CONSTRUCTION CERTIFICATION REPORT

CHERRY FARM SITE (NYSDEC SITE NO. 9-15-063)
RIVER ROAD SITE (NYSDEC SITE NO. 9-15-031)
TONAWANDA, NEW YORK

SUBMITTED TO:

E-FILED

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

SUBMITTED BY:

**CHERRY FARM/RIVER ROAD SITE
PRP GROUP**

PREPARED BY:

PARSONS ENGINEERING SCIENCE, INC.
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PARSONS

OCTOBER 1999

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Construction Certification Report for:

CHERRY FARM SITE (NYSDEC Site No. 9-15-063)
RIVER ROAD SITE (NYSDEC Site No. 9-15-031)

TONAWANDA, ERIE COUNTY, NEW YORK

Prepared For:

The Cherry Farm and River Road Site
Potentially Responsible Parties

Prepared By:

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October 1999

PARSONS

CONSTRUCTION CERTIFICATION REPORT
CHERRY FARM/RIVER ROAD SITE CLOSURE
TONAWANDA, NEW YORK

ENGINEERING CERTIFICATION STATEMENT

I hereby certify[1], under penalty of law and as a Professional Engineer licensed in the State of New York that this document and all attachments were prepared by Parsons Engineering Science, Inc. (Parsons ES) under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

The purpose of this document, the Construction Certification Report, is to present documentation that the combined final remedial action for the Cherry Farm Site (NYSDEC Site No. 9-15-063) and the River Road Site (NYSDEC Site No. 9-15-031) was completed in general conformance with the New York State Department of Environmental Conservation (NYSDEC) Order on Consent (Index Nos. B9-0046-84-10 and B9-0047-91-02), NYSDEC-approved Cherry Farm/River Road Site Remedial Design Report (Parsons ES, 1995), the Remedial Design Report for Sediment Removal (Parsons ES, 1998), and the Consent Order Amendment (NYSDEC, 1998). Parsons ES construction inspection personnel were present daily during each construction phase, and documented the observations and data that are presented in this Construction Certification Report.

STATE OF NEW YORK
EUGENE W. MELNYK
No. 071847
LICENSED PROFESSIONAL ENGINEER

Eugene W. Melnyk, P.E.
New York State Professional Engineer
No. 071847-1

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[1] Certification/Certify means to state or declare a professional opinion of conditions whose true properties cannot be known at the time such certification is made, despite appropriate professional evaluation. The professional opinion made is based on limited observations and widely spaced tests. This certification of conditions in no way relieves any other party from meeting requirements imposed by contract or other means, nor does it warranty/guarantee the conditions of the constructed product.

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INTRODUCTION

1.1 PURPOSE AND REQUIREMENTS

The purpose of this Construction Certification Report is to document that the final remedial action for the Cherry Farm/River Road Sites (Site) was completed in general conformance with the New York State Department of Environmental Conservation (NYSDEC) Order on Consent (Index Nos. B9-0046-84-10 and B9-0047-91-02), NYSDEC-approved Remedial Design Report (Design Report) (Parsons ES, 1995a), the Remedial Design Report for Sediment Removal (Parsons ES, 1998), and the Consent Order Amendment (NYSDEC, 1998). Parsons' construction inspection personnel were present daily during each construction phase, and documented the observations and data that are presented in this Construction Certification Report.

The Construction Certification Report includes documentation related to site activities; construction techniques; quality assurance/quality control testing; operational difficulties, and resolution thereof; horizontal and vertical survey control; materials verification; and conformance with construction specifications.

Any repair or maintenance operations conducted following the construction phase are not addressed in this report.

1.2 PROJECT BACKGROUND

The Site is located on the east shore of the Niagara River, south of the South Grand Island Bridge, in the Town of Tonawanda, Erie County, New York (see Figure 1.1), and occupies a total of 79 acres. The River Road Site is comprised of two separate parcels occupying approximately 23 acres. The northern portion of the River Road Site is owned by Mr. Matthew Duggan of Amherst, New York. The southern portion of the River Road Site is owned by Niagara River World, Inc. and Clarence Material Corporation (Pineledge Holding Corporation). The Cherry Farm Site, a 56-acre parcel owned by Niagara Mohawk Power Corporation, is located immediately north of the River Road Site.

These two sites were, at one time, part of a larger piece of property owned by Wickwire-Spencer Steel Company. Due to the common history, former common ownership, and similar remedial programs, it was considered appropriate by the NYSDEC and Potentially Responsible Parties (PRPs) to combine the remedial programs at the two sites.

The Site was used for the disposal of waste from steel manufacturing processes from approximately 1908 to 1963. From 1963 until about 1970, it was operated as a landfill for the disposal of industrial wastes from facilities in the area. The industrial wastes included flyash, bottom ash, slag, sludge, liquid boiler cleaning waste, concrete rubble, and miscellaneous wastefill.

1.3 REMEDIAL CONSTRUCTION

On November 2, 1998, a Consent Order Amendment was issued by the NYSDEC. The amendment required the removal of impacted sediments from the Niagara River adjacent to the Site, and incorporation of the sediments into the Site remediation plan. The changes in the remedial design were presented in the Remedial Design Report for Sediment Removal (Parsons ES, 1998).

The completed remedial measures implemented for the Site were in accordance with the combined Records of Decision and the Consent Order Amendment (NYSDEC, 1994, 1998). The implemented remedial design included the following items:

- Consolidation of wastes;
- Removal of impacted sediments located within onsite drainage ditches and wetlands, and consolidation of sediments with wastes;
- Removal of river sediments impacted by the Site, and subsequent placement in an onsite sediment disposal area (SDA);
- Installation of permeable and impermeable soil covers over the consolidated wastes and sediment;
- Installation of habitat enhancements along the Niagara River shoreline, including installation of wooded and wetland areas;
- Installation and operation of groundwater extraction wells and collection trenches;
- Treatment of extracted groundwater and subsequent discharge to the Town of Tonawanda sanitary sewer system; and
- Collection and disposal of light non-aqueous phase liquids (LNAPL) from the groundwater treatment system.

Remedial surface features are shown on Figure 1.2.

The objectives of the remedial design were to develop a cost-effective remedy that conformed to the accepted standards, reduced mobility of contamination and potential pathways for migration, and minimized long-term operation and maintenance costs. To the extent practicable, the remedial design was developed to reflect the proposed post-remedial development of a waterfront park and recreation area by the Town of Tonawanda. A Draft Master Plan for the proposed park was developed by Wendel Engineers (Wendel, 1995). As the remedial design engineering firm, Parsons worked with Wendel to integrate elements of the master plan into the remedial design, as appropriate.

Construction began in 1996 and continued through 1997 with the completion of the cap installation and riverbank reconstruction of Cherry Farm, and the construction of the SDA on the River Road Site. The groundwater treatment system, including the installation of all recovery wells, shallow collection trenches, and the treatment plant, was also completed during this time. Construction activities during 1998 included the sediment dredging and riverbank reconstruction in the area of sediment removal, and final grading and placement of the cap over a portion of the River Road Site. Construction was completed in 1999 with the installation of the permeable cap over the SDA (Figure 1.2).

1.4 PROJECT RESPONSIBILITIES

The project sponsor is the Potentially Responsible Parties (PRPs) Group including AlliedSignal, Inc., General Motors Corporation, and Niagara Mohawk Power Corporation. Construction and oversight was performed by the following companies:

- The prime contractor responsible for the closure construction was Haseley Construction Company (Haseley) of Niagara Falls, New York;
- Construction quality assurance was the responsibility of Parsons;
- Laboratory testing of cover materials and onsite testing and inspection activities were performed by SJB Services, Inc. of Buffalo, New York, a subcontractor to Haseley;
- Surveying services to document cover system thickness and grades were performed by Wendel Associates (Wendel) of Lockport, New York, a New York State-licensed surveying firm, also subcontracted to Haseley; and
- Sediment dredging was performed by the King Company (King) of Holland, Michigan under a separate contract with the PRPs.

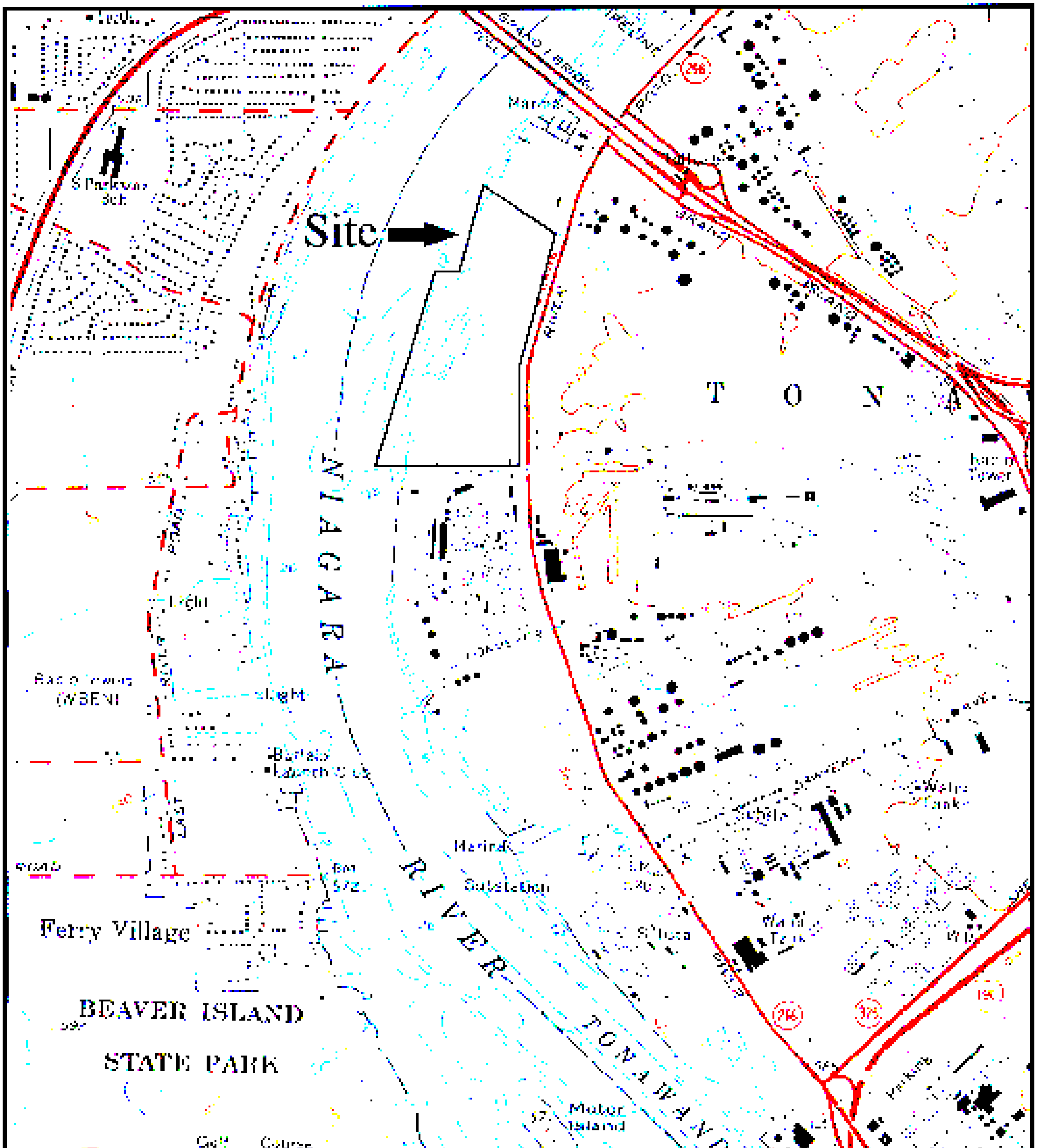
1.5 CONSTRUCTION QUALITY CONTROL/QUALITY ASSURANCE

The Parsons Project Manager was responsible for the Quality Assurance/Quality Control (QA/QC) of all work performed during the construction phase. Full-time construction quality assurance was provided by the Parsons Quality Assurance (QA) inspector. Quality control was performed by Haseley and King and their subcontractors, to ensure compliance with the plans, specifications, and engineering requirements specified in the Contract Documents. The Parsons QA inspector communicated directly with the Contractor's superintendent, and kept the Parsons Project Manager and the PRP Group informed of these communications. The Parsons QA inspector also communicated regularly with the Parsons Project Manager/Quality Assurance Engineer regarding site activities, quality control testing, and corrective actions required. Parsons coordinated and directed QA/QC activities, such as testing of borrow material sources, grade controls, thickness verification, and cover soil material testing.

1.6 ORGANIZATION OF CERTIFICATION REPORT

The report is organized into four sections and ten appendices:

- Section 1 - Introduction;
- Section 2 - Sequential narrative of the construction activities;
- Section 3 - Declaration of construction certification and limitations;
- Section 4 - References used for establishing and guiding cover system and closure construction; and
- Appendices A through G contain field documentation, drawings, test results, and photographs necessary to certify the remedial construction.



QUADRANGLE LOCATION
LONGITUDE: 78° 52' 30"
LATITUDE: 42° 52' 30"

SOURCE: U.S.G.S. 7.5 SERIES BUFFALO NW, New York Ont (TOPOGRAPHIC), 1965

Figure 1.1

Cherry Farm/River Road Site PRP Group
Cherry Farm/River Road Site

SITE LOCATION MAP

PARSONS ENGINEERING SCIENCE, INC.
DESIGN * RESEARCH * PLANNING
[illegible] LAWRENCE BELL DRIVE, SUITE [illegible] * WILLIAMSVILLE, N.Y. [illegible]
OFFICES IN PRINCIPAL CITIES

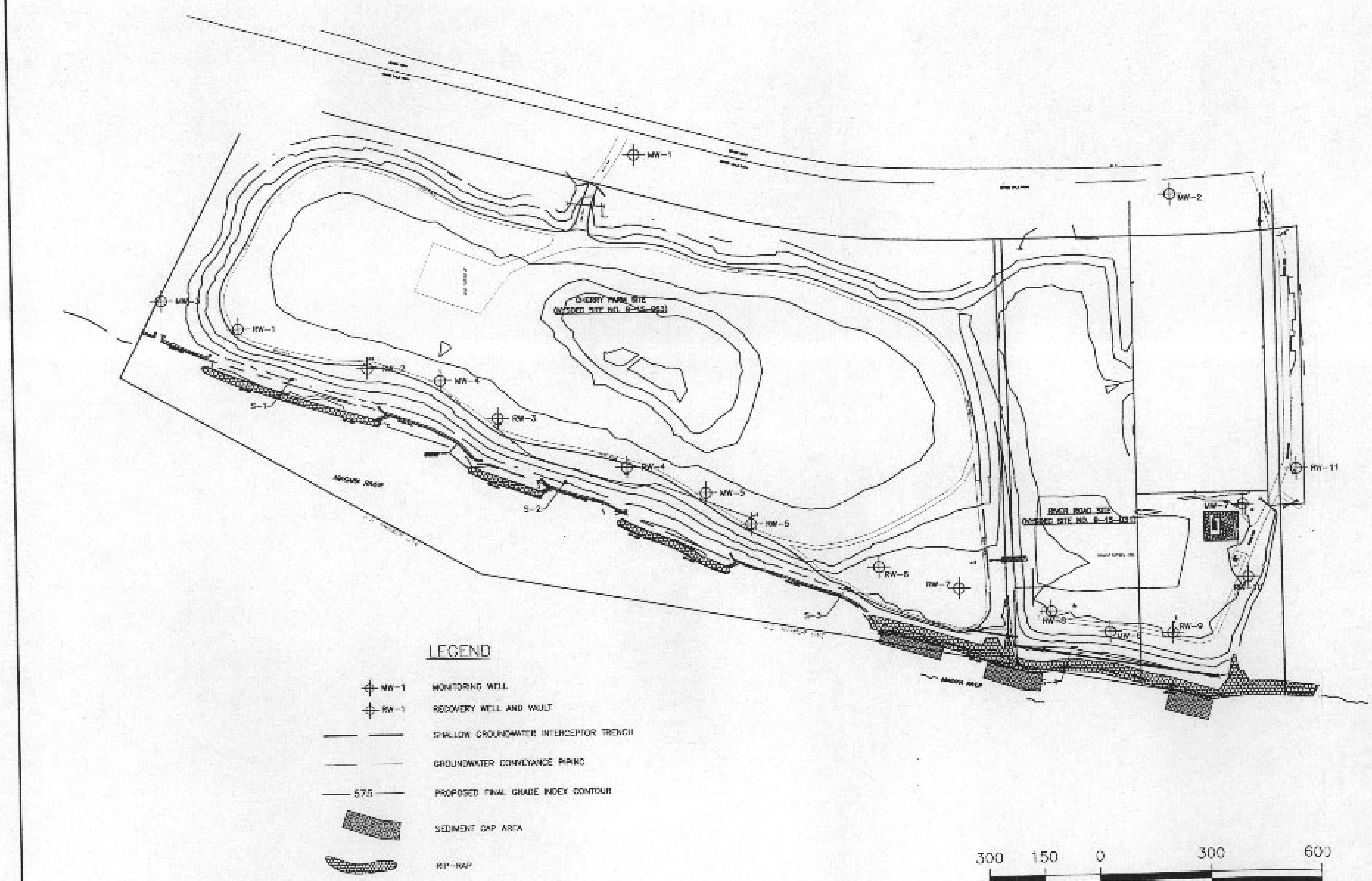


FIGURE 1.2

CHERRY FARM/RIVER ROAD SITE
ANNUAL GROUNDWATER MONITORING REPORT

SITE PLAN MAP

PARSONS ENGINEERING SCIENCE, INC.
DESIGN • RESEARCH • PLANNING

DATE: 09/13/99 (FCW)
FILE: P:\726673\CAD\R03\26671R04.DWG
SCALE: PAPER SCALE, 1/300xp
XREF'S: 26671c01,cont-text.lop

SECTION 2
CONSTRUCTION NARRATIVE

2.1 INTRODUCTION

The purpose of this section is to describe the remediation activities, monitoring activities, and QA/QC controls needed to certify construction for each of the construction elements, health and safety monitoring, and any deviations from the original design. Daily inspection reports completed by the Parsons construction inspector are contained in Appendix A. These daily inspection logs detail the work completed each day, equipment, and any items of concern. Record drawings to reference post-remedial conditions are presented in Appendix B.

2.2 CONSTRUCTION SCHEDULE AND SEQUENCE

The first phase of construction commenced on May 6, 1996 and continued through November 14, 1997. All remediation activities specified in the June 1995 Design Report were completed by the end of the 1997 construction season, with the exception of the permeable cap placement over areas designated for further remediation activities, including the SDA and related work areas. Work completed during this time included clearing and grubbing, wastefill excavation and consolidation, grading, utility trenches, installation of access and maintenance roads, and the placement of the permeable cap over 48 acres. Also, work included the installation of recovery wells and shallow collection trenches, and the construction and operation of the waste water treatment plant.

During the 1997/1998 construction season, the Sediment Removal Design Report was prepared, and a contractor was selected for the sediment removal operations. Construction during 1998 resumed on April 3, 1998 and concluded on November 21, 1998, with the completion of the sediment removal operations. Work performed during this time included removal of a barge wreck from the river bed, dredging of sediments within the river, placement of sediment caps over specified areas of the river bed to prevent further sediment migration, and capping of 1.74 acres of the River Road Site.

Construction resumed on May 14, 1999 with regrading of the sediment fill, completion of the remaining 4.57 acres of the permeable cap over the SDA, cover seeding, wetland and wooded shoreline plantings, and miscellaneous cleanup items. Remedial construction activities were completed during July 1999.

2.3 SURVEY CONTROL

Survey control, both horizontal and vertical, was provided by Wendel, a New York State-licensed surveying firm. A construction baseline and coordinate system was developed prior to the start of construction activities. Wendel surveyed the locations of all pertinent remedial construction features including the groundwater recovery and monitoring system, groundwater treatment building, utilities, shoreline features, and roadways. Wendel also performed field surveying to document that desired grades and waste placement were achieved, and to determined the thickness of each cover layer. These surveys were used to prepare the record drawings (Appendix B).

Establishment of the horizontal and vertical survey controls for the sediment dredging was also performed by Wendel. The dredging contractor, King, performed the in-river bathymetric surveying under the supervision of Wendel. The bathymetric surveying is further described in Section 2.9.6.

Throughout all phases of construction, field surveying was monitored by a QC inspector from Parsons or Haseley.

2.4 HEALTH AND SAFETY

All health and safety monitoring during the 1996 and 1997 construction seasons was subcontracted by Haseley to Edward O. Watts, P.E., P.C. (Watts) of Buffalo, New York. The responsibilities of Watts included execution of the air monitoring program as specified in the Site Health and Safety Plan, weekly health and safety meetings, and the issuance of daily and monthly health and safety reports. The health and safety officer performed real-time monitoring of volatile organic compounds (VOCs), total particulates, combustible gases, carbon monoxide, and oxygen levels. Monitoring for VOCs was conducted within the breathing zones, and around the perimeter of the Site, using an HNU photoionizer. Monitoring for particulates was performed throughout the Site using an MIE personal aerosol monitor. Monitoring for combustible gases, carbon monoxide and oxygen was performed using an MSA personal alarm monitor.

The monthly summary reports included calibration records, daily monitoring results, and laboratory analyses for particulate matter. Two independent health and safety audits were performed by Parsons. All work was performed in Level D, with the exception of specified monitoring well installations, which were performed in Level C, as advised by Watts.

Health and safety monitoring during sediment dredging was performed by King's site manager. His responsibilities included organic vapor monitoring of the SDA and safety of all dredging operations. All dredging work was performed in Level D. An independent audit was conducted by Parsons.

Water trucks were employed during all construction phases to control dust emissions. Water was sprayed on roadways and other areas of the Site during waste and cover soil grading and compaction, to ensure worker safety and to minimize offsite dust migration.

2.5 SITE PREPARATION

Site preparations, which were completed before the commencement of remedial construction, included the establishment of temporary field offices, the placement of sediment and erosion control measures, construction of a decontamination pad, and clearing and grubbing of all areas to be affected by the construction.

2.5.1 Temporary Field Office and Site Access

Two temporary field offices (trailers) were installed for use by Parsons and Haseley during the 1996 and 1997 construction seasons. The field offices and a temporary storage shed to house supplies and small equipment were set up on the Cherry Farm Site. The trailers and shed were removed at the conclusion of the 1997 construction season.

Two temporary field offices (trailers) were installed near the groundwater treatment plant for use by Parsons and King during the dredging operation in 1998. These trailers were removed at the conclusion of the dredging operation in November 1998. No temporary field offices were used during the 1999 construction season.

One permanent access road from River Road to the Cherry Farm portion of the Site was installed. A second permanent access road was installed at the southeast end of the River Road Site from River Road to the groundwater treatment plant; and a parking area established outside the treatment plant fence perimeter. Gates were installed at the entrance of both access roads to restrict public access during construction.

The perimeter access road around the Cherry Farm Site was installed concurrent with wastefill grading. Also, a temporary roadway was also constructed between Cherry Farm and the River Road Site to allow onsite construction equipment to travel between the two sites. This effort included the installation of a temporary culvert in the drainage channel between the two sites. The temporary roadway and culvert were removed as capping progressed.

2.5.2 Erosion and Sediment Control

Erosion and sediment control included the use of silt fencing and straw bale fences placed at various locations. The erosion controls were used to prevent erosion of disturbed areas, and to prevent siltation of adjacent wetlands and river areas. The silt fences were inspected weekly, and following rain events; and were repaired as needed. The silt fences were relocated during the project, as needed, to avoid interference with construction. Hay mulching of the disturbed areas was conducted following seeding of the topsoil cover layer, and at the end of each construction season to winterize the Site.

During the 1996-1997 construction season, a turbidity curtain was placed in the river during shoreline sediment removal and shoreline reconstruction. The turbidity curtain was placed parallel to the shore, around the area designated for construction activities, to prevent the transport of suspended sediments away from the construction area. The curtain was frequently inspected, and repairs were made as needed. The silt curtain was removed following the conclusion of shoreline excavations.

A turbidity curtain with an attached oil sorbent boom was installed, prior to sediment dredging activities, during the 1998 construction season. This curtain was installed just upstream of the weed bed to minimize sedimentation in the weed bed. The curtain was removed following the conclusion of dredging operations.

2.5.3 Clearing and Grubbing

Pine Ridge Inc., a subcontractor to Haseley, performed clearing and grubbing of the Site. All trees and shrubs up to 6 inches in diameter were removed using a hydro-axe, and were chipped. A portion of the wood chips were used around new plantings. The remainder of the wood chips, and all other trees and shrubs were placed in a designated log disposal area located on the northern portion of the Cherry Farm Site (Drawing C-5, Appendix B). Logs greater than 6 inches in diameter were cut with a chain saw into 4-foot sections before placement in the log disposal area. A backhoe-mounted cutter and a hydraulic tree mover were used for trees that were greater than 6 inches in diameter.

2.5.4 Decontamination Pad

An equipment decontamination pad was constructed adjacent to the proposed location for the groundwater treatment plant on the River Road Site. The pad was constructed in accordance with specifications. The decon pad was maintained through all construction operations. A 1,000 gallon, high-density polyethylene tank was used for clean water storage, and a high pressure steam cleaner was used to decontaminate equipment, prior to leaving the construction site. Potable water was obtained from the Town of Tonawanda hydrant system. All decontamination water and sediments flowed into the open-ended sump adjacent to the decontamination pad. Sediment was cleaned from the sump as needed, and placed with wastefill to be capped.

2.6 SUBGRADE PREPARATION

Subgrade preparation involved grading and consolidating wastefill to design grades, and included removal of wastefill from the onsite wetlands, and from the Niagara River shoreline.

2.6.1 Wetland Remediation

Wastefill and sediment found in the wetlands was excavated to the toe of existing wastefill, and placed within the area to be covered. The cover system was extended into the wetlands only to the toe of wastefill, so that no wetland area was lost. Gravel berms were placed within the wetlands to minimize water velocity and prevent drainage of the wetlands. Wetland vegetation naturally regenerated within these areas, as shown on photographs in Appendix G.

2.6.2 Wastefill Placement

Subgrade preparation involved consolidation of wastefill from shoreline habitat enhancements, wetland sediment removal, utility trench and collection trench spoils, consolidation of dredged sediments, and debris disposal. Wastefill was graded to design elevations, which required a two percent minimum slope and 4H:1V (25 percent) maximum slope. Subgrade areas were compacted with a smooth drum vibratory roller to provide a smooth, compact base for the permeable cover system. No *in situ* compaction tests or laboratory tests were performed on the wastefill. Following completion of the subgrade preparation, the subgrade was surveyed in relation to the control grid system. The subgrade elevations at each grid intersection were used to confirm that required grades were achieved, and determine subsequent cover system thickness. The results of the subgrade survey were incorporated into Drawings C-5 and C-6 in Appendix B.

Several drums were encountered during wastefill excavation and grading. The majority were empty, but some contained waste fluids. The contents of these drums were transferred to storage containers and maintained onsite, awaiting disposal. All empty drums were consolidated, crushed, and disposed of in a designated area on the Cherry Farm Site. The drum disposal area is noted on Drawing C-5, Appendix B.

2.6.3 Utility Trenches and Building Pads

To the extent practicable, the remedial design accommodated the proposed post-remedial development of a waterfront park and recreation area by the Town of Tonawanda. Major elements of the Draft Master Plan for the park included the future construction of various buildings, and the installation of utilities. To reduce the potential for excavation into underlying waste during park construction, utility trenches and building pads consisting of clean soil were incorporated into the capping system to accommodate excavations related to future park development.

The areas designated for future development are noted on several drawings in Appendix B. These areas were surveyed and excavated to the appropriate depth. The depth of excavation below grade varied from four feet at building pads, to a maximum of 12 feet at the down-slope end of the utility trench. The excavations were lined with geotextile fabric and backfilled with clean cover soil. The cover soil was placed in 18 inch lifts, and compacted in accordance with the specifications.

During backfilling, QA/QC testing was performed to ensure proper compaction of each lift. In-place nuclear density testing by method ASTM D-2922 was performed at the frequency of one test for every 50-foot grid per lift within the building pad areas, and one test for every 75 linear feet per lift of trench excavation. A standard moisture/density analysis by method ASTM D-698 was performed at the frequency of one test for every 5,000 cubic yards of material, per source. A compaction of 95% was required for all utility trenches and building pads. Field reports and in-place testing results are contained in Appendix C.

2.7 MONITORING WELL ABANDONMENT

Concurrent with consolidation and regrading activities conducted at the Site, it was necessary to abandon all pre-existing groundwater monitoring wells within the work limits. Groundwater monitoring wells were abandoned in accordance with the Monitoring Well Abandonment Plan included in Appendix O of the Remedial Design Report. Abandonment methods included pulling the surrounding casing and riser, or by overdrilling. The holes were then filled with cement/bentonite grout, concurrent with well removal, to prevent downward migration of borehole groundwater. A total of 45 monitoring wells were abandoned at the Site. In addition, a wash well located at Pine Hill Concrete was also abandoned. Because the well was located inside a building, an alternative method was employed to abandon the well. The well was pressure grouted with sufficient pressure and material to ensure that the screened interval and surrounding formation materials were filled with grout. Grout and pressure calculations, as well as well abandonment records for the remainder of the wells, are contained in Appendix D.

2.8 COVER SYSTEM

Areas containing waste were covered with a permeable cover system, in accordance with the objectives stated in the ROD. This permeable cover system included a permeable isolation fabric, an 18-inch cover soil layer, a 6-inch top soil layer, seeding, and various drainage control measures. A barrier consisting of an 18-inch low permeability clay layer was installed in the eastern portion of the drainage swale between the Cherry Farm and River Road Sites at the request of NYSDEC. A total of 54.3 acres was regraded and covered.

2.8.1 Geotextile Fabric Layer

The remedial design included the placement of a woven geotextile fabric below the final cover system as a visual identifier to preclude excavation into wastefill. The geotextile was manufactured by Belton Industries of Atlanta, Georgia. Manufactured rolls of geotextile were shipped directly to the Site and installed following subgrade preparation, and just prior to installation of the cover soil layer. Prior to installation, the manufacturer submitted material certifications and test results to confirm that each roll met specifications. Geotextile installation did not proceed until the test results and certifications were reviewed and approved by Parsons.

Prior to layout of the geotextile, the areas to receive geotextile were prepared by either grading existing soil or rolling with a compactor. The geotextile rolls were transported to the landfill areas ready to receive geotextile. Once in the general placement area, each roll was then manually unrolled into position. A minimum of 6 inches of overlap was maintained at all adjoining blankets. Each roll was inspected by Parsons for defects, uniformity, and damage as it was placed on the landfill. The blankets were held in position during placement by sandbags or soil piles until the overlying cover materials could be installed.

2.8.2 Cover Soil Layer

An 18-inch thick layer of cover soil was installed directly over the geotextile fabric. The cover soil was obtained from several different borrow sources including River Oaks, Summit Pit, Frontier, Niagara, Chevy Parisio, Canterbury Woods, Green Lake, and Niagara Falls Land Farm. Quality assurance testing, consisting of particle size analysis (ASTM D422), was conducted on soil from each borrow source at a frequency of one test per 5,000 cubic yards to determine the suitability of the material. The QA testing was performed by SJB. The test results are presented in Appendix C.

Tandem-end dump trucks were utilized to move soil from the borrow source to the Site, where the soil was placed directly over the geotextile fabric, or stockpiled for future use. The cover soil was placed in two 9-inch lifts (after compaction) using bulldozers, and was compacted with smooth-drum vibratory rollers. The lift thickness was controlled using grade stakes. A survey was performed upon completion of the final lift of cover soil and is presented in Drawings C-3 and C-4 in Appendix B. Photographs of cover soil placement are contained in Appendix G.

During placement of each lift, QC testing was performed to ensure proper compaction of each lift. In-place nuclear density testing by method ASTM D-2922 was performed at the frequency of one test for every 50-foot grid per lift. A standard proctor analysis by method ASTM D-698 was performed at the frequency of one test per every 5,000 cubic yards of material from each borrow source. A compaction of 90% was required for the cover area, and a compaction of 95% was required under all roadways. All testing was performed by a field inspector from SJB, and the results recorded on a daily field report. Areas not meeting the required compaction were recompacted and retested until the required compaction test results were achieved. Field reports and in-place testing results are contained in Appendix C.

2.8.3 Low Permeability Soil

Prior to remediation, a drainage swale located between the Cherry Farm and River Road site conveyed surface water west to the Niagara River. As part of the remediation, this surface water was redirected northward into a wetland area along the east border of the Cherry Farm Site. This was accomplished by the construction of a berm across the swale. At the request of NYSDEC, the east side of the berm was covered with an 18-inch low permeability soil (LPS) layer. The purpose of the LPS layer was to minimize the potential for water to permeate through the berm toward the west. The LPS layer covered an area measuring approximately 50 feet by 100 feet (Drawing C-2 in Appendix B). The LPS layer was subsequently covered by the cover and topsoil layers.

The LPS was obtained from the Summit Pit. QA testing was conducted on soil from the borrow source to determine the suitability of the material, prior to use. The QA testing consisted of particle size analysis (ASTM D-422), remolded permeability (USACE EN-1110-2-1906), moisture content (ASTM D-2216), specific gravity (ASTM D 854), and Atterberg Limits (ASTM D-4318). The tests were conducted at the frequency of one test per 5,000 cubic yards of material, with the exception of specific gravity and Atterberg limits, which were performed at the frequency of one test per 1,000 cubic yards. A standard moisture/density analysis by method ASTM D-698 was performed at the frequency of one test for every 2,500 cubic yards of material.

The LPS was trucked to the Site where it was installed directly over the geotextile fabric. It was placed in three lifts of approximately six inches each (after compaction) using bulldozers, and was compacted with a smooth-drum vibratory roller.

During placement of the LPS layer, QC testing was performed to ensure the required compaction of 95%. In-place nuclear density testing by method ASTM D-2922 was performed at the frequency of one test for every 50-foot grid per lift. An *in situ* permeability test was performed by method USACE EN-1110-2-1906 at the frequency of one test per acre per lift. Because of the relatively small area covered with the LPS, only three permeability tests were performed. Test data is presented in Appendix C.

2.8.4 Topsoil and Seeding

A six-inch layer of topsoil was placed directly over the cover soil layer. The topsoil was obtained from various sources. QA testing, consisting of particle size analysis by method ASTM D-422, organic content by method ASTM D-2974, and soil pH by method ASTM D-4922, was conducted on topsoil from each borrow source at a frequency of one test per 10,000 cubic yards to determine the suitability of the material. The results are presented in Appendix C.

The topsoil was trucked directly to the area of placement where it was spread and loosely compacted with bulldozers. Upon completion of the topsoil layer, a final survey was performed to ensure conformity to document specifications, and to ensure topsoil layer thickness.

Completed topsoil areas were hydroseeded by Pine Ridge, Inc. A slurry containing seed, paper-based mulch, and starter fertilizer was applied in one operation. Following the hydroseeding, most areas were covered with a hay mulch and sprayed with a tackifier to enhance moisture retention in the soil, and reduce erosion caused by precipitation. Areas adjacent to some drainage ditches were covered with a jute fabric in lieu of the straw mulch. Flood plain areas, adjacent to the river, were covered with a synthetic mesh erosion control material in lieu of the straw mulch to prevent topsoil and vegetation erosion during flood events.

2.9 FENCE AND ROADWAYS

Security fencing was installed in accordance with the design. A 6-foot high chain link fence was erected at the River Road entrance, and around the groundwater treatment plant, to limit unauthorized access upon closure. The balance of the Site, including all areas adjoining the Niagara River and the perimeter wetlands, did not receive fencing. Two vehicle access gates were installed, one at the Cherry Farm entrance, and one at the River Road entrance. The fence alignment is presented on the record drawings in Appendix B.

The drainage culvert, under the existing entrance road at the Cherry Farm Site, was replaced and the road expanded to 24 feet in width. The entrance road at the River Road Site was 20 feet in width. At the entrances of both roadways, a NYSDOT-approved type 2 gravel was used as a foundation, and the roads were paved with asphalt from the property lines to River Road. The gravel was trucked directly to the placement area, spread with a bulldozer, and compacted with a smooth-drum vibratory roller. The balance of the entrance roads to the respective sites were constructed of 6-inches of reclaimed concrete over a woven reinforcing geotextile fabric.

A 12-foot wide gravel perimeter road was installed around the Cherry Farm Site, and along the south and west perimeters of the River Road Site. The roadway was constructed of a minimum of six inches of reclaimed concrete over a woven geotextile fabric. The alignment of all roadways was surveyed, and is presented on the record drawings in Appendix B.

During construction, the bike path (river walk) was moved at the request of the Erie County Parks Commission. The path was relocated away from River Road to prevent obstruction by vehicles waiting to exit the construction area. The new bike path location is shown on record drawings in Appendix B.

2.10 GROUNDWATER COLLECTION AND CONVEYANCE SYSTEM

A groundwater collection system was installed to prevent migration of groundwater to the river, or offsite properties. The system was constructed in general conformance with plans and specifications. The collection system consists of a series of shallow collection trenches which intercept shallow groundwater above a confining layer, and a series of deep extraction wells which recover groundwater below the confining layer.

2.10.1 Groundwater Recovery Wells

Eleven intermediate/deep recovery wells (seven at the Cherry Farm Site, and four at the River Road Site) were installed in general conformance with plans and specifications. Recovery well boring and installation logs, and field notes are contained in Appendix D. Recovery well locations are shown on Drawings C-1 and C-2 in Appendix B.

The wells were drilled to a pre-determined depth using a CME 75-85 track mounted drill rig using 10.25-inch augers, and continuous split spoon sampling. The wells were installed using 8-inch ID, stainless steel wire-wound screen, and schedule 10 stainless steel riser. Morie 0 sand was used around the well screen, up to the bentonite seal. A bentonite seal ranging from three to six feet thick was placed in each well, beginning at the bottom of the marsh deposits. The thickness of the bentonite seal corresponded to the thickness of the marsh layer, as determined by split-spoon sampling. Cement-bentonite grout was placed above the bentonite seal, to the base of the vault installations. Original specifications called for the placement of a 12-inch carbon steel outer casing to be placed one foot into the top of the marsh layer, and extending to the vault. The outer casing was not installed because of difficulties installing the casing through the augers, and because the riser pipe would be completely concealed below grade, and within the concrete vault.

The recovery well heads are enclosed at the surface in pre-cast concrete vaults containing pumping controls and conveyance piping connections. Groundwater extraction pumps placed within the screened area of each well are controlled by conductivity level control sensors to maintain water levels within the desired groundwater capture zone. Vault construction details and pump setup details are contained on Record Drawing C-10 of Appendix B. Field photographs of well heads, vaults, and pumps are contained in Appendix G. Testing of pump operating abilities was performed prior to the installation of the submersible pumps. Pump test results are contained in Appendix E.

2.10.2 Shallow Groundwater Interception Trench

A series of connected trenches were installed at the base of the landfill on the river side. Three trench segments were installed on the Cherry Farm Site, each approximately 800 feet long. The southern trench segment serving Sump S-3 was extended approximately 80 lineal feet to fill in a gap between adjoining trenches. One trench segment was installed on the River Road Site. With the exception of the northern segment from Sump S-4, each trench segment consists of two 400-foot sections of drainage pipe leading to a collection sump at the middle of the segment. The combined length of the installed trenches is 3,075 feet. Trench locations are noted on record drawings in Appendix B, and field photographs showing the installation of the trenches and sumps are contained in Appendix G. A 4-inch perforated high density polyethylene (HDPE) drainage pipe was installed in the trenches at the Cherry Farm Site, and a 6-inch slotted HDPE drainage pipe was installed in the trench on the River Road Site. All drainage pipe was installed at an approximate minimum slope of 0.5% within the trenches. A pea-gravel drainage medium was used on the Cherry Farm Site, and a silica sand drainage medium was used on the River Road Site. Collected water drains by gravity to sumps, and is pumped through a conveyance pipeline to the groundwater treatment plant. The down-gradient side (river side) of the collection trench was lined with a polyethylene membrane prior to drainage pipe and substrate placement.

Installation of the trench involved excavation of a 2-foot wide trench down to the underlying marsh deposit layer, placement of the drainage pipe, and backfilling of the trench with the appropriate drainage material. A filter fabric was placed over the drainage medium to prevent migration of fines from the cover soil layer. The filter fabric was then covered with the soil cap system.

2.10.3 Conveyance Piping

A pressure line was installed to transmit shallow and deep groundwater to the wastewater treatment plant. Submersible pumps installed in the recovery wells pump groundwater directly into the pressure line for transmission to the treatment plant. Discharges from wells and sumps were connected to common conveyance pipes. Recovery wells R-1 through R-7 are on a common pipe. Recovery wells R-8 and R-9, and R-10 and R-11 are on respective common conveyance pipes. Sump S-4 is connected with recovery wells R-8 and R-9. Sumps S-1 through S-3 were originally to be connected to the conveyance line serving recovery wells R-1 through R-7. Because of oil observed in the collection trenches serving sumps S-1 through S-3, a separate conveyance line was installed to convey shallow ground water to the oil separation system in the groundwater treatment plant.

Submersible pumps within each sump in the shallow groundwater collection trenches transfer collected groundwater into the pressure line. All of the conveyance piping consists of fusion welded HDPE, buried a minimum of 42 inches, to eliminate the possibility of freezing. The conveyance piping alignment and vault locations are shown on Record Drawings C-1 and C-2 in Appendix B. Pressure testing of the conveyance piping was performed after installation to ensure the integrity of the conveyance system. Pressure test results are contained in Appendix E.

2.11 GROUNDWATER TREATMENT SYSTEM

The groundwater treatment system treats the incoming groundwater that contains emulsified oil containing PCBs, prior to discharge to the Town of Tonawanda sanitary sewer system.

2.11.1 Building

The groundwater treatment building is a metal-frame and sided structure, and was erected on the River Road Site in general conformance with plans and specifications. Ideal Concrete, a subcontractor to Haseley, installed the reinforced concrete foundation for the treatment building. Concrete testing was performed in accordance with specifications, and laboratory results are presented in Appendix C. Apollo Steel, a subcontractor to Haseley, erected the building frame, insulation, siding, roofing, and doors. Photographs of building construction are contained in Appendix G.

2.11.2 Process Equipment

Quackenbush Mechanical, a subcontractor to Haseley, installed building heating and ventilation, process piping, and equipment. Ferguson Electric, a subcontractor to Haseley, performed all electrical hookups to the plant equipment, as well as extraction well and sump wiring. Building construction, piping, and electrical and equipment installations are presented in Record Drawings S-1, A-1, M-1 through M-3, H-1, E-1 through E-5, and I-1 through I-3 contained in Appendix B. All system operating procedures are contained in Volume III of the O&M Manual.

After construction began in 1996, the permit to discharge to the sanitary sewer was granted by the Town of Tonawanda. The permit condition required non-detectable limits for PCBs. This required modification of the treatment system by the addition of a carbon adsorption system to polish effluent waters from the oil/water separator.

2.12 MONITORING SYSTEM

A series of monitoring wells and observation wells were installed to monitor groundwater levels, including seven intermediate/deep wells to monitor the operation and effectiveness of the extraction well system, and nine shallow observation wells to monitor the effectiveness of the shallow collection trench. The locations of monitoring wells and observation wells are shown on Record Drawings C-1 and C-2 in Appendix B.

2.12.1 Monitoring Wells

Seven double-cased intermediate/deep monitoring wells were installed to a predetermined depth, in general conformance with plans and specifications. The wells were drilled with a CME 75-85 Track-mounted drill rig using 6.75-inch ID augers with continuous split-spoon sampling. Following completion of the drilling, the wells were installed using 2-inch ID, 10 slot (0.010 inch) schedule 40 PVC screen and riser. Moric 0 sand was used as the filter pack around the well screens. The filter pack was topped with six inches of Moric 00 sand, to prevent migration of bentonite into the filter pack. A bentonite seal (from 4 to 12 feet thick) was placed above the sand pack in each boring. The minimum thickness of the bentonite seal corresponded to the thickness of the marsh layer, as determined by split-spoon sampling for each boring. Cement-bentonite grout was placed above the bentonite seal to the surface. Also, an 8-inch carbon steel casing was set into the top of the marsh deposit in each boring, and extended to ground surface. The steel casing was cut off at the ground surface. To protect the above-grade well riser, a 6-inch diameter steel protective casing with locking cap was installed. Well logs and field notes are contained in Appendix D. Construction details and surveyed locations are recorded on Drawing C-11 in Appendix B.

Following installation, the monitoring wells were developed using a submersible pump. Development continued until the pH, temperature, and turbidity stabilized. The pump was decontaminated between wells. A Parsons geologist performed oversight during drilling, construction, and final development. Development data and well acceptance are recorded in field notes, and are contained in Appendix D.

2.12.2 Observation Wells

Nine observation wells were installed to a predetermined depth near the shallow collection trenches, in general conformance with plans and specifications. The wells were drilled with a CME 75-85 track-mounted drill rig using 4-inch ID augers with continuous split spoon sampling. Following completion of the drilling, the wells were installed using 1.5-inch ID 10 slot (0.010 inch), schedule 40 PVC screen and riser. Morie 0 sand was used as the filter pack around each well screen, topped with six inches of Morie 00 sand. A bentonite seal was placed above the sand pack with a minimum thickness of two feet. Cement-bentonite grout was placed above the bentonite seal, to the surface, and 4-inch steel protective casings with locking caps, or flush-mount protective casings with locking caps were installed at the surface.

Development of the observation wells was performed with dedicated bailers. Development continued until the characteristics of the purged water stabilized. A Parsons geologist performed oversight during the drilling, installation, and development. All well installation logs and field notes are contained in Appendix D, and construction details and survey locations are recorded on Drawing C-11 in Appendix B.

2.13 SHORELINE HABITAT ENHANCEMENTS AND PROTECTION

Three different shoreline designs were utilized to provide protection of human health and the environment, as well as provide habitat enhancement for fish and wildlife.

2.13.1 Wooded Shoreline

Three alternating sections of wooded shoreline and submergent habitat were also created along portions of the Cherry Farm shoreline. The three sections alternate with the barrier island shoreline, and total approximately 655 lineal feet. This habitat was constructed by excavating an emergent pool that was set back from the original shoreline by approximately 35 feet. The toe of the landfill was buttressed with a gabion wall, which provided a planting area behind the wall for various plants, shrubs, and woody vegetation. The gabion walls were constructed as specified in Detail 13 on Drawing C-12 in Appendix B. Due to difficult conditions encountered during excavation and construction, the middle and northernmost wall sections were modified by replacing the bottom gabion basket with a geotextile enclosed gravel base. Details of the wall are presented on Record Drawing C-12, Appendix B.

The wooded shoreline was planted with submergent vegetation on the river side of the gabion wall, and woody shrub vegetation on the upland side of the walls. The upland area of the wooded shoreline was planted in April and May 1996, with small shrub varieties including black willows. Most vegetation rooted and has continued to propagate. Some of the willow posts did not survive, and were replanted in the fall of 1998. Again, some of the willow posts did not survive and were replanted in May and June 1999. Additionally, several willow posts were relocated from upslope areas, closer to the gabion walls, to ensure that the plantings would be in clean soils, and were near water for optimal growth.

The river weed beds, adjacent to the gabion walls were enhanced with wild celery plantings. The northern-most and middle wall areas were planted in April and May 1997. Plantings at the southernmost wall were delayed until dredging in that area was completed, then plantings were conducted in June 1999. The northernmost gabion wall area was replanted in June 1999 at the request of NYSDEC, to increase the density of the wild celery in that area.

2.13.2 Riprap Shoreline

A riprap shoreline was constructed to plans and specifications, along the southern-most portion of the Cherry Farm Site, and along the entire River Road shoreline. This type of shoreline was installed to ensure adequate erosion protection. Approximately 9 inches of round cobble riprap, over approximately 3 inches of recycled concrete aggregate was installed at the specified elevations, to include low and high river stage elevations. Also a synthetic erosion matting/turf reinforcement matrix was installed along the shoreline, above the riprap to the toe of the slope. The riprap shoreline was constructed as per Detail 12 on Drawing C-12 in Appendix B.

2.13.3 Wetland Shoreline

Three segments of emergent habitat wetlands were created along the Cherry Farm Site shoreline, totaling approximately 1,040 feet, through the construction of riprap barrier islands and troughs. The troughs were used to create an emergent marsh environment between the barrier islands and the toe of the landfill (Drawings C-1 and C-2, Appendix B). The trough, created between the shoreline and the islands, is typically 35 feet wide with a maximum depth of 3.75 feet (depending on river stage). Following construction, these created wetland areas were planted with submergent and emergent wetland plants. Details of the design are presented in Drawing C-12. The wetlands were planted in April and May 1997. Some plantings failed to establish due to various factors including disruption by wildlife, and widely varying river stages. The wetlands were replanted during the Spring of 1998, but again some plantings failed to establish.

In an attempt to establish the wetland vegetation, a planting plan was devised by Beak Consultants, Inc., a subcontractor to Parsons, in May 1999 (Beak, 1999). The planting plan incorporated several changes to increase chances of plant survival and propagation. These enhancements included:

- Placement of coir logs to expand areas of emergent plantings;
- The addition of topsoil behind the coir logs to provide additional rooting substrate;
- Transplanting of established biota; and

- Wildlife deterrent measures to inhibit consumption of replantings by water fowl.

A final planting was conducted in May and June 1999 in accordance with the planting plan.

2.14 SEDIMENT REMEDIATION

Sediments within the the Niagara River, directly adjacent to the Site, were found to contain levels of PAHs and metals exceeding regulatory guidance values. Impacted sediments were located along approximately 1,600 feet of shoreline, and extending into the river up to 150 feet from shore. The cleanup goals established for the sediments were:

- 20 ppm total PAHs in the shallow zone (top one foot); and
- 50 ppm total PAHs in the deep zone (below one foot). One exception to this goal was a portion of the aquatic weed bed where contaminated sediments were not removed to prevent damage to an existing aquatic habitat and community.

The remedial action included the removal of an existing wooden barge wreck, and approximately 42,000 cubic yards of sediment to be disposed of in an onsite sediment disposal area (Parsons ES, 1998). The elevations specified on the final grading plan were used as the sole measurement mechanism to demonstrate achievement of the established cleanup criteria.

Final river bottom grades were designed to be less than or equal to 3H:1V in order to minimize slope stability concerns. Three nearshore areas, where full removal of sediments in accordance with the cleanup goals was not possible due to slope stability concerns, were capped with geotextile fabric and riprap.

Daily work reports and photographs for the barge wreck removal, sediment removal, and capping are contained in Appendices A and F, respectively.

2.14.1 Mobilization and Setup

Prior to mobilizing the dredging equipment, King began site operations with the setup of site trailers and utilities, and the preparation of the SDA. A clay berm was erected around the northern perimeter of the SDA to increase the available volume for sediment and dredge water. Also, a chain link fence and erosion control fence were erected to limit access to the SDA and minimize erosion, respectively.

King then mobilized both hydraulic and mechanical dredging equipment from their home port of Holland, Michigan. The dredging equipment consisted predominantly of:

- A 160-foot x 60-foot cutter/suction hydraulic dredge. The dredge was equipped with a 16-inch, 1,200 horsepower pump capable of dredging up to 600 cubic yards per hour;
- A 165-foot x 43-foot barge with a crane;
- A 28-foot x 70-foot self-propelled work barge with a 30-ton crane;

- Two tug boats;
- A 32-foot x 110-foot material barge;
- Works skiffs; and
- A survey boat.

King utilized a large dock adjacent to and south of the Site to stage their operations. All equipment was lighted at night when moored in the river, and the dredge was equipped with the required navigation flags. Additionally, the United States Coast Guard was notified of the work and subsequently issued a Notice to Mariners.

Prior to beginning any barge wreck or sediment removal work, turbidity curtains equipped with oil booms were installed in the river. One curtain/boom was installed at the upstream end of the weed bed, while the second was installed approximately 500 feet upstream of the weed bed. The purpose of the curtains/booms was to minimize siltation in the weedbed. The curtains/booms were installed within approximately 100 feet of shore due to the strong river currents. Additionally, the strong currents lifted the curtain bottoms and began to pull the seams apart, thereby decreasing the effectiveness of the curtains.

2.14.2 In-River Turbidity Monitoring

Prior to beginning any barge wreck or sediment removal work, three turbidity monitoring stations were installed in the river. Each station consisted of a turbidity probe with radio transmitter mounted on a small barge. These stations constantly monitored turbidity levels upstream from the work area, downstream in proximity to the work area, and downstream within the weed bed. The locations of the stations and the depth of the turbidity probes were adjusted during the work to most effectively monitor the visible sediment plume. The turbidity limits established for the project required that the turbidity at either downstream monitoring station must not exceed 150 nephelometric turbidity units (NTUs) above the upstream turbidity for a sustained period of 30 minutes.

Turbidity levels were measured at intervals of one minute during all in-river work. The turbidity readings were transmitted via radio telemetry, recorded on a computer dedicated to turbidity monitoring, and displayed in "real-time" format on computer monitors located in the contractor's office trailer and the dredge control room. Also, the system had the capability to sound an audible alarm should the established turbidity limits be exceeded. The turbidity limits were not exceeded during any of the in-river work. A summary of the turbidity readings is provided in Appendix F.

2.14.3 Barge Wreck Removal

The existing barge wreck was removed, prior to dredging, using the derrick and crane equipped with a toothed bucket. The derrick and an empty material barge were positioned adjacent to the barge wreck, and were held in place by lowering the derrick's two spuds. Removal proceeded from upstream to downstream, with the crane operator working methodically across the area to ensure complete removal. The barge, originally estimated to be approximately 40 feet wide by 80 feet long, was actually closer to 80 feet by 200 feet. The barge was constructed of steel trusses covered with wood timbers.

Pieces of the sunken barge were removed from the river, placed on the material barge, offloaded, and moved to the SDA. The barge material was stacked along the north side of the SDA, and subsequently covered with sediment during dredging.

2.14.4 Sediment Removal

2.14.4.1 Sediment Disposal Area (SDA)

As discussed in Section 2.6, the SDA was constructed on the River Road Site to hold excavated sediments and associated effluent water. The SDA consisted of a large pit, approximately two acres in area and up to 16 feet deep, with capacity to hold 56,000 CY of sediment and water. All barge wreck material, dredged sediment, and extraneous waste material were disposed of in the SDA.

2.14.4.2 Hydraulic Dredging

Hydraulic dredging was performed with the cutter/suction dredge. The dredge was equipped with both soft material and rock cutterheads, a 1,200 horsepower pump, and a digital global positioning system (DGPS). The DGPS located the position of the cutterhead to within one meter.

Dredging proceeded from upstream to downstream to prevent recontamination of completed dredge areas. The cutterhead depth was controlled by a staff gauge at the bow visible to the operator in the control room. When the required dredging depth had been reached across the arc, a traveling spud pushed the dredge ahead, and the next arc was begun. The lateral anchors were moved ahead, as needed, as the dredge proceeded downstream.

The dredge removed sediment from the required areas, and pumped the sediment and water slurry directly to the SDA via 16-inch high density polyethylene (HDPE) piping. The coarse sediments and debris settled immediately, with progressively finer material settling as the dredge water progressed across the SDA. The dredge pipe discharge was occasionally repositioned to more evenly distribute the sediments within the SDA. Stockpiling of sediment and the excavation of drainage channels within the SDA were performed to facilitate settling of the dredge solids. Additionally, a turbidity curtain was placed across the lower corner of the SDA to facilitate removal of fines.

Air monitoring for VOCs was conducted each day during dredging operations. No upgrading of the level of personal protective equipment was required.

The dredge decant water was discharged back to the river when the turbidity remained below 50 NTUs, based on a seven-day average, with no turbidity reading exceeding 100 NTUs. Additionally, the decant water had to meet analytical requirements for PAHs, as discussed in section 2.14.4.3. The decant water was removed with a pump positioned behind the turbidity curtain, and discharged to the drainage channel at the south end of the Site.

Several problems were encountered which affected the dredging operation:

- Numerous dredge shutdowns occurred due to debris from the river bottom becoming lodged in the cutterhead or pump. The debris included bricks, stones, timbers, steel cables, bed springs, vacuum cleaner parts, car parts, drums, tires, and boat parts.
- As the water level within the SDA was raised, seeps began to develop around the SDA perimeter which prevented filling the SDA to capacity. Dredged sediments were subsequently placed around the interior perimeter of the SDA to seal the SDA sides, allowing the SDA to be filled to capacity and eliminating the seeps.

An approximate total of 42,445 cubic yards of sediment was dredged and placed within the SDA.

2.14.4.3 SDA Discharge Monitoring

The dredge decant water had to meet discharge requirements of less than 50 NTUs, based on a seven-day average, with no turbidity reading exceeding 100 NTUs. Turbidity monitoring of the decant water was performed using a portable turbidity meter, a Hach Model 1100. Turbidity readings were taken prior to decanting and every four hours or less during decanting. The turbidity limits were met on all occasions except one when the turbidity meter gave incorrect low turbidity readings. Summary tables of all turbidity monitoring results are contained in Appendix F.

Two types of polymers were utilized during the course of the dredging operations to promote settling of suspended solids in the SDA, and assist in meeting the discharge requirement for turbidity. Polymer usage during the dredging operations was as follows:

- August through October 1998: two 55-gallon drums of P560D at approximately 1 to 2 parts per million (ppm) and 10 55-gallon drums of P560D at approximately 50 ppm.
- Starting October 30, 1998: 11 55-gallon drums of Callaway 4864 at approximately 40 to 50 ppm were used to complete the dredging.

The dredge decant water was required to meet discharge requirements for PAHs of 100 micrograms per liter (ug/l) for total PAHs, 20 ug/l for acenaphthene, 10 ug/l for naphthalene, and non-detect for benzo(a)pyrene. Sampling and analysis of the decant water was performed on a weekly basis during hydraulic dredging activities. No PAH exceedances occurred during decanting operations.

Several seeps which developed around the perimeter of the SDA were sampled and analyzed for PAHs. A seep to the north of the SDA was sampled once per week, when flow was sufficient. Sump S-4, the south cleanout of the southern groundwater collection trench, and the retention pond on the adjacent Tonawanda Coke property were sampled periodically. A summary of all chemical analysis performed is provided in Appendix F.

2.14.4.4 Mechanical Dredging

Mechanical dredging was used in the area of the nearshore weed bed to minimize damage to the weed bed. The derrick and material barge were positioned perpendicular to, and far enough from shore so that the equipment did not disturb the river bottom in the weed bed. Dredging with a Cable Arm™ environmental bucket was initially attempted. However, the environmental bucket could not penetrate the stiff sediment. A toothed bucket was subsequently used to complete the mechanical dredging. The dredged sediments were placed onto the material barge, transferred to the offloading area, and transported to the SDA using a front end loader. Approximately 250 cubic yards of sediment were removed by mechanical dredging.

2.14.5 Sediment Capping

Three nearshore areas, where full removal of sediments in accordance with the cleanup goals was not possible due to slope stability concerns, were capped with geotextile fabric and a minimum of 21 inches of riprap. The geotextile fabric was cut and sewn onshore to the appropriate size for each cap. Working from upstream to downstream, the geotextile fabric was then unrolled in short lengths on the river bottom, and covered with riprap. The riprap placement was accomplished using the derrick crane equipped with a toothed bucket and the material barge.

2.14.6 Surveying

2.14.6.1 Bathymetric Surveying

Bathymetric surveys were performed prior to dredging, after dredging, and after installation of the sediment caps. The bathymetric surveys were performed by King with oversight by Wendel Associates, a New York State-licensed surveyor. The bathymetric surveys utilized a survey boat equipped with a bathometer, computer, and a DGPS. The DGPS used a combination of satellites and United States Coast Guard beacons to determine location to within one meter.

Depth readings of the water surface to the river bottom, and the position of the survey boat were recorded continuously by the computer as the boat traversed the dredge area on 40-foot stations perpendicular to shore. Adjustments to the depth readings were made based on staff gauge readings of the river elevation. The information was then electronically downloaded and used to prepare contour maps, cross-sections of the stations, and calculate the volume of sediment removed.

2.14.6.2 Dive Surveys

Periodic dive surveys were made by Parsons to inspect the completed dredge area and sediment caps. Visual observation of the dredged area revealed a bottom consisting of fine white sand and occasional assorted debris. The bottom was generally smoothed over due to the current moving fine sediment slowly downstream. Preliminary inspection of the sediment caps revealed areas with little or no riprap covering the geotextile fabric. These areas were corrected through the addition of riprap, and were confirmed by subsequent dive surveys.

A final dive survey was conducted on July 1, 1999 to complete the inspection of the sediment caps, to inspect the nearshore weed beds, and to ensure that no damage had occurred over the winter season. The sediment caps were intact, with no visible sign of erosion. Dredge bottom was found between the sediment caps, with little sedimentation occurring since the dredging operation. No sloughing of the shoreline was observed. Numerous fish were observed in the low lying, unvegetated areas of the riprap covers and dredge bottom. The most predominant vegetation type below ten feet was wild celery. The observed vegetation in the shallow, near shore areas was a mix of wild celery, milfoil, and other aquatic plants. The wild celery was of various maturity, from recent plantings beginning to take root, to mature plants with runners spreading out and new plants sprouting from the runners.

SECTION 3
DECLARATION

3.1 DECLARATION

Parsons Engineering Science, Inc. monitored the closure construction according to generally accepted practices. Based on the field observations made by inspection personnel, laboratory and field test data, the record drawings, and data provided by the Contractor, the construction observed at the Site complied with the Contract Documents and the Closure Plan approved by the NYSDEC.

3.2 LIMITATIONS

This Construction Certification Report was prepared by Parsons for the exclusive use of the PRP Group. This Report applies specifically to the closure construction of the Cherry Farm/River Road Site, Tonawanda, New York. It was prepared in accordance with generally accepted engineering practices. No warranty, expressed or implied, is made.

The observations and monitoring described in this Report were made under the conditions stated. Conclusions made in this report were based on these observations and data obtained from field and laboratory tests on randomly spaced samples. Variations in material properties between test samples and locations may occur.