
15. Drilling fluid used: Water ☒ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☒ No

Describe _____

17. Source of water (attach analysis): _____

E. Bentonite seal, top _____ ft. MSL or 2.0 ft.
F. Fine sand, top _____ ft. MSL or 36.0 ft.
G. Filter pack, top _____ ft. MSL or 38.0 ft.
H. Screen joint, top _____ ft. MSL or 40.0 ft.
I. Well bottom _____ ft. MSL or 45.0 ft.
J. Filter pack, bottom _____ ft. MSL or 46.0 ft.
K. Borehole, bottom _____ ft. MSL or 50.0 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 8.0
b. Length: 1.3
c. Material: Steel ☒ Other ☐
d. Additional protection? ☐ Yes ☐ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ Concrete ☒ Other ☐
4. Material between well casing and protective pipe: Bentonite ☐ Annular space seal ☐ Other ☒ Sand
5. Annular space seal: a. Granular Bentonite ☒ Chips
b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry ☐
c. _____ Lbs/gal mud weight . . . . . Bentonite slurry ☐
d. _____ % Bentonite . . . . . Bentonite-cement grout ☐
e. 750 lbs volume added for any of the above
f. How installed: Tremie ☐ Tremie pumped ☐ Gravity ☒
6. Bentonite seal: a. Bentonite granules ☐
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite pellets ☐
c. _____ Other ☐
7. Fine sand material: Manufacturer, product name & mesh si:
a. Badger State Mining Corp #70
b. Volume added 50 lbs ft³
8. Filter pack material: Manufacturer, product name and mesh
a. Red Flint Sands & Gravel #30
b. Volume added 200 lbs ft³
9. Well casing: Flush threaded PVC schedule 40 ☒; Flush threaded PVC schedule 80 ☐; Other ☐ _____
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒; Continuous slot ☐; Other ☐ _____
b. Manufacturer Boart longyear
c. Slot size: 0.01
d. Slotted length: 5.0
11. Backfill material (below filter pack): None ☐ Other ☒ Bentonite Chips

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: James D Schick | Firm: Dames & Moore

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State of Wisconsin
Department of Natural Resources

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 4-90

Facility/Project Name: NSP, Ashland	Local Grid Location of Well: _____ ft. ☐N ☐S _____ ft. ☐E ☐W	Well Name: MW-13B
Facility License, Permit or Monitoring Number: _____	Grid Origin Location: Lat. _____ Long. _____ or	Wis. Unique Well Number / DNR Well Number: _____ / _____
Type of Well: Water Table Observation Well ☐ 11; Piezometer ☒ 12	St. Plane _____ ft. N, _____ ft. E.	Date Well Installed: 5/29/96 (m m d d y y)
Distance Well Is From Waste/Source Boundary: _____ ft.	Section Location of Waste/Source: SW 1/4 of NW 1/4 of Sec. 33, T. 48 N, R. 4 ☐E ☒W	Well Installed By: (Person's Name and Firm): Jon Weeks; Boart Longyear
Is Well A Point of Enforcement Std. Application? ☐ Yes ☐ No	Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☒ Not Known	

A. Protective pipe, top elevation _____ ft. MSL
B. Well casing, top elevation 635.90 ft. MSL
C. Land surface elevation 636.3 ft. MSL
D. Surface seal, bottom _____ ft. MSL or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis attached? ☐ Yes ☐ No

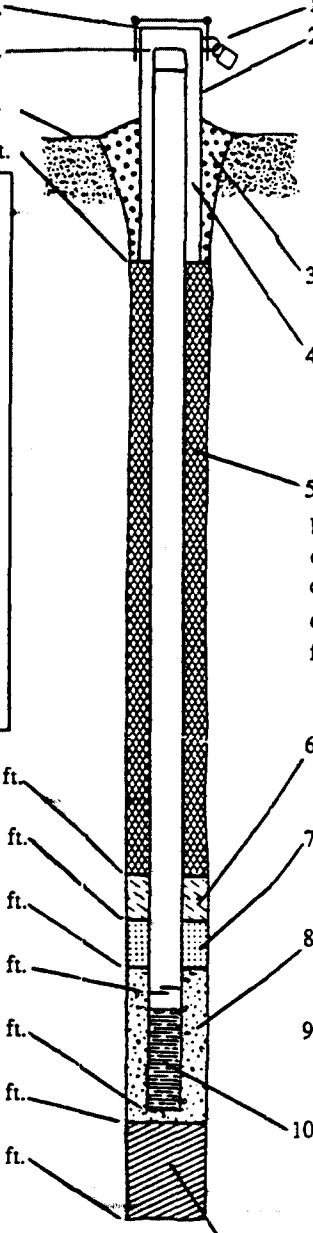
14. Drilling method used: Rotary ☒ 50; Hollow Stem Auger ☐ 41; Other ☐ __

15. Drilling fluid used: Water ☒ 02; Air ☐ 01; Drilling Mud ☐ 03; None ☐ 99

16. Drilling additives used? ☐ Yes ☐ No
Describe _____

17. Source of water (attach analysis):
_____

E. Bentonite seal, top _____ ft. MSL or 59.0 ft.
F. Fine sand, top _____ ft. MSL or 61.0 ft.
G. Filter pack, top _____ ft. MSL or 63.0 ft.
H. Screen joint, top _____ ft. MSL or 65.0 ft.
I. Well bottom _____ ft. MSL or 70.0 ft.
J. Filter pack, bottom _____ ft. MSL or 70.0 ft.
K. Borehole, bottom _____ ft. MSL or 70.0 ft.
L. Borehole, diameter 6.0 in.
M. O.D. well casing 2.3 in.
N. I.D. well casing 2.0 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
a. Inside diameter: 8.0 in.
b. Length: 1.2 ft.
c. Material: Steel ☒ 04; Other ☐ __
d. Additional protection? ☐ Yes ☒ No
If yes, describe: _____
3. Surface seal: Bentonite ☐ 30; Concrete ☒ 01; Other ☐ __
4. Material between well casing and protective pipe: Bentonite ☐ 30; Annular space seal ☐ __; Other ☐ __
5. Annular space seal: a. Granular Bentonite ☐ 33
b. [redacted] Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 35
c. 11 Lbs/gal mud weight . . . . . Bentonite slurry ☒ 31
d. ____ % Bentonite . . . . . Bentonite-cement grout ☐ 50
e. [redacted] gal/ft³ volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ☐ 08
6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐1/4 in. ☒3/8 in. ☐1/2 in. Bentonite pellets ☒ 32
c. _____ Other ☐ __
7. Fine sand material: Manufacturer, product name & mesh size
a. Badger Mining Corp #
b. Volume added 50 ft³
8. Filter pack material: Manufacturer, product name and mesh size
a. Red Flint Sands & Gravel #30
b. Volume added 200 ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ 23; Flush threaded PVC schedule 80 ☐ 24; Other ☐ __
10. Screen material: Sch 40 PVC
a. Screen type: Factory cut ☒ 11; Continuous slot ☐ 01; Other ☐ __
b. Manufacturer Boart Longyear
c. Slot size: 0.01 in.
d. Slotted length: 5.0 ft.
11. Backfill material (below filter pack): None ☒ 14; Other ☐ __

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature _____ Firm _____

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State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4[illegible]3B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP Ashland	Ashland	MW-4A
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	02	_____ / _____

		Before Development	After Development
1. Can this well be purged dry?	☒ Yes ☐ No		
2. Well development method			
surged with bailer and bailed	☒ 41		
surged with bailer and pumped	☐ 61		
surged with block and bailed	☐ 42		
surged with block and pumped	☐ 62		
surged with block, bailed and pumped	☐ 70		
compressed air	☐ 20		
bailed only	☐ 10		
pumped only	☐ 51		
pumped slowly	☐ 50		
Other _____	☐		
3. Time spent developing well	75 min.		
4. Depth of well (from top of well casisng)	25.6 ft.		
5. Inside diameter of well	2.0 in.		
6. Volume of water in filter pack and well casing	7.1 gal.		
7. Volume of water removed from well	40.0 gal.		
8. Volume of water added (if any)	____.__ gal.		
9. Source of water added	_____		
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ☐ No		
11. Depth to Water (from top of well casing)	a.	7.97 ft.	13.06 ft.
Date	b. m m d d y y	5/22/96	6/5/96
Time	c.	3:10 ☐ a.m. ☒ p.m.	10:00 ☒ a.m. ☐ p.m.
12. Sediment in well bottom		.3.0 inches	___.__ inches
13. Water clarity		Clear ☐ 10 Turbid ☒ 15 (Describe) silty reddish brown	Clear ☒ 20 Turbid ☐ 25 (Describe) slight milky color
Fill in if drilling fluids were used and well is at solid waste facility:			
14. Total suspended solids		____.__ mg/l	____.__ mg/l
15. COD		____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Bailed dry five times

Well developed by: Person's Name and Firm

Name: James Schick

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick

Print Initials: JDS

Firm: Dames & Moore

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP, Ashland	Ashland	MW-4B
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	02	_____ / _____

1. Can this well be purged dry? ☐ Yes ☐ No

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐ ▒▒

3. Time spent developing well _____ min.

4. Depth of well (from top of well casisng) 55.0 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 10.6 gal.

7. Volume of water removed from well 110.0 gal.

8. Volume of water added (if any) _____ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 15.45 ft.	15.46 ft.
Date	b. 5/23/96 (m m d d y y)	6/5/96 (m m d d y y)
Time	c. 3:25 ☐ a.m. ☒ p.m.	10:10 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	.4.0 inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) very silty reddish brown	Clear ☒ 20 Turbid ☐ 25 (Describe) slightly silty color
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	_____.__ mg/l	_____.__ mg/l
15. COD	_____.__ mg/l	_____.__ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: James D Schick

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick

Print Initials: JDS

Firm: Dames & Moore

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State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP Ashland		MW-5

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well Number
_____	02	_____	_____

1. Can this well be purged dry? ☐ Yes ☐ No

2. Well development method

surged with bailer and bailed	☒	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	__

3. Time spent developing well 130 min.

4. Depth of well (from top of well casing) 28.1 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 7.2 gal.

7. Volume of water removed from well 75.0 gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 19.11 ft.	19.21 ft.
Date	b. 10/17/95 (m m d d y y)	10/18/95 (m m d d y y)
Time	c. 15:00 ☐ a.m. ☒ p.m.	7:30 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	5.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☐ 20 Turbid ☒ 25
(Describe)	extreme black, strong petroleum odor, sheen on top.	No change
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: JAMES SCHICK

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D. Schick

Print Initials: JDS

Firm: Dames & Moore

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State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP Ashland		MW-5A

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well Number
_____	02	_____	___

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☒	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well 120 min.

4. Depth of well (from top of well casisng) 33.1 ft.

5. Inside diameter of well 2.00 in.

6. Volume of water in filter pack and well casing 5.1 gal.

7. Volume of water removed from well 55. gal.

8. Volume of water added (if any) ____. gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 18.45 ft.	19.70 ft.
Date	b. 10/18/95 m m d d y y	10/19/95 m m d d y y
Time	c. 8:30 ☒ a.m. ☐ p.m.	7:30 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	4.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☐ 20 Turbid ☒ 25
(Describe)	extremely turbid red-brown	moderately turbid red-brown

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____. mg/l	____. mg/l
15. COD	____. mg/l	____. mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: James Schick

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D. Schick

Print Initials: JDS

Firm: Dames & Moore

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4[illegible]3B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP, Ashland	Ashland	MW-5B
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_ _ _ _ _ _ _	02	_ _ _ _ _ _ _ / _ _ _ _

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method

surged with bailer and bailed	☒ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well 160 min.

4. Depth of well (from top of well casisng) 49.1 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 8.7 gal.

7. Volume of water removed from well 85.0 gal.

8. Volume of water added (if any) _ _ _ _._ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 19.30 ft.	_ _ _ _._ _ ft.
Date	b. 10/19/95 (m m d d y y)	_ _/_ _/_ _ (m m d d y y)
Time	c. 7:30 ☒ a.m. ☐ p.m.	_ _:_ _ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	6.0 inches	_ _._ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) Extremely turbid red-brown petroleum odor	Clear ☐ 20 Turbid ☒ 25 (Describe) as before, slightly less turbid.
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	_ _ _ _._ mg/l	_ _ _ _._ mg/l
15. COD	_ _ _ _._ mg/l	_ _ _ _._ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: James Schick

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D. Schick

Print Initials: JDS

Firm: Dames & Moore

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4[illegible]3B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP, Ashland	Ashland	MW-5C
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	02	_____ / _____

	Before Development	After Development
1. Can this well be purged dry?	☒ Yes ☐ No	
2. Well development method		
surged with bailer and bailed	☒ 41	
surged with bailer and pumped	☐ 61	
surged with block and bailed	☐ 42	
surged with block and pumped	☐ 62	
surged with block, bailed and pumped	☐ 70	
compressed air	☐ 20	
bailed only	☐ 10	
pumped only	☐ 51	
pumped slowly	☐ 50	
Other _____	☐ [shaded]	
11. Depth to Water (from top of well casing)	a. 6.45 ft.	8.86 ft.
Date	b. 6/01/96 (m m d d y y)	6/5/96 (m m d d y y)
Time	c. 11:00 ☒ a.m. ☐ p.m.	10:30 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	8.0 inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☒ 20 Turbid ☐ 25
(Describe)	very silty, reddish brown	very slight milky color.
3. Time spent developing well	180 min.	
4. Depth of well (from top of well casisng)	75.6 ft.	
5. Inside diameter of well	2.0 in.	
6. Volume of water in filter pack and well casing	15.2 gal.	
7. Volume of water removed from well	155.0 gal.	
8. Volume of water added (if any)	____.__ gal.	
9. Source of water added	_____	
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ☐ No	

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	_____.__ mg/l	_____.__ mg/l
15. COD	_____.__ mg/l	_____.__ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: James D Schick

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick

Print Initials: JDS

Firm: Dames & Moore

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP, Ashland	Ashland	MW-6
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	02	_____ / _____

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☒	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well _____ min.

4. Depth of well (from top of well casisng) 17.5 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 6.0 gal.

7. Volume of water removed from well 12.0 gal.

8. Volume of water added (if any) _____ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 7.88 ft.	13.59 ft.
Date	b. 5/24/96 (m m d d y y)	6/5/96 (m m d d y y)
Time	c. 3:45 ☐ a.m. ☒ p.m.	8:00 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	4.0 inches	_____ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☐ 20 Turbid ☒ 25
(Describe)	extremely silty, reddish brown	slight decrease in siltyness
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	_____ mg/l	_____ mg/l
15. COD	_____ mg/l	_____ mg/l

16. Additional comments on development:
Bailed dry six times

Well developed by: Person's Name and Firm

Name: James D Schick

Firm: ~~James D Schick~~ Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick

Print Initials: J D S

Firm: Dames & Moore

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP, Ashland	Ashland	MW-6A
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	__	_____ / ___

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method

surged with bailer and bailed	☒	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well 130 min.

4. Depth of well (from top of well casisng) 46.8 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 8.7 gal.

7. Volume of water removed from well 90.0 gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 17.89 ft.	18.82 ft.
Date	b. 5/24/96 (m m d d y y)	6/5/96 (m m d d y y)
Time	c. 3:45 ☐ a.m. ☒ p.m.	8:10 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	6.0 inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☒ 20 Turbid ☐ 25
(Describe)	very silty reddish brown	slight milky color
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: James D Schick

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick

Print Initials: JDS

Firm: Dames & Moore

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP, Ashland	Ashland	MW-7
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	02	_____ / _____

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☒	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well 75 min.

4. Depth of well (from top of well casisng) 17.9 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 8.4 gal.

7. Volume of water removed from well 40.0 gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 7.43 ft.	7.77 ft.
Date	b. 6/04/96 (m m d d y y)	6/5/96 (m m d d y y)
Time	c. 10:00 ☒ a.m. ☐ p.m.	13:00 ☐ a.m. ☐ p.m.
12. Sediment in well bottom	1.0 inches	0.0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☐ 20 Turbid ☒ 25
(Describe)	extremely turbid, dark grey oily	slight decrease in turbidity
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

Fill in if drilling fluids were used and well is at solid waste facility:

16. Additional comments on development:
Bailed dry 8 times, removing 5 gallons each time

Well developed by: Person's Name and Firm

Name: James Schick

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick

Print Initials: JDS

Firm: Dames & Moore

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP, Ashland	Ashland	MW-7A
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	02	_____ / _____

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☒	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well: 100 min.

4. Depth of well (from top of well casing): 38.0 ft.

5. Inside diameter of well: 2.0 in.

6. Volume of water in filter pack and well casing: 10.1 gal.

7. Volume of water removed from well: 110.0 gal.

8. Volume of water added (if any): ____.__ gal.

9. Source of water added: _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. -11.00 ft.	-11.00 ft.
Date	b. 6/04/96 (m m d d y y)	6/05/96 (m m d d y y)
Time	c. 11:30 ☒ a.m. ☐ p.m.	12:00 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	N/A inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) very silty reddish brown	Clear ☒ 20 Turbid ☐ 25 (Describe) clear, very slight milky color
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Artesian Well.

Well developed by: Person's Name and Firm

Name: James Schick

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick

Print Initials: JDS

Firm: Dames & Moore

NOTE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP Ashland	Ashland	MW-8
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	02	_____ / _____

	Before Development	After Development
1. Can this well be purged dry?	☒ Yes ☐ No	
2. Well development method		
surged with bailer and bailed	☒ 41	
surged with bailer and pumped	☐ 61	
surged with block and bailed	☐ 42	
surged with block and pumped	☐ 62	
surged with block, bailed and pumped	☐ 70	
compressed air	☐ 20	
bailed only	☐ 10	
pumped only	☐ 51	
pumped slowly	☐ 50	
Other _____	☐	
3. Time spent developing well	30 min.	
4. Depth of well (from top of well casisng)	15.5 ft.	
5. Inside diameter of well	2.0 in.	
6. Volume of water in filter pack and well casing	1.0 gal.	
7. Volume of water removed from well	10.0 gal.	
8. Volume of water added (if any)	___.__ gal.	
9. Source of water added	_____	
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ☐ No	
11. Depth to Water (from top of well casing) a.	1.32 ft.	14.32 ft.
Date b.	5/31/96 (m m d d y y)	6/5/96 (m m d d y y)
Time c.	10:15 ☒ a.m. ☐ p.m.	11:25 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	3.0 inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) extremely turbid, reddish brown.	Clear ☐ 20 Turbid ☐ 25 (Describe)
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Bailed dry 6 times

Well developed by: Person's Name and Firm

Name: James Schick
Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick
Print Initials: JDS
Firm: Dames & Moore

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State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☒ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP, Ashland	Ashland	MW-8A
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	02	_____ / _____

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method

surged with bailer and bailed	☒	41
surged with bailer and pumped	☐	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	

3. Time spent developing well: 60 min.

4. Depth of well (from top of well casisng): 49.6 ft.

5. Inside diameter of well: 2.0 in.

6. Volume of water in filter pack and well casing: ____.__ gal.

7. Volume of water removed from well: 30.0 gal.

8. Volume of water added (if any): ____.__ gal.

9. Source of water added: _____

10. Analysis performed on water added? ☐ Yes ☐ No (If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 11.91 ft.	15.07 ft.
Date	b. 5/31/96 (m m d d y y)	6/5/96 (m m d d y y)
Time	c. 8:30 ☒ a.m. ☐ p.m.	11:30 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	6.0 inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) extremely turbid, reddish brown and very silty.	Clear ☒ 20 Turbid ☐ 25 (Describe) slight milky color.

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:
Bailed dry 6 times

Well developed by: Person's Name and Firm

Name: James Schick
Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick
Print Initials: JDS
Firm: Dames & Moore

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State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP, Ashland	Ashland	MW-13A
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	02	_____ / _____

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ☒ No	
2. Well development method		
surged with bailer and bailed	☒ 41	
surged with bailer and pumped	☐ 61	
surged with block and bailed	☐ 42	
surged with block and pumped	☐ 62	
surged with block, bailed and pumped	☐ 70	
compressed air	☐ 20	
bailed only	☐ 10	
pumped only	☐ 51	
pumped slowly	☐ 50	
Other _____	☐	
3. Time spent developing well	140 min.	
4. Depth of well (from top of well casisng)	45.3 ft.	
5. Inside diameter of well	2.0 in.	
6. Volume of water in filter pack and well casing	8.7 gal.	
7. Volume of water removed from well	90.0 gal.	
8. Volume of water added (if any)	___.__ gal.	
9. Source of water added	_____	
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ☐ No	
11. Depth to Water (from top of well casing)	a. 16.38 ft.	20.75 ft.
Date	b. 5/28/96 (m m d d y y)	6/5/96 (m m d d y y)
Time	c. 2:00 ☐ a.m. ☒ p.m.	11:00 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	5.0 inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) extremely silty reddish brown	Clear ☐ 20 Turbid ☑ 25 (Describe) light turbidity, slightly silty
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: James Schick

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick

Print Initials: JDS

Firm: Dames & Moore

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State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

Route to: Solid Waste ☐ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ _____

Facility/Project Name	County Name	Well Name
NSP Ashland	Ashland	MW-13B
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number** / **DNR Well Number**
_____	02	_____ / _____

	Before Development	After Development
1. Can this well be purged dry?	☐ Yes ☒ No	
2. Well development method		
surged with bailer and bailed	☒ 41	
surged with bailer and pumped	☐ 61	
surged with block and bailed	☐ 42	
surged with block and pumped	☐ 62	
surged with block, bailed and pumped	☐ 70	
compressed air	☐ 20	
bailed only	☐ 10	
pumped only	☐ 51	
pumped slowly	☐ 50	
Other _____	☐	
3. Time spent developing well	____ min.	
4. Depth of well (from top of well casisng)	69.8 ft.	
5. Inside diameter of well	2.0 in.	
6. Volume of water in filter pack and well casing	13.4 gal.	
7. Volume of water removed from well	135.6 gal.	
8. Volume of water added (if any)	___.__ gal.	
9. Source of water added	_____	
10. Analysis performed on water added? (If yes, attach results)	☐ Yes ☐ No	
11. Depth to Water (from top of well casing)	a. 10.57 ft.	10.56 ft.
Date	b. 5/30/96 (m m d d y y)	6/5/96 (m m d d y y)
Time	c. 1:30 ☐ a.m. ☒ p.m.	11:15 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	4.0 inches	___.__ inches
13. Water clarity	Clear ☐ 10 / Turbid ☒ 15	Clear ☒ 20 / Turbid ☐ 25
(Describe)	very silty reddish brown	
Fill in if drilling fluids were used and well is at solid waste facility:		
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Additional comments on development:

Well developed by: Person's Name and Firm

Name: James Schick

Firm: Dames & Moore

I hereby certify that the above information is true and correct to the best of my knowledge.

Signature: James D Schick

Print Initials: J D S

Firm: Dames & Moore

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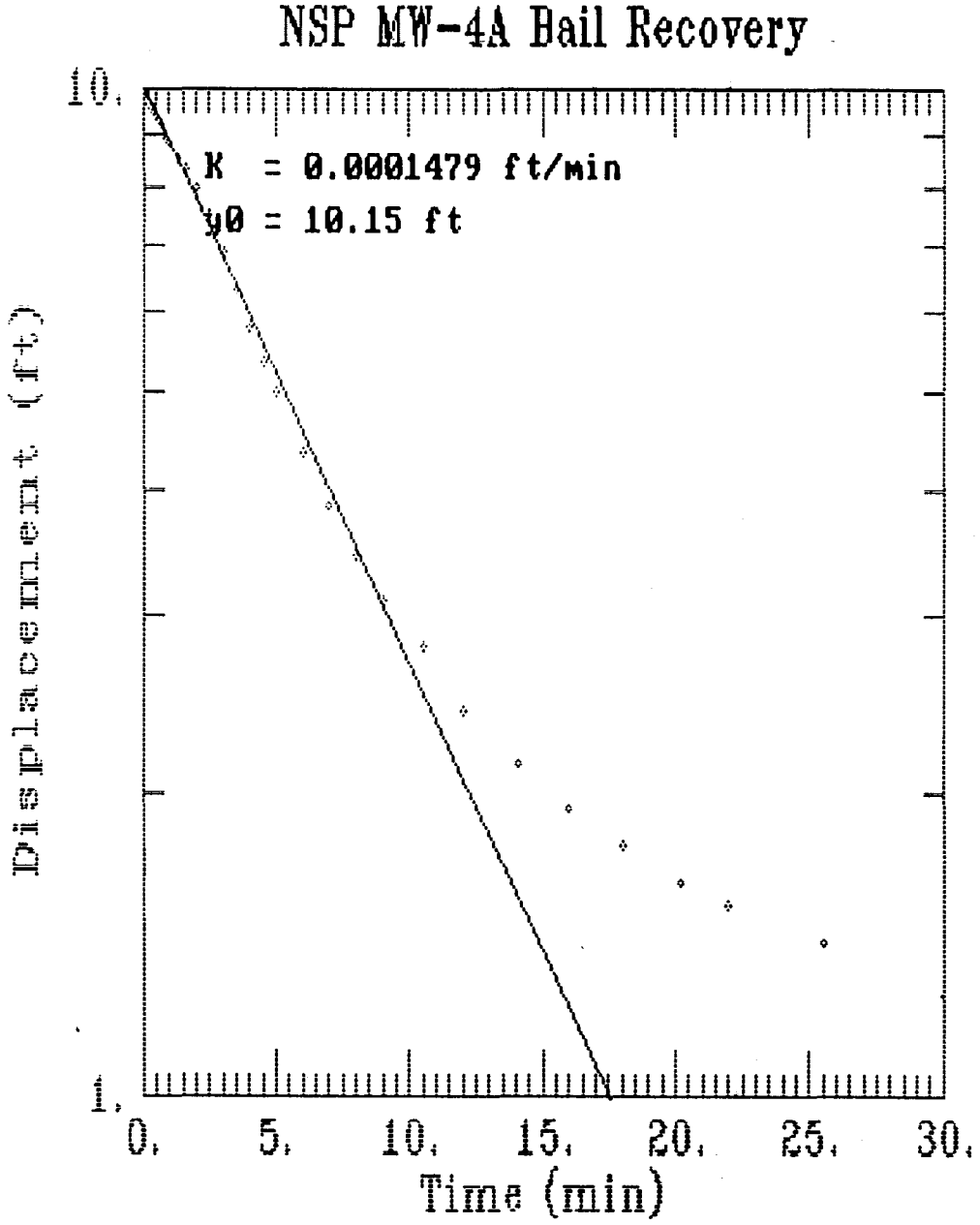
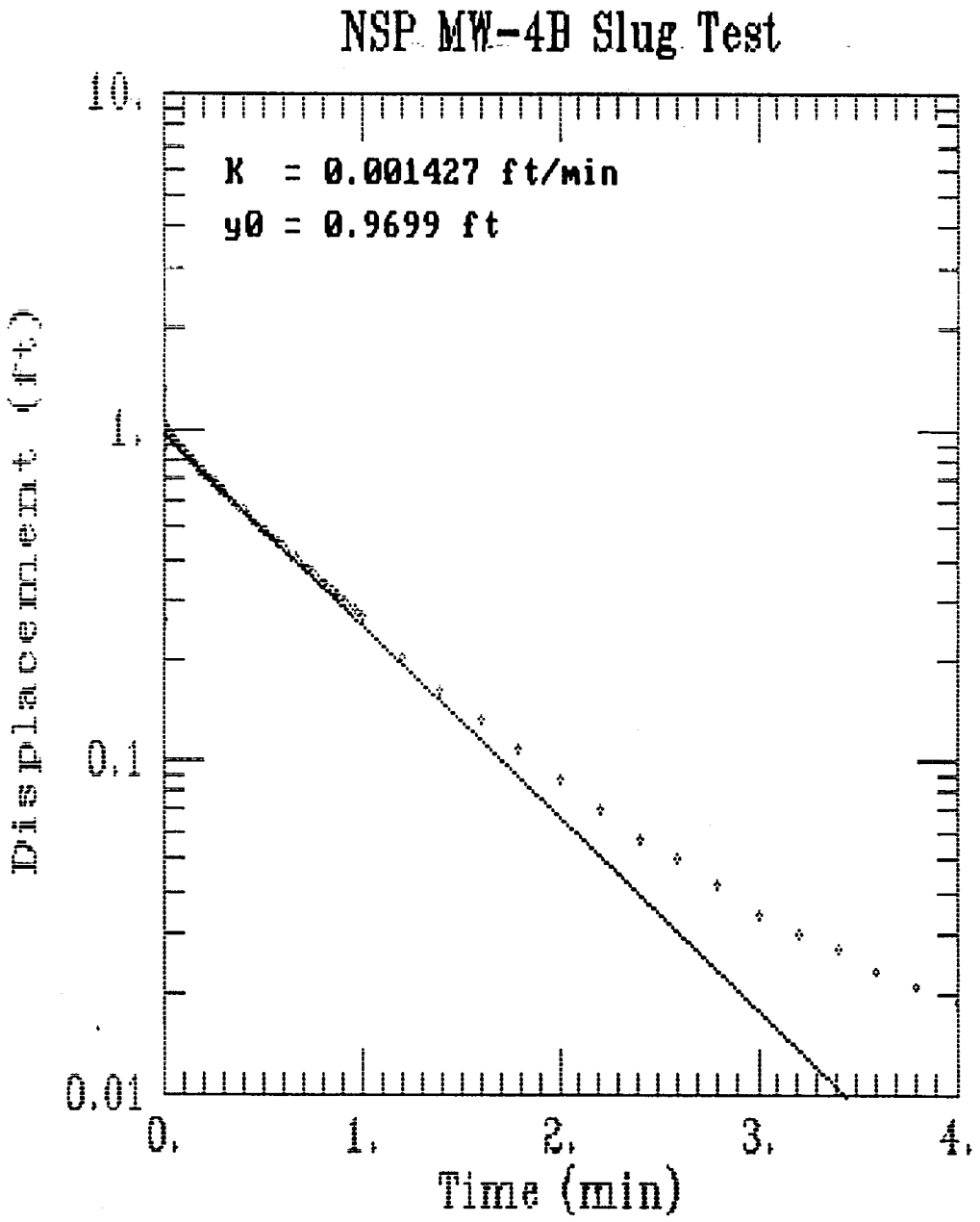
APPENDIX C
SLUG TEST AND BAIL RECOVERY TEST RESULTS


NSP MW-4A Bail Recovery
K = 0.0001479 ft/min
y0 = 10.15 ft
Displacement (ft)
10.
1.
0.
5.
10.
15.
20.
25.
30.
Time (min)

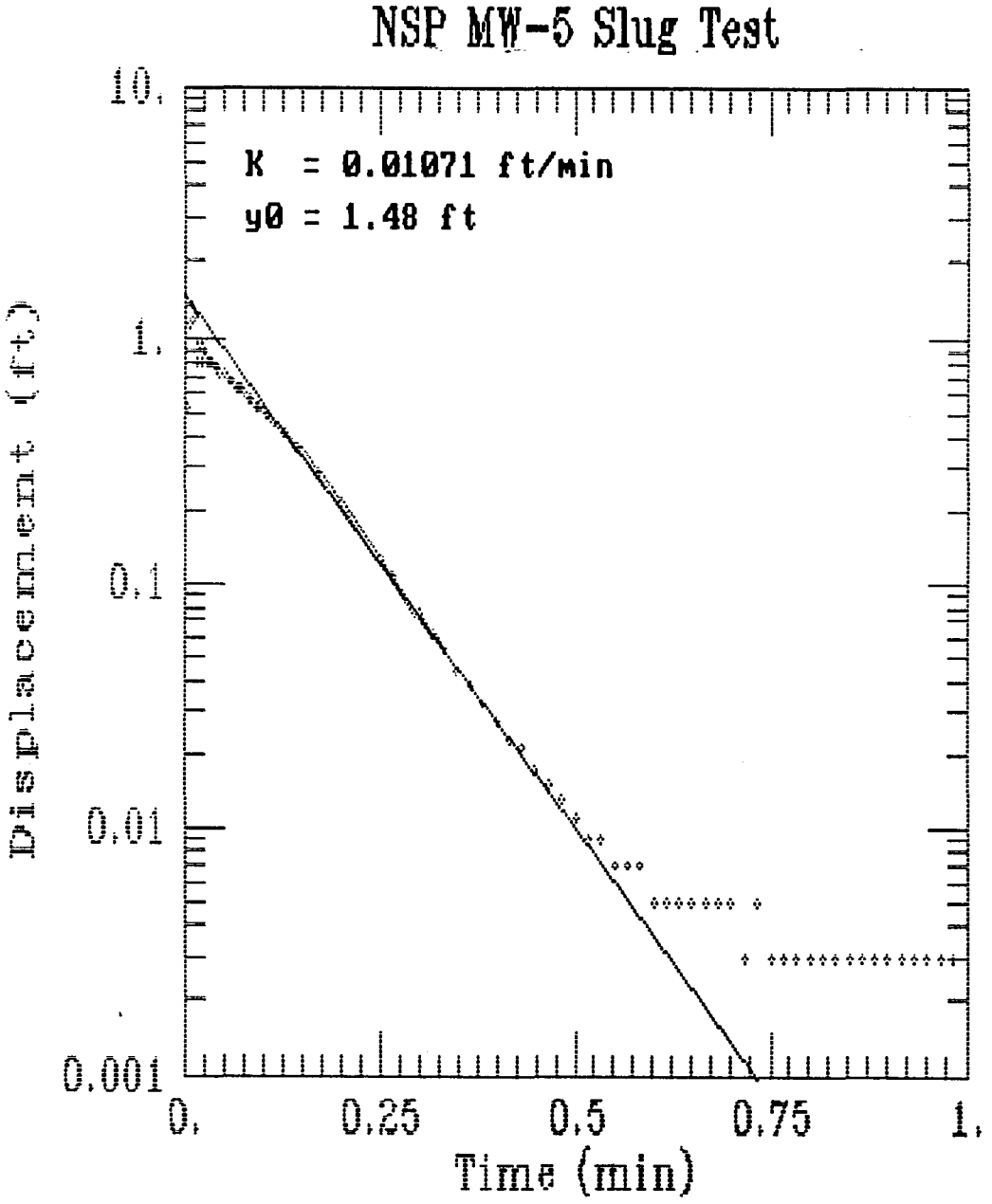
NSP MW-4A Bail Recovery
slugt 1
9.94
0.083
0.25
slugt2
9
9
12.54
tsdata

0	9.94	1
0.1667	9.74	1
0.33	9.55	1
0.5	9.39	1
0.667	9.24	1
0.83	9.04	1
1	8.86	1
1.33	8.56	1
1.667	8.3	1
2	7.97	1
2.5	7.48	1
3	6.89	1
3.5	6.32	1
4.03	5.79	1
4.5	5.38	1
5	5	1
6	4.37	1
7	3.85	1
8	3.44	1
9	3.12	1
10.5	2.81	1
12.08	2.42	1
14.08	2.14	1
16	1.94	1
18	1.78	1
20.167	1.63	1
22	1.55	1
25.5	1.42	1
30	1.26	1
40	1.02	1
52.167	0.84	1


NSP MW-4B Slug Test
K = 0.001427 ft/min
y0 = 0.9699 ft
Displacement (ft)
10.
1.
0.1
0.01
0.
1.
2.
3.
4.
Time (min)

NSP MW-4B Slug Test
slugt 1
1.318
0.083
0.25
slugt 2
100
9
39.54
tsdata

0	0.032	1
0.0033	0.266	1
0.0066	0.874	1
0.01	1.318	1
0.0133	1.003	1
0.0166	0.97	1
0.02	1.017	1
0.0233	0.997	1
0.0266	0.974	1
0.03	0.972	1
0.0333	0.97	1
0.0366	0.976	1
0.04	0.961	1
0.0433	0.949	1
0.0466	0.932	1
0.05	0.941	1
0.0533	0.941	1
0.0566	0.922	1
0.06	0.928	1
0.0633	0.918	1
0.0666	0.905	1
0.07	0.901	1
0.0733	0.905	1
0.0766	0.901	1
0.08	0.895	1
0.0833	0.883	1
0.0866	0.876	1
0.09	0.874	1
0.0933	0.868	1
0.0966	0.864	1
0.1	0.856	1
0.1033	0.851	1
0.1066	0.847	1
0.11	0.845	1
0.1133	0.841	1
0.1166	0.835	1
0.12	0.831	1
0.1233	0.827	1
0.1266	0.824	1
0.13	0.82	1
0.1333	0.816	1
0.1366	0.81	1
0.14	0.808	1
0.1433	0.804	1
0.1466	0.799	1
0.15	0.797	1
0.1533	0.793	1
0.1566	0.789	1
0.16	0.785	1
0.1633	0.781	1
0.1666	0.777	1
0.17	0.773	1
0.1733	0.77	1
0.1766	0.768	1
0.18	0.764	1
0.1833	0.76	1
0.1866	0.756	1
0.19	0.752	1
0.1933	0.748	1
0.1966	0.744	1
0.2	0.743	1
0.2033	0.739	1
0.2066	0.735	1
0.21	0.733	1
0.2133	0.729	1
0.2166	0.725	1
0.22	0.723	1
0.2233	0.719	1
0.2266	0.716	1
0.23	0.714	1
0.2333	0.71	1
0.2366	0.706	1
0.24	0.704	1
0.2433	0.7	1
0.2466	0.696	1
0.25	0.694	1
0.2533	0.69	1
0.2566	0.689	1
0.26	0.685	1
0.2633	0.683	1
0.2666	0.679	1
0.27	0.677	1
0.2733	0.673	1
0.2766	0.671	1
0.28	0.667	1
0.2833	0.665	1
0.2866	0.661	1
0.29	0.66	1
0.2933	0.656	1
0.2966	0.654	1
0.3	0.652	1
0.3033	0.648	1
0.3066	0.646	1
0.31	0.642	1
0.3133	0.64	1
0.3166	0.636	1
0.32	0.634	1
0.3233	0.633	1
0.3266	0.629	1
0.33	0.627	1
0.3333	0.625	1
0.35	0.609	1
0.3666	0.596	1
0.3833	0.582	1
0.4	0.571	1
0.4166	0.557	1
0.4333	0.546	1
0.45	0.534	1
0.4666	0.523	1
0.4833	0.511	1
0.5	0.499	1
0.5166	0.49	1
0.5333	0.48	1
0.55	0.47	1
0.5666	0.461	1
0.5833	0.451	1
0.6	0.441	1
0.6166	0.432	1
0.6333	0.424	1
0.65	0.414	1
0.6666	0.407	1
0.6833	0.399	1
0.7	0.389	1
0.7166	0.384	1
0.7333	0.376	1
0.75	0.368	1
0.7666	0.36	1
0.7833	0.353	1
0.8	0.345	1
0.8166	0.339	1
0.8333	0.333	1
0.85	0.326	1
0.8666	0.32	1
0.8833	0.314	1
0.9	0.308	1
0.9166	0.301	1
0.9333	0.295	1
0.95	0.289	1
0.9666	0.285	1
0.9833	0.279	1
1	0.274	1
1.2	0.204	1
1.4	0.164	1
1.6	0.131	1
1.8	0.106	1
2	0.086	1
2.2	0.071	1
2.4	0.057	1
2.6	0.05	1
2.8	0.042	1
3	0.034	1
3.2	0.03	1
3.4	0.027	1
3.6	0.023	1
3.8	0.021	1
4	0.019	1
4.2	0.015	1
4.4	0.015	1
4.6	0.013	1
4.8	0.013	1
5	0.011	1
5.2	0.011	1
5.4	0.011	1
5.6	0.011	1
5.8	0.009	1
6	0.009	1
6.2	0.009	1
6.4	0.009	1
6.6	0.009	1
6.8	0.009	1
7	0.009	1
7.2	0.007	1
7.4	0.009	1
7.6	0.009	1
7.8	0.009	1
8	0.009	1
8.2	0.009	1
8.4	0.009	1
8.6	0.009	1
8.8	0.009	1
9	0.009	1
9.2	0.007	1
9.4	0.009	1
9.6	0.009	1
9.8	0.009	1
10	0.007	1
12	0.007	1
6.6	0.028	1
6.8	0.027	1
7	0.028	1
7.2	0.027	1
7.4	0.027	1
7.6	0.027	1
7.8	0.025	1
8	0.025	1
8.2	0.025	1
8.4	0.025	1
8.6	0.025	1
8.8	0.025	1
9	0.025	1
9.2	0.025	1
9.4	0.023	1
9.6	0.023	1
9.8	0.023	1
10	0.023	1


NSP MW-5 Slug Test
K = 0.01071 ft/min
y0 = 1.48 ft
Displacement (ft)
10.
1.
0.1
0.01
0.001
0.
0.25
0.5
0.75
1.
Time (min)

NSP MW-5 Slug Test

slugt 1

1.328

0.083

0.25

slugt 2

8.61

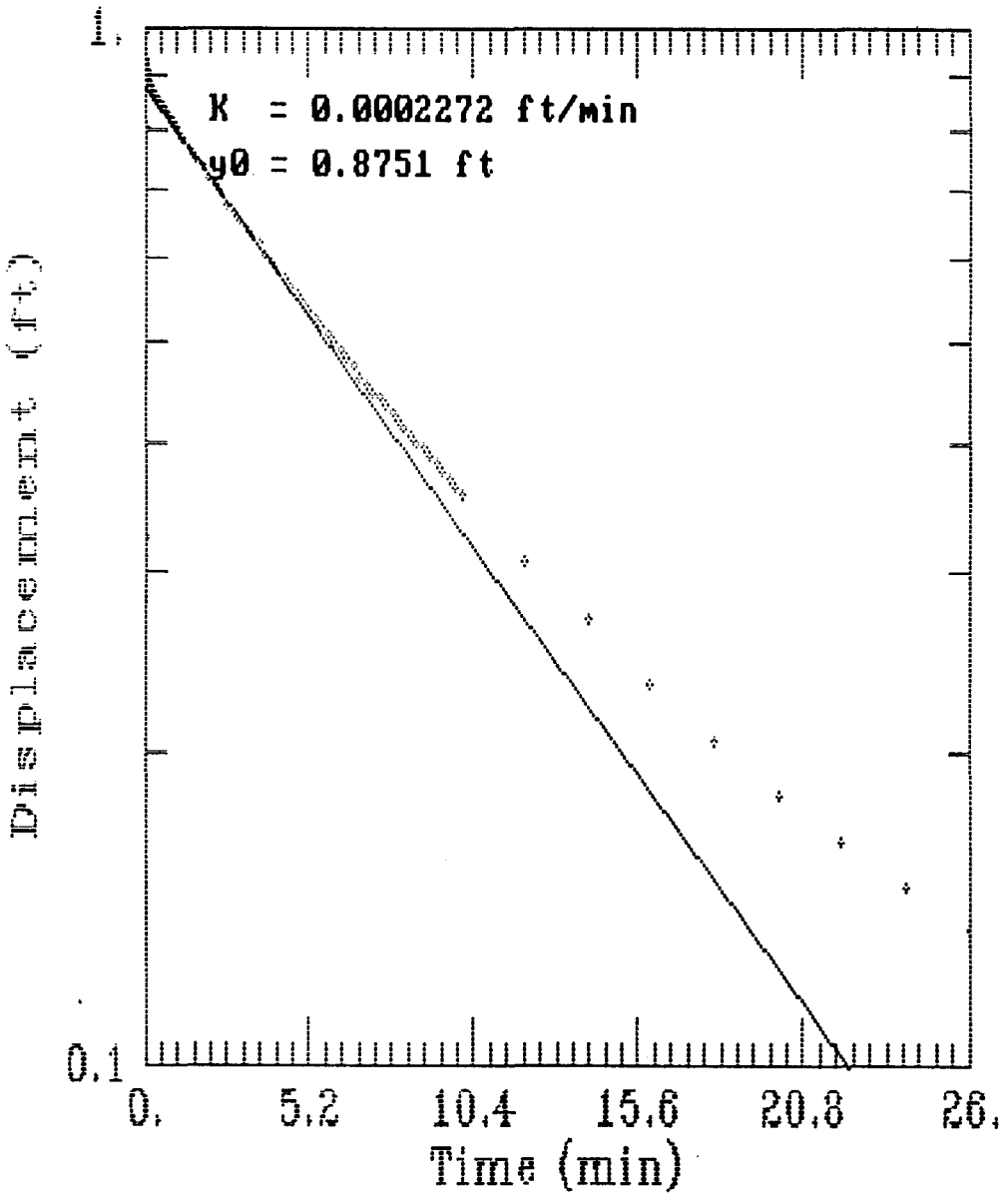
8.61

8.61

tsdata

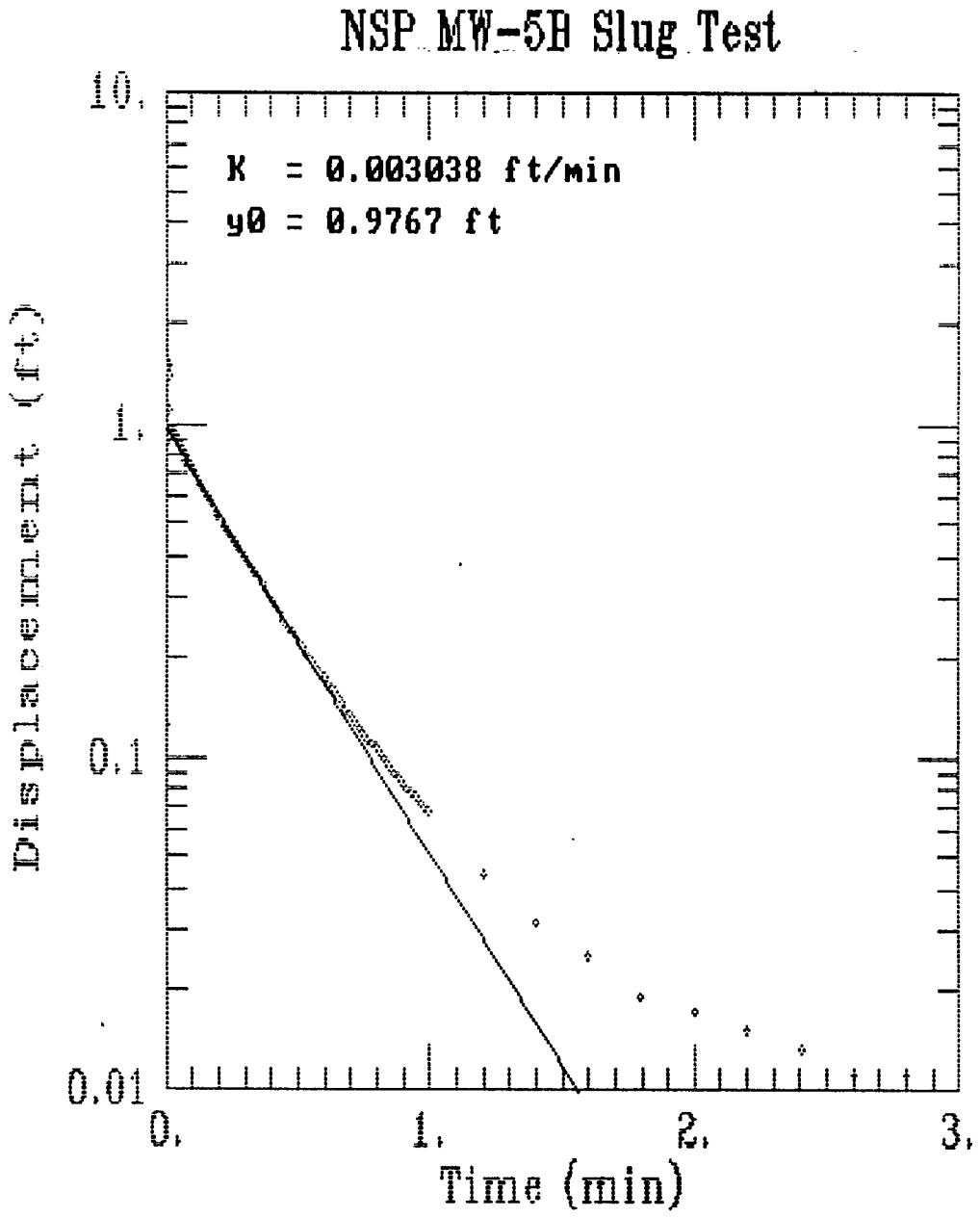
0	0.073	1
0.0033	0.534	1
0.0066	1.132	1
0.01	1.328	1
0.0133	1.207	1
0.0166	0.787	1
0.02	0.962	1
0.0233	0.792	1
0.0266	0.871	1
0.03	0.804	1
0.0333	0.806	1
0.0366	0.802	1
0.04	0.76	1
0.0433	0.767	1
0.0466	0.727	1
0.05	0.715	1
0.0533	0.692	1
0.0566	0.675	1
0.06	0.682	1
0.0633	0.651	1
0.0666	0.634	1
0.07	0.621	1
0.0733	0.619	1
0.0766	0.605	1
0.08	0.586	1
0.0833	0.572	1
0.0866	0.559	1
0.09	0.553	1
0.0933	0.532	1
0.0966	0.524	1
0.1	0.511	1
0.1033	0.499	1
0.1066	0.488	1
0.11	0.476	1
0.1133	0.464	1
0.12	0.441	1
0.1233	0.432	1
0.1266	0.42	1
0.13	0.408	1
0.1333	0.397	1
0.1366	0.387	1
0.14	0.376	1
0.1433	0.366	1
0.1466	0.356	1
0.15	0.345	1
0.1533	0.335	1
0.1566	0.326	1
0.16	0.316	1
0.1633	0.306	1
0.1666	0.297	1
0.17	0.287	1
0.1733	0.279	1
0.1766	0.27	1
0.18	0.262	1
0.1833	0.252	1
0.1866	0.245	1
0.19	0.237	1
0.1933	0.229	1
0.1966	0.221	1
0.2	0.214	1
0.2033	0.206	1
0.2066	0.2	1
0.21	0.192	1
0.2133	0.187	1
0.2166	0.179	1
0.22	0.173	1
0.2233	0.167	1
0.2266	0.162	1
0.23	0.156	1
0.2333	0.152	1
0.2366	0.146	1
0.24	0.14	1
0.2433	0.136	1
0.2466	0.131	1
0.25	0.127	1
0.2533	0.121	1
0.2566	0.117	1
0.26	0.113	1
0.2633	0.109	1
0.2666	0.106	1
0.27	0.102	1
0.2733	0.098	1
0.2766	0.094	1
0.28	0.092	1
0.2833	0.088	1
0.2866	0.086	1
0.29	0.082	1
0.2933	0.079	1
0.2966	0.077	1
0.3	0.075	1
0.3033	0.071	1
0.3066	0.069	1
0.31	0.067	1
0.3133	0.065	1
0.3166	0.063	1
0.32	0.061	1
0.3233	0.059	1
0.3266	0.057	1
0.33	0.055	1
0.3333	0.054	1
0.35	0.044	1
0.3666	0.038	1
0.3833	0.032	1
0.4	0.027	1
0.4166	0.023	1
0.4333	0.021	1
0.45	0.017	1
0.4666	0.015	1
0.4833	0.013	1
0.5	0.011	1
0.5166	0.009	1
0.5333	0.009	1
0.55	0.007	1
0.5666	0.007	1
0.5833	0.007	1
0.6	0.005	1
0.6166	0.005	1
0.6333	0.005	1
0.65	0.005	1
0.6666	0.005	1
0.6833	0.005	1
0.7	0.005	1
0.7166	0.003	1
0.7333	0.005	1
0.75	0.003	1
0.7666	0.003	1
0.7833	0.003	1
0.8	0.003	1
0.8166	0.003	1
0.8333	0.003	1
0.85	0.003	1
0.8666	0.003	1
0.8833	0.003	1
0.9	0.003	1
0.9166	0.003	1
0.9333	0.003	1
0.95	0.003	1
0.9666	0.003	1
0.9833	0.003	1
1	0.003	1
1.2	0.003	1
1.4	0.003	1
1.6	0.003	1
1.8	0.003	1
2	0.003	1
2.2	0.003	1
2.4	0.003	1
2.6	0.003	1
2.8	0.003	1
3	0.003	1
3.2	0.003	1
3.4	0.003	1
3.6	0.003	1
3.8	0.003	1
4	0.003	1
4.2	0.003	1
4.4	0.003	1
4.6	0.003	1
4.8	0.003	1
5	0.003	1
5.2	0.003	1
5.4	0.003	1
5.6	0.003	1
5.8	0.003	1
6	0.003	1
6.2	0.003	1
6.4	0.003	1
6.6	0.003	1
6.8	0.003	1
7	0.003	1
7.2	0.003	1
7.4	0.003	1
7.6	0.003	1
7.8	0.003	1
8	0.003	1
8.2	0.003	1
8.4	0.003	1
8.6	0.003	1
8.8	0.003	1
9	0.003	1
9.2	0.003	1
9.4	0.003	1
9.6	0.003	1
9.8	0.003	1
10	0.003	1
12	0.005	1
14	0.003	1

NSP MW-5A Slug Test



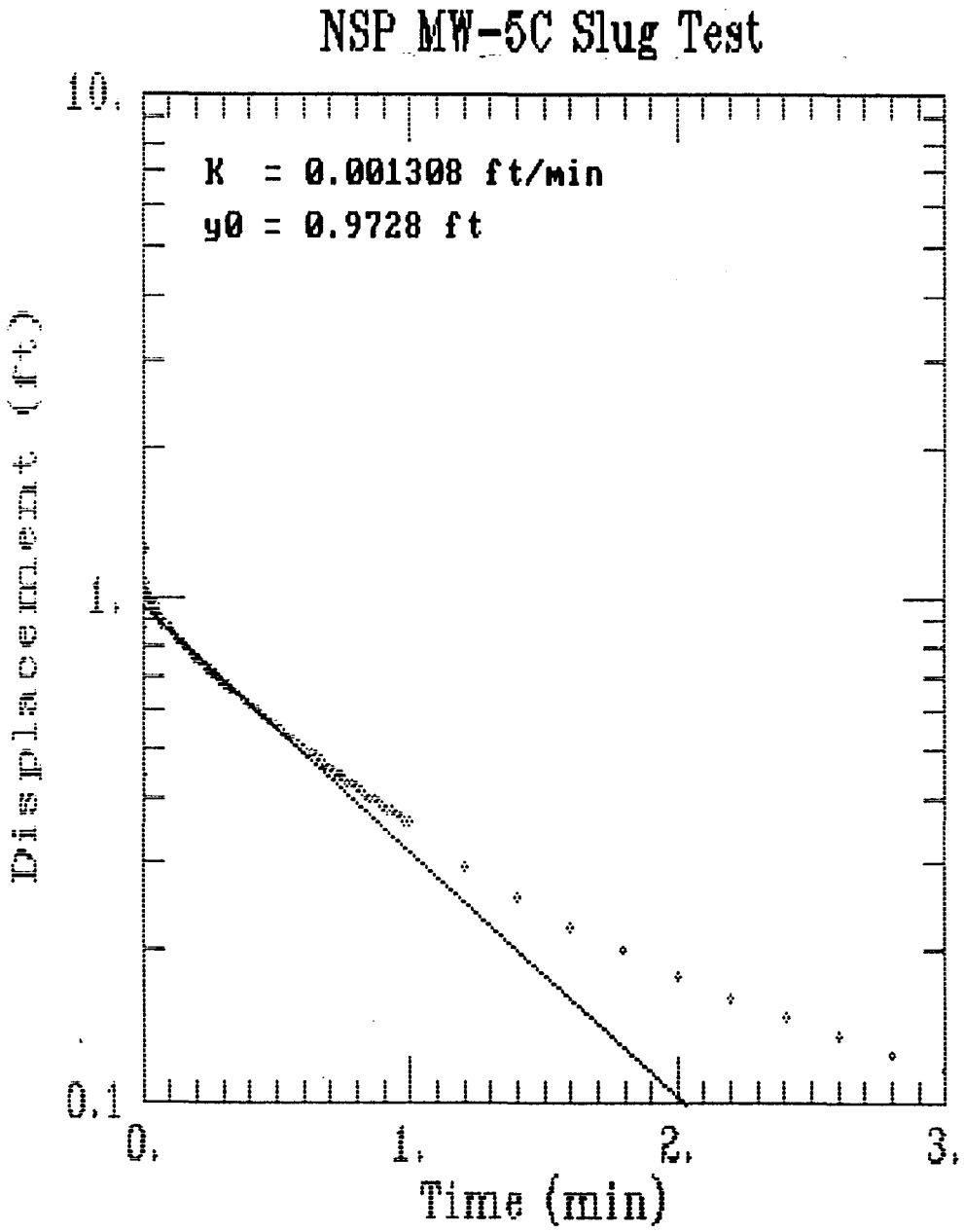
NSP MW-5A Slug Test
slugt 1
1.263
0.083
0.25
slugt 2
4
4
13.78
tsdata

0	0.054	1
0.0033	0.048	1
0.0066	0.326	1
0.01	0.987	1
0.0133	1.263	1
0.0166	0.802	1
0.02	0.991	1
0.0233	0.931	1
0.0266	0.935	1
0.03	0.933	1
0.0333	0.926	1
0.0366	0.92	1
0.04	0.916	1
0.0433	0.92	1
0.0466	0.918	1
0.05	0.912	1
0.0533	0.904	1
0.0566	0.914	1
0.06	0.918	1
0.0633	0.918	1
0.0666	0.91	1
0.07	0.904	1
0.0733	0.904	1
0.0766	0.906	1
0.08	0.906	1
0.0833	0.901	1
0.0866	0.897	1
0.09	0.899	1
0.0933	0.904	1
0.0966	0.906	1
0.1	0.899	1
0.1033	0.895	1
0.1066	0.893	1
0.11	0.893	1
0.1133	0.889	1
0.1166	0.893	1
0.12	0.889	1
0.1233	0.891	1
0.1266	0.889	1
0.13	0.889	1
0.1333	0.889	1
0.1366	0.887	1
0.14	0.887	1
0.1433	0.887	1
0.1466	0.887	1
0.15	0.885	1
0.1533	0.885	1
0.1566	0.885	1
0.16	0.885	1
0.1633	0.883	1
0.1666	0.883	1
0.17	0.883	1
0.1733	0.883	1
0.1766	0.881	1
0.18	0.881	1
0.1833	0.881	1
0.1866	0.881	1
0.19	0.879	1
0.1933	0.879	1
0.1966	0.879	1
0.2	0.879	1
0.2033	0.877	1
0.2066	0.877	1
0.21	0.877	1
0.2133	0.877	1
0.2166	0.877	1
0.22	0.875	1
0.2233	0.875	1
0.2266	0.875	1
0.23	0.875	1
0.2333	0.874	1
0.2366	0.874	1
0.24	0.874	1
0.2433	0.874	1
0.2466	0.872	1
0.25	0.872	1
0.2533	0.872	1
0.2566	0.872	1
0.26	0.872	1
0.2633	0.872	1
0.2666	0.87	1
0.27	0.87	1
0.2733	0.87	1
0.2766	0.87	1
0.28	0.87	1
0.2833	0.868	1
0.29	0.868	1
0.2933	0.868	1
0.2966	0.868	1
0.3	0.866	1
0.3033	0.866	1
0.3066	0.866	1
0.31	0.866	1
0.3133	0.866	1
0.3166	0.864	1
0.32	0.864	1
0.3233	0.864	1
0.3266	0.864	1
0.33	0.864	1
0.3333	0.862	1
0.35	0.862	1
0.3666	0.86	1
0.3833	0.858	1
0.4	0.856	1
0.4166	0.854	1
0.4333	0.852	1
0.45	0.85	1
0.4666	0.848	1
0.4833	0.847	1
0.5	0.845	1
0.5166	0.845	1
0.5333	0.843	1
0.55	0.841	1
0.5666	0.839	1
0.5833	0.837	1
0.6	0.837	1
0.6166	0.835	1
0.6333	0.833	1
0.65	0.831	1
0.6666	0.829	1
0.6833	0.827	1
0.7	0.827	1
0.7166	0.825	1
0.7333	0.823	1
0.75	0.821	1
0.7666	0.821	1
0.7833	0.819	1
0.8	0.818	1
0.8166	0.816	1
0.8333	0.816	1
0.85	0.814	1
0.8666	0.812	1
0.8833	0.81	1
0.9	0.81	1
0.9166	0.808	1
0.9333	0.806	1
0.95	0.804	1
0.9666	0.804	1
0.9833	0.802	1
1	0.8	1
1.2	0.781	1
1.4	0.765	1
1.6	0.75	1
1.8	0.735	1
2	0.719	1
2.2	0.706	1
2.4	0.692	1
2.6	0.679	1
2.8	0.667	1
3	0.654	1
3.2	0.642	1
3.4	0.63	1
3.6	0.619	1
3.8	0.607	1
4	0.596	1
4.2	0.584	1
4.4	0.574	1
4.6	0.565	1
4.8	0.555	1
5	0.546	1
5.2	0.536	1
5.4	0.526	1
5.6	0.517	1
5.8	0.507	1
6	0.499	1
6.2	0.49	1
6.4	0.482	1
6.6	0.474	1
6.8	0.465	1
7	0.457	1
7.2	0.449	1
7.4	0.443	1
7.6	0.436	1
7.8	0.428	1
8	0.42	1
8.2	0.414	1
8.4	0.407	1
8.6	0.401	1
8.8	0.395	1
9	0.389	1
9.2	0.382	1
9.4	0.376	1
9.6	0.37	1
9.8	0.364	1
10	0.358	1
12	0.308	1
14	0.27	1
16	0.235	1
18	0.206	1
20	0.183	1
22	0.165	1
24	0.148	1
26	0.135	1


NSP MW-5B Slug Test
K = 0.003038 ft/min
y0 = 0.9767 ft
10.
1.
0.1
0.01
0.
1.
2.
3.
Displacement (ft)
Time (min)

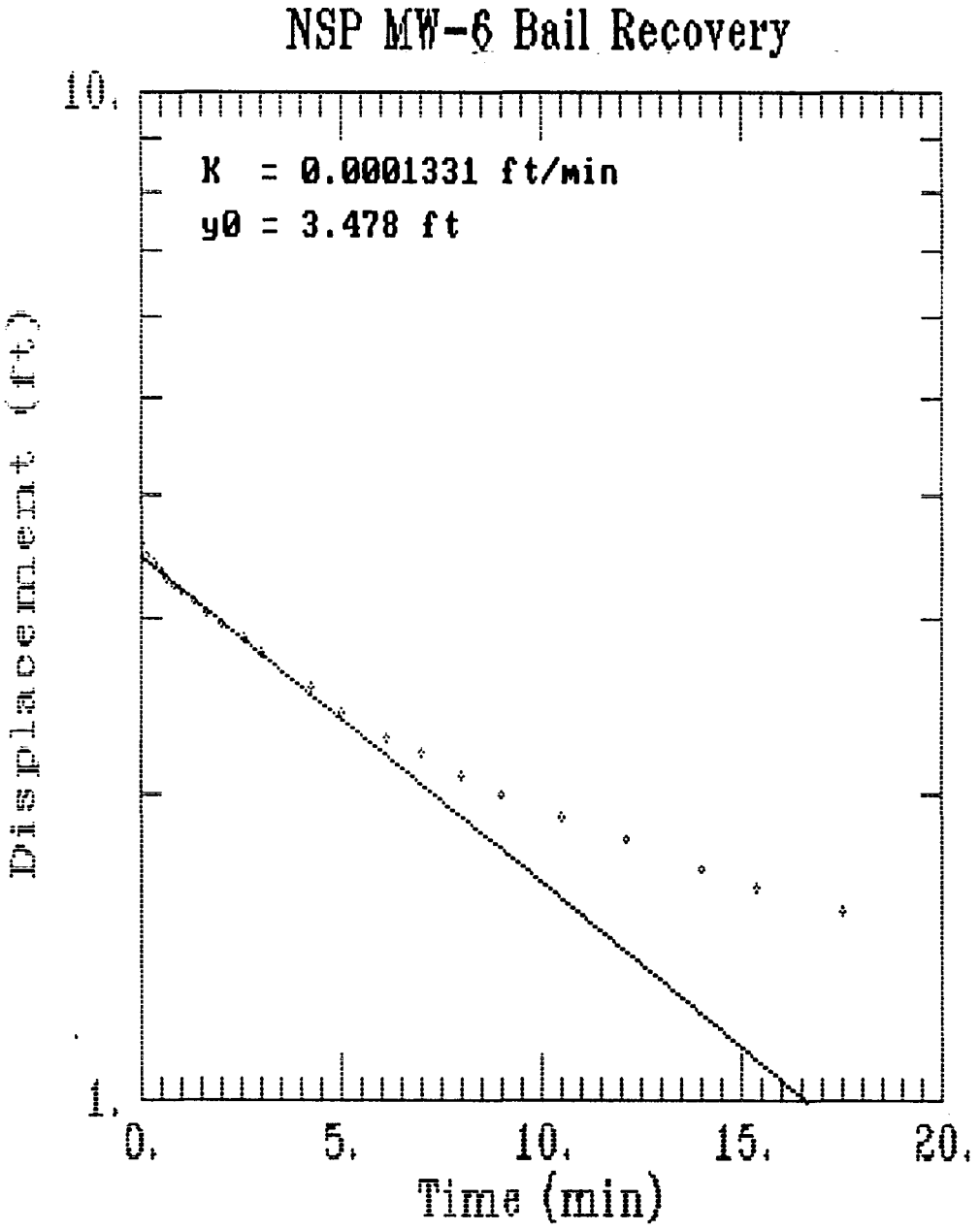
NSP MW-5B Slug Test
slugt 1
1.493
0.083
0.25
slugt 2
100
9
30.12
tsdata

0	0	1
0.0033	0.125	1
0.0066	0.874	1
0.01	1.493	1
0.0133	1.404	1
0.0166	1.103	1
0.02	0.947	1
0.0233	0.964	1
0.0266	0.966	1
0.03	0.951	1
0.0333	0.932	1
0.0366	0.92	1
0.04	0.907	1
0.0433	0.901	1
0.0466	0.887	1
0.05	0.868	1
0.0533	0.86	1
0.0566	0.858	1
0.06	0.858	1
0.0633	0.841	1
0.0666	0.766	1
0.07	0.808	1
0.0733	0.812	1
0.0766	0.81	1
0.08	0.793	1
0.0833	0.773	1
0.0866	0.768	1
0.09	0.771	1
0.0933	0.758	1
0.0966	0.743	1
0.1	0.731	1
0.1033	0.721	1
0.1066	0.715	1
0.11	0.702	1
0.1133	0.696	1
0.1166	0.69	1
0.12	0.683	1
0.1233	0.675	1
0.1266	0.669	1
0.13	0.661	1
0.1333	0.654	1
0.1366	0.648	1
0.14	0.642	1
0.1433	0.634	1
0.1466	0.627	1
0.15	0.621	1
0.1533	0.615	1
0.1566	0.609	1
0.16	0.604	1
0.1633	0.596	1
0.1666	0.59	1
0.17	0.584	1
0.1733	0.578	1
0.1766	0.573	1
0.18	0.567	1
0.1833	0.561	1
0.1866	0.557	1
0.19	0.551	1
0.1933	0.546	1
0.1966	0.54	1
0.2	0.534	1
0.2033	0.53	1
0.2066	0.524	1
0.21	0.519	1
0.2133	0.513	1
0.2166	0.509	1
0.22	0.503	1
0.2233	0.499	1
0.2266	0.494	1
0.23	0.49	1
0.2333	0.486	1
0.2366	0.48	1
0.24	0.476	1
0.2433	0.47	1
0.2466	0.467	1
0.25	0.463	1
0.2533	0.457	1
0.2566	0.453	1
0.26	0.449	1
0.2633	0.445	1
0.2666	0.441	1
0.27	0.436	1
0.2733	0.432	1
0.2766	0.428	1
0.28	0.424	1
0.2833	0.42	1
0.2866	0.416	1
0.29	0.413	1
0.2933	0.409	1
0.2966	0.405	1
0.3	0.401	1
0.3033	0.397	1
0.3066	0.393	1
0.31	0.391	1
0.3133	0.387	1
0.3166	0.384	1
0.32	0.38	1
0.3233	0.376	1
0.3266	0.374	1
0.33	0.37	1
0.3333	0.366	1
0.35	0.349	1
0.3666	0.331	1
0.3833	0.316	1
0.4	0.301	1
0.4166	0.287	1
0.4333	0.272	1
0.45	0.26	1
0.4666	0.248	1
0.4833	0.237	1
0.5	0.225	1
0.5166	0.216	1
0.5333	0.206	1
0.55	0.198	1
0.5666	0.189	1
0.5833	0.181	1
0.6	0.173	1
0.6166	0.165	1
0.6333	0.16	1
0.65	0.152	1
0.6666	0.146	1
0.6833	0.14	1
0.7	0.135	1
0.7166	0.129	1
0.7333	0.123	1
0.75	0.119	1
0.7666	0.113	1
0.7833	0.11	1
0.8	0.106	1
0.8166	0.102	1
0.8333	0.098	1
0.85	0.094	1
0.8666	0.09	1
0.8833	0.088	1
0.9	0.084	1
0.9166	0.081	1
0.9333	0.079	1
0.95	0.077	1
0.9666	0.073	1
0.9833	0.071	1
1	0.069	1
1.2	0.044	1
1.4	0.032	1
1.6	0.025	1
1.8	0.019	1
2	0.017	1
2.2	0.015	1
2.4	0.013	1
2.6	0.011	1
2.8	0.011	1
3	0.009	1
3.2	0.009	1
3.4	0.009	1
3.6	0.009	1
3.8	0.007	1
4	0.007	1
4.2	0.007	1
4.4	0.007	1
4.6	0.007	1
4.8	0.007	1
5	0.007	1
5.2	0.007	1
5.4	0.007	1
5.6	0.007	1
5.8	0.007	1
6	0.007	1
6.2	0.005	1
6.4	0.005	1
6.6	0.005	1
6.8	0.005	1
7	0.005	1
7.2	0.005	1
7.4	0.005	1
7.6	0.005	1
7.8	0.005	1
8	0.005	1
8.2	0.005	1
8.4	0.005	1
8.6	0.005	1
8.8	0.005	1
9	0.005	1
9.2	0.005	1
9.4	0.005	1
9.6	0.005	1
9.8	0.005	1
10	0.005	1
12	0.003	1


NSP MW-5C Slug Test
K = 0.001308 ft/min
y0 = 0.9728 ft
10.
1.
0.1
Displacement (ft)
0.
1.
2.
3.
Time (min)

NSP MW-5C Slug Test
slugt 1
1.253
0.083
0.25
slugt 2
100
9
66.74
tsdata

0	0.112	1
0.0033	0.444	1
0.0066	0.87	1
0.01	1.253	1
0.0133	1.017	1
0.0166	1.069	1
0.02	0.994	1
0.0233	1.023	1
0.0266	1	1
0.03	0.99	1
0.0333	1.003	1
0.0366	0.971	1
0.04	0.98	1
0.0433	0.94	1
0.0466	0.955	1
0.05	0.967	1
0.0533	0.928	1
0.0566	0.936	1
0.06	0.942	1
0.0633	0.922	1
0.0666	0.911	1
0.07	0.894	1
0.0733	0.894	1
0.0766	0.911	1
0.08	0.897	1
0.0833	0.899	1
0.0866	0.886	1
0.09	0.886	1
0.0933	0.882	1
0.0966	0.872	1
0.1	0.87	1
0.1033	0.866	1
0.1066	0.863	1
0.11	0.857	1
0.1133	0.855	1
0.1166	0.849	1
0.12	0.847	1
0.1233	0.841	1
0.1266	0.837	1
0.13	0.832	1
0.1333	0.832	1
0.1366	0.826	1
0.14	0.824	1
0.1433	0.818	1
0.1466	0.816	1
0.15	0.812	1
0.1533	0.809	1
0.1566	0.805	1
0.16	0.801	1
0.1633	0.797	1
0.1666	0.795	1
0.17	0.791	1
0.1733	0.787	1
0.1766	0.785	1
0.18	0.782	1
0.1833	0.778	1
0.1866	0.776	1
0.19	0.772	1
0.1933	0.77	1
0.1966	0.766	1
0.2	0.764	1
0.2033	0.76	1
0.2066	0.758	1
0.21	0.754	1
0.2133	0.751	1
0.2166	0.749	1
0.22	0.747	1
0.2233	0.743	1
0.2266	0.741	1
0.23	0.737	1
0.2333	0.735	1
0.2366	0.731	1
0.24	0.729	1
0.2433	0.725	1
0.2466	0.724	1
0.25	0.722	1
0.2533	0.72	1
0.2566	0.716	1
0.26	0.714	1
0.2633	0.71	1
0.2666	0.708	1
0.27	0.706	1
0.2733	0.704	1
0.2766	0.7	1
0.28	0.698	1
0.2833	0.697	1
0.2866	0.695	1
0.29	0.691	1
0.2933	0.689	1
0.2966	0.687	1
0.3	0.685	1
0.3033	0.681	1
0.3066	0.679	1
0.31	0.677	1
0.3133	0.675	1
0.3166	0.671	1
0.32	0.671	1
0.3233	0.668	1
0.3266	0.666	1
0.33	0.664	1
0.3333	0.662	1
0.35	0.65	1
0.3666	0.639	1
0.3833	0.627	1
0.4	0.615	1
0.4166	0.604	1
0.4333	0.594	1
0.45	0.585	1
0.4666	0.575	1
0.4833	0.565	1
0.5	0.556	1
0.5166	0.546	1
0.5333	0.538	1
0.55	0.529	1
0.5666	0.521	1
0.5833	0.513	1
0.6	0.505	1
0.6166	0.498	1
0.6333	0.49	1
0.65	0.482	1
0.6666	0.474	1
0.6833	0.469	1
0.7	0.461	1
0.7166	0.455	1
0.7333	0.447	1
0.75	0.442	1
0.7666	0.434	1
0.7833	0.428	1
0.8	0.422	1
0.8166	0.419	1
0.8333	0.411	1
0.85	0.405	1
0.8666	0.399	1
0.8833	0.393	1
0.9	0.39	1
0.9166	0.384	1
0.9333	0.38	1
0.95	0.374	1
0.9666	0.368	1
0.9833	0.364	1
1	0.361	1
1.2	0.295	1
1.4	0.258	1
1.6	0.225	1
1.8	0.2	1
2	0.179	1
2.2	0.162	1
2.4	0.148	1
2.6	0.135	1
2.8	0.125	1
3	0.115	1
3.2	0.108	1
3.4	0.102	1
3.6	0.096	1
3.8	0.092	1
4	0.086	1
4.2	0.083	1
4.4	0.079	1
4.6	0.075	1
4.8	0.073	1
5	0.071	1
5.2	0.069	1
5.4	0.067	1
5.6	0.065	1
5.8	0.063	1
6	0.061	1
6.2	0.059	1
6.4	0.059	1
6.6	0.058	1
6.8	0.058	1
7	0.055	1
7.2	0.055	1
7.4	0.054	1
7.6	0.054	1
7.8	0.054	1
8	0.052	1
8.2	0.052	1
8.4	0.05	1
8.6	0.05	1
8.8	0.05	1
9	0.048	1
9.2	0.048	1
9.4	0.048	1
9.6	0.048	1
9.8	0.046	1
10	0.046	1


NSP MW-6 Bail Recovery
K = 0.0001331 ft/min
y0 = 3.478 ft
Displacement (ft)
10.
1.
0.
5.
10.
15.
20.
Time (min)

NSP MW-6 Bail Recovery

slugt 1

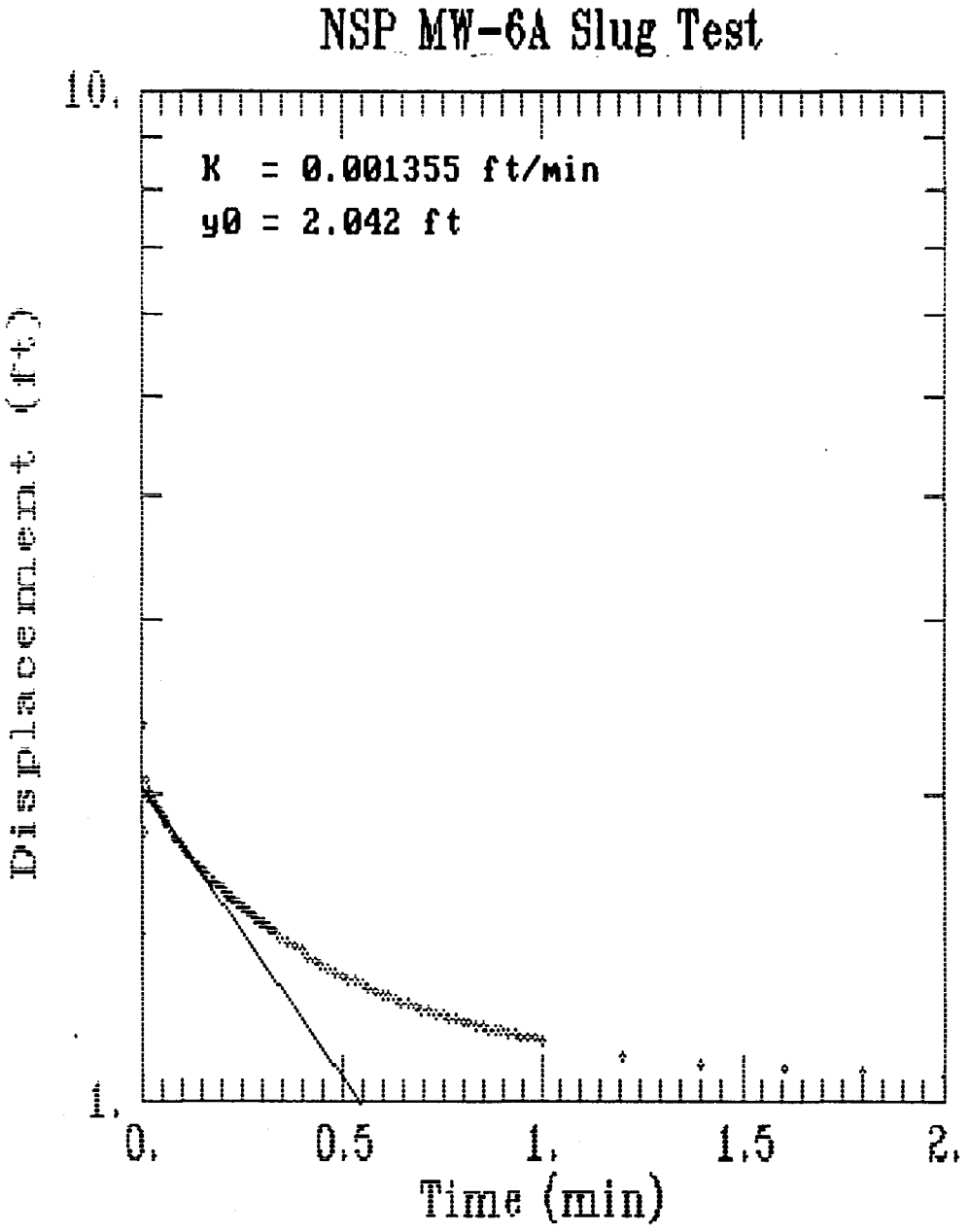
3.56
0.083
0.25

slugt2

3.89
3.89
3.89

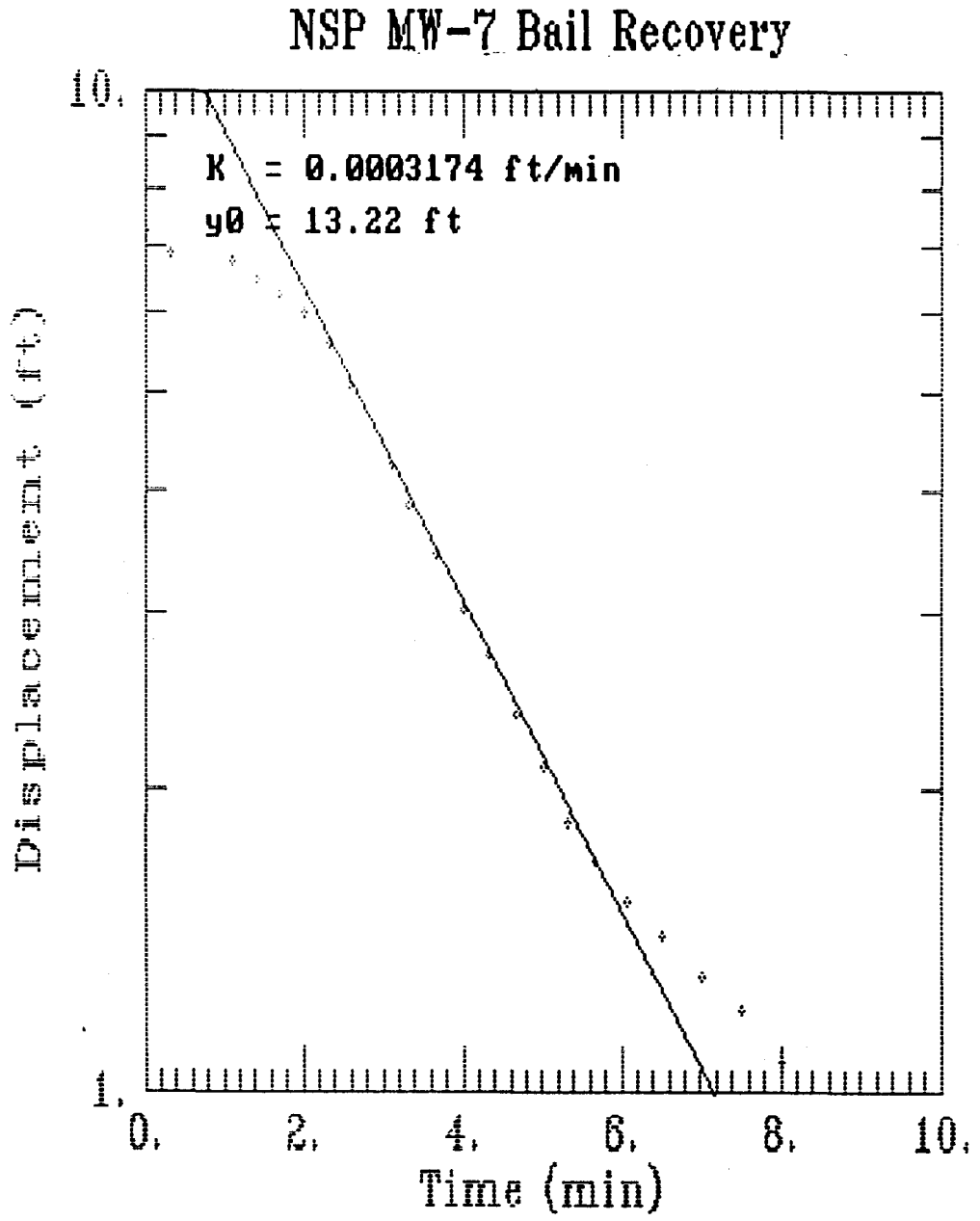
tsdata

0	3.56	1
0.1667	3.47	1
0.33	3.42	1
0.5	3.36	1
0.667	3.3	1
0.83	3.26	1
1	3.21	1
1.33	3.14	1
1.667	3.07	1
2	2.99	1
2.58	2.88	1
3	2.79	1
4.25	2.57	1
5	2.43	1
6.1667	2.28	1
7	2.2	1
8	2.1	1
9	2.01	1
10.5	1.9	1
12.13	1.8	1
14	1.69	1
15.42	1.61	1
17.5	1.53	1
20.25	1.42	1
25	1.28	1
30	1.17	1
40	1.01	1
50	0.87	1
62.5	0.72	1
75.33	0.63	1
89	0.54	1


NSP MW-6A Slug Test
K = 0.001355 ft/min
y0 = 2.042 ft
Displacement (ft)
10.
1.
0.
0.5
1.
1.5
2.
Time (min)

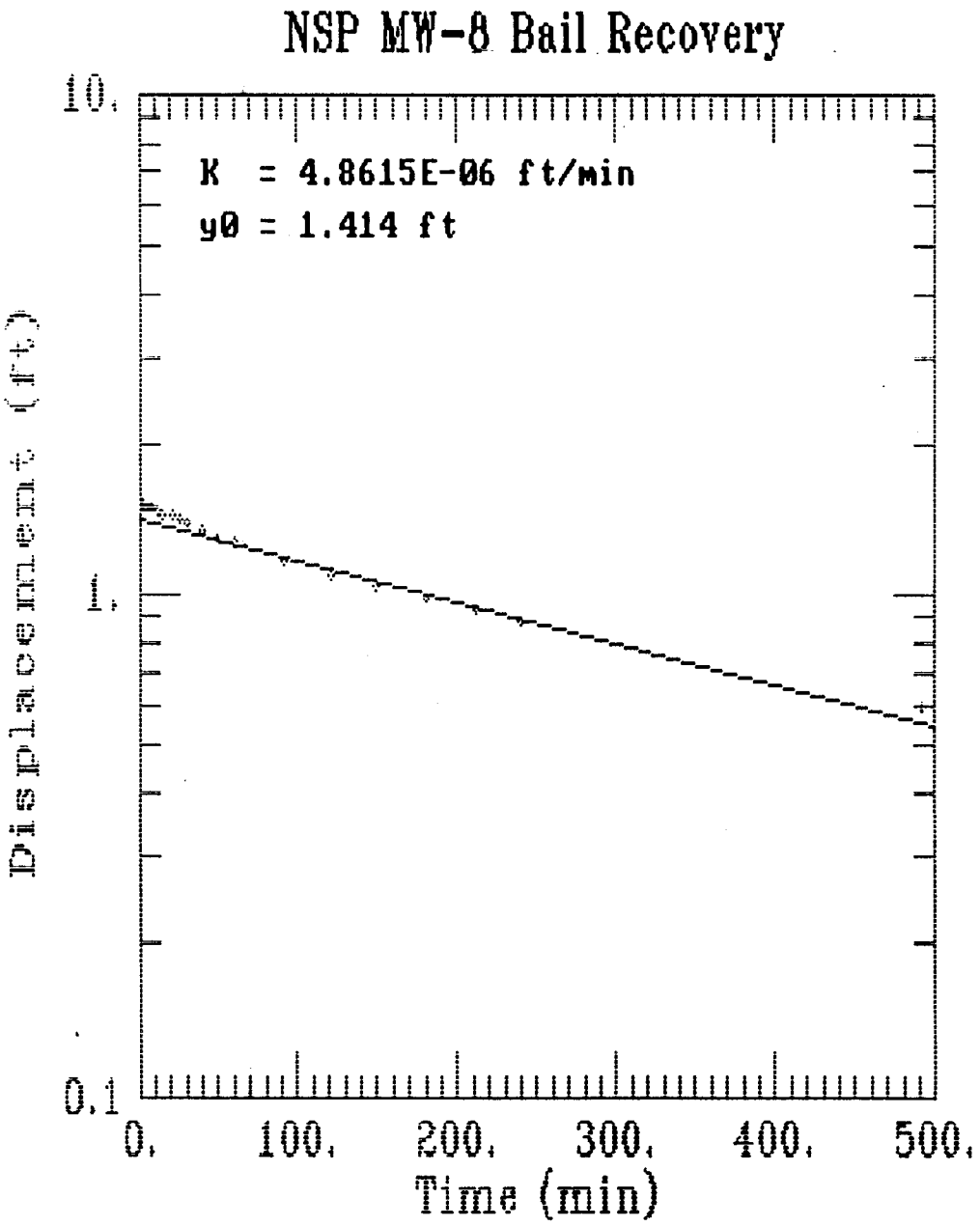
NSP MW-6A Slug Test
slugt 1
2.36
0.083
0.25
slugt 2
100
9
29.78
tsdata

0	1.195	1
0.0033	1.461	1
0.0066	1.837	1
0.01	2.36	1
0.0133	1.988	1
0.0166	2.071	1
0.02	2.015	1
0.0233	2.001	1
0.0266	1.984	1
0.03	1.974	1
0.0333	1.965	1
0.0366	1.955	1
0.04	1.94	1
0.0433	1.928	1
0.0466	1.93	1
0.05	1.918	1
0.0533	1.909	1
0.0566	1.899	1
0.06	1.878	1
0.0633	1.882	1
0.0666	1.872	1
0.07	1.859	1
0.0733	1.847	1
0.0766	1.843	1
0.08	1.839	1
0.0833	1.826	1
0.0866	1.814	1
0.09	1.805	1
0.0933	1.801	1
0.0966	1.795	1
0.1	1.787	1
0.1033	1.779	1
0.1066	1.772	1
0.11	1.764	1
0.1133	1.758	1
0.1166	1.75	1
0.12	1.745	1
0.1233	1.739	1
0.1266	1.733	1
0.13	1.725	1
0.1333	1.722	1
0.1366	1.714	1
0.14	1.708	1
0.1433	1.704	1
0.1466	1.696	1
0.15	1.693	1
0.1533	1.687	1
0.1566	1.681	1
0.16	1.675	1
0.1633	1.671	1
0.1666	1.666	1
0.17	1.66	1
0.1733	1.656	1
0.1766	1.65	1
0.18	1.646	1
0.1833	1.64	1
0.1866	1.637	1
0.19	1.631	1
0.1933	1.627	1
0.1966	1.623	1
0.2	1.615	1
0.2033	1.613	1
0.2066	1.608	1
0.21	1.604	1
0.2133	1.598	1
0.2166	1.594	1
0.22	1.59	1
0.2233	1.584	1
0.2266	1.581	1
0.23	1.577	1
0.2333	1.573	1
0.2366	1.569	1
0.24	1.563	1
0.2433	1.561	1
0.2466	1.556	1
0.25	1.552	1
0.2533	1.548	1
0.2566	1.544	1
0.26	1.54	1
0.2633	1.536	1
0.2666	1.532	1
0.27	1.528	1
0.2733	1.527	1
0.2766	1.523	1
0.28	1.517	1
0.2833	1.515	1
0.2866	1.511	1
0.29	1.507	1
0.2933	1.505	1
0.2966	1.5	1
0.3	1.498	1
0.3033	1.494	1
0.3066	1.49	1
0.31	1.488	1
0.3133	1.484	1
0.3166	1.48	1
0.32	1.476	1
0.3233	1.474	1
0.3266	1.471	1
0.33	1.467	1
0.3333	1.465	1
0.35	1.447	1
0.3666	1.432	1
0.3833	1.417	1
0.4	1.401	1
0.4166	1.388	1
0.4333	1.374	1
0.45	1.362	1
0.4666	1.351	1
0.4833	1.339	1
0.5	1.328	1
0.5166	1.318	1
0.5333	1.308	1
0.55	1.299	1
0.5666	1.289	1
0.5833	1.28	1
0.6	1.272	1
0.6166	1.264	1
0.6333	1.256	1
0.65	1.249	1
0.6666	1.243	1
0.6833	1.235	1
0.7	1.229	1
0.7166	1.223	1
0.7333	1.218	1
0.75	1.21	1
0.7666	1.206	1
0.7833	1.2	1
0.8	1.195	1
0.8166	1.191	1
0.8333	1.185	1
0.85	1.181	1
0.8666	1.177	1
0.8833	1.171	1
0.9	1.169	1
0.9166	1.164	1
0.9333	1.162	1
0.95	1.158	1
0.9666	1.154	1
0.9833	1.15	1
1	1.146	1
1.2	1.106	1
1.4	1.09	1
1.6	1.077	1
1.8	1.067	1
2	1.061	1
2.2	1.059	1
2.4	1.056	1
2.6	1.054	1
2.8	1.052	1
3	1.05	1
3.2	1.048	1
3.4	1.048	1
3.6	1.048	1
3.8	1.048	1
4	1.046	1
4.2	1.046	1
4.4	1.044	1
4.6	1.044	1
4.8	1.044	1
5	1.044	1
5.2	1.044	1
5.4	1.042	1
5.6	1.042	1
5.8	1.04	1
6	1.04	1
6.2	1.038	1
6.4	1.038	1
6.6	1.038	1
6.8	1.038	1
7	1.038	1
7.2	1.036	1
7.4	1.036	1
7.6	1.036	1
7.8	1.036	1
8	1.034	1
8.2	1.034	1
8.4	1.034	1
8.6	1.034	1
8.8	1.032	1
9	1.032	1
9.2	1.03	1
9.4	1.03	1
9.6	1.029	1
9.8	1.029	1
10	1.029	1
12	1.023	1


NSP MW-7 Bail Recovery
K = 0.0003174 ft/min
y0 = 13.22 ft
Distance to Top (ft)
10.
1.
0.
2.
4.
6.
8.
10.
Time (min)

NSP MW-7 Bail Recovery
slugt 1
7.23
0.083
0.33
slugt2
10.13
10.13
10.13
tsdata

0	7.23	1
0.333	6.91	1
1.1	6.78	1
1.42	6.46	1
1.7	6.26	1
2	6	1
2.33	5.58	1
2.58	5.09	1
3.1	4.26	1
3.33	3.85	1
3.667	3.45	1
4	3.03	1
4.333	2.73	1
4.667	2.39	1
5	2.11	1
5.333	1.86	1
5.667	1.7	1
6.08	1.55	1
6.5	1.43	1
7	1.3	1
7.5	1.2	1
8	1.07	1
9	0.94	1
10.1667	0.82	1
11	0.76	1
13	0.67	1
15	0.61	1


NSP MW-8 Bail Recovery
K = 4.8615E-06 ft/min
y0 = 1.414 ft
Displacement (ft)
10.
1.
0.1
0.
100.
200.
300.
400.
500.
Time (min)

NSP MW-8 Bail Recovery

slugt 1

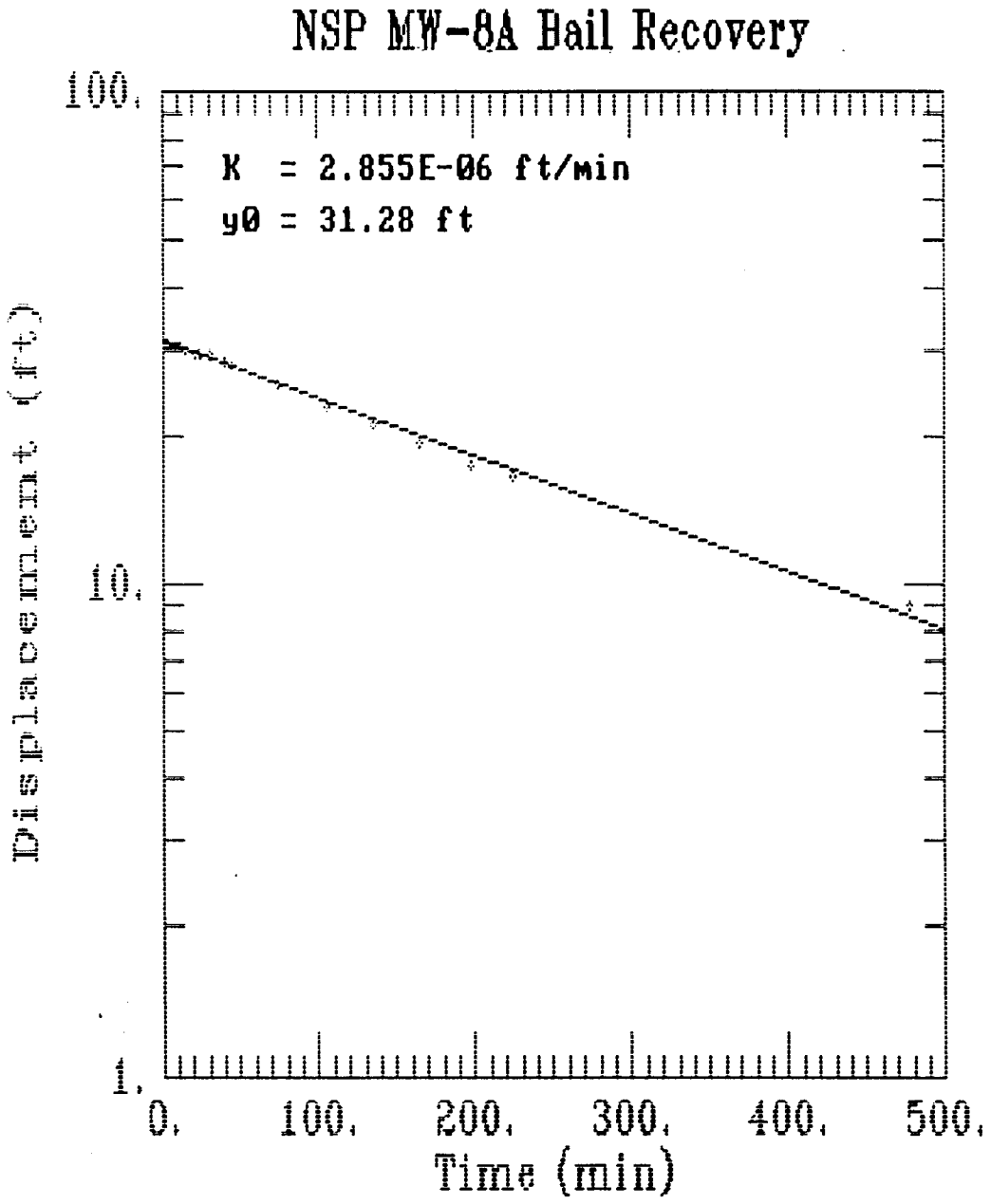
1.53
0.083
0.25

slugt2

1.96
1.96
1.96

tsdata

0	1.53	1
0.1667	1.52	1
0.33	1.52	1
0.5	1.52	1
0.667	1.52	1
0.83	1.52	1
1	1.52	1
1.33	1.52	1
1.667	1.515	1
2	1.51	1
3	1.5	1
4	1.5	1
5.3	1.495	1
7	1.49	1
9	1.485	1
12	1.475	1
15	1.45	1
20.75	1.43	1
25.75	1.41	1
30	1.39	1
40	1.355	1
50	1.31	1
60	1.275	1
91	1.18	1
121	1.09	1
150	1.045	1
180	0.99	1
212.5	0.94	1
240	0.895	1
492	0.595	1
1080	0.13	1


NSP MW-8A Bail Recovery
K = 2.855E-06 ft/min
y0 = 31.28 ft
100.
10.
1.
Displacement (ft)
0.
100.
200.
300.
400.
500.
Time (min)

NSP MW-8A Bail Recovery

slugt 1

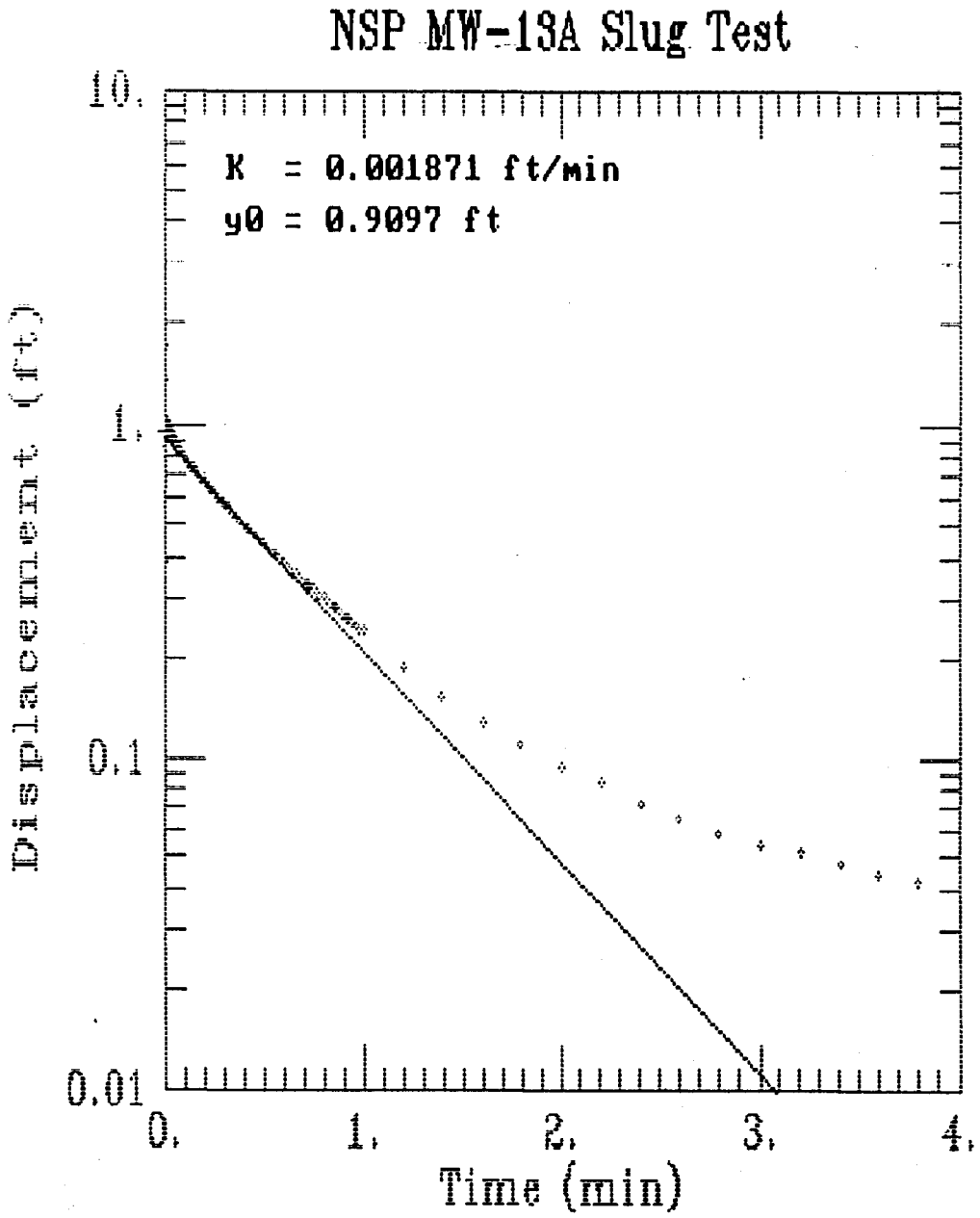
30.55
0.083
0.25

slugt2

100
9
34.53

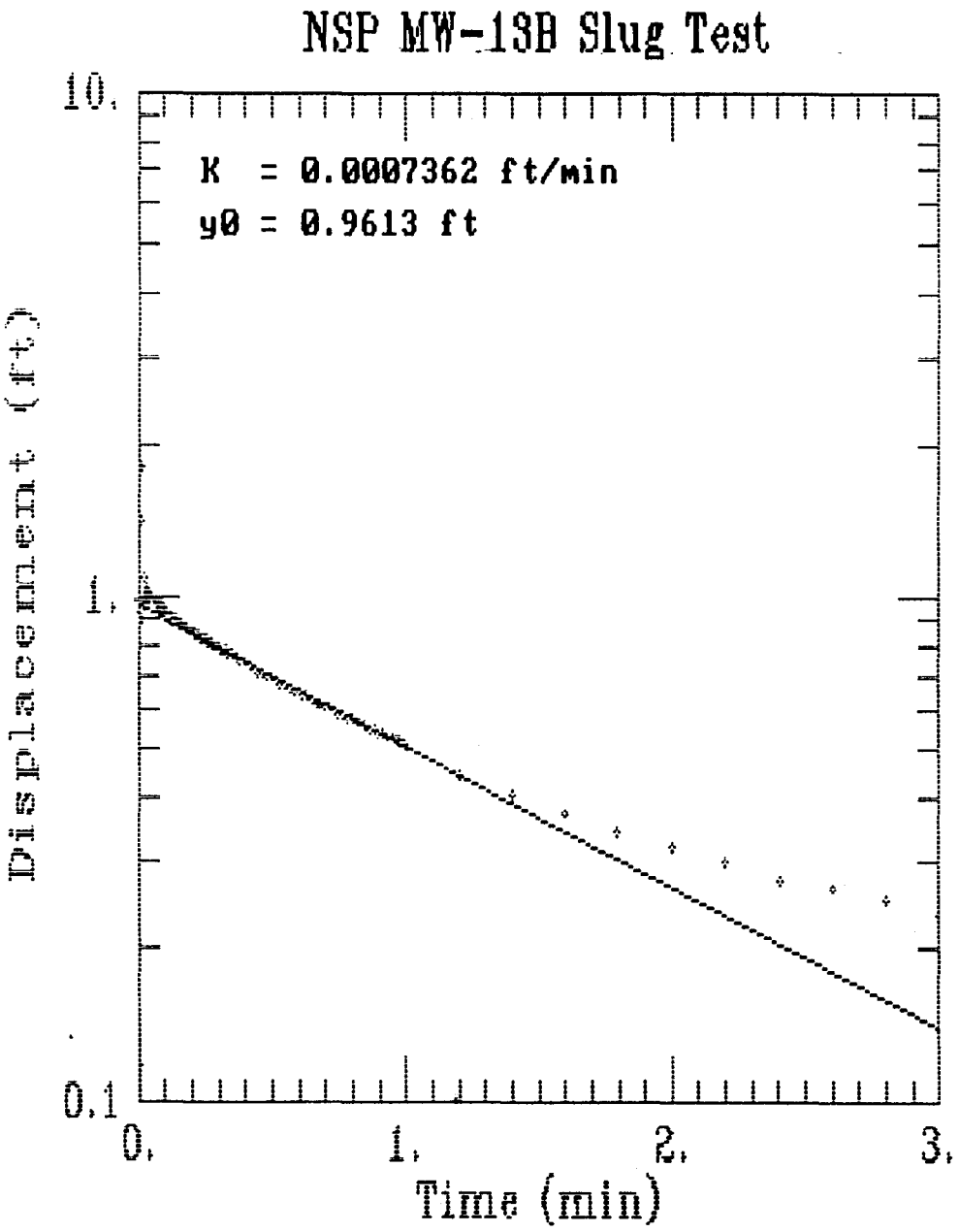
tsdata

0	30.55	1
0.1667	30.55	1
0.33	30.55	1
0.5	30.54	1
0.667	30.54	1
0.83	30.53	1
1	30.52	1
1.33	30.5	1
1.667	30.48	1
2	30.46	1
3.25	30.41	1
4	30.37	1
5.25	30.32	1
7	30.23	1
9	30.15	1
12	30.04	1
15	29.73	1
20.58	29.45	1
25	29.34	1
30	29.21	1
40	28.3	1
45	27.85	1
74.5	25.37	1
105.75	23.07	1
135	21.15	1
165	19.415	1
197.5	17.54	1
225	16.5	1
477	9.06	1
1065	3.34	1


NSP MW-13A Slug Test
K = 0.001871 ft/min
y0 = 0.9097 ft
Displacement (ft)
10.
1.
0.1
0.01
0.
1.
2.
3.
4.
Time (min)

NSP MW-13A Slug Test
slugt 1
1.69
0.083
0.25
slugt 2
16
9
24.55
tsdata

0	0.046	1
0.0033	0.395	1
0.0066	1.343	1
0.01	1.69	1
0.0133	0.937	1
0.0166	1.009	1
0.02	1.011	1
0.0233	0.984	1
0.0266	0.964	1
0.03	0.964	1
0.0333	0.959	1
0.0366	0.945	1
0.04	0.932	1
0.0433	0.922	1
0.0466	0.92	1
0.05	0.91	1
0.0533	0.895	1
0.0566	0.883	1
0.06	0.891	1
0.0633	0.891	1
0.0666	0.866	1
0.07	0.86	1
0.0733	0.868	1
0.0766	0.856	1
0.08	0.841	1
0.0833	0.833	1
0.0866	0.833	1
0.09	0.826	1
0.0933	0.816	1
0.0966	0.81	1
0.1	0.804	1
0.1033	0.8	1
0.1066	0.795	1
0.11	0.791	1
0.1133	0.785	1
0.1166	0.781	1
0.12	0.775	1
0.1233	0.772	1
0.1266	0.768	1
0.13	0.764	1
0.1333	0.76	1
0.1366	0.754	1
0.14	0.75	1
0.1433	0.746	1
0.1466	0.743	1
0.15	0.739	1
0.1533	0.735	1
0.1566	0.731	1
0.16	0.725	1
0.1633	0.721	1
0.1666	0.719	1
0.17	0.716	1
0.1733	0.712	1
0.1766	0.708	1
0.18	0.704	1
0.1833	0.7	1
0.1866	0.696	1
0.19	0.692	1
0.1933	0.689	1
0.1966	0.687	1
0.2	0.683	1
0.2033	0.679	1
0.2066	0.675	1
0.21	0.671	1
0.2133	0.669	1
0.2166	0.665	1
0.22	0.662	1
0.2233	0.658	1
0.2266	0.656	1
0.23	0.652	1
0.2333	0.648	1
0.2366	0.646	1
0.24	0.642	1
0.2433	0.64	1
0.2466	0.636	1
0.25	0.633	1
0.2533	0.631	1
0.2566	0.627	1
0.26	0.623	1
0.2633	0.621	1
0.2666	0.619	1
0.27	0.615	1
0.2733	0.613	1
0.2766	0.609	1
0.28	0.606	1
0.2833	0.604	1
0.2866	0.602	1
0.29	0.598	1
0.2933	0.596	1
0.2966	0.592	1
0.3	0.59	1
0.3033	0.586	1
0.3066	0.584	1
0.31	0.582	1
0.3133	0.579	1
0.3166	0.577	1
0.32	0.573	1
0.3233	0.571	1
0.3266	0.569	1
0.33	0.567	1
0.3333	0.563	1
0.35	0.55	1
0.3666	0.536	1
0.3833	0.523	1
0.4	0.511	1
0.4166	0.499	1
0.4333	0.488	1
0.45	0.476	1
0.4666	0.467	1
0.4833	0.455	1
0.5	0.445	1
0.5166	0.436	1
0.5333	0.426	1
0.55	0.416	1
0.5666	0.407	1
0.5833	0.399	1
0.6	0.391	1
0.6166	0.382	1
0.6333	0.374	1
0.65	0.366	1
0.6666	0.36	1
0.6833	0.353	1
0.7	0.345	1
0.7166	0.337	1
0.7333	0.331	1
0.75	0.326	1
0.7666	0.318	1
0.7833	0.312	1
0.8	0.306	1
0.8166	0.301	1
0.8333	0.295	1
0.85	0.289	1
0.8666	0.283	1
0.8833	0.279	1
0.9	0.274	1
0.9166	0.268	1
0.9333	0.264	1
0.95	0.258	1
0.9666	0.254	1
0.9833	0.248	1
1	0.245	1
1.2	0.187	1
1.4	0.154	1
1.6	0.129	1
1.8	0.11	1
2	0.094	1
2.2	0.084	1
2.4	0.073	1
2.6	0.065	1
2.8	0.059	1
3	0.055	1
3.2	0.052	1
3.4	0.048	1
3.6	0.044	1
3.8	0.042	1
4	0.04	1
4.2	0.038	1
4.4	0.036	1
4.6	0.036	1
4.8	0.034	1
5	0.032	1
5.2	0.032	1
5.4	0.03	1
5.6	0.03	1
5.8	0.03	1
6	0.028	1
6.2	0.028	1
6.4	0.027	1
6.6	0.028	1
6.8	0.027	1
7	0.028	1
7.2	0.027	1
7.4	0.027	1
7.6	0.027	1
7.8	0.025	1
8	0.025	1
8.2	0.025	1
8.4	0.025	1
8.6	0.025	1
8.8	0.025	1
9	0.025	1
9.2	0.025	1
9.4	0.023	1
9.6	0.023	1
9.8	0.023	1
10	0.023	1


NSP MW-13B Slug Test
K = 0.0007362 ft/min
y0 = 0.9613 ft
Displacement (ft)
10.
1.
0.1
0.
1.
2.
3.
Time (min)

NSP MW-13B Slug Test
slugt 1
1.794
0.083
0.25
slugt 2
100
9
59.24
tsdata

0	0.011	1
0.0033	0.001	1
0.0066	0.117	1
0.01	0.912	1
0.0133	1.794	1
0.0166	1.416	1
0.02	0.966	1
0.0233	0.98	1
0.0266	1.1	1
0.03	1.046	1
0.0333	1.015	1
0.0366	1.032	1
0.04	0.999	1
0.0433	1.013	1
0.0466	0.993	1
0.05	1.011	1
0.0533	1.001	1
0.0566	0.988	1
0.06	0.992	1
0.0633	0.982	1
0.0666	0.986	1
0.07	0.98	1
0.0733	0.982	1
0.0766	0.98	1
0.08	0.974	1
0.0833	0.951	1
0.0866	0.959	1
0.09	0.955	1
0.0933	0.949	1
0.0966	0.949	1
0.1	0.951	1
0.1033	0.924	1
0.1066	0.938	1
0.11	0.932	1
0.1133	0.926	1
0.1166	0.914	1
0.12	0.907	1
0.1233	0.918	1
0.1266	0.914	1
0.13	0.909	1
0.1333	0.909	1
0.1366	0.905	1
0.14	0.903	1
0.1433	0.899	1
0.1466	0.897	1
0.15	0.893	1
0.1533	0.891	1
0.1566	0.889	1
0.16	0.887	1
0.1633	0.883	1
0.1666	0.882	1
0.17	0.88	1
0.1733	0.876	1
0.1766	0.874	1
0.18	0.872	1
0.1833	0.87	1
0.1866	0.866	1
0.19	0.864	1
0.1933	0.862	1
0.1966	0.86	1
0.2	0.858	1
0.2033	0.855	1
0.2066	0.853	1
0.21	0.851	1
0.2133	0.849	1
0.2166	0.847	1
0.22	0.843	1
0.2233	0.843	1
0.2266	0.839	1
0.23	0.837	1
0.2333	0.835	1
0.2366	0.833	1
0.24	0.831	1
0.2433	0.829	1
0.2466	0.828	1
0.25	0.826	1
0.2533	0.824	1
0.2566	0.822	1
0.26	0.82	1
0.2633	0.818	1
0.2666	0.816	1
0.27	0.814	1
0.2733	0.812	1
0.2766	0.81	1
0.28	0.808	1
0.2833	0.806	1
0.2866	0.804	1
0.29	0.802	1
0.2933	0.8	1
0.2966	0.799	1
0.3	0.797	1
0.3033	0.795	1
0.3066	0.793	1
0.31	0.791	1
0.3133	0.789	1
0.3166	0.787	1
0.32	0.787	1
0.3233	0.785	1
0.3266	0.781	1
0.33	0.781	1
0.3333	0.779	1
0.35	0.77	1
0.3666	0.76	1
0.3833	0.75	1
0.4	0.743	1
0.4166	0.733	1
0.4333	0.725	1
0.45	0.716	1
0.4666	0.708	1
0.4833	0.7	1
0.5	0.692	1
0.5166	0.685	1
0.5333	0.677	1
0.55	0.671	1
0.5666	0.662	1
0.5833	0.656	1
0.6	0.648	1
0.6166	0.642	1
0.6333	0.636	1
0.65	0.629	1
0.6666	0.621	1
0.6833	0.615	1
0.7	0.609	1
0.7166	0.604	1
0.7333	0.598	1
0.75	0.59	1
0.7666	0.584	1
0.7833	0.58	1
0.8	0.575	1
0.8166	0.569	1
0.8333	0.563	1
0.85	0.557	1
0.8666	0.552	1
0.8833	0.548	1
0.9	0.542	1
0.9166	0.536	1
0.9333	0.532	1
0.95	0.526	1
0.9666	0.523	1
0.9833	0.517	1
1	0.513	1
1.2	0.449	1
1.4	0.409	1
1.6	0.374	1
1.8	0.343	1
2	0.32	1
2.2	0.297	1
2.4	0.277	1
2.6	0.264	1
2.8	0.25	1
3	0.237	1
3.2	0.227	1
3.4	0.218	1
3.6	0.21	1
3.8	0.202	1
4	0.196	1
4.2	0.193	1
4.4	0.187	1
4.6	0.183	1
4.8	0.179	1
5	0.175	1
5.2	0.171	1
5.4	0.167	1
5.6	0.166	1
5.8	0.164	1
6	0.162	1
6.2	0.16	1
6.4	0.158	1
6.6	0.156	1
6.8	0.156	1
7	0.154	1
7.2	0.152	1
7.4	0.15	1
7.6	0.15	1
7.8	0.15	1
8	0.148	1
8.2	0.146	1
8.4	0.146	1
8.6	0.146	1
8.8	0.146	1
9	0.144	1
9.2	0.144	1
9.4	0.142	1
9.6	0.142	1
9.8	0.142	1
10	0.142	1
12	0.14	1

APPENDIX D
SOIL LABORATORY RESULTS - BACK PRESSURE PERMEAMETER AND SIEVE GRADATION ANALYSES

Dames & Moore

PERMEABILITY TEST BY BACK PRESSURE
CONSTANT HEAD (Pbp)

Owner NSP
Job # 05644-071
Location
Boring # MW-43
Sample #
Depth 21.5'

Deflecting Speed 0 in/Hr Min
Lateral Pressure 14 PSF (PSI)
Saturated ☑ Field Moisture ☐
Set-Up 6/27/96 Tested EGL (160 office)
Soil Type CL

$K_{AV} = 4.47 \times 10^{-8}$ cm/s

		Initial	Final	
Weight soil & dish no.		466.1		
Dry weight soil & dish		440.9		
Net loss of moisture				
Weight of dish only		224.6		
Net weight of dry soil				
Moisture, % of dry weight		11.7	11.7	
Wt. solids + moisture	W_0	590.2	590.3	gms.
$W_0 \div 454$	W_0'			lbs.
Weight solids	W_s			gms.
Wet density $W_0' \div V_0'$		139.7	148.4	pcf
Dry density		125.1	132.9	pcf
Net diameter	D_0	2.416		in.
Area ($0.785\ D_0^2$)	A_0	4.582	4.343	sq. in
Height	H_0	3.51	3.487	in.
Volume $(A_0H_0) \div 1728$	V_0'			cu. ft.
Volume $(A_0H_0) \times 16.4$	V_0	263.76	248.36	cc
Specific gravity of solids	G_s			
Volume of solids $W_s \div G_s$	V_s			cc
$(V_0 - V_s) \div V_s$	e_i			
Initial burette reading				cc
Burette reading under pressure				cc
$(V_p - V_s) \div V_s$	e_p			

DAMES & MOORE

SATURATION DATA

PROJECT: NSP NO.: 05644-071 LOCATION

Boring No.: MW-4B Sample: $D_o = 0.846$ Depth: 21.5' (ft./m.) Set up: EE1 6/27/96

σ_3 = 14 psi = psf D_f .869 Type of Test: PSP Cell No.: Dial No.:

DATE	TIME CLOSED	TIME OPEN	CHAMBER PRESSURE (PSI)	BACK PRESSURE (PSI)	EXTERNAL BURETTE OR DIAL RDG. (CC)/(IN.)	PORE PRESSURE (PSI)	Δ	B
		0902		0 4/4				
6/27/96	0901		3/5	CLOSED	6.0 / 4.3	0.0 / 0.9	3/5	
		0941		0 9/9				
	0940		5/10	CLOSED	4.1 / 7.1	4.0 / 4.9	-9/5	
		0958		0 14/14				
	0957		10/15	CLOSED	5.5 / 8.4	9.0 / 16.7	1.7/5	
		1018		0 19/19				
	1017		15/20	CLOSED	8.8 / 10.6	14.0 / 16.2	2.2/5	
		1039		0 24/24				
	1038		20/25	CLOSED	9.8 / 11.6	19.0 / 22.4	3.4/5	
		1115		0 29/29				
	1114		25/30	CLOSED	11.5 / 13.0	24.0 / 27.9	3.9/5	
		1145		0 34/34				
	1144		30/35	CLOSED	12.4 / 13.9	29.0 / 33.6	4.6/5	
	1312		35/40	CLOSED	13.5 / —	34.0 / 39.0	5/5	
			40/48		— / 16.3			
6/27/96	1313	0	48	0 34/34	16.3 /			
	1330				19.3 /			
	1641				24.4			
	1657	0	48	0 34/31	/ 19.0			
	1720	23			/ 18.9			
	0630	790			/ 18.0			
	1028	238			/ 17.8			
	1412	224			/ 17.5			
					/			
					/			
					/			
					/			
					/			
					/			
					/			
					/			
					/			

928.5 (10-75)

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PERMEABILITY TEST BY BACK PRESSURE CONSTANT-HEAD

NSP

Boring MW-4B

at a depth of 21.5 feet

	Initial	Final
Wet Density pcf	139.7	148.4
Dry density pcf	125.1	132.9
% Moisture	11.7	11.7

Height Initial	3.510		466.1	Wet soil and dish
Diameter Initial	2.416		440.9	Dry soil and dish
Area Initial	4.582		224.6	dish only
Volume Initial	263.76		590.2	Ws Initial
Initial dial	0.846		590.3	Final Ws
Final dial	0.869		528.6	Weight solids
Initial cc/in res	0			
Final cc/in res.	24.4			
Height Final	3.487	8.857 cm		
Diameter Final	2.352			
Area Final	4.343	28.042 cm^2		
Volume Final	248.36			
Height change	-0.023			
cc/in reser.	0.011			
Volume change	-24.4			
Cell Change	9	@ 48 psi		
Net Volume Change	-15.4			
h= T/B PREss. diff	3	210.30 cm		

Standard Water .005 N CaSO4

Hydraulic Gradient
23.74

"B" final 1.00

Elapsed Time minutes	cc's	K cm/sec
23.0	0.10	1.01E-07
790.0	0.90	2.65E-08
238.0	0.20	1.96E-08
224.0	0.30	3.12E-08

K Average = 4.47E-08 cm/s

Dames & Moore

PERMEABILITY TEST BY BACK PRESSURE
CONSTANT HEAD (Pbp)

Owner NSP
Job # 05644-071
Location
Boring # MW-13A
Sample #
Depth 25'

Deflecting Speed ~~0~~ in/Hr Min
Lateral Pressure 14 PSF (PSI)
Saturated ☒ Field Moisture ☐
Set-Up 6/27/96 Tested SEL (V62 Office)
Soil Type CL

$K_{AV} = 6.86 \times 10^{-8}$ cm/s

		Initial	Final	
Weight soil & dish no M-10		152.8		
Dry weight soil & dish		148.9		
Net loss of moisture				
Weight of dish only		113.3		
Net weight of dry soil				
Moisture, % of dry weight		11.0	12.1	
Wt. solids + moisture	W_0	428.4	432.9	gms.
$W_0 \div 454$	W_0'			lbs.
Weight solids	W_s			gms.
Wet density $W_0' \div V_0'$		136.9	140.2	pcf
Dry density		123.4	125.0	pcf
Net diameter	D_0	~~2.4776~~ 4.59		in.
Area ($0.785 D_0^2$)	A_0	4.582	4.551	sq. in
Height	H_0	2.60	2.583	in.
Volume $(A_0H_0) \div 1728$	V_0'			cu. ft.
Volume $(A_0H_0) \times 16.4$	V_0	195.38	192.78	cc
Specific gravity of solids	G_s			
Volume of solids $W_s \div G_s$	V_s			cc
$(V_0 - V_s) \div V_s$	e_i			
Initial burette reading				cc
Burette reading under pressure				cc
$(V_p - V_s) \div V_s$	e_p			

DAMES & MOORE

SATURATION DATA

PROJECT: NSP NO.: 05644-071 LOCATION:

Boring No.: MW-13A Sample: D_o = .342 Depth: 25' (ft./m.) Set up: EH 6/27/96

σ_3 = psi = psf σ_f = .359 Type of Test: PBP Cell No.: Dial No.:

DATE	TIME CLOSED	TIME OPEN	CHAMBER PRESSURE (PSI)	BACK PRESSURE (PSI)	EXTERNAL BURETTE OR DIAL RDG. (CC)/(IN.)	PORE PRESSURE (PSI)	Δ	B
6/27/96	1010	1041	0/5	0 4/4 CO2 SAT	2.8 / 4.3	0.0 / 1.2	1.2/5	
	1021	1022	5/10	0 9/9 CO2 SAT	4.0 / 5.8	4.0 / 5.7	1.7/5	
	1047	1048	10/15	0 14/14 CO2 SAT	5.0 / 6.6	9.0 / 11.5	2.5/5	
	1109	1110	15/20	0 19/19 CO2 SAT	5.2 / 6.6	14.0 / 17.6	3.6/5	
	1132	1133	20/25	0 24/24 CO2 SAT	6.2 / 7.4	19.0 / 23.0	4./5	
	1149	1150	25/30	0 29/29 CO2 SAT	7.0 / 8.0	24.0 / 28.3	4.3/5	
	1310		30/35	CO2 SAT	6.6 / 7.4	29.0 / 33.9	4.9/5	
			35/43	CO2 SAT	7.4 / 8.6	/		
	1311 1330	0	43	0 29/29	8.6 11.8 /	/		
	1639 1641	0	43	0 29/26	13.4 / 40.4	/		
	1720	39			/ 40.2	/		
	0629	789			/ 37.8	/		
	1014	222			/ 36.8	/		
	1307	176			/ 36.1	/		

928.5 (10-79)

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PERMEABILITY TEST BY BACK PRESSURE CONSTANT-HEAD

NSP

Boring MW-13A

at a depth of 25 feet

	Initial	Final
Wet Density pcf	136.9	140.2
Dry density pcf	123.4	125.0
% Moisture	11.0	12.1

Height Initial	2.600		152.8	Wet soil and dish
Diameter Initial	2.416		148.9	Dry soil and dish
Area Initial	4.582		113.3	dish only
Volume Initial	195.38		428.4	Ws Initial
Initial dial	0.342		432.9	Final Ws
Final dial	0.359		386.1	Weight solids
Initial cc/in res	2.8			
Final cc/in res.	13.4			
Height Final	2.583	6.561 cm		
Diameter Final	2.408			
Area Final	4.551	29.384 cm^2		
Volume Final	192.78			
Height change	-0.017			
cc/in reser.	0.011			
Volume change	-10.6			
Cell Change	8	@ 43 psi		
Net Volume Change	-2.6			
h= T/B PREss. diff	3	210.30 cm		

Standard Water .005 N CaSO4

Hydraulic Gradient
32.05

"B" final 0.98

Elapsed Time minutes	cc's	K cm/sec
39.0	0.20	8.45E-08
789.0	2.40	5.01E-08
222.0	1.00	7.42E-08
176.0	0.70	6.55E-08

K Average = 6.86E-08 cm/s

Dames & Moore

PERMEABILITY TEST BY BACK PRESSURE
CONSTANT HEAD (Pbp)

Owner NSP
Job # 05644-071
Location
Boring # MW-4A
Sample # SITE134
Depth 15.75

Deflecting Speed 6 in/Hr Min
Lateral Pressure 10 PSF (PSI)
Saturated ☑ Field Moisture ☐
Set-Up 6/27/96 Tested EEK (162 Office)
Soil Type ML/CL

	Initial	Final
Weight soil & dish no. 453	102.4	
Dry weight soil & dish	95.4	
Net loss of moisture		
Weight of dish only	16.8	
Net weight of dry soil		
Moisture, % of dry weight	8.9	9.9
Wt. solids + moisture W_0	603.6	609.2 gms.
$W_0 \div 454$ W_0'		lbs.
Weight solids W_s		gms.
Wet density $W_0' \div V_0'$	143.3	141.9 pcf
Dry density	131.5	129.1 pcf
Net diameter D_0	2.416	in.
Area ($0.785 D_0^2$) A_0	4.582	4.682 sq. in
Height H_0	3.50	3.49 in.
Volume $(A_0H_0) \div 1728$ V_0'		cu. ft.
Volume $(A_0H_0) \times 16.4$ V_0	263.01	268.00 cc
Specific gravity of solids G_s		
Volume of solids $W_s \div G_s$ V_s		cc
$(V_0 - V_s) \div V_s$ e_i		
Initial burette reading		cc
Burette reading under pressure		cc
$(V_p - V_s) \div V_s$ e_p		

$K_N = 4.58 \times 10^{-8}$ cm/s

DAMES & MOORE

SATURATION DATA

PROJECT: NSP NO.: 05644-071 LOCATION:

Boring No.: MW-4A Sample: D_o = .292 Depth: 15.75 (ft./m.) Set up: EEL 6/27/96

σ_3 = 10 psi = psf D_f = .302 Type of Test: Pop Cell No.: Dial No.:

DATE	TIME CLOSED	TIME OPEN	CHAMBER PRESSURE (PSI)	BACK PRESSURE (PSI)	EXTERNAL BURETTE OR DIAL RDG. (CC)/(IN.)	PORE PRESSURE (PSI)	Δ	B
6/27/96	0843	0844	0/5	0 4/4 CLOSED	3436 / —	0.0 / 2.5	.5/5	
	0848	0849	5/10	0 9/9 CLOSED	— / —	4.0 / 5.4	2.4/5	
	0857	0858	10/15	0 14/14 CLOSED	— / —	9.0 / 11.8	2.8/5	
	0905	0906	15/20	0 19/19 CLOSED	— / —	14.0 / 17.1	3.1/5	
	0921	0922	20/25	0 24/24 CLOSED	— / —	19.0 / 22.6	3.6/5	
	0943	0944	25/30	0 29/29 CLOSED	— / —	24.0 / 27.9	3.9/5	
	1012	1013	30/35	0 34/34 CLOSED	— / —	29.0 / 33.2	4.2/5	
	1043	1044	35/40	0 39/39 CLOSED	— / —	34.0 / 38.6	4.6/5	
	1141		40/45	CLOSED	— / —	39.0 / 43.9	4.9/5	
			45/49	CLOSED	/ .1152	/		
6/27/96	1142	0	49	0 39/39	.1152 /	/		
	1330				0861			
	1638				0730			
	1643	0	49	0 39/36	/ 48.6	/		
	1658				/ 48.5	/		
	1720	22			/ 48.4	/		
	0629	789			/ 47.9	/		
	0752	83			/ 47.8	/		
	1016	144			/ 47.5	/		
					/	/		
					/	/		
					/	/		
					/	/		
					/	/		
					/	/		
					/	/		

PERMEABILITY TEST BY BACK PRESSURE CONSTANT-HEAD

NSP

Boring MW-4A

at a depth of 15.75 feet

	Initial	Final
Wet Density pcf	143.3	141.9
Dry density pcf	131.5	129.1
% Moisture	8.9	9.9

Height Initial	3.500		102.4	Wet soil and dish
Diameter Initial	2.416		95.4	Dry soil and dish
Area Initial	4.582		16.8	dish only
Volume Initial	263.01		603.6	Ws Initial
Initial dial	0.292		609.2	Final Ws
Final dial	0.302		554.2	Weight solids
Initial cc/in res	0.073			
Final cc/in res.	0.344			
Height Final	3.490	8.865 cm		
Diameter Final	2.442			
Area Final	4.682	30.232 cm^2		
Volume Final	268.00			
Height change	-0.01			
cc/in reser.	0.06			
Volume change	-4.51667			
Cell Change	9.5 @ 49 psi			
Net Volume Change	4.983333			
h= T/B PREss. diff	3	210.30 cm		

Standard Water .005 N CaSO4

Hydraulic Gradient
23.72

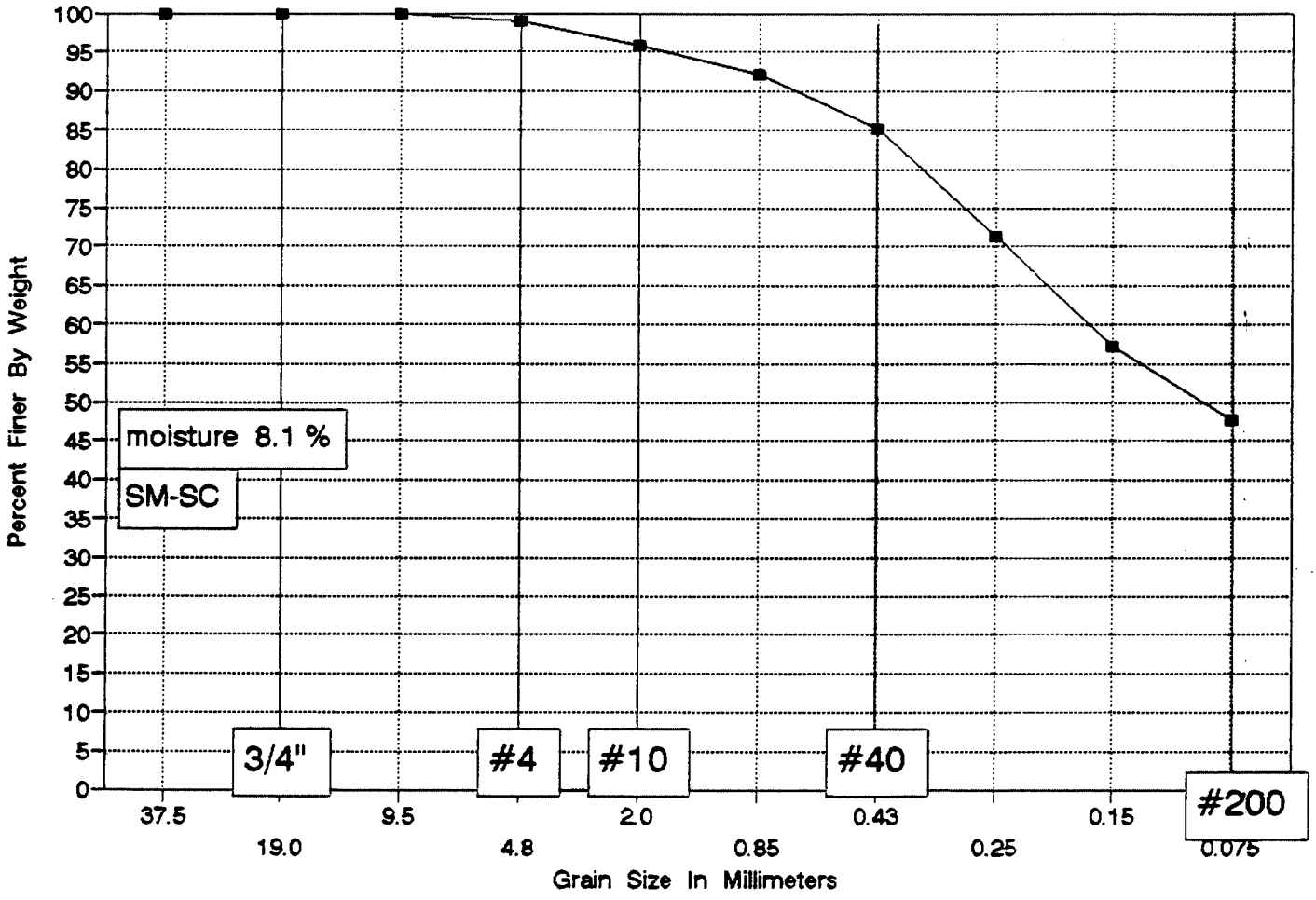
"B" final 0.98

Elapsed Time minutes	cc's	K cm/sec
22.0	0.10	9.83E-08
789.0	0.50	1.37E-08
83.0	0.10	2.61E-08
144.0	0.30	4.51E-08

K Average = 4.58E-08 cm/s

GRADATION CURVE

Boring MW-4A, sample at 15.75 feet



NSP

Boring MW-4A
Sample at 15.75 feet

Moisture Content = 8.1%
wet Density PCF = ERR
Dry Density PCF = ERR

Wt soil and dish	531.4
Dry soil & dish	508
Dish	218.7
soil+tube	0
tube	0
soil	0
soil H	0
diameter	2.416
Area	4.582

SIEVE ANALYSIS

Dry weight of total sample= 289.3

Sieve #	weight retained	Finer	% Finer	mm
1.5 inch	0	100.00%	100.0	37.5
3/4 inch	0	100.00%	100.0	19.0
3/8 inch	0	100.00%	100.0	9.5
# 4	3.08	98.94%	98.9	4.8
# 10	12.36	95.73%	95.7	2.0
# 20	23.08	92.02%	92.0	0.85
# 40	42.98	85.14%	85.1	0.43
# 60	82.71	71.41%	71.4	0.25
# 100	123.76	57.22%	57.2	0.15
# 200	151.55	47.61%	47.6	0.075

MECHANICAL ANALYSIS

SA ☒ HA ☐ BLK SA ☐ -#200 ☐

OWNER /CLIENT NSP JOB NUMBER 05644-071-5124

LOCATION/PROJECT _____ DATE 6/27/96

BORING MW4A SAMPLE _____ DEPTH 15.75' BY RJH

DENSITY		MOISTURE ANALYSIS	MC			
HEIGHT- DIAMETER-		PAN	ST1			
NUMBER OF RINGS		WT. OF PAN & WET SOIL	531.4			
WT. OF RINGS & WET SOIL		WT. OF PAN & DRY SOIL	508.0			
WT. OF RINGS		WT. OF MOISTURE				
WT. OF WET SOIL		WT. OF PAN	218.7			
FIELD DENSITY		WT. OF DRY SOIL				
DRY DENSITY		MOISTURE CONTENT %	8.1			

WET SAMPLE			
WT. OF WET SAMPLE & PAN			
WT. OF PAN			
WT. OF WET SOIL			
WT. OF SAMPLE/ OVEN DRIED			

FIELD SAMPLE CONTAINER	
DRY SIEVE	WASH SIEVE

SAMPLE SPLIT ☐

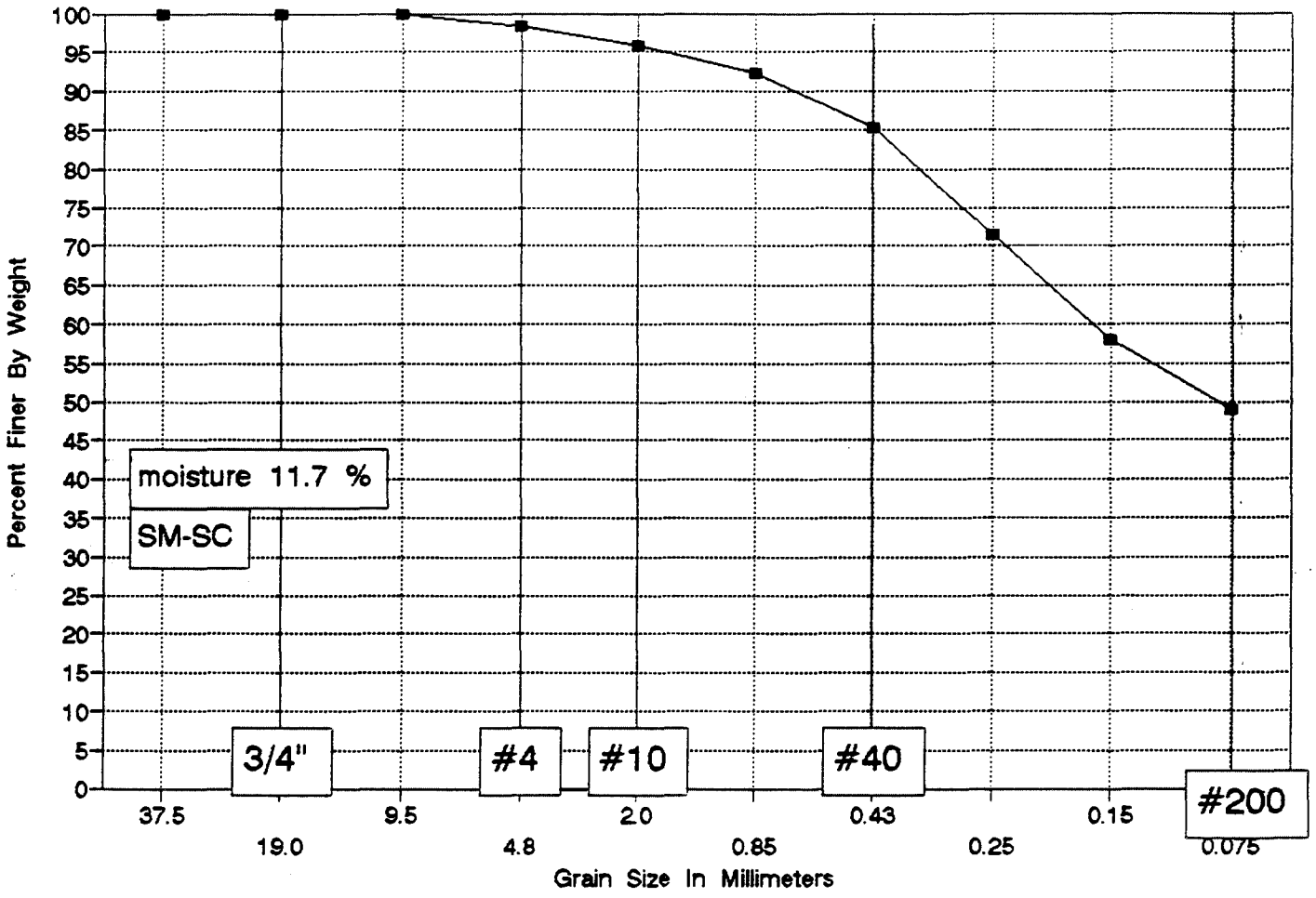
PAN NUMBER	PAN WEIGHT	SIEVE NUMBER	WEIGHT RETAINED	ACCUMULATIVE WEIGHT RETAINED	ACCUMULATIVE PERCENT		
					PARTIAL		TOTAL
					RETAINED	FINER	FINER
		3"					
		1-1/2"					
		3/4"					
		3/8"		0			
		#4		3.08			
		#10		12.36			
		#20		23.08			
		#40		42.98			
		#60		82.71			
		#100		123.76			
		#200		151.55			

NOTE: _____

Dames & Moore

GRADATION CURVE

Boring MW-4B, sample at 21.5 feet



NSP

Boring MW-4B
Sample at 21.5 feet

Moisture Content = 11.7%
wet Density PCF = ERR
Dry Density PCF = ERR

Wt soil and dish	466.1
Dry soil & dish	440.9
Dish	224.6
soil+tube	0
tube	0
soil	0
soil H	0
diameter	2.416
Area	4.582

SIEVE ANALYSIS

Dry weight of total sample= 216.3

Sieve #	weight retained	Finer	% Finer	mm
1.5 inch	0	100.00%	100.0	37.5
3/4 inch	0	100.00%	100.0	19.0
3/8 inch	0	100.00%	100.0	9.5
# 4	3.27	98.49%	98.5	4.8
# 10	8.99	95.84%	95.8	2.0
# 20	16.84	92.21%	92.2	0.85
# 40	31.53	85.42%	85.4	0.43
# 60	61.66	71.49%	71.5	0.25
# 100	90.98	57.94%	57.9	0.15
# 200	110.36	48.98%	49.0	0.075

MECHANICAL ANALYSIS

SA ☐ HA ☐ BLK SA ☐ -#200 ☐

OWNER /CLIENT NSP JOB NUMBER 05644-071

LOCATION/PROJECT DATE 6/27/96

BORING MW4B SAMPLE DEPTH 21.5 BY RJH

DENSITY		MOISTURE ANALYSIS	MC
HEIGHT- DIAMETER-		PAN	515
NUMBER OF RINGS		WT. OF PAN & WET SOIL	466.1
WT. OF RINGS & WET SOIL		WT. OF PAN & DRY SOIL	440.9
WT. OF RINGS		WT. OF MOISTURE	
WT. OF WET SOIL		WT. OF PAN	224.6
FIELD DENSITY		WT. OF DRY SOIL	
DRY DENSITY		MOISTURE CONTENT %	11.7

WET SAMPLE			
WT. OF WET SAMPLE & PAN			
WT. OF PAN			
WT. OF WET SOIL			
WT. OF SAMPLE/ OVEN DRIED			

FIELD SAMPLE CONTAINER	
DRY SIEVE	WASH SIEVE

SAMPLE SPLIT

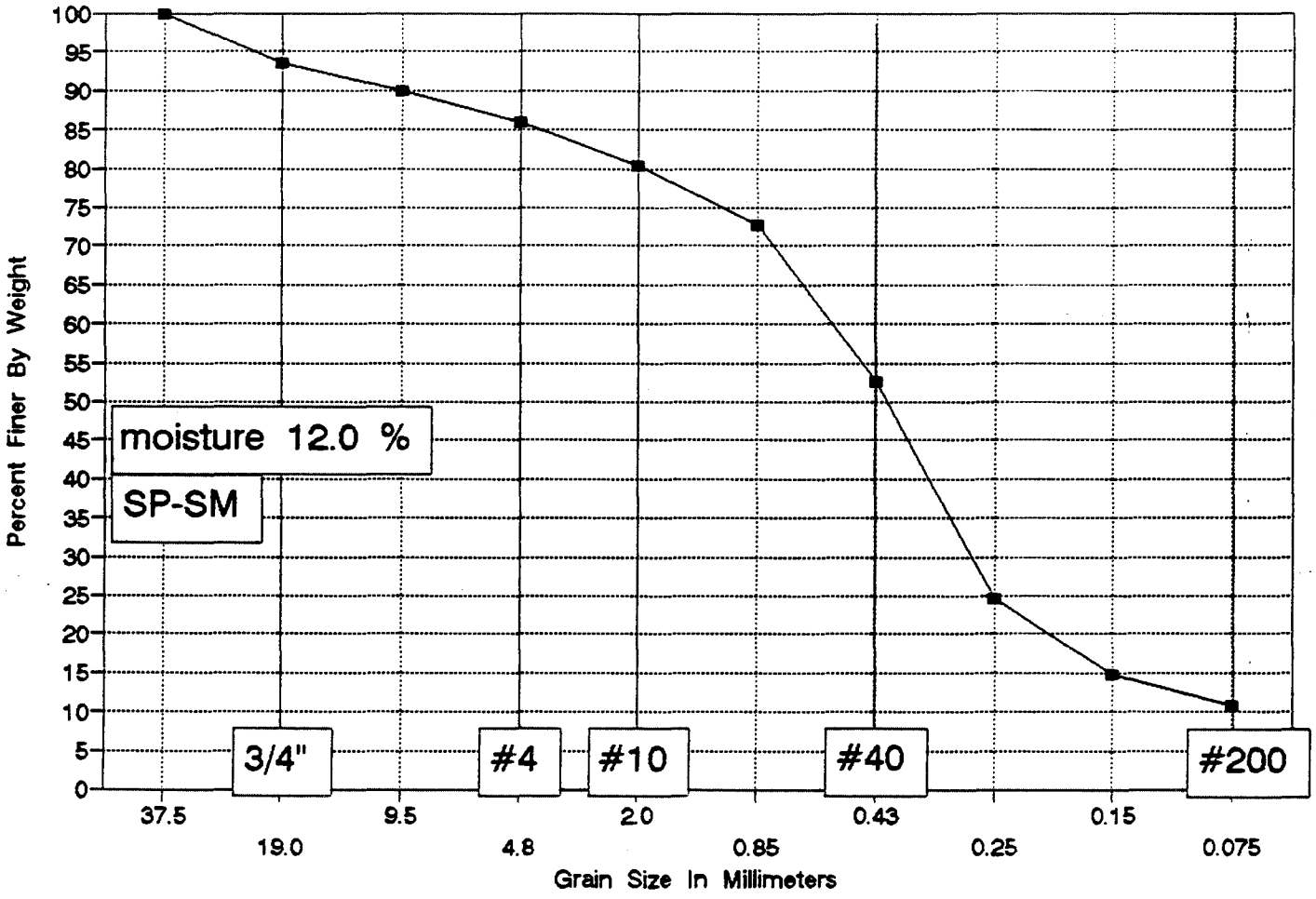
PAN NUMBER	PAN WEIGHT	SIEVE NUMBER	WEIGHT RETAINED	ACCUMULATIVE WEIGHT RETAINED	ACCUMULATIVE PERCENT PARTIAL RETAINED	ACCUMULATIVE PERCENT PARTIAL FINER	ACCUMULATIVE PERCENT TOTAL FINER
		3"					
		1-1/2"					
		3/4"					
		3/8"		0			
		#4		3.27			
		#10		8.99			
		#20		16.84			
		#40		31.53			
		#60		61.66			
		#100		90.98			
		#200		110.36			

NOTE:

Dames & Moore

GRADATION CURVE

Boring MW-4A Sample at 22-24 feet



NSP Project

Boring MW-4A
Sample at 22-24 feet

Wet soil & dish	587.5
Dry soil & dish	547.2
Dish	211.1

Moisture Content = 12.0

SIEVE ANALYSIS

Dry weight of total sample= 336.1 g

Sieve #	weight retained	Finer	% Finer	mm
1.5 inch	0	100.00%	100.0	37.5
3/4 inch	21.82	93.51%	93.5	19.0
3/8 inch	33.27	90.10%	90.1	9.5
# 4	47.22	85.95%	86.0	4.8
# 10	66.27	80.28%	80.3	2.0
# 20	92.02	72.62%	72.6	0.85
# 40	159.34	52.59%	52.6	0.43
# 60	253.5	24.58%	24.6	0.25
# 100	286.5	14.76%	14.8	0.15
# 200	300.1	10.71%	10.7	0.075

MECHANICAL ANALYSIS SA HA -#20(

DATE 6/18/96 BY RJH

JOB NUMBER 05644-071 OWNER/CLIENT NSP PROJECT

LOCATION _____

BORING MW-4H SAMPLE _____ DEPTH 22-24

NUMBER OF RINGS		DISH	ST3
WT. OF RINGS & WET SOIL		WT. OF DISH & WET SOIL	587.5
WT. OF RINGS		WT. OF DISH & DRY SOIL	547.2
WT. OF WET SOIL		WT. OF MOISTURE	
FIELD DENSITY		WT. OF DISH	211.1
DRY DENSITY		WT. OF DRY SOIL	
		FIELD MOISTURE CONTENT	12.0

WASH SIEVE _____ DRY SIEVE _____ WEIGHT OF OVEN DRY SOIL _____ (grams)

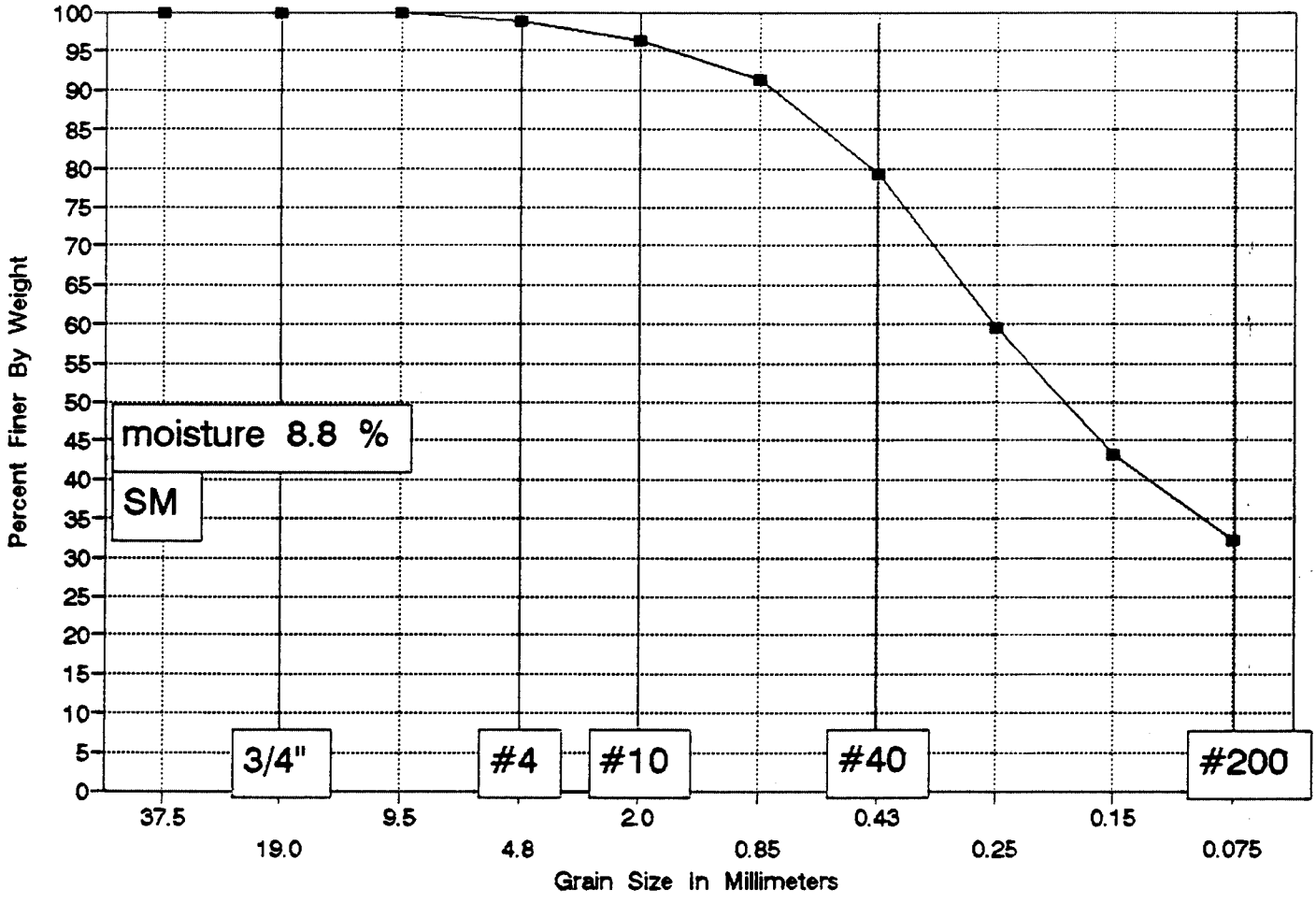
DISH NUMBER	DISH WEIGHT	SIEVE NUMBER	WEIGHT RETAINED	ACCUMULATIVE WEIGHT RETAINED	ACCUMULATIVE PERCENT	
					RETAINED	FINER
		3"				
		1-1/2"		0		
		3/4"		21.82		
		3/8"		33.27		
		#4		47.22		
		PAN				
		TOTAL				

DISH NUMBER	DISH WEIGHT	SIEVE NUMBER	WEIGHT RETAINED	ACCUM. WEIGHT RETAINED	ACCUMULATIVE PERCENT		
					PARTIAL		TOTAL
					RETAINED	FINER	FINER
		#10		60.27			
		#20		92.02			
		#40		139.34			
		#60		253.50			
		#100		286.5			
		#200		300.7			
		PAN					
		TOTAL					

Dames & Moore

GRADATION CURVE

Boring MW-4A Sample at 26-28 feet



NSP Project

Boring MW-4A
Sample at 26-28 feet

Wet soil & dish	351.9
Dry soil & dish	341.4
Dish	221.4

Moisture Content = 8.8

SIEVE ANALYSIS

Dry weight of total sample= 120 g

Sieve #	weight retained	Finer	% Finer	mm
1.5 inch	0	100.00%	100.0	37.5
3/4 inch	0	100.00%	100.0	19.0
3/8 inch	0	100.00%	100.0	9.5
# 4	1.35	98.88%	98.9	4.8
# 10	4.44	96.30%	96.3	2.0
# 20	10.51	91.24%	91.2	0.85
# 40	24.88	79.27%	79.3	0.43
# 60	48.57	59.53%	59.5	0.25
# 100	68.19	43.17%	43.2	0.15
# 200	81.31	32.24%	32.2	0.075

MECHANICAL ANALYSIS (SA) HA -#200

DATE 6/18/96 BY RJH

JOB NUMBER 05644-071 OWNER/CLIENT NSD PROJECT

LOCATION _____

BORING MW-4A SAMPLE _____ DEPTH 26-28

NUMBER OF RINGS		DISH	ST 2
WT. OF RINGS & WET SOIL		WT. OF DISH & WET SOIL	351.9
WT. OF RINGS		WT. OF DISH & DRY SOIL	341.4
WT. OF WET SOIL		WT. OF MOISTURE	
FIELD DENSITY		WT. OF DISH	221.4
DRY DENSITY		WT. OF DRY SOIL	
		FIELD MOISTURE CONTENT	8.8

WASH SIEVE _____ DRY SIEVE _____ WEIGHT OF OVEN DRY SOIL _____ (grams)

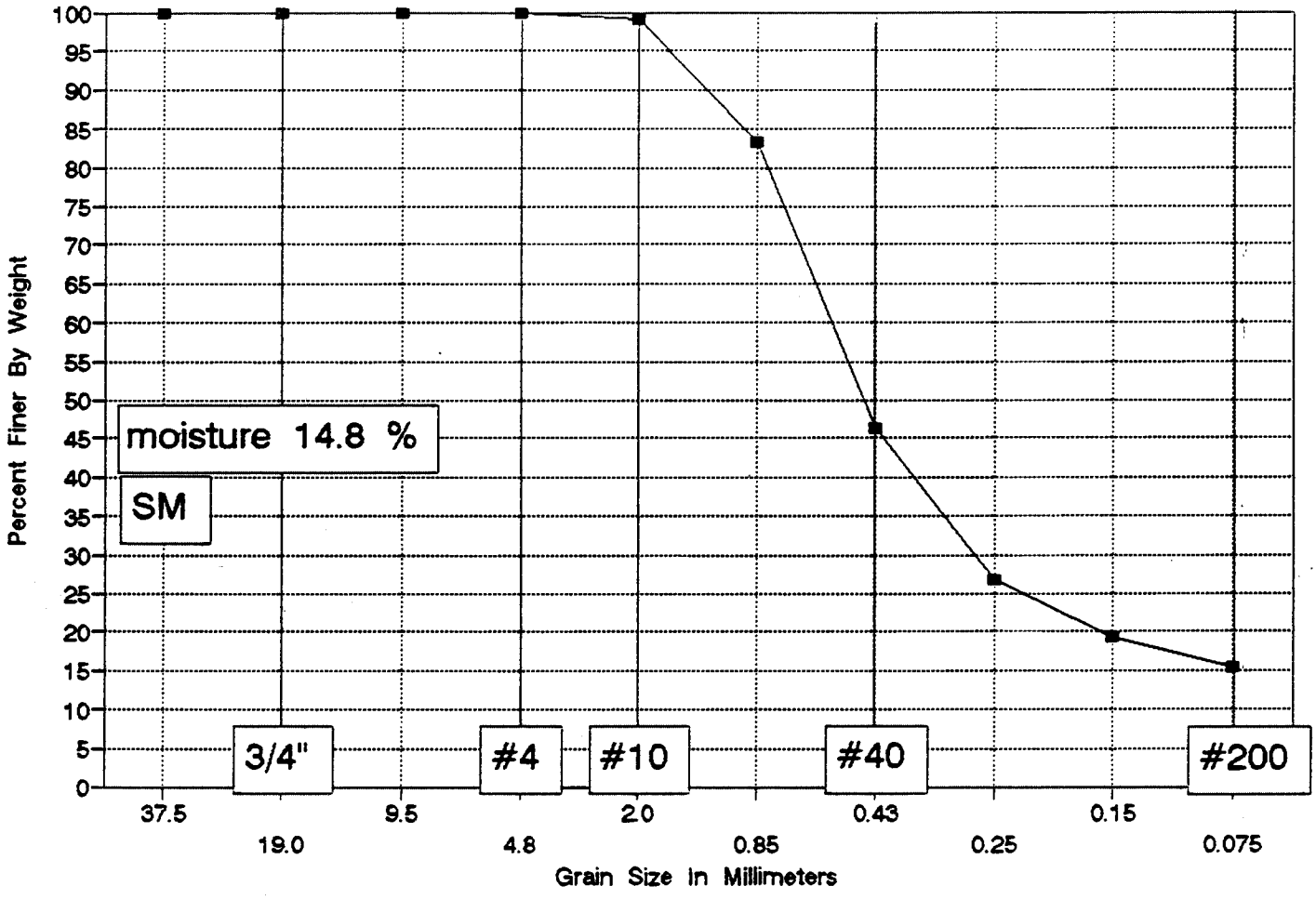
DISH NUMBER	DISH WEIGHT	SIEVE NUMBER	WEIGHT RETAINED	ACCUMULATIVE WEIGHT RETAINED	ACCUMULATIVE PERCENT	
					RETAINED	FINER
		3"				
		1-1/2"				
		3/4"				
		3/8"		0		
		#4		1.35		
		PAN				
		TOTAL				

DISH NUMBER	DISH WEIGHT	SIEVE NUMBER	WEIGHT RETAINED	ACCUM. WEIGHT RETAINED	ACCUMULATIVE PERCENT		
					PARTIAL		TOTAL
					RETAINED	FINER	FINER
		#10		4.44			
		#20		10.51			
		#40		24.88			
		#60		48.57			
		#100		68.19			
		#200		81.31			
		PAN					
		TOTAL					

Dames & Moore

GRADATION CURVE

Boring MW-13 Sample at 38-40 feet



NSP Project

Boring MW-13
Sample at 38-40 feet

Wet soil & dish	411.4
Dry soil & dish	382.1
Dish	184.3

Moisture Content = 14.8

SIEVE ANALYSIS

Dry weight of total sample= 197.8 g

Sieve #	weight retained	Finer	% Finer	mm
1.5 inch	0	100.00%	100.0	37.5
3/4 inch	0	100.00%	100.0	19.0
3/8 inch	0	100.00%	100.0	9.5
# 4	0	100.00%	100.0	4.8
# 10	1.68	99.15%	99.2	2.0
# 20	33.18	83.23%	83.2	0.85
# 40	105.94	46.44%	46.4	0.43
# 60	144.85	26.77%	26.8	0.25
# 100	159.44	19.39%	19.4	0.15
# 200	167.37	15.38%	15.4	0.075

MECHANICAL ANALYSIS (SA) HA -#20(

DATE 6/15/96 BY RJH

JOB NUMBER 05644-071 OWNER/CLIENT NSP PROJECT

LOCATION _____

BORING MW-13 SAMPLE _____ DEPTH 38-40

NUMBER OF RINGS		DISH	STH
WT. OF RINGS & WET SOIL		WT. OF DISH & WET SOIL	411.4
WT. OF RINGS		WT. OF DISH & DRY SOIL	392.1
WT. OF WET SOIL		WT. OF MOISTURE	
FIELD DENSITY		WT. OF DISH	104.3
DRY DENSITY		WT. OF DRY SOIL	
		FIELD MOISTURE CONTENT	14.8

WASH SIEVE _____ DRY SIEVE _____ WEIGHT OF OVEN DRY SOIL _____ (grams)

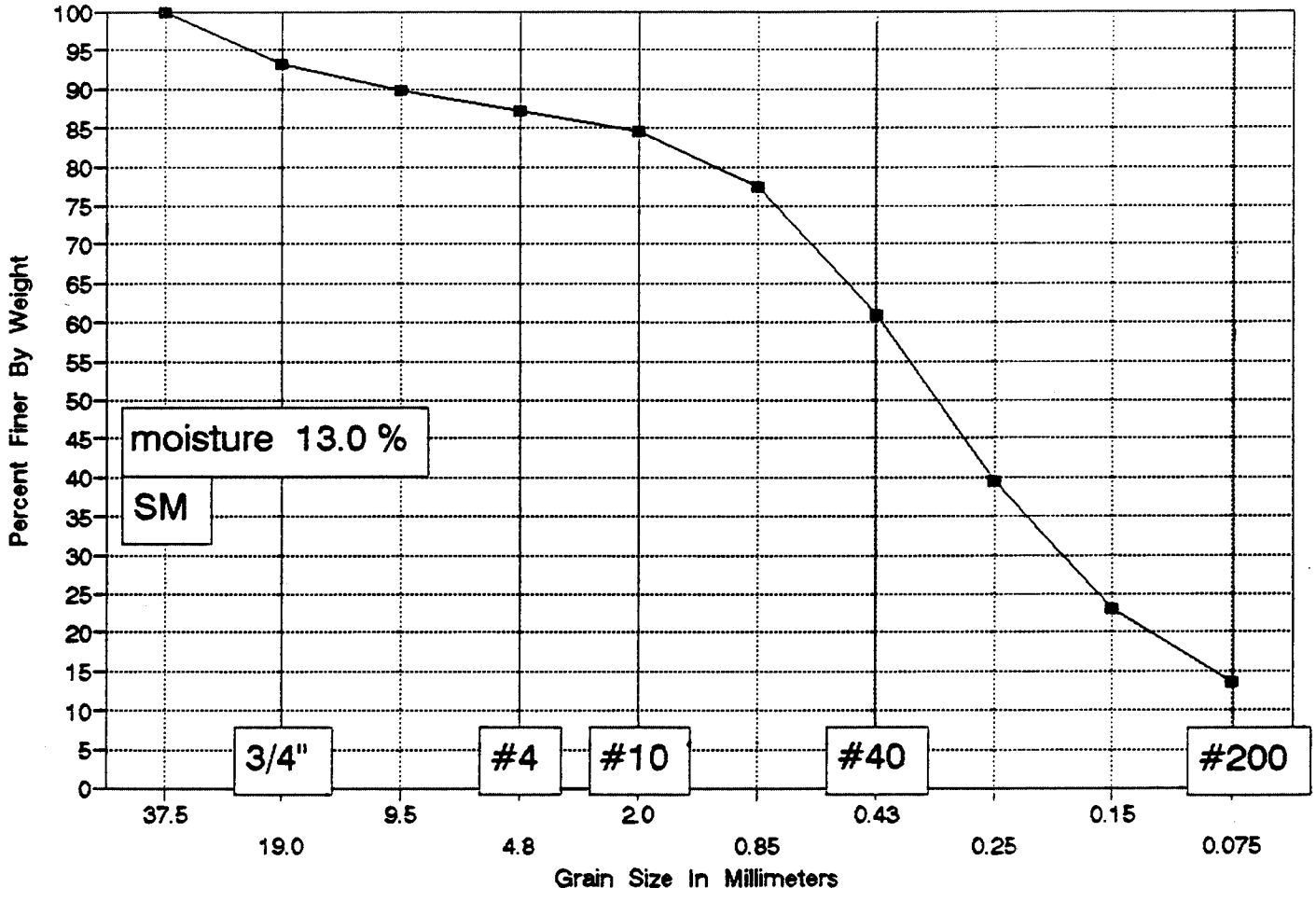
DISH NUMBER	DISH WEIGHT	SIEVE NUMBER	WEIGHT RETAINED	ACCUMULATIVE WEIGHT RETAINED	ACCUMULATIVE PERCENT	
					RETAINED	FINER
		3"				
		1-1/2"				
		3/4"				
		3/8"				
		#4		0		
		PAN				
		TOTAL				

DISH NUMBER	DISH WEIGHT	SIEVE NUMBER	WEIGHT RETAINED	ACCUM. WEIGHT RETAINED	ACCUMULATIVE PERCENT		
					PARTIAL		TOTAL
					RETAINED	FINER	FINER
		#10		1.68			
		#20		33.18			
		#40		105.94			
		#60		144.85			
		#100		159.44			
		#200		167.37			
		PAN					
		TOTAL					

Dames & Moore

GRADATION CURVE

Boring MW-5C Sample at 71-73 feet



NSP Project

Boring MW-5C
Sample at 71-73 feet

Wet soil & dish	486.6
Dry soil & dish	455
Dish	211.7

Moisture Content = 13.0

SIEVE ANALYSIS

Dry weight of total sample= 243.3 g

Sieve #	weight retained	Finer	% Finer	mm
1.5 inch	0	100.00%	100.0	37.5
3/4 inch	16.46	93.23%	93.2	19.0
3/8 inch	24.85	89.79%	89.8	9.5
# 4	31.12	87.21%	87.2	4.8
# 10	37.52	84.58%	84.6	2.0
# 20	55.32	77.26%	77.3	0.85
# 40	95.29	60.83%	60.8	0.43
# 60	147.3	39.46%	39.5	0.25
# 100	187.28	23.03%	23.0	0.15
# 200	210.5	13.48%	13.5	0.075

MECHANICAL ANALYSIS (SA) HA -#20

DATE 6/18/96 BY EJH

JOB NUMBER 05644-071 OWNER/CLIENT NSP Project Samples

LOCATION

BORING MW-5C SAMPLE DEPTH 71-73

NUMBER OF RINGS		DISH	ST50
WT. OF RINGS & WET SOIL		WT. OF DISH & WET SOIL	496.6
WT. OF RINGS		WT. OF DISH & DRY SOIL	455.8
WT. OF WET SOIL		WT. OF MOISTURE	
FIELD DENSITY		WT. OF DISH	211.7
DRY DENSITY		WT. OF DRY SOIL	
		FIELD MOISTURE CONTENT	13.0

WASH SIEVE _____ DRY SIEVE _____ WEIGHT OF OVEN DRY SOIL _____ (grams)

DISH NUMBER	DISH WEIGHT	SIEVE NUMBER	WEIGHT RETAINED	ACCUMULATIVE WEIGHT RETAINED	ACCUMULATIVE PERCENT	
					RETAINED	FINER
		3"				
		1-1/2"		0		
		3/4"		16.46		
		3/8"		24.85		
		#4		31.12		
		PAN				
		TOTAL				

DISH NUMBER	DISH WEIGHT	SIEVE NUMBER	WEIGHT RETAINED	ACCUM. WEIGHT RETAINED	ACCUMULATIVE PERCENT		
					PARTIAL		TOTAL
					RETAINED	FINER	FINER
		#10		37.52			
		#20		55.32			
		#40		95.29			
		#60		147.30			
		#100		187.28			
		#200		210.56			
		PAN					
		TOTAL					

Dames & Moore

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. _____

CLIENT/OWNER _____

LOCATION _____

BORING MW-4E SAMPLE 3 DEPTH 30-2

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

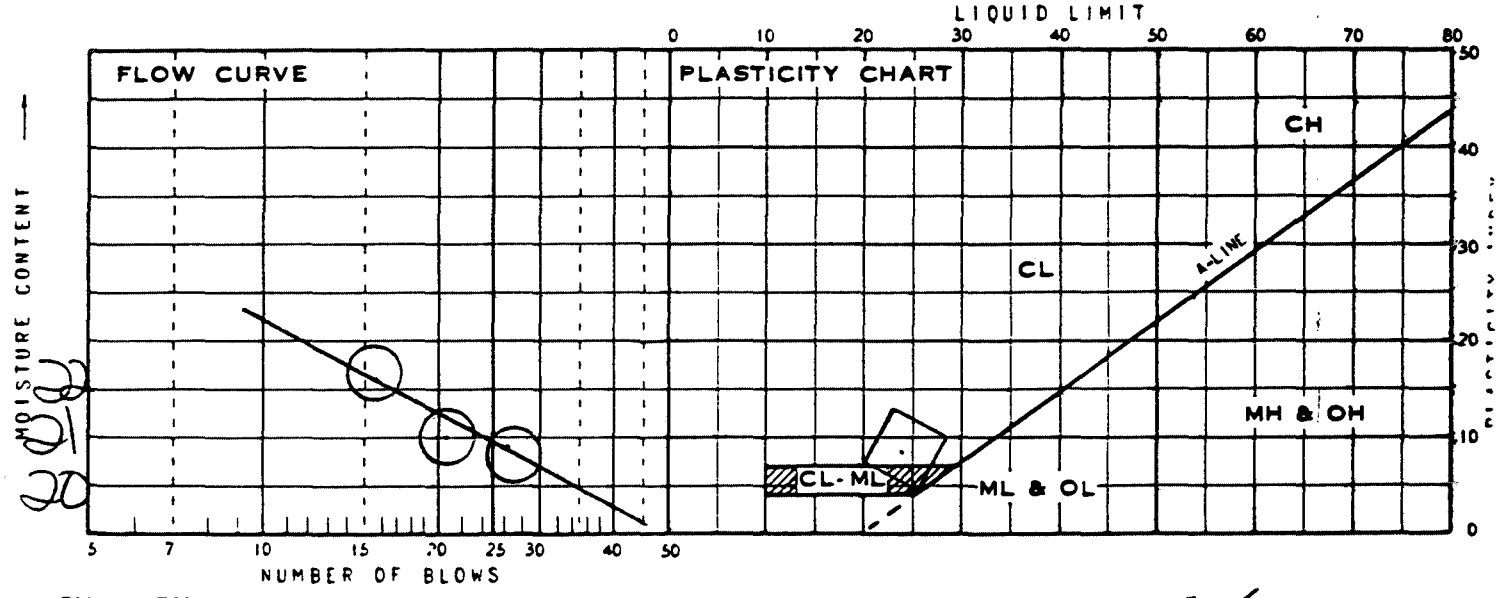
DETERMINATION	1	2
DISH	E20	
WT OF DISH + WET SOIL	164.6	
WT OF DISH + DRY SOIL	146.7	—
WT OF MOISTURE		
WT OF DISH	43.1	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY CKH 6/29/96

DETERMINATION	1	2	3	4	5	6
DISH	62	56				
WT OF DISH + WET SOIL	11.10	11.58				
WT OF DISH + DRY SOIL	10.04	10.38	—	—	—	—
WT OF MOISTURE						
WT OF DISH	1.38	1.37	—	—	—	—
WT OF DRY SOIL						
MOISTURE CONTENT	12.24	13.32	AV= 13			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	86	42	75			
NUMBER OF BLOWS	34	21	16			
WT OF DISH + WET SOIL	11.11	12.55	15.29			
WT OF DISH + DRY SOIL	9.43	10.61	12.76	—	—	—
WT OF MOISTURE						
WT OF DISH	1.37	1.37	1.38	—	—	—
WT OF DRY SOIL						
MOISTURE CONTENT	20.92	21.00	20.23			



SUMMARY

EEI

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		21	13	8	CL	

DAMES & MOORE

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB [illegible]

CLIENT/OWNER NSC

LOCATION _____

BORING M-34 SAMPLE ____ DEPTH 25'

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

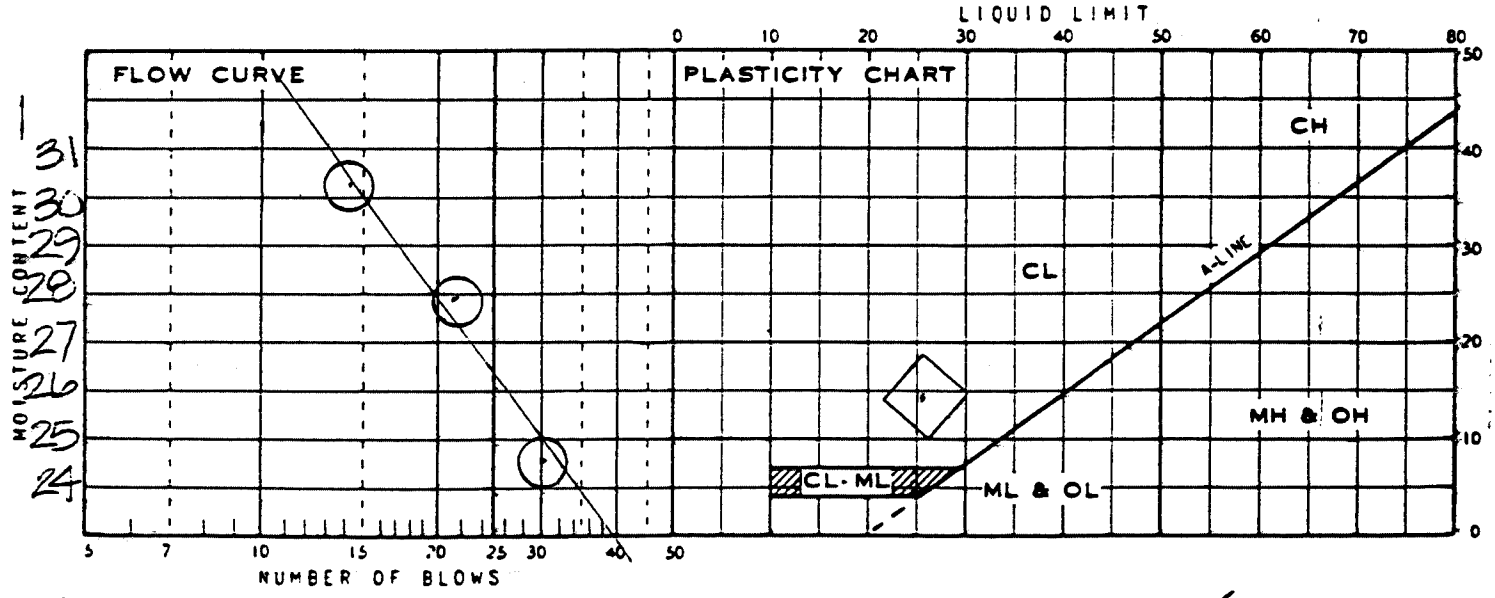
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY RJH 6/27/96

DETERMINATION	1	2	3	4	5	6
DISH	200	1				
WT OF DISH + WET SOIL	8.98	9.63				
WT OF DISH + DRY SOIL	8.18	8.75	—	—	—	—
WT OF MOISTURE						
WT OF DISH	1.40	1.31	—	—	—	—
WT OF DRY SOIL						
MOISTURE CONTENT	11.90	11.93	AV = 12			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	35	42	28			
NUMBER OF BLOWS	30	21	14			
WT OF DISH + WET SOIL	14.31	12.94	11.01			
WT OF DISH + DRY SOIL	11.75	10.42	9.17	—	—	—
WT OF MOISTURE						
WT OF DISH	1.37	1.40	1.40	—	—	—
WT OF DRY SOIL						
MOISTURE CONTENT	24.66	27.94	30.39			



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		26	12	14	CL	

DAMES & MOORE

APPENDIX E
GROUNDWATER SAMPLE ANALYTICAL REPORTS AND SAMPLE CHAIN OF CUSTODY RECORDS

cc: DPT
FBR

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 17854

RECEIVED
NOV - 6 1995

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
#210
Madison, WI 53704

Project Description: NSP, Ashland

Sample ID: MW-5A **NLS#: 91952**
Ref. Line 1 of COC 16650 Description: MW-5A
Collected: 10/18/95 Received: 10/19/95 Reported: 11/02/95

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	1.9	ug/L	1.8	6.5	SW846 6010	10/24/95
Cadmium, dis. as Cd by ICP	ND	ug/L	0.16	0.58	SW846 6010	10/24/95
Chromium, dis. as Cr by ICP	ND	ug/L	0.61	2.1	SW846 6010	10/24/95
Copper, dis. as Cu by ICP	1.7	ug/L	1.7	6.0	SW846 6010	10/24/95
Iron, dis. as Fe by ICP	0.083	mg/L	0.015	0.054	SW846 6010	10/24/95
Lead, dis. as Pb by ICP	2.2	ug/L	2.0	6.4	SW846 6010	10/24/95
Selenium, dis. as Se by furnace	ND	ug/L	1.5	5.0	SW846 7740	10/23/95
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	10/24/95
Metals digestion - dissolved ICP	yes				SW846 3050	10/23/95
Metals digestion - dissolved Furnace	yes				SW846 3050	10/23/95
VOCs (water) by EPA 8021	see attached				SW846 8021	10/24/95
Organics Extraction (A/B/N)	yes					10/20/95
Acids/Bases/Neutrals by EPA 8270	see attached				SW846 8270	10/23/95

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
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WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 17854

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
#210
Madison, WI 53704

Project Description: NSP, Ashland

Sample ID: MW-5B **NLS#: 91953**
Ref. Line 2 of COC 16650 Description: MW-5B
Collected: 10/19/95 Received: 10/19/95 Reported: 11/02/95

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	2.5	ug/L	1.8	6.5	SW846 6010	10/24/95
Cadmium, dis. as Cd by ICP	ND	ug/L	0.16	0.58	SW846 6010	10/24/95
Chromium, dis. as Cr by ICP	ND	ug/L	0.61	2.1	SW846 6010	10/24/95
Copper, dis. as Cu by ICP	ND	ug/L	1.7	6.0	SW846 6010	10/24/95
Iron, dis. as Fe by ICP	0.046	mg/L	0.015	0.054	SW846 6010	10/24/95
Lead, dis. as Pb by ICP	3.3	ug/L	2.0	6.4	SW846 6010	10/24/95
Selenium, dis. as Se by furnace	ND	ug/L	1.5	5.0	SW846 7740	10/23/95
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	10/24/95
Metals digestion - dissolved ICP	yes				SW846 3050	10/23/95
Metals digestion - dissolved Furnace	yes				SW846 3050	10/23/95
VOCs (water) by EPA 8021	see attached				SW846 8021	10/24/95
Organics Extraction (A/B/N)	yes					10/20/95
Acids/Bases/Neutrals by EPA 8270	see attached				SW846 8270	10/23/95

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
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WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 17854

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
#210
Madison, WI 53704

Project Description: NSP, Ashland

Sample ID: MW-5 **NLS#: 91954**
Ref. Line 3 of COC 16650 Description: MW-5
Collected: 10/19/95 Received: 10/19/95 Reported: 11/02/95

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.1	3.9	SW846 6010	10/26/95
Cadmium, dis. as Cd by ICP	ND	ug/L	0.23	0.81	SW846 6010	10/26/95
Chromium, dis. as Cr by ICP	ND	ug/L	0.60	2.1	SW846 6010	10/26/95
Copper, dis. as Cu by ICP	1.4	ug/L	0.68	2.4	SW846 6010	10/26/95
Iron, dis. as Fe by ICP	2.5	mg/L	0.0017	0.0059	SW846 6010	10/26/95
Lead, dis. as Pb by ICP	1.3	ug/L	1.2	4.2	SW846 6010	10/26/95
Selenium, tot. as Se by furnace	ND	ug/L	1.4	5.1	SW846 7740	11/01/95
Zinc, dis. as Zn by ICP	840	ug/L	12	12	SW846 6010	10/26/95
VOCs (water) by EPA 8021	see attached				SW846 8021	10/20/95
Organics Extraction (A/B/N)	yes					10/20/95
Acids/Bases/Neutrals by EPA 8270	see attached				SW846 8270	10/24/95

Sample ID: Trip Blank **NLS#: 91955**
Ref. Line 4 of COC 16650 Description: Trip Blank
Collected: 10/19/95 Received: 10/19/95 Reported: 11/02/95

Parameter	Result	Units	MDL	LOQ	Method	Date
VOCs (water) by EPA 8021	see attached				SW846 8021	10/20/95

Please note that analytical results greater than the MDL but less than the LOQ are within a region of "Less-Certain Quantitation". Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

MDL = Method Detection Limit LOQ = Limit of Quantitation ND = Not Detected Date = Date Analysis Performed
DWB = Dry Weight Basis NA = Not Applicable %DWB = (mg/kg DWB)/10000

Reviewed by:

Authorized by:
R. T. Krueger
Laboratory Manager

ANALYTICAL RESULTS: METHOD Bases/Neutrals/Acids by EPA 8270

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91952 MW-5A ug/L
Acenaphthene	2.0		ND
Acenaphthylene	2.0		13
Aniline	2.0		15
Anthracene	2.0		8.7
Benzoic Acid	10		ND
Benzo (a) anthracene	2.0		ND
Benzo (a) pyrene	2.0		ND
Benzo (b) fluoranthene	2.0		ND
Benzo (k) fluoranthene	2.0		ND
Benzo (g,h,i) perylene	2.0		ND
Bis (2-Chloroethoxy) methane	2.0		ND
Bis (2-Chloroethyl) ether	2.0		ND
Bis (2-Chloroisopropyl) ether	2.0		ND
Bis (2-Ethylhexyl) phthalate	10		ND
4-Bromophenyl phenyl ether	2.0		ND
Butyl benzyl phthalate	2.0		ND
2-Chloronaphthalene	2.0		ND
4-Chlorophenyl phenyl ether	2.0		ND
Chrysene	2.0		ND
Dibenzo (a,h) anthracene	2.0		ND
Di-n-butylphthalate	10		ND
Di-n-octylphthalate	2.0		ND
1,2-Dichlorobenzene	2.0		ND
1,3-Dichlorobenzene	2.0		ND
1,4-Dichlorobenzene	2.0		ND
Diethylphthalate	2.0		ND
Dimethylphthalate	2.0		ND
2,4-Dinitrotoluene	2.0		ND
2,6-Dinitrotoluene	2.0		ND
Fluoranthene	2.0		ND
Fluorene	2.0		4.0
Hexachlorobenzene	2.0		ND
Hexachlorobutadiene	2.0		ND
Hexachlorocyclopentadiene	2.0		ND
Hexachloroethane	2.0		ND
Indeno (1,2,3-cd) pyrene	2.0		ND
Isophorone	2.0		ND
Naphthalene	2.0		650
Nitrobenzene	2.0		ND
n-Nitrosodiphenylamine	2.0		ND
Phenanthrene	2.0		8.3
Pyrene	2.0		ND
1,2,4-Trichlorobenzene	2.0		ND
Benzyl alcohol	2.0		ND
4-Chloroaniline	2.0		ND
4-Chloro-3-methylphenol	2.0		ND
2-Chlorophenol	2.0		ND
Dibenzofuran	2.0		ND
2,4-Dichlorophenol	2.0		ND
2,4-Dimethylphenol	2.0		180
4,6-Dinitro-2-methylphenol	10		ND
2,4-Dinitrophenol	10		ND
2-Methylnaphthalene	2.0		79
2-Methylphenol	2.0		160

ANALYTICAL RESULTS: METHOD Bases/Neutrals/Acids by EPA 8270

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91952 MW-5A ug/L
4-Methylphenol	2.0		59
2-Nitroaniline	10		ND
3-Nitroaniline	10		ND
4-Nitroaniline	10		ND
2-Nitrophenol	2.0		ND
4-Nitrophenol	10		ND
N-Nitroso-di-N-propylamine	2.0		ND
Pentachlorophenol	10		ND
Phenol	2.0		ND
2,4,5-Trichlorophenol	10		ND
2,4,6-Trichlorophenol	10		ND

ANALYTICAL RESULTS: METHOD Bases/Neutrals/Acids by EPA 8270

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91953 MW-5B ug/L
Acenaphthene	20		ND
Acenaphthylene	20		200
Aniline	20		ND
Anthracene	20		54
Benzoic Acid	100		ND
Benzo (a) anthracene	20		23
Benzo (a) pyrene	20		ND
Benzo (b) fluoranthene	20		ND
Benzo (k) fluoranthene	20		ND
Benzo (g,h,i) perylene	20		ND
Bis (2-Chloroethoxy) methane	20		ND
Bis (2-Chloroethyl) ether	20		ND
Bis (2-Chloroisopropyl) ether	20		ND
Bis (2-Ethylhexyl) phthalate	100		ND
4-Bromophenyl phenyl ether	20		ND
Butyl benzyl phthalate	20		ND
2-Chloronaphthalene	20		ND
4-Chlorophenyl phenyl ether	20		ND
Chrysene	20		20
Dibenzo (a,h) anthracene	20		ND
Di-n-butylphthalate	100		ND
Di-n-octylphthalate	20		ND
1,2-Dichlorobenzene	20		ND
1,3-Dichlorobenzene	20		ND
1,4-Dichlorobenzene	20		ND
3,3-Dichlorobenzidine	100		ND
Diethylphthalate	20		ND
Dimethylphthalate	20		ND
2,4-Dinitrotoluene	20		ND
2,6-Dinitrotoluene	20		ND
Fluoranthene	20		41
Fluorene	20		72
Hexachlorobenzene	20		ND
Hexachlorobutadiene	20		ND
Hexachlorocyclopentadiene	20		ND
Hexachloroethane	20		ND
Indeno (1,2,3-cd) pyrene	20		ND
Isophorone	20		ND
Naphthalene	20		2200
Nitrobenzene	20		ND
n-Nitrosodiphenylamine	20		ND
Phenanthrene	20		180
Pyrene	20		58
1,2,4-Trichlorobenzene	20		ND
Benzyl alcohol	20		ND
4-Chloroaniline	20		ND
4-Chloro-3-methylphenol	20		ND
2-Chlorophenol	20		ND
Dibenzofuran	20		ND
2,4-Dichlorophenol	20		ND
2,4-Dimethylphenol	20		1100
4,6-Dinitro-2-methylphenol	100		ND
2,4-Dinitrophenol	100		ND
2-Methylnaphthalene	20		770

ANALYTICAL RESULTS: METHOD Bases/Neutrals/Acids by EPA 8270

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91953 MW-5B ug/L
2-Methylphenol	20		450
4-Methylphenol	20		750
2-Nitroaniline	100		ND
3-Nitroaniline	100		ND
4-Nitroaniline	100		ND
2-Nitrophenol	20		ND
4-Nitrophenol	100		ND
N-Nitroso-di-N-propylamine	20		ND
Pentachlorophenol	100		ND
Phenol	20		270
2,4,5-Trichlorophenol	100		ND
2,4,6-Trichlorophenol	100		ND

ANALYTICAL RESULTS: METHOD Bases/Neutrals/Acids by EPA 8270

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91954 MW-5 ug/L
Acenaphthene	20		340
Acenaphthylene	20		ND
Aniline	20		ND
Anthracene	20		84
Benzoic Acid	100		ND
Benzo (a) anthracene	20		41
Benzo (a) pyrene	20		36
Benzo (b) fluoranthene	20		25
Benzo (k) fluoranthene	20		ND
Benzo (g,h,i) perylene	20		ND
Bis (2-Chloroethoxy) methane	20		ND
Bis (2-Chloroethyl) ether	20		ND
Bis (2-Chloroisopropyl) ether	20		ND
Bis (2-Ethylhexyl) phthalate	100		ND
4-Bromophenyl phenyl ether	20		ND
Butyl benzyl phthalate	20		ND
2-Chloronaphthalene	20		ND
4-Chlorophenyl phenyl ether	20		ND
Chrysene	20		37
Dibenzo (a,h) anthracene	20		ND
Di-n-butylphthalate	100		ND
Di-n-octylphthalate	20		ND
1,2-Dichlorobenzene	20		ND
1,3-Dichlorobenzene	20		ND
1,4-Dichlorobenzene	20		ND
3,3-Dichlorobenzidine	100		ND
Diethylphthalate	20		ND
Dimethylphthalate	20		ND
2,4-Dinitrotoluene	20		ND
2,6-Dinitrotoluene	20		ND
Fluoranthene	20		100
Fluorene	20		110
Hexachlorobenzene	20		ND
Hexachlorobutadiene	20		ND
Hexachlorocyclopentadiene	20		ND
Hexachloroethane	20		ND
Indeno (1,2,3-cd) pyrene	20		ND
Isophorone	20		ND
Naphthalene	20		1100
Nitrobenzene	20		ND
n-Nitrosodiphenylamine	20		ND
Phenanthrene	20		350
Pyrene	20		150
1,2,4-Trichlorobenzene	20		ND
Benzyl alcohol	20		ND
4-Chloroaniline	20		ND
4-Chloro-3-methylphenol	20		ND
2-Chlorophenol	20		ND
Dibenzofuran	20		ND
2,4-Dichlorophenol	20		ND
2,4-Dimethylphenol	20		ND
4,6-Dinitro-2-methylphenol	100		ND
2,4-Dinitrophenol	100		ND
2-Methylnaphthalene	20		350

ANALYTICAL RESULTS: METHOD Bases/Neutrals/Acids by EPA 8270

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91954 MW-5 ug/L
2-Methylphenol	20		ND
4-Methylphenol	20		ND
2-Nitroaniline	100		ND
3-Nitroaniline	100		ND
4-Nitroaniline	100		ND
2-Nitrophenol	20		ND
4-Nitrophenol	100		ND
N-Nitroso-di-N-propylamine	20		ND
Pentachlorophenol	100		ND
Phenol	20		ND
2,4,5-Trichlorophenol	100		ND
2,4,6-Trichlorophenol	100		ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91952 MW-5A ug/L
Benzene	5.7	20	13000
Bromobenzene	17	56	ND
Bromochloromethane	17	65	ND
Bromodichloromethane	14	47	ND
Bromoform	30	100	ND
Bromomethane	11	43	ND
n-Butylbenzene	12	42	14
sec-Butylbenzene	9.3	32	ND
tert-Butylbenzene	14	47	ND
Carbon Tetrachloride	32	110	ND
Chlorobenzene	27	100	ND
Chloroethane	11	39	ND
Chloroform	45	170	ND
Chloromethane	28	97	ND
2-Chlorotoluene	14	47	ND
4-Chlorotoluene	12	42	ND
Dibromochloromethane	15	56	ND
1,2-Dibromo-3-Chloropropane	27	100	ND
1,2-Dibromoethane	29	100	ND
Dibromomethane	37	140	ND
1,2-Dichlorobenzene	15	53	ND
1,3-Dichlorobenzene	27	90	ND
1,4-Dichlorobenzene	28	91	ND
Dichlorodifluoromethane	13	40	ND
1,1-Dichloroethane	17	55	ND
1,2-Dichloroethane	19	72	ND
1,1-Dichloroethene	11	36	ND
cis-1,2-Dichloroethene	25	85	ND
trans-1,2-Dichloroethene	9.5	32	ND
1,2-Dichloropropane	37	140	ND
1,3-Dichloropropane	21	73	ND
2,2-Dichloropropane	45	170	ND
1,1-Dichloropropene	32	110	ND
cis-1,3-Dichloropropene	20	75	ND
trans-1,3-Dichloropropene	20	75	ND
Ethylbenzene	7.3	24	1600
Hexachlorobutadiene	18	62	ND
Isopropylbenzene	9.1	31	38
p-Isopropyltoluene	38	120	ND
Methylene chloride	9.7	37	ND
Naphthalene	28	94	1900
n-Propylbenzene	22	69	ND
ortho-Xylene/Styrene	23	80	410
1,1,1,2-Tetrachloroethane	27	100	ND
1,1,2,2-Tetrachloroethane	17	65	ND
Tetrachloroethene	21	73	ND
Toluene	10	34	1600
1,2,3-Trichlorobenzene	18	63	ND
1,2,4-Trichlorobenzene	12	40	ND
1,1,1-Trichloroethane	18	68	ND
1,1,2-Trichloroethane	21	81	ND
Trichloroethene	9.6	33	ND
Trichlorofluoromethane	11	40	ND
1,2,3-Trichloropropane	17	63	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91952 MW-5A ug/L
1,2,4-Trimethylbenzene	18	61	130
1,3,5-Trimethylbenzene	12	42	44
Vinyl chloride	28	92	ND
meta,para-Xylene	43	150	890
tert-Butylmethyl ether	13	49	ND
Isopropyl ether	13	49	16

Surrogate Recovery on Fluorobenzene = 101 %
Surrogate Recovery on 1,4-Dichlorobutane = 82.6 %

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91953 MW-5B ug/L
Benzene	5.7	20	31000
Bromobenzene	17	56	ND
Bromochloromethane	17	65	ND
Bromodichloromethane	14	47	ND
Bromoform	30	100	ND
Bromomethane	11	43	ND
n-Butylbenzene	12	42	38
sec-Butylbenzene	9.3	32	ND
tert-Butylbenzene	14	47	ND
Carbon Tetrachloride	32	110	ND
Chlorobenzene	27	100	ND
Chloroethane	11	39	ND
Chloroform	45	170	ND
Chloromethane	28	97	ND
2-Chlorotoluene	14	47	ND
4-Chlorotoluene	12	42	ND
Dibromochloromethane	15	56	ND
1,2-Dibromo-3-Chloropropane	27	100	ND
1,2-Dibromoethane	29	100	ND
Dibromomethane	37	140	ND
1,2-Dichlorobenzene	15	53	ND
1,3-Dichlorobenzene	27	90	ND
1,4-Dichlorobenzene	28	91	ND
Dichlorodifluoromethane	13	40	ND
1,1-Dichloroethane	17	55	ND
1,2-Dichloroethane	19	72	ND
1,1-Dichloroethene	11	36	ND
cis-1,2-Dichloroethene	25	85	ND
trans-1,2-Dichloroethene	9.5	32	ND
1,2-Dichloropropane	37	140	ND
1,3-Dichloropropane	21	73	ND
2,2-Dichloropropane	45	170	ND
1,1-Dichloropropene	32	110	ND
cis-1,3-Dichloropropene	20	75	ND
trans-1,3-Dichloropropene	20	75	ND
Ethylbenzene	7.3	24	500
Hexachlorobutadiene	18	62	ND
Isopropylbenzene	9.1	31	12
p-Isopropyltoluene	38	120	ND
Methylene chloride	9.7	37	ND
Naphthalene	28	94	3800
n-Propylbenzene	22	69	30
ortho-Xylene/Styrene	23	80	6800
1,1,1,2-Tetrachloroethane	27	100	ND
1,1,2,2-Tetrachloroethane	17	65	ND
Tetrachloroethene	21	73	ND
Toluene	10	34	18000
1,2,3-Trichlorobenzene	18	63	ND
1,2,4-Trichlorobenzene	12	40	ND
1,1,1-Trichloroethane	18	68	ND
1,1,2-Trichloroethane	21	81	ND
Trichloroethene	9.6	33	ND
Trichlorofluoromethane	11	40	ND
1,2,3-Trichloropropane	17	63	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91953 MW-5B ug/L
1,2,4-Trimethylbenzene	18	61	460
1,3,5-Trimethylbenzene	12	42	140
Vinyl chloride	28	92	ND
meta,para-Xylene	43	150	2900
tert-Butylmethyl ether	13	49	16
Isopropyl ether	13	49	ND

Surrogate Recovery on Fluorobenzene = 97.7 %
Surrogate Recovery on 1,4-Dichlorobutane = 84.0 %

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water
Page: 5

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91954 MW-5 ug/L
Benzene	5.7	20	24
Bromobenzene	17	56	ND
Bromochloromethane	17	65	ND
Bromodichloromethane	14	47	ND
Bromoform	30	100	ND
Bromomethane	11	43	ND
n-Butylbenzene	12	42	22
sec-Butylbenzene	9.3	32	ND
tert-Butylbenzene	14	47	ND
Carbon Tetrachloride	32	110	ND
Chlorobenzene	27	100	ND
Chloroethane	11	39	ND
Chloroform	45	170	ND
Chloromethane	28	97	ND
2-Chlorotoluene	14	47	ND
4-Chlorotoluene	12	42	ND
Dibromochloromethane	15	56	ND
1,2-Dibromo-3-Chloropropane	27	100	ND
1,2-Dibromoethane	29	100	ND
Dibromomethane	37	140	ND
1,2-Dichlorobenzene	15	53	ND
1,3-Dichlorobenzene	27	90	ND
1,4-Dichlorobenzene	28	91	ND
Dichlorodifluoromethane	13	40	ND
1,1-Dichloroethane	17	55	ND
1,2-Dichloroethane	19	72	ND
1,1-Dichloroethene	11	36	ND
cis-1,2-Dichloroethene	25	85	ND
trans-1,2-Dichloroethene	9.5	32	ND
1,2-Dichloropropane	37	140	ND
1,3-Dichloropropane	21	73	ND
2,2-Dichloropropane	45	170	ND
1,1-Dichloropropene	32	110	ND
cis-1,3-Dichloropropene	20	75	ND
trans-1,3-Dichloropropene	20	75	ND
Ethylbenzene	7.3	24	140
Hexachlorobutadiene	18	62	ND
Isopropylbenzene	9.1	31	36
p-Isopropyltoluene	38	120	ND
Methylene chloride	9.7	37	ND
Naphthalene	28	94	6700
n-Propylbenzene	22	69	ND
ortho-Xylene/Styrene	23	80	290
1,1,1,2-Tetrachloroethane	27	100	ND
1,1,2,2-Tetrachloroethane	17	65	ND
Tetrachloroethene	21	73	ND
Toluene	10	34	120
1,2,3-Trichlorobenzene	18	63	ND
1,2,4-Trichlorobenzene	12	40	ND
1,1,1-Trichloroethane	18	68	ND
1,1,2-Trichloroethane	21	81	ND
Trichloroethene	9.6	33	ND
Trichlorofluoromethane	11	40	ND
1,2,3-Trichloropropane	17	63	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91954 MW-5 ug/L
1,2,4-Trimethylbenzene	18	61	62
1,3,5-Trimethylbenzene	12	42	30
Vinyl chloride	28	92	ND
meta,para-Xylene	43	150	90
tert-Butylmethyl ether	13	49	ND
Isopropyl ether	13	49	ND

Surrogate Recovery on Fluorobenzene = 94.0 %
Surrogate Recovery on 1,4-Dichlorobutane = 77.5 %

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91955 Trip Blank ug/L
Benzene	0.11	0.39	ND
Bromobenzene	0.34	1.1	ND
Bromochloromethane	0.34	1.3	ND
Bromodichloromethane	0.27	0.94	ND
Bromoform	0.60	2.1	ND
Bromomethane	0.23	0.85	ND
n-Butylbenzene	0.24	0.83	ND
sec-Butylbenzene	0.19	0.64	ND
tert-Butylbenzene	0.28	0.94	ND
Carbon Tetrachloride	0.65	2.2	ND
Chlorobenzene	0.55	2.1	ND
Chloroethane	0.23	0.78	ND
Chloroform	0.90	3.4	ND
Chloromethane	0.56	1.9	ND
2-Chlorotoluene	0.28	0.94	ND
4-Chlorotoluene	0.24	0.84	ND
Dibromochloromethane	0.30	1.1	ND
1,2-Dibromo-3-Chloropropane	0.54	2.1	ND
1,2-Dibromoethane	0.58	2.0	ND
Dibromomethane	0.75	2.8	ND
1,2-Dichlorobenzene	0.30	1.1	ND
1,3-Dichlorobenzene	0.54	1.8	ND
1,4-Dichlorobenzene	0.57	1.8	ND
Dichlorodifluoromethane	0.25	0.80	ND
1,1-Dichloroethane	0.35	1.1	ND
1,2-Dichloroethane	0.38	1.4	ND
1,1-Dichloroethene	0.21	0.73	ND
cis-1,2-Dichloroethene	0.49	1.7	ND
trans-1,2-Dichloroethene	0.19	0.63	ND
1,2-Dichloropropane	0.75	2.8	ND
1,3-Dichloropropane	0.42	1.5	ND
2,2-Dichloropropane	0.90	3.4	ND
1,1-Dichloropropene	0.65	2.2	ND
cis-1,3-Dichloropropene	0.40	1.5	ND
trans-1,3-Dichloropropene	0.40	1.5	ND
Ethylbenzene	0.15	0.48	ND
Hexachlorobutadiene	0.36	1.2	ND
Isopropylbenzene	0.18	0.63	ND
p-Isopropyltoluene	0.77	2.4	ND
Methylene chloride	0.19	0.73	ND
Naphthalene	0.56	1.9	ND
n-Propylbenzene	0.43	1.4	ND
ortho-Xylene/Styrene	0.46	1.6	ND
1,1,1,2-Tetrachloroethane	0.55	2.1	ND
1,1,2,2-Tetrachloroethane	0.35	1.3	ND
Tetrachloroethene	0.42	1.5	ND
Toluene	0.21	0.69	ND
1,2,3-Trichlorobenzene	0.37	1.3	ND
1,2,4-Trichlorobenzene	0.23	0.80	ND
1,1,1-Trichloroethane	0.36	1.4	ND
1,1,2-Trichloroethane	0.43	1.6	ND
Trichloroethene	0.19	0.66	ND
Trichlorofluoromethane-	0.21	0.81	ND
1,2,3-Trichloropropane	0.33	1.3	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore
Project Description: NSP, Ashland
Northern Lake Service Project Number: 17854

Analyte Name	MDL ug/L	LOQ ug/L	91955 Trip Blank ug/L
1,2,4-Trimethylbenzene	0.36	1.2	ND
1,3,5-Trimethylbenzene	0.24	0.84	ND
Vinyl chloride	0.55	1.8	ND
meta,para-Xylene	0.86	3.0	ND
tert-Butylmethyl ether	0.26	0.98	ND
Isopropyl ether	0.26	0.98	ND

Surrogate Recovery on Fluorobenzene = 99.4 %
Surrogate Recovery on 1,4-Dichlorobutane = 105 %

NO. 16650

NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520
Tel: (715) 478-2777 • Fax: (715) 478-3060

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT: Dames & Moore		PROJECT TITLE: NSP, Ashland	
ADDRESS: 2701 International Ln #210		PROJECT NO.	P.O. NO.
CITY: Madison	STATE: WI ZIP: 53704	CONTACT: Dave Trainor	PHONE: 608 244-1788

ITEM NO.	NLS LAB NO.	SAMPLE ID	COLLECTION DATE	COLLECTION TIME	SAMPLE TYPE	GRAB/ COMP.	CONTAINER/PRESERVATIVE /H	/NP	/N			COLLECTION REMARKS
1.		MW-5A	10/18/95	1400	GW	GRAB	2	2	1			Short Turnover
2.		MW-5B	10/19/95	1000	GW	GRAB	1	1	1			Short Turnover
3.		MW-5	10/19/95	1030	↓	↓	↓	↓	↓			Reg. TAT
4.		Trip Blank										
5.		Temp Blank										
6.												
7.												
8.												
9.												
10.												
11.												
12.												

SAMPLE TYPE:
SW = surface water; WW = wastewater; GW = groundwater; DW = drinking water; TIS = tissue; AIR = air; PROD = product; SOIL = soil; SED = sediment; describe others

CONTAINER: P = plastic; G = glass; V = glass vial; B = plastic bag; describe others

PRESERVATIVES & PREPARATION: NP = nothing added; S = sulfuric acid; N = nitric acid; Z = zinc acetate; OH = sodium hydroxide; HA = hydrochloric & ascorbic acid; H = hydrochloric acid; F = field filtered

COLLECTED BY (signatures): James D Schick	CUSTODY SEAL NO. (IF ANY)	DATE/TIME: 10/18/95/1400
RELINQUISHED BY (signature): James D. Schick	RECEIVED BY (signature)	DATE/TIME: 10/19/95/1400
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature)	METHOD OF TRANSPORT	DATE/TIME

RECEIVED AT NLS BY (signature): [illegible]	DATE/TIME: 10-19-95 15:15	CONDITION	TEMP.: 0-2°
SEAL INTACT? ☐ YES ☒ NO	SEAL #	REMARKS & OTHER INFORMATION	

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM MUST BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, NOT PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 27593

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
Suite 210
Madison, WI 53704

Project Description: NSP
Project Title: 05644-071

Sample ID: MW-7 **NLS#: 107027**
Ref. Line 1 of COC 19955 Description: MW-7
Collected: 06/04/96 Received: 06/05/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.6	5.7	SW846 6010	06/06/96
Cadmium, dis. as Cd by ICP	0.19	ug/L	0.12	0.38	SW846 6010	06/06/96
Chromium, dis. as Cr by ICP	0.50	ug/L	0.26	0.93	SW846 6010	06/06/96
Copper, dis. as Cu by ICP	0.88	ug/L	0.54	1.9	SW846 6010	06/06/96
Iron, dis. as Fe by ICP	0.22	mg/L	0.0010	0.0035	SW846 6010	06/06/96
Lead, dis. as Pb by ICP	1.5	ug/L	1.5	5.2	SW846 6010	06/06/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/17/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/06/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/17/96
Base/Neutral/Acid Extraction by 3510B	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Sample ID: MW-7A **NLS#: 107028**
Ref. Line 2 of COC 19955 Description: MW-7A
Collected: 06/04/96 Received: 06/05/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.6	5.7	SW846 6010	06/06/96
Cadmium, dis. as Cd by ICP	0.14	ug/L	0.12	0.38	SW846 6010	06/06/96
Chromium, dis. as Cr by ICP	ND	ug/L	0.26	0.93	SW846 6010	06/06/96
Copper, dis. as Cu by ICP	ND	ug/L	0.54	1.9	SW846 6010	06/06/96
Iron, dis. as Fe by ICP	0.024	mg/L	0.0010	0.0035	SW846 6010	06/06/96
Lead, dis. as Pb by ICP	ND	ug/L	1.5	5.2	SW846 6010	06/06/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/17/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/06/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/12/96
Base/Neutral/Acid Extraction by 3510B	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 27593

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
Suite 210
Madison, WI 53704

Project Description: NSP
Project Title: 05644-071

Sample ID: MW-8 **NLS#: 107029**
Ref. Line 3 of COC 19955 Description: MW-8
Collected: 06/04/96 Received: 06/05/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Base/Neutral/Acid Extraction by 3510B	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Please note that analytical results greater than the MDL but less than the LOQ are within a region of "Less-Certain Quantitation". Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

MDL = Method Detection Limit LOQ = Limit of Quantitation ND = Not Detected Date = Date Analysis Performed
DWB = Dry Weight Basis NA = Not Applicable %DWB = (mg/kg DWB)/10000

Steven R. Cuyler

Reviewed by:

Authorized by:

R. T. Krueger
Laboratory Manager

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644-071

Northern Lake Service Project Number: 27593

Analyte Name	MDL ug/L	LOQ ug/L	10[illegible]27 MW-7 ug/L
Benzene	51	180	150[illegible]
Bromobenzene	160	540	ND
Bromochloromethane	58	200	ND
Bromodichloromethane	71	240	ND
Bromoform	71	240	ND
Bromomethane	50	170	ND
n-Butylbenzene	41	140	200
sec-Butylbenzene	63	220	ND
tert-Butylbenzene	59	200	ND
Carbon Tetrachloride	54	180	ND
Chlorobenzene	56	190	ND
Chloroethane	52	180	ND
Chloroform	22	69	ND
Chloromethane	52	180	ND
2-Chlorotoluene	68	230	ND
4-Chlorotoluene	88	310	ND
Dibromochloromethane	57	200	ND
1,2-Dibromo-3-Chloropropane	230	780	ND
1,2-Dibromoethane	62	210	ND
Dibromomethane	57	150	ND
1,2-Dichlorobenzene	75	260	ND
1,3-Dichlorobenzene	68	230	ND
1,4-Dichlorobenzene	80	280	ND
Dichlorodifluoromethane	51	180	ND
1,1-Dichloroethane	64	220	ND
1,2-Dichloroethane	51	180	ND
1,1-Dichloroethene	53	180	ND
cis-1,2-Dichloroethene	57	200	ND
trans-1,2-Dichloroethene	53	180	ND
1,2-Dichloropropane	52	180	ND
1,3-Dichloropropane	56	190	ND
2,2-Dichloropropane	82	280	ND
1,1-Dichloropropene	52	170	ND
cis-1,3-Dichloropropene	23	79	ND
trans-1,3-Dichloropropene	52	180	ND
Ethylbenzene	55	190	930
Hexachlorobutadiene	100	350	ND
Isopropylbenzene	50	190	ND
p-Isopropyltoluene	50	200	ND
Methylene chloride	57	200	ND
Naphthalene	71	240	3800
n-Propylbenzene	62	210	ND
ortho-Xylene/Styrene	54	190	330
1,1,1,2-Tetrachloroethane	91	220	ND
1,1,2,2-Tetrachloroethane	91	310	ND
Tetrachloroethene	57	210	ND
Toluene	51	180	290
1,2,3-Trichlorobenzene	78	270	ND
1,2,4-Trichlorobenzene	64	210	ND
1,1,1-Trichloroethane	64	220	ND
1,1,2-Trichloroethane	56	150	ND
Trichloroethene	52	180	ND
Trichlorofluoromethane	67	230	ND
1,2,3-Trichloropropane	160	550	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644-071

Northern Lake Service Project Number: 27593

Analyte	MDL	LOQ	10[illegible]27 MW-7
Name	ug/L	ug/L	ug/L
1,2,4-Trimethylbenzene	24	83	260
1,3,5-Trimethylbenzene	76	260	ND
Vinyl chloride	41	130	ND
meta,para-Xylene	120	400	470
tert-Butylmethyl ether	89	310	ND
Isopropyl ether	100	360	ND
Surrogate Recovery on 2-Bromochlorobenzene (PID) = 99.2 %			
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 119 %			

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644-071

Northern Lake Service Project Number: 27593

Analyte	MDL	LOQ	107028 MW-7A
Name	ug/L	ug/L	ug/L
Benzene	95	330	6600
Bromobenzene	160	560	ND
Bromochloromethane	58	180	ND
Bromodichloromethane	60	190	ND
Bromoform	190	660	ND
Bromomethane	170	570	ND
n-Butylbenzene	540	1900	2900
sec-Butylbenzene	290	1000	610
tert-Butylbenzene	290	1000	ND
Carbon Tetrachloride	630	2200	ND
Chlorobenzene	450	1600	ND
Chloroethane	250	870	ND
Chloroform	320	1100	ND
Chloromethane	360	1200	ND
2-Chlorotoluene	290	1000	ND
4-Chlorotoluene	260	880	ND
Dibromochloromethane	120	430	ND
1,2-Dibromo-3-Chloropropane	230	790	ND
1,2-Dibromoethane	120	420	ND
Dibromomethane	110	370	ND
1,2-Dichlorobenzene	66	210	ND
1,3-Dichlorobenzene	400	1400	ND
1,4-Dichlorobenzene	280	970	ND
Dichlorodifluoromethane	350	1200	ND
1,1-Dichloroethane	290	1000	ND
1,2-Dichloroethane	76	240	ND
1,1-Dichloroethene	290	1000	ND
cis-1,2-Dichloroethene	300	1000	ND
trans-1,2-Dichloroethene	280	980	ND
1,2-Dichloropropane	73	230	ND
1,3-Dichloropropane	640	2200	ND
2,2-Dichloropropane	640	2200	ND
1,1-Dichloropropene	270	940	ND
cis-1,3-Dichloropropene	350	1200	ND
trans-1,3-Dichloropropene	280	960	ND
Ethylbenzene	280	970	970
Hexachlorobutadiene	310	1100	ND
Isopropylbenzene	290	1000	ND
p-Isopropyltoluene	320	1100	ND
Methylene chloride	220	770	ND
Naphthalene	240	920	5500
n-Propylbenzene	270	940	2200
ortho-Xylene/Styrene	130	410	2100
1,1,1,2-Tetrachloroethane	70	220	ND
1,1,2,2-Tetrachloroethane	390	1400	ND
Tetrachloroethene	270	920	ND
Toluene	250	970	4600
1,2,3-Trichlorobenzene	150	500	ND
1,2,4-Trichlorobenzene	130	460	ND
1,1,1-Trichloroethane	310	1100	ND
1,1,2-Trichloroethane	150	510	ND
Trichloroethene	340	1200	ND
Trichlorofluoromethane	310	1100	ND
1,2,3-Trichloropropane	390	1400	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644-071

Northern Lake Service Project Number: 27593

Analyte Name	MDL ug/L	LOQ ug/L	107028 MW-7A ug/L
1,2,4-Trimethylbenzene	260	1000	720
1,3,5-Trimethylbenzene	570	2000	ND
Vinyl chloride	180	620	ND
meta,para-Xylene	610	2100	1700
tert-Butylmethyl ether	470	1600	ND
Isopropyl ether	62	200	ND

Surrogate Recovery on 2-Bromochlorobenzene-PID = 92.1 %

Surrogate Recovery on 2-Bromochlorobenzene-HECD = 89.9 %

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270B

Customer: Dames & Moore

Project Description: NSP Project Title: 05644-071

Northern Lake Service Project Number: 27593

Analyte Name	MDL ug/L	LOQ ug/L	107027 MW-7 ug/L
Acenaphthene	1.7	5.4	180
Acenaphthylene	1.7	5.4	ND
4-Aminobiphenyl	1.6	5.4	ND
Aniline	1.4	4.7	ND
Anthracene	1.4	4.5	29
Benzidine	5.7	20	ND
Benzo[a]anthracene	1.3	4.2	9.4
Benzo[a]pyrene	1.5	4.7	11
Benzo[b]fluoranthene	4.5	15	8.8
Benzo[g,h,i]perylene	1.8	5.9	3.2
Benzo[k]fluoranthene	1.4	4.5	ND
Benzoic Acid	6.6	22	ND
Benzyl Alcohol	2.9	9.7	ND
Bis(2-chloroethyl)ether	1.6	5.2	ND
Bis(2-chloroethoxy)methane	1.9	6.3	ND
Bis(2-ethylhexyl)phthalate	1.9	6.1	ND
Bis(2-chloroisopropyl)ether	1.7	5.6	ND
4-Bromophenyl-phenyl ether	1.3	4.5	ND
Butylbenzylphthalate	1.0	3.3	ND
2-Chlorophenol	1.5	5.2	ND
4-Chloro-3-methylphenol	1.6	5.4	ND
1-Chloronaphthalene	1.4	4.7	ND
2-Chloronaphthalene	1.8	6.1	ND
4-Chloroaniline	1.8	5.9	ND
4-Chlorophenyl-phenyl ether	1.5	5.2	ND
Chrysene	1.6	5.2	9.6
Di-n-butylphthalate	1.7	5.9	ND
Di-n-octylphthalate	1.0	3.3	ND
Dibenzo[a,h]anthracene	1.6	5.2	ND
Dibenzofuran	1.6	5.4	7.2
1,2-Dichlorobenzene	1.1	3.5	ND
1,3-Dichlorobenzene	0.96	3.3	ND
1,4-Dichlorobenzene	1.1	3.8	ND
3,3'-Dichlorobenzidine	2.1	7.3	ND
2,4-Dichlorophenol	1.8	6.1	ND
2,6-Dichlorophenol	1.8	5.9	ND
Diethylphthalate	1.9	6.3	ND
2,4-Dimethylphenol	1.2	3.8	160
Dimethylphthalate	1.8	6.1	13
p-(Dimethylamino)azobenzene	1.2	4.0	ND
4,6-Dinitro-2-methylphenol	0.96	3.0	ND
2,4-Dinitrophenol	12	41	ND
2,4-Dinitrotoluene	1.7	5.4	ND
2,6-Dinitrotoluene	1.7	5.9	ND
Diphenylamine	1.6	5.4	ND
1,2-Diphenylhydrazine	2.4	7.8	ND
Fluoranthene	1.4	4.5	29
Fluorene	1.4	4.5	74
Hexachlorobenzene	1.4	4.7	ND
Hexachlorobutadiene	1.3	4.2	ND
Hexachlorocyclopentadiene	2.8	9.4	ND
Hexachloroethane	1.0	3.3	ND
Indeno[1,2,3-cd]pyrene	1.8	5.9	ND
Isophorone	1.7	5.6	ND

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270B

Customer: Dames & Moore

Project Description: NSP Project Title: 05644-071

Northern Lake Service Project Number: 27593

Analyte Name	MDL ug/L	LOQ ug/L	107027 MW-7 ug/L
2-Methylnaphthalene	1.6	5.4	500
2-Methylphenol	1.8	5.9	100
3 & 4-Methylphenol	3.1	10	140
N-nitroso-di-n-propylamine	1.6	5.2	ND
N-nitrosodi-n-butylamine	1.8	5.9	ND
N-nitrosodimethylamine	1.1	3.8	ND
N-nitrosopiperidine	4.8	17	ND
N-nitrosodiphenylamine	1.6	5.4	ND
Naphthalene	2.1	6.6	3100
1-Naphthylamine	1.0	3.3	ND
2-Naphthylamine	1.5	5.2	ND
2-Nitroaniline	1.4	4.7	ND
3-Nitroaniline	1.8	5.9	ND
Nitrobenzene	1.7	5.6	ND
2-Nitrophenol	3.0	10	ND
4-Nitroaniline	1.6	5.4	ND
4-Nitrophenol	1.0	3.3	ND
Pentachlorobenzene	1.5	4.9	ND
Pentachloronitrobenzene	1.5	4.9	ND
Pentachlorophenol	1.5	5.2	ND
Phenanthrene	1.5	4.7	130
Phenol	1.1	3.5	36
Pyrene	1.4	4.5	49
Pyridine	7.3	24	ND
1,2,4,5-Tetrachlorobenzene	1.6	5.4	ND
2,3,4,6-Tetrachlorophenol	1.4	4.5	ND
1,2,4-Trichlorobenzene	1.4	4.7	ND
2,4,5-Trichlorophenol	1.7	5.9	ND
2,4,6-Trichlorophenol	2.0	6.8	ND

Surrogate Recovery on 2-Fluorophenol = 56.3 %

Surrogate Recovery on Phenol-d5 = 37.1 %

Surrogate Recovery on Nitrobenzene-d5 = 113 %

Surrogate Recovery on 2-Fluorobiphenyl = 76.0 %

Surrogate Recovery on 2,4,6-Tribromophenol = 73.0 %

Surrogate Recovery on Terphenyl-d14 = 65.5 %

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270B

Customer: Dames & Moore

Project Description: NSP Project Title: 05644-071

Northern Lake Service Project Number: 27593

Analyte Name	MDL ug/L	LOQ ug/L	107028 MW-7A ug/L
Acenaphthene	1.3	4.1	14
Acenaphthylene	1.3	4.1	ND
4-Aminobiphenyl	1.2	4.1	ND
Aniline	1.1	3.6	ND
Anthracene	1.1	3.4	ND
Benzidine	4.4	15	ND
Benzo[a]anthracene	1.0	3.2	ND
Benzo[a]pyrene	1.2	3.6	ND
Benzo[b]fluoranthene	3.4	11	ND
Benzo[g,h,i]perylene	1.4	4.5	ND
Benzo[k]fluoranthene	1.1	3.4	ND
Benzoic Acid	5.0	17	ND
Benzyl Alcohol	2.2	7.4	ND
Bis(2-chloroethyl)ether	1.2	4.0	ND
Bis(2-chloroethoxy)methane	1.4	4.9	ND
Bis(2-ethylhexyl)phthalate	1.5	4.7	ND
Bis(2-chloroisopropyl)ether	1.3	4.3	ND
4-Bromophenyl-phenyl ether	1.0	3.4	ND
Butylbenzylphthalate	0.77	2.5	ND
2-Chlorophenol	1.2	4.0	ND
4-Chloro-3-methylphenol	1.3	4.1	ND
1-Chloronaphthalene	1.1	3.6	2.4
2-Chloronaphthalene	1.4	4.7	ND
4-Chloroaniline	1.4	4.5	ND
4-Chlorophenyl-phenyl ether	1.2	4.0	ND
Chrysene	1.2	4.0	ND
Di-n-butylphthalate	1.3	4.5	ND
Di-n-octylphthalate	0.77	2.5	ND
Dibenzo[a,h]anthracene	1.3	4.0	ND
Dibenzofuran	1.3	4.1	15
1,2-Dichlorobenzene	0.81	2.7	ND
1,3-Dichlorobenzene	0.74	2.5	ND
1,4-Dichlorobenzene	0.86	2.9	ND
3,3'-Dichlorobenzidine	1.6	5.6	ND
2,4-Dichlorophenol	1.4	4.7	ND
2,6-Dichlorophenol	1.4	4.5	ND
Diethylphthalate	1.5	4.9	ND
2,4-Dimethylphenol	0.92	2.9	110
Dimethylphthalate	1.4	4.7	ND
p-(Dimethylamino azobenzene	0.95	3.1	ND
4,6-Dinitro-2-methylphenol	0.73	2.3	ND
2,4-Dinitrophenol	9.2	32	ND
2,4-Dinitrotoluene	1.3	4.1	ND
2,6-Dinitrotoluene	1.3	4.5	ND
Diphenylamine	1.3	4.1	ND
1,2-Diphenylhydrazine	1.8	5.9	ND
Fluoranthene	1.1	3.4	ND
Fluorene	1.1	3.4	33
Hexachlorobenzene	1.1	3.6	ND
Hexachlorobutadiene	0.97	3.2	ND
Hexachlorocyclopentadiene	2.2	7.2	ND
Hexachloroethane	0.77	2.5	ND
Indeno[1,2,3-cd]pyrene	1.4	4.5	ND
Isophorone	1.3	4.3	ND

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270B

Customer: Dames & Moore

Project Description: NSP Project Title: 05644-071

Northern Lake Service Project Number: 27593

Analyte Name	MDL ug/L	LOQ ug/L	107028 MW-7A ug/L
2-Methylnaphthalene	1.2	4.1	1200
2-Methylphenol	1.4	4.5	39
3 & 4-Methylphenol	2.3	7.7	150
N-nitroso-di-n-propylamine	1.2	4.0	ND
N-nitrosodi-n-butylamine	1.4	4.5	ND
N-nitrosodimethylamine	0.85	2.9	ND
N-nitrosopiperidine	3.7	13	ND
N-nitrosodiphenylamine	1.3	4.1	ND
Naphthalene	1.6	5.0	3900
1-Naphthylamine	0.77	2.5	ND
2-Naphthylamine	1.2	4.0	ND
2-Nitroaniline	1.1	3.6	ND
3-Nitroaniline	1.4	4.5	ND
Nitrobenzene	1.3	4.3	ND
2-Nitrophenol	2.3	7.8	ND
4-Nitroaniline	1.2	4.1	ND
4-Nitrophenol	0.77	2.5	ND
Pentachlorobenzene	1.1	3.8	ND
Pentachloronitrobenzene	1.1	3.8	ND
Pentachlorophenol	1.2	4.0	ND
Phenanthrene	1.1	3.6	16
Phenol	0.81	2.7	14
Pyrene	1.1	3.4	ND
Pyridine	5.6	18	ND
1,2,4,5-Tetrachlorobenzene	1.2	4.1	ND
2,3,4,6-Tetrachlorophenol	1.0	3.4	ND
1,2,4-Trichlorobenzene	1.1	3.6	ND
2,4,5-Trichlorophenol	1.3	4.5	ND
2,4,6-Trichlorophenol	1.5	5.2	ND

Surrogate Recovery on 2-Fluorophenol = 60.4 %

Surrogate Recovery on Phenol-d5 = 39.0 %

Surrogate Recovery on Nitrobenzene-d5 = 160 %

Surrogate Recovery on 2-Fluorobiphenyl = 76.6 %

Surrogate Recovery on 2,4,6-Tribromophenol = 74.5 %

Surrogate Recovery on Terphenyl-d14 = 68.5 %

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270B

Customer: Dames & Moore

Project Description: NSP Project Title: 05644-071

Northern Lake Service Project Number: 27593

Analyte	MDL	LOQ	107029 MW-8
Name	ug/L	ug/L	ug/L
Acenaphthene	1.5	4.9	ND
Acenaphthylene	1.5	4.9	ND
4-Aminobiphenyl	1.4	4.9	ND
Aniline	1.3	4.3	ND
Anthracene	1.3	4.1	ND
Benzidine	5.2	18	ND
Benzo[a]anthracene	1.2	3.9	ND
Benzo[a]pyrene	1.4	4.3	ND
Benzo[b]fluoranthene	4.1	14	ND
Benzo[g,h,i]perylene	1.7	5.4	ND
Benzo[k]fluoranthene	1.3	4.1	ND
Benzoic Acid	6.0	20	ND
Benzyl Alcohol	2.7	8.9	ND
Bis(2-chloroethyl)ether	1.4	4.7	ND
Bis(2-chloroethoxy)methane	1.7	5.8	ND
Bis(2-ethylhexyl)phthalate	1.8	5.6	ND
Bis(2-chloroisopropyl)ether	1.5	5.2	ND
4-Bromophenyl-phenyl ether	1.2	4.1	ND
Butylbenzylphthalate	0.92	3.0	ND
2-Chlorophenol	1.4	4.7	ND
4-Chloro-3-methylphenol	1.5	4.9	ND
1-Chloronaphthalene	1.3	4.3	ND
2-Chloronaphthalene	1.7	5.6	ND
4-Chloroaniline	1.6	5.4	ND
4-Chlorophenyl-phenyl ether	1.4	4.7	ND
Chrysene	1.5	4.7	ND
Di-n-butylphthalate	1.6	5.4	ND
Di-n-octylphthalate	0.92	3.0	ND
Dibenzo[a,h]anthracene	1.5	4.7	ND
Dibenzofuran	1.5	4.9	ND
1,2-Dichlorobenzene	0.97	3.2	ND
1,3-Dichlorobenzene	0.88	3.0	ND
1,4-Dichlorobenzene	1.0	3.4	ND
3,3'-Dichlorobenzidine	1.9	6.7	ND
2,4-Dichlorophenol	1.7	5.6	ND
2,6-Dichlorophenol	1.6	5.4	ND
Diethylphthalate	1.7	5.8	ND
2,4-Dimethylphenol	1.1	3.4	ND
Dimethylphthalate	1.7	5.6	ND
p-(Dimethylamino)azobenzene	1.1	3.7	ND
4,6-Dinitro-2-methylphenol	0.88	2.8	ND
2,4-Dinitrophenol	11	38	ND
2,4-Dinitrotoluene	1.5	4.9	ND
2,6-Dinitrotoluene	1.6	5.4	ND
Diphenylamine	1.5	4.9	ND
1,2-Diphenylhydrazine	2.2	7.1	ND
Fluoranthene	1.3	4.1	ND
Fluorene	1.3	4.1	ND
Hexachlorobenzene	1.3	4.3	ND
Hexachlorobutadiene	1.2	3.9	ND
Hexachlorocyclopentadiene	2.6	8.6	ND
Hexachloroethane	0.92	3.0	ND
Indeno[1,2,3-cd]pyrene	1.7	5.4	ND
Isophorone	1.5	5.2	ND

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270B

Customer: Dames & Moore

Project Description: NSP Project Title: 05644-071

Northern Lake Service Project Number: 27593

Analyte Name	MDL ug/L	LOQ ug/L	107029 MW-8 ug/L
2-Methylnaphthalene	1.5	4.9	ND
2-Methylphenol	1.6	5.4	ND
3 & 4-Methylphenol	2.8	9.2	ND
N-nitroso-di-n-propylamine	1.4	4.7	ND
N-nitrosodi-n-butylamine	1.6	5.4	ND
N-nitrosodimethylamine	1.0	3.4	ND
N-nitrosopiperidine	4.4	15	ND
N-nitrosodiphenylamine	1.5	4.9	ND
Naphthalene	1.9	6.0	ND
1-Naphthylamine	0.92	3.0	ND
2-Naphthylamine	1.4	4.7	ND
2-Nitroaniline	1.3	4.3	ND
3-Nitroaniline	1.6	5.4	ND
Nitrobenzene	1.5	5.2	ND
2-Nitrophenol	2.8	9.3	ND
4-Nitroaniline	1.5	4.9	ND
4-Nitrophenol	0.92	3.0	ND
Pentachlorobenzene	1.4	4.5	ND
Pentachloronitrobenzene	1.3	4.5	ND
Pentachlorophenol	1.4	4.7	ND
Phenanthrene	1.4	4.3	ND
Phenol	0.97	3.2	ND
Pyrene	1.3	4.1	ND
Pyridine	6.7	22	ND
1,2,4,5-Tetrachlorobenzene	1.5	4.9	ND
2,3,4,6-Tetrachlorophenol	1.2	4.1	ND
1,2,4-Trichlorobenzene	1.3	4.3	ND
2,4,5-Trichlorophenol	1.6	5.4	ND
2,4,6-Trichlorophenol	1.8	6.2	ND

Surrogate Recovery on 2-Fluorophenol = 53.0 %

Surrogate Recovery on Phenol-d5 = 36.2 %

Surrogate Recovery on Nitrobenzene-d5 = 76.4 %

Surrogate Recovery on 2-Fluorobiphenyl = 77.4 %

Surrogate Recovery on 2,4,6-Tribromophenol = 71.3 %

Surrogate Recovery on Terphenyl-d14 = 66.4 %

NORTHERN LAKE SERVICE, INC.

Analytical Laboratory and Environmental Services

400 North Lake Avenue • Crandon, WI 54520
Tel: (715) 478-2777 • Fax: (715) 478-3060

NO. 19955

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

Wisconsin Lab Cert. No. 721026460

RETURN THIS FORM WITH SAMPLES.

CLIENT: Dames & Moore		PROJECT TITLE: NSP	
ADDRESS: 2701 International ln		PROJECT NO.: 05644-071	P.O. NO.:
CITY: Madison	STATE: WI ZIP: 53704	CONTACT: Dave Trainor	PHONE: 608 244 1785

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION DATE	COLLECTION TIME	SAMPLE TYPE	GRAB/ COMP.	CONTAINER/PRESERVATIVE VH	VN	GNP			COLLECTION REMARKS
1.	[illegible]	MW-7	6/4/96	1400	GW	GRAB	3	1	2			
2.	[illegible]	MW-7A	↓	1300	↓	↓	3	1	2			
3.	[illegible]	MW-8			↓	↓			1			
4.		Temp Blank										
5.												
6.												
7.												
8.												
9.												
10.												
11.												
12.												

SAMPLE TYPE:
SW = surface water; DW = drinking water; PROD = product
WW = wastewater; TIS = tissue; SOIL = soil
GW = groundwater; AIR = air; SED = sediment
describe others

CONTAINER
P = plast[illegible]
G = glass
V = glass vial
B = plastic bag
describe others

PRESERVATIVES & PREPARATION
NP = nothing added; OH = sodium hydroxide
S = sulfuric acid; HA = hydrochloric & ascorbic acid
N = nitric acid
Z = zinc acetate
H = hydrochloric acid
describe others
F = field filtered

COLLECTED BY (signature): James D Schlich	CUSTODY SEAL NO. (IF ANY)	DATE/TIME: 6/4/96 1400
RELINQUISHED BY (signature): James D Schlich	RECEIVED BY (signature)	DATE/TIME: 6/4/96 1500
RELINQUISHED BY (signature)	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature)	METHOD OF TRANSPORT	DATE/TIME

RECEIVED AT NLS BY (signature): [illegible]	DATE/TIME: 6/5/96 9:15	CONDITION: on ice	TEMP: 12 / 9
SEAL INTACT? ☐ YES ☐ NO N/A	SEAL #	REMARKS & OTHER INFORMATION	
UPS			

IMPORTANT: 1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE SHIPPER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP PINK COPY.

DUPLICATE COPY

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 27568

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
Suite 210
Madison, WI 53704

Project Description: NSP
Project Title: 05644071

Sample ID: MW-4A **NLS#: 106927**
Ref. Line 1 of COC 19978 Description: MW-4A
Collected: 06/02/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	4.4	ug/L	1.6	5.7	SW846 6010	06/05/96
Cadmium, dis. as Cd by ICP	0.69	ug/L	0.12	0.38	SW846 6010	06/05/96
Chromium, dis. as Cr by ICP	1.4	ug/L	0.26	0.93	SW846 6010	06/05/96
Copper, dis. as Cu by ICP	3.3	ug/L	0.54	1.9	SW846 6010	06/05/96
Iron, dis. as Fe by ICP	2.3	mg/L	0.0010	0.0035	SW846 6010	06/05/96
Lead, dis. as Pb by ICP	ND	ug/L	1.5	5.2	SW846 6010	06/05/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/12/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/05/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/11/96
Base/Neutral/Acid Extraction	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Additional Comments: Surrogate Nitrobenzene-d5 elevated due to matrix interference.

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 27568

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
Suite 210
Madison, WI 53704

Project Description: NSP
Project Title: 05644071

Sample ID: MW-4B **NLS#: 106928**
Ref. Line 2 of COC 19978 Description: MW-4B
Collected: 06/02/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.6	5.7	SW846 6010	06/05/96
Cadmium, dis. as Cd by ICP	ND	ug/L	0.12	0.38	SW846 6010	06/05/96
Chromium, dis. as Cr by ICP	ND	ug/L	0.26	0.93	SW846 6010	06/05/96
Copper, dis. as Cu by ICP	3.1	ug/L	0.54	1.9	SW846 6010	06/05/96
Iron, dis. as Fe by ICP	0.011	mg/L	0.0010	0.0035	SW846 6010	06/05/96
Lead, dis. as Pb by ICP	ND	ug/L	1.5	5.2	SW846 6010	06/05/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/12/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/05/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/12/96
Base/Neutral/Acid Extraction	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Additional Comments: Surrogate recovery for Nitrobenzene-d5 elevated due to matrix interference.

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 27568

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
Suite 210
Madison, WI 53704

Project Description: NSP
Project Title: 05644071

Sample ID: MW-6 **NLS#: 106929**
Ref. Line 3 of COC 19978 Description: MW-6
Collected: 05/31/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.6	5.7	SW846 6010	06/05/96
Cadmium, dis. as Cd by ICP	0.31	ug/L	0.12	0.38	SW846 6010	06/05/96
Chromium, dis. as Cr by ICP	0.41	ug/L	0.26	0.93	SW846 6010	06/05/96
Copper, dis. as Cu by ICP	6.8	ug/L	0.54	1.9	SW846 6010	06/05/96
Iron, dis. as Fe by ICP	0.046	mg/L	0.0010	0.0035	SW846 6010	06/05/96
Lead, dis. as Pb by ICP	1.8	ug/L	1.5	5.2	SW846 6010	06/05/96
Selenium, dis. as Se by furnace	ND	ug/L	18	65	SW846 7740	06/13/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/05/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/11/96
Base/Neutral/Acid Extraction	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Sample ID: MW-6A **NLS#: 106930**
Ref. Line 4 of COC 19978 Description: MW-6A
Collected: 05/31/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	2.2	ug/L	1.6	5.7	SW846 6010	06/05/96
Cadmium, dis. as Cd by ICP	ND	ug/L	0.12	0.38	SW846 6010	06/05/96
Chromium, dis. as Cr by ICP	0.87	ug/L	0.26	0.93	SW846 6010	06/05/96
Copper, dis. as Cu by ICP	3.9	ug/L	0.54	1.9	SW846 6010	06/05/96
Iron, dis. as Fe by ICP	0.0046	mg/L	0.0010	0.0035	SW846 6010	06/05/96
Lead, dis. as Pb by ICP	1.8	ug/L	1.5	5.2	SW846 6010	06/05/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/12/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/05/96
VOCs (water) by EPA 8021	see attached **Additional Comments:** Trichlorofluoromethane was detected in the laboratory blank at .281 ug/L.				SW846 8021	06/11/96
Base/Neutral/Acid Extraction	yes				EPA 3510B	06/07/96

Sample# 106930 results continued on next page.

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 27568

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
Suite 210
Madison, WI 53704

Project Description: NSP
Project Title: 05644071

Sample ID: MW-6A NLS#: 106930 (continued)
Ref. Line 4 of COC 19978 Description: MW-6A
Collected: 05/31/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Sample ID: MW-8 NLS#: 106931
Ref. Line 5 of COC 19978 Description: MW-8
Collected: 06/02/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.6	5.7	SW846 6010	06/05/96
Cadmium, dis. as Cd by ICP	ND	ug/L	0.12	0.38	SW846 6010	06/05/96
Chromium, dis. as Cr by ICP	8.3	ug/L	0.26	0.93	SW846 6010	06/05/96
Copper, dis. as Cu by ICP	3.9	ug/L	0.54	1.9	SW846 6010	06/05/96
Iron, dis. as Fe by ICP	0.086	mg/L	0.0010	0.0035	SW846 6010	06/05/96
Lead, dis. as Pb by ICP	ND	ug/L	1.5	5.2	SW846 6010	06/05/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/12/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/05/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/12/96

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Tel:(715)478-2777 Fax:(715)478-3060

WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 27568

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
Suite 210
Madison, WI 53704

Project Description: NSP
Project Title: 05644071

Sample ID: MW-8A **NLS#: 106932**
Ref. Line 6 of COC 19978 Description: MW-8A
Collected: 06/02/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.6	5.7	SW846 6010	06/05/96
Cadmium, dis. as Cd by ICP	ND	ug/L	0.12	0.38	SW846 6010	06/05/96
Chromium, dis. as Cr by ICP	ND	ug/L	0.26	0.93	SW846 6010	06/05/96
Copper, dis. as Cu by ICP	0.91	ug/L	0.54	1.9	SW846 6010	06/05/96
Iron, dis. as Fe by ICP	0.027	mg/L	0.0010	0.0035	SW846 6010	06/05/96
Lead, dis. as Pb by ICP	ND	ug/L	1.5	5.2	SW846 6010	06/05/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/12/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/05/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/12/96
Base/Neutral/Acid Extraction	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Sample ID: MW-13A **NLS#: 106933**
Ref. Line 7 of COC 19978 Description: MW-13A
Collected: 06/02/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.6	5.7	SW846 6010	06/05/96
Cadmium, dis. as Cd by ICP	ND	ug/L	0.12	0.38	SW846 6010	06/05/96
Chromium, dis. as Cr by ICP	ND	ug/L	0.26	0.93	SW846 6010	06/05/96
Copper, dis. as Cu by ICP	1.5	ug/L	0.54	1.9	SW846 6010	06/05/96
Iron, dis. as Fe by ICP	0.11	mg/L	0.0010	0.0035	SW846 6010	06/05/96
Lead, dis. as Pb by ICP	ND	ug/L	1.5	5.2	SW846 6010	06/05/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/12/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/05/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/12/96
Base/Neutral/Acid Extraction	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Additional Comments: Surrogate recovery for Nitrobenzene-d5 elevated due to matrix interference.

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WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 27568

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
Suite 210
Madison, WI 53704

Project Description: NSP
Project Title: 05644071

Sample ID: MW-13B **NLS#: 106934**
Ref. Line 8 of COC 19978 Description: MW-13B
Collected: 06/02/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.6	5.7	SW846 6010	06/05/96
Cadmium, dis. as Cd by ICP	ND	ug/L	0.12	0.38	SW846 6010	06/05/96
Chromium, dis. as Cr by ICP	ND	ug/L	0.26	0.93	SW846 6010	06/05/96
Copper, dis. as Cu by ICP	1.0	ug/L	0.54	1.9	SW846 6010	06/05/96
Iron, dis. as Fe by ICP	0.011	mg/L	0.0010	0.0035	SW846 6010	06/05/96
Lead, dis. as Pb by ICP	3.1	ug/L	1.5	5.2	SW846 6010	06/05/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/12/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/05/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/12/96
Base/Neutral/Acid Extraction	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Additional Comments: Surrogate recovery for Nitrobenzene-d5 elevated due to matrix interference.

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WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 27568

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
Suite 210
Madison, WI 53704

Project Description: NSP
Project Title: 05644071

Sample ID: MW-5C **NLS#: 106935**
Ref. Line 9 of COC 19978 Description: MW-5C
Collected: 06/02/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.6	5.7	SW846 6010	06/05/96
Cadmium, dis. as Cd by ICP	ND	ug/L	0.12	0.38	SW846 6010	06/05/96
Chromium, dis. as Cr by ICP	ND	ug/L	0.26	0.93	SW846 6010	06/05/96
Copper, dis. as Cu by ICP	ND	ug/L	0.54	1.9	SW846 6010	06/05/96
Iron, dis. as Fe by ICP	0.043	mg/L	0.0010	0.0035	SW846 6010	06/05/96
Lead, dis. as Pb by ICP	ND	ug/L	1.5	5.2	SW846 6010	06/05/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/17/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/05/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/12/96
Base/Neutral/Acid Extraction	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Sample ID: Trip Blank **NLS#: 106936**
Ref. Line 11 of COC 19978 Description: Trip Blank
Collected: 06/02/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
VOCs (water) by EPA 8021	see attached				EPA 8021	06/12/96

Additional Comments: The final calibration check standard for naphthalene was 78%. EPA requires 85% to 115%. The initial calibration check standard and matrix spike and duplicate were within QC limits.

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WIS. LAB CERT. NO. 721026460

ANALYTICAL REPORT

 NLS PROJECT# 27568

Client: Dames & Moore
Attn: Dave Trainor
2701 International Lane
Suite 210
Madison, WI 53704

Project Description: NSP
Project Title: 05644071

Sample ID: FB-1 **NLS#: 106937**
Ref. Line 12 of COC 19978 Description: FB-1
Collected: 06/02/96 Received: 06/04/96 Reported: 06/19/96

Parameter	Result	Units	MDL	LOQ	Method	Date
Arsenic, dis. as As by ICP	ND	ug/L	1.6	5.7	SW846 6010	06/05/96
Cadmium, dis. as Cd by ICP	ND	ug/L	0.12	0.38	SW846 6010	06/05/96
Chromium, dis. as Cr by ICP	ND	ug/L	0.26	0.93	SW846 6010	06/05/96
Copper, dis. as Cu by ICP	ND	ug/L	0.54	1.9	SW846 6010	06/05/96
Iron, dis. as Fe by ICP	0.013	mg/L	0.0010	0.0035	SW846 6010	06/05/96
Lead, dis. as Pb by ICP	ND	ug/L	1.5	5.2	SW846 6010	06/05/96
Selenium, dis. as Se by furnace	ND	ug/L	1.8	6.5	SW846 7740	06/17/96
Zinc, dis. as Zn by ICP	ND	ug/L	12	12	SW846 6010	06/05/96
VOCs (water) by EPA 8021	see attached				SW846 8021	06/12/96
	Additional Comments: The final calibration check standard for naphthalene was 78%. EPA requires 85% to 115%. The initial calibration check standard and matrix spike and duplicate were within QC limits.					
Base/Neutral/Acid Extraction	yes				EPA 3510B	06/07/96
Semivolatile GC/MS by 8270B	see attached				EPA 8270B	06/09/96

Please note that analytical results greater than the MDL but less than the LOQ are within a region of "Less-Certain Quantitation". Results greater than the LOQ are considered to be in the region of "Certain Quantitation".

MDL = Method Detection Limit LOQ = Limit of Quantitation ND = Not Detected Date = Date Analysis Performed
DWB = Dry Weight Basis NA = Not Applicable %DWB = (mg/kg DWB)/10000

Reviewed by: Tony Bock

Authorized by:
R. T. Krueger
Laboratory Manager

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106927 MW-4A ug/L
Benzene	280	780	12000
Bromobenzene	400	1400	ND
Bromochloromethane	220	740	ND
Bromodichloromethane	320	1200	ND
Bromoform	120	370	ND
Bromomethane	220	720	ND
n-Butylbenzene	340	1200	ND
sec-Butylbenzene	270	930	1400
tert-Butylbenzene	360	1200	ND
Carbon Tetrachloride	220	750	ND
Chlorobenzene	240	820	ND
Chloroethane	230	800	ND
Chloroform	290	990	ND
Chloromethane	240	830	ND
2-Chlorotoluene	320	1100	ND
4-Chlorotoluene	310	1200	ND
Dibromochloromethane	310	1000	ND
1,2-Dibromo-3-Chloropropane	550	1900	ND
1,2-Dibromoethane	950	1000	ND
Dibromomethane	520	1800	ND
1,2-Dichlorobenzene	430	1500	ND
1,3-Dichlorobenzene	300	1000	ND
1,4-Dichlorobenzene	270	930	ND
Dichlorodifluoromethane	360	1200	ND
1,1-Dichloroethane	350	1200	ND
1,2-Dichloroethane	320	1100	ND
1,1-Dichloroethene	250	870	ND
cis-1,2-Dichloroethene	220	740	ND
trans-1,2-Dichloroethene	350	1200	ND
1,2-Dichloropropane	290	1000	ND
1,3-Dichloropropane	290	1000	ND
2,2-Dichloropropane	720	2500	ND
1,1-Dichloropropene	400	1400	ND
cis-1,3-Dichloropropene	300	1000	ND
trans-1,3-Dichloropropene	270	920	ND
Ethylbenzene	260	890	2100
Hexachlorobutadiene	280	970	ND
Isopropylbenzene	260	910	ND
p-Isopropyltoluene	310	1100	ND
Methylene chloride	250	850	ND
Naphthalene	320	1200	10000
n-Propylbenzene	280	970	ND
ortho-Xylene/Styrene	410	1600	5500
1,1,1,2-Tetrachloroethane	760	2600	ND
1,1,2,2-Tetrachloroethane	380	1300	ND
Tetrachloroethene	210	830	ND
Toluene	220	760	8800
1,2,3-Trichlorobenzene	310	1100	ND
1,2,4-Trichlorobenzene	350	1200	ND
1,1,1-Trichloroethane	320	1100	ND
1,1,2-Trichloroethane	270	930	ND
Trichloroethene	250	850	ND
Trichlorofluoromethane	200	710	ND
1,2,3-Trichloropropane	260	860	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106927 MW-4A ug/L
1,2,4-Trimethylbenzene	280	980	1500
1,3,5-Trimethylbenzene	560	1900	2400
Vinyl chloride	330	1100	ND
meta,para-Xylene	520	1800	4200
tert-Butylmethyl ether	260	980	ND
Isopropyl ether	260	980	ND

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 95.7 %

Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 110 %

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106928 MW-4B ug/L
Benzene	19	66	430
Bromobenzene	32	110	ND
Bromochloromethane	12	37	ND
Bromodichloromethane	12	38	ND
Bromoform	38	130	ND
Bromomethane	34	110	ND
n-Butylbenzene	110	380	770
sec-Butylbenzene	59	200	150
tert-Butylbenzene	58	200	ND
Carbon Tetrachloride	130	430	ND
Chlorobenzene	90	310	ND
Chloroethane	50	170	ND
Chloroform	64	220	ND
Chloromethane	71	240	ND
2-Chlorotoluene	58	200	ND
4-Chlorotoluene	52	180	ND
Dibromochloromethane	25	86	ND
1,2-Dibromo-3-Chloropropane	46	160	ND
1,2-Dibromoethane	24	84	ND
Dibromomethane	21	73	ND
1,2-Dichlorobenzene	13	42	ND
1,3-Dichlorobenzene	79	270	ND
1,4-Dichlorobenzene	56	190	ND
Dichlorodifluoromethane	70	240	ND
1,1-Dichloroethane	59	200	ND
1,2-Dichloroethane	15	48	ND
1,1-Dichloroethene	59	200	ND
cis-1,2-Dichloroethene	60	210	ND
trans-1,2-Dichloroethene	57	200	ND
1,2-Dichloropropane	15	46	ND
1,3-Dichloropropane	130	440	ND
2,2-Dichloropropane	130	440	ND
1,1-Dichloropropene	54	190	ND
cis-1,3-Dichloropropene	70	240	ND
trans-1,3-Dichloropropene	56	190	ND
Ethylbenzene	56	190	110
Hexachlorobutadiene	62	210	ND
Isopropylbenzene	58	200	96
p-Isopropyltoluene	64	220	ND
Methylene chloride	45	150	ND
Naphthalene	47	180	1800
n-Propylbenzene	54	190	ND
ortho-Xylene/Styrene	26	81	580
1,1,1,2-Tetrachloroethane	14	45	ND
1,1,2,2-Tetrachloroethane	78	270	ND
Tetrachloroethene	54	180	ND
Toluene	50	190	580
1,2,3-Trichlorobenzene	29	100	ND
1,2,4-Trichlorobenzene	27	92	ND
1,1,1-Trichloroethane	63	220	ND
1,1,2-Trichloroethane	30	100	ND
Trichloroethene	69	240	ND
Trichlorofluoromethane	62	220	ND
1,2,3-Trichloropropane	78	270	ND

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106928 MW-4B ug/L
1,2,4-Trimethylbenzene	51	200	190
1,3,5-Trimethylbenzene	110	400	170
Vinyl chloride	36	120	ND
meta,para-Xylene	120	420	390
tert-Butylmethyl ether	94	320	ND
Isopropyl ether	12	39	ND

Surrogate Recovery on 2-Bromochlorobenzene-PID = 95.0 %
Surrogate Recovery on 2-Bromochlorobenzene-HECD = 82.6 %

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106929 MW-6 ug/L
Benzene	0.28	0.78	ND
Bromobenzene	0.40	1.4	ND
Bromochloromethane	0.22	0.74	ND
Bromodichloromethane	0.32	1.2	ND
Bromoform	0.12	0.37	ND
Bromomethane	0.22	0.72	ND
n-Butylbenzene	0.34	1.2	ND
sec-Butylbenzene	0.27	0.93	ND
tert-Butylbenzene	0.36	1.2	ND
Carbon Tetrachloride	0.22	0.75	ND
Chlorobenzene	0.24	0.82	ND
Chloroethane	0.23	0.80	ND
Chloroform	0.29	0.99	ND
Chloromethane	0.24	0.83	ND
2-Chlorotoluene	0.32	1.1	ND
4-Chlorotoluene	0.31	1.2	ND
Dibromochloromethane	0.31	1.0	ND
1,2-Dibromo-3-Chloropropane	0.55	1.9	ND
1,2-Dibromoethane	0.95	1.0	ND
Dibromomethane	0.52	1.8	ND
1,2-Dichlorobenzene	0.43	1.5	ND
1,3-Dichlorobenzene	0.30	1.0	ND
1,4-Dichlorobenzene	0.27	0.93	ND
Dichlorodifluoromethane	0.36	1.2	ND
1,1-Dichloroethane	0.35	1.2	ND
1,2-Dichloroethane	0.32	1.1	ND
1,1-Dichloroethene	0.25	0.87	ND
cis-1,2-Dichloroethene	0.22	0.74	ND
trans-1,2-Dichloroethene	0.35	1.2	ND
1,2-Dichloropropane	0.29	1.0	ND
1,3-Dichloropropane	0.29	1.0	ND
2,2-Dichloropropane	0.72	2.5	ND
1,1-Dichloropropene	0.40	1.4	ND
cis-1,3-Dichloropropene	0.30	1.0	ND
trans-1,3-Dichloropropene	0.27	0.92	ND
Ethylbenzene	0.26	0.89	ND
Hexachlorobutadiene	0.28	0.97	ND
Isopropylbenzene	0.26	0.91	ND
p-Isopropyltoluene	0.31	1.1	ND
Methylene chloride	0.25	0.85	ND
Naphthalene	0.32	1.2	0.86
n-Propylbenzene	0.28	0.97	ND
ortho-Xylene/Styrene	0.41	1.6	2.2
1,1,1,2-Tetrachloroethane	0.76	2.6	ND
1,1,2,2-Tetrachloroethane	0.38	1.3	ND
Tetrachloroethene	0.21	0.83	ND
Toluene	0.22	0.76	ND
1,2,3-Trichlorobenzene	0.31	1.1	ND
1,2,4-Trichlorobenzene	0.35	1.2	ND
1,1,1-Trichloroethane	0.32	1.1	ND
1,1,2-Trichloroethane	0.27	0.93	ND
Trichloroethene	0.25	0.85	ND
Trichlorofluoromethane	0.20	0.71	ND
1,2,3-Trichloropropane	0.26	0.86	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106929 MW-6 ug/L
1,2,4-Trimethylbenzene	0.28	0.98	ND
1,3,5-Trimethylbenzene	0.56	1.9	ND
Vinyl chloride	0.33	1.1	ND
meta,para-Xylene	0.52	1.8	ND
tert-Butylmethyl ether	0.26	0.98	ND
Isopropyl ether	0.26	0.98	ND

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 96.8 %

Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 108 %

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106930 MW-6A ug/L
Benzene	0.28	0.78	ND
Bromobenzene	0.40	1.4	ND
Bromochloromethane	0.22	0.74	ND
Bromodichloromethane	0.32	1.2	1.2
Bromoform	0.12	0.37	ND
Bromomethane	0.22	0.72	ND
n-Butylbenzene	0.34	1.2	ND
sec-Butylbenzene	0.27	0.93	ND
tert-Butylbenzene	0.36	1.2	ND
Carbon Tetrachloride	0.22	0.75	ND
Chlorobenzene	0.24	0.82	ND
Chloroethane	0.23	0.80	ND
Chloroform	0.29	0.99	9.3
Chloromethane	0.24	0.83	ND
2-Chlorotoluene	0.32	1.1	ND
4-Chlorotoluene	0.31	1.2	ND
Dibromochloromethane	0.31	1.0	ND
1,2-Dibromo-3-Chloropropane	0.55	1.9	ND
1,2-Dibromoethane	0.95	1.0	ND
Dibromomethane	0.52	1.8	ND
1,2-Dichlorobenzene	0.43	1.5	ND
1,3-Dichlorobenzene	0.30	1.0	ND
1,4-Dichlorobenzene	0.27	0.93	ND
Dichlorodifluoromethane	0.36	1.2	ND
1,1-Dichloroethane	0.35	1.2	ND
1,2-Dichloroethane	0.32	1.1	ND
1,1-Dichloroethene	0.25	0.87	ND
cis-1,2-Dichloroethene	0.22	0.74	ND
trans-1,2-Dichloroethene	0.35	1.2	ND
1,2-Dichloropropane	0.29	1.0	ND
1,3-Dichloropropane	0.29	1.0	ND
2,2-Dichloropropane	0.72	2.5	ND
1,1-Dichloropropene	0.40	1.4	ND
cis-1,3-Dichloropropene	0.30	1.0	ND
trans-1,3-Dichloropropene	0.27	0.92	ND
Ethylbenzene	0.26	0.89	ND
Hexachlorobutadiene	0.28	0.97	ND
Isopropylbenzene	0.26	0.91	ND
p-Isopropyltoluene	0.31	1.1	ND
Methylene chloride	0.25	0.85	ND
Naphthalene	0.32	1.2	ND
n-Propylbenzene	0.28	0.97	ND
ortho-Xylene/Styrene	0.41	1.6	2.3
1,1,1,2-Tetrachloroethane	0.76	2.6	ND
1,1,2,2-Tetrachloroethane	0.38	1.3	ND
Tetrachloroethene	0.21	0.83	1.4
Toluene	0.22	0.76	ND
1,2,3-Trichlorobenzene	0.31	1.1	ND
1,2,4-Trichlorobenzene	0.35	1.2	ND
1,1,1-Trichloroethane	0.32	1.1	ND
1,1,2-Trichloroethane	0.27	0.93	ND
Trichloroethene	0.25	0.85	1.0
Trichlorofluoromethane	0.20	0.71	0.21
1,2,3-Trichloropropane	0.26	0.86	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106930 MW-6A ug/L
1,2,4-Trimethylbenzene	0.28	0.98	ND
1,3,5-Trimethylbenzene	0.56	1.9	ND
Vinyl chloride	0.33	1.1	ND
meta,para-Xylene	0.52	1.8	ND
tert-Butylmethyl ether	0.26	0.98	ND
Isopropyl ether	0.26	0.98	ND

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 95.7 %

Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 108 %

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106931 MW-8 ug/L
Benzene	0.95	3.3	38
Bromobenzene	1.6	5.6	ND
Bromochloromethane	0.58	1.8	ND
Bromodichloromethane	0.60	1.9	1.3
Bromoform	1.9	6.6	ND
Bromomethane	1.7	5.7	ND
n-Butylbenzene	5.4	19	30
sec-Butylbenzene	2.9	10	7.6
tert-Butylbenzene	2.9	10	ND
Carbon Tetrachloride	6.3	22	ND
Chlorobenzene	4.5	16	ND
Chloroethane	2.5	8.7	ND
Chloroform	3.2	11	4.7
Chloromethane	3.6	12	ND
2-Chlorotoluene	2.9	10	ND
4-Chlorotoluene	2.6	8.8	ND
Dibromochloromethane	1.2	4.3	ND
1,2-Dibromo-3-Chloropropane	2.3	7.9	ND
1,2-Dibromoethane	1.2	4.2	ND
Dibromomethane	1.1	3.7	ND
1,2-Dichlorobenzene	0.66	2.1	ND
1,3-Dichlorobenzene	4.0	14	ND
1,4-Dichlorobenzene	2.8	9.7	ND
Dichlorodifluoromethane	3.5	12	ND
1,1-Dichloroethane	2.9	10	ND
1,2-Dichloroethane	0.76	2.4	ND
1,1-Dichloroethene	2.9	10	ND
cis-1,2-Dichloroethene	3.0	10	ND
trans-1,2-Dichloroethene	2.8	9.8	ND
1,2-Dichloropropane	0.73	2.3	ND
1,3-Dichloropropane	6.4	22	ND
2,2-Dichloropropane	6.4	22	ND
1,1-Dichloropropene	2.7	9.4	ND
cis-1,3-Dichloropropene	3.5	12	ND
trans-1,3-Dichloropropene	2.8	9.6	ND
Ethylbenzene	2.8	9.7	ND
Hexachlorobutadiene	3.1	11	ND
Isopropylbenzene	2.9	10	ND
p-Isopropyltoluene	3.2	11	ND
Methylene chloride	2.2	7.7	ND
Naphthalene	2.4	9.2	93
n-Propylbenzene	2.7	9.4	ND
ortho-Xylene/Styrene	1.3	4.1	18
1,1,1,2-Tetrachloroethane	0.70	2.2	ND
1,1,2,2-Tetrachloroethane	3.9	14	ND
Tetrachloroethene	2.7	9.2	ND
Toluene	2.5	9.7	22
1,2,3-Trichlorobenzene	1.5	5.0	2.9
1,2,4-Trichlorobenzene	1.3	4.6	ND
1,1,1-Trichloroethane	3.1	11	ND
1,1,2-Trichloroethane	1.5	5.1	ND
Trichloroethene	3.4	12	ND
Trichlorofluoromethane	3.1	11	ND
1,2,3-Trichloropropane	3.9	14	ND

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106931 MW-8 ug/L
1,2,4-Trimethylbenzene	2.6	10	7.1
1,3,5-Trimethylbenzene	5.7	20	ND
Vinyl chloride	1.8	6.2	ND
meta,para-Xylene	6.1	21	14
tert-Butylmethyl ether	4.7	16	ND
Isopropyl ether	0.62	2.0	ND

Surrogate Recovery on 2-Bromochlorobenzene-PID = 97.6 %
Surrogate Recovery on 2-Bromochlorobenzene-HECD = 83.0 %

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106932 MW-8A ug/L
Benzene	55	160	25000
Bromobenzene	80	270	ND
Bromochloromethane	43	150	ND
Bromodichloromethane	63	240	ND
Bromoform	23	73	ND
Bromomethane	43	140	ND
n-Butylbenzene	67	230	ND
sec-Butylbenzene	54	190	230
tert-Butylbenzene	72	250	ND
Carbon Tetrachloride	44	150	ND
Chlorobenzene	48	160	ND
Chloroethane	46	160	ND
Chloroform	57	200	ND
Chloromethane	48	170	ND
2-Chlorotoluene	64	220	ND
4-Chlorotoluene	61	240	ND
Dibromochloromethane	61	210	ND
1,2-Dibromo-3-Chloropropane	110	380	ND
1,2-Dibromoethane	190	210	ND
Dibromomethane	100	360	ND
1,2-Dichlorobenzene	86	300	ND
1,3-Dichlorobenzene	61	210	ND
1,4-Dichlorobenzene	54	190	ND
Dichlorodifluoromethane	72	250	ND
1,1-Dichloroethane	71	240	ND
1,2-Dichloroethane	64	220	ND
1,1-Dichloroethene	50	170	ND
cis-1,2-Dichloroethene	43	150	ND
trans-1,2-Dichloroethene	71	240	ND
1,2-Dichloropropane	58	200	ND
1,3-Dichloropropane	59	200	ND
2,2-Dichloropropane	140	490	ND
1,1-Dichloropropene	79	270	ND
cis-1,3-Dichloropropene	59	200	ND
trans-1,3-Dichloropropene	53	180	ND
Ethylbenzene	52	180	340
Hexachlorobutadiene	56	190	ND
Isopropylbenzene	53	180	ND
p-Isopropyltoluene	62	220	ND
Methylene chloride	49	170	ND
Naphthalene	63	250	7500
n-Propylbenzene	56	190	ND
ortho-Xylene/Styrene	82	320	1600
1,1,1,2-Tetrachloroethane	150	520	ND
1,1,2,2-Tetrachloroethane	76	260	ND
Tetrachloroethene	43	170	ND
Toluene	44	150	8000
1,2,3-Trichlorobenzene	62	210	ND
1,2,4-Trichlorobenzene	70	240	ND
1,1,1-Trichloroethane	63	220	ND
1,1,2-Trichloroethane	54	190	ND
Trichloroethene	50	170	ND
Trichlorofluoromethane	41	140	ND
1,2,3-Trichloropropane	51	170	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106332 MW-8A ug/L
1,2,4-Trimethylbenzene	57	200	25[illegible]
1,3,5-Trimethylbenzene	110	390	ND
Vinyl chloride	66	220	ND
meta,para-Xylene	100	360	ND
tert-Butylmethyl ether	52	200	ND
Isopropyl ether	53	200	ND

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 84.9 %

Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 114 %

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106933 MW-13A ug/L
Benzene	140	390	79000
Bromobenzene	200	690	ND
Bromochloromethane	110	370	ND
Bromodichloromethane	160	600	ND
Bromoform	58	180	ND
Bromomethane	110	360	ND
n-Butylbenzene	170	580	440
sec-Butylbenzene	140	470	970
tert-Butylbenzene	180	620	600
Carbon Tetrachloride	110	380	ND
Chlorobenzene	120	410	ND
Chloroethane	120	400	ND
Chloroform	140	490	ND
Chloromethane	120	420	ND
2-Chlorotoluene	160	560	ND
4-Chlorotoluene	150	590	ND
Dibromochloromethane	150	520	ND
1,2-Dibromo-3-Chloropropane	280	950	ND
1,2-Dibromoethane	480	520	ND
Dibromomethane	260	900	ND
1,2-Dichlorobenzene	220	740	ND
1,3-Dichlorobenzene	150	520	ND
1,4-Dichlorobenzene	130	460	ND
Dichlorodifluoromethane	180	620	ND
1,1-Dichloroethane	180	610	ND
1,2-Dichloroethane	160	560	ND
1,1-Dichloroethene	130	430	ND
cis-1,2-Dichloroethene	110	370	ND
trans-1,2-Dichloroethene	180	610	ND
1,2-Dichloropropane	150	500	ND
1,3-Dichloropropane	150	500	ND
2,2-Dichloropropane	360	1200	ND
1,1-Dichloropropene	200	680	ND
cis-1,3-Dichloropropene	150	510	ND
trans-1,3-Dichloropropene	130	460	ND
Ethylbenzene	130	450	970
Hexachlorobutadiene	140	480	ND
Isopropylbenzene	130	450	ND
p-Isopropyltoluene	160	540	ND
Methylene chloride	120	420	ND
Naphthalene	160	620	21000
n-Propylbenzene	140	480	ND
ortho-Xylene/Styrene	200	790	8000
1,1,1,2-Tetrachloroethane	380	1300	ND
1,1,2,2-Tetrachloroethane	190	650	ND
Tetrachloroethene	110	420	ND
Toluene	110	380	36000
1,2,3-Trichlorobenzene	160	540	ND
1,2,4-Trichlorobenzene	180	600	ND
1,1,1-Trichloroethane	160	540	ND
1,1,2-Trichloroethane	140	470	ND
Trichloroethene	120	430	ND
Trichlorofluoromethane	100	350	ND
1,2,3-Trichloropropane	130	430	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106933 MW-13A ug/L
1,2,4-Trimethylbenzene	140	490	860
1,3,5-Trimethylbenzene	280	970	1100
Vinyl chloride	160	550	ND
meta,para-Xylene	260	900	3500
tert-Butylmethyl ether	130	490	ND
Isopropyl ether	130	490	ND

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 89.9 %

Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 122 %

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte	MDL	LOQ	106934 MW-13B
Name	ug/L	ug/L	ug/L
Benzene	140	390	62000
Bromobenzene	200	690	ND
Bromochloromethane	110	370	ND
Bromodichloromethane	160	600	ND
Bromoform	58	180	ND
Bromomethane	110	360	ND
n-Butylbenzene	170	580	450
sec-Butylbenzene	140	470	980
tert-Butylbenzene	180	620	600
Carbon Tetrachloride	110	380	ND
Chlorobenzene	120	410	ND
Chloroethane	120	400	ND
Chloroform	140	490	ND
Chloromethane	120	420	ND
2-Chlorotoluene	160	560	ND
4-Chlorotoluene	150	590	ND
Dibromochloromethane	150	520	ND
1,2-Dibromo-3-Chloropropane	280	950	ND
1,2-Dibromoethane	480	520	ND
Dibromomethane	260	900	ND
1,2-Dichlorobenzene	220	740	ND
1,3-Dichlorobenzene	150	520	ND
1,4-Dichlorobenzene	130	460	ND
Dichlorodifluoromethane	180	620	ND
1,1-Dichloroethane	180	610	ND
1,2-Dichloroethane	160	560	ND
1,1-Dichloroethene	130	430	ND
cis-1,2-Dichloroethene	110	370	ND
trans-1,2-Dichloroethene	180	610	ND
1,2-Dichloropropane	150	500	ND
1,3-Dichloropropane	150	500	ND
2,2-Dichloropropane	360	1200	ND
1,1-Dichloropropene	200	680	ND
cis-1,3-Dichloropropene	150	510	ND
trans-1,3-Dichloropropene	130	460	ND
Ethylbenzene	130	450	950
Hexachlorobutadiene	140	480	ND
Isopropylbenzene	130	450	ND
p-Isopropyltoluene	160	540	ND
Methylene chloride	120	420	ND
Naphthalene	160	620	13000
n-Propylbenzene	140	480	ND
ortho-Xylene/Styrene	200	790	7700
1,1,1,2-Tetrachloroethane	380	1300	ND
1,1,2,2-Tetrachloroethane	190	650	ND
Tetrachloroethene	110	420	ND
Toluene	110	380	30000
1,2,3-Trichlorobenzene	160	540	ND
1,2,4-Trichlorobenzene	180	600	ND
1,1,1-Trichloroethane	160	540	ND
1,1,2-Trichloroethane	140	470	ND
Trichloroethene	120	430	ND
Trichlorofluoromethane	100	350	ND
1,2,3-Trichloropropane	130	430	ND

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106934 MW-13B ug/L
1,2,4-Trimethylbenzene	140	490	870
1,3,5-Trimethylbenzene	280	970	1100
Vinyl chloride	160	550	ND
meta,para-Xylene	260	900	350
tert-Butylmethyl ether	130	490	ND
Isopropyl ether	130	490	ND

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 85.1 %
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 122 %

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte	MDL	LOQ	106935 MW-5C
Name	ug/L	ug/L	ug/L
Benzene	1.3	4.4	8.3
Bromobenzene	3.9	14	ND
Bromochloromethane	1.4	5.0	ND
Bromodichloromethane	1.8	6.1	ND
Bromoform	1.8	6.1	ND
Bromomethane	1.2	4.3	ND
n-Butylbenzene	1.0	3.4	19
sec-Butylbenzene	1.6	5.4	5.6
tert-Butylbenzene	1.5	5.1	ND
Carbon Tetrachloride	1.3	4.6	ND
Chlorobenzene	1.4	4.8	ND
Chloroethane	1.3	4.5	ND
Chloroform	0.54	1.7	ND
Chloromethane	1.3	4.5	ND
2-Chlorotoluene	1.7	5.9	ND
4-Chlorotoluene	2.2	7.6	ND
Dibromochloromethane	1.4	4.9	ND
1,2-Dibromo-3-Chloropropane	5.6	19	ND
1,2-Dibromoethane	1.6	5.4	ND
Dibromomethane	1.4	3.8	ND
1,2-Dichlorobenzene	1.9	6.5	ND
1,3-Dichlorobenzene	1.7	5.8	ND
1,4-Dichlorobenzene	2.0	7.0	ND
Dichlorodifluoromethane	1.3	4.4	ND
1,1-Dichloroethane	1.6	5.5	ND
1,2-Dichloroethane	1.3	4.5	ND
1,1-Dichloroethene	1.3	4.5	ND
cis-1,2-Dichloroethene	1.4	4.9	ND
trans-1,2-Dichloroethene	1.3	4.6	ND
1,2-Dichloropropane	1.3	4.5	ND
1,3-Dichloropropane	1.4	4.8	ND
2,2-Dichloropropane	2.1	7.1	ND
1,1-Dichloropropene	1.3	4.3	ND
cis-1,3-Dichloropropene	0.58	2.0	ND
trans-1,3-Dichloropropene	1.3	4.5	ND
Ethylbenzene	1.4	4.8	ND
Hexachlorobutadiene	2.6	8.9	ND
Isopropylbenzene	1.2	4.8	ND
p-Isopropyltoluene	1.3	4.9	ND
Methylene chloride	1.4	4.9	ND
Naphthalene	1.8	5.9	53
n-Propylbenzene	1.6	5.4	5.3
ortho-Xylene/Styrene	1.4	4.7	16
1,1,1,2-Tetrachloroethane	2.3	5.4	ND
1,1,2,2-Tetrachloroethane	2.3	7.9	ND
Tetrachloroethene	1.4	5.2	ND
Toluene	1.3	4.4	13
1,2,3-Trichlorobenzene	1.9	6.7	ND
1,2,4-Trichlorobenzene	1.6	5.3	ND
1,1,1-Trichloroethane	1.6	5.5	ND
1,1,2-Trichloroethane	1.4	3.8	ND
Trichloroethene	1.3	4.5	ND
Trichlorofluoromethane	1.7	5.8	ND
1,2,3-Trichloropropane	4.0	14	ND

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106935 MW-5C ug/L
1,2,4-Trimethylbenzene	0.60	2.1	7.4
1,3,5-Trimethylbenzene	1.9	6.6	ND
Vinyl chloride	1.0	3.2	ND
meta,para-Xylene	2.9	10	13
tert-Butylmethyl ether	2.2	7.6	ND
Isopropyl ether	2.6	9.0	ND

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 92.6 %
Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 84.8 %

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106936 Trip Blank ug/L
Benzene	0.28	0.78	ND
Bromobenzene	0.40	1.4	ND
Bromochloromethane	0.22	0.74	ND
Bromodichloromethane	0.32	1.2	ND
Bromoform	0.12	0.37	ND
Bromomethane	0.22	0.72	ND
n-Butylbenzene	0.34	1.2	ND
sec-Butylbenzene	0.27	0.93	ND
tert-Butylbenzene	0.36	1.2	ND
Carbon Tetrachloride	0.22	0.75	ND
Chlorobenzene	0.24	0.82	ND
Chloroethane	0.23	0.80	ND
Chloroform	0.29	0.99	ND
Chloromethane	0.24	0.83	ND
2-Chlorotoluene	0.32	1.1	ND
4-Chlorotoluene	0.31	1.2	ND
Dibromochloromethane	0.31	1.0	ND
1,2-Dibromo-3-Chloropropane	0.55	1.9	ND
1,2-Dibromoethane	0.95	1.0	ND
Dibromomethane	0.52	1.8	ND
1,2-Dichlorobenzene	0.43	1.5	ND
1,3-Dichlorobenzene	0.30	1.0	ND
1,4-Dichlorobenzene	0.27	0.93	ND
Dichlorodifluoromethane	0.36	1.2	ND
1,1-Dichloroethane	0.35	1.2	ND
1,2-Dichloroethane	0.32	1.1	ND
1,1-Dichloroethene	0.25	0.87	ND
cis-1,2-Dichloroethene	0.22	0.74	ND
trans-1,2-Dichloroethene	0.35	1.2	ND
1,2-Dichloropropane	0.29	1.0	ND
1,3-Dichloropropane	0.29	1.0	ND
2,2-Dichloropropane	0.72	2.5	ND
1,1-Dichloropropene	0.40	1.4	ND
cis-1,3-Dichloropropene	0.30	1.0	ND
trans-1,3-Dichloropropene	0.27	0.92	ND
Ethylbenzene	0.26	0.89	ND
Hexachlorobutadiene	0.28	0.97	ND
Isopropylbenzene	0.26	0.91	ND
p-Isopropyltoluene	0.31	1.1	ND
Methylene chloride	0.25	0.85	ND
Naphthalene	0.32	1.2	0.70
n-Propylbenzene	0.28	0.97	ND
ortho-Xylene/Styrene	0.41	1.6	ND
1,1,1,2-Tetrachloroethane	0.76	2.6	ND
1,1,2,2-Tetrachloroethane	0.38	1.3	ND
Tetrachloroethene	0.21	0.83	ND
Toluene	0.22	0.76	ND
1,2,3-Trichlorobenzene	0.31	1.1	ND
1,2,4-Trichlorobenzene	0.35	1.2	ND
1,1,1-Trichloroethane	0.32	1.1	ND
1,1,2-Trichloroethane	0.27	0.93	ND
Trichloroethene	0.25	0.85	ND
Trichlorofluoromethane	0.20	0.71	ND
1,2,3-Trichloropropane	0.26	0.86	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106936 Trip Blank ug/L
1,2,4-Trimethylbenzene	0.28	0.98	ND
1,3,5-Trimethylbenzene	0.56	1.9	ND
Vinyl chloride	0.33	1.1	ND
meta,para-Xylene	0.52	1.8	ND
tert-Butylmethyl ether	0.26	0.98	ND
Isopropyl ether	0.26	0.98	ND

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 90.9 %

Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 121 %

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte	MDL	LOQ	106937 FB-1
Name	ug/L	ug/L	ug/L
Benzene	0.28	0.78	1.4
Bromobenzene	0.40	1.4	ND
Bromochloromethane	0.22	0.74	ND
Bromodichloromethane	0.32	1.2	ND
Bromoform	0.12	0.37	ND
Bromomethane	0.22	0.72	ND
n-Butylbenzene	0.34	1.2	ND
sec-Butylbenzene	0.27	0.93	1.2
tert-Butylbenzene	0.36	1.2	ND
Carbon Tetrachloride	0.22	0.75	ND
Chlorobenzene	0.24	0.82	ND
Chloroethane	0.23	0.80	ND
Chloroform	0.29	0.99	ND
Chloromethane	0.24	0.83	ND
2-Chlorotoluene	0.32	1.1	ND
4-Chlorotoluene	0.31	1.2	ND
Dibromochloromethane	0.31	1.0	ND
1,2-Dibromo-3-Chloropropane	0.55	1.9	ND
1,2-Dibromoethane	0.95	1.0	ND
Dibromomethane	0.52	1.8	ND
1,2-Dichlorobenzene	0.43	1.5	ND
1,3-Dichlorobenzene	0.30	1.0	ND
1,4-Dichlorobenzene	0.27	0.93	ND
Dichlorodifluoromethane	0.36	1.2	ND
1,1-Dichloroethane	0.35	1.2	ND
1,2-Dichloroethane	0.32	1.1	ND
1,1-Dichloroethene	0.25	0.87	ND
cis-1,2-Dichloroethene	0.22	0.74	ND
trans-1,2-Dichloroethene	0.35	1.2	ND
1,2-Dichloropropane	0.29	1.0	ND
1,3-Dichloropropane	0.29	1.0	ND
2,2-Dichloropropane	0.72	2.5	ND
1,1-Dichloropropene	0.40	1.4	ND
cis-1,3-Dichloropropene	0.30	1.0	ND
trans-1,3-Dichloropropene	0.27	0.92	ND
Ethylbenzene	0.26	0.89	1.4
Hexachlorobutadiene	0.28	0.97	ND
Isopropylbenzene	0.26	0.91	ND
p-Isopropyltoluene	0.31	1.1	ND
Methylene chloride	0.25	0.85	ND
Naphthalene	0.32	1.2	11
n-Propylbenzene	0.28	0.97	ND
ortho-Xylene/Styrene	0.41	1.6	2.7
1,1,1,2-Tetrachloroethane	0.76	2.6	ND
1,1,2,2-Tetrachloroethane	0.38	1.3	ND
Tetrachloroethene	0.21	0.83	ND
Toluene	0.22	0.76	1.8
1,2,3-Trichlorobenzene	0.31	1.1	ND
1,2,4-Trichlorobenzene	0.35	1.2	ND
1,1,1-Trichloroethane	0.32	1.1	ND
1,1,2-Trichloroethane	0.27	0.93	ND
Trichloroethene	0.25	0.85	ND
Trichlorofluoromethane	0.20	0.71	ND
1,2,3-Trichloropropane	0.26	0.86	ND

ANALYTICAL RESULTS: VOC's by EPA 8021 - Water

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106937 FB-1 ug/L
1,2,4-Trimethylbenzene	0.28	0.98	1.2
1,3,5-Trimethylbenzene	0.56	1.9	2.2
Vinyl chloride	0.33	1.1	ND
meta,para-Xylene	0.52	1.8	2.7
tert-Butylmethyl ether	0.26	0.98	ND
Isopropyl ether	0.26	0.98	ND

Surrogate Recovery on 2-Bromochlorobenzene (PID) = 84.5 %

Surrogate Recovery on 2-Bromochlorobenzene (HECD) = 115 %

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270E

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	105827 MW-4A ug/L
Acenaphthene	1.4	4.6	17
Acenaphthylene	1.4	4.6	ND
4-Aminobiphenyl	1.3	4.6	ND
Aniline	1.2	4.0	ND
Anthracene	1.2	3.8	18
Benzidine	4.9	17	ND
Benzo[a]anthracene	1.1	3.6	3.1
Benzo[a]pyrene	1.3	4.0	3.4
Benzo[b]fluoranthene	3.8	13	5.4
Benzo[g,h,i]perylene	1.6	5.0	ND
Benzo[k]fluoranthene	1.2	3.8	ND
Benzoic Acid	5.6	19	ND
Benzyl Alcohol	2.5	8.2	ND
Bis(2-chloroethyl)ether	1.3	4.4	ND
Bis(2-chloroethoxy)methane	1.6	5.4	ND
Bis(2-ethylhexyl)phthalate	1.6	5.2	ND
Bis(2-chloroisopropyl)ether	1.4	4.8	ND
4-Bromophenyl-phenyl ether	1.1	3.8	ND
Butylbenzylphthalate	0.86	2.8	ND
2-Chlorophenol	1.3	4.4	ND
4-Chloro-3-methylphenol	1.4	4.6	ND
1-Chloronaphthalene	1.2	4.0	ND
2-Chloronaphthalene	1.6	5.2	ND
4-Chloroaniline	1.5	5.0	ND
4-Chlorophenyl-phenyl ether	1.3	4.4	ND
Chrysene	1.4	4.4	3.0
Di-n-butylphthalate	1.5	5.0	ND
Di-n-octylphthalate	0.86	2.8	ND
Dibenzo[a,h]anthracene	1.4	4.4	ND
Dibenzofuran	1.4	4.6	26
1,2-Dichlorobenzene	0.90	3.0	ND
1,3-Dichlorobenzene	0.82	2.8	ND
1,4-Dichlorobenzene	0.96	3.2	ND
3,3'-Dichlorobenzidine	1.8	6.2	ND
2,4-Dichlorophenol	1.5	5.2	ND
2,6-Dichlorophenol	1.5	5.0	ND
Diethylphthalate	1.6	5.4	ND
2,4-Dimethylphenol	1.0	3.2	510
Dimethylphthalate	1.5	5.2	ND
p-(Dimethylamino)azobenzene	1.1	3.4	ND
4,6-Dinitro-2-methylphenol	0.82	2.6	ND
2,4-Dinitrophenol	10	35	ND
2,4-Dinitrotoluene	1.4	4.6	ND
2,6-Dinitrotoluene	1.5	5.0	ND
Diphenylamine	1.4	4.6	ND
1,2-Diphenylhydrazine	2.0	6.6	ND
Fluoranthene	1.2	3.8	12
Fluorene	1.2	3.8	52
Hexachlorobenzene	1.2	4.0	ND
Hexachlorobutadiene	1.1	3.6	ND
Hexachlorocyclopentadiene	2.4	8.0	ND
Hexachloroethane	0.86	2.8	ND
Indeno[1,2,3-cd]pyrene	1.6	5.0	ND
Isophorone	1.4	4.8	ND

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270B

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106927 MW-4A ug/L
2-Methylnaphthalene	1.4	4.6	1500
2-Methylphenol	1.5	5.0	ND
3 & 4-Methylphenol	2.6	8.6	820
N-nitroso-di-n-propylamine	1.3	4.4	ND
N-nitrosodi-n-butylamine	1.5	5.0	ND
N-nitrosodimethylamine	0.94	3.2	ND
N-nitrosopiperidine	4.1	14	ND
N-nitrosodiphenylamine	1.4	4.6	ND
Naphthalene	1.8	5.6	8800
1-Naphthylamine	0.86	2.8	ND
2-Naphthylamine	1.3	4.4	ND
2-Nitroaniline	1.2	4.0	ND
3-Nitroaniline	1.5	5.0	ND
Nitrobenzene	1.4	4.8	ND
2-Nitrophenol	2.6	8.6	ND
4-Nitroaniline	1.4	4.6	ND
4-Nitrophenol	0.86	2.8	ND
Pentachlorobenzene	1.3	4.2	ND
Pentachloronitrobenzene	1.2	4.2	ND
Pentachlorophenol	1.3	4.4	ND
Phenanthrene	1.3	4.0	74
Phenol	0.90	3.0	240
Pyrene	1.2	3.8	19
Pyridine	6.2	20	24
1,2,4,5-Tetrachlorobenzene	1.4	4.6	ND
2,3,4,6-Tetrachlorophenol	1.2	3.8	ND
1,2,4-Trichlorobenzene	1.2	4.0	ND
2,4,5-Trichlorophenol	1.5	5.0	ND
2,4,6-Trichlorophenol	1.7	5.8	ND

Surrogate Recovery on 2-Fluorophenol = 42.1 %

Surrogate Recovery on Phenol-d5 = 30.0 %

Surrogate Recovery on Nitrobenzene-d5 = 250 %

Surrogate Recovery on 2-Fluorobiphenyl = 78.3 %

Surrogate Recovery on 2,4,6-Tribromophenol = 80.0 %

Surrogate Recovery on Terphenyl-d14 = 72.9 %

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	105928 MW-4B ug/L
Acenaphthene	2.5	8.0	11
Acenaphthylene	2.5	8.0	ND
4-Aminobiphenyl	2.3	8.0	ND
Aniline	2.1	7.0	ND
Anthracene	2.1	6.6	4.5
Benzidine	8.5	29	ND
Benzo[a]anthracene	2.0	6.3	ND
Benzo[a]pyrene	2.2	7.0	ND
Benzo[b]fluoranthene	6.6	22	ND
Benzo[g,h,i]perylene	2.7	8.8	ND
Benzo[k]fluoranthene	2.1	6.6	ND
Benzoic Acid	9.8	33	ND
Benzyl Alcohol	4.3	14	ND
Bis(2-chloroethyl)ether	2.3	7.7	ND
Bis(2-chloroethoxy)methane	2.8	9.4	ND
Bis(2-ethylhexyl)phthalate	2.9	9.1	20
Bis(2-chloroisopropyl)ether	2.5	8.4	ND
4-Bromophenyl-phenyl ether	2.0	6.6	ND
Butylbenzylphthalate	1.5	4.9	ND
2-Chlorophenol	2.3	7.7	ND
4-Chloro-3-methylphenol	2.4	8.0	ND
1-Chloronaphthalene	2.1	7.0	ND
2-Chloronaphthalene	2.7	9.1	ND
4-Chloroaniline	2.6	8.8	ND
4-Chlorophenyl-phenyl ether	2.3	7.7	ND
Chrysene	2.4	7.7	ND
Di-n-butylphthalate	2.6	8.8	ND
Di-n-octylphthalate	1.5	4.9	ND
Dibenzo[a,h]anthracene	2.4	7.7	ND
Dibenzofuran	2.4	8.0	20
1,2-Dichlorobenzene	1.6	5.2	ND
1,3-Dichlorobenzene	1.4	4.9	ND
1,4-Dichlorobenzene	1.7	5.6	ND
3,3'-Dichlorobenzidine	3.2	11	ND
2,4-Dichlorophenol	2.7	9.1	370
2,6-Dichlorophenol	2.7	8.8	ND
Diethylphthalate	2.8	9.4	ND
2,4-Dimethylphenol	1.8	5.6	ND
Dimethylphthalate	2.7	9.1	ND
p-(Dimethylamino)azobenzene	1.9	6.0	ND
4,6-Dinitro-2-methylphenol	1.4	4.5	ND
2,4-Dinitrophenol	18	62	ND
2,4-Dinitrotoluene	2.5	8.0	ND
2,6-Dinitrotoluene	2.6	8.8	ND
Diphenylamine	2.4	8.0	ND
1,2-Diphenylhydrazine	3.5	12	ND
Fluoranthene	2.1	6.6	ND
Fluorene	2.1	6.6	46
Hexachlorobenzene	2.1	7.0	ND
Hexachlorobutadiene	1.9	6.3	ND
Hexachlorocyclopentadiene	4.2	14	ND
Hexachloroethane	1.5	4.9	ND
Indeno[1,2,3-cd]pyrene	2.7	8.8	ND
Isophorone	2.5	8.4	ND

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270E

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106928 MW-4B ug/L
2-Methylnaphthalene	2.4	8.0	1300
2-Methylphenol	2.7	8.8	ND
3 & 4-Methylphenol	4.6	15	530
N-nitroso-di-n-propylamine	2.3	7.7	ND
N-nitrosodi-n-butylamine	2.6	8.8	ND
N-nitrosodimethylamine	1.6	5.6	ND
N-nitrosopiperidine	7.2	25	ND
N-nitrosodiphenylamine	2.4	8.0	ND
Naphthalene	3.1	9.8	7200
1-Naphthylamine	1.5	4.9	ND
2-Naphthylamine	2.3	7.7	ND
2-Nitroaniline	2.1	7.0	ND
3-Nitroaniline	2.6	8.8	ND
Nitrobenzene	2.5	8.4	ND
2-Nitrophenol	4.5	15	ND
4-Nitroaniline	2.4	8.0	ND
4-Nitrophenol	1.5	4.9	ND
Pentachlorobenzene	2.2	7.4	ND
Pentachloronitrobenzene	2.2	7.4	ND
Pentachlorophenol	2.3	7.7	ND
Phenanthrene	2.2	7.0	55
Phenol	1.6	5.2	ND
Pyrene	2.1	6.6	7.9
Pyridine	11	35	18
1,2,4,5-Tetrachlorobenzene	2.4	8.0	ND
2,3,4,6-Tetrachlorophenol	2.0	6.6	ND
1,2,4-Trichlorobenzene	2.1	7.0	ND
2,4,5-Trichlorophenol	2.6	8.8	ND
2,4,6-Trichlorophenol	3.0	10	ND

Surrogate Recovery on 2-Fluorophenol = 57.2 %

Surrogate Recovery on Phenol-d5 = 32.0 %

Surrogate Recovery on Nitrobenzene-d5 = 149 %

Surrogate Recovery on 2-Fluorobiphenyl = 77.3 %

Surrogate Recovery on 2,4,6-Tribromophenol = 79.0 %

Surrogate Recovery on Terphenyl-d14 = 75.5 %

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106929 MW-6 ug/L
Acenaphthene	1.4	4.6	ND
Acenaphthylene	1.4	4.6	ND
4-Aminobiphenyl	1.3	4.6	ND
Aniline	1.2	4.0	ND
Anthracene	1.2	3.8	ND
Benzidine	4.9	17	ND
Benzo[a]anthracene	1.1	3.6	ND
Benzo[a]pyrene	1.3	4.0	ND
Benzo[b]fluoranthene	3.8	13	ND
Benzo[g,h,i]perylene	1.6	5.0	ND
Benzo[k]fluoranthene	1.2	3.8	ND
Benzoic Acid	5.6	19	ND
Benzyl Alcohol	2.5	8.2	ND
Bis(2-chloroethyl)ether	1.3	4.4	ND
Bis(2-chloroethoxy)methane	1.6	5.4	ND
Bis(2-ethylhexyl)phthalate	1.6	5.2	ND
Bis(2-chloroisopropyl)ether	1.4	4.8	ND
4-Bromophenyl-phenyl ether	1.1	3.8	ND
Butylbenzylphthalate	0.86	2.8	ND
2-Chlorophenol	1.3	4.4	ND
4-Chloro-3-methylphenol	1.4	4.6	ND
1-Chloronaphthalene	1.2	4.0	ND
2-Chloronaphthalene	1.6	5.2	ND
4-Chloroaniline	1.5	5.0	ND
4-Chlorophenyl-phenyl ether	1.3	4.4	ND
Chrysene	1.4	4.4	ND
Di-n-butylphthalate	1.5	5.0	ND
Di-n-octylphthalate	0.86	2.8	ND
Dibenzo[a,h]anthracene	1.4	4.4	ND
Dibenzofuran	1.4	4.6	ND
1,2-Dichlorobenzene	0.90	3.0	ND
1,3-Dichlorobenzene	0.82	2.8	ND
1,4-Dichlorobenzene	0.96	3.2	ND
3,3'-Dichlorobenzidine	1.8	6.2	ND
2,4-Dichlorophenol	1.5	5.2	ND
2,6-Dichlorophenol	1.5	5.0	ND
Diethylphthalate	1.6	5.4	ND
2,4-Dimethylphenol	1.0	3.2	ND
Dimethylphthalate	1.5	5.2	ND
p-(Dimethylamino)azobenzene	1.1	3.4	ND
4,6-Dinitro-2-methylphenol	0.82	2.6	ND
2,4-Dinitrophenol	10	35	ND
2,4-Dinitrotoluene	1.4	4.6	ND
2,6-Dinitrotoluene	1.5	5.0	ND
Diphenylamine	1.4	4.6	ND
1,2-Diphenylhydrazine	2.0	6.6	ND
Fluoranthene	1.2	3.8	ND
Fluorene	1.2	3.8	ND
Hexachlorobenzene	1.2	4.0	ND
Hexachlorobutadiene	1.1	3.6	ND
Hexachlorocyclopentadiene	2.4	8.0	ND
Hexachloroethane	0.86	2.8	ND
Indeno[1,2,3-cd]pyrene	1.6	5.0	ND
Isophorone	1.4	4.8	ND

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270B

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106929 MW-6 ug/L
2-Methylnaphthalene	1.4	4.6	ND
2-Methylphenol	1.5	5.0	ND
3 & 4-Methylphenol	2.6	8.6	ND
N-nitroso-di-n-propylamine	1.3	4.4	ND
N-nitrosodi-n-butylamine	1.5	5.0	ND
N-nitrosodimethylamine	0.94	3.2	ND
N-nitrosopiperidine	4.1	14	ND
N-nitrosodiphenylamine	1.4	4.6	ND
Naphthalene	1.8	5.6	ND
1-Naphthylamine	0.86	2.8	ND
2-Naphthylamine	1.3	4.4	ND
2-Nitroaniline	1.2	4.0	ND
3-Nitroaniline	1.5	5.0	ND
Nitrobenzene	1.4	4.8	ND
2-Nitrophenol	2.6	8.6	ND
4-Nitroaniline	1.4	4.6	ND
4-Nitrophenol	0.86	2.8	ND
Pentachlorobenzene	1.3	4.2	ND
Pentachloronitrobenzene	1.2	4.2	ND
Pentachlorophenol	1.3	4.4	ND
Phenanthrene	1.3	4.0	ND
Phenol	0.90	3.0	ND
Pyrene	1.2	3.8	ND
Pyridine	6.2	20	ND
1,2,4,5-Tetrachlorobenzene	1.4	4.6	ND
2,3,4,6-Tetrachlorophenol	1.2	3.8	ND
1,2,4-Trichlorobenzene	1.2	4.0	ND
2,4,5-Trichlorophenol	1.5	5.0	ND
2,4,6-Trichlorophenol	1.7	5.8	ND

Surrogate Recovery on 2-Fluorophenol = 43.1 %

Surrogate Recovery on Phenol-d5 = 25.9 %

Surrogate Recovery on Nitrobenzene-d5 = 77.7 %

Surrogate Recovery on 2-Fluorobiphenyl = 78.8 %

Surrogate Recovery on 2,4,6-Tribromophenol = 75.8 %

Surrogate Recovery on Terphenyl-d14 = 84.0 %

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106930 MW-6A ug/L
Acenaphthene	2.1	6.7	ND
Acenaphthylene	2.1	6.7	ND
4-Aminobiphenyl	1.9	6.7	ND
Aniline	1.7	5.8	ND
Anthracene	1.7	5.5	ND
Benzidine	7.0	24	ND
Benzo[a]anthracene	1.7	5.2	ND
Benzo[a]pyrene	1.9	5.8	ND
Benzo[b]fluoranthene	5.5	18	ND
Benzo[g,h,i]perylene	2.3	7.2	ND
Benzo[k]fluoranthene	1.7	5.5	ND
Benzoic Acid	8.1	27	ND
Benzyl Alcohol	3.6	12	ND
Bis(2-chloroethyl)ether	1.9	6.4	ND
Bis(2-chloroethoxy)methane	2.3	7.8	ND
Bis(2-ethylhexyl)phthalate	2.4	7.5	ND
Bis(2-chloroisopropyl)ether	2.1	7.0	ND
4-Bromophenyl-phenyl ether	1.7	5.5	ND
Butylbenzylphthalate	1.2	4.1	ND
2-Chlorophenol	1.9	6.4	ND
4-Chloro-3-methylphenol	2.0	6.7	ND
1-Chloronaphthalene	1.7	5.8	ND
2-Chloronaphthalene	2.3	7.5	ND
4-Chloroaniline	2.2	7.2	ND
4-Chlorophenyl-phenyl ether	1.9	6.4	ND
Chrysene	2.0	6.4	ND
Di-n-butylphthalate	2.1	7.2	ND
Di-n-octylphthalate	1.2	4.1	ND
Dibenzo[a,h]anthracene	2.0	6.4	ND
Dibenzofuran	2.0	6.7	ND
1,2-Dichlorobenzene	1.3	4.4	ND
1,3-Dichlorobenzene	1.2	4.1	ND
1,4-Dichlorobenzene	1.4	4.6	ND
3,3'-Dichlorobenzidine	2.6	9.0	ND
2,4-Dichlorophenol	2.2	7.5	ND
2,6-Dichlorophenol	2.2	7.2	ND
Diethylphthalate	2.3	7.8	ND
2,4-Dimethylphenol	1.5	4.6	ND
Dimethylphthalate	2.2	7.5	ND
p-(Dimethylamino azobenzene	1.5	4.9	ND
4,6-Dinitro-2-methylphenol	1.2	3.7	ND
2,4-Dinitrophenol	15	51	ND
2,4-Dinitrotoluene	2.1	6.7	ND
2,6-Dinitrotoluene	2.1	7.2	ND
Diphenylamine	2.0	6.7	ND
1,2-Diphenylhydrazine	2.9	9.6	ND
Fluoranthene	1.7	5.5	ND
Fluorene	1.8	5.5	ND
Hexachlorobenzene	1.7	5.8	ND
Hexachlorobutadiene	1.6	5.2	ND
Hexachlorocyclopentadiene	3.5	12	ND
Hexachloroethane	1.2	4.1	ND
Indeno[1,2,3-cd]pyrene	2.3	7.2	ND
Isophorone	2.1	7.0	ND

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270E

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106930 MW-6A ug/L
2-Methylnaphthalene	2.0	6.7	ND
2-Methylphenol	2.2	7.2	ND
3 & 4-Methylphenol	3.8	12	ND
N-nitroso-di-n-propylamine	1.9	6.4	ND
N-nitrosodi-n-butylamine	2.2	7.2	ND
N-nitrosodimethylamine	1.4	4.6	ND
N-nitrosopiperidine	5.9	21	ND
N-nitrosodiphenylamine	2.0	6.7	ND
Naphthalene	2.6	8.1	ND
1-Naphthylamine	1.2	4.1	ND
2-Naphthylamine	1.9	6.4	ND
2-Nitroaniline	1.7	5.8	ND
3-Nitroaniline	2.2	7.2	ND
Nitrobenzene	2.1	7.0	ND
2-Nitrophenol	3.7	13	ND
4-Nitroaniline	2.0	6.7	ND
4-Nitrophenol	1.2	4.1	ND
Pentachlorobenzene	1.8	6.1	ND
Pentachloronitrobenzene	1.8	6.1	ND
Pentachlorophenol	1.9	6.4	ND
Phenanthrene	1.8	5.8	ND
Phenol	1.3	4.4	ND
Pyrene	1.7	5.5	ND
Pyridine	9.0	29	ND
1,2,4,5-Tetrachlorobenzene	2.0	6.7	ND
2,3,4,6-Tetrachlorophenol	1.7	5.5	ND
1,2,4-Trichlorobenzene	1.8	5.8	ND
2,4,5-Trichlorophenol	2.1	7.2	ND
2,4,6-Trichlorophenol	2.5	8.4	ND

Surrogate Recovery on 2-Fluorophenol = 56.4 %

Surrogate Recovery on Phenol-d5 = 29.3 %

Surrogate Recovery on Nitrobenzene-d5 = 73.3 %

Surrogate Recovery on 2-Fluorobiphenyl = 74.6 %

Surrogate Recovery on 2,4,6-Tribromophenol = 71.3 %

Surrogate Recovery on Terphenyl-d14 = 80.0 %

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106332 MW-8A ug/L
Acenaphthene	1.4	4.6	ND
Acenaphthylene	1.4	4.6	ND
4-Aminobiphenyl	1.3	4.6	ND
Aniline	1.2	4.0	ND
Anthracene	1.2	3.8	ND
Benzidine	4.9	17	ND
Benzo[a]anthracene	1.1	3.6	ND
Benzo[a]pyrene	1.3	4.0	ND
Benzo[b]fluoranthene	3.8	13	ND
Benzo[g,h,i]perylene	1.6	5.0	ND
Benzo[k]fluoranthene	1.2	3.8	ND
Benzoic Acid	5.6	19	ND
Benzyl Alcohol	2.5	8.2	ND
Bis(2-chloroethyl)ether	1.3	4.4	ND
Bis(2-chloroethoxy)methane	1.6	5.4	ND
Bis(2-ethylhexyl)phthalate	1.6	5.2	ND
Bis(2-chloroisopropyl)ether	1.4	4.8	ND
4-Bromophenyl-phenyl ether	1.1	3.8	ND
Butylbenzylphthalate	0.86	2.8	ND
2-Chlorophenol	1.3	4.4	ND
4-Chloro-3-methylphenol	1.4	4.6	ND
1-Chloronaphthalene	1.2	4.0	ND
2-Chloronaphthalene	1.6	5.2	ND
4-Chloroaniline	1.5	5.0	ND
4-Chlorophenyl-phenyl ether	1.3	4.4	ND
Chrysene	1.4	4.4	ND
Di-n-butylphthalate	1.5	5.0	ND
Di-n-octylphthalate	0.86	2.8	ND
Dibenzo[a,h]anthracene	1.4	4.4	ND
Dibenzofuran	1.4	4.6	ND
1,2-Dichlorobenzene	0.90	3.0	ND
1,3-Dichlorobenzene	0.82	2.8	ND
1,4-Dichlorobenzene	0.96	3.2	ND
3,3'-Dichlorobenzidine	1.8	6.2	ND
2,4-Dichlorophenol	1.5	5.2	ND
2,6-Dichlorophenol	1.5	5.0	ND
Diethylphthalate	1.6	5.4	ND
2,4-Dimethylphenol	1.0	3.2	570
Dimethylphthalate	1.5	5.2	ND
p-(Dimethylamino)azobenzene	1.1	3.4	ND
4,6-Dinitro-2-methylphenol	0.82	2.6	ND
2,4-Dinitrophenol	10	35	ND
2,4-Dinitrotoluene	1.4	4.6	ND
2,6-Dinitrotoluene	1.5	5.0	ND
Diphenylamine	1.4	4.6	ND
1,2-Diphenylhydrazine	2.0	6.6	ND
Fluoranthene	1.2	3.8	ND
Fluorene	1.2	3.8	ND
Hexachlorobenzene	1.2	4.0	ND
Hexachlorobutadiene	1.1	3.6	ND
Hexachlorocyclopentadiene	2.4	8.0	ND
Hexachloroethane	0.86	2.8	ND
Indeno[1,2,3-cd]pyrene	1.6	5.0	ND
Isophorone	1.4	4.8	ND

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106932 MW-8A ug/L
2-Methylnaphthalene	1.4	4.6	ND
2-Methylphenol	1.5	5.0	600
3 & 4-Methylphenol	2.6	8.6	1200
N-nitroso-di-n-propylamine	1.3	4.4	ND
N-nitrosodi-n-butylamine	1.5	5.0	ND
N-nitrosodimethylamine	0.94	3.2	ND
N-nitrosopiperidine	4.1	14	ND
N-nitrosodiphenylamine	1.4	4.6	ND
Naphthalene	1.8	5.6	560
1-Naphthylamine	0.86	2.8	ND
2-Naphthylamine	1.3	4.4	ND
2-Nitroaniline	1.2	4.0	ND
3-Nitroaniline	1.5	5.0	ND
Nitrobenzene	1.4	4.8	ND
2-Nitrophenol	2.6	8.6	ND
4-Nitroaniline	1.4	4.6	ND
4-Nitrophenol	0.86	2.8	ND
Pentachlorobenzene	1.3	4.2	ND
Pentachloronitrobenzene	1.2	4.2	ND
Pentachlorophenol	1.3	4.4	ND
Phenanthrene	1.3	4.0	ND
Phenol	0.90	3.0	390
Pyrene	1.2	3.8	ND
Pyridine	6.2	20	ND
1,2,4,5-Tetrachlorobenzene	1.4	4.6	ND
2,3,4,6-Tetrachlorophenol	1.2	3.8	ND
1,2,4-Trichlorobenzene	1.2	4.0	ND
2,4,5-Trichlorophenol	1.5	5.0	ND
2,4,6-Trichlorophenol	1.7	5.8	ND

Surrogate Recovery on 2-Fluorophenol = 59.6 %
Surrogate Recovery on Phenol-d5 = 38.8 %
Surrogate Recovery on Nitrobenzene-d5 = 81.9 %
Surrogate Recovery on 2-Fluorobiphenyl = 78.2 %
Surrogate Recovery on 2,4,6-Tribromophenol = 74.6 %
Surrogate Recovery on Terphenyl-d14 = 77.2 %

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106933 MW-13A ug/L
Acenaphthene	1.5	4.7	9.9
Acenaphthylene	1.5	4.7	ND
4-Aminobiphenyl	1.4	4.7	ND
Aniline	1.2	4.1	89
Anthracene	1.2	3.9	ND
Benzidine	5.0	17	ND
Benzo[a]anthracene	1.2	3.7	ND
Benzo[a]pyrene	1.3	4.1	ND
Benzo[b]fluoranthene	3.9	13	ND
Benzo[g,h,i]perylene	1.6	5.1	ND
Benzo[k]fluoranthene	1.2	3.9	ND
Benzoic Acid	5.7	19	ND
Benzyl Alcohol	2.5	8.4	ND
Bis(2-chloroethyl)ether	1.4	4.5	ND
Bis(2-chloroethoxy)methane	1.6	5.5	ND
Bis(2-ethylhexyl)phthalate	1.7	5.3	40
Bis(2-chloroisopropyl)ether	1.5	4.9	ND
4-Bromophenyl-phenyl ether	1.2	3.9	ND
Butylbenzylphthalate	0.88	2.9	ND
2-Chlorophenol	1.3	4.5	ND
4-Chloro-3-methylphenol	1.4	4.7	ND
1-Chloronaphthalene	1.2	4.1	ND
2-Chloronaphthalene	1.6	5.3	ND
4-Chloroaniline	1.5	5.1	ND
4-Chlorophenyl-phenyl ether	1.3	4.5	ND
Chrysene	1.4	4.5	ND
Di-n-butylphthalate	1.5	5.1	ND
Di-n-octylphthalate	0.88	2.9	ND
Dibenzo[a,h]anthracene	1.4	4.5	ND
Dibenzofuran	1.4	4.7	15
1,2-Dichlorobenzene	0.92	3.1	ND
1,3-Dichlorobenzene	0.84	2.9	ND
1,4-Dichlorobenzene	0.98	3.3	ND
3,3'-Dichlorobenzidine	1.8	6.4	ND
2,4-Dichlorophenol	1.6	5.3	ND
2,6-Dichlorophenol	1.6	5.1	ND
Diethylphthalate	1.7	5.5	ND
2,4-Dimethylphenol	1.0	3.3	3400
Dimethylphthalate	1.6	5.3	ND
p-(Dimethylamino azobenzene	1.1	3.5	ND
4,6-Dinitro-2-methylphenol	0.84	2.6	ND
2,4-Dinitrophenol	10	36	ND
2,4-Dinitrotoluene	1.5	4.7	ND
2,6-Dinitrotoluene	1.5	5.1	ND
Diphenylamine	1.4	4.7	ND
1,2-Diphenylhydrazine	2.0	6.8	ND
Fluoranthene	1.2	3.9	ND
Fluorene	1.2	3.9	32
Hexachlorobenzene	1.2	4.1	ND
Hexachlorobutadiene	1.1	3.7	ND
Hexachlorocyclopentadiene	2.5	8.2	ND
Hexachloroethane	0.88	2.9	ND
Indeno[1,2,3-cd]pyrene	1.6	5.1	ND
Isophorone	1.5	4.9	ND

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106933 MW-13A ug/L
2-Methylnaphthalene	1.4	4.7	930
2-Methylphenol	1.6	5.1	2800
3 & 4-Methylphenol	2.7	8.8	6300
N-nitroso-di-n-propylamine	1.4	4.5	ND
N-nitrosodi-n-butylamine	1.5	5.1	ND
N-nitrosodimethylamine	0.96	3.3	ND
N-nitrosopiperidine	4.2	15	ND
N-nitrosodiphenylamine	1.4	4.7	ND
Naphthalene	1.8	5.7	7000
1-Naphthylamine	0.88	2.9	16
2-Naphthylamine	1.3	4.5	9.3
2-Nitroaniline	1.2	4.1	ND
3-Nitroaniline	1.5	5.1	ND
Nitrobenzene	1.5	4.9	ND
2-Nitrophenol	2.6	8.9	ND
4-Nitroaniline	1.4	4.7	ND
4-Nitrophenol	0.88	2.9	ND
Pentachlorobenzene	1.3	4.3	ND
Pentachloronitrobenzene	1.3	4.3	ND
Pentachlorophenol	1.3	4.5	ND
Phenanthrene	1.3	4.1	23
Phenol	0.92	3.1	1900
Pyrene	1.2	3.9	ND
Pyridine	6.4	20	20
1,2,4,5-Tetrachlorobenzene	1.4	4.7	ND
2,3,4,6-Tetrachlorophenol	1.2	3.9	ND
1,2,4-Trichlorobenzene	1.2	4.1	ND
2,4,5-Trichlorophenol	1.5	5.1	ND
2,4,6-Trichlorophenol	1.8	5.9	ND

Surrogate Recovery on 2-Fluorophenol = 67.0 %
Surrogate Recovery on Phenol-d5 = 24.8 %
Surrogate Recovery on Nitrobenzene-d5 = 309 %
Surrogate Recovery on 2-Fluorobiphenyl = 74.8 %
Surrogate Recovery on 2,4,6-Tribromophenol = 77.8 %
Surrogate Recovery on Terphenyl-d14 = 75.6 %

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106934 MW-13B ug/L
Acenaphthene	1.3	4.3	13
Acenaphthylene	1.3	4.3	ND
4-Aminobiphenyl	1.2	4.3	ND
Aniline	1.1	3.7	ND
Anthracene	1.1	3.5	12
Benzidine	4.5	16	ND
Benzo[a]anthracene	1.1	3.3	ND
Benzo[a]pyrene	1.2	3.7	ND
Benzo[b]fluoranthene	3.5	12	3.[illegible]
Benzo[g,h,i]perylene	1.4	4.6	ND
Benzo[k]fluoranthene	1.1	3.5	ND
Benzoic Acid	5.2	17	ND
Benzyl Alcohol	2.3	7.6	ND
Bis(2-chloroethyl)ether	1.2	4.1	ND
Bis(2-chloroethoxy)methane	1.5	5.0	ND
Bis(2-ethylhexyl)phthalate	1.5	4.8	17
Bis(2-chloroisopropyl)ether	1.3	4.4	ND
4-Bromophenyl-phenyl ether	1.1	3.5	ND
Butylbenzylphthalate	0.80	2.6	ND
2-Chlorophenol	1.2	4.1	ND
4-Chloro-3-methylphenol	1.3	4.3	ND
1-Chloronaphthalene	1.1	3.7	ND
2-Chloronaphthalene	1.4	4.8	ND
4-Chloroaniline	1.4	4.6	ND
4-Chlorophenyl-phenyl ether	1.2	4.1	ND
Chrysene	1.3	4.1	ND
Di-n-butylphthalate	1.4	4.6	ND
Di-n-octylphthalate	0.80	2.6	ND
Dibenzo[a,h]anthracene	1.3	4.1	ND
Dibenzofuran	1.3	4.3	20
1,2-Dichlorobenzene	0.83	2.8	ND
1,3-Dichlorobenzene	0.76	2.6	ND
1,4-Dichlorobenzene	0.89	3.0	ND
3,3'-Dichlorobenzidine	1.7	5.7	ND
2,4-Dichlorophenol	1.4	4.8	ND
2,6-Dichlorophenol	1.4	4.6	ND
Diethylphthalate	1.5	5.0	ND
2,4-Dimethylphenol	0.94	3.0	3400
Dimethylphthalate	1.4	4.8	ND
p-(Dimethylamino)azobenzene	0.98	3.1	ND
4,6-Dinitro-2-methylphenol	0.75	2.4	ND
2,4-Dinitrophenol	9.5	33	ND
2,4-Dinitrotoluene	1.3	4.3	ND
2,6-Dinitrotoluene	1.4	4.6	ND
Diphenylamine	1.3	4.3	ND
1,2-Diphenylhydrazine	1.8	6.1	ND
Fluoranthene	1.1	3.5	3.[illegible]
Fluorene	1.1	3.5	43
Hexachlorobenzene	1.1	3.7	ND
Hexachlorobutadiene	1.0	3.3	ND
Hexachlorocyclopentadiene	2.2	7.4	ND
Hexachloroethane	0.80	2.6	ND
Indeno[1,2,3-cd]pyrene	1.4	4.6	ND
Isophorone	1.3	4.4	ND

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106934 MW-13B ug/L
2-Methylnaphthalene	1.3	4.3	990
2-Methylphenol	1.4	4.6	1700
3 & 4-Methylphenol	2.4	8.0	3100
N-nitroso-di-n-propylamine	1.2	4.1	ND
N-nitrosodi-n-butylamine	1.4	4.6	ND
N-nitrosodimethylamine	0.87	3.0	ND
N-nitrosopiperidine	3.8	13	ND
N-nitrosodiphenylamine	1.3	4.3	ND
Naphthalene	1.6	5.2	7600
1-Naphthylamine	0.80	2.6	22
2-Naphthylamine	1.2	4.1	18
2-Nitroaniline	1.1	3.7	ND
3-Nitroaniline	1.4	4.6	ND
Nitrobenzene	1.3	4.4	ND
2-Nitrophenol	2.4	8.0	ND
4-Nitroaniline	1.3	4.3	ND
4-Nitrophenol	0.80	2.6	ND
Pentachlorobenzene	1.2	3.9	ND
Pentachloronitrobenzene	1.1	3.9	ND
Pentachlorophenol	1.2	4.1	ND
Phenanthrene	1.2	3.7	54
Phenol	0.83	2.8	150
Pyrene	1.1	3.5	8.1
Pyridine	5.7	18	19
1,2,4,5-Tetrachlorobenzene	1.3	4.3	ND
2,3,4,6-Tetrachlorophenol	1.1	3.5	ND
1,2,4-Trichlorobenzene	1.1	3.7	ND
2,4,5-Trichlorophenol	1.4	4.6	ND
2,4,6-Trichlorophenol	1.6	5.4	ND

Surrogate Recovery on 2-Fluorophenol = 65.4 %
Surrogate Recovery on Phenol-d5 = 32.6 %
Surrogate Recovery on Nitrobenzene-d5 = 199 %
Surrogate Recovery on 2-Fluorobiphenyl = 77.0 %
Surrogate Recovery on 2,4,6-Tribromophenol = 82.8 %
Surrogate Recovery on Terphenyl-d14 = 79.4 %

ANALYTICAL RESULTS: Semi-Volatile Organic Compounds by EPA 8270B

Customer: Dames & Moore

Project Description: NSP Project Title: 05644071

Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106935 MW-5C ug/L
Acenaphthene	1.8	5.9	ND
Acenaphthylene	1.8	5.9	ND
4-Aminobiphenyl	1.7	5.9	ND
Aniline	1.5	5.1	ND
Anthracene	1.5	4.8	ND
Benzidine	6.2	21	ND
Benzo[a]anthracene	1.5	4.6	ND
Benzo[a]pyrene	1.6	5.1	ND
Benzo[b]fluoranthene	4.8	16	ND
Benzo[g,h,i]perylene	2.0	6.4	ND
Benzo[k]fluoranthene	1.5	4.8	ND
Benzoic Acid	7.1	24	ND
Benzyl Alcohol	3.2	11	ND
Bis(2-chloroethyl)ether	1.7	5.6	ND
Bis(2-chloroethoxy)methane	2.0	6.9	ND
Bis(2-ethylhexyl)phthalate	2.1	6.6	13
Bis(2-chloroisopropyl)ether	1.8	6.1	ND
4-Bromophenyl-phenyl ether	1.5	4.8	ND
Butylbenzylphthalate	1.1	3.6	ND
2-Chlorophenol	1.7	5.6	ND
4-Chloro-3-methylphenol	1.8	5.9	ND
1-Chloronaphthalene	1.5	5.1	ND
2-Chloronaphthalene	2.0	6.6	ND
4-Chloroaniline	1.9	6.4	ND
4-Chlorophenyl-phenyl ether	1.7	5.6	ND
Chrysene	1.7	5.6	ND
Di-n-butylphthalate	1.9	6.4	ND
Di-n-octylphthalate	1.1	3.6	ND
Dibenzo[a,h]anthracene	1.8	5.6	ND
Dibenzofuran	1.8	5.9	ND
1,2-Dichlorobenzene	1.1	3.8	ND
1,3-Dichlorobenzene	1.0	3.6	ND
1,4-Dichlorobenzene	1.2	4.1	ND
3,3'-Dichlorobenzidine	2.3	7.9	ND
2,4-Dichlorophenol	2.0	6.6	ND
2,6-Dichlorophenol	1.9	6.4	ND
Diethylphthalate	2.1	6.9	ND
2,4-Dimethylphenol	1.3	4.1	ND
Dimethylphthalate	2.0	6.6	ND
p-(Dimethylamino)azobenzene	1.4	4.3	ND
4,6-Dinitro-2-methylphenol	1.0	3.3	ND
2,4-Dinitrophenol	13	45	ND
2,4-Dinitrotoluene	1.8	5.9	ND
2,6-Dinitrotoluene	1.9	6.4	ND
Diphenylamine	1.8	5.9	ND
1,2-Diphenylhydrazine	2.6	8.4	ND
Fluoranthene	1.5	4.8	ND
Fluorene	1.6	4.8	ND
Hexachlorobenzene	1.5	5.1	ND
Hexachlorobutadiene	1.4	4.6	ND
Hexachlorocyclopentadiene	3.1	10	ND
Hexachloroethane	1.1	3.6	ND
Indeno[1,2,3-cd]pyrene	2.0	6.4	ND
Isophorone	1.8	6.1	ND

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106935 MW-5C ug/L
2-Methylnaphthalene	1.7	5.9	ND
2-Methylphenol	1.9	6.4	ND
3 & 4-Methylphenol	3.3	11	ND
N-nitroso-di-n-propylamine	1.7	5.6	ND
N-nitrosodi-n-butylamine	1.9	6.4	ND
N-nitrosodimethylamine	1.2	4.1	ND
N-nitrosopiperidine	5.2	18	ND
N-nitrosodiphenylamine	1.8	5.9	ND
Naphthalene	2.2	7.1	ND
1-Naphthylamine	1.1	3.6	ND
2-Naphthylamine	1.7	5.6	ND
2-Nitroaniline	1.5	5.1	ND
3-Nitroaniline	1.9	6.4	ND
Nitrobenzene	1.8	6.1	ND
2-Nitrophenol	3.3	11	ND
4-Nitroaniline	1.8	5.9	ND
4-Nitrophenol	1.1	3.6	ND
Pentachlorobenzene	1.6	5.4	ND
Pentachloronitrobenzene	1.6	5.4	ND
Pentachlorophenol	1.7	5.6	ND
Phenanthrene	1.6	5.1	ND
Phenol	1.1	3.8	ND
Pyrene	1.5	4.8	ND
Pyridine	7.9	26	ND
1,2,4,5-Tetrachlorobenzene	1.8	5.9	ND
2,3,4,6-Tetrachlorophenol	1.5	4.8	ND
1,2,4-Trichlorobenzene	1.6	5.1	ND
2,4,5-Trichlorophenol	1.9	6.4	ND
2,4,6-Trichlorophenol	2.2	7.4	ND

Surrogate Recovery on 2-Fluorophenol = 43.1 %
Surrogate Recovery on Phenol-d5 = 29.9 %
Surrogate Recovery on Nitrobenzene-d5 = 72.7 %
Surrogate Recovery on 2-Fluorobiphenyl = 73.8 %
Surrogate Recovery on 2,4,6-Tribromophenol = 61.9 %
Surrogate Recovery on Terphenyl-d14 = 50.3 %

Customer: Dames & Moore
Project Description: NSP Project Title: 05644071
Northern Lake Service Project Number: 27568

Analyte Name	MDL ug/L	LOQ ug/L	106937 FB-1 ug/L
Acenaphthene	1.2	3.9	ND
Acenaphthylene	1.2	3.9	ND
4-Aminobiphenyl	1.1	3.9	ND
Aniline	1.0	3.4	ND
Anthracene	1.0	3.2	ND
Benzidine	4.1	14	ND
Benzo[a]anthracene	0.97	3.1	ND
Benzo[a]pyrene	1.1	3.4	ND
Benzo[b]fluoranthene	3.2	11	ND
Benzo[g,h,i]perylene	1.3	4.2	ND
Benzo[k]fluoranthene	1.0	3.2	ND
Benzoic Acid	4.8	16	ND
Benzyl Alcohol	2.1	7.0	ND
Bis(2-chloroethyl)ether	1.1	3.7	ND
Bis(2-chloroethoxy)methane	1.4	4.6	ND
Bis(2-ethylhexyl)phthalate	1.4	4.4	ND
Bis(2-chloroisopropyl)ether	1.2	4.1	ND
4-Bromophenyl-phenyl ether	0.97	3.2	ND
Butylbenzylphthalate	0.73	2.4	ND
2-Chlorophenol	1.1	3.7	ND
4-Chloro-3-methylphenol	1.2	3.9	ND
1-Chloronaphthalene	1.0	3.4	ND
2-Chloronaphthalene	1.3	4.4	ND
4-Chloroaniline	1.3	4.2	ND
4-Chlorophenyl-phenyl ether	1.1	3.7	ND
Chrysene	1.2	3.7	ND
Di-n-butylphthalate	1.3	4.2	ND
Di-n-octylphthalate	0.73	2.4	ND
Dibenzo[a,h]anthracene	1.2	3.7	ND
Dibenzofuran	1.2	3.9	ND
1,2-Dichlorobenzene	0.76	2.6	ND
1,3-Dichlorobenzene	0.70	2.4	ND
1,4-Dichlorobenzene	0.82	2.7	ND
3,3'-Dichlorobenzidine	1.5	5.3	ND
2,4-Dichlorophenol	1.3	4.4	ND
2,6-Dichlorophenol	1.3	4.2	ND
Diethylphthalate	1.4	4.6	ND
2,4-Dimethylphenol	0.87	2.7	ND
Dimethylphthalate	1.3	4.4	ND
p-(Dimethylamino)azobenzene	0.90	2.9	ND
4,6-Dinitro-2-methylphenol	0.69	2.2	ND
2,4-Dinitrophenol	8.7	30	ND
2,4-Dinitrotoluene	1.2	3.9	ND
2,6-Dinitrotoluene	1.3	4.2	ND
Diphenylamine	1.2	3.9	ND
1,2-Diphenylhydrazine	1.7	5.6	ND
Fluoranthene	1.0	3.2	ND
Fluorene	1.0	3.2	ND
Hexachlorobenzene	1.0	3.4	ND
Hexachlorobutadiene	0.92	3.1	ND
Hexachlorocyclopentadiene	2.0	6.8	ND
Hexachloroethane	0.73	2.4	ND
Indeno[1,2,3-cd]pyrene	1.3	4.2	ND
Isophorone	1.2	4.1	ND