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REPORT

Pre-Remedial Design Investigation and Remedial Design Report

Byron Barrel & Drum
Byron, New York

December 1999

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BLASLAND, BOUCK & LEE, INC.
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BLASLAND, BOUCK & LEE, INC.
engineers & *scientists*

Transmitted Via Federal Express

December 6, 1999

Chief, Central New York Remedial Action Section
Emergency and Remedial Response Division
U. S. Environmental Protection Agency, Region II
290 Broadway Avenue, 20th Floor
New York, New York 10007-1866

Attention: Mr. George Jacob, Byron Barrel & Drum
Superfund Site Project Manager

Re: Pre-Remedial Design Investigation and Remedial Design Report
Project #: 773.04

Dear Mr. Jacob:

Enclosed is the Pre-Remedial Design Investigation and Remedial Design Report for Area 2 of the Byron Barrel and Drum Site in Byron, New York. As with the draft report submittal in July 1999, we have consolidated the Pre-Remedial Design Investigation Report and the Remedial Design Report into one submittal. The enclosed report presents the activities performed to characterize the ground-water system at the site to design a ground-water extraction, treatment and reinjection of a portion of the treatment groundwater required in the Record of Decision (ROD). This report also includes the 100 percent design package (Appendix F - Plans and Specifications) as a separately bound appendix.

Also, please note that a Construction Health and Safety Plan (Section 6.0) is not included at this time. A generic Construction Health and Safety Plan will be developed prior to construction. Appendix D, PW-1 Borehole Water Quality Results, and Appendix E, Pump Test Influent/Effluent Water Quality Results and MW-21 Water Quality Results, both consisting of laboratory analytical results, are provided as separately bound appendices due to size.

The design presented in this report is intended to meet the intent of the ROD. Contaminated ground water in the vicinity of the maintenance garage will be extracted and treated. As you are aware, components related to soil flushing and reinjection of the treated ground water have been modified due to the limited infiltration capacity of the shallow (i.e., near surface) soils. The proposed concept is to excavate potentially impacted soils within an area adjacent to the former maintenance building to the maximum depth of three feet and install a distribution system over the soil to allow the infiltration of a portion of the treated ground water. The excavated volume of soil will be tested for volatile organic compounds (VOCs). If above NYSDEC TAGM 4046 guidance values, the soil will be sent off site for disposal. Soils with VOC concentrations below TAGM 4046, will be tested for hazardous waste characteristic of toxicity using TCLP and if acceptable will be used as backfill over the infiltration piping. Additional clean fill would then be placed over the infiltration gallery and the area seeded.

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In reality, the ability of the system to provide infiltration of treated water is dependent upon the variability of the soils at the base of the excavation, fluctuations in the water table, and the size of the soil excavation. We anticipate a period of adjustment required to effectively balance the reinjection rate with the amount of treated water that will be discharged to the ditch.

We look forward to discussing your comments following your review. If you have any questions, please feel free to contact me at (716) 292-6740 ext. 19.

Very truly yours,

BLASLAND, BOUCK & LEE, INC.

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Mark F. Weider
Associate

MFW/aeb
Enclosure
COVER.LTR

cc: Mr. Kevin Krueger, Unisys Corporation
Mr. Bruce Amig, BFGoodrich
Office of Regional Counsel, USEPA
Chief, Environmental Enforcement Section, U.S. Department of Justice
Mr. Gary R. Cameron, Blasland, Bouck, & Lee, Inc.

TECHNICAL REPORT

Pre-Remedial Design Investigation and Remedial Design Report

Byron Barrel & Drum
Byron, New York

December 1999

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Section 1.0

BLASLAND, BOUCK & LEE, INC.
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Introduction

10 *Introduction*

1.1 General

This Pre-Remedial Design Investigation and 100% Remedial Design Report has been prepared by Blasland, Bouck & Lee, Inc. (BBL) for the Byron Barrel & Drum Site (United States Environmental Protection Agency [USEPA] Index Number II Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] -00215) on behalf of Unisys Corporation and BF Goodrich Corporation. This report outlines the Pre-Remedial Design Investigation activities, Remedial Design criteria and objectives, Operation and Maintenance Plan, Construction Quality Assurance/ Quality Control Plan, and Health and Safety Plan required for the implementation of the remedial action for the Site. This report was prepared in accordance with the following documents:

- Record of Decision (ROD), issued by USEPA;

- Consent Decree (CA No. 86-CV-748A) between USEPA and Unisys Corporation and Garlock, Inc. as the settling work defendants;

- Remedial Design Work Plan (RDWP), prepared by Dames & Moore, and submitted to USEPA in October 1992;

- Field Sampling Plan (FSP), prepared by Dames & Moore, and submitted to USEPA in 1992;

- Addendum No. 3 Remedial Design Work Plan, prepared by Blasland, Bouck & Lee, Inc., and submitted to USEPA in October, 1998; and

- Draft Explanation of Significant Differences (ESD), issued by USEPA in February 1999.

The RDWP for the Site described the activities associated with the remedial design of the selected remedy, and included the following components:

- Basis of Design;
- Preliminary Design; and
- Description of Pre-Final and Final Design Report.

In support of the RDWP, a supplemental pre-design investigation was performed at the Site to collect data required to design a ground-water extraction and reinjection system for Area 2 to meet the requirements established in the ROD. The pre-design investigation was performed in accordance with Addendum No. 3 Remedial Design Work Plan, and previous supporting documents. The pre-design investigation included the collection of data related to aquifer parameters, infiltration capacity, and water quality distribution in support of the remedial design of a ground-water extraction, treatment, and reinjection system for Area 2. The pre-design investigation was performed between December 1998 and April 1999 with the results presented in this report.

1.2 Site Description and Project Background

The Byron Barrel and Drum Site (Site) comprises three separate areas of concern: Area 1, a former drum storage and disposal area; Area 2, a solvent disposal area located in the vicinity of a maintenance building; and Area 3, a shallow ravine containing construction debris and fill material. Volatile Organic Compounds (VOCs), including trichloroethylene (TCE) and 1,1,1 -trichloroethane (TCA), were detected in the ground water underlying Areas 1 and 2. However, hydrogeologic and ground-water quality investigations determined that VOC-impacted ground water had not migrated to or impacted area drinking water supply wells. Chromium and lead were detected in a few surface soil samples from Area 3, but no organic contamination or ground-water impacts were detected in this area.

Based upon the Remedial Investigations/Feasibility Studies (RI/FS), EPA selected a remedy consisting of extraction and treatment of contaminated ground water underlying Areas 1 and 2, and reinjection of the treated ground water into the aquifer to enhance the flushing of low-level residual subsurface soil contamination into the ground water. In addition, dismantling and decontamination, if necessary, of the maintenance building and disposing of the debris at an off-site landfill were selected components of the remedy for Area 2. The selected remedy for Area 3 called for further evaluation of the concentrations of inorganic constituents in the surface soil in Area 3.

Further investigations, including sampling and analyses of ground water in Area 1 and 2 and soil sampling and analyses in Area 3, were conducted at the site. Based upon these investigations, EPA issued a Draft Explanation of Significant Differences (ESD) for the site in February 1999. The ESD concluded that no further action was required for Areas 1 and 3, except implementation of a monitoring program. The remedy selected for Area 2 — extraction and treatment of contaminated ground water, reinjection of treated ground water to the aquifer, and long-term monitoring (along with dismantling, and decontamination of the maintenance building, if necessary) and disposing of the debris in an off-site landfill — was retained for implementation.

1.3 Objectives

The objective of this report is to present the remedial design that will meet the requirements of the selected remedy for the Site established in the ROD as modified by the ESD.

The remedial objectives selected for the Site are:

- Extraction and treatment of contaminated ground water, and reinjection of a portion of the treated water through the soil in the vicinity of the maintenance building;

- Dismantling, and decontamination, if necessary, of the maintenance building and disposing of the debris at an off-site landfill; and

- Long-term monitoring of the site.

The main elements of the selected remedy, which have been designed to meet these objectives as stated above and as presented in the ROD and RDWP, include the following:

- Extraction of contaminated ground water in Area 2;
- Installation of treatment building, air stripper, and pumps;
- Excavation of a portion of the contaminated soil near the maintenance building based on previous soil vapor results and side wall sampling to allow for reinjection of treated ground water to the more permeable underlying soils;
- Installation of reinjection piping system to allow infiltration of a portion of the treated water through the excavation and placement of clean soil over the infiltration gallery; and
- Off-site disposal of excavated soil, if necessary, based on analytical results, or placement of uncontaminated soil back in the excavation (after installation of the reinjection system).

This Pre-Remedial Design Investigation and 100% Remedial Design Report addresses each of these remedial design components to fulfill the requirements of the ROD as modified by the ESD.

1.4 Purpose and Organization of Report

This report presents the general design and implementation requirements for remedial activities at the Site and has been organized into the following sections:

- Section 1 - Introduction;
- Section 2 - Pre-Remedial Design Investigation;
- Section 3 - 100% Remedial Design;
- Section 4 - Operation & Maintenance Plan;
- Section 5 - Construction Quality Assurance/Quality Control Plan;
- Section 6 - Construction Health & Safety Plan; and
- Section 7 - Construction Schedule and Cost Estimate.

In addition, the following appendices are included in this report:

- Appendix A - Well Construction Logs;
- Appendix B - PW-1 Grain Size Analysis;
- Appendix C - PW-1 Borehole Water Quality Results;
- Appendix D - Pump Test Reduction Data;
- Appendix E - PW-1 Pump Test Influent/Effluent Water Quality Results, MW-21 Water Quality Results;
- Appendix F - Plans & Specifications;
- Appendix G - Design Basis Information; and
- Appendix H - Post-Excavation and Excavated Soil Sampling and Analysis Plan.

Section 2.0

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Pre-Remedial Design Investigation Report

2.0 Pre-Remedial Design Investigation

This Pre-Remedial Design Investigation Report presents a summary of the field activities and results of the monitoring well and pump well installation at the Byron Barrel & Drum Site (Site) located in Byron, New York (Figure 1). These field activities were performed in accordance with the United States Environmental Protection Agency-approved (USEPA-approved) "Addendum No. 3 Remedial Design Work Plan" (Addendum No. 3 RD Work Plan), prepared by Blasland, Bouck & Lee, Inc. (BBL) in October 1998. The purpose of the Work Plan was to specify pre-design activities that would support the design of a pump-and-treat remedy, in conjunction with soil flushing in accordance with the Record of Decision (ROD) for Area 2 (Figure 2).

Components of the pre-design activities included the following:

- Installation of a pump well (PW-1) located near existing monitoring well MW-4, and performing a pump test to determine the available yield and potential capture zone from this well. The pump well was sampled during installation and during the pump test to provide ground-water quality data;

- Installation of two piezometers located near existing monitoring well MW-1 and the newly installed pump well PW-1. The piezometers were installed to provide ground-water elevation data in response to the pump test to determine the effectiveness of the pump well and to determine aquifer parameters;

- Installation and sampling of a new background or "sentinel" monitoring well (MW-21) located between Area 2 and the entrance to the site. The monitoring well will also be used to collect water-level data to refine the ground-water flow direction; and

- Performing a percolation test in the area of the garage in Area 2 where the proposed infiltration gallery would be constructed for reinjection of treated ground water and flushing of contaminated soil.

The Addendum No. 3 RD Work Plan is supported by the USEPA-approved Remedial Design Work Plan prepared by Dames & Moore, Inc. in October 1992. The Remedial Design Work Plan contains a Sampling and Analysis Plan (SAMP) and Quality Assurance/Quality Control Plan (QA/QC Plan). The field activities initiated as part of the Addendum No. 3 RD Work Plan were performed in accordance with the requirements outlined within the SAMP and QA/QC Plan.

The remainder of this report presents a detailed description of the pre-design investigation activities and results.

2.1 General

2.2 Monitoring Well Installation

As part of the pre-design investigation, one "sentinel" monitoring well (MW-21), one pump well, and two piezometers (PZ-1 and PZ-2) were installed. The initial mobilization to the Site for the installation of these wells was during the period from December 21 to 23, 1998. In accordance with the Remedial Design Work Plan, all down-hole equipment was decontaminated by the drilling contractor prior to arrival at the site. In addition, the soil cuttings and development/decontamination water generated during the pre-design investigation activities were contained in 55-gallon drums and staged in the vicinity of the garage in Area 2.

2.2.1 Monitoring Well MW-21 Installation

Monitoring well MW-21 was installed along the entrance road to Area 2 of the Site, as identified on Figure 3. BBL's drilling contractor, Nothnagle Drilling Company, Inc. (Nothnagle), completed the installation with a BK.-81 truck-mounted drill rig equipped with 6-1/4-inch-inside-diameter (ID) hollow-stem augers under supervision of a BBL geologist. Standard sampling was performed in the soil boring from ground surface to the top of till (confining layer). The soil samples were collected using 2-foot-long, 2-inch-diameter, split-spoon samplers for characterization. Glacial till was encountered at approximately 25 feet below ground surface (bgs).

The soil boring was advanced to approximately 25.6 feet to allow for the installation of a 6-inch sump. The overburden soil above the glacial till was screened using a 15-foot length of 4-inch-I.D., 0.01-inch-slot, type 316 stainless steel, continuous wire wrapped screen with flush joint stainless steel riser. A clean, washed quartz sand pack, grade 00N, was placed from 25.6 feet to 7.5 feet bgs. A two-foot thick hydrated bentonite seal was placed above the sandpack, followed by 2.5 feet of cement/bentonite grout. The well construction was completed with a concrete surface seal and protective casing. The soil boring/monitoring well construction log is presented in Appendix A.

Well development was accomplished by alternating surging the well screen with a 4-inch-diameter surge block and purging ground water with a Moino pump. Ground-water field parameters were recorded after removal of each well volume. Ten well volumes were removed to complete well development with the stabilization of field parameters and the reduction of turbidity levels to less than 50 NTUs.

2.2.2 Pump Well Installation

Pump well PW-1 was installed north of the garage in Area 2 near existing monitoring well MW-4, as shown on Figure 3. The well was located and constructed to allow the well to operate as the main extraction point during the pump test and to be a probable component of the remedial design. On December 21, 1998, Nothnagle Drilling initially advanced the soil boring for the pump well with a BK-81 truck-mounted drill rig equipped with 4-1/4-inch-I.D. hollow-stem augers under supervision of a BBL geologist. Standard sampling was performed in the soil boring from ground surface to a depth of 10-feet bgs. From a depth of 10-feet bgs to the top of till, continuous split-spoon sampling was performed. Each 2-foot interval from 10 feet to the top of till was sampled for grain size analysis. Grain size results are presented in Appendix B. The grain size analyses were used to determine the effective screen slot size, as well as the grade sands to use in the sand pack construction. Glacial till was encountered at approximately 23.3 feet bgs. The hollow-stem augers were left in-place to prevent borehole collapse while design and acquisition of well screen and filter pack materials were completed.

Two ground-water samples were obtained during installation of the initial soil boring. The first ground-water sample was collected from a depth of approximately 17 feet bgs using a decontaminated Teflon bailer. Approximately 1 gallon of water was purged from the well point prior to collecting the ground-water sample. The second ground-water sample was collected from depth of approximately 24 feet bgs. This sample was also collected after purging approximately 1 gallon of water from the well point. An MS and MSD sample and an equipment blank sample were also collected from this location and submitted for laboratory analysis. These samples were submitted to Severn Trent Laboratories (Severn Trent) for laboratory analysis of VOCs by USEPA Method 8260. Analytical reports are summarized in Table I with the full analytical report presented in Appendix C.

On February 8, 1999, Nothnagle and BBL performed a second mobilization to the Site to complete the installation of the pump well. The existing soil boring was overdrilled using 10-1/4-inch-I.D. hollow-stem augers to a depth of 27.0 feet to allow for the installation of a 3-foot sump. The4-l/4-inch-I.D. hollow-stem augers were removed from the borehole to allow for clean out of the borehole, and subsequent well construction. A piston bailer was used to remove sediments that were continually settling in the bottom of the soil boring. Upon removal of the majority of the borehole sediments, the pump well sump, screen, and riser were placed into the borehole. The kame deposits above the glacial till were screened using an 11-foot length of 6-inch-I.D., 0.03-inch slot, type 316 stainless steel, continuous wire wrapped screen with flush joint Schedule 80 PVC sump and riser. A clean, washed quartz sand pack, grade 1 Ricci Brothers, was placed from 27.2 feet to 8.95 feet bgs followed by grade 0 Ricci Brothers sand from 8.95 feet bgs to 7.65 feet bgs. Grade 00N sand was placed above the grade 0 sand to the ground surface. The pump well was initially completed using sand to the ground surface to allow for compaction and settlement of the sand during well development and the pump test, thus minimizing any potential breaches in the pump well sand pack or seals. The pump well construction was completed with a locking well cap on the Schedule 80 PVC riser. Final surface completion details on PW-1 will be completed as part of the construction of the final remediation design. The soil boring/pump well construction log is presented in Appendix A.

Well development was accomplished by alternating surging the well screen with a 6-inch-diameter surge block and purging ground water with a Moino pump. The purge water was contained in a portable 1,500-gallon polyethylene tank on the Site. Between rounds of well screen surging and removal of ground water, the accumulation of sand and sediment was recorded. Pump well surging was considered completed when the amount of pass through (sand and sediment) was less than 0.3 feet. Upon completion of surging and purging activities, the Moino was used to pump ground water at a continuous flow rate to establish communication with the existing aquifer. The pump well was pumped at approximately 7 gallons per minute (gpm) for nearly one hour, followed by 15 minutes of surging. Less than 0.05 feet of accumulated sediment was measured in the pump well after this surging effort. The pump was re-activated at approximately 8 gpm upon return to a nearly static water level condition. Well development was determined to be completed upon removal of approximately 1,000 gallons of low turbidity (less than 50 NTU) water.

2.2.3 Piezometer Installation

Piezometers PZ-1 and PZ-2 were installed north of the garage building in Area 2, at locations shown on Figure 3. PZ-1 was located off the northwest corner of the garage building and PZ-2 was located west of existing monitoring well MW-1. The piezometers were screened over the entire saturated thickness of the kame aquifer to coincide with the open interval of the pumping well and to supplement the existing monitoring wells, which are primarily screened in the upper 5 feet of saturated zone. The piezometers were placed at locations due south and due east of the pumping well to allow evaluation of any directional differences in hydraulic conductivity.

Nothnagle completed the piezometer installations using 4-1/4-inch-I.D. hollow-stem augers under supervision of a BBL geologist. The augers were advanced to the top of glacial till based upon the depth to glacial till encountered in the pump well soil boring. Glacial till was encountered at approximately 25.2 and 25.0 feet below ground surface (bgs) at PZ-1 and PZ-2, respectively.

The overburden soil above the glacial till was screened using a 10-foot length of 2-inch-I.D., Schedule-40 PVC, 0.01-inch slot well screen with flush joint riser. Washed quartz sand packs consisting of grade 00N sand were placed from the bottom of the soil borings to approximately two feet above the top of the well screens. A two-foot-thick hydrated bentonite seal was placed above the sandpack followed by cement/bentonite grout to the ground surface. The soil boring/monitoring well construction logs are presented in Appendix A.

Well development was accomplished by surging the well screen with a 2-inch-diameter stainless steel bailer followed by purging ground water with the stainless steel bailer. Approximately seven well volumes were removed to establish communication with the kame aquifer.

2.3 Pump Test

The pump test program consisted of a step-drawdown test and a more comprehensive 48-hour constant rate pumping test.

2.3.1 Step-Drawdown Test

The purpose of the step-drawdown test was to determine the optimum discharge rate to be implemented for the constant-rate pumping test and to provide a preliminary estimate of the hydraulic conductivity of the aquifer. During development of the pump well, an initial step-drawdown pump rate of approximately 8 gpm was established. On March 22, 1999, BBL mobilized to the site to collect water level data from Area 2 monitoring wells, piezometers, pump well, and two background wells, prior to initiation of the step-drawdown test. The monitoring wells included MW-1, -2, -4, -10B, and -20, piezometers PZ-1 and PZ-2, and background wells MW-21 and MW-6B, located southwest and east, respectively.

In addition, a granular activated carbon (GAC) treatment system was delivered and installed at the Site for treatment of extracted ground water. This specific system, Culligan GAC Unit 007, comprised five carbon vessels, each containing 165 pounds of Flowsorb 300 GAC. This GAC system was designed to handle 50 gpm of ground water with each vessel receiving a maximum flow rate of 10 gpm. The vessels were connected in parallel. To meet 6NYCRR Part 703 ground-water quality and New York SPDES permit requirements, the GAC treatment system was designed to remove the anticipated volatile organic compounds (VOCs) at the levels encountered in Area 2 monitoring wells and produce effluent at less than 5 parts per billion (ppb) on an individual VOC basis. BBL received permission form the New York State Department of Environmental Conservation (NYSDEC) to discharge treated ground water generated during the step-drawdown test and pump test to the adjacent ditch in Area 2. As part of the discharge approval requirements, influent and effluent samples were collected within the first hour of the step-drawdown and pump tests, and at the 24- and 48-hour marks of the pump test for VOC analysis. A discussion of the sampling effort and results is presented in Section 2.5 of this report. To minimize the potential impact of discharge water in the pump test area, the treated ground water was discharged to the surface water ditch downstream from the test area.

A decontaminated 1.5 horsepower, stainless steel submersible pump was placed into the pump well and connected to the GAC treatment system. An in-line gate valve and flow meter were installed before the treatment system to regulate the flow rate and record the flow volume. Sampling ports were installed on the pump hose leading into the treatment system and on the discharge hose exiting the system. In addition, a stilling tube, consisting of two-inch-diameter, schedule 40 PVC, was introduced into the pump well to obtain water-level data not influenced by turbulence generated by the submersible pump. Immediately prior to initiating the step-drawdown test, water-level data was recorded from Area 2 wells and two background wells.

The step-drawdown test was initiated at a flow rate of 8.1 gpm. Water-level data was recorded from wells at approximately 15-minute intervals. After 132 minutes, the water level in the pump well appeared to become stable, at which point the pump rate was increased to 9.0 gpm. At 9.0 gpm, the drawdown increased an additional 3.5 feet in five minutes and continued dropping toward the depth of the pump intake. The flow rate of the pump was then scaled back to approximately 7.0 gpm. The step-drawdown test was terminated after 140 minutes of pumping.

2.3.2 Pump Test

The purpose of the pump test was to provide an empirical demonstration of the hydraulic influence that would be achieved as a result of pumping the well. The objective of the constant-rate pumping test was to:

- Measure the transient hydraulic response and the empirical, steady-state pumping rate and hydraulic-head distribution within the formation during pumping;

- Approach steady-state head and flow conditions; and

- Identify the effects of gravity drainage of the unconfined aquifer.

Upon review of the step-drawdown test data, a constant pumping rate of approximately 7.0 gpm was determined to be the target pumping rate during the 48-hour pump test. On March 23, 1999, BBL mobilized to the site to collect water level data from Area 2 wells, install and calibrate pressure transducers, and to reconnect the submersible pump and in-line flow meter. Transducers were placed in monitoring wells MW-1, -2, -4, and -10B, piezometers PZ-1 and PZ-2, and the pump well (inside stilling tube). The data logger was programmed to record drawdown data at intervals specified in Addendum No. 3 RD Work Plan. An electronic water-level probe was used to record water levels in MW-6B, -20, and -21, and periodically in all monitoring wells. The weather during the step-drawdown test was cold (32°F) with wet snow and limited snow cover. During the pump test, the weather was cold overnight (approximately 24°F), warming to low- to mid-30s during the day under sunny skies.

The pump test was initiated at 11:21 a.m. on March 23, 1999, by starting the submersible pump and data logging unit and simultaneously recording an initial flow-meter reading. The in-line gate valve used to regulate flow was pre-set to achieve a flow rate of approximately 7.0 gpm. The actual pump rate produced by the pre-set gate valve was measured at approximately 5 gpm, which was established as the constant pumping rate for the duration of the test. Water levels were recorded at 60-minute intervals for the first 8 hours of the pump test, followed by every 120 minutes for the remainder of the pump test. Periodic checks of the transducer-generated drawdown data were made throughout the pump test to check for consistency and accuracy of data being generated.

The pumping test was terminated at 12:28 p.m. on March 25,1999, followed by the resetting of the data logger to record the recovery phase (24-hour period) of the pump test. The collection of recovery data was completed at 08:55 a.m. on March 26,1999. After completion of the pump test, the pressure transducers, submersible pump, and stilling tube were removed from the Area 2 wells and decontaminated. Prior to decontamination of the submersible pump, previously collected well development water was pumped through the on-site treatment system for discharge to the drainage ditch. The treatment system was then disassembled and stored in the Area 2 garage for future on-site use.

2.3.3 Pump Test Data Analysis

The pump test data were analyzed using AQTESOLV version 2.0 (Geraghty & Miller, 1994) software. Data were transferred from the data loggers into the AQTESOLVE model and were subsequently organized into separate files for each well/piezometer (PZ-1, PZ-2, MW-1 and MW-4). In addition to the pump test drawdown data, information for each individual well/piezometer was entered into the model. Drawdown data from each well/piezometer were subsequently plotted on a Time-Displacement semilog graph from which curve matching could be performed.

Initially curve matching utilized the Theis solution for unconfined aquifers. The unconfined Theis matching was chosen based on the assumptions that the pump test was performed in an unconfined water table aquifer. However, initial attempts at curve matching utilizing the Theis solution failed to produce a reasonable fit. A re-evaluation of the geologic conditions prompted the use of the Hantush-Jacob solution for leaky aquifers and resulted in reasonably good curve matches with the data. The leaky aquifer analysis is more appropriate for the site considering the orientation of the less permeable silt and clay materials overlying the sands and gravels of the water-producing formation. Analysis of the data also indicates that, based on the lack of a recharge boundary effect in the drawdown data, the drainage ditch on the north side of the site is isolated from the lower water-bearing formation by the silt and clay zone.

Results of the Hantush-Jacob solution for the pump test data are provided on test curves presented in Appendix C. In general, all test results were in general agreement, with the results from piezometers PZ-1 and PZ-2 and well MW-1 being most representative, as these monitoring points are fully penetrating into the aquifer. Test results from MW-4 showed a hydraulic conductivity value lower then the other points; however, this well is only partially penetrating with a greater portion of the well screen located in the overlying silt and clay unit. A summary of test results for each monitoring point are presented below.

	PZ-1	•?:l PZ-2.	;;MW-l	;.-'MVV-4..' .,••"
Hydraulic Conductivity (k)	3.96 x $10^{'2}$ cm/sec	2.58 xlO$^{"2}$ cm/sec	3.92 xlO$^{"2}$ cm/sec	7.68 x $10^{"3}$ cm/sec
Transmissivity (T)	24.12 cmVsec	15.74 cmVsec	23.91 cnrVsec	4.684 cmVsec
Storativity (S)	0.000536	0.000753	0.000102	0.000571

2.4 Percolation Test

On December 28, 1998, BBL was on site to construct two percolation test pits in front of the Area 2 garage (east side) to acquire information for design of an infiltration gallery for the *in situ* soil flushing component of the remedy. The percolation pits were hand constructed to be 12-inches by 12-inches by 18-inches deep, as specified in the Addendum No. 3 RD Work Plan. Approximately two inches of gravel were placed in the bottom of each percolation pit. Due to saturated conditions in the upper Site soils, shallow ground water was seeping into the percolation pits. In accordance with the percolation test protocol, the holes were then filled with water to a depth of six inches and re-filled as necessary. Because of weather, the percolation pits were covered with insulation, cardboard, and dirt to allow overnight saturation. On December 29, 1999, BBL was on site to complete the percolation tests and observed that there was still approximately six inches of water in the percolation pits, indicating minimal infiltration. After nine hours of monitoring the percolation pits, the water level in each of the two test pits had dropped approximately 0.09 feet. During this time, another test percolation pit was constructed north of the garage to be monitored without pre-soaking the soil. After 6-1/2 hours of monitoring the percolation pits, the slow percolation rates in the shallow percolation pit is attributed to the dense silt and clay observed in the upper strata that overlies the more permeable lower sand unit.

BBL re-mobilized to the site on May 12, 1999 to perform three additional percolation tests south and east of the Area 2 garage at depths of approximately 4 feet below grade. The deeper percolation tests were performed to determine if a deeper zone, below the upper silt and clay layer, would be more conducive to infiltration of treated ground water. Two inches of gravel were placed in the bottom of these deeper percolation pits and filled with two inches of water above the gravel. The pits were pre-soaked with water for approximately one hour prior to monitoring a 1-inch drop in the water level within each percolation pit. The resultant percolation tests yielded a

1-inch drop in water level in five minutes (southeast), 8 minutes (south), and 300 minutes (east) for each pit, indicating improved infiltration capacity at this depth.

2.5 Pump Test Water Quality Sampling

Ground-water samples were collected from the pump well (influent/untreated) during the pump test and analyzed using Contract Laboratory Protocol (CLP) methods. Table 2 presents a summary of ground-water samples and analyses performed during the pump test.

2.5.1 Pump Well Water Quality Sampling

As specified in the RD Work Plan, ground-water samples were collected during the step-drawdown test and pump test. Four untreated ground-water (influent) samples and four treated ground-water (effluent) samples were collected. The influent and effluent samples were transported to Severn Trent for laboratory analysis for the selected parameters in accordance with CLP methods.

An influent sample (INF-1) and effluent sample (EFF-1) were collected within the first hour of pump operation during the step-drawdown test. These samples were analyzed by Severn Trent for VOCs by USEPA Method 8260. During the pump test, influent and effluent samples were collected within the first hour, twenty-fourth, hour and forty-eighth hour of the pump test. The influent samples collected during the pump test (INF-2, INF-3, and INF-4) were analyzed by Severn Trent for VOCs (Method 8260), total suspended solids (TDS) by USEPA Method 160.2, total dissolved solids (TDS) by USEPA Method 160.1, and total dissolved iron and manganese by USEPA Method 6010/7000 series. The effluent samples collected during the pump test (EFF-2, EFF-3, and EFF-4) were analyzed by Severn Trent for VOCs (Method 8260). Trip blank samples were also submitted to Severn Trent for VOC analysis. The sampling and analyses performed during the step-drawdown test and pump test are summarized in Table 2.

The analytical results for influent samples collected during the step-drawdown and pump test are presented in Table 3 (TSS and TDS), Table 4 (dissolved iron and manganese), and Table 5 (VOCs). Analytical results for the effluent samples are presented in Table 6 (VOCs). The laboratory data packages are provided in Appendix E.

2.6 Water Level Measurements

To confirm the previous interpretation of the ground-water flow direction under static conditions, ground-water elevation measurements were collected prior to pumping and used to construct a ground-water contour map (Figure 4). Ground-water elevation data from March 22, 1999, indicates that ground-water flow is in the general northwest direction across Area 2 of the Site. This general flow pattern is used as the starting pointfor evaluating various remedial configurations. A ground-water elevation contour map was also prepared to present ground-water elevation data collected on March 24, 1999 (Figure 5), after two days of pumping at approximately 5 gpm. The resulting contour map indicates that the ground-water flow direction was altered very little by the pumping at PW-1, with the ground-water flow direction remaining toward the northwest. Local changes in the ground-water contour pattern are evident in the vicinity of PW-1.

2.7 Monitoring Well Sampling

Monitoring well MW-21 was sampled on March 26,1999, upon completion of the pump test. Three well volumes were removed during purging using a disposable Teflon bailer prior to collection of the ground-water samples. In accordance with the QA/QC Plan, field duplicate, matrix spike (MS), and matrix spike duplicate (MSD) samples were collected. These samples were submitted to Severn Trent for laboratory analysis of VOCs by USEPA Method 8260 using CLP Methods. Analytical results for monitoring well MW-21 indicated only the estimated presence of acetone at 4 ppb. No other VOC s were detected in MW-21. Analytical results are presented in Table 7. The full analytical report is presented in Appendix D.

2.8 Ground-Water Modeling

The results of the pump test and the second set of percolation tests were used to establish the parameters for the analysis of extraction and reinjection remedial alternatives. As stated in the project objectives, the basic approach is to extract impacted ground water at the northern downgradient side of the site, treat the water to acceptable levels and reinject the water or allow it to infiltrate through any residual contaminated soils at Area 2 to address any remaining source area.

A two-dimensional ground-water model (QuickFlow) was utilized to simulate the extraction and infiltration of water at the site. An initial system was laid out based on the assumed configuration of extracting ground water near the north side of Area 2 and reinjecting the treated ground water in the area of the most impacted soils, previously identified during the soil vapor survey and soil sampling programs on the east and south sides of the garage. The ground-water extraction system was simulated to capture the majority of the ground-water contaminant plume identified from the latest round of ground-water sampling from July 1998. The model was also constructed to simulate the infiltration of treated ground water at an infiltration gallery located upgradient of the extraction system. In essence, the constructed model simulates a closed loop system between the extraction wells and the infiltration gallery. This simulation represents an area of steeper ground-water gradients that will allow for more rapid ground-water movement and a quicker flushing of the saturated subsurface.

The model was constructed with the following parameters:

Parameter	Measurement
Hydraulic Conductivity	5.6×10^{-2} cm/sec
Aquifer Thickness	12 feet representing the most permeable portion of the saturated thickness
Hydraulic Gradient	0.0025 to the northwest
Storage Coefficient	6.8e-4
Porosity	0.3
Recharge	0

Following the establishment of the steady state conditions, the extraction and infiltration components were added to the model. Three extraction wells were simulated, all pumping at 5 gpm, with the wells placed along the east-west northern edge of the property, near the downgradient edge of the plume. The middle well is the existing PW-1 extraction well; a second proposed well was added to the model approximately 70 feet east of PW-1, and a third extraction well was added to the model approximately 50 feet west of PW-1. The proposed infiltration system was simulated as three parallel pipes on the east side of the existing garage. The total length of the simulated injection system is 120 feet, and it was assumed that treated ground water will be equally distributed over the infiltration gallery at a rate of 1 gpm or 1.60 cubic feet (ft^3)/day per foot of pipe.

The model was run under steady state conditions with the simulation of the extraction of 15 gpm and infiltration of I gpm incorporated into the model. Particle tracking between the extraction wells and the infiltration gallery, as shown on Figure 6, indicates that ground water in the vicinity of the garage is controlled by the extraction wells. The model results also show that contaminants flushed from the soil in the source area will be routed directly to the extraction wells for removal and treatment. The results of this model form the basis of design for the remedial system presented in Section 3.

Section 3.0

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

100 Percent Remedial Design

3.0 100 Percent Remedial Design

3.1 General

This section presents the engineering design associated with the Site remedy. This design has been prepared to achieve the requirements set forth in the ROD and draft ESD. In particular, as discussed in the ROD and Addendum 3 of the RD Work Plan, this design has been prepared to implement the extraction and treatment of the contaminated ground water, and flushing of contaminated soils via reinjection of the treated ground water to an infiltration gallery. Construction of the infiltration gallery will require excavation and off-site disposal of those soils containing levels of VOCs above NYSDEC cleanup objectives. In addition, dismantlement and decontamination of the maintenance building located in Area 2, along with disposal of the resultant debris to an off-site landfill, will be performed, if necessary.

The primary engineering design components include the following:

- Site preparation;
- *Building decontamination;*
- Installation of the treated water reinjection system (infiltration gallery), which will include the following components;
  - Excavation and temporary staging of impacted soils;
  - Characterization of excavated soils;
  - Installation of gravel backfill and reinjection piping system;
  - Backfilling of excavated soil (if determined to be clean) or clean backfill; and
  - Placement of top soil and seeding.
- Installation of extraction wells, pumps, piping; and
- Installation of treatment building and air stripper.

Following installation, startup and testing of the system will be performed prior to commencement of full-scale operations. The basic components required for startup/testing of the remedial system are discussed in Section 4. The Operations and Maintenance Manual, to be submitted to the USEPA prior to completion of construction, will provide a detailed startup/testing procedure for the remedial system.

Engineering plans and material and performance specifications are included as Appendix F. Design basis information is provided in Appendix G.

3.2 Site Preparation Activities

This section summarizes activities that will be performed to prepare the Site for subsequent remedial activities.

3.2.1 Mobilization

Under this task, the remedial contractor will mobilize the necessary construction equipment and materials required for the remedial action. Temporary toilet facilities will be provided during site work.

3.2.2 Clearing/Grubbing

Prior to performing Site work, Area 2 will be cleared and grubbed within the limits of work (as shown in the plans). Trees and brush will be removed to the ground surface using heavy construction equipment, chain saws, and brush hogs. The cleared vegetative materials will either be chipped and spread on Site as mulch and/or disposed off site.

There is a fair amount of surficial debris consisting of junk automobiles/trailers, tires, and concrete on the property. This surficial debris will be consolidated and staged on site as shown in Drawing G-2.

3.3 Building Decontamination

The maintenance garage building is a single story concrete block structure with concrete floor, approximately 80 feet long by 65 feet wide, with one internal partition. The roof structure is constructed of corrugated steel sheets with structural steel framing. The maintenance garage contains some miscellaneous wastes consisting of paint cans, paint thinners, automotive parts, etc. Prior to decontamination, non-structural material in the maintenance garage will be removed by the remedial contractor and disposed off-site in accordance with applicable regulations.

Soil analytical results obtained from soil samples previously collected from beneath the building subfloor do not indicate VOCs at levels requiring excavation and off-site disposal. These data, collected during the initial RI and supplemental investigation in 1996, indicate that levels of VOCs present below the building subfloor are at levels below detection limits or below NYSDEC soil cleanup objectives (TAGM 4046). The previous soil analytical results collected from the soil subfloor are provided in Figure 7.

However, at the request of the USEPA, the settling defendants will clean out the two main garage bays and maintenance area. Cleaning will include the removal and off-site disposal of miscellaneous debris in the garage, steam-cleaning and/or pressure washing of the garage interior (walls and floor), dewatering and steam-cleaning and/or pressure washing of the mechanic's pit in the garage floor, and control, containerization, and disposal of the pit and rinse water.

3.4 Treated Water Reinjection System

This section discusses those activities to be performed as part of the installation of the treated water reinjection system. The purpose of the treated water reinjection system is to provide flushing of potentially contaminated soils with clean water to enhance the remediation of residual levels of constituents in soil that may serve as a potential source of ground-water contamination. The treated water reinjection system will be located in the appropriate area of the site having soil gas VOC concentrations above 50 ppm.

The design of the treated water reinjection system is based on results of the percolation tests performed at the Site in December 1998 and May 1999 (Section 2). The results from the first percolation test indicated that surficial soils were not sufficiently permeable to allow for effective infiltration of treated ground water through the existing shallow soil mass. The next series of percolation tests indicated that the soils located approximately four feet below grade that contained a greater fraction of sands/gravels had a greater capacity for percolation. The treated water reinjection system has been designed to provide infiltration of water through these deeper, more permeable, soils. However, the estimated capacity of these deeper soils for infiltration of treated water is not considered sufficient to allow reinjection of the entire volume of treated water. Therefore, only a portion of treated water will be diverted to the reinjection system using a throttling valve. The throttling valve settings will be adjusted to optimize the flow of water into the reinjection system. The remainder (majority) of the treated water volume will be discharged to the adjacent ditch. The treated water discharged through the reinjection system will provide flushing of water through the soils. However, the final distribution of water between the reinjection system and the ditch outfall is dependent upon the final areal extent of the excavation piping layout

Installation of the treated water reinjection system will involve the excavation of potentially impacted soils to the required elevation. Excavated soils will be temporarily staged and characterized to determine whether this soil is appropriate for use as excavation backfill (over the treated water reinjection piping), or requires off-site disposal. The treated water reinjection system will be installed to an approximate depth of four feet below grade in order to maximize the rate of percolation of treated water and to protect the system from freezing. In addition, installation of the reinjection piping at depth will access the more permeable lower soil. The excavation methodology is provided in Section 3.4.1. The methodology for characterization and management requirements of excavated soils is provided in Section 3.5.

3.4.1 Excavation and Soils Management Plan

This section discusses the excavation component of the Site remedy required to install the treated water reinjection system. It has been developed based on previous soil gas measurements collected at the Site. Following excavation to the initial limits proposed, post-excavation samples will be collected from the excavation sidewalls to verify that the soil cleanup objectives have been met. Post-excavation samples will be analyzed for VOCs and compared with NYSDEC TAGM 4046 (TAGM 4046) soil guidance values. If levels of VOCs are detected above TAGM 4046 levels, then the excavation will be extended horizontally until the post-excavation sidewall sample analytical results are below the TAGM 4046 levels. The contaminants of concern from the excavation side wall samples and the associated TAGM 4046 are presented below:

TAGM 4046 Soil Cleanup Levels	
Contaminant of Concern *	Soil Cleanup Objective to Protect Groundwater Quality, ppm
l,l,l Trichloroethane	0.76
Trichloroethene	0.7

* Based on parameters identified in ROD that have been shown to be present in Area 2 Soils.

The base of the excavation will be to elevation 636 ft (NGVD), which is approximately 4 feet below the surrounding grade. Excavated soils will be staged on-site and characterized in order to determine if they are suitable for return to the excavation (based on comparison with NYSDEC TAGM 4046 guidance values). Excavated soils that contain levels of constituents above TAGM 4046 levels will be characterized for off-site disposal and sent off site for treatment/disposal as non-hazardous or RCRA characteristic hazardous waste soils.

The following subsections present a detailed summary of the various components associated with soil excavation at the Site.

3.4.1.1 Limits of Excavation

The anticipated limits of excavation, including those soils that may require management as RCRA characteristic hazardous waste, are presented in Sheet G-2, Excavation Plan & General Notes. The initial excavation limits are based on the area of the site, located along the southeastern portion of the maintenance building, that historically contained soil gas VOC concentrations of 50 ppm or greater. The final excavation limits will be dictated by post-excavation samples to be collected from the excavation sidewalls. The base of the excavation will be an elevation of 636 ft. The excavation depth will generally vary between 4 and 5 feet, although the southern limits of the excavation require a limited volume of soils excavated to approximately 9 feet below grade (based on a five foot increase in ground surface elevation along the southern limits of excavation). The initial excavation limits have also been developed in order to provide protection of the adjacent maintenance building structure and existing monitoring well MW-10B, if possible. If necessary, the building and monitoring well will be demolished/removed in order to allow for removal of soils containing levels of VOCs above TAGM 4046 objectives.

3.4.1.2 General Requirements

During excavation activities, the following control measures will be implemented:

- Surface water will be directed away from the excavation to prevent erosion and flow of surface water into the excavation. Surface water run-on will be observed continuously during the performance of the excavation activities to verify effectiveness of controls;

- Areas surrounding the excavation will be monitored during excavation activities to ensure that they are draining effectively. Also, the temporary erosion control/protection devices will be monitored continuously during the performance of excavation activities;

- Air monitoring will be provided in the breathing zone within and along the downwind perimeter of the excavation in accordance with the HASP (to be provided by the remedial contractor as a separate document prior to remediation);

- Excavation activities that are conducted near any identified underground utility and/or structure will be excavated manually, as necessary, to protect the integrity of the utility and/or structure; and

- At the end of each work day, the excavated area will be barricaded appropriately (i.e., orange construction fencing, barriers, or yellow caution tape) to prevent unauthorized individuals from entering the excavation when remedial action personnel are off site.

3.4.1.3 Excavation Procedures

This task includes the excavation of soil from the proposed limits of excavation, as outlined in Sheet G-2, Excavation Plan.

Excavated soil will be loaded directly into a dedicated on-site dump trailer (or equivalent), for transfer to the on-site soil staging area. Staged soil will subsequently be characterized to determine if it will be suitable for re-use as backfill material in the excavation. The excavation will be performed to the initial excavation limits and to the required elevation. Excavated soils will be staged in approximate 100 to 200 cubic yard piles for subsequent characterization. Equipment used for excavation of soils will consist of a trackhoe (or equivalent).

Once the initial excavation limits have been met, post-excavation verification samples will be collected from the sidewalls of the excavation, in accordance with the Post-Excavation and Excavated Soil Sampling and Analysis Plan (Appendix H). Excavation sidewall samples will be analyzed for VOCs to determine if the clean-up goals have been achieved. If the analytical results indicate the presence of VOCs above NYSDEC TAGM 4046 cleanup levels in remaining soils, additional excavation and sampling will be required until the clean-up goals have been achieved. Once the analytical data indicates that the clean-up goals have been achieved, backfilling will commence.

3.4.1.4 Soil Staging Area

The anticipated location of the soil staging area is provided in Sheet G-3. Prior to construction of the soil staging area, debris will be removed from the ground surface, clearing and grubbing will be performed as necessary, and the ground surface will be graded to provide a level working surface. The soil staging area consist of a bermed, plastic liner to prevent contact with the underlying ground surface. Silt fencing will be installed around the perimeter of each soil staging area, and soil piles will be covered to minimize runoff. Soil will be staged in the soil staging area in individual piles of approximately 100 to 200 cubic yards each.

3.4.1.5 Post-Excavation Sampling/Analysis

Once the initial excavation has been completed in an area, the excavation sidewalls will be visually inspected for visual evidence of contamination (i.e., stains, discolorations) and screened with a PID and/or FID for organic vapors. If the screening does not provide evidence of further contamination, then post-excavation sidewall samples will be collected in accordance with the procedures and frequencies established in the Post-Excavation and Excavated Soil Sampling and Analysis Plan. One excavation sidewall sample will be collected for every 30 linear feet of excavation sidewall. The sidewall sample will be collected from the excavation face at a height of approximately one-third to one-half of the excavation depth (measured from the base of the excavation).

3.4.2 Reinjection System Layout and Backfilling

Once excavation is completed, the treated water reinjection system piping will be installed as depicted in Sheet G-3. The piping layout may be modified based on the final excavation limits. The reinjection piping consists of 2-inch-diameter Schedule 80 perforated PVC pipe. The perforated pipe will be placed in a gravel backfill (#1 stone) to allow for even distribution of treated water. A geotextile will be wrapped around each portion of perforated pipe to limit intrusion of sediments into the pipe (Sheet G-3). The perforated pipe will be placed at an approximate elevation of 636.75' +/-, and the gravel backfill will be placed to an approximate elevation of 637' +/-.

Once the reinjection system has been placed, the remainder of the excavation will be backfilled. The backfill material used will consist either of excavated soil which has been determined to be suitable for use as backfill, or clean backfill material from an off-site source. The backfill material will be placed so that the final soil cover is located a minimum of 4 inches over the treated water reinjection piping. The anticipated minimum final grades for the backfilled excavation are depicted in Sheet G-3. The final grades will be dependent upon the volume of excavated soils that can be placed back in the excavation. The maximum final grades will not be greater than existing grades. Excess material (e.g., excavated soils that meet soil cleanup objectives), if any, will be spread on site.

3.5 Management of Excavated Soils

This section discusses the on-site and off-site management of excavated soils. On-site management of soils includes the handling and subsequent characterization of excavated soil. Off-site management of soils, if necessary, includes those soils that are identified as containing levels of VOCs above soil cleanup objectives and, therefore, require off-site disposal.

3.5.1 On-Site Soils Management

Soils excavated from contiguous areas will be stockpiled together. Soil will be stockpiled in individual piles of approximately 100 to 200 cubic yards. Once a soil stockpile is generated, it will be characterized, as described below, for total VOC levels. If characterization results indicate the soils are suitable for return to the excavation (i.e., less than TAGM 4046 guidance levels), they will be used as backfill over the treated water reinjection system. If levels of VOCs are detected above the soil cleanup objectives, then the soil will be characterized for disposal purposes and sent off-site for disposal as non-hazardous waste or RCRA hazardous waste, depending upon characterization results.

3.5.1.1 Soil Stockpile Sampling/Analysis

Representative soil samples will be collected from each temporary soil stockpile in the soil staging area. If it is determined that the levels of VOCs in an individual soil pile are below the soil cleanup objectives, then that soil will be used as backfill for the excavation. If it is determined that the levels of VOCs are above the soil cleanup objectives, then the soil will require characterization for off-site disposal purposes. The disposal characterization effort will involve the collection of soil samples for Toxicity Characteristics Leaching Procedure (TCLP), the results of which will be used to determine if the soils are considered a RCRA characteristic waste or a non-hazardous waste. Once disposal characterization results are obtained, the soil will be loaded into trucks and sent off-site for appropriate disposal.

The soil sampling procedure and required analyses are presented in the Post-Excavation and Excavated Soils Sampling and Analysis Plan. In general, soil will be staged and characterized in individual soil stockpiles. Characterization of soil stockpiles will involve collection of a representative number of soil samples (e.g., 4 to 5) from the soil stockpile. The samples will be sent to the analytical laboratory to prepare a composite sample for each pile prior to analysis.

3.5.2 Off-Site Soils Management

This section describes the procedures for transporting and disposing of those soils not suitable for return to the excavation. These soils will require disposal as non-hazardous or RCRA characteristic hazardous wastes.

These soils will be properly managed to minimize environmental impacts and to comply with all applicable federal, state, and local laws, as well as regulations. These procedures, in conjunction with applicable non-hazardous and hazardous waste manifests, will govern the waste from its point of origin to its final destination.

Prior to sending any soils off site for disposal, written verification from each proposed non-hazardous and RCRA hazardous waste transporter and disposal facility will be provided to the USEPA in a separate correspondence based on the soil and waste characterization analytical data. The proposed waste transporter and disposal facilities will be in compliance with all applicable federal, state, and local laws, as well as regulations, and will have all of the required licenses and permits.

3.5.2.1 Non-Hazardous and Hazardous Waste Transportation

Soils requiring off-site disposal will be transported off site by a licensed USEPA-approved hauler, in accordance with the DOT guidelines as outlined in 49 CFR, Parts 171 through 179, 6 NYCRR Part 364, and any other applicable state and local regulations. Each shipment of soil (solid waste) will be properly characterized, containerized, loaded, and manifested prior to exiting the Site. Also, the waste transporters must carry with them a copy of the applicable waste transporter's permit and license, as required.

A non-hazardous bill of lading or hazardous waste manifest will be prepared and completed for each shipment of solid waste prior to exiting the Site. The bill of lading or manifest will include, at a minimum, the following information:

- Sufficient information for the waste transporters to do their job safely and lawfully;

- Sufficient information for emergency response personnel who would respond in the event of an incident or spill involving the waste;

- The waste classification and the estimated weight or volume of the waste material;

- The names of the waste generator, transporter, and waste disposal facility and their USEPA Identification Numbers, where required;

- A signature from the driver of the transport vehicle which acknowledges receipt/acceptance of the waste material and acceptance of responsibility for the transportation of the waste material to the appropriate waste disposal facility.

The transporter must possess the signed non-hazardous bill of lading or hazardous waste manifest when transporting the waste material to the waste disposal facility. The transporter will also be responsible for traveling along the designated truck routes and will have the proper labels and placards on the waste containers when transporting the waste materials off site. Once arriving at the waste disposal facility, the manifest must be given to the waste disposal facility as it accepts the waste material at their facility.

3.5.2.2 Non-Hazardous and Hazardous Waste Disposal

Soil requiring off-site disposal will be characterized as a specific waste stream and will be managed as either a non-hazardous or RCRA characteristic hazardous waste.

In addition to soils, other solid waste materials that may be generated during remedial action implementation include, but are not limited to, contaminated soil, roots, tree stumps, concrete, asphalt, rocks/cobbles, and construction materials (i.e., stone, polyethylene, fence posts, silt fence, personal protective equipment, piping). The solid waste materials will be disposed of as follows:

- All solid RCRA characteristic hazardous waste materials will be transported to a USEPA-approved and permitted Subtitle C waste disposal facility for treatment followed by landfilling. A Certificate of Disposal will then be issued by the waste disposal facility to verify that the hazardous waste specified on the corresponding manifest was properly disposed in accordance with all local, state, and federal regulations; and

- All non-hazardous waste materials will be transported to a USEPA-approved, state permitted Subtitle D waste disposal facility for landfilling.

3.6 Fugitive Dust Control Measures

This section addresses the fugitive dust suppression measures and action levels to be implemented as an integral component of the remedial action for the site. The typical fugitive dust sources included with any typical remedial construction projects are excavation, material handling and transport, and material placement and grading. Although a list of suggested control measures is presented in this section, it is the responsibility of the remedial contractor to implement fugitive dust control measures. The Remedial Action Plan, to be submitted by the Remedial Contractor, will include a Fugitive Dust Control Plan, which will meet the minimum requirements presented here. In addition, particulate monitoring will be incorporated into the overall Health and Safety Plan in accordance with the requirements provided in NYSDEC TAGM No. 4031, "Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites" (October 27,1989). The Fugitive Dust Control Plan will include procedures for providing additional dust control measures, if required, and for temporary shutdown of excavation operations, and reevaluation of dust control measures, in the event shutdown is required.

3.6.1 Fugitive Dust Sources

Excavation and Soil Handling

The primary dust suppression technique to be utilized during soil excavation and handling operations will be water spray. Water will be sprayed onto the excavation face. The rate at which water is applied to the excavation face will be a function of the general activity in the area (excavation rate, number of vehicles actively operating), the moisture content of material being excavated, the proximity of the excavation to the property line, wind speed and direction, precipitation, and excavation geometry. Water will be applied evenly over the excavation surface to that level required to prevent visible particulate at the relevant property line. The use of water spray will be optimized so that fugitive dusts are sufficiently controlled, while preventing generation of surface-water run off.

Stockpiles

Potential alternatives to address fugitive dust emissions from undisturbed stockpiles include water spray, crusting agents (i.e., calcium chloride), surfactants, erosion control mats, wind screens, or covers. The stockpiles which have the highest potential for generation of fugitive dusts are temporary working piles, which have not yet been placed onto the reinjection area. Water spray and temporary covers will represent the primary method of fugitive dust control for active stockpiles.

3.6.2 Ambient Air Monitoring Action Levels

Normal operating conditions for fugitive dust control are dictated by ambient air monitoring results. In accordance with the TAGM No. 4031, the ambient air monitoring action level for PM-10 is 150 ug/m^3, integrated over a fifteen-minute period. If the 150 ug/m^3 action level is exceeded, then background (upwind) measurements of will be taken. If the downwind levels are less than 100 ug/m^3 greater than the upwind levels, then no further action is required. In addition, because fugitive dusts generated at this site have the potential to be impacted by VOCs, an additional standard of no visible dust at the property lines will also be implemented as part of this project, in accordance with TAGM No. 4031.

3.7 Ground-Water Extraction and Treatment System Design

Ground-water extraction system components to be installed include two extraction wells (PW-2 and PW-3, including pitless adaptors), a pitless adaptor for the existing extraction well (PW-1), three submersible ground-water extraction pumps, and the required piping, level sensors, and power supply for each extraction well. The ground-water treatment system components to be installed include the precast concrete treatment building, interior piping , the skid mounted air stripper, conveyance piping connecting the pumping wells to the treatment system and discharge piping conveying a portion of the treated effluent to the reinjection system and the remainder of the effluent to the ditch. A brief description of the design rationale and capacities of individual components are presented below.

Extraction Wells

Three extraction wells will provide ground-water extraction for the system. Existing extraction well PW-1, initially used for the pump test, will be converted to a full-scale extraction well through installation of a pitless adaptor. Two new extraction wells, depicted in Drawing G-3, will also be installed. These extraction wells will be installed to the same specifications as PW-1. A pitless adaptor will be installed in all pump wells. Drawing G-4 provides an extraction well detail.

Extraction Pumps

The extraction pump to be installed in each of the extraction wells has a pumping range of 3 to 10 gpm at a Total Dynamic Head (TDH) range of 210 to 70 feet. The pumping range is well within the anticipated yield of 5 gpm per well based on the pump test conducted at the site, as presented in Section 2. Appendix G presents the pump curve along with anticipated operating conditions for the selected extraction pumps. The extraction wells will be fitted with pitless adaptors so that the conveyance piping will be placed 4.5 to 5 feet below the ground surface to protect from freezing. The extraction well will also be connected to a power supply and level sensors to provide for on/off control during pumping. A low-level sensor will be installed above the well screen to shut off the extraction pump. A high-level sensor will be installed above the low-level sensor to turn the extraction pump back on. A third sensor will be installed below the screen to provide a baseline condition for the other two sensors. The actual depths of the level sensors will be determined during initial startup activities in conjunction with initial flow balancing of the system in order to minimize the cycling of the pump and increase hydraulic control of the system. Drawing G-5 presents details for the extraction pumps, level sensors, and power supplies.

Treatment Building

The treatment building is a precast concrete building with a dimension of 10 feet by 12 feet and 8 feet in height. The layout of the treatment building is provided in Drawings A-l (plans) and M-2 (piping). The building will be provided with the required electrical and insulation systems per the Engineering Plans and Specifications. The treated and untreated water piping will enter and exist through a floor opening as shown in Drawing M-2. The air inlet and outlet piping will enter and exit through the side walls of the building. The building will be set on grade over a 12-inch deep compacted select fill.

Air Stripper

The air stripper chosen for this project is a Shallow Tray Model 1331 with 304 L stainless steel trays. The stripper is capable of treating up to 20 gpm of groundwater containing 850 ppb of 1,1,1 -trichloroethane (1,1,1 -TCA) to an effluent concentration of 3 ppb. The basis for the selection of this model is provided in Appendix G. The hydraulic capacity of the stripper represents an excess capacity of 100% to provide for future use (if necessary) or fluctuations in actual flow rates from those modeled rates.

The air stripper is equipped with an induced blower, capable of delivering 150 cubic feet per minute of air. The induced blower was chosen to provide an additional downstream pressure of 8-inches water column (w.c.) so that vapor phase treatment, using granular activated carbon, could be added at a later time, if necessary. Under the current regulations in the State of New York, this project is considered as a "permit exempt" facility from air permit requirements. An evaluation of ambient air impacts from the air stripper was performed in accordance with

NYSDEC's Air Guide-1. This analysis, included in Appendix G, indicates that vapor phase treatment of the air stream will not be required.

The treated water will be transferred to the discharge piping and reinjection system via a 1.5 HP pump with a capacity of 40 gpm at 50 feet TDH. With the use of a throttling valve, the discharge pump will be set at a discharge rate higher than the ground-water extraction rate, to prevent an alarm (shutoff) condition in the collection sump.

The treated effluent discharge flow to the adjacent ditch and to the treated water reinjection system will be distributed and controlled using a throttling valve. This will provide flushing of the potentially contaminated soils while minimizing the potential for flooding of the treated water reinjection system. The initial valve settings will provide approximately 14 gpm of flow to the ditch and approximately 1 gpm of flow to the treated water reinjection system. The throttling valve settings will be adjusted during system startup activities to maximize the amount of treated water diverted to the reinjection system.

The stripper is equipped with a controller, which will control the three extraction wells, the blower, treated water transfer pump, and an auto dialer. The controller will automatically shut off the remedial system in the event one of the following conditions is met:

- High pressure in the air stripper blower (indicating a blockage in the air duct work);
- Low pressure in the air stripper blower (indicating a leak in the system); and
- High-high level in the air stripper collection sump (indicating the transfer pump/level controls are not working).

Air and Water Piping

Three inlet water pipes will provide the groundwater flow from the three extraction wells (PW-1, PW-2, and PW-3). The two discharge pipes will provide discharge of treated water to the ditch and the treated water reinjection system. Throttling valves in the treated water discharge pipes will be used to distribute flow between the ditch and the treated water reinjection system. This will provide the necessary soil flushing component, while ensuring that the portion of the flow discharged to the reinjection system will be self-contained (e.g., surface water outbreaks or flooding would be prevented) and the limited flow of treated water flushed through the soil would be captured within the groundwater plume.

The air inlet pipe inside the building will have a damper to mix outside and inside air. This feature will be used more in the winter months to provide warmer air for the stripper. The air discharge pipe will have a Tee and appropriate valves, so that the vapor phase treatment can be implemented readily, if required.

3.8 Contractor Selection

The remedial contractor will be selected through a bidding process. Upon selecting a contractor, the qualifications will be submitted to the EPA for approval prior to initiation of construction activities. The selection process is documented in the specifications, and sufficient time will be allowed for this selection process. Upon completing the contractor selection process, an agreement will be executed between the contractor and the Settling Work Defendants and a notice to proceed will be issued to the contractor.

3.9 Implementation of Construction and Construction Oversight

Prior to on-site construction activities commencing, the Settling Work Defendants will submit a Remedial Action Work Plan (RAWP) to the USEPA and NYSDEC for approval. The RAWP will provide for construction and implementation of the approved remedial design. The RAWP will include the following components:

- A request for modification of the final remedial design report, if applicable.

- A Site Management Plan (SMP). The SMP will include the following items:
  - Identification of the Remedial Action team;
  - A final schedule for completion of the Remedial Action;
  - Methodology for implementation of the CQAP;
  - Procedures and plans for decontamination of construction equipment and disposal of contaminated materials;
  - Methods for satisfying permit requirements;
  - Methods for implementing Institutional Controls through completion of groundwater treatment and at least five years thereafter;
  - Discussion of the methods by which construction operations shall proceed; and
  - Discussion of construction quality control.

Throughout construction, oversight and construction quality assurance/construction quality control (CQA/CQC) will be performed in accordance with the CQAP, provided in Section 5.

3.10 Permits and Approvals

Discharge of the treated water to the adjacent ditch will require that discharge monitoring, in accordance with the technical and substantive requirements of aNYSDEC State Pollutant Discharge Elimination System (SPDES) permit be performed. It should be noted that this remedial action is considered exempt from a SPDES permit, but not the associated operating, monitoring, and reporting requirements. The conditions for discharge of the treated effluent to the ditch (e.g., maximum allowable concentrations, flow rates, and other water quality parameters, and associated discharge monitoring and reporting requirements) will be negotiated with the NYSDEC as part of the overall remedial action process. Anticipated discharge monitoring requirements are provided in Section 4.

Section 4.0

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O&M Plan

4.0 O&M Plan

4.1 Introduction

4.1.1 General

This document presents the Operations and Maintenance Plan (O&M Plan) for the Area 2 remedial system at the Byron Barrel & Drum Site (Site) located in Byron, New York. This plan describes the Site and information management procedures, and provides information regarding the remedial system components, operation and maintenance, start-up and testing and shutdown activities, sampling and analysis requirements, and health and safety requirements.

This O&M Plan has been developed based on the anticipated operating characteristics of the remedial system equipment as presented in this 100% Remedial Design Report. As required by the Remedial Design Statement of Work (SOW), this document will serve as a basis for the O&M Manual to be submitted by the remedial contractor no later than ninety (90) days prior to completion of remedial system construction activities. The O&M Manual will contain more detailed information on the remedial system equipment as provided by the equipment manufacturers.

The final O&M Manual will:

- Outline the responsibilities and training requirements of personnel;
- Provide O&M personnel with an outline of the inspection and maintenance procedures;
- Provide O&M personnel with a description of required performance monitoring, including ground-water and treated effluent monitoring; and
- Establish the reporting requirements for system operation.

4.1.2 O&M Plan Organization

Following this introductory section, this O&M Plan is organized into the following sections:

- Section 4.2 - presents a description of personnel involved in O&M of the remedial system and associated responsibilities;
- Section 4.3 - presents information regarding system operation and maintenance;
- Section 4.4 - presents information regarding system startup and testing;
- Section 4.5 - presents an overview of sampling and analysis activities to be conducted during operation of the remedial system;
- Section 4.6 - presents information regarding health and safety procedures to be followed during operation of the remedial system; and
- Section 4.7 - presents information regarding reporting requirements during operation of the system.

4.2 O&M Personnel Requirements

Personnel, including subcontractors, will perform specific tasks such as system inspection and maintenance and ground-water monitoring, as well as equipment replacement and system repairs as necessary.

4.2.1 Responsibilities and Duties

4.2.1.1 Settling Work Defendants

The Settling Work Defendants will be responsible for the overall management of the remedial action at the Byron, Barrel & Drum Site (Site) as part of the long-term maintenance program. The responsibilities include staffing, training and supervision of site personnel, budget control, site maintenance, record keeping, and preparation and submittal of reports.

The Settling Work Defendants will also be responsible for financial aspects of the maintenance for the Site. The Settling Work Defendants will secure a contractor to perform system operations and maintenance, as well as the periodic environmental ground-water and treated effluent sampling and reporting to meet the requirements specified in the ROD and SOW.

4.2.1.2 O&M Contractor

The O&M contractor will be responsible for preparation and submittal of the O&M Manual and implementation of the remedial system O&M. The O&M contractor will also be responsible for providing trained personnel to perform the routine and non-routine maintenance activities at the Site. In addition, periodic inspections will be performed by trained personnel as outlined in Section 4.3.3.1 of this O&M Plan.

4.2.1.3 Environmental Monitoring Contractor

The environmental monitoring contractor will be responsible for providing trained personnel to perform the environmental sampling in accordance with the schedule frequency outlined in Section 4.5 of this O&M Plan.

4.2.2 Personnel Training

All field personnel will have completed OSHA1910.120 (e) (2) 40-hour hazardous waste training. In addition, yearly 8-hour hazardous waste refresher training will be documented for site personnel. Specialized training, as necessary, will be provided by contractors for their personnel.

4.3 System Operation and Maintenance

4.3.1 Remedial System Overview

The remedial system will collect and treat ground water extracted from Area 2. Existing well PW-1 and future wells PW-2 and PW-3 will collect area ground water. Collected ground water will be pumped through an in-line bag filter for removal of suspended solids and then through a low-profile air stripper where VOCs will be stripped to the vapor phase via an induced draft, countercurrent air stream. The vapor stream will be discharged directly to the atmosphere. A portion of the ground-water effluent (approximately 1 gpm) leaving the air stripper will be pumped to the treated water reinjection system, where it will flush through impacted soils and the ditch located north of the maintenance building. The reinjection system is designed to enhance removal of contaminants in the soils to the ground water, which will in turn be recovered and treated by the remedial system. Discharge to the ditch is required for the remainder of the treated effluent based on the limited capacity of the soils for infiltration of water. The low-profile air stripper and related electrical and instrumentation equipment will be located in the treatment building.

4.3.2 Remedial System Components

The remedial system consists of the following components:

4.3.2.1 Ground-Water Extraction Pumps

The system will be equipped with three submersible ground-water extraction pumps which are designed to extract ground water from each extraction well and discharge it to the water treatment system at an estimated flow rate of 5 gpm each. When a pump is operating, it will pump water through a pitless adaptor installed in the well to a 2" PVC Schedule 80 PVC conveyance pipe.

4.3.2.2 tn-Line Bag Filter

Water pumped from the ground-water extraction wells will be pumped through an in-line bag filter (25-micron) to remove suspended solids prior to treatment in the air stripper.

4.3.2.3 Air Stripper

The shallow tray air stripper is designed to remove VOCs from the ground water at an efficiency of 99.7%. Water flows into the air stripper's uppermost tray and cascades through the trays to a sump located under the trays. From the sump, treated water will be pumped to the soil infiltration system located adjacent to the former garage area. The air stripper will be equipped with three trays in series. The air stripper blower is a 3 HP unit with a capacity of 150 cfm at 26 in. w.c. The blower will be equipped with a motor starter located in the main control panel. Treated ground water will drain to a collection sump equipped with a ground-water discharge pump. The ground-water discharge pump will pump treated water to the infiltration system and the ditch located north of the maintenance building.

4.3.2.4 Control System

The remedial system is equipped with the following control systems on each of the system components:

Extraction Pumps/Wells

Each extraction well is equipped with three level sensors: a reference sensor to be installed below the pump intake, a low-level sensor, and a high-level sensor. Each extraction well pump will shut off in the event the water level is dropped below the low level and will turn on in the event the water level rises to the high-level sensor.

Air Stripper. Collection Sump

The collection sump in the air stripper is equipped with two float switches. The first switch will operate the discharge pump. The second will be triggered in the event the water in the sump rises above the pump's operating range; at which point the system will turn off and will notify the operator regarding this condition. This alarm may be an indication that water within the infiltration gallery is backed up and cannot infiltrate through the soil at the required rate, requiring adjustment of the throttling valves that distribute flow between the ditch and the reinjection system.

Air Stripper. Blower

The air stripper is equipped with pressure switches which are designed to shut the system off and notify the operator in the event certain conditions are reached. A high pressure switch will be triggered in the event of high air pressure indicating a potential blockage in the system. A low pressure switch will be triggered in the event a low-pressure condition is noted indicating the blower is not working.

4.3.2.5 Autodialer

The system will be equipped with an autodialer in the event of a system alarm condition or shutdown. The autodialer will automatically notify the operator of any alarm conditions via telephone message. In addition, the autodialer will allow for remote checks on the system to ensure the system is operating normally.

4.3.3 System Operation

The remedial system has been designed to operate continuously once it has been started. It is also equipped with an alarm system to alert the operator via autodialer in the event an alarm condition is reached or the system was shut down. The air stripper has been designed to operate only while at least one well is pumping. As discussed above, the system will automatically be shut down in the event of an alarm condition and in the event of a power failure. In the event of any alarm condition that results in system shutdown, a manual restart of the system will be required to ensure the condition is alleviated prior to restart.

During system operations, weekly monitoring of the system will be performed to document operating conditions and ensure continued operation. The weekly monitoring visits will entail collection of performance data and general system conditions. The information to be collected during the weekly site visits is summarized below. Monitoring activities are discussed in greater detail below. In addition, monitoring of influent and effluent ground water and vapors (through collection of samples for laboratory analysis) will be performed on a quarterly basis.

The following monitoring activities will be performed on a weekly basis.

1. General Housekeeping

   - Observe containment areas and piping for leaks and spills.

   - Record the instantaneous flow rates and totalized flow to the air stripper and the totalized flow from each well.

   - Check previous totalizer flow readings with previous readings. If a discrepancy exists, note the condition.

   - Check the bag filters and change out if necessary.

2. Low-Profile Air Stripper System

   - Observe the air stripper system for proper operation.

   - Observe water levels in the collection sump to verify proper operation.

   - Record the pressure readings for the following:

- Air stripper influent line;
- Air inlet line;
- Air discharge line; and
- Air stripper effluent line.

3. Extraction Wells

   - Open well caps at each extraction well. Check the pumps for operation and note unusual sounds if pumps are running.

4. Discharge System

   - Check the treated water reinjection area and ditch outfall for overall condition and note the following conditions, if any:

     - Presence of standing water near the reinjection system;
     - Proper setting of throttling valves (ensuring treated effluent flow is distributed between the ditch outfall and the treated water reinjection system);
     - Subsidence/sloughing/erosion of the ditch or soil pile side slopes;
     - Condition of vegetative cover; and
     - Any other noted anomalies.

4.3.4 System Maintenance

Mechanical maintenance is important to the overall performance of the ground-water treatment system. Equipment must be in good working condition for the system to maintain satisfactory performance. A preventative maintenance program contributes to minimize unexpected equipment or system failures. The O&M Manual will provide a detailed preventative maintenance plan, including schedules for inspection of system components and replacement of parts and equipment. In addition, the system maintenance program will include a troubleshooting guide which will provide the initial items to evaluate in the event of a mechanical or electrical problem with system components.

4.3.4.1 Preventative Maintenance

The following major components will be addressed under the preventative maintenance program. The preventative maintenance program will primarily include regularly scheduled inspections and replacement of system components. The following provides an overall summary of the preventative maintenance for each of the primary system components. The O&M Manual will provide a thorough discussion of the preventative maintenance program.

<u>Ground-Water Extraction System</u> - The ground-water extraction pumps will be removed periodically for inspection of power cables, pump seals, and general condition. The pump intake and impeller will also be checked for clogging, excessive wear, and damage. Worn or broken components will be replaced as necessary and in accordance with manufacturer's recommendations. The level sensors will also be removed and inspected. If necessary, level sensors will be recalibrated and cleaned to remove precipitates and sediments. In addition, a total depth measurement of each extraction well will be made to identify the presence of sediment, if any, at the bottom of the well. If a significant amount of sediment exists that could potentially affect pump performance, the sediment will be removed.

<u>Piping. Valves, and Totalizers/Meters</u> - External portions of system piping, valves, and flow totalizers/meters will be inspected once a month for leaks and proper operation. Flow totalizer readings will be recorded each month. These recorded measurements will be used to identify any potential issues with the extraction/conveyance system

(e.g., if a significant decrease in flow were recorded from one well). If leaks are identified, the piping/equipment will be repaired/replaced as necessary. The totalizer readings from the extraction wells will be compared to the readings from the total system flow each month. If a significant difference between the readings is identified, the totalizers will be recalibrated per manufacturer's recommended procedures.

In-Line Bag Filter - The in-line bag filter will be inspected periodically and replaced, at a minimum, on a quarterly basis. The operation of the bag filter will be evaluated based on a monthly comparison of system flow rates. If the total system flow rate is found to be decreasing, indicating a potential build up of pressure across the system, the bag filter will be replaced.

Air S'tripper - The blower pressure will be recorded on a monthly basis. In addition, the stripper trays will be visually inspected each month for signs of buildup of precipitate and/or sediments. If necessary, trays will be cleaned and/or replaced. The stripper trays will be cleaned, at a minimum, on a quarterly basis using a high-pressure wash in accordance with manufacturer's specifications. The blower will be maintained in accordance with manufacturer's recommendations. Blower maintenance will include:

- Cleaning blower housing;
- Cleaning blower blades;
- Lubricating blower fan and motor bearings as necessary; and
- Checking/retightening blower belts as necessary.

4.3.4.2 Troubleshooting

As part of the O&M Manual, a troubleshooting guide will be prepared for use by the operator in the event of a system or component failure. The troubleshooting guide will summarize the recommended procedures to be employed in the event a system component fails or is not working properly. The troubleshooting guide will also include a description of procedures to be employed in the event that difficulties are encountered during startup of the system after an alarm condition has been identified. The troubleshooting guide will address all mechanical and electrical components of the system.

4.4 Startup and Testing Requirements

4.4.1 General

This section presents an overview of the remedial system startup/testing and shutdown procedures. The information presented herein is for general reference purposes. The O&M Manual will present the specific startup/testing and shutdown procedures which include manufacturer's instructions to be completed by the remedial contractor.

4.4.2 System Startup/Testing

Following installation, the air stripper will initially be operated to verify the performance criteria have been met and to adjust system flow rates as necessary. The system will initially be started up following the manufacturer's recommended startup procedures, except that clean water will initially be used to test the air stripper for initial testing. The initial system startup will involve addition of clean water to the air stripper to verify proper operation of the stripper, blower, collection sump and associated alarms and controls. Once the remedial system has been thoroughly tested, the clean water influent will be removed and the ground-water influent lines will be activated and flow rates adjusted as necessary.

4.4.3 Initial Extraction Wells Start Up

Anticipated design flow rates from the extraction wells were established in the ground-water flow modeling presented in Section 2.8. Based on this model, well pumps located in extraction wells PW-1, PW-2, and PW-3 will be started and the flow rate monitored. Valves located in the treatment building will be manually adjusted to control the flow rate from each extraction well entering the air stripper to the target rate of approximately 5 gpm each. As part of initial performance testing of the system, the flow rates will be adjusted as necessary based on system operating parameters and ground-water elevations.

4.5 Sampling and Analysis

4.5.1 Initial Start Up Sampling and Analysis

In order to compare actual influent concentrations with the basis of design conditions, sampling of the remedial system influent will occur. Once the remedial system has been started up and thoroughly tested, samples of influent and treated effluent will be collected after approximate frequencies of one week, one month, and three months (one quarter) of operation. The system is designed to allow individual well influent water samples and a composite influent water sample. During the first two years of operation, influent samples will be collected from each well (PW-1, PW-2, and PW-3) on a semi-annual basis with a composite sample obtained from the sample tap located in the combined influent line (combined flow from PW-1, PW-2, and PW-3) on the alternate quarterly events. Treated effluent samples will be collected on a quarterly basis thereafter. Influent samples will be analyzed for the following parameters:

Parameter	USEPA **Method**
Volatile Organic Compounds (VOCs)	8260
Total Dissolved Solids (TDS)	160.2
Total Suspended Solids (TSS)	160.2
PH	150.1

Treated effluent samples will be sampled for VOCs (Method 8260). Ground-water elevations will also be measured from each monitoring well in Area 2 during initial performance evaluation. A baseline round of ground-water elevations will be collected prior to system startup. During initial performance evaluation, ground-water elevations will be measured once per month for the first quarter of operations.

4.5.2 Routine Air Stripper Performance

Following the first two years of system performance, the O&M Contractor will collect samples from the air stripper influent (one each from extraction wells PW-1, PW-2, and PW-3) on a semi-annual basis, with samples collected from the combined influent collected in alternate quarters. Samples will be collected for the air stripper effluent on a quarterly basis. Influent and effluent samples will be analyzed for VOCs (USEPA Method 8260). Results of the analysis will be used to track air stripper performance and evaluate the need for additional maintenance or use of final polishing (Granular Activated Carbon) of the air stripper effluent using granular activated carbon. In addition, flow measurements will also be recorded for influent (individual wells) and effluent.

The data collected to monitor system performance will be evaluated with respect to modifying the monitory frequency or system operating parameters.

4.5.3 Ground-Water Monitoring

4.5.3.1 Monitoring Well Locations

As part of the overall performance evaluation for the remedial system, quarterly ground-water monitoring of the Area 2 wells will be performed. The following summarizes the monitoring wells and piezometers to be included in the overall ground-water monitoring program, along with the type of data collected from each well:

Well ID	Measurements	
	Ground-Water Quality	Ground-Water Elevation
MW-1	X	X
MW-4	X	X
MW-1 OB	X	X
MW-20	X	X
MW-21	X	X
PZ-1		X
PZ-2		X
PW-1	X	X
PW-2*	X	X
PW-3*	X	X
A-Frame Residential Well	X	X

* Future extraction wells to be installed as part of remedial action.

4.5.3.2 Sampling Procedures and Methods

Ground-water sampling from monitoring wells, and the air stripper influent and effluent, will be performed in accordance with procedures outlined in the Sampling, Analysis & Monitoring Plan (SAMP), to be included in the O&M Manual, which will be submitted to USEPA no later than 90 days prior to the scheduled completion of the construction phase of the work. During long-term operation of the system, samples submitted for laboratory analysis will be analyzed for total VOCs using USEPA Method 8260. The specific laboratory methods will be identified in the Remedial Action SAMP and the Quality Assurance Project Plan (QAPP), also to be submitted with the O&M Manual.

4.5.3.3 Sampling Frequencies and Parameters

Ground-water samples will be collected from monitoring wells and the air stripper on a quarterly basis for the first two years of remedial system operation. Following the first two years of operations, ground-water analytical data will be reviewed to determine downward trends in VOC concentrations at each monitoring well. Should these trends be present, the sampling program will be performed on a semi-annual schedule for the analysis of VOCs for the remainder of the system operational period or until four consecutive concentrations for individual VOCs are present below the ground-water quality criteria. If four consecutive rounds of sampling indicate VOCs are not present above ground-water quality criteria, then that well will be sampled on an annual basis. The air stripper influent and effluent will be sampled on a quarterly basis throughout operation of the remedial system.

4.5.3.4 Quality Assurance/Quality Control Procedures

The ground-water samples collected as part of the long-term ground-water monitoring program will be submitted to an approved laboratory for VOC analysis following USEPA CLP Methods. The specific methods will be presented in the QAPP. During each sampling event a duplicate sample will be collected. If disposable or dedicated sampling equipment will be used to collect ground-water samples, a field blank will not be necessary.

4.6 Health and Safety

All activities associated with the operation of the remedial system will be conducted in accordance with the Site-Specific Health and Safety Plan (HASP), to be included in the O&M Manual. A copy of the HASP will be kept on site at all times in an accessible location in the vicinity of the remedial system. At a minimum, the site-specific HASP will address the following health and safety requirements:

- Identification of key health and safety personnel;
- Task/operation health and safety risk analysis;
- Personnel protective equipment (PPE);
- PPE equipment reassessment program;
- Personnel training requirements;
- Medical surveillance;
- Site control measures;
- Community Monitoring Plan;
- Personnel decontamination; and
- Emergency response/contingency plan.

4.7 Information Management

4.7.1 General

Records will be maintained throughout the operation of the remedial system in order to verify performance. This section identifies the procedures for record keeping and reporting for proper documentation of remedial system operations.

4.7.2 Record Keeping

Records for the operation of the remedial system will be maintained as described below. All operations, maintenance, monitoring, and sampling documentation will be maintained in separate files and segregated by calendar weeks. In addition to the records related to operation activities described below, the following documents will be available on site:

- O&M Plan;
- Site-Specific HASP;
- Record Drawings; and
- O&M Manual.

4.7.2.1 O&M Data

The O&M Contractor will be responsible for O&M of the remedial system. O&M activities, including ground-water monitoring, will be documented in a log book and/or specific inspection logs to be developed and included in the O&M Manual.

4.7.2.2 Sampling Data

All preliminary analytical results and final analytical data packages, including, for the latter, the associated quality assurance/quality control (QA/QC), will be maintained in a sample results file. Sampling results and the associated QA/QC will be copied as necessary; the original copies will be retained by the Environmental Monitoring Contractor. The sampling program associated with operation of the treatment system is described in Section 5.0.

4.7.2.3 Inspection Data

All required inspection logs and equipment logs will be maintained in an inspection file. Completed forms will be copied as necessary; the original copies will be retained by the O&M Contractor. Specific inspection logs will be developed for the remedial system and included in the O&M Manual.

4.7.2.4 Monthly Summary Reports

Monthly summary reports will be maintained in the project file. The monthly summary reports will be copied as necessary; the originals will be retained by the O&M Contractor. At a minimum, the monthly summary reports will include the following:

- Total volume of ground water treated during the month (based on flow totalizer readings); and

- Compilation of inspection logs and sampling data collected over the previous month.

4.7.3 Reporting

4.7.3.1 Remedial Action Report

Following completion of system construction and initial testing and start-up operations, a Remedial Action Report will be submitted to the USEPA. The Remedial Action Report will summarize construction activities and provide as-built drawings of the remedial system.

4.7.3.2 Performance Evaluation Report

Following the first quarter of operations, a Performance Evaluation Report will be submitted to the USEPA detailing the operational parameters for the remedial system, including treatment efficiencies, operational parameters, and ground-water quality and elevation data. The Performance Evaluation Report will include any recommendations for system modifications or any operational data significantly different than that anticipated. The specific components to be included in the Performance Evaluation Report will be included in the Remedial Action Plan, to be submitted to USEPA following approval of the Remedial Design Report.

4.7.3.3 Progress Reports

During the first two years of system operations, quarterly progress reports will be submitted to the USEPA and NYSDEC detailing analytical data and performance data collected from the previous quarter's operation. The quarterly progress reports will include all operational data from the remedial system, along with any recommendations for the system and associated ground-water quality data, if any. Following the first two years of operations, semi-annual reports will be submitted to the USEPA and NYSDEC. These reports will be prepared to also fulfill the discharge monitoring requirements for the treated effluent discharged to the ditch.

Section 5.0

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Construction Quality Assurance/ Quality Control Plan

5.0 Construction Quality Assurance/Quality Control Plan

5.1 Introduction

5.1.1 General

The following Construction Quality Assurance/Quality Control (CQA/QC) Project Plan has been developed to describe the materials and procedures necessary to ensure proper construction, evaluation, and documentation during implementation of the site remedy at the Byron Barrel & Drum Site (Site) located in Byron, New York.

A ground-water extraction, treatment, and reinjection system (collectively referred to as the "remedial system") will be installed in Area 2 of the Site in accordance with the Final Design Plans and Specifications. The site remedy will include the installation of an additional extraction well, ground-water extraction pumps, conveyance piping, an air stripping system, and reinjection of treated water to contaminated soils to induce flushing of contaminants to ground water. Soils excavated as part of the remedial construction will be staged, characterized, and, if appropriate, used as backfill. Excavated soil containing levels of VOCs above NYSDEC cleanup objectives will be sent off site for appropriate disposal.

The remainder of this CQA/QC Plan describes the requirements for construction of the remedial system.

5.1.2 Scope

This CQA/QC Plan is organized for use as a reference document and is organized by major project components (e.g., project management organization, system components, and reporting). The Contractor responsible for construction and startup of the system should be completely familiar with the entire contents of this document prior to commencing construction activities. Following this introductory section, Section 5.2 describes the project management organization. In Section 5.3, Construction Quality Assurance (CQA) requirements for major project components are described as follows:

- Section 5.3.1 Site Preparation;
- Section 5.3.2 Treatment Building;
- Section 5.3.3 Process Equipment;
- Section 5.3.4 Electrical Equipment; and
- Section 5.3.5 Soil Excavation/Placement.

In Section 5.4, the methods of documenting construction activities are described.

5.2 Construction Organization

5.2.1 General

This section describes the organization, qualifications, and responsibilities of the Project Consulting Engineer (PCE) and the Remedial Action Contractor (Contractor) for this project. Also discussed in this section are the interactions required between the PCE and Contractor to ensure CQA is maintained through completion of construction.

5.2.2 CQA/QC Management Organization

The Settling Work Defendants will retain the services of a consulting engineering firm to serve as the PCE. The PCE must be licensed to practice services in the State of New York and will be responsible for observing, documenting, and certifying that activities associated with the construction of remedial system components are in general conformance with construction plans and specifications.

The PCE will provide qualified CQA personnel to serve in the following capacities:

Project Director/Manager - The Project Director/Manager should be a professional engineer registered in the State of New York. The Project Director/Manager must demonstrate past experience in a position of significant responsibility for remediation projects of similar magnitude and complexity in comparison with the project being undertaken. The Project Director/Manager must be knowledgeable of the project requirements and objectives, and must be familiar with the design plans and specifications.

The Project Director/Manager will serve as the official representative of the PCE and will have the ultimate technical and financial responsibility for the work performed. The Project Director/Manager will be responsible for overall coordination of CQA/QC activities.

COA Engineer - The CQA Engineer must demonstrate a knowledge of remediation projects and applicable test methods through a combination of formal education, training, and experience. The CQA Engineer will report to the Project Director/Manager and will be responsible for coordination of observations, sampling, testing, and documentation of construction activities on a daily basis. The CQA Engineer will have the following responsibilities in the implementation of the procedures in the CQAP:

- Review, comment, and approval of submittals by the Contractor in support of the Remedial Action Work Plan (RAWP) to be submitted to the USEPA prior to commencement of site work;
- Oversee and coordinate CQA testing;
- Record any on-site activities that could potentially result in damage to the Site and report these activities to the Contractor and Project Director/Manager.
- Review daily construction reports with the CQA Observer;
- Prepare weekly project status reports;
- Review shop drawings and other submittals for conformance with the Final Design Plans and Specifications;
- Review and document sampling results to confirm results are consistent with the Final Design Plans and Specifications;
- Coordinate with the Contractor on shop drawing approval;
- Serve as the daily contact person for the PCE. Maintain routine contact with the Settling Work Defendants and Contractor regarding conformance with quality control requirements;
- Coordinate activities of the CQA Observer to establish proper sampling procedures;

- Perform regular site visits to review progress and CQA/CQC procedures; and
- Notify Contractor and CQA Observer of acceptance of installed portions of work.

COA Observer - The CQA Observer must have a demonstrated knowledge of remediation projects of a similar nature and applicable testing methods through a combination of formal education, training, and experience. The CQA Observer will be on site on a daily basis and will document, sample and test under the direction of the CQA Engineer. The CQA Observer(s) will have the following responsibilities:

- Perform and document field and laboratory testing at the frequency established in the Final Design Plans and Specifications;
- Delineate areas of non-conformance with the Final Design Plans and Specifications;
- Visually observe construction materials and equipment delivered to the Site to determine general conformance with the Final Design Plans and Specifications;
- Observe and record procedures used for Site preparation;
- Observe and record procedures used for excavation, segregation, and backfilling of soils to required elevations;
- Collect samples during startup;
- Prepare Weekly Summary Reports which will include any implemented changes from the approved Final Design Plans and Specifications;
- Serve as the daily on-site contact person(s) and maintain routine contact with the PCE regarding conformance with the Final Design Plans and Specifications.

5.2.2.1 Contractor

The Contractor will be responsible for ensuring that construction activities adhere to the provisions of this CQAP. The Contractor shall have the following general responsibilities associated with CQA procedures:

1. Provide the PCE with the following for review, comment, and incorporation into the RAWP:

   - Any proposed revisions to the construction methods or construction schedule presented in the Final Remedial Design Report. These revisions would be incorporated into the Remedial Action Work Plan, to be submitted by the Settling Work Defendants within 75 days after approval of the Final Remedial Design Report.
   - A draft Site Management Plan (SMP), which will be reviewed and incorporated into the RAWP. The SMP shall include the following components:

     - Identification of the Remedial Action project team;
     - A final schedule for completion of the Remedial Action;

- Procedures and plans for the decontamination of construction equipment and disposal of contaminated materials;
- Methods for satisfying permit requirements; and
- Discussion of the methods by which construction activities will proceed.

• The name and qualifications of the field crew foreman proposed by the Contractor;

2. Review and be completely familiar with the Final Design Plans and Specifications, and any revisions provided in the RAWP;

3. Maintain a continuous line of communication with the PCE to identify and discuss field issues as they arise;

4. Coordinate with all equipment suppliers to ensure compliance with CQAP requirements;

5. Prepare and submit to the PCE all shop drawings and other required submittals;

6. Ensure that all CQA requirements are achieved;

7. Identify any potential design and/or construction issues as early as possible to allow resolution in a manner that will not impact the quality of the construction and the schedule of construction and start-up activities; and

8. Maintain a continuous record of any approved changes or modifications to the Final Design Plans and Specifications.

The Contractor will provide qualified personnel to serve in the following capacities:

Project Officer - The Project Officer will be the official representative for the Contractor. The Project Officer will assume ultimate responsibility for construction of the remedial system design in accordance with the Final Design Plans and Specifications, coordination and control of all subcontractors, coordination of CQA activities performed by the Contractor, and coordination with the PCE to implement CQA activities to be performed by the PCE.

Construction Manager - The Construction Manager will have the following responsibilities:

- Serve as the primary contact person for the Contractor, and maintain communications with the PCE regarding conformance with the requirements in the Final Design Plans and Specifications; and

- Provide overall coordination of construction activities and management of subcontractors.

5.2.3 Construction Meetings

Prior to the start of construction activities, a pre-construction meeting will be held with representatives of the PCE, the Contractor, and Settling Work Defendants. Topics covered at this meeting will include, but may not be limited to:

- This CQAP and its role relative to the Final Design Plans and Specifications;

- Responsibilities of each individual and organization;

- Lines of authority and communication for each organization;
- Established procedures of construction, change orders, deficiencies, repairs, and retesting;
- Work area security and safety practice;
- Procedures for the location and protection of construction materials, and for the prevention of damage of the materials from inclement weather or adverse conditions;
- Required training and acknowledgment forms documenting that required health and safety training has been completed prior to conducting work at the Site;
- A review of Site conditions, including staging and storage locations;
- The Remedial Action Work Plan, which will include the Contractor's proposed construction plan, schedule, procedures; and
- Other topics of discussion.

5.2.4 Material and Performance Specifications

The primary function of the material and performance specifications (which are given on the Final Design Plans and Specifications) will be to:

1. Identify the scope of work necessary to achieve the design objective;
2. Provide a basis by which the Contractor can develop a construction cost quotation; and
3. Indicate the specific materials, equipment, and standards to be utilized in performing the construction.

The Technical Specifications will also play an important role in the implementation and monitoring of desired CQA measures by establishing CQA elements for activities occurring before, during, and after construction. The Technical Specifications may, depending on the given component of construction, specify any or all of the following:

1. Manufacturer and model number for specific equipment;
2. Performance standards or operating conditions to assist the Contractor in the selection and purchase of equipment;
3. Required construction materials;
4. Required conformity with codes, standards, and specifications to govern material and workmanship;
5. Information to be submitted for technical review (also referred to as shop drawing submittals);
6. Coordination activities with other elements of construction;

7. Manufacturer or field testing requirements; and

8. Workmanship/equipment warranties.

The requirement of the Technical Specifications will provide the framework for CQA measures. CQA activities will gauge compliance with the requirements of the Technical Specifications. Such activities will involve the review of technical submittals, material/equipment testing, on-site observation, and start-up.

5.2.5 CQA Submittals

For several elements of construction, the Contractor will prepare technical data (e.g., shop drawings, proposed electrical equipment layout, etc.) and submit this information for review. This requirement allows for monitoring of the Contractor's understanding of the design and prevention of any misinterpretation of the Technical Specifications that may otherwise impact the design objectives or construction schedule. The submittal of technical data, also referred to as shop drawing submittals, encompasses many elements of the construction activity. Typical submittals that will be required as part of the Technical Specifications may include the following performance data: a material list with manufacturer data showing compliance with the Technical Specifications; material samples; engineering drawings of the components showing sizes, widths, weights, connections, etc.; installation drawings; operating descriptions; layout drawings; detail drawing, etc.

The submittal review will be an essential activity for monitoring CQA before construction is initiated. The Contractor's submittal of a shop drawing will constitute their representation that they have determined and verified all quantities, dimensions, field construction criteria, materials, model numbers, and submittals with the requirements of the Technical Specifications (including CQA requirements). The PCE's review of shop drawings will be to determine general compliance with the Technical Specifications. Submitted data will be reviewed and stamped by the PCE as follows:

1. "Reviewed" if no objections are observed or comments made;

2. "Reviewed and Noted" if minor objections, comments, or additions are made but resubmittal is not considered necessary provided the Contractor addresses the noted items;

3. "Resubmit" if objections, comments, or additions are extensive. In this case, the Contractor would resubmit the items after revision; and

4. "Rejected" if the submittal under consideration is not, even with reasonable revision, acceptable or when the data submitted are not sufficiently complete to establish compliance with the Technical Specifications.

The shop drawing submittal and review process will afford an opportunity to monitor and control the quality of construction before construction is actually initiated and thus be a key element of the CQA process.

5.3 CQA Requirements

5.3.1 Site Preparation

The remedial system will be located in the vicinity of Area 2, adjacent to the former garage. Site preparation activities will include the installation of utilities (electric and telephone) and the prefabricated treatment building enclosure. In addition, clearing and grubbing of the area around the treated water reinjection system and any other required areas to provide for installation of buildings, utilities, and pipelines will be performed as part of site preparation activities. Clearing and grubbing activities will include the removal of vegetation and surficial debris in the excavation area.

Site preparation activities shall be performed by the Contractor in accordance with the Final Design Plans and Specifications. CQA testing will consist of observation and documentation of all site preparation activities by the On-Site CQA Observer during construction. The Contractor shall submit manufacturer's details including materials of construction and detailed shop drawings showing all pertinent information necessary for the site preparation activities. Any changes to the Final Design Plans and Specifications must be shown and highlighted on the shop and record drawings.

5.3.2 Treatment Building

The remedial system will be housed in a prefabricated, reinforced concrete treatment building. The treatment building will house the air stripper and associated controls, and has been designed with additional space to allow for installation of additional treatment equipment in the future (e.g., vapor-phase carbon), if necessary. The treatment building will also contain lighting, electric outlets, and a space heater. Because the extraction piping headers and treated water reinjection headers will enter the building from the floor, the treatment building will be installed in conjunction with the installation of piping. Installation of the treatment building will be performed in accordance with the Final Design Plans and Specifications. CQA testing will consist of observation and documentation of modifications by the On-Site CQA Observer. The Contractor will submit all detailed shop drawings showing all pertinent information for the treatment building, including any changes to the Final Design Plans and Specifications.

5.3.3 Process Equipment

Process equipment (i.e., low-profile air stripper, piping, pumps, etc.) will be installed in accordance with the configuration shown on the Final Design Plans and Specifications and, if applicable, proposed modifications presented in the Remedial Action Work Plan. CQA testing of the equipment and required submittals will be in accordance with the procedures described below.

5.3.3.1 Low-Profile Air Stripper

Installation of the low-profile air stripper will be performed in accordance with the Final Design Plans and Specifications, and specific installation instructions from the manufacturer's representative. Following installation by the Contractor, the start up of the low-profile air stripper system will be performed with a manufacturer's representative on site.

The following submittals are required for the proposed low-profile air stripper:

1. Dimensioned shop drawings of the complete low-profile air stripper system showing equipment sizes, widths, weights, and connections;

2. Listing of equipment components;

3. Listing of materials of construction for all components;

4. Installation instructions;

5. Manufacturer's initial start up and operating procedures, including trouble-shooting guide (i.e., Operation and Maintenance Manual [O&M Manual]);

6. Manufacturer's performance guarantee;

7. Manufacturer's warranty (to be transferred to the Settling Work Defendants); and

8. List of recommended spare parts.

5.3.3.2 Pumping Equipment

Each pump will be tested hydrostatically in the manufacturer's shop at a pressure equal to not less than twice the specified shut-off head or 150 pounds per square inch (psi), whichever is greater. Pump casings should show no undue deflection, cracks, or other signs of weakness under the test pressure and there should be no sweating through porous metal.

Each pump assembly with auxiliary equipment will be field tested by the Contractor after installation. Field tests to demonstrate satisfactory operation over the full range of operating conditions will be conducted by the Contractor with the CQA Observer present. Additionally, the following will also be demonstrated:

1. The unit has been properly installed and has no mechanical defects;

2. The unit is in proper alignment and has been properly connected;

3. The unit is free from undue vibration; and

4. The unit is free from overloading or overheating.

All field testing will be documented by the CQA Observer and will be included in the Construction Certification Report. Test data will include, at a minimum, the following:

- Date and time of tests;

- Person performing the tests and witnesses;

- Pump size, model, serial number, and location;

- The nature of any noted deficiencies; and

- Repair procedures performed for failing tests (including retest results).

The Contractor shall make the following submittals for the pumping equipment:

1. Pump performance curves for each pump provided;

2. Shop drawings of pumps and motors, including dimensional information and materials of construction; and

3. Technical manuals for pumps and motors (including O&M Manuals), troubleshooting information, and spare parts list.

5.3.3.3 Valves

Operation and hydraulic testing on all valves will be performed by the Contractor to ensure the integrity of the equipment and its operation. Following installation, the Contractor will operate all valves with the CQA Observer present to demonstrate that they operate without grinding or strain. All pipelines in which valves are installed shall also be filled with potable water and pressurized to the design pressure recommended by the manufacturer to demonstrate that the installed valves do not leak. Subsurface piping will be tested prior to backfilling. The Contractor will correct any valve deficiencies observed during the operation and hydraulic testing at no cost to the Settling Work Defendants.

The following submittals are required for all valves:

1. Detailed shop drawings and descriptions of all valves;

2. A materials and parts list which includes full information regarding all components of the equipment, including materials of construction;

3. The manufacturer's O&M Manuals for each type of valve; and

4. The manufacturer's warranties for each type of valve.

5.3.3.4 Process Piping

All process piping will be installed by the Contractor in accordance with the Final Design Plans and Specifications and will be tested hydrostatically for leakage prior to being placed in service. Subsurface piping will be tested prior to backfilling the pipe trench. The Contractor will submit to the Engineer drawings and manufacturer's data on the hose, pipe, joints, and fittings. All piping will be examined by the Construction Manager during the test and all leaks, and defective material or joints shall be repaired or replaced before repeating the tests.

5.3.3.5 Flow Meters and Pressure Gauges

All flow meters and pressure gauges shall be calibrated and certified at the manufacturer's shop to ensure integrity and compliance with the Final Design Plans and Specifications. The Contractor shall submit manufacturer's details including materials of construction. Copies of the calibration tests shall also be submitted for review by the CQA Observer.

5.3.4 Electrical Equipment

All electrical equipment must be installed in accordance with the configuration shown on the Final Design Plans and Specifications. Prior to obtaining any material in connection with electrical work, detailed shop drawings will be submitted. In addition to equipment data, shop drawings will be submitted for approval that show proposed raceway layout, electrical equipment layout, grounding system layout, interconnecting wiring, and elementary diagrams.

Testing/inspections of electrical equipment requiring documentation for the remedial system may include, but will not be limited to, the following:

1. Inspection of all electrical work by local authorities having jurisdiction;

2. Certification of compliance with the National Electric Code;

3. Testing of all wire and cable when in-place but before final connections are made;

4. UL master label approval of lightning protection system;

5. Inspection and approval of the incoming electrical and telephone service by the power and telephone company and the local inspection agency, certificate of inspections to be provided;

6. Performance of an electrical grounding system;

7. Coordination and calibration of instrumentation components; and

8. Field tests of all miscellaneous electrical controls.

5.3.5 Soil Excavation/Placement

Installation of the treated water reinjection system in accordance with the ROD will require excavation of soils in Area 2 to access a deeper zone of more permeable soil, characterization of excavated soils based on analytical results, and replacement of clean soils into the excavation. Excavated soils that contain VOC concentrations above the NYSDEC TAGM 4046 levels will require off-site disposal as non-hazardous waste or RCRA characteristic hazardous waste. The extent of excavation, testing methodology for segregation, and requirements for replacement of soils is provided in the Final Design Plans and Specifications.

CQA testing of the treated water reinjection system excavation will include observations and documentation of excavation limits, along with analytical results for post-excavation side wall samples, soil pile samples, and samples collected for soil disposal purposes.

5.4 Documentation of Construction Activities

5.4.1 Methods of Documentation

1. The CQA Observer will keep a daily log documenting all work performed and completed by the Contractor each day. The log may include, but need not be limited to, the following:

    - The date, project name, location, and other information;
    - Relevant conversations with the Contractor;
    - A summary of any unusual circumstances, deficiencies, and/or defects;
    - A record of the labor, material, and equipment deployed each day;
    - Materials brought to the site;
    - A summary of test results, failures, and retests;
    - Record of visitors to the site; and
    - The signature(s) of the Construction Manager.

2. The Construction Manager will prepare Weekly Construction Summary Reports, which will summarize the progress of the project.

3. The Contractor will maintain equipment and personnel logs for all work performed during the construction and start up of the remedial system.

4. The Construction Manager will take photographs on a daily basis to document the progress of the project.

5.4.2 Remedial Action Report

The PCE will prepare a Remedial Action Report to certify that the work has been performed in general accordance with the Final Design Plans and Specifications. The report will provide a summary of the work performed during the construction and start up of the remedial system. The report will contain the following:

- Summaries of construction activities, including a comprehensive narrative which summarizes the daily reports of the Construction Manager;
- Analytical results, including associated data validation;
- Sampling documentation (locations, depths, procedures, etc.);
- Testing data sheets;
- Chronology of significant milestone dates;
- Contractor submittals;
- Summary of construction problems and solutions;
- Summary of changes from the approved Final Design Plans and Specifications;
- Color photographs of major project features;
- Construction Certification Statement sealed and signed by the Project Certifying Officer; and
- Record drawings sealed and signed by an authorized representative of the PCE showing all changes to the approved Construction Drawings.

Section 6.0

BLASLAND, BOUCK & LEE, INC.
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Construction Health & Safety Plan

6.0 Construction Health & Safety Plan

A generic Construction Health & Safety Plan will be provided as a separate document prior to construction.

Section 7.0

Construction Schedule and Cost Estimate

7.0 Construction Schedule and Cost Estimate

7.1 Schedule

The schedule for the installation of the remedial system is presented in Figure 8. The schedule presented includes the submittals and approvals required from USEPA for the Pre-Remedial Investigation and Remedial Design Report, Remedial Action Work Plan, performance of remedial action (construction), Pre-Final Inspection, Pre-Certification, Remedial Action Report, and initiation of the operation and maintenance of the system. The proposed schedule is consistent with the ESD and has adequate time for construction during the winter/spring of 1999.

7.2 Cost

An estimate of capital cost to construct the selected remedy for this site is presented in Table 8. This estimate was prepared based on the design presented in this document.

Tables

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TABLE 1

Pre-Design Investigation Report
Byron Barrel & Drum
Analytical Results for VOCs in Influent Ground Water
Pump Test March 22 - 25, 1999

Detected Compounds	PW1-17 12/21/98 (ug/L)	PW1-23[1] 12/21/98 (ug/L)
1,1-DCA	Non-detect	4
1,1-DCE	5 J	1 J
cis-1,2-DCE	Non-detect	2
Methylene Chloride	9 B J	Non-detect
1,1,1-TCA	270	120 D
TCE	11 J	U
Tetrachloroethene	4 J	Non-detect
Toluene	Non-detect	0.4 J

Notes:
Ground-water samples obtained from PW-1 borehole through well point at depths of 17 and 23 feet.
All compounds are expressed in micrograms per liter (ug/L) or parts per billion (ppb).
B: Compound detected in blank sample.
D: Reported concentration is a result of dilution.
J: Indicates an estimate value. This flag is used either when estimating for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria; but the result is less than the sample quantitation limit, but greater than zero.

TABLE 2

Pre-Design Investigation Report
Byron Barrel & Drum
Pump Test Sampling and Analysis Summary
Pump Test March 22 - 25,1999

Sample ID		D&scnpiion	Analysis			I
			VOCs	TSS	TDS	Dissolved Iron and Manganese
Influent Samples*	INF-1	1-hour sample, step-drawdown test	X			
	INF-2	1-hour sample, pump test	X	X	X	X
	INF-3	24-hour sample, pump test	X	X	X	X
	INF-4	48-hour sample, pump test	X	X	X	X
Effluent Samples**	EFF-1	1-hour sample, step-drawdown test	X			
	EFF-2	1-hour sample, pump test	X			
	EFF-3	24-hour sample, pump test	X			
	EFF-4	48-hour sample, pump test	X			

Notes:
VOC analysis by USEPA Method 8260.
TSS analysis by USEPA Method 160.2
TDS analysis by USEPA Method 160.1
Dissolved Iron and Manganese analysis by USEPA Method 6010/7000.

*Samples directly from pump discharge prior to treatment
"Samples from effluent line after carbon treatment

TABLE 3

Pre-Design Investigation Report
Byron Barrel & Drum
Analytical Results for Suspended and Dissolved Solids
in Influent Ground Water
Pump Test March 22 - 25, 1999

Sample I.D. Job Number Lab Sample I.D. Sample Date	INF-2 A99-1657 A9165701 03/23/99	INF-3 A99-1657 A9165702 03/24/99 -	INF-4 A99-1657 A9165703 03/25/99
Wet Chemistry Analysis			
Filterable Residue (180 °C)	319	339	336
Non-Filterable Residue (103 °C)	-	-	-

Notes:
All compounds are expressed in micrograms per liter (mg/L) or parts per million (ppm).
- Compound was not detected at the detection limit concentration.

Influent samples taken from pump discharge line prior to treatment.

TABLE 4

Pre-Design Investigation Report
Byron Barrel & Drum
Analytical Results for Soluble Metals in Influent Ground Water
Pump Test March 22 - 25,1999

Sample I.D. Job Number Lab Sample I.D. Sample Date	INF-2 A99-1657 A9165701 03/23/99	INF-3 A99-1657 A9165702 03/24/99	INF-4 A99-1657 A9165703 03/25/99
Iron - Soluble	30.3	-	280
Maganese - Soluble	30.1	16.3	16.9

Notes:
All compounds are expressed in micrograms per liter (ug/L) or parts per billion (ppb).
- Compound was not detected at the detection limit concentration.

Influent samples taken from pump discharge line prior to treatment.

TABLE 5

Pre-Design Investigation Report
Byron Barrel & Drum
Analytical Results for VOCs in Influent Ground Water
Pump Test March 22 - 25,1999

Sample I.D. Job Number Lab Sample I.D. Sample Date	INF-1 A99-1655 A9165501 03/22/99	INF-2 A99-1657 A9165701 03/23/99	INF-3 A99-1657 A9165702 03/24/99	INF-4 A99-1657 A9165703 03/25/99
Acetone	1 J	-	-	-
1,1-Dichloroethane	4	2	-	11
1,1-Dichloroethene	2	-	-	5
cis-1,2-Dichloroethene	3	1 J	-	3
Methylene chloride	-	1 BJ	5J	12 DJ
1,1,1-Trichloroethane	180 D	33	200	440 D
Trichloroethene	2	0.7 J	4J	4
Toluene	6	4	-	2

Notes:
All compounds are expressed in micrograms per liter (ug/L) or parts per billion (ppb).
Only compounds with detections listed in table.
- Compound was not detected at the detection limit concentration.
D: Reported concentration is a result of dilution.
J: Indicates an estimate value. This flag is used either when estimating for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria; but the result is less than the sample quantitation limit, but greater than zero.
Influent samples taken from pump discharge line prior to treatment.

TABLE 6

Pre-Design Investigation Report
Byron Barrel & Drum
Analytical Results for VOCs in Effluent Ground Water
Pump Test March 22 - 25,1999

Sample I.D. Job Number Lab Sample I.D. Sample Date	EFF-1 A99-1655 AA9165502 03/22/99	EFF-2 A99-1655 A9165503 03/23/99	EFF-3 A99-1655 A9165504 03/24/99	EFF-4 A99-1655 A9165505 03/25/99
Acetone	-	5	-	-
Benzene	-	0.9 J	-	-
Chloromethane	-	0.3 J	-	-
1,1-Dichloroethane	-	-	-	-
1,1-Dichloroethene	-	-	-	-
cis-1,2-Dichloroethene	-	-	-	-
1,1,1-Trichloroethane	0.4 J	0.3 J	-	0.8 J
Toluene	-	0.3 J	-	-
Trichloroethene	-	-	-	-

Notes:
All compounds are expressed in micrograms per liter (ug/L) or parts per billion (ppb).
Only compounds with detections listed in table.
- Compound was not detected at the indicated detection limit concentration.
J: Indicates an estimate value. This flag is used either when estimating for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria; but the result is less than the sample quantitation limit, but greater than zero.

Effluent samples taken from carbon treatment system discharge line.

TABLE 7

Pre-Design Investigation Report
Byron Barrel & Drum
Analytical Results for VOCs; MW21

Sample I.D. Job Number Lab Sample I.D. Sample Date	MW-21 A99-1657. A9165704 03/26/99
Acetone	4J

Notes:
All compounds are expressed in micrograms per liter (ug/L) or parts per billion (ppb).
J: Indicates an estimate value. This flag is used either when estimating for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria; but the result is less than the sample quantitation limit, but greater than zero.

Table 8
Remedial Design Report
Byron Barrel & Drum, Area 2
Cost Estimate

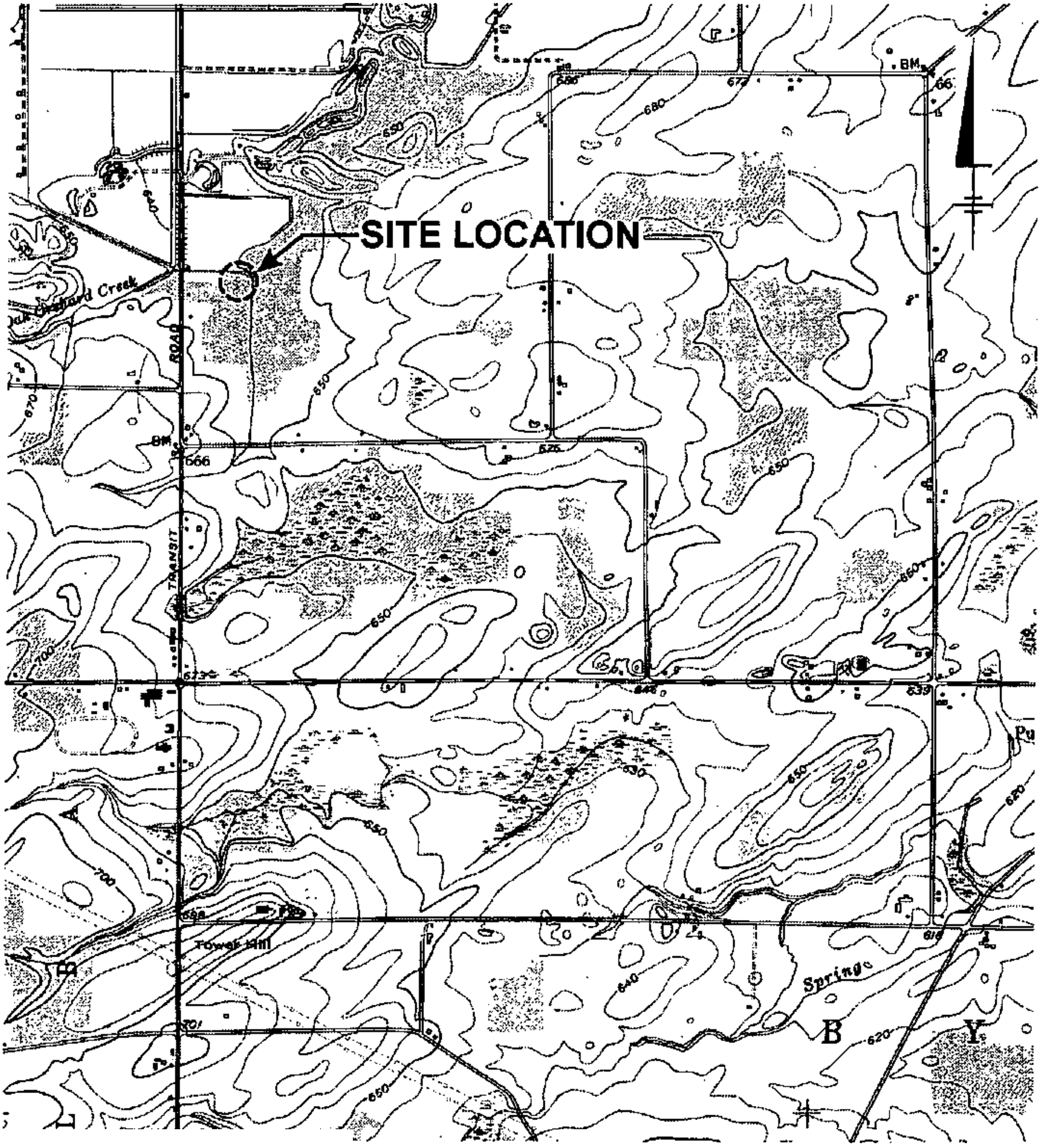
Item *4umbe	Direct Costs Item	Unit	Unit Cost	Quantity	Capital Costs
A. Extraction, Treatment, and Reinjectlon of Ground Water					
1	Mobilization/Demobilization	LS	$2,500.00	1	$2,500
2	Clearing & Grubbing	LS	$2,000.00	1	$2,000
3	Excavation & Backfilling[0']	CY	$18.00	500	$9,000
4	Gravel Backfill (Reinjectlon System)	CY	$15.00	125	$1,875
5	Access Road	LS	$3,500.00	**1**	$3,500
6	Top Soil & Seeding	LS	$2,500.00	1	$2,500
7	Skid Mounted Air Stripper with Controller	LS	$22,000.00	**1**	$22,000
8	Pre-Fabricated Building with Electrical and Insulation Package	LS	$20,000.00	1	$20,000
9	Foundation, Concrete Walls	LS	$1,200.00	1	$1,200
10	Extraction Wells # 2, & #3; Installation and Modification to Well #1	LS	$6,000.00	1	$6,000
11	Extraction Pumps, including one spare Pump	Ea.	$500.00	4	$2,000
12	Piping	FT	$15	350	$5,250
13	Electrical	LS	$3,500	1	$3,500
13	Sampling and Analysis (VOCs)™	Ea.	$250	14	$3,500
	Sub Total				$84,825
B. Maintenance Garage Decontamination					
1	Disposal (Water and Misc. Debris) and Steam Cleaning	LS	$12,000	**1**	$12,000
	Sub Total				$12,000
	Total				$96,825
	Contingency @10%				$9,683
	Total				$106,508
C. Construction Oversight					
1	Construction Observation	Wk	$3,500.00	10	$35,000
	Total				**$141,508**
	Rounded Total				**$142,000**

Cost assumes all excavated soil will be suitable for replacement of soils in excavation.

Cost is for gravel backfill for treated water infiltration gallery (reinjection system).

Cost includes analytical for post-excavation sampling and soil pile sampling (total VOCs).

Figures



REFERENCE: ALBION, NEW YORK. USGS QUAD., 7.5 MIN. SERIES, 1988

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BYRON BARREL & DRUM SITE
BYRON, NEW YORK

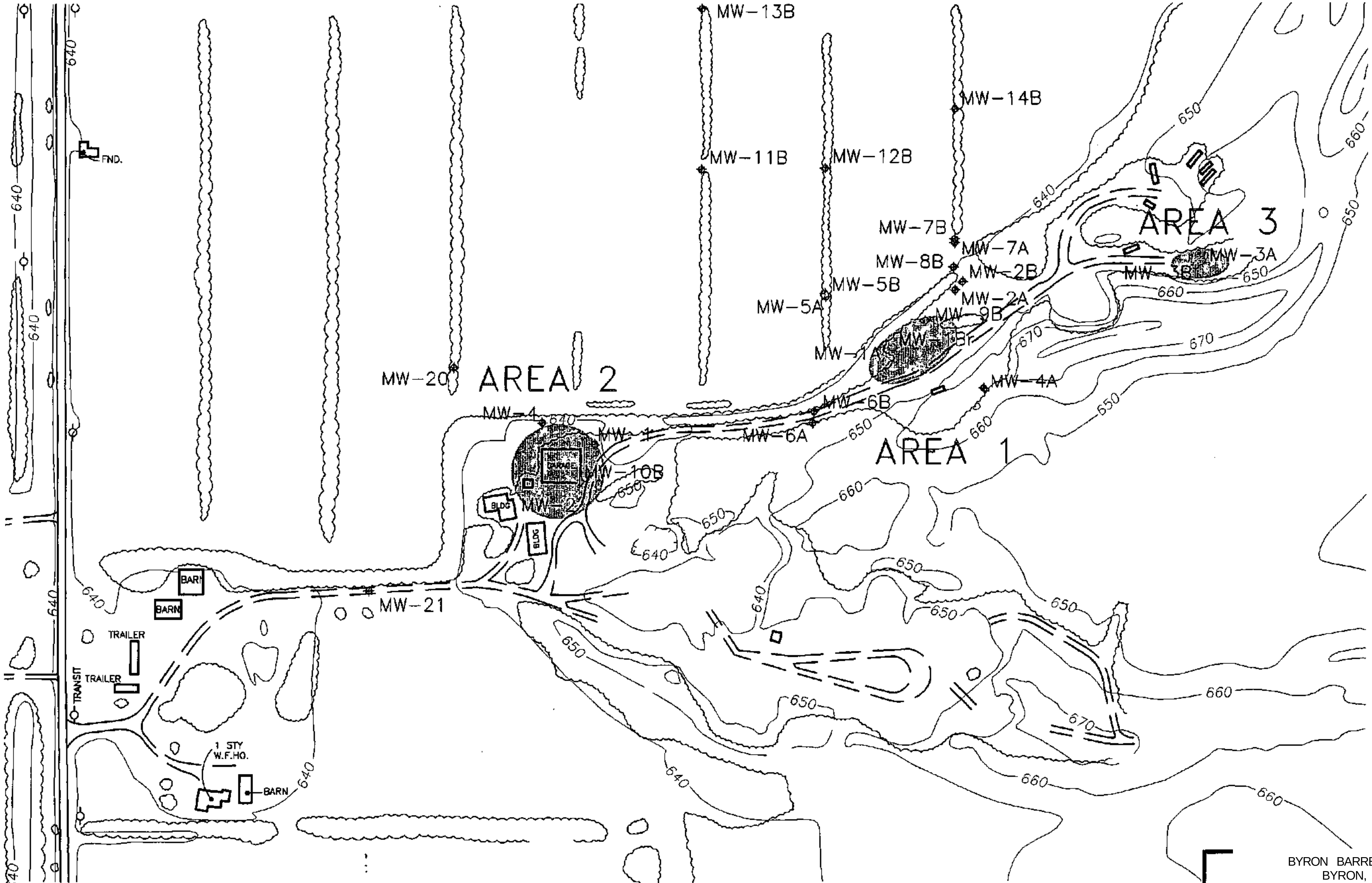
PRE-REMEDIAL DESIGN INVESTIGATION AND REMEDIAL DESIGN REPORT

SITE LOCATION MAP

BBL iLA9^pjray^_&I£EJNC,
engineers & scientists

FIGURE
1

6/99 D54 YCC
77304003/77304C02.CDR



BYRON BARREL & DRUM SITE
BYRON, NEW YORK

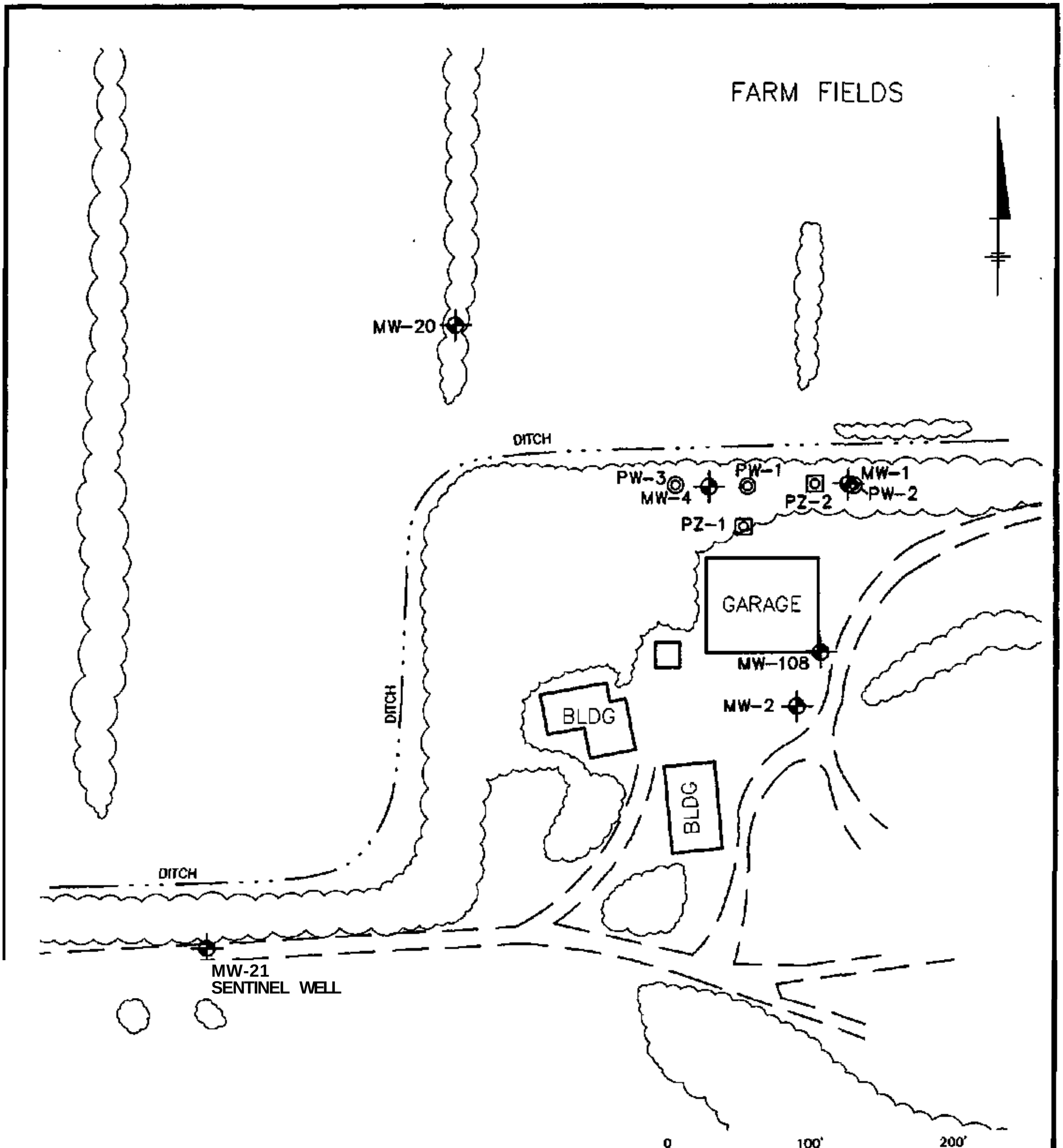
PRE-REMEDIAL DESIGN INVESTIGATION AND REMEDIAL DESIGN REPORT

BYRON BARREL AND DRUM SITE

BBL BLASLAND, BOUCK ft LEE, INC. *engineers & scientists*

FIGURE

X: 77M2X0I
L: (LAYER)
P: STD BL
B/11/09 ROC-54-ATJ SYR-5* RC9
773040O3/77302G1 BDW3



LEGEND

• MW-1
- ^ - GROUND-WATER MONITORING WELL

PW-1
@ PUMPING WELL (EXISTING AND PROPOSED)

PZ-1
[QI PIEZOMETER

BYRON BARREL & DRUM SITE
BYRON, NEW YORK
PRE-REMEDIAL DESIGN INVESTIGATION
AND REMEDIAL DESIGN REPORT

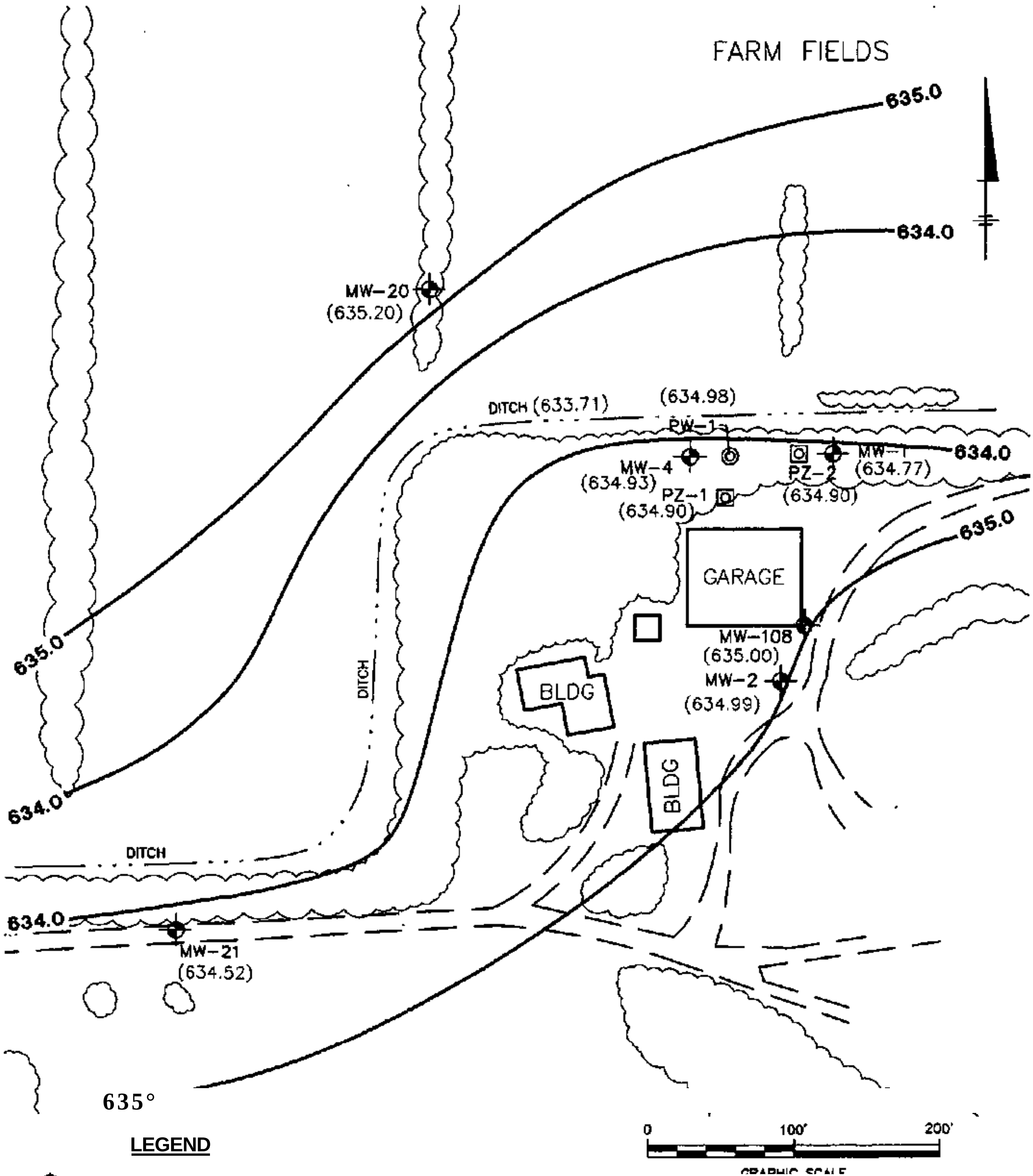
AREA 2

SITE MAP

BBL BLASLAND, BOUCK A LEE, INC.
engineers & scientists

FIGURE

& 77302X01.DW
U SP~PRE.CRID,CVa42M,LIM=,HEF,SHD-155,S\P.VW;*-OfF,SU.QN
P-.BtRW
11/S/89 SIR DIV-54 RGB. POL
77M4003/773O4BO1. D WJ



LEGEND

(monitoring well symbol)	GROUND-WATER MONITORING WELL
PW-1	PUMPING WELL
PZ-1	PIEZOMETER
(634.52)	GROUND-WATER ELEVATION IN FEET AMSL
635.0 —	GROUND-WATER ELEVATION CONTOUR IN FEET AMSL

BYRON BARREL & DRUM SITE
BYRON, NEW YORK

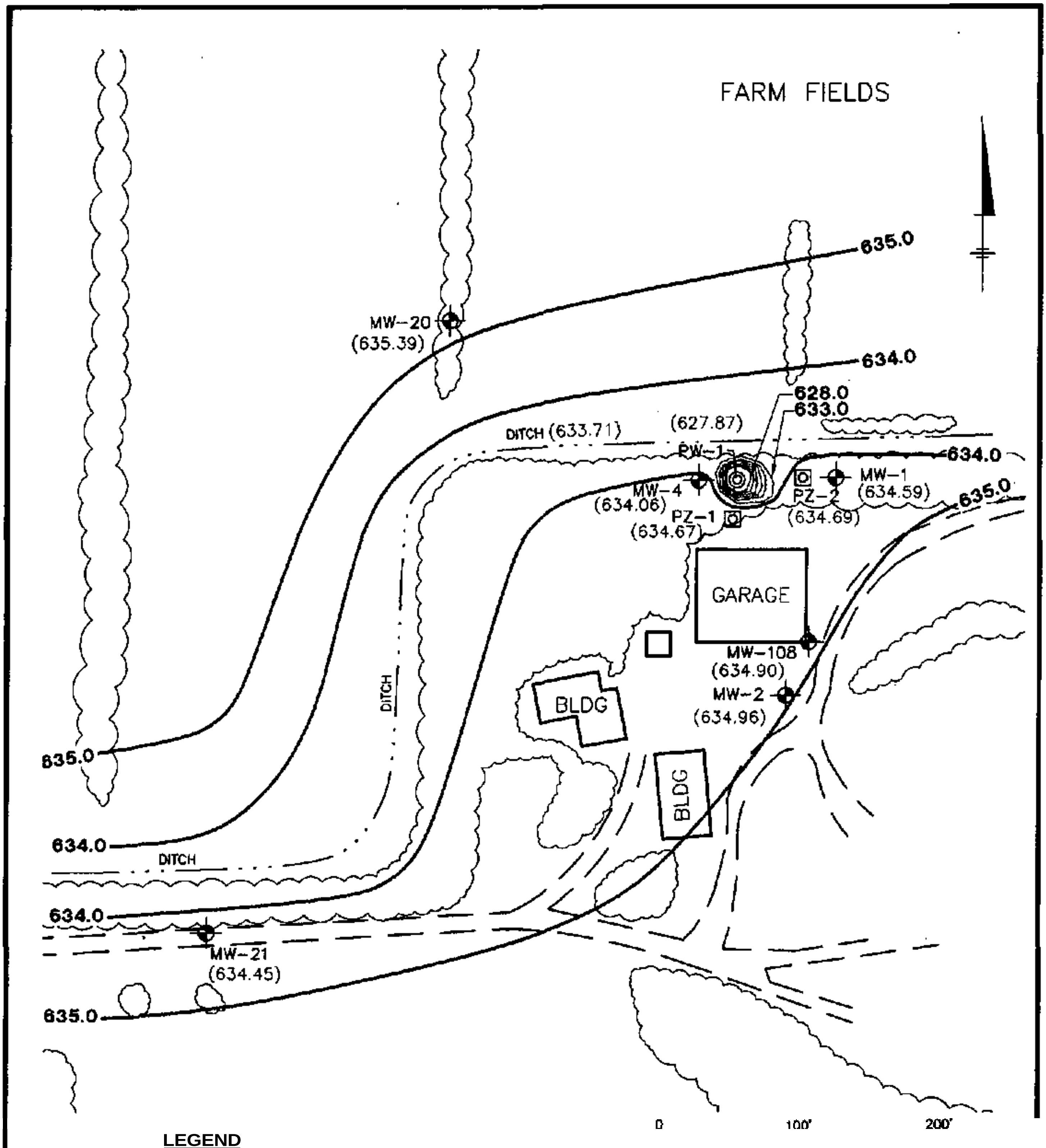
PRE-REMEDIAL DESIGN INVESTIGATION AND REMEDIAL DESIGN REPORT

GROUND-WATER CONTOUR MAP
MARCH 22, 1999
PRIOR TO PUMP TEST

FIGURE

HBL BUSLAND, BOUCK ft LEE, INC.
engineers & scientists

fc 77301X01 S3 WC
L: SP-PRE,OraO,flEF,SHD-253.5^-OFF.VOC.MVP-OH
P: BIflON
9/11/W S1H DIV-34 RGB
77304O03/77J0*e0JJ)l«



LEGEND

MW-1 GROUND-WATER MONITORING WELL

PW-1 PUMPING WELL

PZ-1 PIEZOMETER

(635.20) GROUND-WATER ELEVATION IN FEET AMSL

635.0 — GROUND-WATER ELEVATION CONTOUR IN FEET AMSL

BYRON BARREL & DRUM SITE
BYRON, NEW YORK

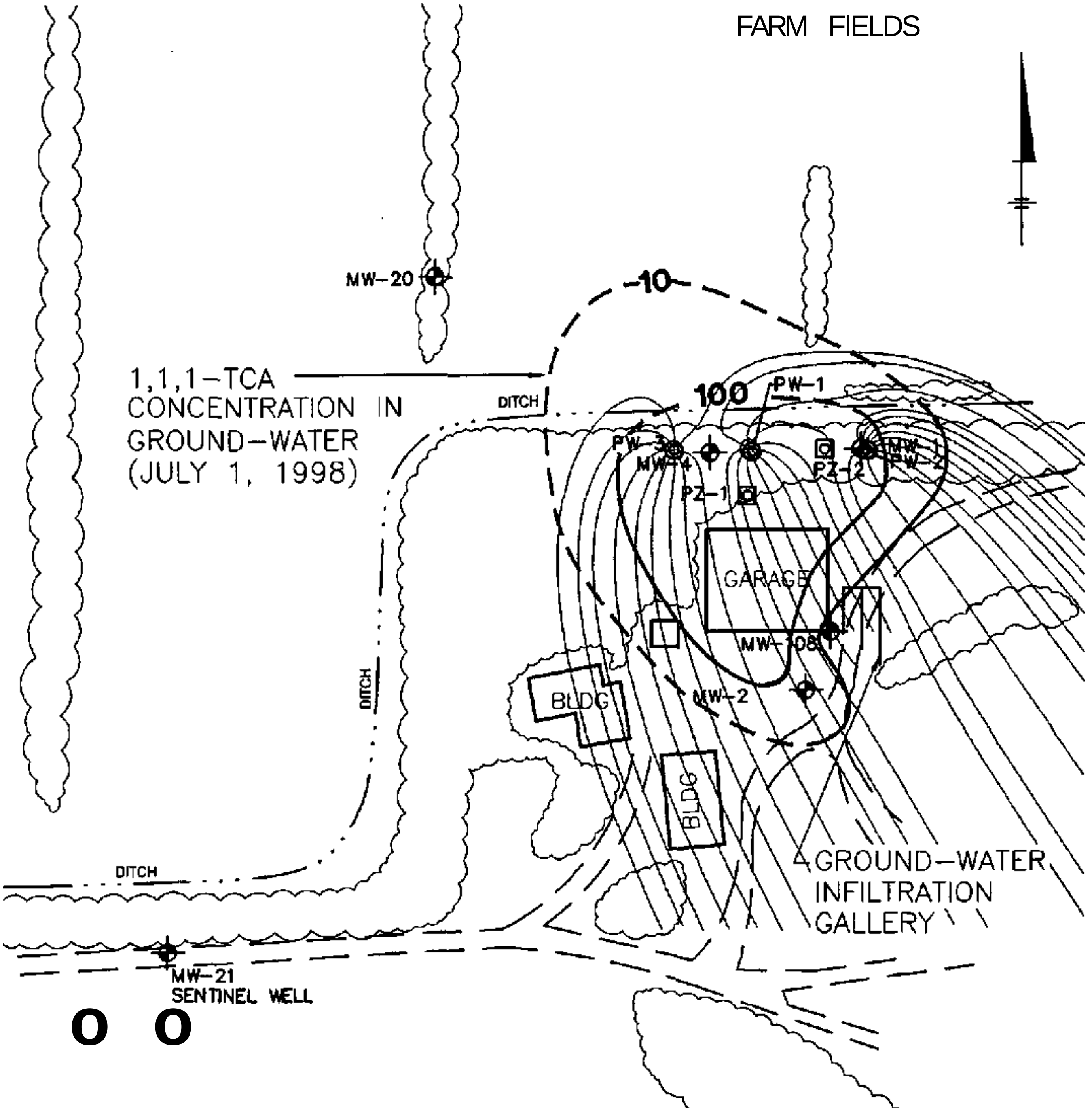
PRE-REMEDIAL DESIGN INVESTIGATION AND REMEDIAL DESIGN REPORT

GROUND-WATER CONTOUR MAP MARCH 24, 1999 AFTER 2 DAYS OF PUMP TEST

BBL BLASLAND, BOUCK ft LEE, INC. *engineers & scientists*

FIGURE

X: 77302X01D IK
L SP-PHE,CR10,REF.SH0-2SS,SVP-OfF,VOC*, MVP-CM
RBTRON
6/11/99 5YR OV-84 RGB
773O40O3/773Ote0S.DWC



LEGEND

iMW-1 GROUND-WATER MONITORING WELL

PW-1 @ PUMPING WELL (EXISTING AND PROPOSED)

PZ-1 PIEZOMETER

GROUND-WATER FLOW PATH (PARTICLE TRACK)

0 100' 200'

GRAPHIC SCALE

8YR0N BARREL 8c ORUM SITE
BYRON, NEW YORK

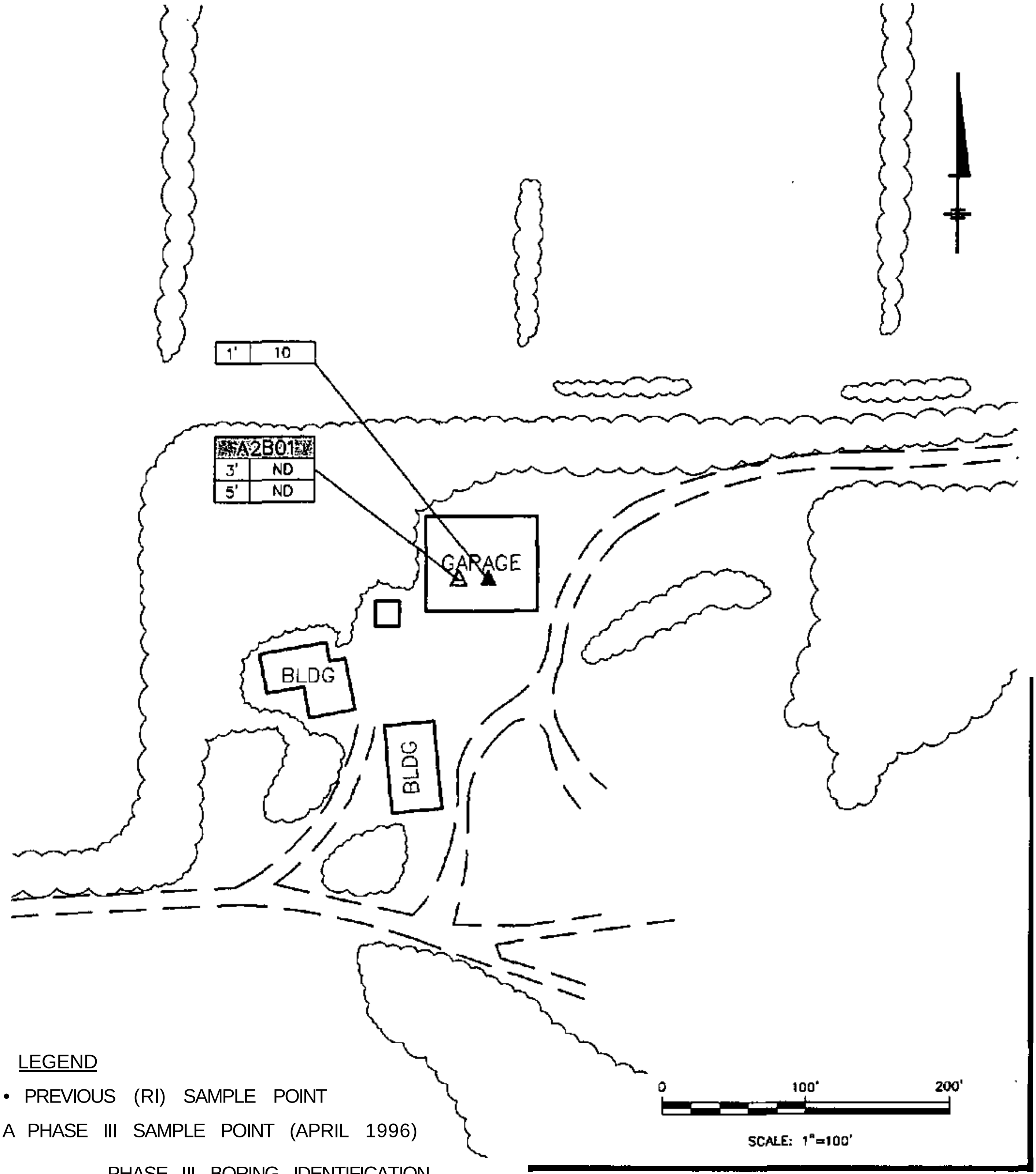
PRE-REMEDIAL DESIGN INVESTIGATION AND REMEDIAL DESIGN REPORT

MODEL SIMULATION OF GROUND-WATER EXTRACTION AND REINJECTION SYSTEM

FIGURE

BBL **BLASIAND,** BOUCK & LEE, INC.
engineers & scientists

* 77302X01,DW
U SP~PRE,<»ID.REF.SHD-25S,5VP-0FF,VOC*,MVP«0N
PATRON
ii/B/ea *sirt* **«v-54** RCB. pa
77304003/77304604.DWO



LEGEND

• PREVIOUS (RI) SAMPLE POINT

A PHASE III SAMPLE POINT (APRIL 1996)

PHASE III BORING IDENTIFICATION

3' ND SAMPLE INTERVAL WITH CORRESPONDING
5' ND^ TOTAL SITE VOC CONCENTRATION (mg/kg)

V(ND) INDICATES NOT DETECTED

MHES

1. DATA PRESENTED FROM AREA 2 PHASE INVESTIGATION REPORT, BBL, 1996.
2. COMPOUND DETECTED IN RI SOIL SAMPLE WAS 1,1,1-TCA AT 10 ug/Kg.

& 77302XOt.O«
L; SP-P0E.OBD,R£F.SHD-15iSVP-0FT-,V0C>IVP-0N
P: STB-PCP/AP
11/11/96 SIR tNV-54 RCa CMW, (KM
773WO0J/773Wfl0S.DWJ

BYRON BARREL & DRUM SITE
BYRON, NEW YORK

PRE-REMEDIAL DESIGN INVESTIGATION AND REMEDIAL DESIGN REPORT

GARAGE - HISTORIC SOIL ANALYTICAL SUMMARY

BBL

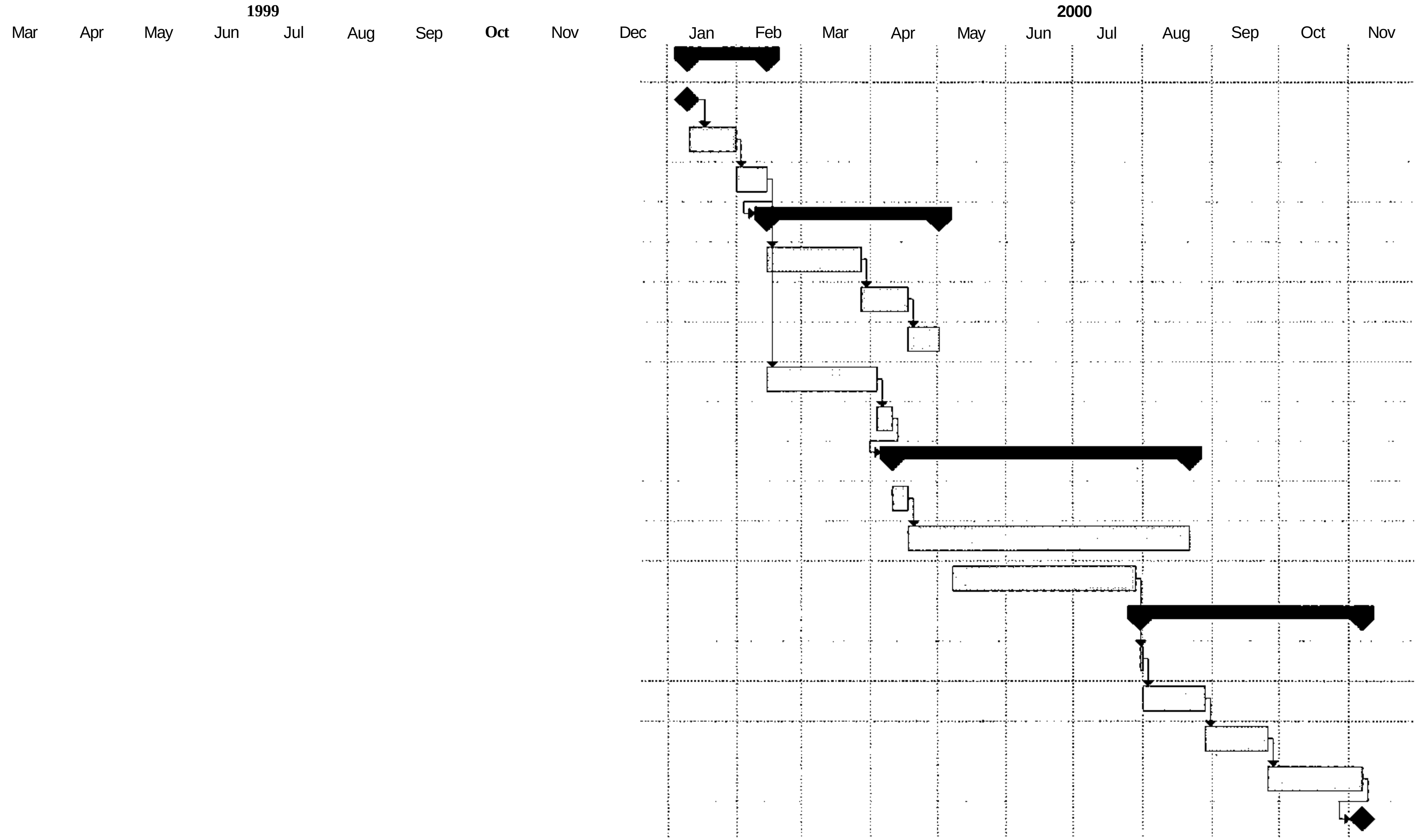
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE

IMPLEMENTATION OF REMEDIAL ACTIONS
BYRON BARREL & DRUM SITE
BYRON, NEW YORK

FIGURE 8

ID	Task Name
	100% Remedial Design Report
	Receive Comments from EPA
	Address Comments from EPA
	Obtain approval from EPA
	Remedial Action Work Plan
	Prepare and Submit Remedial Action Work Plan
	EPA Review
	Address EPA Comments & Submit (if required)
9	Advertise, Receive and review Bids
T(F	Submit Selected Contractors Qualifications to EPA
11	**Performance of Remedial Action**
12	Complete Contractor Procurement
13	Construction
14	Preparation of O&M Manual
15	**Pre-Final Inspection, Remedial Action Report, Notice of Completion**
16	Pre-Final Inspection
17	Corrective Measures (if Required)
18	Pre Certification
19	Remedial Action Report
20	**Initiation of Operation & Maintenance**



PREPARED BY BLASLAND, BOUCK & LEE, **INC.**
FOR UNISYS CORPORATION and BF GOODRICH

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks
Progress | Summary | Rolled Up Milestone \ y | Split | Project Summary

Appendices

BLASLAND, BOUCK & LEE, INC.
engineers & tclentltts

Appendix A

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Well Construction Details

Date Start/Finish: 2-8^99/2-8-99
Drilling Company: Nothnagle Drilling
Driller's Name: Kevin Busch
Drilling Method: Hollow Stem Auger

Auger Size: I.D.- 4.25/10.25 in.
Rig Type: BK-81

Borehole Depth: 27.4 ft.

Geologist: Douglas M. Ruszczyk

HeliNo:PH-i

Client:
;;Byron Barrel S Drum PRP Group

Location:
Byron Barrel S Drum Site
Byron, New York

Depth	Sample No.	Sample Interval	Blows	N	Recovery	PID			Stratigraphic Description	Construction
									GROUND SURFACE	r-|
—	i		5 7 S 10	16	0.7	-			Medium, brown lo black SILT, some fine to necfun sand, ittie fine to coarse, gravel, trace clay, dry.	
-									Karae Deposits	
— 5	2		23 23 20 17	43	L0				Dense, tan/gray SILT and very fine to nedhn SAND, title fine to *team* gravel, trace clay, wist.	PVC riser from 3.0* AGS tol3766S.
-										No. ORlcciBros. sandpack from 7.65* to 8.65" BGS.
—D	3		6 11 24 30	35	14	-			Same, except necEum, wet.	
	4		18 15 24	27	L8				Medium, gray/tan the to coarse SAND, some sHt, tittle fine lo coarse gravel, trace sit, wet	No. 1 Ricci Bros. 272* BGS.
- 6	5		17	SI	UI	-			Sane.	

Remarks*

Initial; soil boring used 4.25-inch I.D. HSA.
10.25-Inch 1,0. HSA used to Installpump well.

Saturated Zones

Date / Time	Elevation	Depth

CLient:
Byron Barrel S Drum PRP Group

Location:
Byron Barrel S Drum Site
Byron, New York

Log Number: PH-1

Total Depth - 27.4 ft.

OJ a

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3 O m

OJ o (D Q. crt •o (0 at X

Depth					Stratigraphic Description	Construction
			37		Kame Deposits	
			25		Same.	
					Dense, tan SILT and line to coarse SANO, little tine to coarse gravel, trace clay, weL	
			38	L5		
—20					Dense, tan to gray SILT and fine coarse SAND, little to some gravel, trace clay, wet.	6-inch dameter stainless steel 0.030-iich slotted wel screen from 137 to *2A2* BGS.
	12 14 25 44		39			
					Medium, gray SILT and fine to coarse SAND, some fine to coarse gravel, trace to Utile clay, wel (22.0' - 23.3').	
				16	Medium, gray CLAY, some silt, little fine to coarse sand, little fine to coarse gravel, wet.	
—25					Tflt	• 6-fich dameter SCH 80-PVC sump from 242" lo *112* BGS.
					Bottom of boring al 27.4' BGS.	Total Depth = 272" BGS.
—30						

Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Date Start/F|hlsh: 12-22-98 / l2r22-98 **Drilling Company:** Nothnagle Drilling **Driller's Name:Kevin** Busch **Drilling Method:** Hollow Stem Auger **Auger Size: I.O.=** 4.25 in. **Rig Type:** BK-81	**Borehole Depth:** 25.2 **ft.** **Geologist:** Oougias M. Ruszczyk	**HellNo:PZ-1** **pent:** Byron Barrel S Drum PRP Group **Location:** Byron Barrel S Drum Site Byron, New York

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Stratigraphic Description

Construction

GROUND SURFACE

Canent/bentorfle gout- fron grotnd sjf ace to tl2"B6S.

Augers advanced to top of glacial tffl.

2-*chdaneterSCH4(H PVC riser frotnZO* AGS toWBGS.

—D

See monitoring wen PM-t for subsurface soil description.

Hydrated bentortte seat fron 0.8* to 0.8' BGS.

Remarks:

Saturated Zones

Date / Time Elevation Depth

Client:
Byron Barret S Drum PRP Group
Location:
Byron Barrel S Drum Site
Byron, New York

Log Number: PZ-l

Total Depth - 25.2 ft.

X h- CL. UI a •z. o 1— <\/ LU _J LU <U r> "5. -z. % § to tr CO 3 o m o •n ·(•) 0) (D r x: in o

Stratigraphic Description

Construction

"OQirsanclackfrai tiff to 252" BGS.

—20

2-inch dameter SCH 40-PVC 0.0lCHrch slotted wel screen from 152* to •&2 BGS.

—25

Bottom of boring at 25.2" BGS.

• Total OepBi = 252' BGS.

—30

Remarks:

Saturated Zones
Date / Time Elevation Depth

Date Starl/Flnl»h:>i2n22-98 / 12-22^-98 • DriHinO^CofflPariy: Npthnagte Drilling; Driiler;Nanie::KeviH;i8usch DrillihgiMethod: follow Stem Auger **Auger Size: I.b:= 4:25 in.** **Rig Type:** BK-81	**Borehole Depth:** 25.0 ft. GeblbglstrDouglas M. Ruszczyk	**Hell No: PZ-2** **Client:** Byron Barrel-S Drum PRP Group **Location::** Byron Barrel S Drum Site Byron, New: York

Depth									Stratigraphic Description	Construction
									GROUND SURFACE	
— 5									Augers advanced to top of glacial UL	canent/bentontte gout-fraoflwnd surface to 0.6-BGa
—D		1 1 1 1							See monitoring wen for PM-i for subsutace sol description.	PVCrbffrroD22'AGS to&tTBGS. Hydf ated bentortte seat frora DET to CO* 6GS.

Remarks*

Saturated Zones		
Date / Time	Elevation	Oepth

CLient:
Byron Barrel S Drum PRP Group

Location:
Byron Barrel G Drum Site
Byron, New York

Log Number: PZ-2

Total Depth - 25.0 ft.

X 1- Q. ID Q <> UJ _I LU | 0) n a, I a. z i § | 05 in | 3 o CO | o m n u X | fO r x: 0 0) o O) | Stratigraphic Description | Construction

'TOTsanctoKkfrai £6" to 25.0* B6S.

—20

2-teh dameta SCH 40-PVCO.0KHnch skitted wel screen from 6.0' to 25.0" BGS.

—25

Bottom of boring at 25.0' BGS.

Total Depth-25.0' - 80S.

—30

Remarks:

Saturated Zones

Date / Time Elevation Depth

Date Start/Finish: 12-21-98 / 12-21-98
Drilling Company: Nothnagie Drilling
Driller's Name: Kevin Busch
Drilling Method: Hollow Stem .Auger

Auger Size: I.O.= :6.25 in.
Rig Type: BK-81 ;.

Borehole Depth: 25.6 **ft.**

Geologist: Dougjas M. Ruszczyk

^WeMiWb:'MH-2i:-:fe

Clients >-.
i:Byron:Barret SiDrumPRP Group

i **Location:**
ByronjBarrel S Drum Site
Byron,;New York •-•---.'.

Depth	Sample No.	Sample	Blows	Recovery	PID				Stratigraphic Description	Construction
									GROUND SURFACE	Steel protective cashg eqdppedwithlockjrv cap.
—	1	\ \ \ \	6	11	0.7	-			Medhm, tan to black SILT, sotae very fine to nedun sand, trace clay and *ire* gravel, damp.	Concrete sulace pad - froo groind suf ace to 3.0" BBS.
									Kame Deposits	Canent/bentortte ff out-Iffto55B6S.
— 5	2	V \ \	9 18	28	0.5	—			Medhm, tan/gray SILT and very fine to nediun SANO, ittte fine to nedhitn, gravel, trace clay, wrist.	Hydrated bentorite seal froo iff to 75 B6S.
—»	3		6 13 14 14	27	0.4	-			Sane, except wet.	stainless steel riser tron 22*A6Sto».CfBGS. *
B	4	\ ^	6	28	0.6	-				

Remarks*

Saturated Zones

Date / Time	Elevation	Depth

CLient:
Byron Barrel S Drum PRP Group

Location:
Byron Barrel S Drum Site
Byron, New York

Log Number: MH-21

Total Depth - 25.6 ft.

CL. ID a | > LLI | OJ A CO cc | CO | 3 o m | o fl> m T> IU X | (0 r r o (D o

Stratigraphic Description

Construction

28 0.6

Heditn, gray SILT and fine to coarse SAM), little fine lo coarse gravel, t/ace clay, wet

•TOW sandpack from 7.5'10 25.tr BGS

Kame deposits

Same.

—20

4-inch dareter stainless steel O.OO-rch wire wrapped wel saeen from CO' to-25.ffB6S.

—25

4-hch d&neter slaMess steel snip from 25.0' to 25,5" BGS.

Total Depth = 255' BGS.

Bottom of boring at 25-6" BGS.

^30

Remarks:

Saturated Zones

Date / Time Elevation Depth

Appendix B

BLASLAND, BOUCK 8t LEE, INC.
engineers ft scientists

PW-1 Grain Size Analysis

RAY M. TEETER, P.E.
CONSULTING GEOTECHNICAL ENGINEER

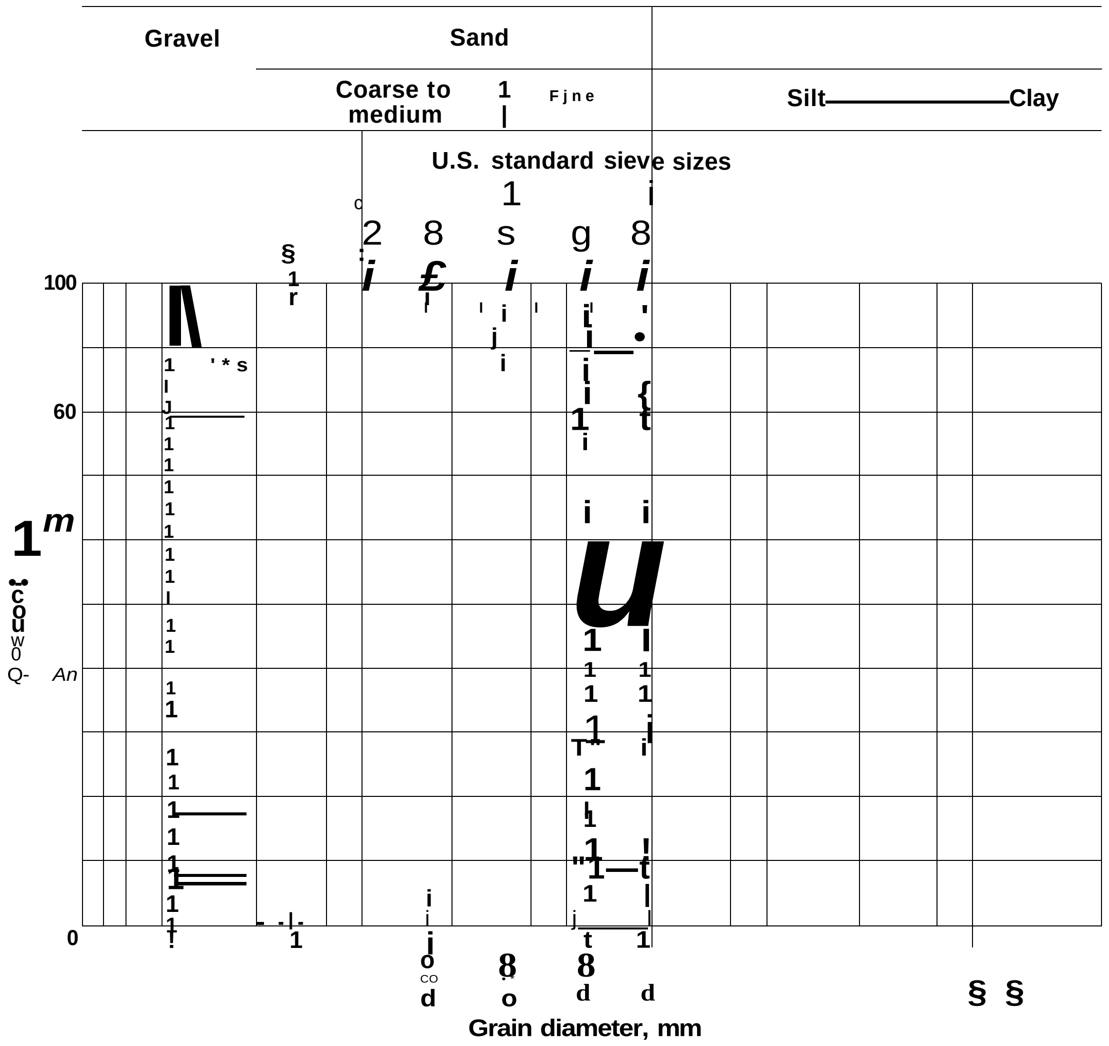
PARTICLE-SIZE DISTRIBUTION

Project 4? <? * P Exploration No. y^^y — l

Location ^Vyg-g/v, A/ r Sample No. ____________

File No. ? ^ 9 ? Depth (feet) / s> - / 2.

Date / z> / •? g



RAY M. TEETER, P.E.

CONSULTING GEOTECHNICAL ENGINEER

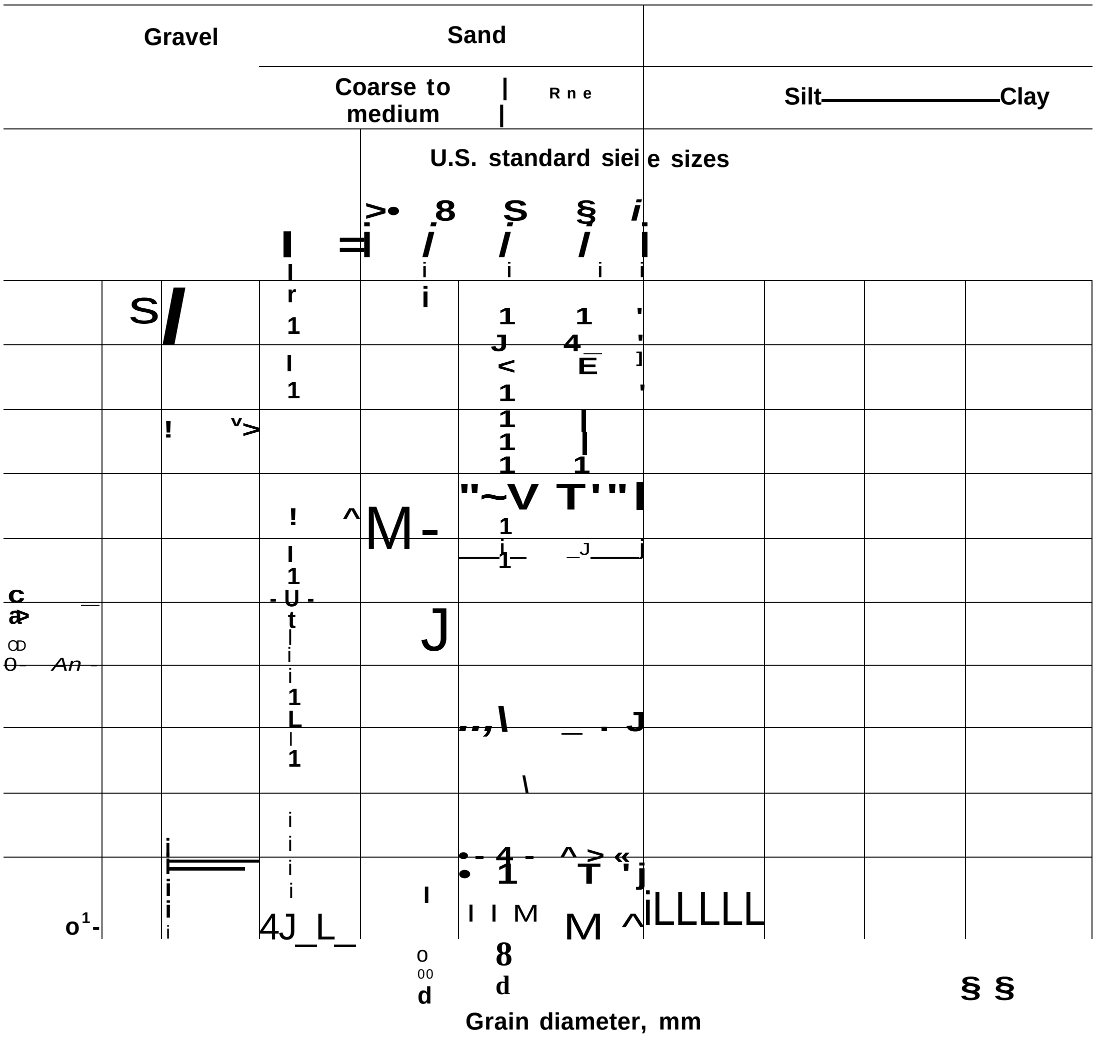
PARTICLE-SIZE DISTRIBUTION

Project # <7 ~ /? Exploration No.. /? t«» — /

lbontion / ^ ^ / ^ r Sample No. ______________

File No. 7 & 9 ~> Depth (feet) /2 - / *

Dnte / •« / *i 8



RAY M. TEETER, P.E.

CONSULTING GEOTECHNICAL ENGINEER

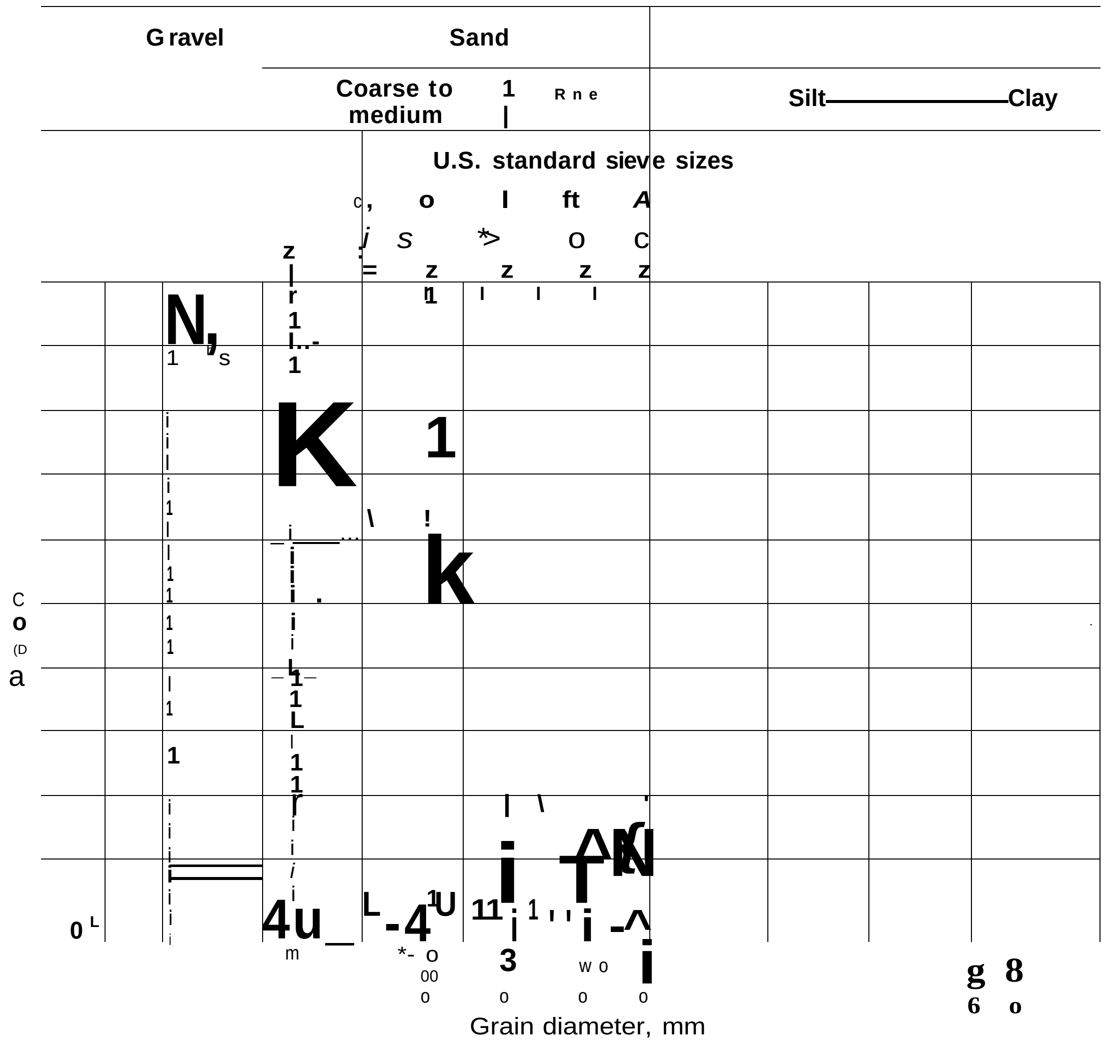
PARTICLE-SIZE DISTRIBUTION

Project # # + ^ Exploration No. /^As — /

I ocation <7r * "~. <v y Sample No.________

File No. *? & ? 7 Depth (feet) /</-/£

Date / *• / f g



RAY M. TEETER, P.E.

CONSULTING GEOTECHNICAL ENGINEER

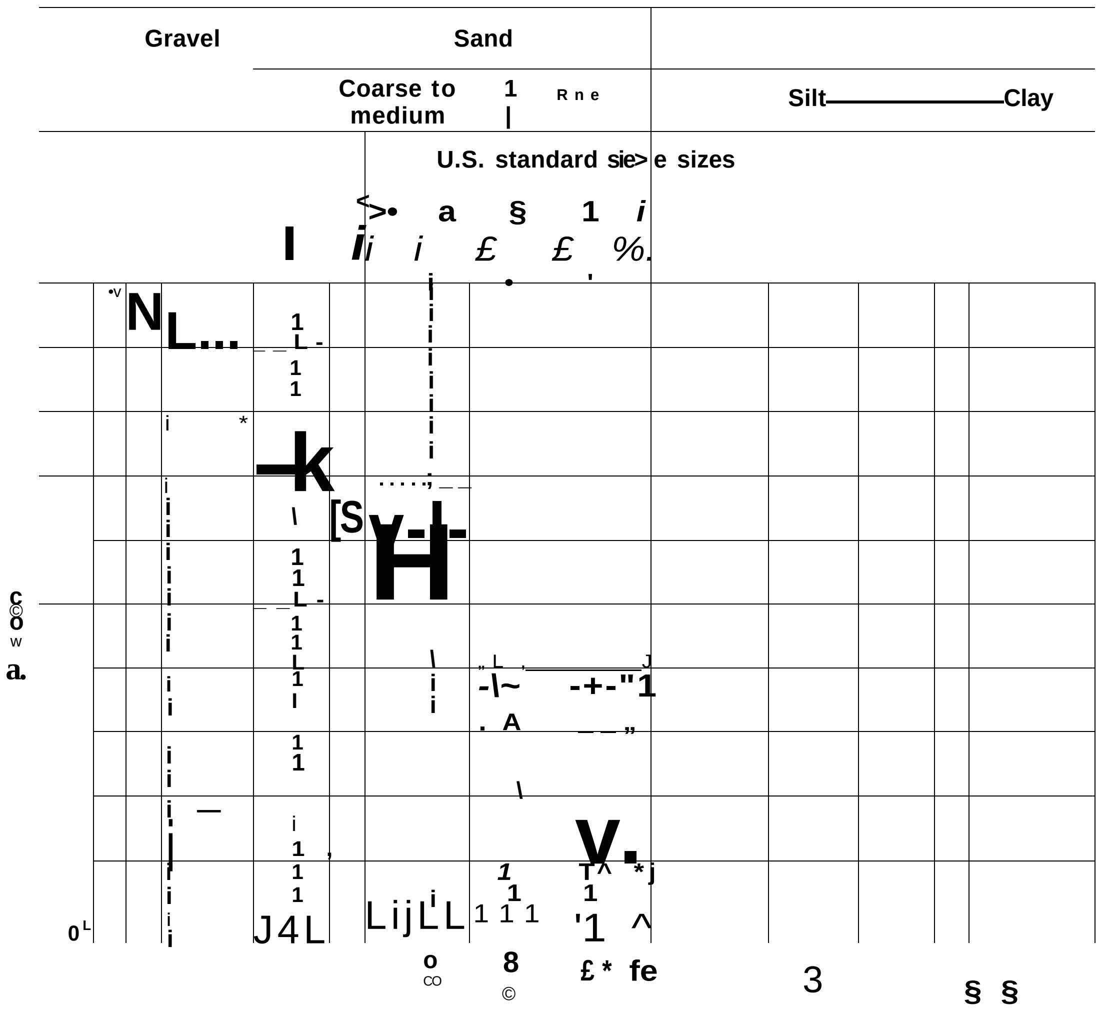
PARTICLE-SIZE DISTRIBUTION

Project ^ # + £> Exploration No. / " ^ — /

I ocation ^' r/z <*<", <* r Sample No. ____________

File No. ? ^ ' ? 7 Depth (feet) /< - / 0

Date ' *- /' '18



RAY M. TEETER, P.E.

CONSULTING GEOTECHNICAL ENGINEER

PARTICLE-SIZE DISTRIBUTION

Project <? <? <* / g

Exploration No. /^ 4** —V

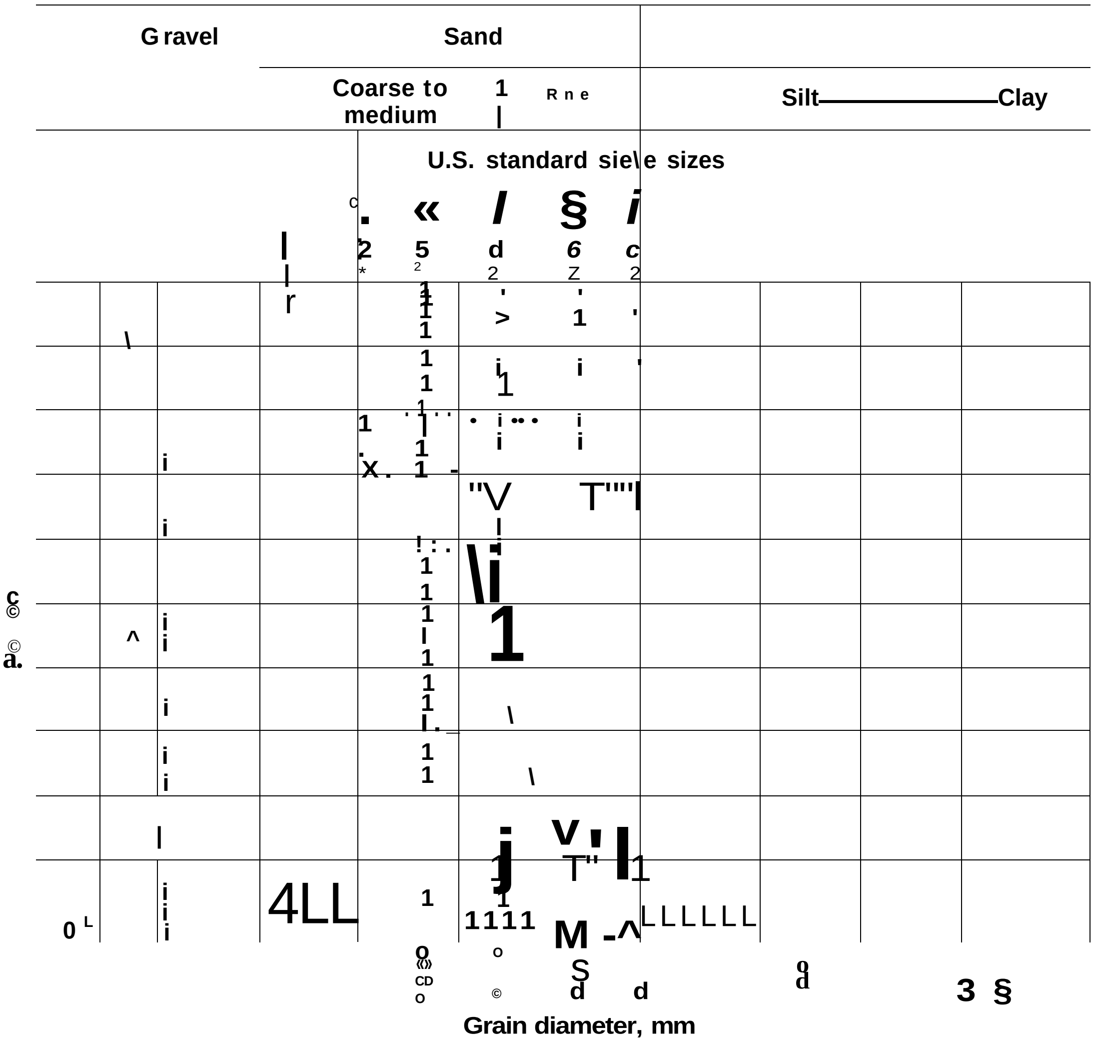
Location / ^ / " ^ /V ^

Sample No. ______________

File No. 9 <g ? ?

Depth (feet) / 8 - ^ o

Date /i~/ <=> 8



RAY M. TEETER, P.E.
CONSULTING GEOTECHNICAL ENGINEER

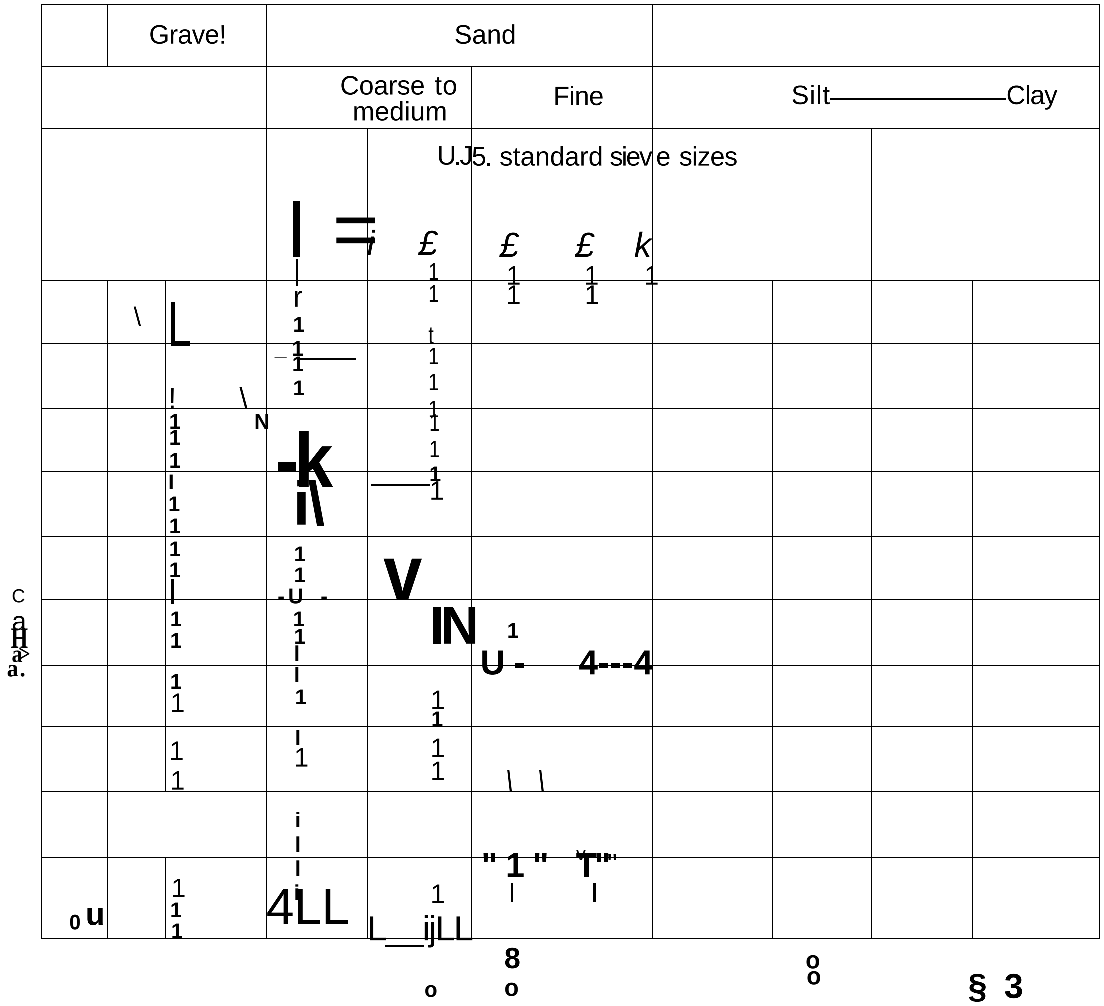
PARTICLE-SIZE DISTRIBUTION

Project # S +• /> Exploration No. /^/k/ — /

locntion <frs* »", /* f SampleNo.

File No. 9 & 9 ? Depth (feet) «3 o - .? a.

Date___ /?. / *? 8



Grain diameter, mm

RAY M. TEETER, P.E.
CONSULTING GEOTECHNICAL ENGINEER

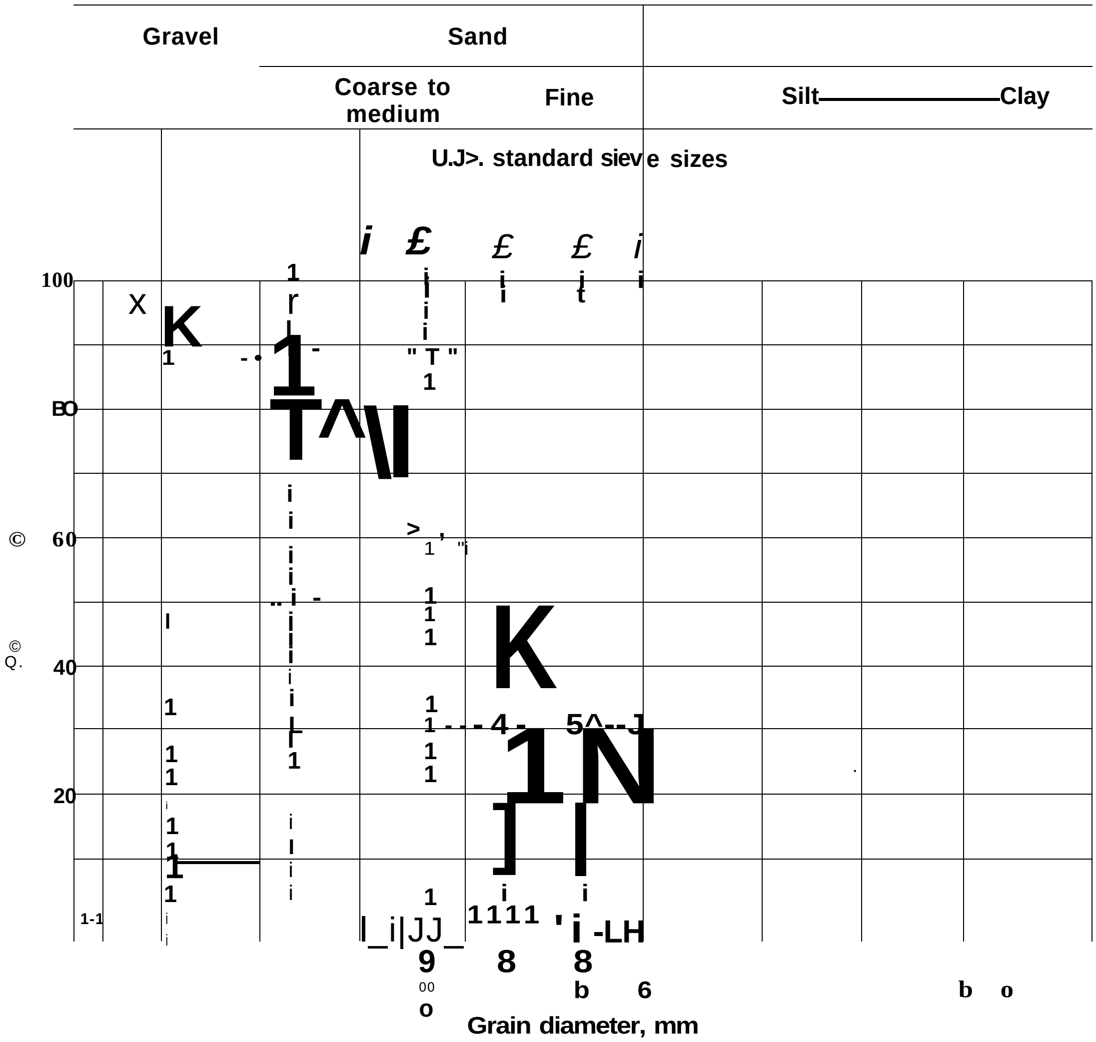
PARTICLE-SIZE DISTRIBUTION

Project & # •* 4? Exploration No. S&* -/

lonntion 4? ft of, A* f Sample No.___

File No. ^ 8 "9} 7 Depth (feet)_ .2 2 - 2 r

Date /z /°> 8



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	*£ B	#e*i	64. t	4%f	t?.*	->?. y	6Y.*	?*. 9
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RAY M. TEETER, P.E.

T,IUE	^ ^ - / t ^ * r f i f s ^ ^ T f		
PROJECT	j>r*0** & * * * € . +/>*<*,*>		
LOCATE	^ y s T - S , , A/<*t~ r~*X		
WTF	/ *• / ? e	BY	^ r / 7 7 -
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Appendix C

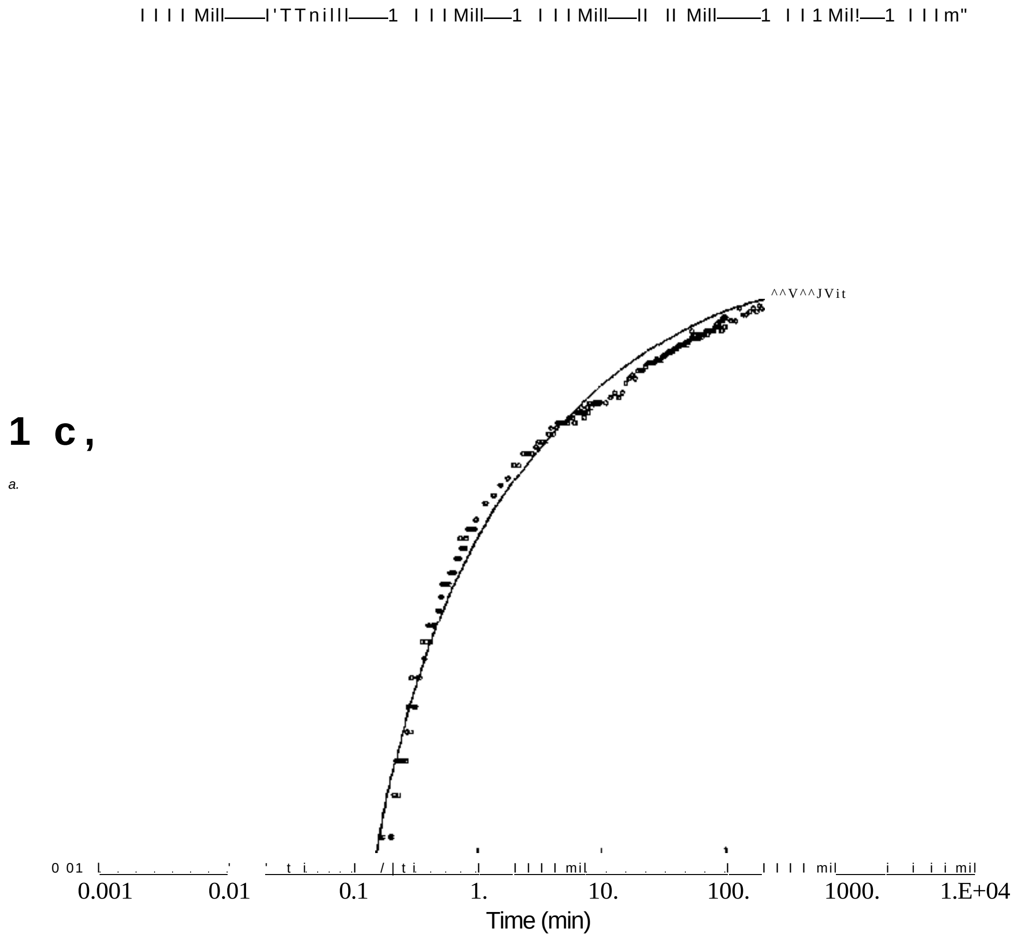
BLASLAND, BOUCK & LEE. INC.
engineers & tclentlttt

Pump Test Data Reduction

Pump Test Results

BLASLAND, BOUCK 8t LEE, INC.
engineers & tclentlsts

Observation Well PZ-1



Data Set: U :\BYRON\PZ-1 .AQT Date: 04/02/99		PUMPTEST PZ-1 Time: 15:32:42			
Saturated Thickness: 20. ft		AQUIFER DATA Anisotropy Ratio (Kz/Kr): 1			
		WELL DATA			
Pumping Wells			Observation Wells		
Well Name	X(ft)	Y(ft)	Well Name	X(ft)	Y(ft)
PW1	6.258E+005	1.137E+006	• PZ-1	6.258E+005	1.137E+006
Aquifer Model: Leaky Solution Method: Hantush-Jacob		SOLUTION T = 24,12 cm^2/sec S = 0.0005366 r/B = 0.04597			

Data Set: U:\BYRON\PZ-1.AQT
Title: Pumptest PZ-1
Date: 04/02/99
Time: 15:32:56

PROJECT INFORMATION

Company: Blasland, Bouck and Lee
Client: Byron Barrel and Drum
Project: 77302
Location: Bryon, New York
Test Date: 3\25\99
Test Well: PW-1

AQUIFER DATA

Saturated Thickness: 20 ft
Anisotropy Ratio (Kz/Kr): 1

PUMPING WELL DATA

Number of pumping wells: 1

Pumping Well No. 1: PW1

X Location: 625816 ft
Y Location: 1.13714E+006ft

Pumping Period Data

Time (min)	Rate (gal/min)
0.0083	4.97

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: PZ-1

X Location: 625802 ft
Y Location: 1.13711E+006 ft

Observation Data

Time (min)	Displacement (ft)
0.0083	0.003
0.0166	0.
0.025	0.003
0.0333	0.
0.0416	0.
0.05	0.
0.0583	0.003
0.0666	0.003
0.075	0.003
0.0833	0.003
0.0916	0.006
0.1	0.003
0.1083	0.003
0.1166	0.006

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14.	0.124
15.	0.127
16.	0.134
17.	0.137
18.	0.14
19.	0.137
20.	0.143
21.	0.143
22.	0.143
23.	0.146
24.	0.149
25.	0.149
26.	0.149
27.	0.149
28.	0.152
29.	0.152
30.	0.152
31.	0.152
32.	0.156
33.	0.156
34.	0.156
35.	0.159
36.	0.159
37.	0.159
38.	0.159
39.	0.162
40.	0.162
41.	0.162
42.	0.162
43.	0.165
44.	0.165
45.	0.165
46.	0.165
47.	0.165
48.	0.165
49.	0.168
50.	0.165
51.	0.168
52.	0.168
53.	0.171
54.	0.177
55.	0.171
56.	0.174
57.	0.171
58.	0.174
59.	0.171
60.	0.171
61.	0.171
62.	0.174
63.	0.174
64.	0.171
65.	0.174
66.	0.174
67.	0.174
68.	0.174
69.	0.177
70.	0.177

71.	0.177
72.	0.174
73.	0.177
74.	0.177
75.	0.177
76.	0.177
77.	0.177
78.	0.177
79.	0.177
80.	0.177
81.	0.181
82.	0.181
83.	0.181
84.	0.181
85.	0.184
86.	0.181
87.	0.181
88.	0.181
89.	0.181
90.	0.181
91.	0.187
92.	0.177
93.	0.187
94.	0.177
95.	0.187
96.	0.19
97.	0.181
98.	0.187
99.	0.181
100.	0.19
110.	0.187
120.	0.187
130.	0.199
140.	0.193
150.	0.193
160.	0.196
170.	0.199
180.	0.196
190.	0.202
200.	0.199
230.	0.206
260.	0.209
290.	0.212
320.	0.215
350.	0.212
380.	0.215
410.	0.215
440.	0.212
470.	0.215
500.	0.215
560.	0.218
620.	0.212
680.	0.218
740.	0.215
800.	0.224
860.	0.218
920.	0.215

980.	0.224
1040.	0.227
1100.	0.224
1160.	0.234
1220.	0.234
1280.	0.24
1340.	0.243
1400.	0.243
1460.	0.246
1940.	0.246
2420.	0.249
2900.	0.268
2947.	0.268

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	24.12	cm^2/sec
S	0.0005366	
r/B	0.04597	

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	
T	24.12	not estimated	cm^2/sec
S	0.0005366	not estimated	
r/B	0.04597	0.001266	

Parameter Correlations

	r/B
r/B	1.00

Residual Statistics

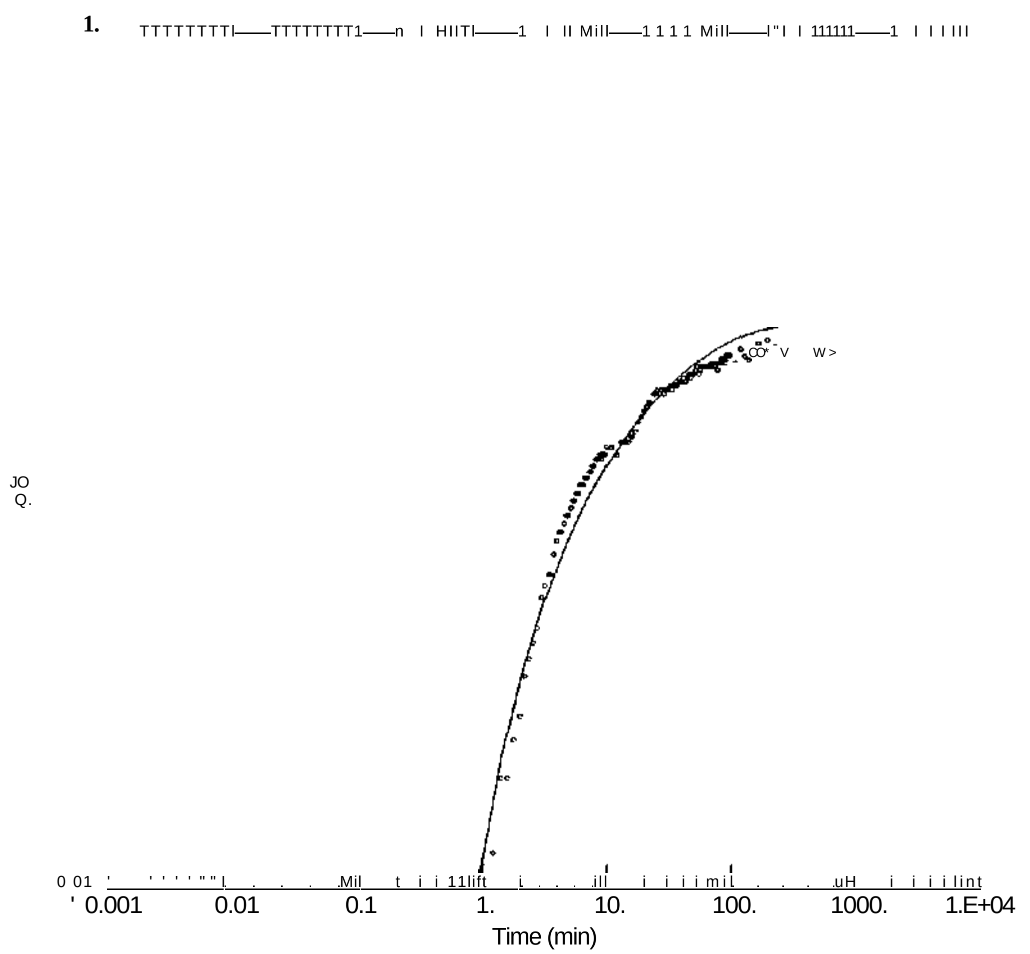
for weighted residuals

Sum of Squares .... 0.02996ft^2
Variance. . . . . .0.000118ft^2
Std. Deviation. 0.01086ft
Mean. . . . .-0.00369ft
No. of Residuals.... 255
No. of Estimates____1

Pump Test Results

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Observation Well PZ-2



Data Set: U:\BYRON\PZ-2 .AQT Date: 04/02/99	PUMPTEST P2-2 Time: 15:49:11				
Saturated Thickness: 20. ft	AQUIFER DATA Anisotropy Ratio (Kz/Kr): 1.				
Pumping Wells	WELL DATA		Observation Wells		
Well Name	X(tt)	Y(ft)	Well Name	X(ft)	Y(ft)
PW1	6.258E+005	1.137E+0O6	• PZ-2	6.259E+005	1.137E+006
Aquifer Model: Leaky Solution Method: Hantush-Jacob	SOLUTION T = 15.74 cm^2/sec S = 0.0007534 r/B = 0.1605				

Data Set: U:\BYRON\PZ-2.AQT
Title: Pumptest PZ-2
Date: 04/02/99
Time: 15:50:17

PROJECT INFORMATION

Company: Blasland, Bouck and Lee
Client: Byron Barrel and Drum
Project: 77302
Location: Byron, New York
Test Date: 3/35/99
Test Well: PW-1

AQUIFER DATA

Saturated Thickness: 20 ft
Anisotropy Ratio (Kz/Kr): 1

PUMPING WELL DATA

Number of pumping wells: 1

Pumping Well No. 1: PW 1

X Location: 625816 ft
Y Location: 1.13714E+006ft

Pumping Period Data

Time (min)	Rate (gal/min)
0.0083	4.97

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: PZ-2

X Location: 625888 ft
Y Location: 1.13714E+006ft

Observation Data

Time (min)	Displacement (ft)
0.0083	0.
0.0166	0.
0.025	0.
0.0333	0.
0.0416	0.
0.05	0.
0.0583	0.
0.0666	0.
0.075	0.
0.0833	0.
0.0916	0.
0.1	0.
0.1083	0.003
0.1166	0.

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0.8666	0.006
0.8833	0.006
0.9	0.006
0.9166	0.006
0.9333	0.006
0.95	0.006
0.9666	0.009
0.9833	0.006
1.	0.009
1.2	0.012
1.4	0.018
1.6	0.018
1.8	0.022
2.	0.025
2.2	0.031
2.4	0.034
2.6	0.037
2.8	0.04
3.	0.047
3.2	0.05
3.4	0.053
3.6	0.053
3.8	0.059
4.	0.063
4.2	0.066
4.4	0.066
4.6	0.069
4.8	0.072
5.	0.072
5.2	0.075
5.4	0.078
5.6	0.078
5.8	0.081
6.	0.081
6.2	0.085
6.4	0.085
6.6	0.085
6.8	0.088
7.	0.088
7.2	0.088
7.4	0.091
7.6	0.091
7.8	0.094
8.	0.094
8.2	0.097
8.4	0.097
8.6	0.097
8.8	0.1
9.	0.097
9.2	0.1
9.4	0.1
9.6	0.1
9.8	0.1
10.	0.104
11.	0.104
12.	0.1
13.	0.107

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980.	0.198
1040.	0.201
1100.	0.195
1160.	0.208
1220.	0.211
1280.	0.214
1340.	0.217
1400.	0.211
1460.	0.217
1940.	0.204
2420.	0.214
2900.	0.245
2947.	0.242

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	15.74	cm^2/sec
S	0.0007534	
r/B	0.1605	

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	
T	16.78	not estimated	cm^2/sec
S	0.0007181	not estimated	
r/B	0.1605	0.002234	

Parameter Correlations

	r/B
r/B	1.00

Residual Statistics

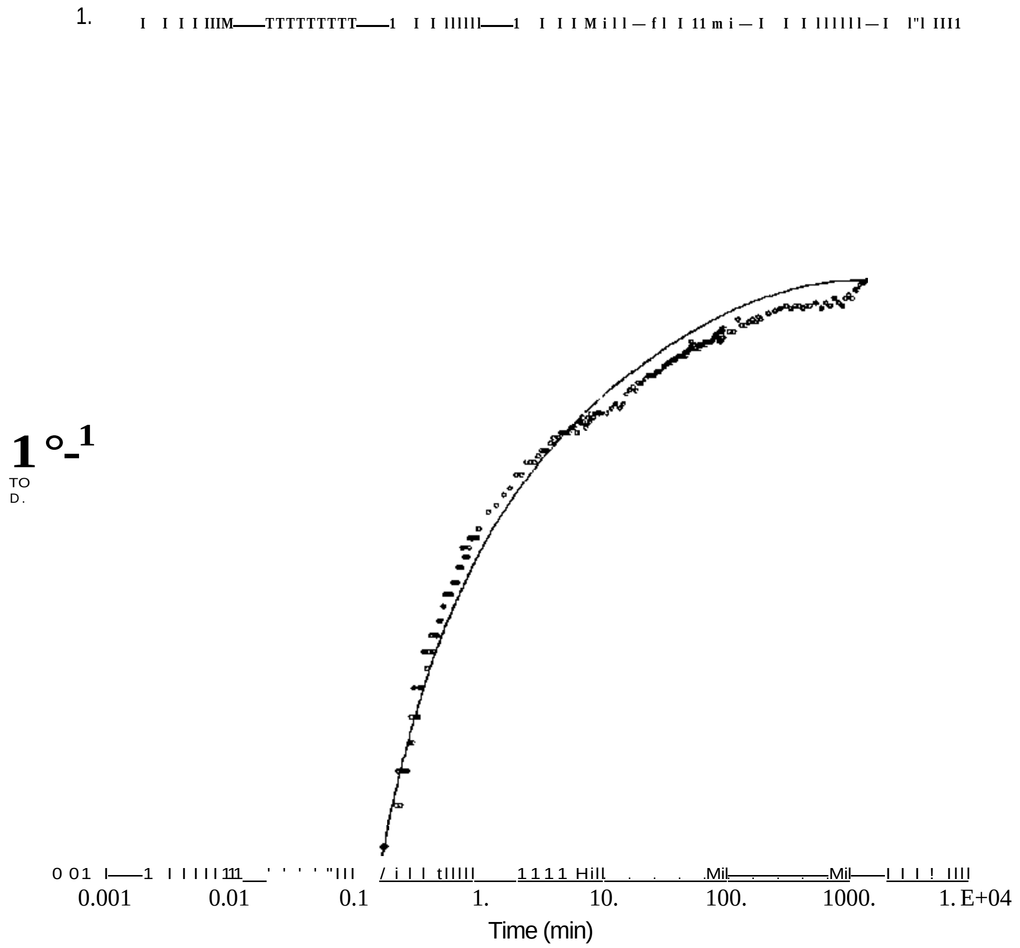
for weighted residuals

Sum of Squares .... 0.01888ft^2
Variance . . . . 7.435E-05ft^2
Std. Deviation 0.008623ft
Mean . . . . -1.84E-05ft
No. of Residuals.... 255
No. of Estimates____1

Pump Test Results

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Observation Well MW-1



PUMPTEST MW-1

Data Set: U:\BYRON\MW-1 .AQT
Date: 04/02/99

Time: 15:40:17

AQUIFER DATA

Saturated Thickness: 20. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells			Observation Wells		
Well Name	X(ft)	Y(ft)	Well Name	X(ft)	Y(ft)
PW1	6.258E+005	1.137E+006	MW-1	6.259E+005	1.137E+006

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

T = 23.91 cm^2/sec
S = 0.0001026
r/B = 0.03004

Data Set: U:\BYRON\MW-1.AQT
Title: Pumptest MW-1
Date: 04/02/99
Time: 15:40:32

PROJECT INFORMATION

Company: Blalsaind, Bouck and Lee
Client: Byron Barrel and Drum
Project: 77302
Location: Byron, New York
Test Date: 3\24\99
Test Well: PW-1

AQUIFER DATA

Saturated Thickness: 20 ft
Anisotropy Ratio (Kz/Kr): 1

PUMPING WELL DATA

Number of pumping wells: 1

Pumping Well No. 1: PW 1

X Location: 625816 ft
Y Location: 1.13714E+006ft

Pumping Period Data

Time (min)	Rate (gal/min)
0.0083	4.97

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-1

X Location: 625899 ft
Y Location: 1.13715E+006ft

Observation Data

Time (min)	Displacement (ft)
0.0083	0.003
0.0166	0.
0.025	0.003
0.0333	0.
0.0416	0.
0.05	0.
0.0583	0.003
0.0666	0.003
0.075	0.003
0.0833	0.003
0.0916	0.006
0.1	0.003
0.1083	0.003
0.1166	0.006

0.125
0.1333
0.1416
0.15
0.1583
0.1666
0.175
0.1833
0.1916
0.2
0.2083
0.2166
0.225
0.2333
0.2416
0.25
0.2583
0.2666
0.275
0.2833
0.2916
0.3
0.3083
0.3166
0.325
0.3333
0.35
0.3666
0.3833
0.4
0.4166
0.4333
0.45
0.4666
0.4833
0.5
0.5166
0.5333
0.55
0.5666
0.5833
0.6
0.6166
0.6333
0.65
0.6666
0.6833
0.7
0.7166
0.7333
0.75
0.7666
0.7833
0.8
0.8166
0.8333
0.85

0.8666	0.062
0.8833	0.062
0.9	0.062
0.9166	0.062
0.9333	0.062
0.95	0.062
0.9666	0.062
0.9833	0.062
1.	0.065
1.2	0.071
1.4	0.074
1.6	0.078
1.8	0.081
2.	0.087
2.2	0.087
2.4	0.093
2.6	0.093
2.8	0.093
3.	0.096
3.2	0.099
3.4	0.099
3.6	0.099
3.8	0.103
4.	0.106
4.2	0.103
4.4	0.106
4.6	0.109
4.8	0.109
5.	0.109
5.2	0.109
5.4	0.109
5.6	0.112
5.8	0.112
6.	0.112
6.2	0.109
6.4	0.115
6.6	0.115
6.8	0.115
7.	0.118
7.2	0.115
7.4	0.112
7.6	0.115
7.8	0.118
8.	0.115
8.2	0.121
8.4	0.118
8.6	0.118
8.8	0.121
9.	0.121
9.2	0.121
9.4	0.121
9.6	0.121
9.8	0.121
10.	0.121
11.	0.121
12.	0.124
13.	0.127

14.	0.124
15.	0.127
16.	0.134
17.	0.137
18.	0.14
19.	0.137
20.	0.143
21.	0.143
22.	0.143
23.	0.146
24.	0.149
25.	0.149
26.	0.149
27.	0.149
28.	0.152
29.	0.152
30.	0.152
31.	0.152
32.	0.156
33.	0.156
34.	0.156
35.	0.159
36.	0.159
37.	0.159
38.	0.159
39.	0.162
40.	0.162
41.	0.162
42.	0.162
43.	0.165
44.	0.165
45.	0.165
46.	0.165
47.	0.165
48.	0.165
49.	0.168
50.	0.165
51.	0.168
52.	0.168
53.	0.171
54.	0.177
55.	0.171
56.	0.174
57.	0.171
58.	0.174
59.	0.171
60.	0.171
61.	0.171
62.	0.174
63.	0.174
64.	0.171
65.	0.174
66.	0.174
67.	0.174
68.	0.174
69.	0.177
70.	0.177

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980.	0.224
1040.	0.227
1100.	0.224
1160.	0.234
1220.	0.234
1280.	0.24
1340.	0.243
1400.	0.243
1460.	0.246
1940.	0.246
2420.	0.249
2900.	0.268
2947.	0.268

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	23.91	cm^/sec
S	0.0001026	
r/B	0.03004	

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error
T	23.91	not estimated crrr/sec
S	0.0001026	not estimated
r/B	0.03004	0.0008482

Parameter Correlations

	r/B
r/B	1.00

Residual Statistics

for weighted residuals

Sum of Squares .... 0.01895ft^2
Variance. . . . . .7.46E-05ft^2
Std. Deviation. 0.008637ft
Mean. . . . .-0.00414ft
No. of Residuals____255
No. of Estimates____1

Pump Test Results

BLASLAND, BOUCK & LEE, INC.
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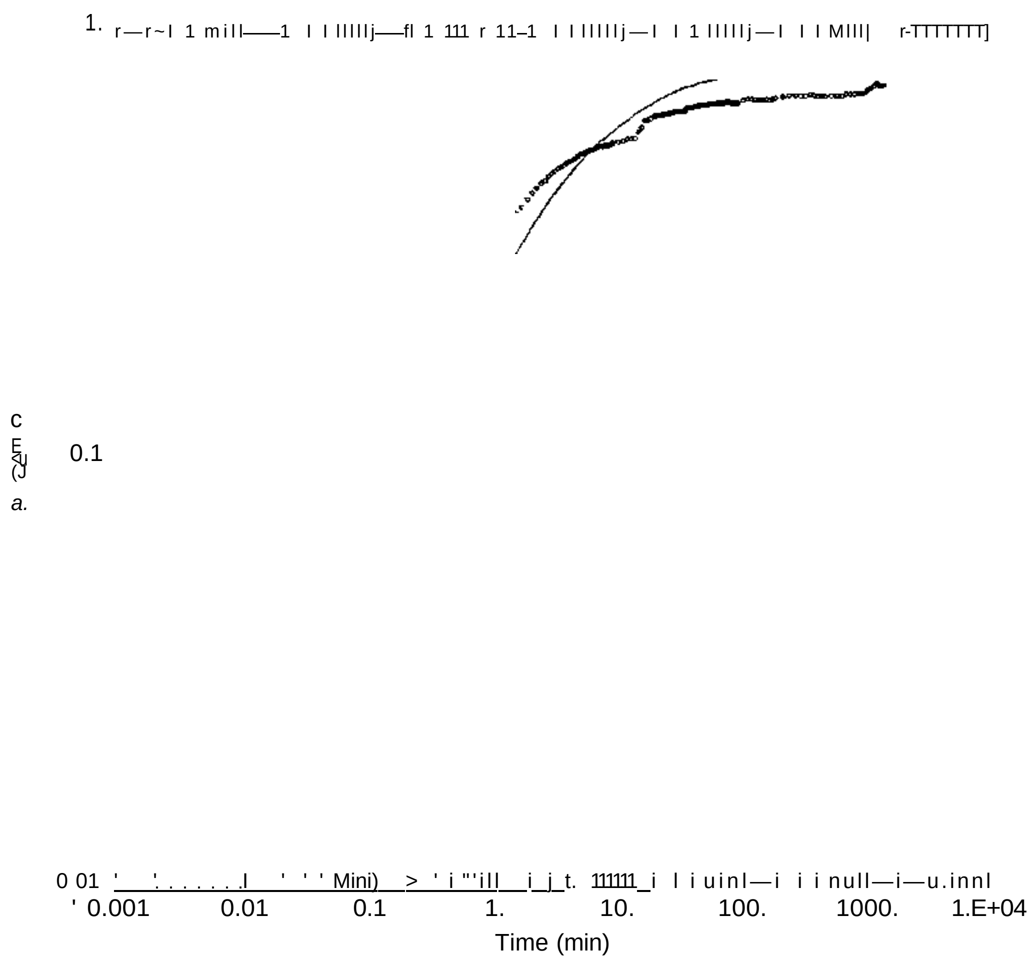
Observation Well MW-4



Data Set: U:\BYRON\MW-4.AQT Date: 04/02/99	PUMPTEST MW-4 Time: 15:29:34				
Saturated Thickness: 20. ft	AQUIFER DATA Anisotropy Ratio (Kz/Kr): 1.				
Pumping Wells	WELL DATA		Observation Wells		
Well Name	X(ft)	Y(ft)	Welt Name	X(ft)	Y(ft)
PW1	6.258E+005	1.137E+006	= MW-4	6.258E+005	1.137E+006
Aquifer Model: Leaky Solution Method: Hantush-Jacob	SOLUTION T = 4.684 cm^2/sec S =0.0005713 r/B =0.1265				

Data Set: U:\BYRON\MW-4.AQT
Title: Pumptest MW-4
Date: 04/02/99
Time: 15:28:58

PROJECT INFORMATION

Company: Blalsaind, Bouck and Lee
Client: Byron Barrel and Drum
Project: 77302
Location: Byron, New York
Test Date: 3\24\99
Test Well: PW-1

AQUIFER DATA

Saturated Thickness: 20 ft
Anisotropy Ratio (Kz/Kr): 1

PUMPING WELL DATA

Number of pumping wells: 1

Pumping Well No. 1: PW1

X Location: 625816 ft
Y Location: 1.13714E+006ft

Pumping Period Data

Time (min)	Rate (gal/min)
0.0083	4.97

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-4

X Location: 625802 ft
Y Location: 1.13715E+006 ft

Observation Data

Time (min)	Displacement (ft)
0.0083	-0.003
0.0166	-0.003
0.025	-0.003
0.0333	0.
0.0416	0.
0.05	0.
0.0583	0.
0.0666	0.003
0.075	0.003
0.0833	0.003
0.0916	0.006
0.1	0.006
0.1083	0.006
0.1166	0.009

0.125	0.012
0.1333	0.015
0.1416	0.018
0.15	0.018
0.1583	0.022
0.1666	0.025
0.175	0.028
0.1833	0.031
0.1916	0.034
0.2	0.037
0.2083	0.041
0.2166	0.044
0.225	0.047
0.2333	0.053
0.2416	0.053
0.25	0.06
0.2583	0.06
0.2666	0.066
0.275	0.069
0.2833	0.072
0.2916	0.075
0.3	0.078
0.3083	0.082
0.3166	0.088
0.325	0.091
0.3333	0.094
0.35	0.101
0.3666	0.107
0.3833	0.113
0.4	0.12
0.4166	0.126
0.4333	0.132
0.45	0.138
0.4666	0.145
0.4833	0.151
0.5	0.154
0.5166	0.164
0.5333	0.167
0.55	0.173
0.5666	0.18
0.5833	0.183
0.6	0.189
0.6166	0.192
0.6333	0.198
0.65	0.202
0.6666	0.208
0.6833	0.211
0.7	0.217
0.7166	0.221
0.7333	0.224
0.75	0.227
0.7666	0.23
0.7833	0.236
0.8	0.24
0.8166	0.246
0.8333	0.246
0.85	0.252

0.255 0.258 0.265 0.268 0.271 0.271 0.277 0.281 0.281 0.315 0.341 0.363 0.375 0.391 0.404 0.416 0.426 0.432 0.442 0.448 0.454 0.461 0.464 0.467 0.473 0.476 0.48 0.483 0.486 0.492 0.495 0.499 0.499 0.502 0.505 0.505 0.508 0.508 0.511 0.514 0.514 0.517 0.517 0.517 0.521

NCNJCNICNCN^CNCMNKCOCOX

cocococo^^^^^^ioiri«iri®dddd^^^r^r^coradd

14.	0.54
15.	0.543
16.	0.562
17.	0.577
18.	0.6
19.	0.6
20.	0.606
21.	0.612
22.	0.612
23.	0.615
24.	0.619
25.	0.619
26.	0.619
27.	0.622
28.	0.622
29.	0.622
30.	0.625
31.	0.625
32.	0.628
33.	0.628
34.	0.628
35.	0.628
36.	0.631
37.	0.628
38.	0.631
39.	0.637
40.	0.641
41.	0.644
42.	0.644
43.	0.644
44.	0.644
45.	0.644
46.	0.647
47.	0.647
48.	0.647
49.	0.65
50.	0.647
51.	0.65
52.	0.65
53.	0.65
54.	0.65
55.	0.65
56.	0.65
57.	0.65
58.	0.653
59.	0.65
60.	0.653
61.	0.656
62.	0.653
63.	0.656
64.	0.653
65.	0.656
66.	0.656
67.	0.656
68.	0.656
69.	0.66
70.	0.656

71.	0.656
72.	0.656
73.	0.656
74.	0.66
75.	0.66
76.	0.656
77.	0.66
78.	0.66
79.	0.66
80.	0.656
81.	0.66
82.	0.66
83.	0.663
84.	0.663
85.	0.663
86.	0.66
87.	0.66
88.	0.66
89.	0.656
90.	0.66
91.	0.66
92.	0.656
93.	0.656
94.	0.656
95.	0.66
96.	0.66
97.	0.66
98.	0.66
99.	0.66
100.	0.656
110.	0.666
120.	0.672
130.	0.672
140.	0.669
150.	0.672
160.	0.672
170.	0.675
180.	0.672
190.	0.675
200.	0.678
230.	0.682
260.	0.688
290.	0.688
320.	0.685
350.	0.685
380.	0.691
410.	0.688
440.	0.682
470.	0.685
500.	0.682
560.	0.685
620.	0.685
680.	0.685
740.	0.691
800.	0.691
860.	0.691
920.	0.691

980.	0.691
1040.	0.694
1100.	0.707
1160.	0.713
1220.	0.72
1280.	0.732
1340.	0.723
1400.	0.72
1460.	0.723
1940.	0.726
2420.	0.821
2900.	0.855
2947.	0.858

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	4.684	cm^2/sec
S	0.0005713	
r/B	0.1265	

AUTOMATIC ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	Std. Error	
T	4.684	not estimated	cm^/sec
S	0.0005713	not estimated	
r/B	0.1265	0.007542	

Parameter Correlations

	r/B
r/B	1.00

Residual Statistics

for weighted residuals

Sum of Squares .... 0.1988ft^2
Variance . . . . 0.0007889ft^2
Std. Deviation 0.02809ft
Mean . . . . -0.001332ft
No. of Residuals.... 255
No. of Estimates____3

Appendix D (under separate cover)

BLASLAND, BOUCK & LEE, INC.
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PW~1 Borehole Water Quality Results

Appendix E (under separate cover)

BLASLAND, BOUCK & LEE. INC.
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PW-1 Pump Test Influent/Effluent Water Quality Results

MW-21 Water Quality Results

Appendix F (under separate cover)

8LASLAND, BOUCK & LEE, INC.
engineers & scientists

Plans & Specifications

Appendix G

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Design Basis information

ShalloWItav^

low profile air strippers

System Performance Estimate

Client & Proposal Information:

Blasland, Bouck, & Lee: N. Sathi

Byron: Rochester, NY

#499902-1

Model chosen:	1300
Water Flow Rate	20.0 gpm
Air Row Rate:	150 dm
Water Temp:	55.0 °F
Air temp:	40.0 °F
A/W Ratio:	56.1
Safety Factor	20%

Contaminant	Untreated Influent Effluent Target	**Model 1311 Effluent** Water Air{lbs/hr) % removal	**Model 1321 Effluent** Water Air(lbs/hr) % removal	IModel 1331 **Effluent** Water Air(lbs/hr) % removal	**Model 1341 Effluent** Water Air(lbs/hr) % removal
1,1,1-Trichloroethane	850 ppb 5ppb	124 ppb 0.007263 85.5113%	18 ppb 0.008324 97.9008%	3 ppb 0.008474 99.6959%	1 ppb 0.008494 99.9559%

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New York State Air Guide-1 Comparison
Calculations For Air Discharge Concentrations
Byron Barrel & Drum (Area 2)

Compound	Toxicity Level	Estimated Emissions	Estimated Emissions	Annual Cavity Impact	Short-Term Cavity Impact	Maximum Actual Annual Impact	Maximum Potential Annual Impact	Maximum Short-Term Impact	New York State Air Guide-1 AGC	New York State Air Guide-1 SGC
				Basic Cavity Impact Method		Standard Point Source Method				
		(lb/hr)	(lb/yr)	(ng/m^3)	(ng/m^3)	(ng/m^3)	(Mfl/m^3)	(ng/m^3)	(ng/m^3)	(ng/m^3)
1,1.1-Trichtoroethane	L	8.47E-03	74.23	1.277E+00	7.660E+01	2.505E+00	2.502E+00	1.626E+02	1.00E+03	4.50E+05

Stack HaighL 10 fMt

Stack Height Squared: 100 teat[1]

Stack Haighl Railed to 2.25 177.82794 (••f^n

Baaed on Air Guide-1 Bitic Cavity Impact Method, 1995 Edition

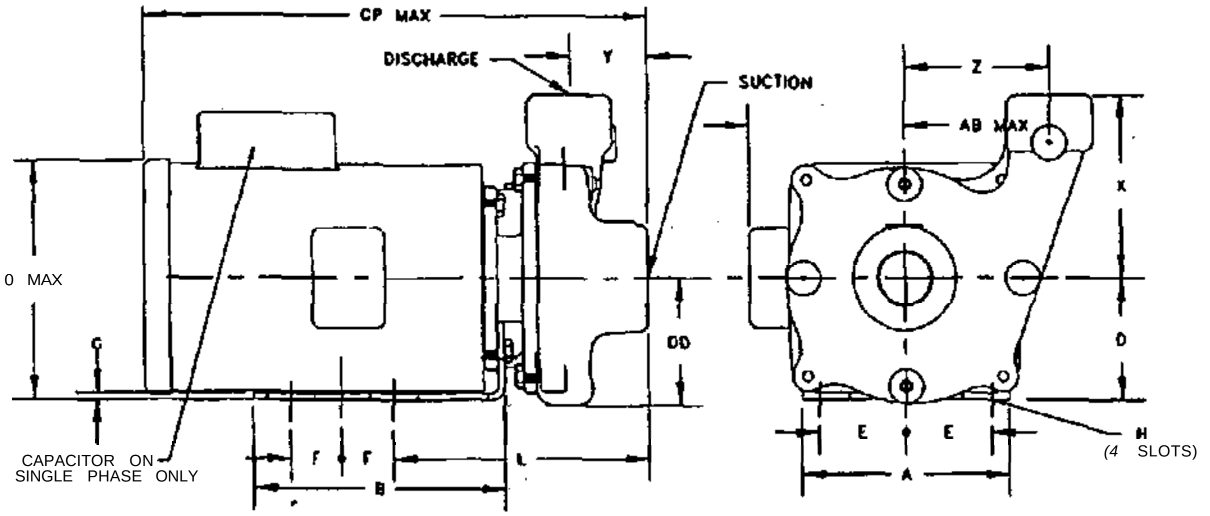
BiMHl on Air Guide-1 Standard Point Source Malhod, 1WS Edition

H: Httfi Toxicity Laval

M: Moderate Toxicity Laval

L: Low Toxicity Laval

DIMENSIONS



DIMENSIONS IN INCHES

PUMP MOTOF FRAUE Silt DISC. HPT SUCT. NPT AS CP OD

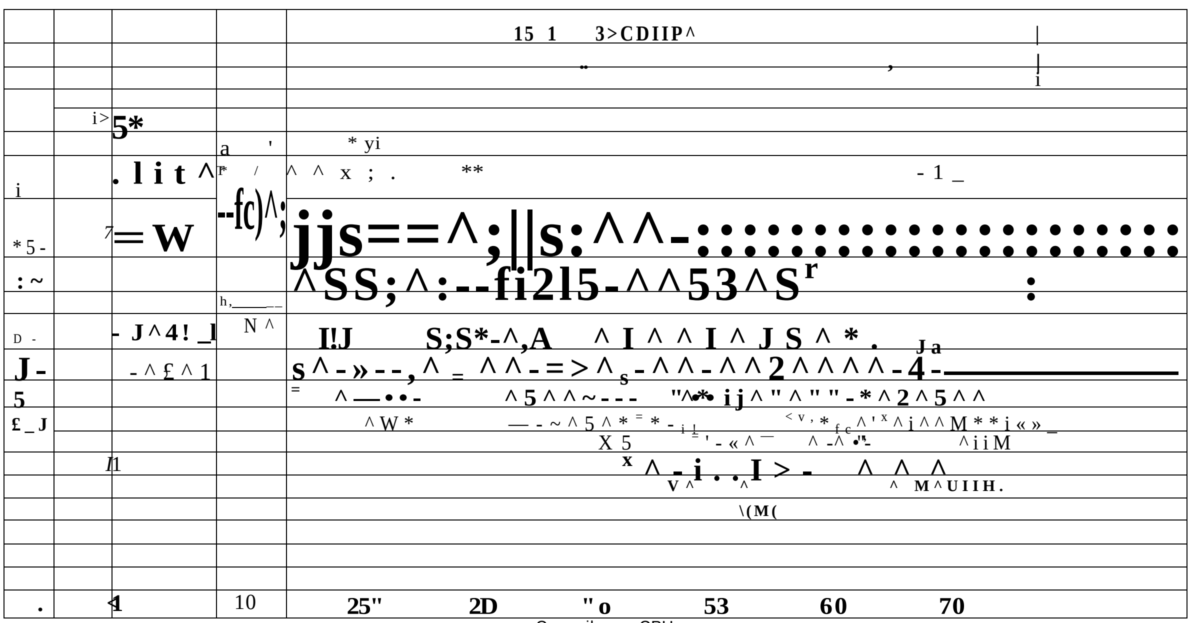
R5-1 56J 1 1/4 7 1/4 5 1/4 16 1/4 3 1/2 3 5/8 2 7/16 I 1/2 3/16 1 X J/8 7 7/16 6 7/8 5 5/16 2 3/8

R5-1 1/4 56J • l/« 1 1/2 7 1/4 5 1/4 16 1/4 3 1/2 3 5/8 2 7/16 I 1/2 J/16 1 X 3/8 7 7/16 6 7/8 5 5/16 2 1/4 4 1/4

R6-1 1/4 56J 1 1/4 1 1/2 6 7 1/4 5 1/4 16 1/4 J 1/2 4 l/4 2 7/16 I 1/2 3/16 1 X 3/8 8 1/4 5 7/B 5 l/z| J i 7/16

TYPICAL SPECIFICATIONS

- Furnish and install pumps with capacities as shown on plans. Pumps shall be close coupled, single-stage, vertically-split case design, capable of being serviced without disturbing piping. Pump volute shall be Class 30 cast iron and impeller shall be brass enclosed type, dynamically balanced.
- Seal shaft shall be of rotary type and suitable for water temperatures up to 225 degrees Fahrenheit.
- Pumps shall be rated for minimum of 175 psi working pressure. Casings shall have vent and drain ports at top and bottom.
- Motor shall meet NEMA specifications and shall be of the size, voltage and enclosure called for on ihe plans. It shall have heavyrduty sealed ball bearings, stainless steel shaft, adequate for the maximum load for which the motor is designed. Each pump shall be factory tested. It shall then be thoroughly cleaned and painted with at least one coat of high-grade lacquer prior to shipment.
- Each pump shall be checked by contractor and regulated for proper pressure, voltage and amperage draw. Data shall be noted on a tag or label and fastened to pump for reference. Pumps shall be Series R5 or R6 as manufactured by MEPCO.

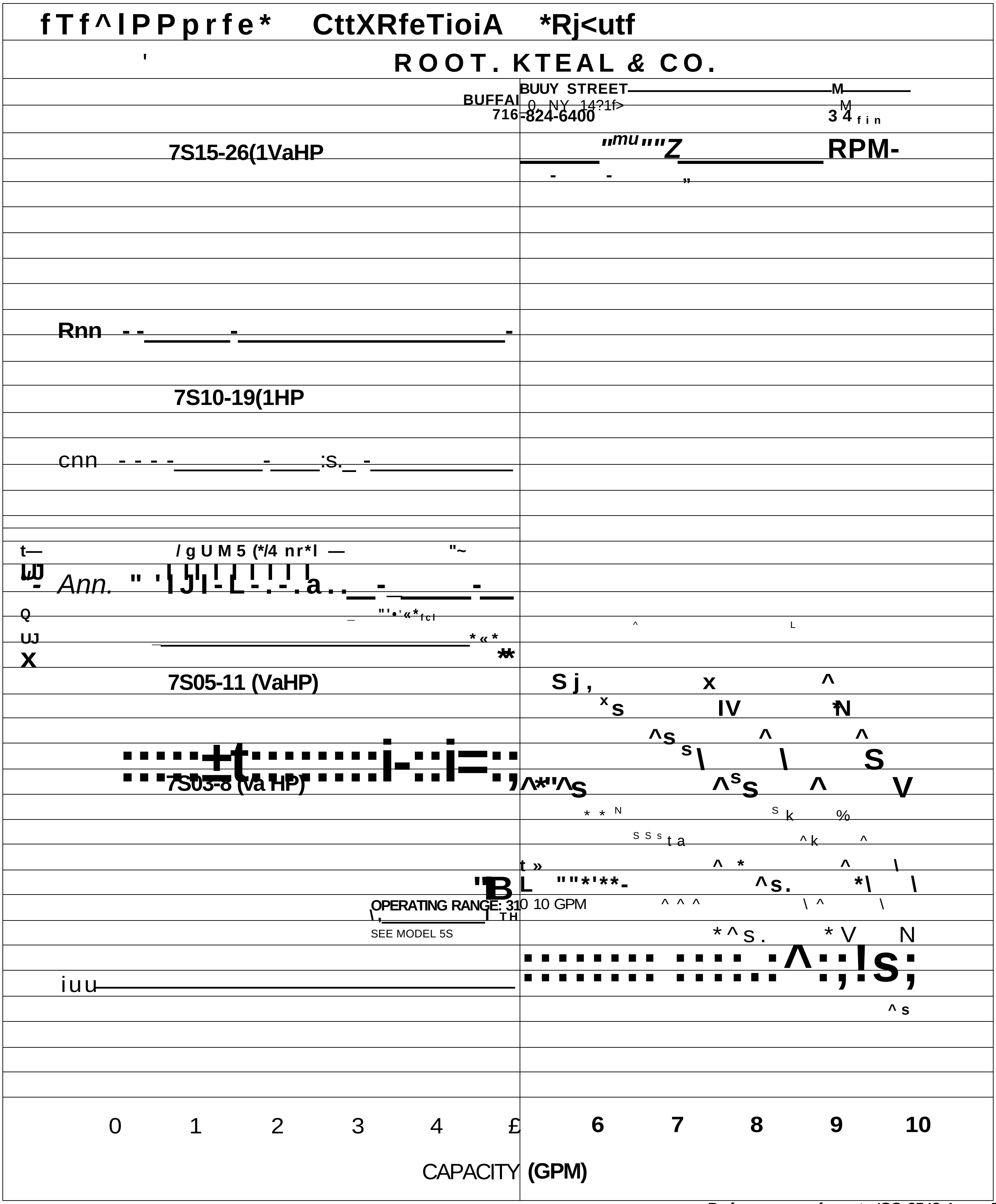


Copocily - CPU

NOTE: Dashed line on curve refers to motor service factor.

Performance Curves

FLOW RANGE: 3 -10 GPM **OUTLET SIZE: 1" NPT** **NOMINAL DIA. 4"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 3450 RPM.

Performance conforms to ISO 2548 Annex B
© 2 ft. min. submergence.

Model 7S 7GPM Technical Data

(DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DtSCH. SIZE	DIMENSIONS IN INCHES A	B	C	D	E	APPROX. SH1PWT.
I7S03-8	A	1/3	4"	1'NPT	21.5	6.8	12.7	3.8	3.9	27
7S05-11	A	M2	4"	1"NPT	24.7	9.5	15.2	3.8	3.9	30
J7S07-1S	A	3/4	4"	1"NPT	29.2	10.7	18.5	3.8	3.9	33
J7S10-19	A	1	4"	1"NPT	33.6	11.8	21.8	3.8	3.9	36
I7S15-26	A	1 1/2	4"	1'NPT	41.2	13.6	27.6	3.8	3.9	46

NOTES: AD models suitable for use in 4* wells.
r eights Include pump end with motor in lbs.

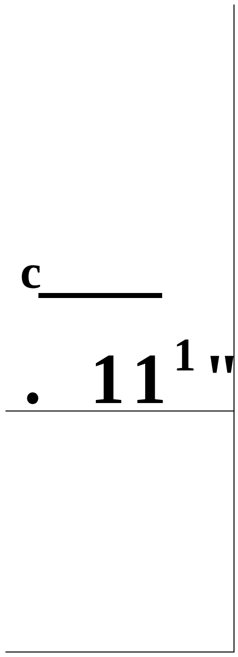


Fig. A

IATERIALS OF CONSTRUCTION

COMPONENT	SPLINE SHAFT
ICheck Valve Housing	304 Stainless Steet
fcheck Valve	304 Stainless Steel
(Diffuser Chamber	304 Stainless Steel
Impeller	304 Stainless Steel
(Suction Interconnected	304 Stainless Steel
fcnlet Screen	304 Stainless Steel
tump Shaft	304 Stainless Steel
[Straps	304 Stainless Steel
table Guard	304 Stainless Steel
(Priming Inducer	304 Stainless Steel
^Coupling	316/431 Stainless Steel
fcheck Valve Seat	NBR/304 Stainless Steel
hop Bearing	NBR
Inpeller Seal R-.g	NBR/PBT(Valox@)
TIntermediate Bearings	NBR

)T£S: Specifications subject to change without notice.
ikw @ is a registered trademark of General Electric Co.

(TO) BBL - Sathi
(RE) Grundfos 7S specs / ^ ^ - ^ ^ r - f c * ~ ~
request

KOOX NEAL & CO
64, P6ABODY STREET
BUFFALO, "
716-824-6400

<^%Tf

torf

Appendix H

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Post-Excavation and Excavated Soil Sampling and Analysis Plan

TECHNICAL REPORT

Post-Excavation and Excavated Soil Sampling and Analysis Plan

Appendix H
100% Remedial Design Report

Byron Barrel & Drum Site
Byron, NY

December 1999

BBL
BIASIAND, BOUCK & LEE. INC.
engineer* ft solentlstt

155 Corporate Woods
Suite 150
Rochester, NY 14623
(716)292-6740

Table of Contents

1.0 Introduction

1.1 General

This Sampling and Analysis Plan (SAP) identifies procedures for the collection of analytical data in support of the remedial action to be performed in Area 2 of the Byron Barrel and Drum site (Site), located in Byron, NY. This SAP has been prepared in support of the 100% Remedial Design Report, which requires that a limited shallow soil excavation be performed to allow installation of a soil flushing remedy. Excavation of these soils will require that delineation of the lateral extent of impacted soils be performed to ensure complete removal of impacted soils and to allow flushing of the underlying impacted soils. This SAP also includes procedures for characterization of excavated soil for potential return to the excavation and, if necessary, characterization of these soils for disposal purposes. Specifically, the items that are presented in this SAP include:

- Post-Excavation Sampling Plan;
- Excavated Soil Pile Sampling Plan;
- Waste Classification Sampling Plan.

Field sampling methods and laboratory analyses described in this SAP will be performed in accordance with Standard Operating Procedures (SOPs) presented as attachments to this SAP. This SAP includes only those pertinent field SOPs required for remedial construction activities. Field sampling methodologies for collection of ground water and treated effluent samples will follow procedures provided in the USEPA-approved Remedial Design Work Plan (October 1992) as amended.

2.0 Post-Excavation Sampling Plan

2.1 General

Once excavation has been completed to the initial limits described in the 100% RD Report, post-excavation soil samples will be collected from the excavation sidewalls as grab samples at frequencies of one sample per 30 linear feet of excavation side wall. Samples from the wall of the excavation will be taken from the bottom one-third to one-half portion of the wall. Attachment 1 provides the SOP for sample collection.

Post excavation samples, including the required QA/QC samples, will be submitted to an off-site laboratory for CLP analysis for VOCs. The SOP for decontamination of sampling equipment is addressed in Attachment 2. The SOP for handling, packing, and shipping soil samples is presented in Attachment 3.

The initial data to be received, which will be required in order to determine if additional excavation is required, will include the raw analytical data, and not the entire CLP data package. If the CLP analytical data indicates that soil cleanup objectives are met, then the laboratory will provide the full CLP deliverable for the associated samples(s). If the CLP analytical data for a sample(s) indicates that one or more constituents are present at levels above soil clean up objectives, then the laboratory will not provide the full CLP package. Additional excavation and sampling, as described above, would be required until the clean up objectives or maximum excavation limits have been achieved. The final CLP analytical data will verify that the remaining (shallow) side wall soils do not contain levels of VOCs above TAGM 4046 soil clean up objectives.

Once the post-excavation sampling results indicate that the clean up levels and/or maximum excavation limits have been achieved, installation of the treated water reinjection system can commence as discussed in the 100% RD Report.

2.2 Characterization of Liquid Waste for Off-Site Disposal

Any contaminated liquid waste (i.e., decontamination water or contaminated water/run on within the excavation) collected during the remedial action construction will be pumped/placed into a polyethylene storage tank(s) or drums. Once the tank is filled or construction activities have been completed, the contents of the tank will be sampled and submitted to an off-site laboratory for analysis to determine whether the liquid waste will be managed as a non-hazardous or RCRA characteristic hazardous waste. Based on the analytical results, the liquid will then be disposed of either at an approved disposal facility or discharged to the air stripper for on-site treatment and discharge under the SPDES permit to be obtained as part of the remedial action implementation.

3.0 Soil Pile Sampling Plan

3.1 General

The objective of the Soil Pile Sampling Plan is to identify those excavated soils that are potentially suitable for replacement into the excavation, following completion of excavation activities and, if necessary, to characterize the soils for off-site disposal purposes in the event these soils are not suitable for use as excavation backfill. Excavated soil will be staged on, and covered with, plastic. As these soils are excavated, they will be placed in approximate 100- to 200-cubic-yard piles for subsequent characterization. Once a soil pile has been generated, the individual soil pile will be sampled to determine if it is suitable for use as backfill material. Each pile of soil generated will by physically separated from adjacent soil piles.

3.2 Soil Pile Characterization Sampling (VOCs)

One five-part composite sample will be collected from each of the soil piles (approximately 1 location per 20 to 40 cubic yards [c.y.], depending upon the volume of the soil pile). Each soil pile will be divided into five approximately equal areas. The samples will be collected from a random location within each subdivided area using a decontaminated hand auger or trowel through the entire depth of the stockpile in accordance with the procedures outlined in Attachment 1.

Five discrete samples from each soil pile will be submitted to an off-site laboratory for CLP analysis for VOCs. The five discrete samples will be composited by the analytical laboratory prior to analysis. The SOP for handling, packing, and shipping soil samples is presented in Attachment 3. The laboratory CLP data will be compared against the NYSDEC TAGM 4046 soil clean up objectives. If the analytical results indicate soils contain VOCs at levels below the soil clean up objectives, then the soil will be used as backfill following completion of the excavation (per the Stage 1 RD Report). If the results indicate the presence of one or more VOCs at levels above soil clean up objectives, then the soils will be characterized for off-site disposal purposes as discussed in Section 3.3. Attachment 1 provides a detailed SOP for the soil pile sampling.

3.3 Soil Pile Disposal Characterization

The objective of the Soil Pile Disposal Characterization Plan is to provide the data required to characterize excavated soil piles that require off-site disposal. Once it is determined that VOC levels in an excavated soil pile are not suitable for use as excavation backfill, samples will be collected from the excavated soil pile(s) for Toxicity Characteristic Leaching Procedures (TCLP) and RCRA characteristics (ignitability, corrosivity, and reactivity), and for total PCBs to identify appropriate disposal requirements (e.g., as RCRA characteristic hazardous waste or as non-hazardous waste).

The sampling procedure will be identical to that described in Section 3.2. One five-part composite sample will be collected from each of the soil piles (approximately 1 location per 20 to 40 cubic yards [c.y.], depending upon the volume of the soil pile). Each soil pile will be divided into five approximately equal areas. The samples will be collected from a random location within each subdivided area using a decontaminated hand auger or trowel through the entire depth of the stockpile in accordance with the procedures outlined in Attachment 1.

Five discrete samples from each soil pile will be submitted to an off-site laboratory for TCLP and RCRA characteristics. The five discrete samples will be composited by the analytical laboratory prior to analysis. The SOP for handling, packing, and shipping soil samples is presented in Attachment 3. The laboratory data will be compared against the levels for RCRA characteristic hazardous wastes.

Attachment 1

BBL ENVIRONMENTAL SERVICES. INC.

So/7 Sampling Procedures

1.0 Soil Sampling Procedures

1.1 Scope and Application

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. This SOP has been modified from USEPA's SOP #2012, dated November 16, 1994 (Rev # 0.0), to provide guidance for performing the activities specified in the SAP, as part of the 100% RD Report. Analysis of soil samples will determine whether concentrations of specific contaminants exceed established action levels.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed will be documented and incorporated into the final report.

1.2 Method Summary

Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths will be performed using a continuous flight auger and a split-spoon sampler (for in-situ soil samples), or a backhoe bucket for post-excavation locations where entry into the excavation would pose an undue risk to sampling personnel.

1.3 Sample Preservation, Containers, Handling, and Storage

Chemical preservation of solids is not generally recommended. Samples will, however, be cooled and protected from sunlight to minimize volatilization.

1.4 Interferences and Potential Problems

There are two primary interferences or potential problems associated with soil sampling. These include cross-contamination of samples and improper sample collection. Cross-contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

1.5 Equipment

Soil sampling equipment includes the following:

- Sampling plan;
- Maps/plot plan;
- Safety equipment, as specified in the HASCP;
- Flame Ionization Detector (FID);
- Camera and film;
- Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan;
- Appropriate size sample containers;
- Ziplock plastic bags;

- Logbook;
- Sample labels;
- Chain of Custody records and seals;
- Field data sheets
- Coolers);
- Ice;
- Verm icu lite;
- Decontamination supplies/equipment;
- Canvas or plastic sheet;
- Spade or shovel;
- Spatula;
- Scoop;
- Plastic or stainless steel spoons;
- Trowel;
- Aluminum Foil;
- Split spoons; and
- Continuous flight hollow-stem augers.

1.6 Procedures

1.6.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required;

2. Obtain necessary sampling and monitoring equipment;

3. Decontaminate or pre-clean equipment, and ensure that it is in working order;

4. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate;

5. Perform a general site survey prior to site entry in accordance with the site HASP (to be provided as part of the Remedial Action Work Plan); and

6. Use stakes or flagging to identify and mark sampling locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations will be utility-cleared by the property owner prior to soil sampling.

1.6.2 Sample Collection

1.6.2.1 Surface Soil Samples

Collection of samples from near-surface soil will be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material will be removed to the required depth with this equipment, then a stainless steel or plastic scoop will be used to collect the sample.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade;

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade; and

3. For volatile organic analysis transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place an additional sample into an appropriate labeled sample jar for soil headspace measurement. Place the soil sample for laboratory analysis in a cooler with ice and cool to 4°C. The soil headspace sample will be kept at a ambient air conditions (or approximately 20°C).

1.6.2.2 Post-Excavation Samples

The procedure for collection of post-excavation sidewall samples will depend on access to the excavation as determined by the HASP. If entry into the excavation is allowed, samples from the excavation walls will be collected in accordance with surface soil sampling procedures. If access is denied, samples will be collected from remote locations with extended reach tools or from soil collected by the excavation bucket.

1.6.2.3 Soil Pile Sampling

The procedure for soil pile sampling describes the collection and extraction of composite soil samples for characterization from excavated soils temporarily staged on plastic.

The following procedures will be used for collecting soil pile samples:

1. Identify the soil pile dimensions and pile location in the field log. Also indicate the temperature, weather, date, and personnel at the site.

2. Prior to collecting samples, subdivide the soil pile, which is contained in a soil staging area "cell" into five sections, of approximately equivalent area.

3. Within each area, select a random sampling location. Record sampling locations and designations in the field log.

4. For each sampling location within the soil pile, a hand soil boring will be installed through the entire depth of the soil pile (anticipated to be approximately 3 to 4 feet). If hand augering is not possible, a decontaminated shovel will be used to collect soil samples from the entire thickness of the soil pile. A representative sample of soil will be collected from the entire depth of the boring.

5. Place each sample from the five borings directly into the appropriate sample containers). The five discrete samples collected from each soil pile will be composited by the analytical laboratory prior to analysis.

6. Decontaminate augers and sampling equipment prior to collecting samples from other soil piles.

7. Excess soil shall be placed on the soil pile.

8. Cover the soil pile with plastic after sampling is complete.

1.7 Quality Assurance/Quality Control

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks; and

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

Attachment 2

BBL ENVIRONMENTAL SERVICES, INC.

Sampling Equipment Decontamination (modified USEPA SOP #2006)

2.0 Sampling Equipment Decontamination

2.1 Scope and Application

The purpose of this Standard Operating Procedure (SOP) is to provide a description of the methods used for preventing, minimizing, or limiting cross-contamination of samples due to inappropriate or inadequate equipment decontamination. This SOP has been modified from USEPA's SOP #2006, dated August 11, 1994 (Rev. #0.0), to provide guidance for performing the activities specified in the SAMP, as part of the 100% RD Report. This SOP does not address personnel decontamination.

These are standard (i.e. typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitation, or limitations imposed by the procedure. In all instances, the ultimate procedures employed will be documented and incorporated into the final report.

2.2 Method Summary

Removing or neutralizing contaminants from equipment minimizes the likelihood of sample cross-contamination, reduces or eliminates transfer of contaminants to clean areas, and prevents the mixing of incompatible substances.

Gross contamination can be removed by physical decontamination procedures. These abrasive and non-abrasive methods include the use of brushes, air and wet blasting, and high and low pressure water cleaning.

The first step, a soap and water wash, removes all visible particulate matter and residual oils and grease. This may be preceded by a steam or high pressure water wash to facilitate residuals removal. The second step involves a tap water rinse and a distilled/deionized water rinse to remove the detergent. Next, a high purity solvent rinse is performed for trace organics removal. Typical solvents used for removal of organic contaminants include acetone, hexane, or water (see attached Table 1). Acetone will be used because it is an excellent solvent, miscible in water, and not a site specific COC. The solvent must be allowed to evaporate completely and then a final distilled/deionized water rinse is performed. This rinse removes any residual traces of the solvent.

The decontamination procedure described above may be summarized as follows:

3. Physical removal;
4. Non-phosphate detergent wash;
5. Tap water rinse;
6. Distilled/deionized water rinse;
7. Solvent rinse (pesticide grade);
8. Air dry; and
9. Distilled/deionized water rinse.

Modifications to the SOP, if any, will be documented in the field logbook and subsequent final report.

2.3 Sample Preservation, Containers, Handling, and Storage

The amount of sample to be collected and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest.

2.4 Equipment

The following standard materials and equipment may be used for decontamination activities:

2.4.1 Decontamination Solutions

Non-phosphate detergent;
Selected solvents (acetone, hexane, etc.);
Tap water; and
Distilled or deionized water.

2.4.2 Decontamination Tools/Supplies

Long and short handled brushes;
Drop cloth/plastic sheeting;
Paper towels;
Plastic or galvanized tubs or buckets;
Pressurized sprayers (H_20);
Solvent sprayers; and
Aluminum foil.

2.4.3 Health and Safety Equipment

Appropriate personal protective equipment (i.e., safety glasses or splash shield, appropriate gloves, aprons or coveralls, respirator, and emergency eye wash).

2.4.4 Waste Disposal

Trash bags
Trash containers
55-gallon drums
Metal/plastic buckets/containers for storage and disposal of decontamination solutions

2.5 Reagents

There are no reagents used in this procedure aside from the actual decontamination solutions. Table 1 lists solvent rinses which may be required for elimination of particular chemicals. In general, the following solvents are typically utilized for decontamination purposes:

- 10% nitric acid is typically used for inorganic compounds such as metals. An acid rinse may not be required if inorganics are not a COC;
- Acetone (pesticide grade); and
- Hexane (pesticide grade).

2.6 Procedures

As part of the HASCP, the decontamination plan outlines the procedures to be implemented for equipment decontamination.

2.6.1 Decontamination Methods

All samples and equipment leaving the contaminated area of a site must be decontaminated to remove any contamination that may have adhered to equipment. Various decontamination methods will remove contaminants by: (1) flushing or other physical action, or (2) chemical complexing to inactivate contaminants by neutralization, chemical reaction, disinfection, or sterilization.

Physical decontamination techniques can be grouped into two categories: abrasive methods and non-abrasive methods, as follows:

2.6.1.1 Abrasive Cleaning

Abrasive cleaning methods work by rubbing and wearing away the top layer of the surface containing the contaminant. The mechanical abrasive cleaning methods are most commonly used at hazardous waste sites. The following abrasive method will be used at the site:

- Scrubbing using metal or nylon brush.

2.6.1.2 Non-Abrasive Cleaning Methods

Non-abrasive cleaning methods work by forcing the contaminant off a surface with pressure. In general, the equipment surface is not removed using non-abrasive methods. The following non-abrasive cleaning methods may used at the site:

- Low-pressure water wash;
- High-pressure water wash; and
- Rinsing

2.6.2 Field Sampling Equipment Decontamination Procedures

The decontamination line is setup so that the first station is used to clean the most contaminated item. It progresses to the last station where the least contaminated item is cleaned. The spread of contaminants is further reduced by separating each decontamination station by a minimum of three (3) equipment feet. Ideally, the contamination should decrease as the equipment progresses from one station to another farther along in the line. Specific decontamination procedures are referenced in the HASP.

2.7 Quality Assurance/Quality Control

A rinsate blank is one specific type of quality control sample associated with the field decontamination process. This sample will provide information on the effectiveness of the decontamination process employed in the field.

Rinsate blanks will be obtained by running analyte free water over decontaminated sampling equipment to test for residual contamination. The blank water is collected in sample containers for handling, shipment, and analysis. These samples (when collected) are treated identical to samples collected that day.

A rinsate blank is used to assess cross-contamination brought about by improper decontamination procedures.

2.8 Data Validation

Results of quality control samples will be evaluated for contamination. This information will be utilized to qualify the environmental sample results in accordance with the project's data quality objectives.

Attachment 3

BBL ENVIRONMENTAL SERVICES, INC.

Sample Handling, Packing and Shipping Procedures

3.0 *Sample Handling, Packing and Shipping Procedures*

3.1 Handling

1. Fill in sample label (provided by laboratory) with:

   a. Sample type (water, etc.);

   b. Project number and site name;

   c. Sample identification code and other sample identification information, if applicable;

   d. Analysis required;

   e. Date;

   f. Time sampled;

   g. Name of sampling personnel;

   h. Sample type (composite or grab); and

   i. Preservative added, if applicable.

2. Cover the label with clear packing tape to secure the label onto the container.

3. Check the caps on the sample containers to ensure that they are tightly sealed.

4. Mark the level of the sample in the container using an indelible ink marker or grease pencil.

5. Wrap the sample container cap with clear packing tape to prevent it from coming loose.

6. Place a signed custody seal label (provided by laboratory) over the cap such that the cap cannot be removed without breaking the custody seal.

7. Initiate chain-of-custody by designated sampling personnel responsible for sample custody (provided by the laboratory) (after sampling or prior to sample packing). Note: If the designated sampling person relinquishes the samples to other sampling or field personnel for packing or other purposes, the samplers will complete the chain-of-custody prior to this transfer. The appropriate personnel will sign and date the chain-of-custody form to document the sample custody transfer.

3.2 Packing

1. Using duct tape, secure the outside and inside of the drain plug at the bottom of the cooler that is used for sample transport.

2. Place one to two inches of cushioning material (i.e., bubble packs or vermiculite) at the bottom of the cooler.

3. Package the sample containers upright in the cooler.

4. Repackage ice (if required) in small Ziploc^{R}-type plastic bags and place loosely in the cooler. Do not pack ice so tightly that it may prevent addition of sufficient cushioning material.

5. Fill the remaining space in the cooler with cushioning material.

6. Place the completed chain-of-custody forms in a large Ziploc^{R}-type bag and tape the forms to the inside of the cooler lid.

7. Close the lid of the cooler and fasten with duct tape.

8. Mark the cooler on the outside with the following information: shipping address, return address, "Fragile" labels on the top and on one side, and arrows indicating "This Side Up" on two adjacent sides.

9. Place custody seal tape over front right and back left of the cooler lid and cover with clear plastic tape.

3.3 Shipping

All COC samples will be hand delivered within 48 hours or less from the date of sample collection. All biological samples will be shipped overnight within 48 hours or less from the date of sample collection.

END

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