July 24, 2003

Philip G. Waite, P.E.
Project Manager – Alcoa, Inc. Massena East Smelter
NYSDEC - Region 6
Division of Environmental Remediation
State Office Building
317 Washington Street
Watertown, NY 13601

SUBJECT: Bechtel Job No. 20384,
Alcoa, Inc., Massena East Smelter
OVERALL COMPLETION REPORT, REV. 2; Subject Code 1305

Dear Mr. Waite:

Bechtel Associates Professional Corporation - NY is making this submittal on behalf of Alcoa, Inc. and in accordance with the Order on Consent, Index #A6-0291-92-12, effective date March 1, 1993.

Attached for your use is the *Overall Completion Report for the Site Remediation Project for Alcoa Massena East Smelter Plant*, Revision 2. This document was submitted for review on February 21, 2003, and was approved by NYSDEC on June 3, 2003. The following changes were made from the previous revision: added references to FCN-219 and updated the reference to the final version of the approved *Construction Quality Assurance Certification Report*.

If you have any questions concerning the attached report, please call me (865) 220-2374 or Rick Esterline, Alcoa Program Director, at (315) 764-1996.

Very truly yours,

Jeffrey W. Grindstaff, P.E.
Project Engineering Manager

Attachment: Overall Completion Report, Rev. 2 (3 copies)

cc: K. Farrar, DEC Division of Environmental Remediation, Albany, w/o attachment
K. Jock, St. Regis Mohawk Tribe, w/2 copies
C. Shoemaker, DEC Regional Water Engineer, Utica, w/o attachment
A. Rice, DEC Region 6, Division of Water, Watertown, w/o attachment
F. Navratile, NYS Department of Health, w/l copy
C. Dowd, DEC Division of Fish and Wildlife, Albany, w/o attachment
D. Sweredoski, DEC Division of Environmental Remediation, w/o attachment
M. Cox, DEC Onsite Inspector, Massena, w/1
Massena Library, w/1 copy

bcc: Alcoa
N. Dubé, w/1
R. Esterline, w/ 2 copies

Bechtel
M. Elsner, w/ 1 copy
J. Grindstaff, w/ 1 copy

Overall Completion Report

for the

Alcoa, Inc. Massena East Smelter Plant

Site Remediation Project

(Formerly the Reynolds Metals Company
St. Lawrence Reduction Plant)

Massena, NY

Revision 2
July 2003

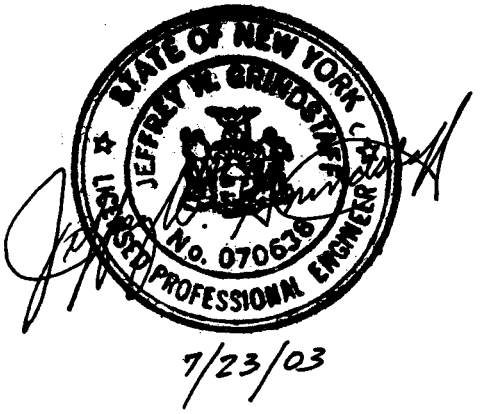
By Bechtel Associates Professional Corporation, NY for
Bechtel Environmental, Inc. • Oak Ridge, Tennessee

74 43 2561 2

CERTIFICATION OF PROFESSIONAL ENGINEER

DOCUMENT TITLE: Overall Completion Report for the Site Remediation Project for Alcoa Massena East Smelter Plant, Massena, New York, Revision 2

To the best of my knowledge, information, and belief, the information, conclusions, and recommendations contained in this document are factual, represent my understanding of conditions and circumstances at the subject area, represent my engineering judgment, comply with applicable or relevant and appropriate requirements, and demonstrate sound engineering practices and principles to protect public health and the environment.



7/23/03

ACKNOWLEDGMENTS

Alcoa wishes to acknowledge the efforts of several people who authored and otherwise helped prepare this summary report and the ten area-specific reports that make up the Project Completion Report for the Massena East Smelter Plant site remediation. Alcoa is well aware and very appreciative of the effort and dedication it takes to produce documents of this quality.

The principal author of most of the individual reports is Dennis E. Smith, P.E., of the Bechtel Project Engineering staff in Oak Ridge, Tennessee. L. Suzanne Curtis, Field Sampling and Site Controls Manager during the two busiest construction years, was the lead author of the massive, two-volume North Yard report. Bechtel Project Engineering Manager Jeffrey W. Grindstaff, P.E., is the principal author of this *Overall Completion Report for the Site Remediation Project* and contributed to each of the other reports. The project's Quality Assurance Manager during most of the remedial excavations, Jerry M. Redenbo, P.E., wrote the quality assurance sections and also contributed as an author and researcher to several of the area-specific reports. The project's Quality Assurance Manager during the 2002 season, Eric A. Strassburger, P.E, wrote the quality assurance certification report for the Landfill capping work (Bechtel 2003a) and also contributed to several of the other documents. Alcoa Project Manager David F. Bence, P.E., contributed to this document and to each area-specific report and wrote the executive summaries. Bechtel Project Field Engineer Mark A. Hunter wrote most of the construction sections. Bechtel Design Engineer Joe Holden and Field Engineer George A. Crawford also made significant contributions in research and authorship.

Preparation of the reports involved many tasks, including:

- Preparing and issuing as-built drawings
- Verifying that all documentation is present and complete in the project file
- Verifying that all regulatory requirements are satisfied
- Searching the project records to capture all relevant information, including pre-Record of Decision (ROD) activities pertaining to the subject area
- Verifying "closure" for all data
- Outlining, writing, reviewing, assembling, and issuing complete, thorough, presentable reports

Each of the eleven reports represents hundreds of hours of organizing, writing, and reviewing effort and researching contractor daily reports, sample results, and other historical records. In addition to satisfying the regulatory requirements, each completion report provides a comprehensive record of all remedial activities relevant to that area, including those occurring before the ROD was issued.

The reports, with all their appendixes and attachments, were edited, printed, arranged, and generally made very presentable by Bechtel's capable document control and reproduction groups in Oak Ridge, Tennessee. Annetta James performed much of the text entry for the various reports. Christina Sekula and Myra A. Southern provided technical editing services. Sherri S. Powell, Cathy Henson, and Alania Ivey were responsible for the organization, assembly, and distribution of the many copies of every report.

EXECUTIVE SUMMARY

Alcoa/Reynolds, Bechtel, the remediation contractors, and all their workers achieved a nearly perfect work safety record over the 14 years of project history. In over 682,000 work hours, the Alcoa Massena East Smelter remediation project incurred no accidents resulting in lost workdays. Three accidental personal injuries were severe enough to require that they be reported to the Occupational Safety and Health Administration even though these employees did not miss any work as a result.

During any remedial construction, the opportunity for accidental spills, vaporization, or erosion of hazardous chemicals increases. Inspectors monitored ambient air quality at the various worksites and at the plant's eastern boundary, predominantly downwind of all excavation work. This monitoring showed that the work methods and controls were effective—results of air quality sample analyses always showed less than the lower exposure limits. The project's water management efforts were similarly effective; they included intensive year-round collection of both groundwater and surface water from each remediation site, followed by complete PCB (polychlorinated biphenyl) removal by granular activated carbon filtration before the water was released to the St. Lawrence River.

While this document is the last of the set of 12 reports, it is intended to be the first on the shelf. In other words, this is the preamble to the "Project Completion Report" required by Section II.D of the Order on Consent. This preamble serves as a directory to the ten area-specific reports and the CQA report for installation of the Landfill cap and provides comprehensive statistics of the remediation. Each of the other works covers the remediation efforts within a specific geographic area of the plant, matching the area descriptions in the Record of Decision. The individual reports provide comprehensive details regarding sampling, remediation, restoration, and any other unique aspects of the work in each geographic area. Some of the reports (the 002 Diversion Area report is a good example) provide synopses of area histories, going back to the Remedial Investigation work done under an earlier Order on Consent. Some of the reports, such as those for the Wetlands, the Rectifier Yard Ditch, and the Area North of Haverstock Road, show full restoration of the specific sites so that all restrictions to onsite use can be removed.

The soil sample data provided the information that both drove the remedial construction and proved that objectives of the Record of Decision (ROD) had been accomplished. The soil sample database, developed and maintained by Bechtel, is included with this document as an appendix. This computerized database was organized so that each sample, regardless of where, when, or how deep in the ground it was taken, could be precisely identified and located on the plant site at any future time. Every sample was assigned a unique "address" that stayed with it all through the project. Most sampling locations were precisely identified and mapped by the surveyors, and these maps are reproduced and presented in at least one volume of this Project Completion Report. The database was the main tool the project team used to plan and control the remedial excavations, and during the preparation of this report, Bechtel checked every soil sample result in this database to see that it is "closed" somewhere in these 11 area-specific completion reports.

The area-specific reports describe the success of the remediation by comparing post-excavation sample results with the cleanup goals of the ROD. Another measure of the remediation success, though not so obvious in the area-specific reports, is the difference between the *actual limits* of excavations and the *predicted limits* given in the ROD. As sampling plans were developed and executed in compliance with each area-specific Work Plan, the boundaries of the areas identified as

affected by PCBs moved both outward and downward. Sampling programs passed through several steps until the limits of the affected areas were firmly established. Samples were spaced closely, often only 25 feet apart horizontally and 1 foot apart vertically, to increase the confidence of all concerned parties that the requirements of the ROD had been fulfilled. For the Rectifier Yard Ditch, which was the first remediation done after the ROD was issued, the volume of soil excavated was nine times greater than predicted by the Remedial Investigation, which had been the basis for the remedial methods selected and cited by the ROD. For the other remediation areas, the volume of soil removed was as much as double the predicted amount. This doubled volume was not a flaw in the preliminary investigation, but rather a reflection of the investment by both Alcoa and Reynolds in the sampling program and the considerable care and planning by Bechtel in carrying out the sampling task.

The ten area-specific completion reports provide detailed descriptions of the development and use of several unique technologies. Prominent among these are a rapid field test for PCB content in soils, and a self-compacting, sand-cement-fly ash mix used to backfill areas that had to be restored quickly so that plant operations could continue as scheduled. These area-specific reports also discuss unique construction methods and actions that improved the outcome of the overall remediation: two good examples are the innovative use of the frozen surface of the Wetlands as a working surface for remedial excavation in February 1996 and the use of remedial excavation spoil from the Wetlands (with chemical concentrations less than those in the Black Mud Pond) as a substitute for clean borrow fill to form the dome beneath the pond cap.

Alcoa and Bechtel take great pride in the contributions of project quality control and quality assurance to the success of the many facets of the overall remediation. From planning document preparation through site layout, excavation, and soil disposal, and then on to the writing, editing, and assembling of these many documents, each individual involved has taken personal responsibility for quality control. This was verified by the formal quality control actions implemented by the individual subcontractors, Bechtel, and Alcoa, and certified by the Project Quality Assurance Manager. The Quality Assurance Managers, who were personally onsite nearly every day during remedial construction, wrote thorough reviews of the quality functions for each area-specific report. These excellent quality assurance reports reflect the meticulous day-to-day actions of their author and are testimonies to the precision of the entire quality assurance process.

CONTENTS

Page

CONTENTS (continued)

Page

APPENDIXES

FIGURES

TABLES

ACRONYMS AND INITIALISMS

ATL	Atlantic Testing Laboratories
CADD	computer-aided design and drafting
CDM	Camp Dresser & McKee
EPA	U.S. Environmental Protection Agency
ESI	Environmental Standards, Inc.
FCN	field change notice
FCR	field change request
IRM	interim remedial measure
LCRS	leachate collection and removal system
L/FPS	Landfill/Former Potliner Storage Area
MH	manhole
NCR	nonconformance report
NYSDEC	New York State Department of Environmental Conservation
OOC	Order on Consent
OSHA	Occupational Safety and Health Administration
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
RCP	reinforced concrete pipe
RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
ROD	Record of Decision
SPDES	State Pollutant Discharge Elimination System
TCLP	toxicity characteristic leaching procedure
WWTP	wastewater treatment plant

UNITS OF MEASURE

µg	microgram
ft	foot
gal	gallon
in.	inch
kg	kilogram
lb	pound
m	meter
mg	milligram
ppm	parts per million
psi	pounds per square inch
yd	yard

1.0 INTRODUCTION

1.1 OVERVIEW

Alcoa and Reynolds merged in the year 2001. Throughout this document and in all the preceding reports, any reference to Reynolds or Reynolds Metals Company may be interpreted as a reference to Alcoa Inc. Reynolds Metals Company still exists as a wholly-owned subsidiary of Alcoa Inc. for certain business and legal purposes. However, the former Reynolds Metals Company St. Lawrence Reduction Plant is now known as the Alcoa East Plant, or more formally as the Alcoa Massena East Smelter. We continue to make occasional reference to Reynolds throughout this document where such use is consistent with the timing or the context of the discussion.

This document summarizes the execution and results of onsite remediation activities at the Alcoa Inc. Massena East Smelter in Massena, New York. These activities included remedial activities pursuant to a Record of Decision (ROD) for the facility as well as early remediation efforts undertaken even before the ROD was in place.

The project documentation includes 12 documents (15 volumes)—this Overall Completion Report for the Site Remediation Project, the Construction Quality Assurance Certification Report for the Landfill cap (Bechtel 2003a), and the area-specific completion reports for the following ten areas:

- Area North of Haverstock Road (Bechtel 1995a)
- Black Mud Pond (Bechtel 1997a)
- Landfill/Former Potliner Storage Area (Bechtel 1997b) with the Landfill Cap Installation Addendum (Bechtel 2003b)
- North Yard (Bechtel 1998a) (2 volumes)
- Potliner Storage Pad Area (Bechtel 1996a)
- Rectifier Yard (Bechtel 1997c)
- Rectifier Yard Ditch (Bechtel 1996b)
- Soil Stockpile (Bechtel 1995b)
- Wetlands (Bechtel 1998b)
- 002 Diversion Area (Bechtel 1997d) (2 volumes)

Figure 1 is a map of major remediation work areas.

Remedial activities began with investigations in the early 1980s. Actual planning, design, and construction efforts intensified after the ROD took effect in March 1993. Nearly all remedial actions were completed by 1998. Some small-scale remedial excavations continued through December 2001. Installation of the Landfill closure cap was completed in September 2002. The successful remediation of each area was followed by post-remedial operations, inspections, maintenance, and monitoring, which will continue indefinitely. Figure 2 is a schedule of the principal remedial activities.

Designs and plans are in place for the sole remaining ROD-mandated activity—wetlands creation. Conversion of the site's borrow area to wetlands will be completed in 2003 following spring thaw and runoff. This effort, which involves no contamination, will be described in ongoing quarterly post-remedial monitoring reports.

1.2 ADMINISTRATIVE RECORD

This section summarizes background information pertaining to the ROD activities.

On September 8, 1987, the New York State Department of Environmental Conservation (NYSDEC) and Reynolds entered into an Order on Consent, Index #A6-0119-87-08 (NYSDEC 1987) to develop and execute a remedial investigation/action program that would (1) determine past, present, and potential future releases or migration of hazardous wastes from the plant site and the location of hazardous wastes on the Reynolds property and (2) evaluate disposal options and locations and closure alternatives for waste management units. Obligations arising from that Order on Consent were fulfilled with the submittal of the Remedial Investigation Report (Woodward-Clyde Consultants 1990a), a Risk Analysis Report (Woodward-Clyde Consultants 1990b), and a Revised Final Feasibility Study Report (Woodward-Clyde Consultants 1991).

On January 22, 1992, NYSDEC issued a ROD (NYSDEC 1992) that presented the selected actions for remediation of the property; the documents in the Administrative Record for the Reynolds site (Section VIII of the ROD) are the basis for the selected remedial actions. NYSDEC and Reynolds entered into another Order on Consent, Index #A6-0291-92-12 (NYSDEC 1993), effective March 1, 1993, to implement the remedies prescribed by the ROD.

In accordance with the NYSDEC Commissioner's Organization and Delegation Memorandum 89-05, Section 9, Reynolds requested that the ROD be amended to allow offsite disposal of excavated materials with polychlorinated biphenyl (PCB) concentrations $\geq$50 ppm and onsite disposal of excavated materials with PCB concentrations <50 ppm. NYSDEC agreed and issued a ROD amendment (NYSDEC 1995).

1.3 DOCUMENTATION

Remedial activities were performed in accordance with documents prepared and submitted to NYSDEC for review and approval; documents were concurrently issued to the Environmental Division of the St. Regis Mohawk Tribe. Final versions of key documents were made available to the public at several locations: Massena Public Library in Massena; Akwesasne Library and Cultural Center in Hogansburg; St. Regis Mohawk Tribe Health Services Building in Hogansburg; and NYSDEC offices in the Dulles State Office Building in Watertown. Because these documents have been issued and are readily available, information is not duplicated in this report but is incorporated by reference. Key documents are listed by remediation area in Appendix A.

In accordance with established administrative procedures, project documents are chronologically logged and filed by Bechtel's project document control center at its offices in Oak Ridge, Tennessee. With the Landfill cap completed in 2002, general files will be preserved for an additional 7 years (through 2009), and safety and health documentation will be preserved for 75 years (through 2077).

1.4 ENVIRONMENT, SAFETY, AND HEALTH

1.4.1 Philosophy

The entire project team committed to a "zero accident" philosophy that provided the foundation for an extremely effective safety and health program. Alcoa and Bechtel management provided serious attention and necessary resources. Safety was a prime consideration in all designs and, in fact, even dictated some elements of the designs. Because construction personnel usually face the greatest health and safety risks, they were especially diligent about safety for themselves and each other. The concerted efforts of the entire team paid off with the nearly perfect safety statistics presented in Section 1.4.4.

1.4.2 Implementing Documents

The *Program Environmental, Safety, and Health Plan* (Bechtel 2001), a separately revised part of the Remedial Design/Remedial Action (RD/RA) Work Plan (Bechtel 1993a), defined general (i.e., not area-specific) environmental, safety, and health requirements and delineated fundamental policies and guidelines for the work. An Area-Specific Safety and Health Plan accompanied each Work Plan (see Section 3.2) to define area-specific requirements on a task-by-task basis. The Area-Specific Safety and Health Plans referred to the overall Program Plan for the general requirements. A manual of standard operating procedures that provided implementation methodology supported both program and area-specific safety and health plans. Specific standard operating procedures addressed medical surveillance, training, air monitoring, personal protective equipment and clothing, respiratory protection, excavation, and trenching.

1.4.3 Behavioral Peer Observation Program

A behavioral-based safety program implemented at the site involved a team of trained observers from the construction crafts who were chartered with developing and implementing a job-specific observation process to heighten awareness of activities that could cause injury. The team developed a checklist and process definitions based on past experiences and general knowledge of the pending work. Team members used this checklist to perform observations of work activities at least twice a week. When an observation was completed, the observer held a close-out session with the persons being observed, focused on (1) providing feedback outlining safe work practices, (2) bringing to an awareness level those activities with potential for injury, and (3) giving all employees a voice in the safety and health program by identifying any barriers to working safely. The information gathered, entered into a computer tracking system for feedback and problem solving, shows that the program was effective in giving the workers a sense of pride and ownership of the safety program and keeping the number and severity of injuries very low.

Toolbox training meetings, a crucial part of the behavioral-based safety program, sent a clear message that crafts are a vital part of the project. Discussions at these meetings included work-related safety topics and feedback of the reports generated from the program.

1.4.4 Statistics

The Site Remediation Project compiled an excellent record of environmental, safety, and health performance. Working over 682,000 jobhours during the 14-year period from 1989 through January 2003, the project compiled the following impressive statistics:

- Number of lost workday cases = 0
- Number of Occupational Safety and Health Administration (OSHA) reportables = 3
- Number of first-aid cases = 13
- Cumulative recordable case rate = 0.88
- Cumulative lost workday case rate = 0.00
- Number of measurable offsite releases = 0

None of the three people injured in the OSHA-recordable accidents lost any workdays as a result. The cumulative recordable case rate and the cumulative lost workday case rate are based on the rates for heavy construction using the OSHA method of reporting injuries and illnesses and the Bureau of Labor Statistics method of calculating rates. For comparison, the Bureau of Labor reported a national average recordable case rate for "heavy construction except highway" of 8.4 between 1993 and 2001, with a high of 10.5 in 1993 and a low of 7.1 in 1999 (statistics for 2002 have not yet been published). The Bureau of Labor also reported an average lost workday case rate of 4.2 for the same period with a high of 5.0 in 1993 and a low of 3.6 in both 1999 and 2000 (statistics for 2002 have not yet been published).

As part of the remediation activities, Alcoa and Bechtel conducted air monitoring in the work areas and at the plant property boundary. Airborne chemistry sampling was conducted in the excavation areas for PCBs, beryllium, arsenic, polynuclear aromatic hydrocarbons (PAHs), and total dust; results never exceeded the OSHA permissible exposure limits. Boundary sampling included PCBs and respirable dust [particulate matter aerodynamically smaller than 10 microns (PM_{10})]; results never exceeded the NYSDEC action levels, and recorded PCB levels on each day of sampling were all below the allowed limit. Based on the excellent air sampling results for 1994 and 1995 (Bechtel 1996c and 1996d), the boundary sampling requirement was suspended following the 1995 construction season.

Dust control was once again a key concern during placement of the river spoils, especially when mixing cement with the spoils for drying and stabilizing. Problems were alleviated through engineering controls such as spraying the area with up to 4,000 gal of water per day. During placement of river sediments into the onsite Landfill, boundary air sampling was performed for particulate dust. Of the 148 samples taken, 133 were non-detects and 0 exceeded action levels. Additional information can be found pages 3-58, 4-36, and 4-46 of the completion report for the river remediation (Bechtel 2002b) and in the *Landfill Cap Installation Addendum to the Area-Specific Completion Report for Remediation of the Landfill/Former Potliner Storage Area* (Bechtel 2003b).

1.5 CONSTRUCTION QUALITY ASSURANCE

Construction quality assurance was performed in accordance with the *Construction Quality Assurance Plan for Remedial Action Activities* (Bechtel 1996e), which was part of the RD/RA Work

Plan. The construction quality assurance manager and the construction quality assurance program were independent of all other project management functions. The construction quality assurance manager reported directly to the Alcoa remediation project director. Each area-specific completion report includes a construction quality assurance report written by the project's construction quality assurance manager.

1.6 PROJECT PARTICIPANTS

The Site Remediation Project was accomplished by a group of committed individuals from NYSDEC, Alcoa/Reynolds, Bechtel, prime contractors, support contractors, labs, and surveyors. Figure 3 provides an organization chart. Appendix B lists the names of key contractors and the services they provided; area-specific completion reports include a more detailed breakdown.

With an emphasis on cooperation, openness, and communication, the participants shared the common goal of completing the remediation as effectively and efficiently as possible. They shared facilities, resources, data, and information along with the problems and solutions. Each entity maintained a distinct role with specific duties and responsibilities, yet all worked toward the common goal. NYSDEC provided regulatory oversight for the project, reviewed and approved documents, and inspected site activities. As owner/operator, Alcoa directed all project activities. Bechtel, the prime contractor, was responsible for design, construction management, safety and health, and related areas. Primary contractors included Perras Excavating, Perras Environmental, Atlantic Testing Laboratories, S&L Electric, Solmax, GSE, and Horizontal Technologies.

Teamwork proved invaluable, as demonstrated by the overall quality of work, adherence to schedule and budget, excellent relations, absence of significant problems, excellent safety and health record, and excellent environmental record.

The spirit of teamwork was key to the success of the Site Remediation Project. The project consistently sought to complete the work through the best means possible, considering good engineering practice, constructibility, track record, availability, regulatory acceptance, and cost. This philosophy often meant using tried and true methods and materials. Where appropriate, however, the project adopted innovative approaches to provide a better product, reduce cost, or shorten the schedule. Appendix C summarizes some of the key accomplishments. In recognition of this outstanding effort, Bechtel's senior management awarded the Integrated Project Team its highest honors for continuous improvement.

1.7 PUBLIC PARTICIPATION

Alcoa welcomed participation by the public and has striven to keep the public informed. All work has been open for public review and input.

1.7.1 Citizen Participation Plan

Early in the project, Reynolds/Bechtel prepared and issued the Citizen Participation Plan (Bechtel 1993b) to help ensure that public stakeholders were given opportunities for appropriate involvement in the project. This plan promotes public understanding of NYSDEC's responsibilities, planning activities, and remedial activities at inactive hazardous waste disposal sites. It also

provides an opportunity for the public to give NYSDEC information to help develop a comprehensive remedial program that is protective of both public health and the environment.

The Citizen Participation Plan is a publicly available document that is evaluated regularly to determine its effectiveness in accomplishing citizen participation, informing the public, and enhancing the overall goals of the remediation project.

1.7.2 Public Updates

In accordance with the Citizen Participation Plan, project updates were issued periodically to keep interested parties apprised of project activities. These updates were prepared by Alcoa/Bechtel, reviewed and approved by NYSDEC and the New York State Department of Health, and then mailed to the contact list. The contact list included elected representatives of Canadian, U.S., and tribal governments and all people who had indicated such interest in the project while attending a public meeting or in communication with NYSDEC or Alcoa.

1.7.3 Distribution of Documents

In accordance with the Citizen Participation Plan, key project documents were issued to designated document repositories (see Section 1.3) where they would be available to the public.

1.7.4 Other Public Relations

The Wetlands project was highlighted as the only display from industry at the Third Annual International Conference on the St. Lawrence River Ecosystem in Cornwall, Ontario, on May 12, 1996. Reynolds/Bechtel presented a poster session titled "Wetlands Remediation, Restoration, and Creation" and freely exchanged information with environmental groups, the Mohawk Tribe, students, scientists, and regulators. The 350 attendees and the project presenters alike enhanced their appreciation for environmental issues as well as the difficulties in solving those issues.

Members of the Reynolds project management team conducted remediation area site tours for the St. Regis Mohawk Tribe environmental staff, various citizen participation groups, students, technical associations, U.S. Environmental Protection Agency (EPA) staff, NYSDEC departments, journalists, and interested individuals. Tours included a brief history of the plant, detailed descriptions of the work accomplished or the work yet required at each site, and answers to any questions.

1.8 INTERFACE WITH RIVER REMEDIATION

Remedial activities at the Massena site have involved two separate projects: the site remediation and the river remediation. This report deals with the Site Remediation Project only. The river remediation is addressed in the *Interim Completion Report for the St. Lawrence River Remediation Project* (Bechtel 2002b).

The physical interface between the site and the St. Lawrence River work occurred at the river's edge in the Area North of Haverstock Road (see Section 2.6.6). The interface was defined as being 2 ft (vertical) above the mean water surface elevation of the river. The logistical interface was at the onsite Landfill (see Section 2.6.2), where materials removed from the St. Lawrence River were disposed of.

The remediation of the shoreline areas was done during the river dredging project in 2001. The excavated interface sites included the strip of shoreline approximately 600 ft long adjacent to the Area North of Haverstock Road, and an area 50 ft × 50 ft in the delta at 008 Outfall. The remediation work overlapped the bounds of the ROD work and is described in Section 3.4 of the *Interim Completion Report for the St. Lawrence River Remediation Project* (Bechtel 2002b).

1.9 INTERFACE WITH OTHER REGULATORY AND LEGAL INITIATIVES

In parallel with the development of the ROD and remedial actions dating back to at least 1988, Reynolds has been working with the New York State Division of Water on revisions to its State Pollutant Discharge Elimination System (SPDES) permits. NYSDEC issued a document (the "Stipulation") on March 16, 1992, requiring that Reynolds perform certain tests, experiments, investigations, equipment installations, and other actions. The stated ultimate goal of the Stipulation (item 16) is "to eliminate PCB discharges at detectable levels." Thus, compliance with the Stipulation has often been intermingled with compliance with the ROD and the Order on Consent. Bechtel provided construction management services for Stipulation compliance. The same contractors accomplished the construction requirements. Treated water generated from both compliance actions is filtered using granular activated carbon.

Construction activities involving PCB cleanup that were driven by the Stipulation rather than the Order on Consent include videotaping, flushing, and cleaning of storm drains; installing outfall sampling stations; flushing and cleaning hydraulic systems; and installing settling ponds and stormwater surge ponds at some of the outfalls. The documents describing compliance actions for the Stipulation were submitted and distributed according to its requirements. Except where the compliance actions from the Stipulation and the Order on Consent overlap and cannot be kept separate, there is no coverage of Stipulation compliance, or of other construction driven by the basic requirements of Reynolds SPDES permits, in the remainder of this Overall Completion Report.

2.0 HISTORY

Figure 2 depicts an integrated chronology of activities related to site remediation. Individual area-specific completion reports give more detailed breakdowns.

2.1 PLANT CONSTRUCTION

The Reynolds St. Lawrence Reduction Plant was built in 1958 to produce aluminum from aluminum oxide (alumina). The plant facility, which covers approximately 112 acres of the 1,600-acre property, is bounded to the north by the Grasse and St. Lawrence Rivers, to the east by CSX Railroad and a General Motors manufacturing plant just beyond, to the south by the Raquette River, and to the west by the Chase and Martin farms.

2.2 IDENTIFICATION OF CONTAMINATION

A regulatory concern arose in 1980 when Reynolds began groundwater investigations focusing on the eastern sector of the Landfill, which had formerly served as a potliner storage area. The first investigative soil borings were made in 1981. In April 1983, Reynolds issued its first Solid Waste Landfill Plan and Report, which included a section titled "Plan for Compliance with 6 NYCRR 360.8," providing the basis for the eventual Landfill closing. The Landfill Plan also called for installation of the first leachate collection system, for which construction began in autumn 1983 and was completed by summer 1984. The Landfill continued to be operated in accordance with the 1983 plan until 1987 when, under an Order on Consent dated September 9, 1987, Reynolds submitted a new 10-Year Solid Waste Management Plan. The Order on Consent and the new plan led to the permanent shutdown of the Landfill effective June 30, 1990.

The 1987 Order on Consent provided for additional studies leading to the 1993 Order on Consent and the associated ROD. Reynolds retained Woodward-Clyde Consultants during the negotiation phase of the 1987 Order, and Woodward-Clyde continued to serve as the lead consultant for Reynolds until the 1993 Order on Consent was issued. Bechtel joined the project team in 1990 as the lead design firm to perform project and construction management functions for the full remediation. During subsequent design and construction phases, Bechtel also executed several additional rounds of subsurface investigations.

2.3 REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Reynolds retained Woodward-Clyde Consultants in 1987 to do the remedial investigations and feasibility studies required by an Order on Consent issued by NYSDEC in November of that year. Initially, Woodward-Clyde's investigation focused on the Landfill and the two long-term storage areas for potliner and potliner-related materials—the Former Potliner Storage Area (located adjacent to the Landfill and now considered part of the Landfill remediation area) and the Black Mud Pond. In spring 1988, the area under investigation expanded to encompass the entire plant, and PCBs were added to the list of chemicals of concern.

To obtain the information to complete the Remedial Investigation, Woodward-Clyde used:

- Soil borings for soil and sediment sampling
- Monitoring wells and piezometers for groundwater elevation measurement and chemical analysis

- Surface water sampling for chemical analysis of stormwater runoff
- Soil permeability testing
- Studies of environmental resources (e.g., air quality, geology, hydrology, hydrogeology, ecology)
- Historical data (e.g., historical aerial photos and maps)
- Plant records (e.g., plant design, construction, and operation records)
- Employee interviews

The Feasibility Study involved screening various technologies and developing remedial alternatives, and the Revised Feasibility Study Report (Woodward-Clyde Consultants 1991) presents a detailed evaluation of each alternative. The criteria against which these alternatives were judged are:

- Short-term impacts and effectiveness
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, and volume of contamination
- Implementability
- Compliance with applicable or relevant and appropriate requirements (ARARs)
- Overall protection of human health and the environment
- Cost

Woodward-Clyde Consultants compiled the results of the investigations in a series of reports, the most comprehensive of which include:

- Preliminary Remedial Investigation Report (Woodward-Clyde Consultants 1989)
- Revised Final Remedial Investigation Report (Woodward-Clyde Consultants 1990a)
- Revised Final Feasibility Study (Woodward-Clyde Consultants 1991)

These extensive investigations and the resulting documents provided the basis for the eventual development of the ROD, the 1993 Order on Consent, and the Remedial Designs.

2.4 EARLY CONSTRUCTION TO REMOVE PCBs FROM DISCHARGE WATER

In March 1992, Reynolds began a program that included a wide-scale compilation of the plant's water uses, an assessment of the potential for introducing PCB contamination at individual drain connection points, and an evaluation of existing effluent treatment processes. As part of these facility-wide activities, Reynolds initiated measures to improve the quality of its water discharges. Some of these measures required excavation and proper disposal of any spoil with elevated PCBs. Most of the spoil was then handled and disposed of in the same way as material from the areas defined in the ROD; in fact, much of the spoil was first placed in the ROD area called the Soil Stockpile, which was eventually moved to the Landfill after the Order on Consent was issued.

2.5 INTERIM REMEDIAL MEASURES

Interim remedial measures (IRMs) were carried out to minimize releases to the environment until the final remedial action plan could be selected and approved; most IRMs were documented in reports transmitted to NYSDEC at that time. These activities were further compiled and summarized in area-specific completion reports issued under the ROD. Appendix D lists the interim remedial measures and the area-specific completion reports where the information is summarized.

2.6 ROD ACTIVITIES

The ROD presents the remedies selected for the following operable units and areas of concern at the site:

- Black Mud Pond (BMP)
- Landfill/Former Potliner Storage (L/FPS) Area – referred to as the "Landfill"
- Wetlands
- Potliner Storage Pad (PSP)
- North Yard
- Miscellaneous Areas
  - Rectifier Yard, including the associated Rectifier Yard Ditch
  - Soil Stockpile
  - West Ditch Outfall
  - Area North of Haverstock Road (ANHR)
  - Outfall 006 Ditch
  - 002 Diversion Area

The following sections summarize the work performed as specified in the ROD. Section 3.0 summarizes the work processes and addresses chemicals of concern, cleanup goals, and volumes. Appendix A lists the area-specific documents containing detailed information.

2.6.1 Black Mud Pond

The 6-acre Black Mud Pond, situated on a ridge west of the plant, was built to store residues from the process that recovered cryolite from spent potliner; active use of the pond ended in 1990.

The primary goal of the remediation was to eliminate migration of black mud constituents. To this end, a network of over 2,200 linear feet of sand-filled french drains was installed in the Black Mud Pond to extract black mud leachate and thus reduce the driving force for possible migration. The area was also capped with a hazardous waste closure cap to isolate the waste and prevent surface water infiltration.

The black mud provided several challenges. In particular, the material is structurally very weak when wet and exhibits a low permeability that makes it slow to dewater.

A detailed evaluation of the leachate extraction progress concluded that extraction is progressing as predicted by the design (Bechtel 1999). The quarterly Post-Remedial Reports give periodic evaluations of the leachate extraction progress.

Since the *Area-Specific Completion Report for Remediation of the Black Mud Pond* (Bechtel 1997a) was approved by NYSDEC, no additional remedial efforts have been undertaken in this area.

Post-remedial requirements and commitments for the Black Mud Pond remain in effect in accordance with the *Post-Remedial Operations, Maintenance, and Contingency Plan for the Black Mud Pond* (Bechtel 1996f). Key post-remedial activities include groundwater collection and treatment, inspections,

and monitoring. Activities will continue to be documented and reported in the quarterly Post-Remedial Reports.

2.6.2 Landfill/Former Potliner Storage Area

The 11½-acre L/FPS Area (also referred to as "the Landfill") is south of the plant facility and immediately north of the Wetlands. The Landfill had received putrescible and industrial waste, construction debris, spent potliner, and sewage sludge. In addition, soils containing <50 ppm PCBs were disposed of in the Landfill during the onsite remediation.

A new perimeter leachate collection trench was installed and keyed into the highly impermeable substrate. Also installed was a new double-walled leachate transfer line from the Landfill to the North Yard granular activated carbon system.

As part of this remediation, the area north of the Landfill, which is mostly within the New York Power Authority's easement, was excavated to remove stray debris, then sampled and restored. This action, performed under Field Change Request (FCR) 190, reduced the size of the managed unit by more than 2 acres, reduced generation of potentially contaminated surface water to be collected and treated, relieved most environmental restrictions on the area, and increased clearance with the overhead powerlines.

Since the *Area-Specific Completion Report for the Remediation of the Landfill/Former Potliner Storage Area* (Bechtel 1997b) was approved by NYSDEC, several additional remedial efforts have been undertaken in this area. These actions are documented and reported in the quarterly Post-Remedial Reports. Key activities since 1997 include the following.

An area identified in 1998 as a former short-term storage area for potliner and other process material and known as the "Former Material Stockpile Area," was managed and remediated under the Landfill Area of Concern. This ¼-acre area was sampled under FCR-199 and remediated under FCR-200. The work was reported in the *Post-Remedial Report for Second Quarter 1998* and in the *Landfill Cap Installation Addendum to the Area-Specific Completion Report for Remediation of the Landfill/Former Potliner Storage Area* (Bechtel 2003b).

After dredging spoils with <50 ppm PCBs from the St. Lawrence River were disposed of in the Landfill, it was closed with a hazardous waste closure cap to reduce infiltration and subsequent leachate generation. Disposal of the river dredging spoils in the Landfill and installation of the closure cap are addressed in the *Landfill Cap Installation Addendum to the Area-Specific Completion Report for Remediation of the Landfill/Former Potliner Storage Area* (Bechtel 2003b). Construction quality assurance associated with this work is addressed in the *Construction Quality Assurance Certification Report for the Landfill/Former Potliner Storage Area Closure Cap* (Bechtel 2003a).

Post-remedial requirements and commitments for the Landfill remain in effect in accordance with the *Post-Remedial Operations, Maintenance, and Contingency Plan for the Landfill/Former Potliner Storage Area* (Bechtel 1996g). Key post-remedial activities include leachate collection and treatment, inspections, and monitoring. Activities will continue to be documented and reported in the quarterly Post-Remedial Reports.

2.6.3 North Yard

Located north of the main plant buildings, the North Yard is the center for receiving, storing, and distributing raw materials for the plant's uninterrupted operation. Consequently, designers of the remediation in this area faced the daunting challenge of massive excavations in the center of congested production facilities without disrupting plant operations.

To meet the plant's operational requirements, two distinct remedial construction plans were developed and described in a ROD amendment (NYSDEC 1995). These plans divided the North Yard into critical and non-critical work areas:

- Area 1 was defined as the area where essential plant operations take place. The design required excavating to predetermined limits and then capping areas with residual PCB levels $\geq$10 ppm. Area 1 covered nearly 3 acres.
- Area 2 was defined as the contaminated but non-critical portions of the North Yard. The design for this area was similar to that for other onsite remediation areas—excavation of soils exceeding the cleanup goal, followed by restoration. Area 2 covered nearly 7 acres.

All elements of the design were accomplished without deficiency. In fact, although the ROD amendment allowed for higher residual levels of PCBs in Area 1, remedial excavations in most of that area met the more stringent cleanup goal established for Area 2.

Since the *Area-Specific Completion Report for the Remediation of the North Yard* (Bechtel 1998a) was approved, several additional remedial efforts have been undertaken in this area. These actions are documented and reported in the quarterly Post-Remedial Reports. Key activities since 1998 are summarized below.

In March 2000, an underground water main in North Yard grid H32 (south of Facility 25A, the Unloading Shed) was repaired. The resulting excavation spoils (approximately 25 yd^3 at 8 ppm PCBs) was disposed of in the Landfill in May 2000. Details are given in the *Post-Remedial Report for Second Quarter 2000.*

PCBs were identified in the excavation spoil from the July 2000 repair of the concrete pavement covering North Yard grid G41. The area was investigated under FCR-204 and remediated under FCR-206. All of the broken concrete pavement (approximately 115 yd^3) and all of the soil from grids G42 and J44 (69 yd^3) were disposed of in the Landfill (total of 184 yd^3); remaining spoils (92 yd^3) were disposed of offsite. The remedial effort was completed in August 2001 and reported in the *Post-Remedial Report for Third Quarter 2001.*

In the summer of 2001, to facilitate replacement of the plant's 42-year-old potable water storage tank, the remediation group sampled the proposed tank site, located immediately east of the existing tank (Facility 65A), which is near the west end of the North Yard Area of Concern. Soil samples collected in September 2001 from beneath the concrete over the proposed excavation footprint showed PCB concentrations <4 ppm in the upper 6 in. and non-detect in the 24- to 30-in. depth. Results were presented to NYSDEC on October 12, 2001, along with a basic work plan for dealing with the various types of excavation spoil. NYSDEC approved the excavation and disposal plans on

October 30. Perras removed the concrete layer and the upper 2 ft of soil, after which the area was turned over to the general contractor. The soil (46 yd^3) was disposed of in the Landfill. To formally record the work, Field Change Notice No. 209 (FCN-209), Area Excavation for Water Storage Tank Installation, was submitted to NYSDEC on November 20, 2001, and was approved by NYSDEC on November 30. Details of this work are given in the *Post-Remedial Report for Fourth Quarter 2001.*

Post-remedial requirements and commitments for the North Yard remain in effect in accordance with the *Post-Remedial Operations, Maintenance, and Contingency Plan for the North Yard* (Bechtel 1995c). Key post-remedial activities include limited groundwater collection and treatment, inspections, and monitoring. Activities will continue to be documented and reported in the quarterly Post-Remedial Reports.

2.6.4 Wetlands

"Wetlands RR-6" is the delineated area officially classified by NYSDEC as a Class II freshwater wetland. Covering approximately 172 acres, it is one of the three largest wetlands in the Town of Massena and is located entirely on plant property to the south and west of the plant buildings.

The Wetlands Operable Unit is the actual remediation area and is not to be confused with the officially delineated wetlands described above. Most of the remediation area was inside the delineated wetlands, though a portion fell outside. The 12-acre Wetlands Operable Unit was comprised of:

- The remediation area within Wetlands RR-6, which covered 7 ¾ acres south of the Landfill
- The remediation area outside of Wetlands RR-6, which covered 4 ¼ acres west of the Landfill (referred to as the "Area West of the Landfill" and added to the operable unit because it drains to the Wetlands)

As noted in Section 2.6.6, 4 ½ additional acres of the delineated Wetlands RR-6 were remediated as part of the Rectifier Yard Ditch Operable Unit. Thus, the total area of excavation within Wetlands RR-6 was 12 ¼ acres.

Following remediation, the Wetlands were restored in a unique manner that included creation of scattered islands surrounded by open water. The islands were formed by randomly piling soil that was carefully selected from fallow land bordering the delineated wetlands. Known as "seed bank," this soil consisted essentially of organic-rich sod and topsoil containing viable wild plants that would flourish in the wetlands environment. As of the issue date of this report, the Wetlands are flourishing. Not only is all evidence of the previously contaminated condition gone, but there is very little trace of the remediation.

Based on the Alternatives Analysis included with the Wetlands Work Plan (Bechtel 1994a), creation of additional wetlands was planned to compensate for the Wetlands area consumed by the Landfill closure cap and buffer zone and to offset any areas that failed to recover to healthy wetlands. Implementation of a Characterization Plan (Bechtel 1994b) determined that the site's proposed Borrow Area provided an appropriate location for creating wetlands. The Borrow Area Use Plan (Bechtel 1994c; as amended, Bechtel 1998c and 2002) for controlling borrow activities and the Mitigation Action Plan (Bechtel 1995d) for controlling wetlands restoration and creation were

developed jointly to facilitate the eventual conversion of the Borrow Area to wetlands. Borrow activity continued through installation of the Landfill cap in 2002, although the excellent suitability of the Borrow Area for wetlands development had already been well demonstrated.

Since the *Area-Specific Work Plan for Remediation of Contaminated Portion of Wetlands* (Bechtel 1994a) was approved, several additional efforts have been undertaken in this area. These efforts are documented and reported in the quarterly Post-Remedial Reports. Key activities since 1994 are summarized below.

Amendment No. 2 to the *Borrow Area Use Plan*, Revision 1 (Bechtel 1994c) was submitted to NYSDEC on June 17, 2002. This amendment provided for extending the Borrow Area westward to make available an additional ±3 acres, with the excavated area subsequently converted to wetlands. NYSDEC approved the amendment without comment on June 27, 2002.

The Borrow Area was accordingly extended in the summer of 2002. Perras reworked the islands and shoreline of the borrow pit, completing the ROD requirement to enhance the pit area so that it converts to healthy wetlands. Perras created several new islands, flattened and roughened the mainland shoreline, and roughened up the island perimeters to encourage the natural establishment of a variety of shoreline and water vegetation. The roughened shorelines also provide safe habitat for ducks, various other birds, and small fish.

When Perras was mining the borrow pit for clay for the Landfill cap in July and August 2002, they exposed thousands of large boulders in the glacial till below the clay layer. Truckloads of these boulders were used to build a reef and a few rocky islands in the deepest portions of the borrow pit.

Alcoa integrated some wetlands mitigation work for the Alcoa Massena West plant with some similar ongoing work at the Massena East plant. Although the wetlands creation project for the Massena West plant is not under the ROD, the work is described here because the Alcoa West replacement wetlands and the Alcoa East mitigation wetland enhancements complement and blend into each other.

Field work for the wetlands creation project for Alcoa's Massena West Smelter was performed primarily by Camp Dresser & McKee (CDM) and Perras Excavating under the direction of Alcoa and Bechtel's onsite management. Field work ran from May through November 2002.

Perras constructed six dams (three sheetpile dams and three earthen embankments) for improved long-term water management. Perras also built access roads to the dam sites using mined or reclaimed onsite materials—rocky clay (unsuitable for the Landfill cap) from the borrow pit for the base with crushed stone recovered from the River Remediation Project staging areas for the surface. Where one of the roads passed close to the plant's 011 stormwater monitoring outfall station, a spur was built off the road to provide safer, year-round access to that station for the sampling crew. The roads provide for construction and long-term maintenance access to the dams; they do not provide general access to the wetland site. Perras also erected a platform suitable for osprey nesting atop a 50-ft-high pole in the wetlands.

CDM placed about 250 nesting boxes in the wetlands, consisting of:

- 100 boxes for bluebirds (a species rare in northern New York/St. Lawrence County but seen in greater numbers in recent years)
- 50 boxes for wood ducks, small owls, or woodpeckers
- 25 wren houses
- 25 hanging mallard nests
- 50 bat boxes

While pumping water from one of the dam sites, Perras noticed hundreds of small fish, mostly young bullhead, trapped in a small pond. Perras filled several 30-gal pails and moved many of the fish to the borrow pit. The pit area is now nicely stocked with at least one species that should thrive and at the same time attract the birds and mammals that feed on them.

For the Wetlands remediation area, post-remedial requirements and commitments have been satisfied, and no further work in this area is planned or required.

For the Wetlands creation area, the Borrow Area/Mitigation Wetlands will eventually tie into the new wetlands created in the fall of 2002 for the Alcoa West plant mitigations. This tie-in and the refilling of the Borrow Area/Wetlands are planned for the spring of 2003. Activities will continue to be documented and reported in the quarterly Post-Remedial Reports.

2.6.5 Potliner Storage Pad

The Potliner Storage Pad is a concrete slab immediately north of the Crusher Building on the northwestern side of the plant; the pad was used in the past to store spent potliner materials. The remediation area encompasses the concrete pad and includes the vicinity of Building 82 (Crusher Building) and Building 85 (Cathode Digging Building) as well as the West Ditch running through the area. The originally designated area grew to include an additional area designated "area south of the Digging Building," bringing the total remediation area to 5 acres.

Remedial work included extensive paving to direct and channel surface runoff and thus preclude groundwater recharge.

Since the *Area-Specific Completion Report at the Remediation of the Potliner Storage Pad Area* (Bechtel 1996a) was approved, only one additional significant remedial effort has been undertaken in this area. In September 1999, excavation was performed near Facility 85 (Cathode Digging Building) as part of the plant modernization effort. The resulting excavation spoils (approximately 120 yd^3) were disposed of in the Landfill. The work was noted in the *Post-Remedial Report for Third Quarter 1999.*

Post-remedial requirements and commitments for the Potliner Storage Pad remain in effect in accordance with the *Post-Remedial Operations, Maintenance, and Contingency Plan for the Potliner Storage Pad* (Bechtel 1995e). Key post-remedial activities include inspections and monitoring. Activities will continue to be documented and reported in the quarterly Post-Remedial Reports.

2.6.6 Miscellaneous Areas

Area North of Haverstock Road

The Area North of Haverstock Road is a narrow strip of land (approximately 1,200 ft long and varying between 200 and 300 ft wide) between Haverstock Road and the St. Lawrence River. Under the ROD requirement that this area (along with the Rectifier Yard Ditch) be one of the first areas remediated, 3 ¼ acres were excavated, backfilled, graded, and seeded.

Since the *Area-Specific Completion Report for Remediation of the Area North of Haverstock Road* (Bechtel 1995a) was approved by NYSDEC, no additional remedial efforts have been undertaken in this area. Post-remedial requirements and commitments were satisfied in October 1999, and no further action under the ROD is planned or required for the Area North of Haverstock Road.

Outfall 006 Ditch

Outfall 006 was partially remediated during installation of a new storm sewer and outfall (Bechtel 1992). The final remediation of Outfall 006 was included in the remediation of the Area North of Haverstock Road. The 006 drainage pathway was intercepted and directed to the 001 Outfall in 1994.

Rectifier Yard

The Rectifier Yard is on the southern end of the plant within the perimeter road; its principal use is as a high-voltage electrical substation. Surface water is drained from the Rectifier Yard by three networks of catch basins that discharge to the Wetlands.

The Rectifier Yard was remediated, with ½ acre excavated, backfilled, graded, and restored with a crushed stone surface. Work included extending and rerouting storm drains, excavating oil transfer piping, cleaning storm drains, and providing a sampling station/retention pond for surface water runoff just upstream of the Wetlands.

Since the *Area-Specific Completion Report for the Remediation of the Rectifier Yard* (Bechtel 1997c) was approved, no additional remedial efforts have been undertaken in this area. Post-remedial requirements and commitments for the Rectifier Yard remain in effect in accordance with the *Post-Remedial Operations, Maintenance, and Contingency Plan for the Rectifier Yard* (Bechtel 1995f). Key post-remedial activities include inspections and monitoring the surface water chemistry from the pond east of the Landfill. Activities will continue to be documented and reported in the quarterly Post-Remedial Reports.

Rectifier Yard Ditch

Although the ROD identified the Rectifier Yard Ditch as part of the Rectifier Yard, it required that the ditch (as well as the Area North of Haverstock Road) be excavated immediately. To best comply with that requirement, the ditch was split apart from the rest of the Rectifier Yard, thus creating the need for separate documentation.

The Rectifier Yard Ditch is south of the plant and extends from near the southern edge of the road at the Scale Building southward to the Wetlands. The area defined during the Remedial Investigation consisted of the drainage gully only and totaled about ¾ acre. As the work progressed, however, the sampling program followed the contamination beyond the bounds of the gully and into the Wetlands; this "eastern extension of the Rectifier Yard Ditch," as it was called, covered an additional 6 ¾ acres. Of the nearly 7 ½ acres ultimately remediated, 4 ½ acres were within the delineated Wetlands RR-6; Wetlands cleanup goals were achieved in this 4 ½ -acre area.

Since the *Area-Specific Completion Report for Remediation of the Rectifier Yard Ditch* (Bechtel 1996b) was approved by NYSDEC, no additional remedial efforts have been undertaken in this area. Post-remedial requirements and commitments were satisfied in October 1999, and no further action under the ROD is planned or required for the Rectifier Yard Ditch.

Soil Stockpile

The Soil Stockpile, southwest of the Black Mud Pond, consisted of excavated earth containing <10 ppm PCBs. The soil, which had been stockpiled from various remediation activities before the signing of the Order on Consent, was removed in its entirety and disposed of in the onsite Landfill. Disturbed areas were then restored.

Since the *Area-Specific Completion Report for the Remediation of the Soil Stockpile* (Bechtel 1995b) was approved by NYSDEC, no additional remedial efforts have been undertaken in this area. Post-remedial requirements and commitments have been satisfied, and no further action under the ROD is planned or required for the Soil Stockpile.

West Ditch Outfall

The upstream portion of the West Ditch was remediated as part of the remediation effort for the Potliner Storage Pad. The remaining portion of the West Ditch was remediated as an interim remedial measure (Section 2.5).

002 Diversion Area

The 002 stormwater drainage system is one of the plant's three principal tributaries to the St. Lawrence River. As described in the ROD, the 002 Diversion Area is an open field inside the northeastern corner of the plant fence; from 1959 until 1988, it served as a fill area for spoils from plant construction projects.

The boundaries of the 002 Diversion Area were expanded to remediate an area near the engineering offices in 1995, an area near the plant water tower in 1996, and an area outside the northeast corner of the plant fence in 1999.

When the open field area was remediated, about ½ acre was excavated, backfilled, and restored. The other three excavation sites were small, each less than a tenth of an acre.

Since the *Area-Specific Completion Report for the Remediation of the 002 Diversion Area* (Bechtel 1997d) was approved, several additional remedial efforts have been undertaken in this area.

These efforts are documented and reported in the quarterly Post-Remedial Reports. Key activities since 1997 are summarized below.

In June 1998, PCBs were detected at the 005 Outfall, which is within the 002 Diversion Area. An extensive investigation revealed PCB concentrations between 1 and 10 ppm in some isolated upstream areas. FCR-202, Remedial Work at 005 Outfall Basin, was submitted on March 24, 1999, and subsequently approved by NYSDEC. Remedial excavation began in July 1999 and was completed in August. All of the excavated soil (estimated at 1,600 yd^3) had PCB concentrations below 10 ppm and was disposed of in the Landfill. Details are given in the *Completion Report for Remediation of the 005 Drainage Basin* (Alcoa 2002) and in the *Post-Remedial Report for Third Quarter 1999.*

During October and November of 2001, Alcoa rebuilt the Sewage Plant Drying Beds located within the 002 Diversion Area. The work included installing a concrete floor beneath the sand bedding layer and installing a double-walled piping system for the drying bed filtrate. Per established protocol for excavations in the 002 Diversion Area, the bedding layers for the drying beds were sampled, with all results <1 ppm PCBs. The sand bedding, filter stone, and a layer of the underlying soils from the beds were shipped offsite for disposal in accordance with Alcoa standard practice. Chain-of-custody records were transmitted from Alcoa to NYSDEC on January 11, 2002. Details are given in the *Post-Remedial Report for Fourth Quarter 2001.*

In November 2001 and in conjunction with the effort to rebuild the Drying Beds in the 002 Diversion Area, the filtrate collection sump and the filtrate transfer pipeline from the Drying Beds to the Treatment Plant (components installed during plant construction in 1958) were replaced both with components that provide double containment with inspection capabilities. This effort necessitated excavating trenches north of the Drying Beds, within the 002 Diversion Area. Consequently, FCR-210, Pipeline Excavation North of Sewage Treatment Plant Drying Beds, was submitted on November 20, 2001. Excavation spoils (approximately 105 yd^3) were disposed of in the Landfill. Details of this work are given in FCR-210 and the *Post-Remedial Report for Fourth Quarter 2001.*

In the fall of 2001, Alcoa removed an office trailer and concrete pavement to prepare for the construction of a new locker building within the 002 Diversion Area. In keeping with established procedures, the area was recognized as having a potential for PCB contamination. The area was characterized and remediated in accordance with the approved *Locker Building Area Site-Specific Remedial Action Work Plan* (Alcoa 2001). The contaminated concrete and soil (roughly 300 yd^3) were shipped offsite for disposal. Some follow-up work in December 2001 consisted of cleaning up the area that had been covered by the stockpile of broken concrete removed from the aforementioned area; this soil (approximately 86 yd^3) from beneath the concrete stockpile (not the soil from the building site) showed residual levels of PCBs between 0.14 and 3.8 ppm and was accordingly disposed of in the onsite Landfill. The final excavated surface was sampled and analyzed for PCBs; the results, which showed no detectable PCBs at a detection limit of 0.1 ppm, were submitted to NYSDEC on January 4, 2002. Details of this work are given in FCN-211, the January 2002 Monthly Report, and the *Post-Remedial Report for Fourth Quarter 2001.*

In May and June 2002, a site within the 002 Diversion Area was remediated in accordance with the "Sewage Treatment Plant – Remedial Excavation Work Plan," a letter submitted by Alcoa on May 17, 2002. In preparation for plant improvements, an aboveground line used to convey digested sewage sludge to the holding tank upstream of the drying beds was removed, and an 80-ft-long strip along the run of the line was excavated to a depth of 2 ft for PCB removal. An abandoned sludge

transfer line in the area was also excavated. Spoils with <50 ppm PCBs (roughly 300 yd^3) were disposed of in the onsite Landfill.

Figure 4 shows the Sewage Treatment Plant area.

Post-remedial requirements and commitments for the 002 Diversion Area were satisfied in June 2000. Nevertheless, Alcoa continues to recognize the potential for residual contamination to remain in this water management area and will manage future work accordingly. Activities will continue to be documented and reported in the quarterly Post-Remedial Reports.

2.7 SUPPORT FACILITIES

Facilities built and used to support the remedial work required by the ROD were the:

- Project office complex
- Decontamination facility
- Temporary storage area for excavated soils
- Borrow area
- Haul roads and access roads
- Modified utilities
- Monitoring wells and piezometers
- Drying beds
- North Yard granular activated carbon system

2.7.1 Project Office Complex

The project office complex west of the plant included laydown yards and storage trailers for materials and equipment; parking areas; and offices for Alcoa/Bechtel, subcontractor, and NYSDEC personnel.

2.7.2 Decontamination Facility

The onsite decontamination facility was built in 1990 for efforts associated with interim remedial measures. Under the ROD, the facility was repaired, operated, inspected, and maintained throughout the project.

Whenever necessary, equipment used in controlled areas was carefully transported to the facility and decontaminated in accordance with procedures. The cleaned equipment was inspected before being released.

Following completion of the site and river remediation efforts, the decontamination facility was cleaned. The facility will be available for operations and maintenance support and future work as needed.

2.7.3 Temporary Storage Area for Excavated Soils

The remediation's first onsite storage area, built during the summer of 1990, was used to accumulate sediments excavated during the 002 Ditch Remediation for shipment. It was quickly recognized that

this geotextile and plastic lined area and its adjacent decontamination facility were too small for project needs, and a new, larger, asphalt- and concrete-lined storage pad with a larger decontamination station were built south of the original facilities. When the first storage area and decontamination stations were removed, the underlying soils were sampled and found clean of residual contamination.

The storage area was used frequently during subsequent remediations; it was cleaned and maintained after each storage cycle.

Following completion of the site and river remediation efforts, the decontamination facility was cleaned. The facility will be available for future work, if needed.

2.7.4 Borrow Area

Large quantities of clean soil were needed: clay for caps, general soil fill for grading, and topsoil to support revegetation efforts. Reynolds found a potential onsite source on fallow land on its property less than ½ mile west of the plant.

In addition to meeting the project's needs for large quantities of soil, the Borrow Area is ideal for conversion to wetlands. Extensive characterization demonstrated that the area contains suitable borrow and has the natural characteristics needed to sustain a wetland. When converted, the borrow site will provide about 6 acres of wetland, much of it open water.

Borrow pit operations were designed to enable easy conversion of this area to wetlands. Borrow activities included excavating near the surface for topsoil, excavating deep pits for clay, creating islands, cutting spillways for overflow to enter the stormwater collection pond, and seeding disturbed areas. The area presently includes sizable deep-water ponds, several large islands, and over 6,000 linear ft of shoreline.

Borrow activities are governed by the *Borrow Area Use Plan* (Bechtel 1994c) as amended (Bechtel 1998c and 2002) to increase the size of the Borrow Area. Conversion of the borrow area to wetlands will be completed as described in Section 2.6.4.

2.7.5 Drying Beds

Drying beds built in the summer of 1994 as an integral part of the North Yard Wastewater Treatment Plant (WWTP) consist of a single, covered, open-sided structure with four hydraulically isolated chambers, providing about 3,000 ft^2 of filter surface area. Drainage is collected and discharged to the North Yard granular activated carbon system. These drying beds were available during remediation for the following materials:

- Carbon from the North Yard granular activated carbon filters
- Skimmings from the sand filter at the 001 Outfall
- Sediment from the sediment basin at the 001 Outfall
- Sediment from the stilling basin and pond at the 002 Outfall
- Sediment from the Waste Water Treatment Plant
- Sediment from storm drains

- Sediment from the decontamination facility sump
- Sediment from miscellaneous remediation activities

2.7.6 North Yard Granular Activated Carbon System

The North Yard granular activated carbon system, installed in 1991, was first used to treat surface water and shallow groundwater from the North Yard area. This system was used throughout the project to treat stormwater collected from all the remedial excavation sumps. It continues to be used to remove PCBs from Black Mud Pond and Landfill leachate and from shallow groundwater in the North Yard.

2.7.7 Modifications to Utilities, Wells/Piezometers, and Other Facilities

Plant facilities related to the environmental remediation efforts were modified or upgraded as needed. Activities included:

- Installation of additional monitoring wells/piezometers
- Decommissioning of some existing wells/piezometers
- Utility work to support the project office complex
- Installation of a new Landfill leachate transfer line (double-walled pipe with leak detection capability) and a new Landfill pumphouse

Thirty-two onsite monitoring wells/piezometers were decommissioned in the summer of 2002, in accordance with the letter from Alcoa (D. Bence) to NYSDEC (P. Waite), dated May 23, 2002, with a subject of "Wetland Area Piezometers." Decommissioning consisted of removing the steel surface casings, removing the PVC riser casing and screen by over-drilling to approximately 1 ft below the well sump, and backfilling with cement-bentonite grout. Decommissioning reports are given in Appendix E.

Table 1 lists the active and decommissioned monitoring wells and piezometers for each remediation area. Table 2 provides the survey data for the wells and piezometers, and Figure 5 shows their locations.

2.8 POST-REMEDIAL ACTIVITIES

2.8.1 Post-Remedial Operations, Inspections, Monitoring, Maintenance, and Contingencies

Post-remedial activities are defined in the area-specific post-remedial operation, maintenance, and contingency plan appended to each area-specific Remedial Design. These plans address operations, maintenance, monitoring, inspections, and implementation of any necessary contingencies to ensure that remediation efforts are functioning as intended and that human health and the environment are being protected.

Post-remedial activities are currently in progress for each area, with results documented in quarterly post-remedial reports. Post-remedial activities will continue indefinitely, and any changes to the plan must be approved by NYSDEC.

The post-remedial reports were prepared and submitted every quarter by the Remediation Group from first quarter of 1997 through the first quarter of 2002. As of April 1, 2002, the responsibilities for operations, monitoring, formal inspections, and maintenance of remediated sites passed from the remediation team to a combination of departments at Alcoa Massena's operations.

Appendix F provides a schedule for post-remedial inspection and monitoring activities.

2.8.2 Management of Future Onsite Excavations

The ROD and the Remedial Designs specify cleanup goals that differ for the individual areas of concern. Some areas were successfully cleaned of PCBs to residual levels of <1 ppm across the entire area; residual levels are higher in portions of some other areas, including the North Yard and the 002 Diversion Area. Some other chemicals of concern listed in the ROD remain at elevated levels; for example, fluoride concentrations in the soil in parts of the Potliner Storage Pad area remain above ROD targets. Some areas are covered, per the Remedial Design, with low-permeability materials or with hazardous waste closure caps to reduce groundwater recharge and reduce migration of groundwater with chemical concentrations exceeding regulatory limits.

As an active plant with need for underground utility repair or installation and an occasional need for installation of new facilities, Alcoa manages all excavations with consideration for residual levels of chemicals regulated by the ROD. This management includes instituting proper controls for the safety and health of workers, proper storage and disposal of excavation spoil, and proper restoration of the excavated area.

Remediation in some areas of concern has been completed in that all ROD cleanup goals were achieved and verified so that future soil disturbances in these areas can proceed without concern for the presence of residual ROD-listed substances. These areas are the:

- Wetlands, including the Area West of Landfill
- Rectifier Yard and Rectifier Yard Ditch
- Soil Stockpile Area
- Area North of Haverstock Road
- SPDES Point 004 Outfall
- West Ditch Outfall

Alcoa manages excavations in all other ROD areas. Management issues include, but are not limited to:

- Review of the necessity for excavation and of alternatives that could eliminate such need
- Review of "as-built" maps and tables of residual levels of ROD-listed substances
- Establishment of proper safety and health programs for the excavation crew and for others who might be exposed

- Management of excavation spoil, including proper interim storage and proper disposal
- Establishment of proper waste profiles if offsite disposal is necessary
- Restoration of covers or hazardous waste closure caps disturbed by excavation
- Notification to NYSDEC prior to and after completion of the excavation work

There is no prescribed time period after which Alcoa' responsibility to manage excavations within the ROD areas of concern will end. Thus, the final facet of this management program is to amend and adapt it to reflect changing conditions as time passes.

3.0 REMEDIATION PROCESS

3.1 PRESCRIBED REMEDIES

3.1.1 Strategy

The remediation strategies dictated by the ROD typically consisted of some combination of excavation, capping, restoration, collection and treatment of groundwater, and post-remedial monitoring.

3.1.2 Chemicals of Concern and Cleanup Goals

Cleanup goals are stipulated in Section V of the ROD. Appendix G summarizes the cleanup goals applicable to each remediation area.

The chemical of concern that drove most remediations was total PCBs.

PAHs seldom drove excavation, but the cleanup goals for these analytes were usually met when soils were excavated to the PCB goals. The 002 Diversion Area, where excavation to achieve PAH goals continued after PCB goals were reached, was a notable exception.

Cyanide, fluoride, and sulfate were chemicals of concern in the Wetlands and Potliner Storage Pad areas. Soil and sediment were analyzed for these anions by a modified toxicity characteristic leaching procedure (TCLP) leachate extraction per Section V of the ROD; results were for comparison with New York State groundwater effluent standards (6 NYCRR Part 703.6).

Dioxins were chemicals of concern in Area 1 of the North Yard. Cleanup goals for these analytes were met in every grid of the North Yard, even when residual PCB levels were close to the upper limits of the levels defined in the 1995 Amendment to the ROD and accompanying design change (NYSDEC June 27, 1995).

3.2 OVERALL APPROACH

Following issuance of the ROD, Reynolds/Bechtel prepared the Remedial Design/Remedial Action (RD/RA) Work Plan for Record of Decision Remediation Activities, first issued as Revision 0 in April 1993 and periodically updated. The final report, issued as Revision 2 (Bechtel 1993a), identified both the broad scope of activities to be performed in association with the remediation activities defined in the ROD and the procedures/protocols to be used in performing those activities. The RD/RA Work Plan addressed activities that are typical for the project as a whole (i.e., not area-specific), including project organization, data management, health and safety, sampling and analysis, submittals, quality assurance/quality control, decontamination facility, onsite waste storage, and onsite waste disposal. Appendix A lists documents contained within the RD/RA Work Plan.

For each area defined in the ROD, work typically progressed through a series of efforts defined in the following key documents (exact titles are listed by area in Appendix A):

- **Area-Specific Work Plan**—The Work Plan established the specific approach for remediating a given area in accordance with the ROD and enabled a mutual understanding among the various participants for work in that area. Work plans typically included the following information:
  - *General information*—remedial action objectives, existing analytical data, additional data needs, conceptual design, and miscellaneous other information
  - *Area-Specific Safety and Health Plan*
  - *Area-Specific Sampling Plan* (for areas where additional sampling was needed)

- **Area-Specific Remedial Design**—The Remedial Design provided for executing the remedy per the approved Area-Specific Work Plan and typically included the following information:
  - *General information*—objectives, considerations, assumptions, schedule, calculation summaries, and other information to facilitate understanding of the design or as requested by NYSDEC
  - *Analytical data*
  - *Construction documents*—design drawings and technical specifications
  - *Statistical model*—basis for evaluating compliance with the ROD cleanup goals
  - *Verification Sampling Plan*—sampling and analysis requirements to verify that cleanup goals had been achieved, with compliance based on the statistical model or other approaches (Note: Verification sampling plans were sometimes issued separately from the Remedial Design.)
  - *Post-Remedial Operation, Maintenance, and Contingency Plan*—post-remedial activities and the contingencies to be implemented if any essential element of the Remedial Design failed to achieve its objective or otherwise failed to protect human health or the environment

- **Area-Specific Completion Report**—The completion report provides comprehensive documentation of all activities undertaken in a specific area pursuant to the ROD or in any way related to the remediation. (Note: These documents also address pre-ROD remedial activities.)

Lists of the technical specifications and as-built drawings are given in Appendixes H and I, respectively.

Field Change Notices (FCNs) and Field Change Requests (FCRs) were used during the construction phases to amend and improve the area-specific Remedial Designs and to maintain a record of NYSDEC reviews and comments on the in-progress remedial action. Appendix J lists all the FCNs and FCRs and describes each change and the area to which it applied.

Nonconformance Reports (NCRs), listed in Appendix K, documented construction that did not conform to the approved design; the deviations were then reviewed and, if necessary, removed and reworked. Ultimately, all work that initially failed to comply with the approved designs was either modified to meet the intent of the design or made acceptable by the establishment of long-term institutional controls. Through the end of 2002, the project had only five nonconformance situations.

All project photographs were submitted to NYSDEC. Selected photos are included in Appendix L.

3.3 SAMPLING

As detailed throughout the area-specific documents (see Appendix A), a three-phased sampling program supported remediation:

- Phase I delineation sampling provided the basis for the excavation plans. Phase I data were key factors in determining the excavation limits and construction logistics.
- Phase II sampling supported the excavation effort by providing rapid PCB analyses, thus allowing real-time decisions regarding any need for additional excavation.
- Phase III sampling verified that remediation goals had been achieved.

The extensive sampling effort is demonstrated by the large number of samples collected throughout the project. The following list summarizes the total number of locations and samples collected and analyzed after the Order on Consent was implemented. The listing counts every soil and sediment sample that was analyzed for any of the chemicals of concern.

Area of Concern	Number of Locations	Number of Samples
Area North of Haverstock Road	171	261
Black Mud Pond	33	248
Landfill/Former Potliner Storage Area	324	727
North Yard	1,009	4,265
Potliner Storage Pad (including area south of the Cathode Digging Building)	196	490
Rectifier Yard	119	242
Rectifier Yard Ditch	549	798
Soil Stockpile	12	21
Wetlands	438	724
002 Diversion Area	241	576
Other	82	142
Totals	**3,174**	**8,494**

It should be noted that in some cases, the quantities listed above do not correlate with the quantities listed in Appendix M or in earlier reports. This listing is taken from the project's database and does not include sampling conducted prior to implementation of the Order on Consent. This listing is current through the end of 2002 and includes sampling that has occurred in some areas after the area-specific reports were issued. This listing also reflects the area designations used for the samples; for example, within the "Area West of the Landfill" all samples were all given an "LF" designation although some of the samples actually fell within the Wetlands.

3.4 WATER MANAGEMENT

As is typical with most large remedial excavation projects, water management proved challenging. The large expanses of exposed soil afforded opportunity for stormwater runoff to transport contamination out of controlled areas. Precipitation sometimes occurred unexpectedly and in large quantities, with the potential for overwhelming the facility's water management capacity. If left uncontrolled, runoff from excavation areas would drain either to Wetlands RR-6 or to the St. Lawrence River—both environmentally sensitive areas.

Consequently, water management was a prime consideration throughout the project. With careful attention during design and onsite micro-management during construction, the efforts proved very successful. Though many acres were exposed at some point over the years of excavation, there was only one escape of storm water: on March 27, 1998, following not only unseasonably heavy rains coupled with rapid melting of the snow pack but also a simultaneous pipeline break and pump shutdown, surface runoff from the Landfill seeped under a temporary geomembrane containment wall. This single, short-duration escape of water from a controlled area is documented in the *Post-Remedial Report for First Quarter 1998.*

As described in the site-wide Water Management Plan (Bechtel 1995e), the strategy for managing wastewater generated and collected during the remediation involved several key elements:

- Minimizing the generation of potentially contaminated water through effective source control
- Complying with regulations
- Using the onsite water treatment capabilities

Design engineers developed a flowchart (Figure 2 of the Water Management Plan) to assist in the decision-making process. Depending on its characteristics, the water could be (1) routed to the sewage treatment influent or the sewage treatment drying beds for biological treatment, filtration, and eventual treatment at the sewage treatment plant granular activated carbon system; or (2) routed to the Waste Water Treatment Plant drying beds or surge tank for pre-treatment and filtration, followed by treatment at the North Yard granular activated carbon system for PCB removal. Effluent from the North Yard granular activated carbon system could be routed to the liquor sump for use as make-up water in the plant's fume scrubbing system, if needed, or (with prior approval from NYSDEC) discharged at the 001 Outfall.

Bechtel and subcontractor Perras Environmental successfully faced frequent, challenging water management situations. The Wetlands remediation was complicated at various times by natural flooding, heavy rains, and solidly frozen ponds. During the North Yard remediation, a water main break flooded some of the deepest holes excavated during the entire project. Heavy rains and rapid spring thaws made the short-term management of stormwater runoff from the Landfill a difficult task. The most complex prerequisite task at the Black Mud Pond was removal and treatment of ponded surface water, which was replenished many times by precipitation. Over the course of the project, Bechtel and Perras built temporary plastic-lined ponds, installed temporary tanks, brought in vacuum trucks, set up giant pumps with heavy hoses, and rented tanker trucks to hold, move, or store water that could not be allowed to escape from the remediation areas. Construction crews and supervisors worked many nights and weekends to successfully contain, collect, move, and treat the waters generated during the remediation.

Details of the water management activities are described in the area-specific documents listed in Appendix A.

3.5 EXCAVATION

Excavation was the primary remediation strategy for dealing with contamination. Details of the means, methods, and constraints are given in the area-specific completion reports. Table 3 shows excavation quantities and disposal locations by area of concern.

3.6 COMPLIANCE VERIFICATION

Compliance verification is the rigorous process by which sampling and analysis activities for a remediation area are planned, executed, documented, evaluated, and reported.

3.6.1 Post-Excavation Sampling Strategy

Post-excavation sampling and analyses demonstrated the success of each remedial excavation. The data were evaluated using statistical methods prescribed by the EPA, statistical methods plus additional biased sampling, or nonstatistical methods. Compliance verification sampling and associated statistical tests were individually designed for each remediation area. The exact method for verifying the effectiveness of each distinct remediation was approved by NYSDEC and is described in detail in the area-specific completion reports.

3.6.2 Laboratory Analyses

Atlantic Testing Laboratories (ATL) performed laboratory analyses using the EPA- and NYSDEC-approved analytical methods and protocol for PCB and PAH compounds outlined in the RD/RA Work Plan (Bechtel 1993a). For cyanide, fluoride, and sulfate, a modified TCLP extraction was performed as specified in the ROD.

Because the ROD-required cleanup goal for most PAH compounds is one-half of the standard level of detection for the approved EPA method (SW-846 Method 8270), NYSDEC requested a method modification. While the method modification concentrates the PAH compounds and allows lower levels to be detected, it also concentrates interferents that can adversely affect precision and accuracy; therefore, the data validators flag these results "J" (estimated) when the effect of interferences is evident.

3.6.3 Data Review, Verification, and Validation

Data review, verification, and contract compliance screening were performed on sample results as required by project procedures and the Project Data Management Plan (Bechtel 1993a, Section 3).

Environmental Standards, Inc. (ESI), a company highly qualified and experienced in this type of work, performed independent reviews of the verification sample results and validated the data using guidance from the EPA Contract Laboratory Program. Data were examined to determine the

usability of the analytical results and contractual compliance with the analytical requirement and/or deliverables specified in New York's Analytical Services Protocol; data validation summaries are provided in an appendix in each area-specific completion report. Based on the data review and ESI reports, analytical results were determined to be suitable for their intended use.

4.0 SUCCESS OF REMEDIATION

4.1 REGULATORY COMPLIANCE

All requirements of the Remedial Designs were met without deficiency. The cleanup goals established by the ROD were achieved in each area of concern through excavation of contaminated wastes, soils, and sediments. ROD-defined remedial action objectives for soils/sediments, groundwater, and surface water were also achieved. The work in Area 1 of the North Yard is worthy of special note, where the remediation process did not require that excavation continue if progress samples failed to meet objectives. However, post-excavation sampling demonstrated that, except for two isolated locations, the *target* level of <10 ppm PCBs and ROD-derived cleanup goals for PAHs were attained. More information is provided in the Area-Specific Completion Report for the North Yard (Bechtel 1998a).

Post-excavation sample results were compared with the cleanup goals in accordance with the ROD; all were below the specified values. Each area of concern satisfied all ROD requirements, thus confirming a successful remediation.

4.2 REVIEW OF ALL SAMPLE RESULTS

The project's extensive sampling program was vital to administering the remedial actions as well as to proving that the ROD objectives had been accomplished. Because the resulting body of data is so important, the project team took great care to maintain it throughout the project. Sampling results were recorded for the purpose of documentation in two ways:

- The database for the Site Remediation Project, which was put into use in 1993, is home to nearly 9,000 sample results, most of which are soil/sediment samples analyzed for PCBs. The database had read-only accessibility throughout the project; entering new data and changing existing data, however, were rigorously controlled in accordance with project procedures. The database was organized so that each sample could be precisely identified and located at any time regardless of where, when, or how deep in the ground it was taken. Every sample was assigned a unique and permanent identification number describing key attributes such as cleanup area, location, depth, type of sample, etc.

- Prior to 1993, Bechtel sampling results were recorded in project documents, all of which were transmitted to NYSDEC at that time. In nearly all cases, the data were plotted or tabulated on drawings showing cleanup area, sample locations, depth, chemical parameters, and results; a good example of this approach is drawing 061-CDD-018, included in Volume II of the Area-Specific Completion Report for Remediation of the North Yard (Bechtel 1998a). In a few cases, the data were documented in tables or figures contained in letter reports.

During preparation of this Overall Completion Report, project data were reexamined to confirm that some necessary remediation has not been overlooked and to show conclusively that all obligations have been closed with regard to each sample. This review is described below.

4.2.1 Rules for Review

The "rules" for this data review were as follows:

1. Consider samples with the following characteristics:
   a. Sampled and analyzed under Bechtel's project management
   b. Soil or sediment matrix
   c. Analyzed for PCBs (both laboratory and immunoassay analysis methods)

2. Reexamine the samples individually.

3. Review samples exceeding the cleanup goals within remediation areas. Outside of remediation areas, review *all* sample results, regardless of analytical result.

4. Pay special attention to outliers and early results.

5. Seek to identify unexplained results and results not addressed in other completion reports.

6. For any previously unexplained results or results not addressed in other completion reports, identify how the sample was "closed."

4.2.2 Review of Sample Results

Database

This data review started with the database. For this portion of the work, a column was added to the database, and in that column was entered a reference where one may find "closure" of the soil represented by that sample. To assess whether a sample was closed, all samples designated as "D" (i.e., delineation or Phase I samples) were superimposed on the as-built excavation limits; this step was automated using computer-aided design and drafting (CADD) to eliminate errors in plotting. Each sample on the plots was then individually inspected to ensure that it fell (horizontally and vertically) within the remediation limits.

The document describing closure for that sample was then entered into the tables in Appendix M. For example, for sample NHD005A6, the entry "ANHR 3.8.2 & App. B (As-Builts)" was made, indicating that the disposition of the material represented by that sample is documented in Section 3.8.2 and Appendix B (As-Built Drawings) of the *Area-Specific Completion Report for Remediation of the Area North of Haverstock Road* (Bechtel 1995a).

Early Documents

The review then moved to those pre-ROD drawings that contained sampling results as well as related letters, reports, and other correspondence, all of which had been captured by the Project Document Control Center. This effort included electronically searching the project's document filing system for keywords (e.g., data, sampling, analyses) to identify documents for further review. The ten area-specific completion reports were included in the review of correspondence.

For this portion of the work, the first step was to inspect the drawings and associated letter or report to determine whether the sample result was closed in that document (i.e., was the soil represented by that sample excavated?). If closure could not be determined from that pre-ROD document, then the review compared that sample location to the ROD remediation to ascertain whether that soil was remediated in ensuing cleanup efforts. As described above, the closure reference was entered.

4.2.3 Conclusion of Sample Review

As expected, nearly all sample results were "closed" in one of the ten area-specific completion reports. However, the review disclosed a few sample results for which the final disposition was not readily obvious. In these cases, an explanation was provided.

This exhaustive reevaluation of each and every sample result confirms that the Site Remediation Program succeeded in satisfying the ROD cleanup requirements.

4.3 REVIEW OF CONSENT ORDER REQUIREMENTS

The work described in the 11-part Project Completion Report is in strict compliance with the requirements of the Order on Consent, Index #A6-0291-92-12 (NYSDEC 1993). Appendix N summarizes the status of each requirement of the Order and verifies and demonstrates full compliance.

REFERENCES

Alcoa, 2001, *Locker Building Area Site-Specific Remedial Action Work Plan* (November).

Alcoa, 2002. *Completion Report for Remediation of the 005 Drainage Basin – 002 Diversion Area, Reynolds Metals Company, St. Lawrence Reduction Plant, Massena, New York, July-August 1999*, Rev. 0 (June).

Bechtel, 1992. *Completion Report for the 006 Outfall Modification at the Reynolds Metals Company, St. Lawrence Reduction Plant* (July).

Bechtel, 1993a. *Remedial Design/Remedial Action (RD/RA) Work Plan for Record of Decision Remediation Activities at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project*, Rev. 2 (September).

Bechtel, 1993b. *Citizen Participation Plan for Remediation Activities, Reynolds Metals Company, St. Lawrence County, New York*, Rev. 0 (August).

Bechtel, 1994a. *Area-Specific Work Plan for Remediation of Contaminated Portion of Wetlands at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 1 (May).

Bechtel, 1994b. *Characterization Plan for Existing and Mitigation Wetlands at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 1 (November).

Bechtel, 1994c. *Borrow Area Use Plan for the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 1 (July).

Bechtel, 1995a. *Area-Specific Completion Report for Remediation of the Area North of Haverstock Road at the Reynolds Metals Company St. Lawrence Reduction Plant*, Rev. 0 (March).

Bechtel, 1995b. *Area-Specific Completion Report for the Remediation of the Soil Stockpile at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 0 (August).

Bechtel, 1995c. *Post-Remedial Operations, Maintenance, and Contingency Plan for the North Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York,* Rev. 1 (July).

Bechtel, 1995d. *Wetlands Mitigation Action Plan for the Restoration and Replacement of Wetlands RR-6 at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 0 (February; reissued in August 1995).

Bechtel, 1995e. *Post-Remedial Operations, Maintenance, and Contingency Plan for the Potliner Storage Pad at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York,* Rev. 0 (February).

Bechtel, 1995f. *Post-Remedial Operations, Maintenance, and Contingency Plan for the Rectifier Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York,* Rev. 0 (January).

Bechtel, 1995g. *Water Management Plan at the Reynolds Metals Company St. Lawrence Reduction Plan Remediation Project, Massena, New York,* Rev. 2 (December).

Bechtel, 1996a. *Area-Specific Completion Report for Remediation of the Potliner Storage Pad Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 0 (December).

Bechtel, 1996b. *Area-Specific Completion Report for Remediation of the Rectifier Yard Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant, Massena, New York*, Rev. 0 (January).

Bechtel, 1996c. *Boundary Air Sampling Report for the 1994 Construction Season for Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 1 (June).

Bechtel, 1996d. *Boundary and Personnel Air Sampling Report for the 1995 Construction Season for Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 0 (June).

Bechtel, 1996e. *Construction Quality Assurance Plan for Remedial Action Activities at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 3 (May).

Bechtel, 1996f. *Post-Remedial Operations, Maintenance, and Contingency Plan for the Black Mud Pond at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York,* Rev. 2, (June).

Bechtel, 1996g. *Post-Remedial Operations, Maintenance, and Contingency Plan for the Landfill/Former Potliner Storage Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York,* Rev. 4, (November).

Bechtel, 1997a. *Area-Specific Completion Report for Remediation of the Black Mud Pond at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 1 (July).

Bechtel, 1997b. *Area-Specific Completion Report for the Remediation of the Landfill/Former Potliner Storage Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 1 (October).

Bechtel, 1997c. *Area-Specific Completion Report for the Remediation of the Rectifier Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 0 (February).

Bechtel, 1997d. *Area-Specific Completion Report for the Remediation of the 002 Diversion Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 0 (April).

Bechtel, 1998a. *Area-Specific Completion Report for the Remediation of the North Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 1 (October).

Bechtel, 1998b. *Area-Specific Completion Report for the Remediation, Restoration, and Mitigation of Wetlands RR-6 at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 1 (January).

Bechtel, 1998c. *Amendment to Borrow Area Use Plan, Rev. 1, Massena, New York* (April).

Bechtel, 1999. *Evaluation of Leachate Extraction from the Black Mud Pond Through December 1998* (May).

Bechtel, 2001. *Program Environmental, Safety, and Health Plan*, Rev. 4 (May).

Bechtel, 2002a. *Amendment #2 to Borrow Area Use Plan* (June).

Bechtel, 2002b. *Interim Completion Report for the St. Lawrence River Remediation Project (SLRRP) at the Alcoa, Inc. Massena East Smelter Plant, New York* (DRAFT), Rev. 0 (March).

Bechtel, 2003a. *Construction Quality Assurance Certification Report for the Landfill/Former Potliner Storage Area Closure Cap for the Alcoa, Inc. Massena East Smelter Remediation Project, Massena, New York*, Rev. 1 (June).

Bechtel, 2003b. *Landfill Cap Installation Addendum to the Area-Specific Completion Report for Remediation of the Landfill/Former Potliner Storage Area at the Alcoa, Inc. Massena East Smelter Plant, Massena, New York*, Rev. 0 (February).

NYSDEC, 1987. Order on Consent, Index #A6-0119-87-08 (September).

NYSDEC, 1992. *Record of Decision for Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, NYSDEC Site # 6-45-009* (January).

NYSDEC, 1993. Order on Consent, Index #A6-0291-92-12 (March).

NYSDEC, 1995. *Amendment to the Record of Decision, Reynolds Metals Company, St. Lawrence County, New York* (June).

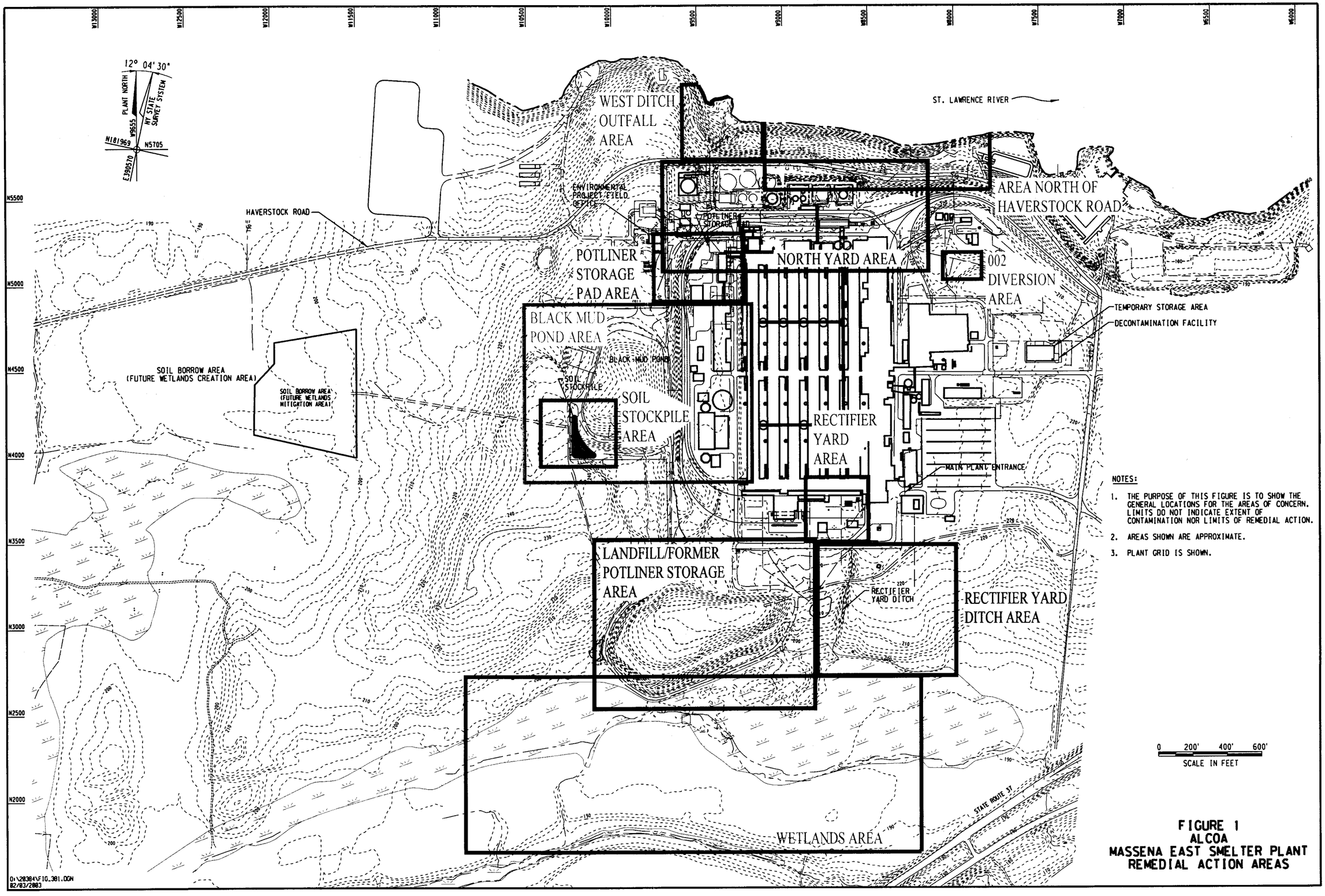
Woodward-Clyde Consultants, 1989. *Preliminary Remedial Investigation Report—St. Lawrence Reduction Plant* (June).

Woodward-Clyde Consultants, 1990a. *Revised Final Remedial Investigation Report—St. Lawrence Reduction Plant* (July).

Woodward-Clyde Consultants, 1990b. *Risk Analysis Report—St. Lawrence Reduction Plant* (March; final version issued in November 1990).

Woodward-Clyde Consultants, 1991. *Revised Final Feasibility Study—St. Lawrence Reduction Plant* (August).

FIGURES



NOTES:

1. THE PURPOSE OF THIS FIGURE IS TO SHOW THE GENERAL LOCATIONS FOR THE AREAS OF CONCERN. LIMITS DO NOT INDICATE EXTENT OF CONTAMINATION NOR LIMITS OF REMEDIAL ACTION.
2. AREAS SHOWN ARE APPROXIMATE.
3. PLANT GRID IS SHOWN.

0 200' 400' 600'
SCALE IN FEET

O:\20384\FIG.381.DGN
02/03/2003

FIGURE 1
ALCOA
MASSENA EAST SMELTER PLANT
REMEDIAL ACTION AREAS

Activity Description	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Administrative Record															
ROD Issued															
Consent Order Issued															
ROD Ammendment Issued															
RD/RA Work Plan															
RD/RA Work Plan															
Area North of Haverstock Rd															
Work Plan Development															
Remedial Design															
Construction for Remediation															
Completion Report Issued															
Black Mud Pond															
Work Plan Development															
Remedial Design for Leachate Extraction															
Remedial Design for Closure Cap															
Construction for Leachate Extraction															
Construction for Remediation & Closure Cap															
Completion Report Issued															
Landfill															
Work Plan Development															
Remedial Design for South Toe of Landfill															
Remedial Design for Leachate Collection															
Design for Leachate Transfer Line															
Design for Northern Consolidation															
Remedial Design for Closure Cap															
Construction for South Toe Remediation															
Construction for Leachate Collection															
Construction for Leachate Transfer Line															
Construction for Northern Consolidation															
Completion Report Issued															
Construction for Closure Cap															
North Yard															
Interim Remedial Measures															
Work Plan Development															
Remedial Design															
Construction for Remediation															
Construction for Misc. Activities															
Completion Report Issued															
Potliner Storage Pad															
Work Plan Development															
Remedial Design															
Construction for Remediation															
Completion Report Issued															
Rectifier Yard															
Work Plan Development															
Remedial Design															
Construction for ReRoute East Storm Drain															
Construction for Storm Drain Cleanup															
Construction for Remediation															
Completion Report Issued															
Rectifier Yard Ditch															
Work Plan Development															
Remedial Design															
Construction for Remediation															
Completion Report Issued															
Soil Stockpile															
Work Plan Development															
Remedial Design															
Construction for Remediation															
Completion Report Issued															
Wetlands															
Work Plan Development															
Remedial Design															
Mitigation Action Plan															
Construction for Remediation															
Completion Report Issued															
Conversion of Borrow Area to Wetlands															
002 Diversion Area															
Interim Remedial Measures															
Work Plan Development															
Remedial Design															
Construction for Remediation															
Completion Report Issued															

Start Date	01SEP88
Finish Date	29AUG03
Data Date	31DEC02
Run Date	28JAN03 08:14

Early Bar
Progress Bar
Critical Activity

CR99 Sheet 1 of 1

Alcoa Massena East Smelter Plant
Site Remediation Project

Figure 2 - Project Schedule

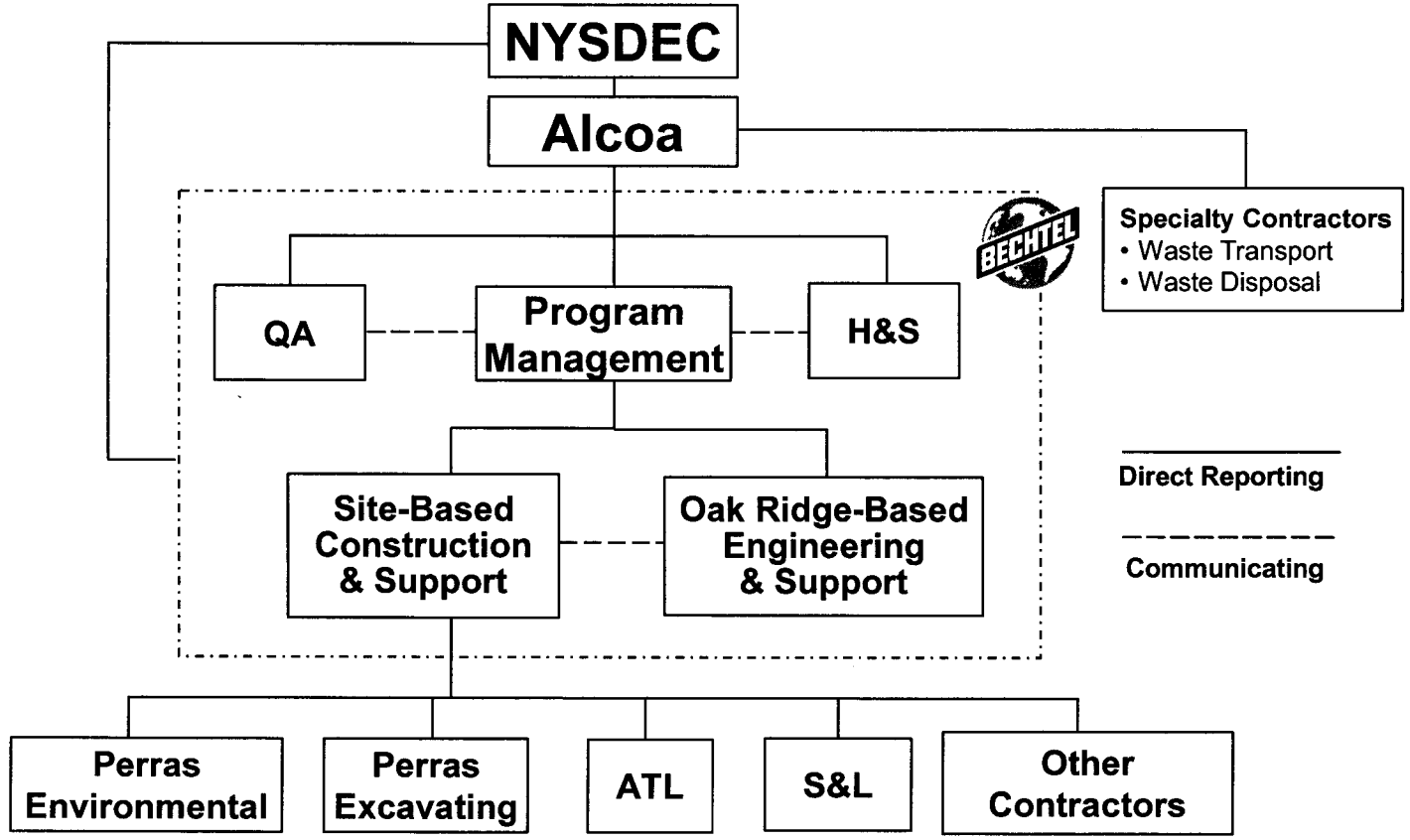


Figure 3. Alcoa Massena East Smelter Plant Site Remediation Project Organization Chart

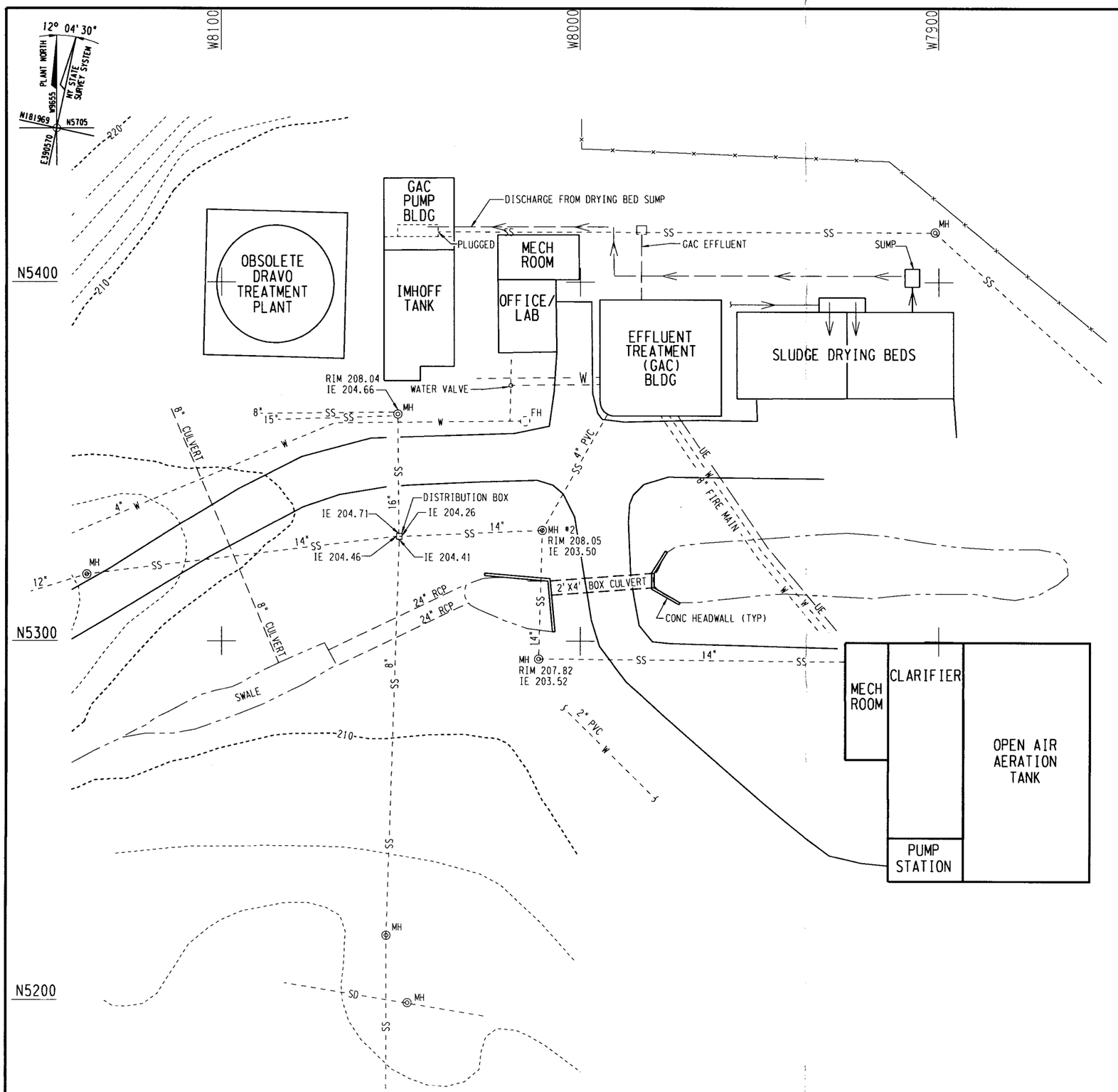


FIG-396.DGN

NOTES

1. PLAN IS BASED ON INFORMATION FROM REFERENCED DRAWINGS.
2. ADDITIONAL UNDERGROUND UTILITIES MAY BE PRESENT.

REFERENCE DRAWINGS

GRADING AND UTILITY PLAN, O'BRIEN & GERE, 08/10/89, REV. 1	A-188581-JM
SEWAGE TREATMENT PLANT, GENERAL PLAN, BECHTEL, 10/01/88, REV. 7	19-6225-63-L-1

LEGEND

- EXISTING FENCE
- SD — STORM DRAIN
- SS — SANITARY SEWER
- W — WATER LINE
- UE — UNDERGROUND ELECTRICAL
- FH — FIRE HYDRANT

0 30 60 90

1" = 30'

Figure 4

SEWAGE TREATMENT PLANT AREA

BECHTEL ASSOCIATES PROFESSIONAL CORPORATION - NY
FOR BECHTEL ENVIRONMENTAL, INC
OAK RIDGE, TENNESSEE

REV 12/94

11 X 17

TABLES

Table 1
Active and Decommissioned Monitoring Wells/Piezometers

Black Mud Pond	Landfill	North Yard	Potliner Storage Pad	Wetlands RR-6	Wetlands Creation Site	Background	Plugged and Abandoned	
MPOF1402S	MW-10S	MW-1S	MW-3S	None	None	MW-32S	BMPB-1	NWP-2B
MPOF1403D	MW-39S	MW-16S	MW-26S				BMPB-2	NWP-3B
MPOG1601S	MW-40S	MW-17S	MW-27S				LFB-2	NWP-4A
MPOG1603D	PZ-1	MW-18S	MW-28S				LFB-4	NWP-4B
MW-11SR	PZ-2	MW-19S	MW-33S				LFOE1001	NWP-5A
MW-12S	PZ-3	MW-36S	MW-34S				LFOF0902	NWP-5B
MW-12D	PZ-4	MW-37S	MW-35SR				LFOF1003	NWP-6A
MW-13S	PZ-5	MW-38S					LFOF1902	NWP-6B
MW-13D	PZ-6						LFOG1901	NWP-7A
MW-14S	PZ-7						LFOK1204	NWP-7B
MW-15S(87)	PZ-8						MW-2S	TB-1
MW-15S(91)	PZ-9						MW-4S	TB-2
MW-15D	PZ-10						MW-5S	TB-3
MW-20-85-S	PZ-11						MW-5D	TB-4
MW-20-85-D	PZ-12						MW-6S	TB-6
MW-21-85S	PZ-13						MS-7S	TB-6A
MW-21-85D	PZ-14						MW-7D	TB-7
MW-22-85-S	PZ-15						MW-8S	WLP-1A
MW-22-85-D	PZ-16						MW-9S	WLP-1B
MW-23-85-S	PZ-17						MW-11S	WLP-2A
MW-23-85-D	PZ-18						MW-24-85-S	WLP-2B
MW-25-85-S							MW-31S	WLP-3A
MW-29S	PZ-20						MW-35S	WLP-3B
MW-30S	PZ-21						NWP-1A	WLP-4A
MW-31SR	PZ-12						NWP-1B	WLP-4B
							NWP-2A	WLP-5A
							NWP-3A	WLP-5B

Note: For locations of wells and piezometers, refer to Figure 5. For survey data of wells and piezometers, refer to Table 2.

Table 2 - Survey Data for Active Monitoring Wells and Piezometers

Well ID	UTM-18 Grid (meters)		Plant Grid (feet)		Elevation (ft MSL)			Date		Affliliated Area of Concern and Site Location
	North	East	North	East	Top of Ground	Top of Steel	Top of PVC	Suveyed	Installed or Repaired	
MW-1S	4,981,274.1	519,558.5	5327.2	-8684.6	224.1	226.69	226.54	09/26/95	09/95	North Yard - south road
MW-3S	4,981,218.0	519,362.3	5286.4	-9353.3	224.5	226.17	225.89	09/30/96		Potliner Storage Pad
MW-10S	4,980,648.4	519,370.7	3455.2	-9730.1	214.5	216.69	216.65	09/24/96		Landfill - northwest of Landfill
MW-11SR	4,980,967.3	519,315.0	4516.6	-9682.6	239.4	242.55	242.36	09/96		Black Mud Pond - east road
MW-12D	4,981,049.8	519,225.4	4844.5	-9911.4	245.3	247.66	247.36	10/95		Black Mud Pond - north of pond
MW-12S	4,981,045.8	519,227.6	4830.1	-9907.2	245.4	247.96	247.86	10/95		Black Mud Pond - north of pond
MW-13D	4,980,977.3	519,174.6	4648.4	-10125.3	243.8	245.38	245.19	09/19/96		Black Mud Pond - northwest of pond
MW-13S	4,980,980.6	519,173.7	4659.5	-10126.0	243.3	245.41	245.17	09/19/96		Black Mud Pond - northwest of pond
MW-14S	4,980,898.1	519,176.8	4392.9	-10174.5	246.7	248.22	247.97	09/19/96		Black Mud Pond - west road
MW-15S(91)	4,980,821.1	519,262.6	4085.4	-9954.1	238.7	242.16	242.01	07/24/96		Black Mud Pond - south road
MW-15D	4,980,820.7	519,260.0	4085.9	-9962.7	239.0	242.07	241.93	07/24/96		Black Mud Pond - south road
MW-15S(87)	4,980,820.0	519,256.8	4085.8	-9973.7	239.2	242.16	242.07	07/24/96		Black Mud Pond - south road
MW-16S	4,981,263.5	519,593.9	5268.2	-8578.6	225.8	228.83	228.69	12/15/95		North Yard - south road
MW-17S	4,981,310.6	519,545.4	5453.4	-8700.7	223.5	227.22	227.02	10/31/96	10/96	North Yard - east of pitch pumphouse
MW-18S	4,981,247.4	519,519.8	5269.2	-8827.7	224.7	227.06	226.67	09/96		North Yard - south road
MW-19S	4,981,292.8	519,462.7	5455.0	-8978.5	224.2	226.95	226.77	10/17/96	10/16/96	North Yard - north road
MW-20-85-S	4,980,780.6	519,300.9	3928.2	-9860.3	222.9	225.75	225.48	10/17/96		Black Mud Pond - south of pond
MW-20-85-D	4,980,777.7	519,302.8	3917.8	-9856.0	222.6	225.88	225.50	10/17/96		Black Mud Pond - south of pond
MW-21-85S	4,980,946.8	519,371.2	4411.0	-9516.9	225.9	228.40	228.38	11/07/96	11/06/96	Black Mud Pond - SW corner of Digger Bldg
MW-21-85D	4,980,951.2	519,369.8	4426.3	-9518.4	225.5	228.47	228.45	11/07/96	11/06/96	Black Mud Pond - SW corner of Digger Bldg
MW-22-85-D	4,981,055.2	519,183.9	4891.4	-10040.3	244.1	246.45	246.45	11/15/96	11/07/96	Black Mud Pond - north of pond
MW-22-85-S	4,981,056.2	519,188.3	4891.4	-10025.5	244.5	246.90	246.95	11/05/96		Black Mud Pond - north of pond
MW-23-85-D	4,980,916.1	519,150.8	4468.9	-10245.1	241.9	245.27	245.28	09/96		Black Mud Pond - west of west road
MW-23-85-S	4,980,920.1	519,150.9	4481.7	-10242.1	241.9	245.19	244.88	09/96		Black Mud Pond - west of west road
MW-25-85-S	4,981,045.0	519,076.3	4935.0	-10392.6	228.3	230.83	230.86	11/05/96		Black Mud Pond - west of Drying Beds
MW-26S	4,981,245.2	519,338.5	5390.7	-9410.3	223.4	225.69	225.35	09/30/96		Potliner Storage Pad - north of pad
MW-27S	4,981,137.3	519,370.3	5022.3	-9384.9	227.5	230.76	230.50	11/10/95		Potliner Storage Pad - south of pad
MW-28S	4,981,251.7	519,362.4	5394.4	-9329.1	224.3	226.63	226.47	09/30/96		Potliner Storage Pad - north of pad
MW-29S	4,981,151.9	519,206.6	5185.2	-9898.9	237.6	241.21	241.17	11/06/96		Black Mud Pond - construction parking lot
MW-30S	4,980,774.2	519,217.6	3966.9	-10131.6	232.0	234.25	234.18	10/17/96	10/16/96	Black Mud Pond - southwest of pond
MW-31SR	4,980,779.1	519,017.2	4124.6	-10770.6	233.4	234.90	234.80	08/24/99	inst.8/99	Black Mud Pond - south of Borrow Pit road
MW-32S	4,980,990.0	520,020.3	4089.1	-7406.1	224.2	227.36	227.26	09/25/96		Background - east of plant parking lot
MW-33S	4,981,267.1	519,316.0	5476.8	-9466.9	223.2	225.85	225.74	08/29/95		Potliner Storage Pad - Thickener Area
MW-34S	4,981,279.0	519,383.6	5466.9	-9241.6	215.8	217.30	217.30	07/10/01	rev.11/00	Potliner Storage Pad - Thickener Area

Table 2 - Survey Data for Active Monitoring Wells and Piezometers

Well ID	UTM-18 Grid (meters)		Plant Grid (feet)		Elevation (ft MSL)			Date		Affiliated Area of Concern and Site Location
	North	East	North	East	Top of Ground	Top of Steel	Top of PVC	Suveyed	Installed or Repaired	
MW-35SR	4,981,341.0	519,341.6	5695.5	-9332.2	211.4	213.94	213.54	07/10/01	inst.10/97	Potliner Storage Pad - Thickener Area
MW-36	4,981,363.8	519,476.7	5672.6	-8883.3	206.8	209.69	209.36	09/96		North Yard - north of Pitch Tanks
MW-37	4,981,368.7	519,530.3	5650.5	-8708.0	204.9	207.89	207.65	09/96		North Yard - north of Pitch Tanks
MW-38	4,981,370.8	519,604.2	5604.5	-8469.6	198.4	202.85	202.64	09/24/96		North Yard - north of Fuel Oil Tanks
MW-39	4,980,393.3	519,458.3	2575.5	-9630.6	193.4	196.16	195.87	10/31/97		Landfill - southwest of Landfill
MW-40	4,980,464.4	519,562.8	2729.3	-9245.1	191.3	194.12	193.75	10/30/97		Landfill - southeast of Landfill
MPOF1403D	4,980,862.0	519,240.8	4231.9	-9994.9	250.4	255.23	254.95	12/10/99		Black Mud Pond
MPOF1402S	4,980,863.3	519,240.2	4236.3	-9996.1	251.1	254.61	254.21	12/10/99		Black Mud Pond
MPOG1603D	4,980,909.9	519,295.6	4346.3	-9785.5	251.1	255.01	254.73	12/10/99		Black Mud Pond
MPOG1601S	4,980,910.1	519,292.4	4349.5	-9795.6	252.4	255.48	254.34	12/10/99		Black Mud Pond
PZ-1	4,980,595.2	519,616.4			216.0	219.00	218.30	07/11/02	06/05/02	Landfill - east side of Landfill
PZ-2	4,980,594.6	519,618.3			214.5	217.50	217.05		06/05/02	Landfill - east side of Landfill
PZ-3	4,980,594.0	519,621.1			212.6	215.50	214.85		06/05/02	Landfill - east side of Landfill
PZ-4	4,980,593.8	519,621.6			212.8	215.80	215.45		06/05/02	Landfill - east side of Landfill
PZ-5	4,980,594.3	519,622.4			213.2	216.20	215.82		06/05/02	Landfill - east side of Landfill
PZ-6	4,980,509.7	519,579.8			199.6	202.40	202.25		05/29/02	Landfill - southeast side of Landfill
PZ-7	4,980,507.7	519,581.2			198.3	201.20	200.90		05/29/02	Landfill - southeast side of Landfill
PZ-8	4,980,504.6	519,583.5			198.3	201.60	201.40		05/30/02	Landfill - southeast side of Landfill
PZ-9	4,980,504.1	519,583.9			198.5	201.70	201.15		05/30/02	Landfill - southeast side of Landfill
PZ-10	4,980,445.8	519,489.4			200.6	203.30	202.95		06/03/02	Landfill - south side of Landfill
PZ-11	4,980,444.1	519,490.5			200.0	202.70	202.55		06/03/02	Landfill - south side of Landfill
PZ-12	4,980,440.5	519,493.0			198.4	201.40	201.15		06/04/02	Landfill - south side of Landfill
PZ-13	4,980,440.1	519,493.4			198.3	201.30	201.10		06/04/02	Landfill - south side of Landfill
PZ-14	4,980,416.0	519,363.6			199.5	202.20	201.85		05/23/02	Landfill - southwest of Landfill
PZ-15	4,980,414.0	519,362.5			198.3	200.80	200.55		05/23/02	Landfill - southwest of Landfill
PZ-16	4,980,410.8	519,360.3			198.4	200.90	200.65		05/23/02	Landfill - southwest of Landfill
PZ-17	4,980,410.2	519,360.0			198.6	201.10	201.00		05/23/02	Landfill - southwest of Landfill
PZ-18	4,980,529.6	519,334.7			208.4	211.20	210.90		05/21/02	Landfill - west side of Landfill
PZ-19	4,980,530.6	519,333.5			207.0	209.50	209.40		05/21/02	Landfill - west side of Landfill
PZ-20	4,980,531.5	519,331.6			205.4	208.20	208.05		05/21/02	Landfill - west side of Landfill
PZ-21	4,980,531.8	519,330.9			205.3	207.80	207.70		05/21/02	Landfill - west side of Landfill
PZ-22	4,980,531.7	519,330.3			205.6	208.10	207.65		05/21/02	Landfill - west side of Landfill

Table 3 - Excavation Quantities and Disposal Locations

Area	Onsite Disposal			Offsite Disposal	TOTAL
	Landfill	BMP	Sum		
Area North of Haverstock Road	**10,837**	**0**	**10,837**	**1,923**	**12,760**
Black Mud Pond [2]	**0**	**1,932**	**1,932**	**0**	**1,932**
Landfill	**27,072**	**0**	**27,072**	**0**	**27,072**
South toe of Landfill	*4,820*	*0*	*4,820*	*0*	*4,820*
Leachate collection system trench	*1,167*	*0*	*1,167*	*0*	*1,167*
Leachate transfer line (construction spoils)	*1,300*	*0*	*1,300*	*0*	*1,300*
Consolidation of Area North of Landfill (FCR-190)	*18,505*	*0*	*18,505*	*0*	*18,505*
Former Material Stockpile Area (FCR-200)	*1,280*	*0*	*1,280*	*0*	*1,280*
North Yard	**25,484**	**0**	**25,484**	**19,588**	**45,072**
Main area	*25,332*	*0*	*25,332*	*19,528*	*44,860*
Interim Remedial Measures (IRMs)	*152*	*0*	*152*	*60*	*212*
Repair of underground water main in grid H32 (south of Facility 25A, the Unloading Shed)	*25*	*0*	*25*	*0*	*25*
Grid G41 and vicinity (FCR-206)	*184*	*0*	*184*	*92*	*276*
Water storage tank installation (FCN-209)	*46*	*0*	*46*	*0*	*46*
Potliner Storage Pad	**8,769**	**10,618**	**19,387**	**482**	**19,869**
Crusher & digging buildings area	*3,144*	*3,362*	*6,506*	*172*	*6,678*
Area south of digging building	*3,777*	*7,256*	*11,033*	*0*	*11,033*
West ditch east of liquor tank	*0*	*0*	*0*	*310*	*310*
Digging building extension (construction spoils)	*1,848*	*0*	*1,848*		*1,848*
Rectifer Yard	**2,699**	**0**	**2,699**	**25**	**2,724**
Rectifer Yard Ditch	**19,116**	**0**	**19,116**	**4,910**	**24,026**
Ditch & utility road culvert	*2,739*	*0*	*2,739*	*2,424*	*5,163*
East extension of ditch	*16,377*	*0*	*16,377*	*2,486*	*18,863*
Soil Stockpile	**5,367**	**0**	**5,367**	**0**	**5,367**
Wetlands	**30,708**	**9,632**	**40,340**	**1,182**	**41,522**
Main area	*20,509*	*7,700*	*28,209*	*464*	*28,673*
Area west of Landfill	*10,199*	*1,932*	*12,131*	*718*	*12,849*
002 Diversion Area	**8,331**	**0**	**8,331**	**3,883**	**12,214**
West of 002 stormwater surge pond	*4,616*	*0*	*4,616*	*25*	*4,641*
002 ditch	*0*	*0*	*0*	*2,876*	*2,876*
Casthouse railroad bay	*0*	*0*	*0*	*520*	*520*
005 ditch	*54*	*0*	*54*	*0*	*54*
Engineering office	*242*	*0*	*242*	*91*	*333*
Water tower area	*1,819*	*0*	*1,819*	*371*	*2,190*
005 Drainage Basin (FCR-202)	*1,600*	*0*	*1,600*	*0*	*1,600*
Pipeline N of WWTP plant drying beds (FCN-210)	*105*	*0*	*105*	*0*	*105*
Removal of soil from Borrow Area (FCN-211)	*86*	*0*	*86*	*300*	*386*
Removal of soil for plant improvements	*300*	*0*	*300*	*0*	*300*
SUBTOTAL FOR ONSITE EXCAVATIONS	**149,117**	**22,182**	**171,299**	**31,993**	**203,292**
SPOILS FROM RIVER REMEDIATION	**80,500**	**0**	**80,500**	**Not Appli.**	**80,500**
TOTAL	**229,617**	**22,182**	**251,799**	**31,993**	**283,792**

1. Excavation quantities are given in cubic yards (yd^3).
2. Quantities for the Black Mud Pond are for overburden from the SW corner of the area as described in the Sections 2.1.2 and 2.1.4 of the Black Mud Pond Completion Report (Bechtel, July 1997).
3. The indicated soil removed from the Borrow Area was underlying the stockpile of broken concrete that had been previously removed from a building construction project near the maintenance shops.

APPENDIX A

KEY DOCUMENTS PRODUCED BY THE SITE REMEDIATION PROJECT

APPENDIX A

KEY DOCUMENTS PRODUCED BY THE SITE REMEDIATION PROJECT

General

Citizen Participation Plan for Remediation Activities, Reynolds Metals Company, St. Lawrence County, New York, Rev. 0, Bechtel, August 1993.

Remedial Design/Remedial Action (RD/RA) Work Plan for Record of Decision Remediation Activities at the Reynolds Metals St. Lawrence Reduction Plant Remediation Project, Rev. 2, Bechtel, September 1993.

- Section 3.1 – *Project Data Management Plan*, Rev. 3, Bechtel, October 1994
- Section 3.2 – Field Sampling Procedures
  - EP-001, "Soil Sampling," Rev. 1, September 1993
  - EP-002, "Surface and Subsurface Sediment Sampling," Rev. 1, September 1993
  - EP-003, "Equipment Decontamination," Rev. 3, February 1994
  - EP-004, "Chain-of Custody," Rev. 1, September 1993
  - EP-005, "Labeling, Packaging, and Shipment Offsite of Environmental Samples for Chemical Analyses," Rev. 1, September 1993
  - EP-006, "Implementation of EPA FM-18, Field Measurement of PCBs in Soil and Sediment Using a Portable GC," Rev. 1, September 1993
  - EP-007, "Water Sampling," Rev. 1, September 1993
  - EP-008, "Data Review," Rev. 1, September 1993
  - EP-009, "Field Logbook Procedure," Rev. 0, April 1994
  - GP-001, "Subsurface Soil Sampling Using a Drill Rig," Rev. 2, August 1994
- Section 3.3 – *Project Sampling and Analysis Plan (SAP) Including Quality Assurance Plan Requirements*, Rev. 5, Bechtel, June 1995
- Section 3.4 – *Project Field Sampling Plan*, Rev. 0, Bechtel, September 1992
- Section 5.1 – *Program Environmental, Health, and Safety Plan*, Rev. 4, Bechtel, May 2001
- Section 6.0 – *Safety Contingency Plan,* Rev. 0, Bechtel, no date given
- Appendix B – *Operation, Maintenance, and Contingency Plan for the Decontamination Facility*, Rev. 0, Bechtel, September 1993
- Appendix C – *Operation, Maintenance, and Contingency Plan for Onsite Disposal of Waste Soils,* Rev. 0, Bechtel, September 1993

- Appendix D – *Operation, Maintenance, and Contingency Plan for Onsite Storage of Waste Soils,* Rev. 0, Bechtel, September 1993

Water Management Plan at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 2, Bechtel, December 1995.

Construction Quality Assurance Plan for Remedial Action Activities at the Reynolds Metals Company St. Lawrence Reduction Plant, Massena, New York, Rev. 3, Bechtel, May 1996.

Boundary Air Sampling Report for the 1994 Construction Season for Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, June 1996.

Boundary and Personnel Air Sampling Report for the 1995 Construction Season for Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, June 1996.

Area North of Haverstock Road (ANHR)

Area-Specific Work Plan for Remediation of Area North of Haverstock Road at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, September 1993.

Area-Specific Safety and Health Plan for Remediation of Area North of Haverstock Road at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, September 1993.

Post-Remedial Operations, Maintenance, and Contingency Plan for the Area North of Haverstock Road at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, September 1993.

Statistical Model for Evaluation of Compliance with the Cleanup Goal in the Record of Decision for the Area North of Haverstock Road (ANHR), Rev. 0, Bechtel, September 1993.

Remedial Design for the Area North of Haverstock Road at the Reynolds Metals Company St. Lawrence Reduction Plant, Massena, New York, Rev. 1, Bechtel, January 1994.

Verification Sampling Plan for the Area North of Haverstock Road at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, April 1994.

Area-Specific Completion Report for Remediation of the Area North of Haverstock Road at the Reynolds Metals Company St. Lawrence Reduction Plant, Rev. 0, Bechtel, March 1995.

Black Mud Pond (BMP)

Area-Specific Safety and Health Plan for Remediation of Black Mud Pond at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, August 1994.

Area-Specific Work Plan for Remediation of the Black Mud Pond at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 2, Bechtel, February 1995.

Remedial Design for the Black Mud Pond Dewatering System at the Reynolds Metals Company St. Lawrence Reduction Plant, Massena, New York, Rev. 0, Bechtel, June 1995.

Geotechnical Data Report for the Black Mud Pond at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, December 1995.

Closure Cap Design for the Black Mud Pond at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, June 1996.

Post-Remedial Operations, Maintenance, and Contingency Plan for the Black Mud Pond at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 2, Bechtel, June 1996.

Area-Specific Completion Report for the Remediation of the Black Mud Pond at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, July 1997.

Landfill/Former Potliner Storage (L/FPS) Area

Area-Specific Safety and Health Plan for Remediation of the Landfill/Former Potliner Storage Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, September 1993.

Area-Specific Work Plan for Remediation of the Landfill/Former Potliner Storage Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, January 1994.

Sampling Plan for South Toe of the L/FPS Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, May 1994.

Remedial Design for the South Toe of the Landfill/Former Potliner Storage Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, May 1994.

Verification Sampling Plan for the Relocated Eastern Portion of the L/FPS Area, Rev. 0, Bechtel, October 1994.

Remedial Design for the Landfill/Former Potliner Storage Area Leachate Collection and Removal System at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 3, Bechtel, March 1995.

Geotechnical Data Report for the Landfill/Former Potliner Storage and Borrow Areas at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, December 1995.

Closure Cap Design for the Landfill/Former Potliner Storage Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, November 1996.

Post-Remedial Operations, Maintenance, and Contingency Plan for the Landfill/Former Potliner Storage Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 4, Bechtel, November 1996.

Area-Specific Completion Report for the Remediation of the Landfill/Former Potliner Storage Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, October 1997.

Construction Quality Assurance Certification Report for the Landfill/Former Potliner Storage Area Closure Cap for the Alcoa, Inc. Massena East Smelter Remediation Project, Massena, New York, Rev. 1, Bechtel, June 2003.

Landfill Cap Installation Addendum to the Area-Specific Completion Report for Remediation of the Landfill/Former Potliner Storage Area at the Alcoa. Massena East Smelter Plant, Massena, New York, Rev. 0, Bechtel, February 2003.

North Yard

Status Report – Contingency Follow-up Investigation and Remediation for the 001 Discharge System at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, February 1993.

Work Plan for Treatability Studies on PCB-Contaminated Soils, Reynolds Metals Company, St. Lawrence County, New York, Rev. 1, Bechtel, October 1993.

Area-Specific Safety and Health Plan for Remediation of North Yard Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, October 1994.

Post-Remedial Operations, Maintenance, and Contingency Plan for the North Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, July 1995.

Area-Specific Work Plan for the North Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, March 1995.

Statistical Model for Evaluation of Compliance with the Cleanup Goal in the Record of Decision for the North Yard Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, July 1995.

Verification Sampling Plan for the North Yard Area 2 at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, July 1995.

Groundwater and Surface Water Monitoring Plan for the North Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 3, Bechtel, August 1995.

Post-Remedial Stormwater Sampling Plan for the North Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, October 1995.

Remedial Design for the North Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, July 1995.

Area-Specific Completion Report for the Remediation of the North Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, October 1998.

Potliner Storage Pad (PSP)

Area-Specific Work Plan for Remediation of the Potliner Storage Pad at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, May 1994.

Area-Specific Safety and Health Plan for Remediation of the Potliner Storage Pad at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, May 1994.

Remedial Design for the Potliner Storage Pad at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, February 1995.

Post-Remedial Operations, Maintenance, and Contingency Plan for the Potliner Storage Pad at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, February 1995.

Groundwater and Surface Water Monitoring Plan for the Potliner Storage Pad Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 2, Bechtel, August 1995.

Area-Specific Completion Report for the Remediation of the Potliner Storage Pad Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, December 1996.

Rectifier Yard (RY)

Area-Specific Safety and Health Plan for Remediation of the Rectifier Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, February 1994.

Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project Completion Report for the Cleanup of Storm Drainage System Eastern Portion of the Rectifier Yard, Rev. 0, Bechtel, June 1994.

Area-Specific Work Plan for Remediation of the Rectifier Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, August 1994.

Post-Remedial Operations, Maintenance, and Contingency Plan for the Rectifier Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, January 1995.

Remedial Design for the Rectifier Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, April 1995.

Area-Specific Completion Report for the Remediation of the Rectifier Yard at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, February 1997.

Rectifier Yard Ditch (RYD)

Area-Specific Work Plan for Remediation of Rectifier Yard Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, September 1993.

Area-Specific Safety and Health Plan for Remediation of the Rectifier Yard Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, September 1993.

Area-Specific Post-Remedial Operations, Maintenance, and Contingency Plan for the Rectifier Yard Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, October 1993.

Remedial Design for the Rectifier Yard Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, January 1994.

Statistical Model for Evaluation of Compliance with the Cleanup Goal in the ROD for the Rectifier Yard Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, January 1994

Verification Sampling Plan for the Rectifier Yard Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, July 1994.

Verification Sampling Plan for the East Extension of the Rectifier Yard Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, September 1994.

Area-Specific Completion Report for Remediation of the Rectifier Yard Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant, Massena, New York, Rev. 0, Bechtel, January 1996.

Soil Stockpile

Area-Specific Work Plan for Remediation of Soil Stockpile at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, May 1994.

Area-Specific Safety and Health Plan for Remediation of the Soil Stockpile at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, May 1994.

Remedial Design for the Soil Stockpile at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, August 1994.

Area-Specific Completion Report for the Remediation of the Soil Stockpile at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, August 1995.

Wetlands

Alternatives Analysis for Restoration or Replacement of a Portion of Wetland RR-6, Reynolds Metals Company St. Lawrence Reduction Plant, Massena, New York, Rev. 0, Bechtel, September 1993.

Area-Specific Safety and Health Plan for Remediation of Contaminated Portions of Wetlands at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, April 1994.

Area-Specific Work Plan for Remediation of Contaminated Portion of Wetlands at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, May 1994.

Borrow Area Use Plan for the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, July 1994.

Characterization Plan for Existing and Mitigation Wetlands at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, November 1994.

Wetlands Mitigation Action Plan for the Restoration and Replacement of Wetlands RR-6 at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, February 1995 (reissued in August 1995)

Operation, Maintenance, and Contingency Plan for Mitigation of Wetlands RR-6 at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, February 1995.

Statistical Model for Evaluation of Compliance with the Cleanup Goal in the Record of Decision for Wetlands Remediation at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, March 1995.

Post-Remedial Operations, Maintenance, and Contingency Plan for the Wetlands RR-6 Remediation at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, March 1995.

Remedial Design for the Wetlands RR-6 Remediation at the Reynolds Metals Company St. Lawrence Reduction Plant, Massena, New York, Rev. 1, Bechtel, March 1995.

Verification Sampling Plan for the Wetlands RR-6 Remediation at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, May 1995.

Geotechnical Data Report for the Landfill/Former Potliner Storage and Borrow Areas at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, December 1995.

Area-Specific Completion Report for the Remediation, Restoration, and Mitigation of Wetlands RR-6 at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, January 1998.

Amendment to Borrow Area Use Plan, Rev. 1, Bechtel, April 1998.

Amendment #2 to Borrow Area Use Plan, Rev. 1, Bechtel, June 2002.

002 Diversion Area

Area-Specific Safety and Health Plan for Remediation of the 002 Diversion Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, February 1994.

Completion Report for Remediation of the 005 Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, March 1994.

Area-Specific Work Plan for Remediation of the 002 Diversion Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 1, Bechtel, June 1994.

Post-Remedial Operations, Maintenance, and Contingency Plan for the 002 Diversion Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, September 1994.

Remedial Design for the 002 Diversion Area at the Reynolds Metals Company St. Lawrence Reduction Plant, Massena, New York, Rev. 2, Bechtel, December 1994.

Area-Specific Completion Report for the Remediation of the 002 Diversion Area at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York, Rev. 0, Bechtel, April 1997.

Comp*letion Report for Remediation of the 005 Drainage Basin – 002 Diversion Area, Reynolds Metals Company, St. Lawrence Reduction Plant, Massena, New York, July-August 1999*, Rev. 0, Alcoa, June 5, 2002.

Locker Building Area Site-Specific Remedial Action Work Plan, Alcoa, November 2001.

APPENDIX B

KEY CONTRACTORS AND SERVICES PROVIDED

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KEY CONTRACTORS AND SERVICES PROVIDED

Atlantic Testing Laboratories, Ltd. (ATL), Canton, New York—Field sampling/testing and laboratory analysis for chemical and geotechnical parameters, surveying for excavation control, CADD services, and installation/decommissioning of piezometers/monitoring wells.

Bechtel Associates Professional Corporation, New York—Project management, design engineering, data management, construction management, safety and health program management, and quality assurance.

Enviro-Line Systems, Inc., Slingerlands, New York—Installation of geomembrane liner material at Potliner Storage Pad stormwater retention pond (subcontracted through Perras Excavating, Inc.).

Environmental Standards, Inc. (ESI), Valley Forge, Pennsylvania—Data review and validation of Phase III (verification) sample results.

Fiacco and Riley, Norwood, New York—Removal and reinstallation of railroad ballast, ties, and tracks; miscellaneous work.

Fourth Coast Pollution Control Inc.—See "Op-Tech" below.

GSE Lining Technology, Inc., Houston, Texas — Installation of geosynthetic layers for the Landfill closure cap.

Horizontal Technologies, Inc., Cape Coral, Florida—Installation of Black Mud Pond leachate collection trenches.

New York State Fence, Hilton, New York—Installation of fencing.

Op-Tech Environmental (and predecessor company, Fourth Coast Pollution Control), Massena, New York—Early interim remedial actions, decontamination services, emergency spill response.

Patterson-Stevens, Inc., Tonawanda, New York—Removal and reinstallation of railroad ballast, ties, and tracks for North Yard remediation.

Perras Environmental Control, Inc., Massena, New York—Contaminated earthwork and miscellaneous site services, including excavation, onsite hauling and landfilling, decontamination, stormwater management, and erosion control activities.

Perras Excavating, Inc., Massena, New York—Uncontaminated earthwork and miscellaneous site services, including excavation, clearing, erosion control, masonry/concrete, carpentry, borrow site work, pipe installation and testing, and restoration.

S&L Electric, Inc., Colton, New York—Disconnection and repair/replacement of electrical service lines, installation of conduit for telecommunication lines, and repair/maintenance of equipment grounding grids.

Solmax Geosynthetics, Inc., New Hartford, New York—Furnishing and installing geomembrane liner for Black Mud Pond and North Yard.

W. W. Patenaude Sons, Inc., Mechanicville, New York—Furnishing and installation of coating system around base of pitch and fuel oil storage tanks.

APPENDIX C

SIGNIFICANT ACHIEVEMENTS

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SIGNIFICANT ACHIEVEMENTS

Safety and health—Project participants achieved a nearly perfect record for safety and health. Reynolds, Bechtel, all the subcontractors, and their crews cooperated in a behavior-based approach to improve safety, beginning with the 1996 construction season. Program activities were reviewed and refocused periodically, resulting in sustained enthusiasm and an overall excellent job safety performance record.

Environmental compliance—No measurable offsite airborne releases were detected at any time during remediation.

Immunoassay analyses—Enzyme-linked immuno-sorbent assay (more familiarly known as "immunoassay") is a system for analysis of selected environmental chemicals. Immunoassay analyses for PCBs were used as a rapid, economical alternative to laboratory analyses to allow real-time decision-making on the need for additional excavation. Use of immunoassay analyses greatly accelerated broad-area screening and delineation sampling and provided a useful construction tool for preliminary verification of cleanup prior to laboratory analyses. Using this method further improved the effectiveness of the remediation effort because field laboratory technicians were able to provide results so quickly that crews could deepen excavations if PCB levels at the final design depth were not as low as indicated by the results from the drill rig sampling.

Data management process—The turnaround time from sampling to usable data was critical to the schedule and was the subject of considerable early management efforts. Improvements were made by streamlining the process; working with site personnel, surveyors, labs, and data validators; and automating data transfer from the database to CADD. Some of the improvements are described below.

- Individual databases were consolidated into a single database, thus allowing all parties to access data, eliminating duplication of effort, and ensuring consistency.

- Direct electronic interfaces were implemented between Bechtel's Oak Ridge office and the analytical labs to improve accuracy, shorten turnaround, and enhance communication.

- Data review processes were streamlined and automated, reducing the turnaround time for final data. Thus, results were available for use in days (often hours) rather than months.

- A direct electronic interface was developed between Bechtel's Oak Ridge office and the surveying contractor, saving considerable CADD time, improving accuracy, allowing immediate transfer of drawings to and from the site, and allowing designs to be developed jointly by all involved parties. The surveying contractor was trained on using CADD equipment that matched the stations in the Bechtel Oak Ridge office.

Borrow site conversion to wetlands—Two independent project needs—wetlands creation and clean borrow soil—were consolidated early in the project when the borrow pits were strategically sited for later conversion to replacement wetlands. This innovation required extensive preliminary work to

ensure that the area contained sufficient borrow and was appropriate to sustain a wetland. Benefits include increased wetland acreage, cost avoidance by not having to restore the borrow pits, and elimination of the need to permanently tie up additional plant land.

Wetlands winter work—Many project construction activities were restricted by the harsh winters in the Massena area, but some excavation in the Wetlands was done purposely during the winter months to take advantage of the frozen conditions. The sub-zero cold created obvious problems such as extremely harsh working conditions, frozen soil, and slow equipment startup. Benefits included allowing excavation without worrying about mud or water flowing back into the cuts, ease of dewatering by removing blocks of ice, reducing decontamination of equipment because items did not get muddy, and using 18-inch-thick layers of ice as improvised roadways that did not affect the ecology and did not require removal.

Wetlands revegetation—NYSDEC Fish and Wildlife, Reynolds, and Bechtel agreed to use wetlands seed bank (fertile topsoil borrowed from uplands bordering the wetlands) to restore disturbed wetlands without expensive plantings. The effort proved successful because the wetlands quickly returned to their natural native ecology. Some of the seedbank soil was used to create islands within open water wetland areas; these islands have become popular nesting sites for waterfowl.

Wet ponds—Wet ponds were incorporated into the designs of surface water sampling stations to consolidate sampling locations, improve quality of water entering the wetlands, and improve aesthetics. The innovative designs allow (1) water to continue flowing beneath the winter ice and (2) oil to be detained in the event of a plant spill, even while the water continues unimpeded.

Disposal optimization—The volume of spoils for onsite disposal grew significantly due to both the site and river remediation projects, and disposal options were limited by available capacity and regulatory constraints. Furthermore, the Black Mud Pond had a deficit of disposal volume because designated spoils (e.g., treatment residuals from the North Yard) were no longer available because of the ROD amendment. The solution was to dispose of low-PCB-concentration soils from the site remediation in the Black Mud Pond, providing the dual benefit of eliminating the need to import clean soil to the area and increasing the remaining capacity in the Landfill.

Reduced cap footprints—Reynolds recognized that the depth of waste was probably shallow in the area north of the Landfill and within the northern portion of the Black Mud Pond. Subsequent investigations via boreholes and trenches confirmed Reynolds' understanding of existing conditions. Following NYSDEC approval, the contamination was consolidated inward, thus reducing the footprint for two closure caps by several acres, saving cost, and reducing the size of managed areas.

Innovative cap design—To provide for near-maximum capacity, the onsite Landfill was designed with slopes too steep to readily accommodate a traditional gas-venting layer. The problem with frictional interfaces was solved by using narrow strip drains for gas transmission in steep areas and traditional netting for gas venting in flatter areas. This truly innovative approach ensured that the Landfill capacity would be adequate for all of the <50 ppm PCB soil to be removed from the site and the river.

Black Mud Pond capping—Black mud has a very low load-bearing capacity when wet and is very slow to dewater—two innate characteristics with the potential to affect the schedule for cap

construction. Consequently, lime was mixed with disposed soils and black mud to form a load-carrying "crust" atop the weak black mud, thus allowing early cap construction.

Black Mud Pond leachate removal—Horizontal drain technology was used to provide a passive dewatering system and allow long-term dewatering of the slow-draining black mud; the specialty contractor who installed the system helped refine and improve the innovative design. The system allowed early cap construction while the pond continues to dewater, isolated the area from the environment, and stopped groundwater recharge through the pond. Early cap construction also reduced the amount of water that must be treated by eliminating the need to collect and treat surface runoff and by stopping recharge of the Black Mud Pond by precipitation.

Flowable fill—To expedite restoration, flowable fill—technically known as "controlled low-strength material"—was sometimes used in lieu of conventional backfill-and-compaction methods. Controlled low-strength material is sand, cement, flyash, and water mixed in the proper proportions to yield an excellent structural backfill that readily flows to fill voids and hard-to-reach places, solidifies without compaction, has a compressive strength in the range of 100 to 200 psi, exhibits almost no long-term settlement, and can be excavated if needed using conventional equipment. Controlled low-strength material will support heavy equipment traffic after 24 to 48 hours, allowing grading and follow-up work to be done quickly. Controlled low-strength material speeds up the backfilling process by eliminating the need for placing, compacting, and testing in lifts (especially in deep excavations, which often require shoring), and it is an efficient and effective material for backfilling around buildings, structures, and foundations. Controlled low-strength material was regularly tested to ensure proper slump, mixture proportions, and strength. Controlled low-strength material was used for backfilling the deep excavations in the North Yard and the Potliner Storage Area, throughout the rail yard area, beneath the pipe bridge tower on the east side of the Pitch Pumphouse, and in selected grid blocks within the Pitch Storage and Fuel Oil Tank area.

Interface between Site Remediation Project and River Remediation Project—Because the river project dealt with much uncertainty in volume and schedule, the site project implemented work-around plans to accommodate various scenarios. The original Landfill cap design, approved five years prior to capping, accommodated projected disposal volumes from the river with ample room for contingency. The two projects also shared many of the same personnel, including some contractors, thus improving continuity and sharing lessons learned.

Integrated water management—A water management plan was prepared to integrate water management activities throughout the entire site. Since 1988, the capture, containment, measurement, and processing of stormwater, leachate, and other waters associated with the remediation effort have constantly improved.

Onsite procurement—All procurement was performed from the jobsite to facilitate coordination with Reynolds and allow Bechtel construction managers to better organize the division of work.

Use of local contractors and site personnel—Local resources were used where appropriate, resulting in cost savings, rapid response, and improved local relations. These resources provided regional expertise and process knowledge that proved invaluable.

Document review cycle—The review cycle for project documents was streamlined to eliminate several weeks from roughly 160 documents, saving considerable schedule and cost. Specifically,

NYSDEC, Reynolds, and Bechtel were able to agree on the revisions necessary to produce a "final" document during the first submittal and review cycle on nearly 100% of the project's documents, saving 60 to 90 days in each activity every time this single approval was achieved.

Consolidated action item list—Team actions were tracked on a single report to eliminate redundancy, improve accountability, and improve communication.

Soil borings for establishing excavation limits and disposal site—Many of the site excavations were controlled by an exhaustive program whereby soil samples were obtained during the design phase through soil borings and detailed survey procedures. Borings were used extensively in the North Yard and the Wetlands to establish the probable maximum depth of excavation required to achieve ROD cleanup goals. Surveyors established grids of consistent size and staked drilling locations at the centers of the grids. Survey baselines were established so that the precise boring locations can be spotted at any time in the future. Bechtel engineers and geologists established depths to be achieved and intervals where samples would be collected and analyzed. The program was used to determine the disposal of soils excavated from each depth interval and to determine the depth of the initial excavation in each grid. Although it was occasionally necessary to excavate further based on sample results at depth following the initial excavation, in most cases the excavation limits predicted by the soil boring program were sufficient to proceed with verification sampling. The sampling plan was approved by NYSDEC for widespread use on the project and returned many times its initial investment by reducing requirements for onsite interim storage of excavated soils; reducing delays for incremental sampling, analysis, and remobilization for additional excavations; and providing construction management with known volumes for onsite placement and for offsite disposal truck scheduling.

APPENDIX D

INTERIM REMEDIAL MEASURES REPORTS

APPENDIX D

INTERIM REMEDIATION MEASURES REPORTS

Addressed in the Area-Specific Completion Report for the Potliner Storage Pad Area

Bechtel, 1992. *Project Completion Report for the 008 Outfall/West Ditch and 007 Outfall Remediation Activities*, Rev. 0 (November).

Addressed in the Area-Specific Completion Report for the 002 Diversion Area

Bechtel, 1991. *Final Report for Interim Remediation, 002 Outfall Ditch, at the Reynolds Metals St. Lawrence Reduction Plant* (April).

Bechtel, 1991. "Closure of the Temporary Staging Pad," letter from M.J. Elsner (Bechtel) to D. Sweredoski (NYSDEC) dated June 17.

Bechtel, 1991. *Final Report for the Remediation of the Facility 20 Railroad Bay at the Reynolds Metals St. Lawrence Reduction Plant* (May).

Bechtel, 1992. *Project Completion Report of 002 Discharge System Clean-Out*, Rev. 0 (August).

Bechtel, 1992. "Completion Letter for the Cleanup Work at the North and South Vertical Casting Units" (June).

Bechtel, 1994. *Completion Report for Remediation of the 005 Ditch at the Reynolds Metals Company St. Lawrence Reduction Plant Remediation Project, Massena, New York*, Rev. 0 (March).

O'Brien and Gere Engineers, 1989. *PCB Sampling Results, 002 Outfall Diversion Project, Reynolds Metals Company, Massena, New York* (November).

O'Brien and Gere Engineers, 1990. *Stormwater Diversion Project Completion Report, Reynolds Metals Company, Massena, New York* (January).

O'Brien and Gere Engineers, 1991. *Oil Shed Floor Replacement Project Report, Reynolds Metals Company, Massena, New York* (August).

Addressed in the Area-Specific Completion Report for the North Yard

Bechtel, 1991. *Final Report on the Construction of the Waste Water Treatment Facility* (August).

Bechtel, 1991. "North Yard Storm Sewer Intercept PCB Sampling Results," letter from M.J. Elsner (Bechtel) to D. Sweredoski (NYSDEC) dated June 26.

Bechtel, 1991. "Miscellaneous Construction Sites: Sampling Report," letter from M.J. Elsner (Bechtel) to P.G. Waite (NYSDEC) dated August 12.

Bechtel, 1991. "Cold Ram Storage Tank Footer Excavation," letter from M.J. Elsner (Bechtel) to D. Sweredoski (NYSDEC) dated August 12.

Bechtel, 1991. "French Drain North of Fuel Oil Dikes" letter from M.J. Elsner (Bechtel) to P. Waite (NYSDEC) dated August 5.

Bechtel, 1992. *Project Completion Report for the 006 Outfall Modification at the Reynolds Metals Company, St. Lawrence Reduction Plant* (July).

Bechtel, 1992. *Final Project Report for 001 Discharge System Catch Basin Clean-out at the Reynolds Metals Massena Plant,* Rev. 0 (June).

Bechtel, 1993. *Status Report—Contingency Follow-up Investigation and Remediation for the 001 Discharge System at the Reynolds Metals Company St. Lawrence Reduction Plant, Massena, New York,* Rev.0 (February).

O'Brien and Gere Engineers, 1989. *Interim Remedial Activities, Reynolds Metals Company, St. Lawrence Reduction Plant* (December).

Reynolds, 1994. "Contaminated Soils from Transformer Replacement Program," letter from D.F. Bence (Reynolds) to P.G. Waite (NYSDEC) dated April 21.

Reynolds, 1994. "Management of Excavation Spoil from Transformer Foundation Installations," letter from D.F. Bence (Reynolds) to P.G. Waite (NYSDEC) dated July 1.

Reynolds, 1994. "Excavation for Plant Construction—North Yard Area," letter from D.F. Bence (Reynolds) to P.G. Waite (NYSDEC) dated October 3.

Reynolds, 1994. "Disposition of Material from Cleaning Under Roaster Stack in the North Yard Area," letter from R.C. Esterline (Reynolds) to P.G. Waite (NYSDEC) dated October 17.

Reynolds, 1995. "Disposal of Excavation Spoil from Ordinary Plant Construction Project," letter from D.F. Bence (Reynolds) to P.G. Waite (NYSDEC) dated March 3.

Woodward-Clyde Consultants, 1989. *Interim Remediation Activities Report, Reynolds Metals Company, St. Lawrence Reduction Plant* (January).

APPENDIX E

PIEZOMETER INSTALLATION LOGS

AND

MONITORING WELL ABANDONMENT LOGS

atl ATLANTIC TESTING LABORATORIES, Limited

Canton
6431 U.S. Highway 11
P.O. Box 29
Canton, NY 13617
315/386-4578 (T)
315/386-1012 (F)

October 17, 2002

Bechtel Environmental Services, Inc.
P.O. Box 5237
Massena, New York 13662

Attn: Mr. Michael Elsner

Telephone: (315) 764-1996
Facsimile: (315) 764-9394

Re: Piezometer Installation and Monitor Well Abandonment
Various Areas
ALCOA East Plant
Massena, New York
ATL Report No. CD2150-10-02

Ladies and Gentleman:

Enclosed you will find the Piezometer Installation and Monitor Well Abandonment diagrams for the referenced project.

Piezometers P-1 through P-22 were installed at locations specified by Bechtel Environmental Services, Inc. The piezometers are located on the east, south and west sides of the landfill. The piezometers were installed utilizing 4-1/4 inch hollow stem augers to the depths specified. Soil sampling was not required. Two-inch PVC riser and .010-inch machine well slot pipe with sufficient sand pack and a bentonite seal were used in the construction of the piezometers. The Piezometer Installation Logs are enclosed. The soil classifications on the installation logs are based on the drillers field classifications.

Thirty-two monitoring wells were abandoned for the referenced project. The monitoring well protectors were removed. The PVC well materials were then removed by over drilling with 4-14 inch hollow stem augers with an auger plug to approximately one-foot below the bottom of the well. The borehole was then backfilled with cement-bentonite grout. A list of the monitoring wells that were abandoned and the Monitoring Well Abandonment Logs are enclosed.

Please contact our office if you have any questions or if we may be of further service. We look forward to our continued association.

Sincerely,
ATLANTIC TESTING LABORATORIES, Limited

Adam J. Schneider, I.E.
Geotechnical Engineer

AJS/SFT/ajs

Enclosures

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/4/2002 Finish Date: 6/5/2002

Monitoring Well No.: PZ-1 Sheet 1 of 1

Northing: 16340502.77 Easting: 1704774.21

Ground Elevation: 216.0

Top of Casing Elevation: 219.0

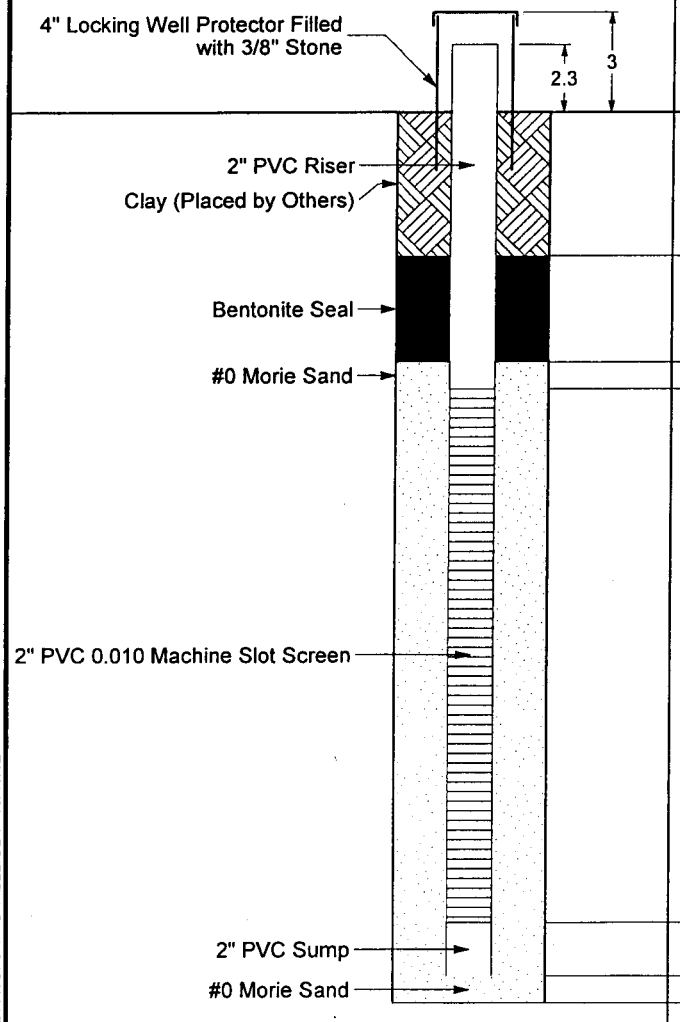
PVC Elevation: 218.30

Boring Advance By: 4-1/4" Auger

Groundwater Observations

Date	Time	Depth	Casing at

Installation Details



DEPTH (feet)

2.7
4.7
5.2
15.2
16.2
16.7

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 16.7 feet.
Flushed augers with wet rotary to 15.2 feet.
When the auger plug was pulled, 6' of silt and sand flowed into auger.

Grey-brown mf SAND and GRAVEL; some SILT; little CLAY

Numerous COBBLES & BOULDERS from 12.5' to 16.7'.

Boring terminated at 16.7 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/5/2002 Finish Date: 6/5/2002

Monitoring Well No.: PZ-2 Sheet 1 of 1

Northing: 16340500.37 Easting: 1704782.16

Ground Elevation: 214.5

Top of Casing Elevation: 217.5

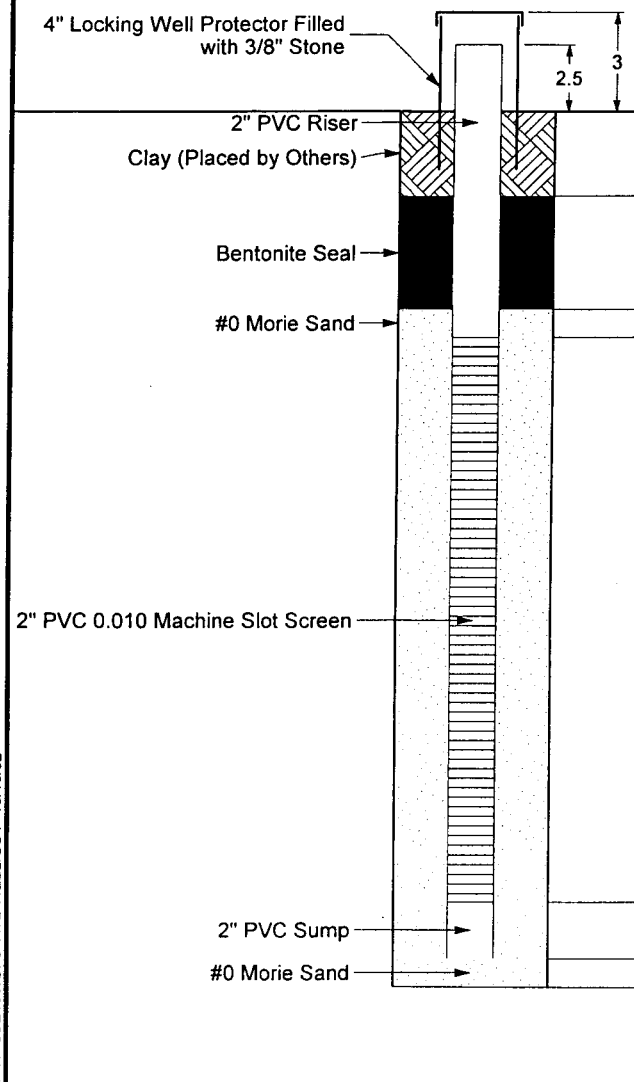
PVC Elevation: 217.05

Boring Advance By: 4-1/4" Auger

Groundwater Observations

Date	Time	Depth	Casing at

Installation Details



DEPTH (feet)

1.5
3.5
4.0
14.0
15.0
15.5

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" augers with auger plug to 15.5 feet.

Brown SAND; some SILT grading a SAND and GRAVEL

Boring terminated at 15.5 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/5/2002 Finish Date: 6/5/2002

Monitoring Well No.: PZ-3 Sheet 1 of 1

Northing: 16340499.00 Easting: 1704790.33

Ground Elevation: 212.6

Top of Casing Elevation: 215.5

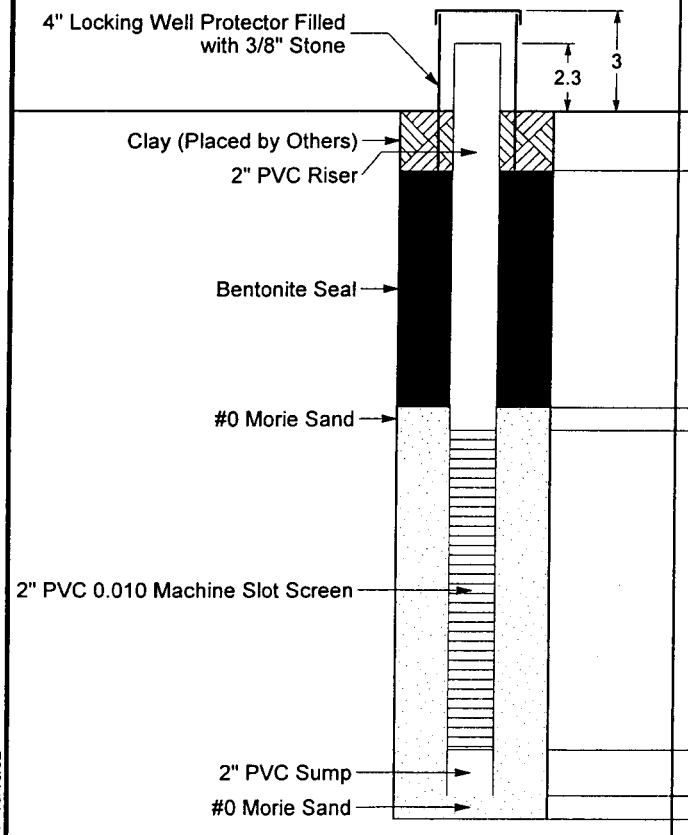
PVC Elevation: 214.85

Boring Advance By: 4-1/4" Auger

Groundwater Observations

Date	Time	Depth	Casing at

Installation Details



DEPTH (feet)

1.3
6.5
7.0
14.0
15.0
15.5

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" augers with auger plug to 15.5 feet.

Grey-Brown mf SAND; some SILT; some GRAVEL; little CLAY

Boring terminated at 15.5 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/5/2002 Finish Date: 6/5/2002

Monitoring Well No.: PZ-4 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340498.20 Easting: 1704792.15

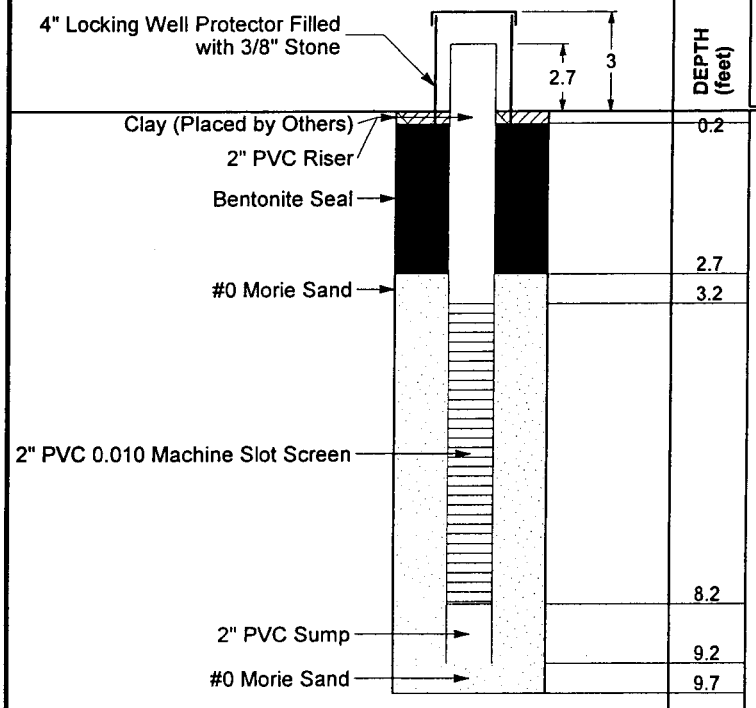
Ground Elevation: 212.8

Top of Casing Elevation: 215.8

PVC Elevation: 215.45

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

0.2
2.7
3.2
8.2
9.2
9.7

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Auger with auger plug to 9.7 feet.

Grey-Brown CLAY and SILT; some mf SAND and GRAVEL

Boring terminated at 13.9 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/6/2002 Finish Date: 6/6/2002

Monitoring Well No.: PZ-5 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340499.37 Easting: 1704794.70

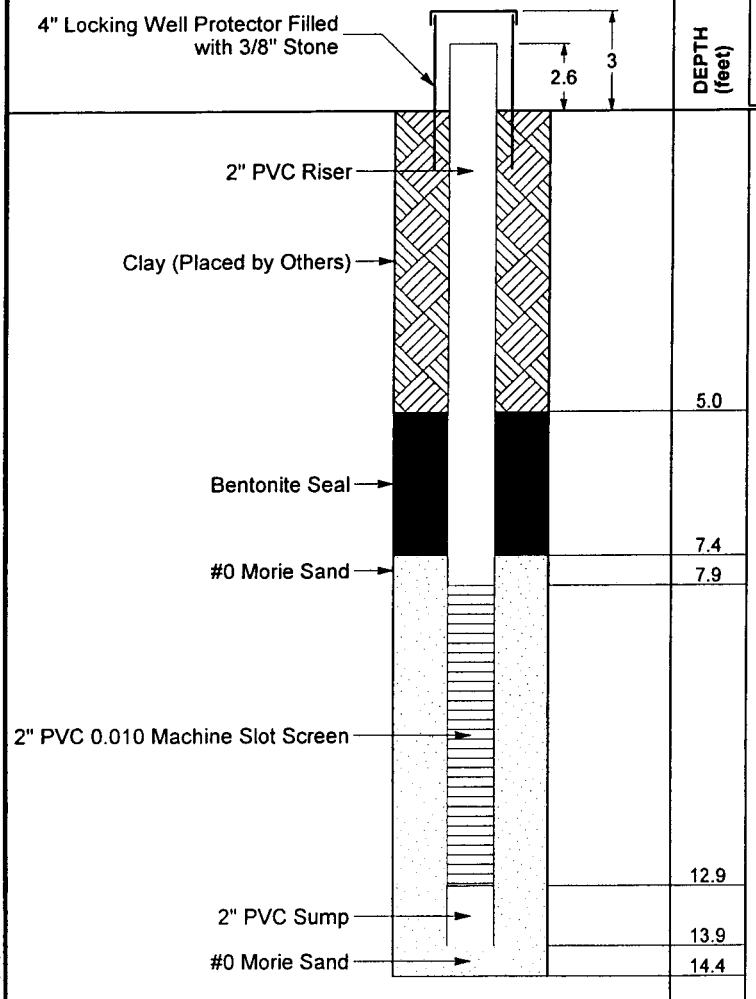
Ground Elevation: 213.2

Top of Casing Elevation: 216.2

PVC Elevation: 215.82

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

5.0
7.4
7.9
12.9
13.9
14.4

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced augers to refusal at 7.5'
Moved Boring 1', Auger refusal at 7.5'
Moved boring 2', advanced augers with auger plug to 14.4 feet.

Grey Brown CLAY; some SILT; some mf SAND; little GRAVEL

Numerous COBBLES and BOULDERS encountered from 3.5' to 8.5'.

Boring terminated at 14.4 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 5/29/2002 Finish Date: 5/29/2002

Monitoring Well No.: PZ-6 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340222.12 Easting: 1704655.06

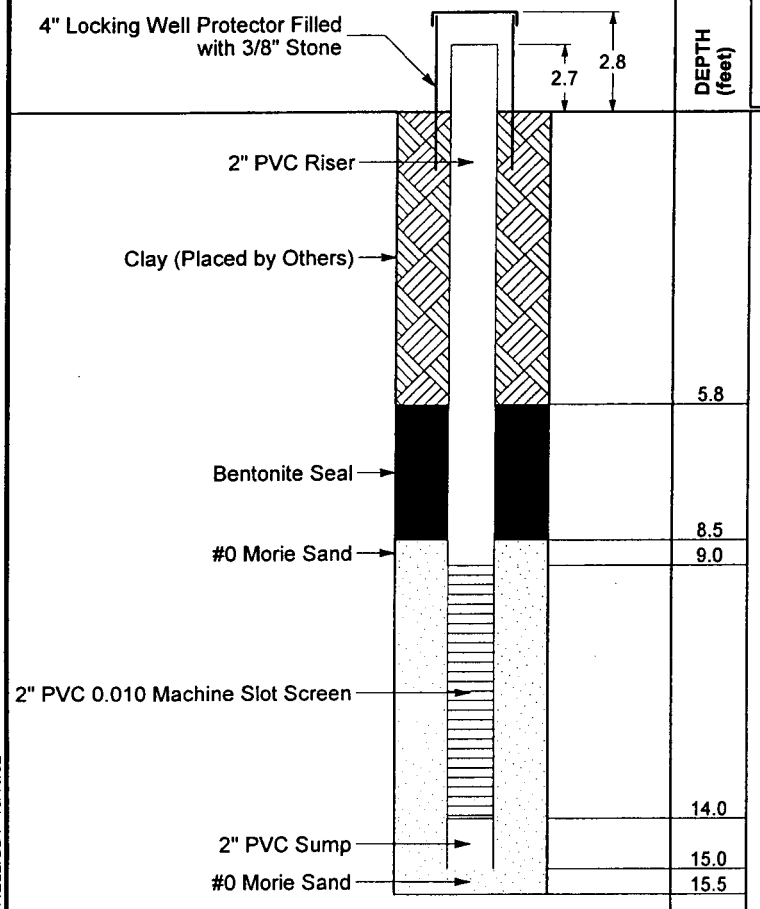
Ground Elevation: 199.6

Top of Casing Elevation: 202.4

PVC Elevation: 202.25

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

5.8
8.5
9.0
14.0
15.0
15.5

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 15.5 feet.

Grey-Brown Silty mf SAND; some mf GRAVEL; some CLAY

Boring terminated at 15.5 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 5/29/2002 Finish Date: 5/29/2002

Monitoring Well No.: PZ-7 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340215.40 Easting: 1704659.53

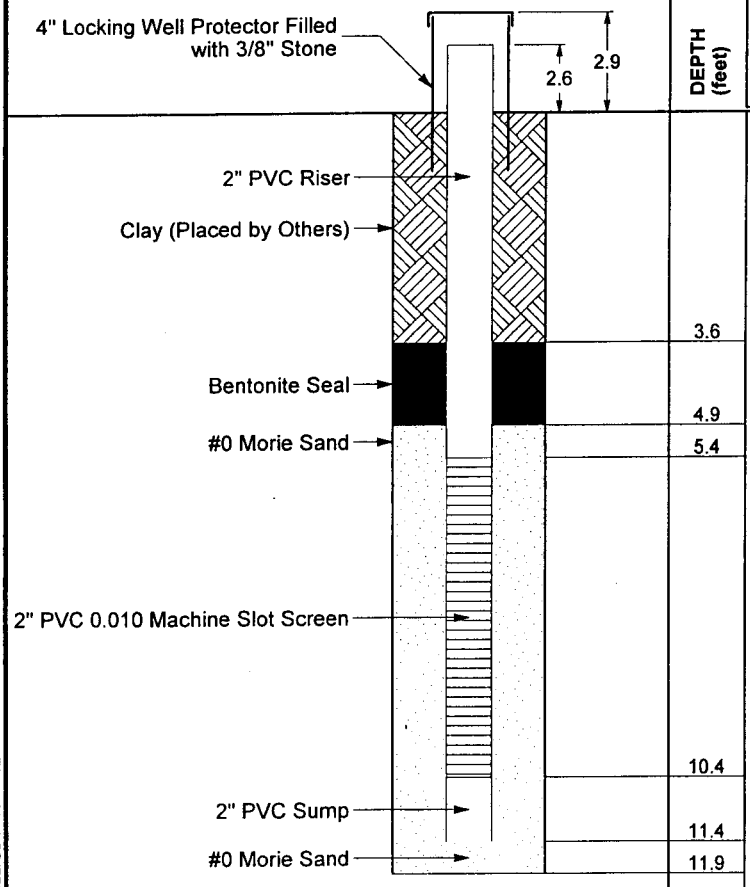
Ground Elevation: 198.3

Top of Casing Elevation: 201.2

PVC Elevation: 200.90

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

3.6
4.9
5.4
10.4
11.4
11.9

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Auger with auger plug to 11.9 feet.

Grey-Brown CLAY; some SILT; trace f SAND; trace GRAVEL

Boring terminated at 11.9 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 5/30/2002 Finish Date: 5/30/2002

Monitoring Well No.: PZ-8 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340205.19 Easting: 1704666.97

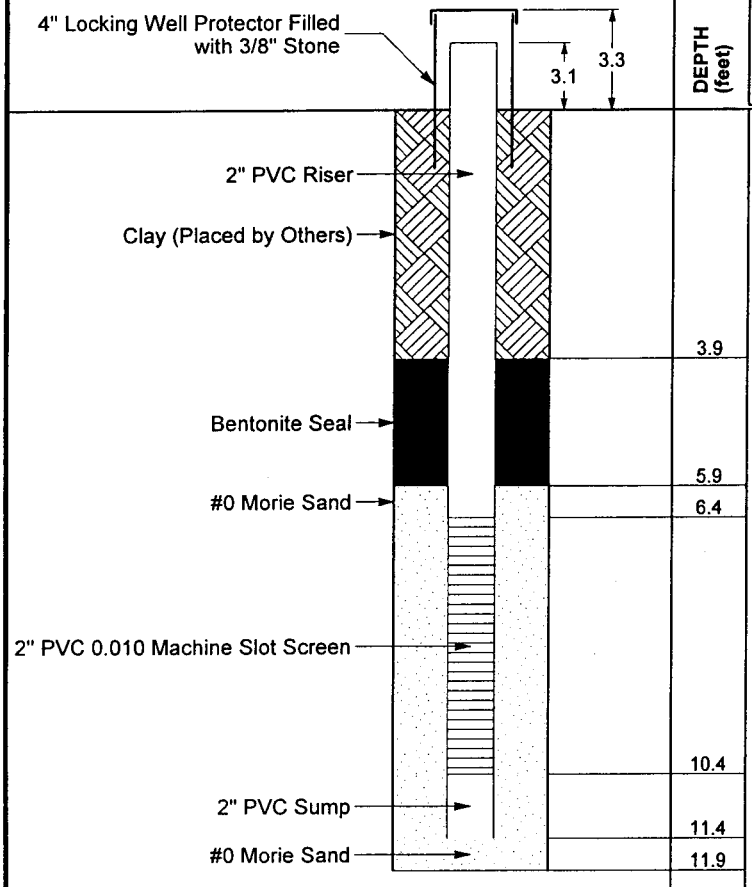
Ground Elevation: 198.3

Top of Casing Elevation: 201.6

PVC Elevation: 201.40

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

3.9
5.9
6.4
10.4
11.4
11.9

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 11.9 feet.

Grey-Brown CLAY; some SILT

Boring terminated at 11.9 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/21/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 5/30/2002 Finish Date: 5/30/2002

Monitoring Well No.: PZ-9 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340203.54 Easting: 1704668.35

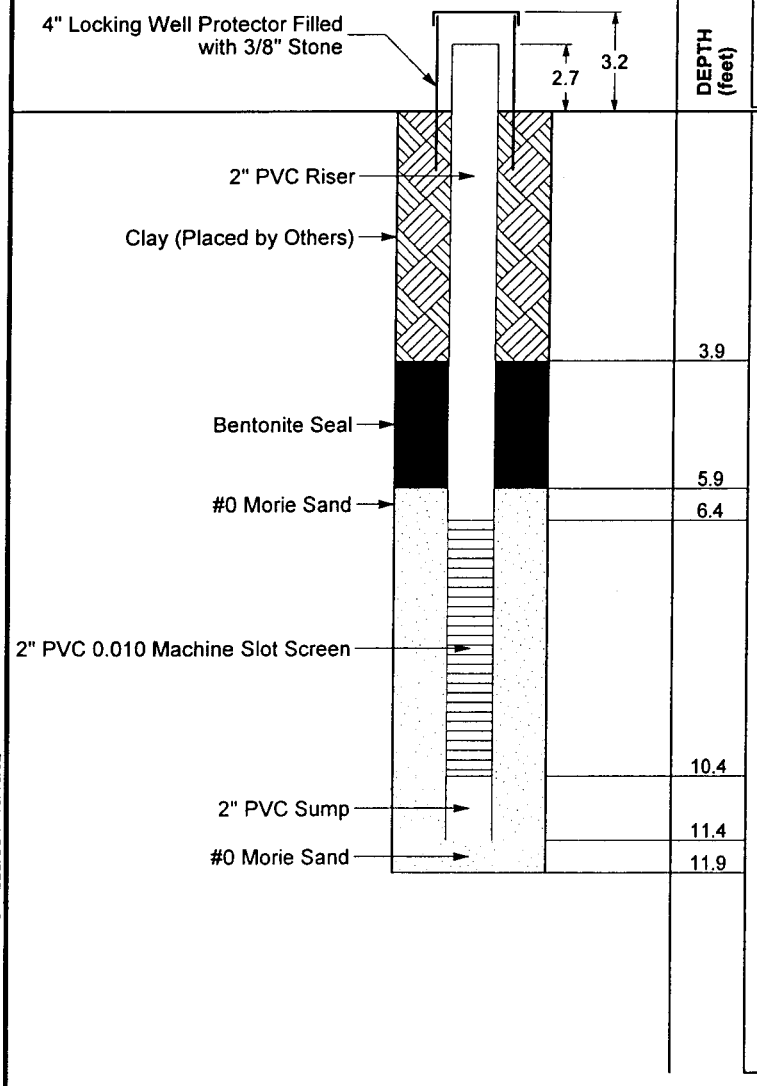
Ground Elevation: 198.5

Top of Casing Elevation: 201.7

PVC Elevation: 201.15

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

3.9
5.9
6.4
10.4
11.4
11.9

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 11.9 feet.

Grey-Brown CLAY; some SILT

Boring terminated at 11.9 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/3/2002 Finish Date: 6/3/2002

Monitoring Well No.: PZ-10 Sheet 1 of 1

Northing: 16340012.69 Easting: 1704358.09

Ground Elevation: 200.6

Top of Casing Elevation: 203.3

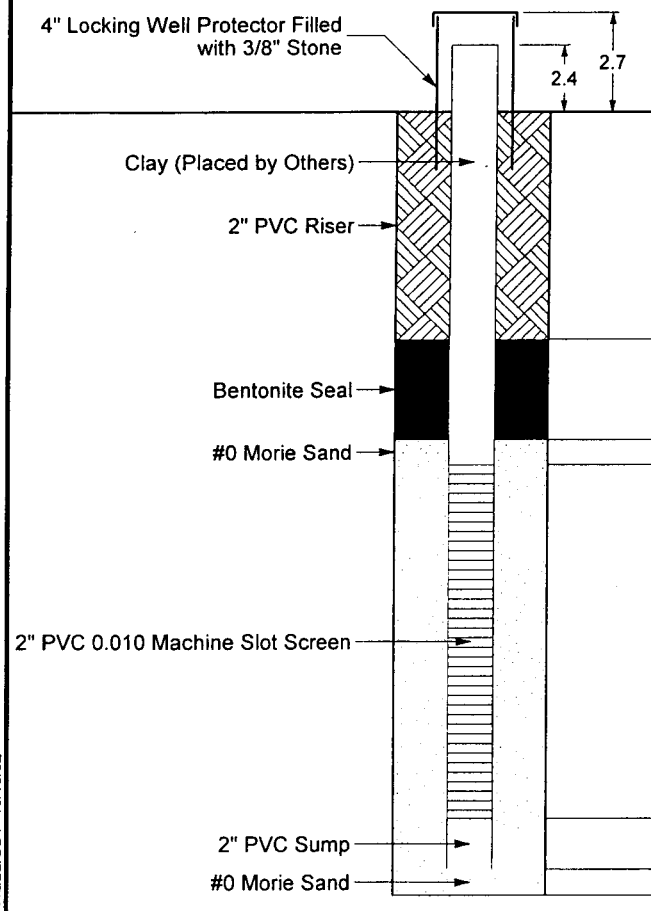
PVC Elevation: 202.95

Boring Advance By: 4-1/4" Auger

Groundwater Observations

Date	Time	Depth	Casing at

Installation Details



DEPTH (feet)

4.5
6.5
7.0
14.0
15.0
15.5

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" auger with auger plug to 15.5 feet.

Grey-Brown CLAY; some SILT

Boring terminated at 15.5 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/3/2002 Finish Date: 6/3/2002

Monitoring Well No.: PZ-11 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340006.76 Easting: 1704361.82

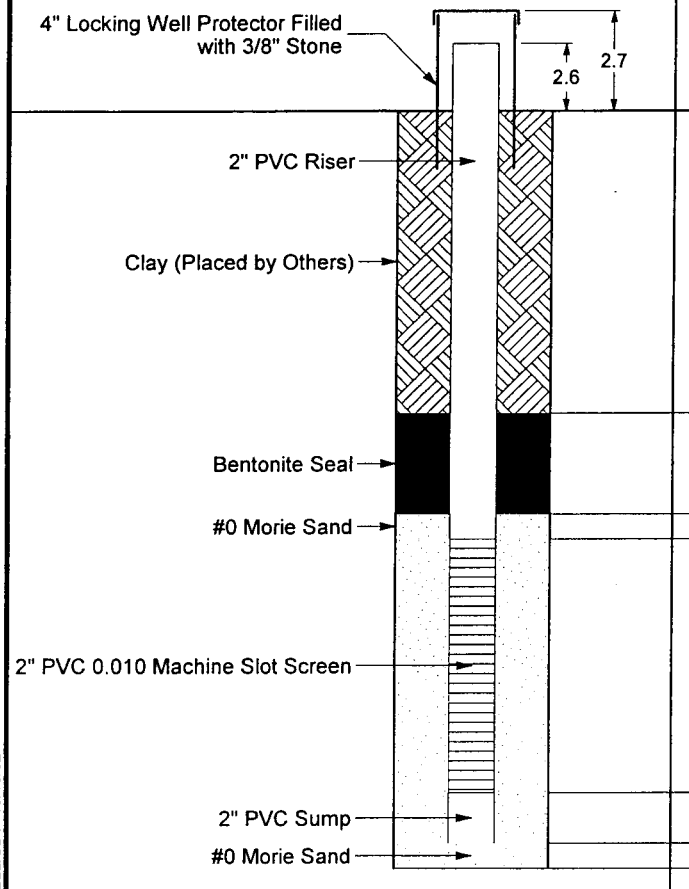
Ground Elevation: 200.0

Top of Casing Elevation: 202.7

PVC Elevation: 202.55

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

6.0
8.0
8.5
13.5
14.5
15.0

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" augers with auger plug to 15.0 feet.

Grey-Brown CLAY; some SILT

Boring terminated at 15.0 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/4/2002 Finish Date: 6/4/2002

Monitoring Well No.: PZ-12 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16339994.75 Easting: 1704370.04

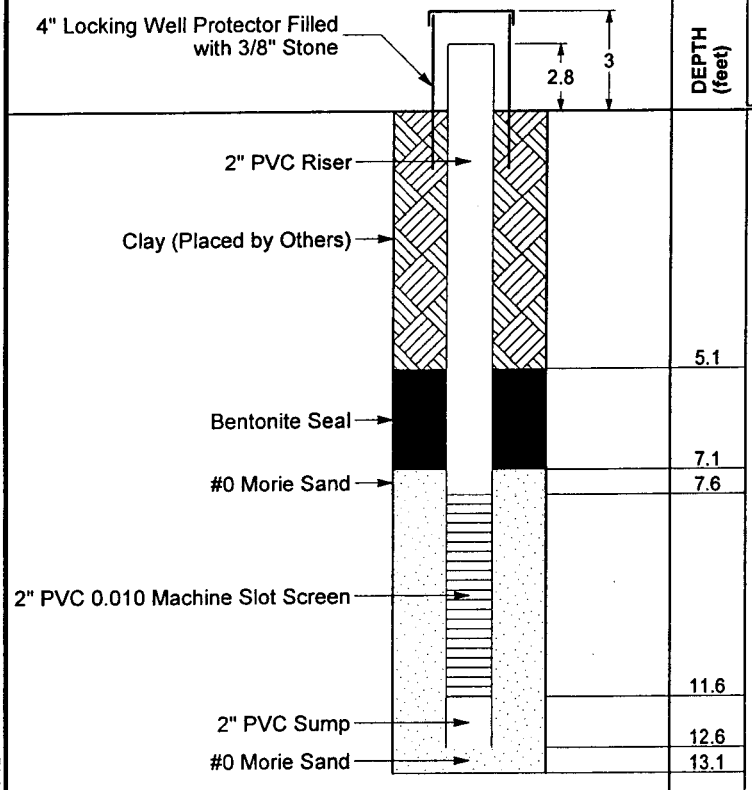
Ground Elevation: 198.4

Top of Casing Elevation: 201.4

PVC Elevation: 201.15

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

5.1
7.1
7.6
11.6
12.6
13.1

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" augers with auger plug to 13.1 feet.

CRUSHED STONE to approximately 5 feet.

Grey-Brown CLAY; some SILT

Boring terminated at 13.1 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/4/2002 Finish Date: 6/4/2002

Monitoring Well No.: PZ-13 Sheet 1 of 1

Northing: 16339993.64 Easting: 1704371.30

Ground Elevation: 198.3

Top of Casing Elevation: 201.3

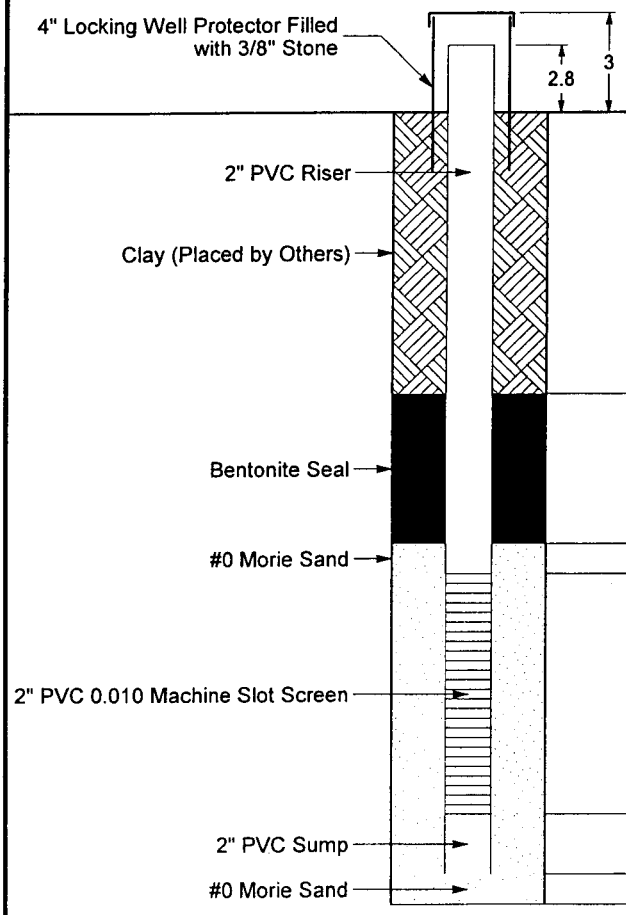
PVC Elevation: 201.10

Boring Advance By: 4-1/4" Auger

Groundwater Observations

Date	Time	Depth	Casing at

Installation Details



DEPTH (feet)

4.7
7.2
7.7
11.7
12.7
13.2

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" augers with auger plug to 13.2 feet.

CRUSHED STONE to about 2.5 feet

Grey-Brown CLAY; some SILT

Boring terminated at 13.2 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 5/23/2002 Finish Date: 5/23/2002

Monitoring Well No.: PZ-14 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16339914.43 Easting: 1703945.51

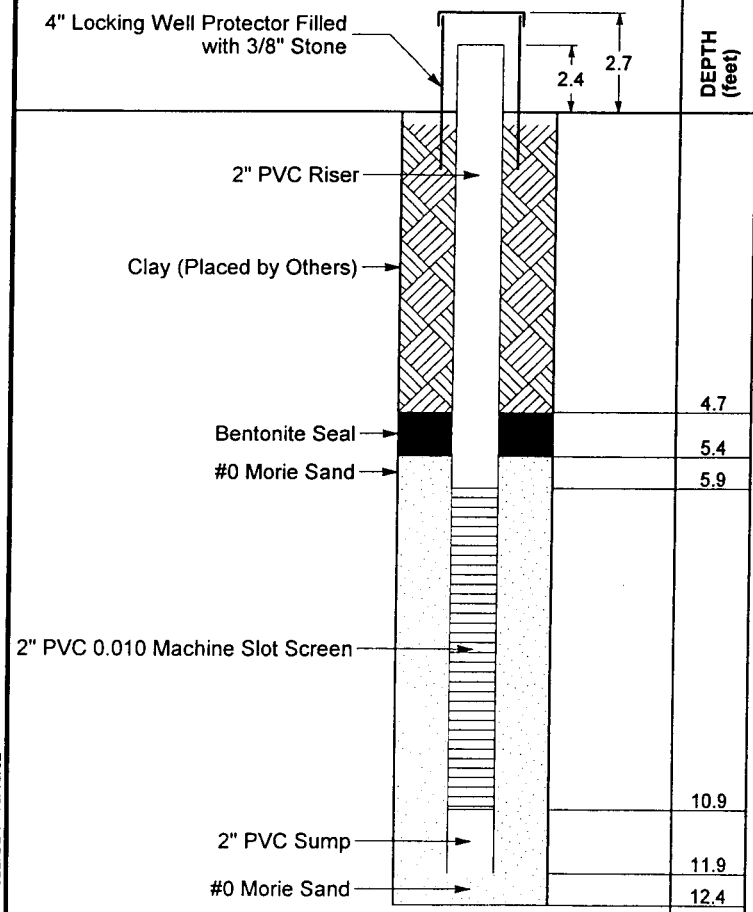
Ground Elevation: 199.5

Top of Casing Elevation: 202.2

PVC Elevation: 201.85

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

4.7
5.4
5.9
10.9
11.9
12.4

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 12.4 feet.

Brown mf SAND; and GRAVEL; some SILT; trace CLAY

Boring terminated at 12.4 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 5/23/2002 Finish Date: 5/23/2002

Monitoring Well No.: PZ-15 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16339908.31 Easting: 1703941.38

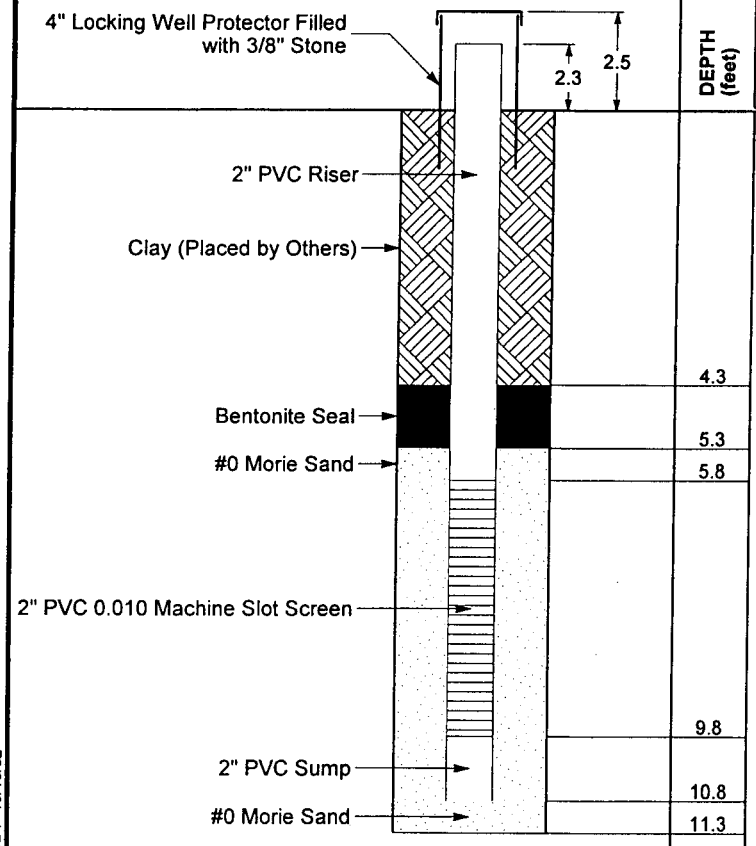
Ground Elevation: 198.3

Top of Casing Elevation: 200.8

PVC Elevation: 200.55

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

4.3
5.3
5.8
9.8
10.8
11.3

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 11.3 feet.

Brown mf SAND; and GRAVEL; some SILT; trace CLAY

Boring terminated at 11.3 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 5/23/2002 Finish Date: 5/23/2002

Monitoring Well No.: PZ-16 Sheet 1 of 1

Northing: 16339897.20 Easting: 1703934.58

Ground Elevation: 198.4

Top of Casing Elevation: 200.9

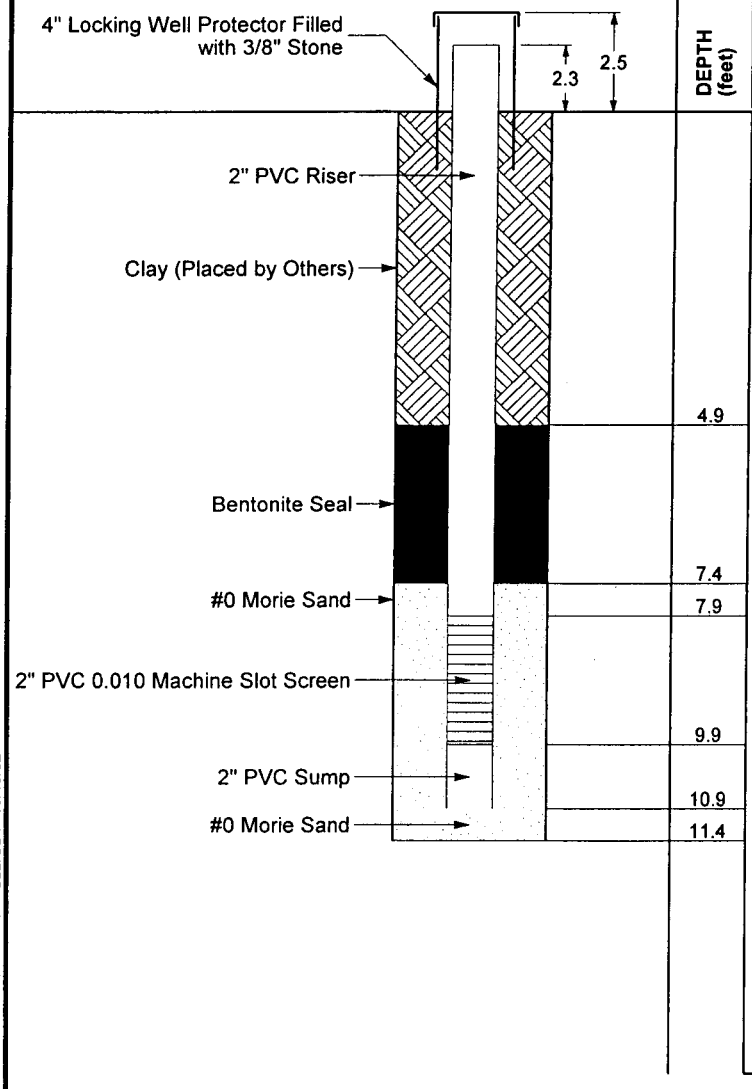
PVC Elevation: 200.65

Boring Advance By: 4-1/4" Auger

Groundwater Observations

Date	Time	Depth	Casing at

Installation Details



DEPTH (feet)

4.9
7.4
7.9
9.9
10.9
11.4

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 11.4 feet.

Brown CLAY and SILT; trace f SAND; trace GRAVEL

Boring terminated at 11.4 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150.5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 5/23/2002 Finish Date: 5/23/2002

Monitoring Well No.: PZ-17 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16339895.30 Easting: 1703933.50

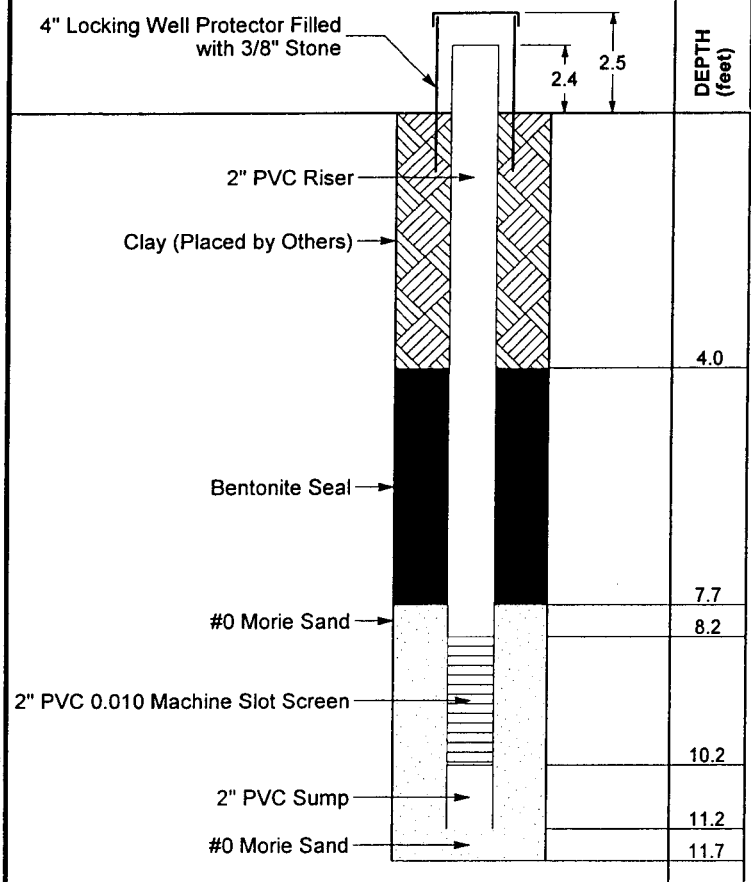
Ground Elevation: 198.6

Top of Casing Elevation: 201.1

PVC Elevation: 201.00

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

4.0
7.7
8.2
10.2
11.2
11.7

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 11.7 feet.

Brown CLAY and SILT; trace f SAND; trace GRAVEL

Boring terminated at 11.7 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 5/21/2002 Finish Date: 5/21/2002

Monitoring Well No.: PZ-18 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340287.61 Easting: 1703850.72

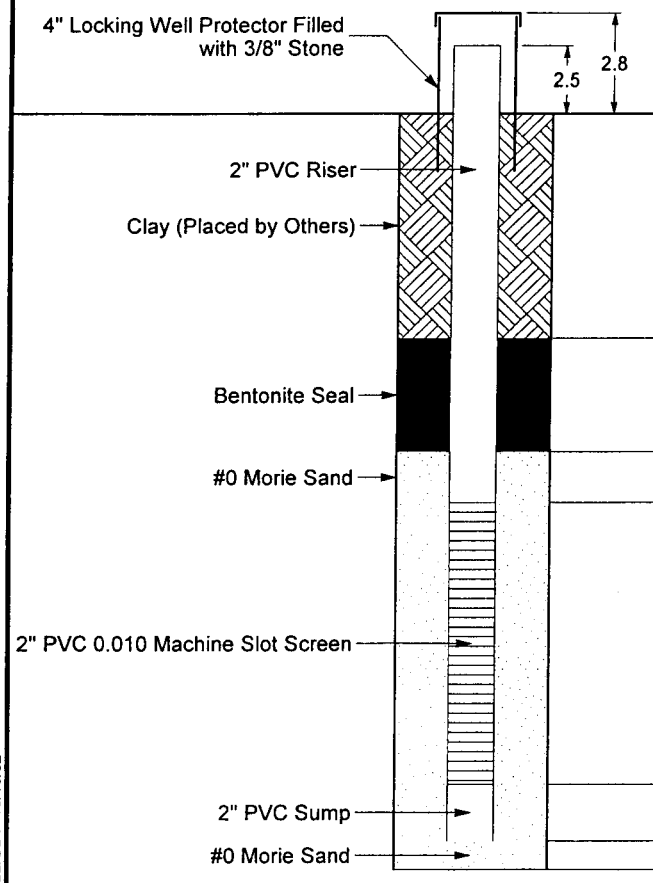
Ground Elevation: 208.4

Top of Casing Elevation: 211.2

PVC Elevation: 210.90

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

4.0
6.0
6.9
11.9
12.9
13.4

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 13.4 feet.

Brown mf SAND; and mf GRAVEL; some SILT; little CLAY

Boring terminated at 13.4 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 5/21/2002 Finish Date: 5/21/2002

Monitoring Well No.: PZ-19 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340290.41 Easting: 1703846.23

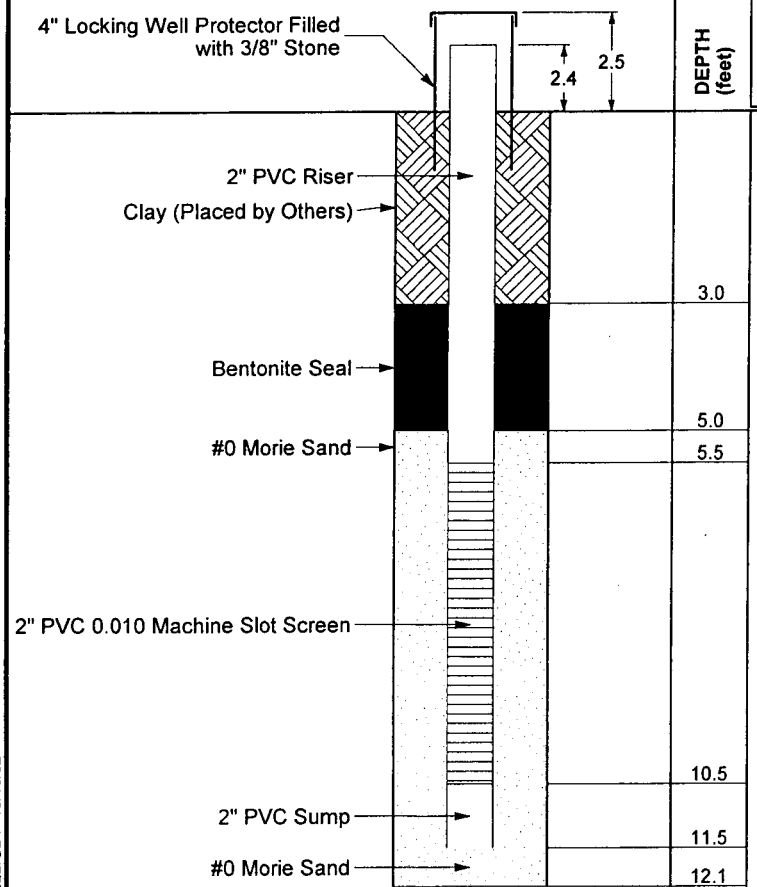
Ground Elevation: 207.0

Top of Casing Elevation: 209.5

PVC Elevation: 209.40

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

3.0
5.0
5.5
10.5
11.5
12.1

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 12.1 feet.

Brown mf SAND; and mf GRAVEL; some SILT; little CLAY

Boring terminated at 12.1 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 5/21/2002 Finish Date: 5/21/2002

Monitoring Well No.: PZ-20 Sheet 1 of 1

Northing: 16340293.29 Easting: 1703839.87

Ground Elevation: 205.4

Top of Casing Elevation: 208.2

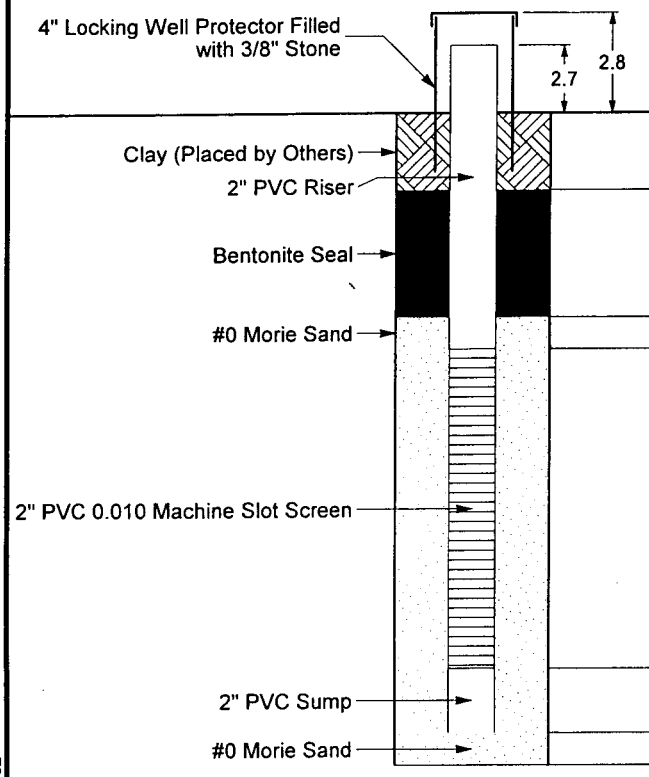
PVC Elevation: 208.05

Boring Advance By: 4-1/4" Auger

Groundwater Observations

Date	Time	Depth	Casing at

Installation Details



DEPTH (feet)

1.2
3.2
3.7
8.7
9.7
10.2

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 10.2 feet.

Brown mf SAND; and mf GRAVEL; some SILT; little CLAY; trace Crushed STONE

Boring terminated at 10.2 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 5/21/2002 Finish Date: 5/21/2002

Monitoring Well No.: PZ-21 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340294.14 Easting: 1703837.85

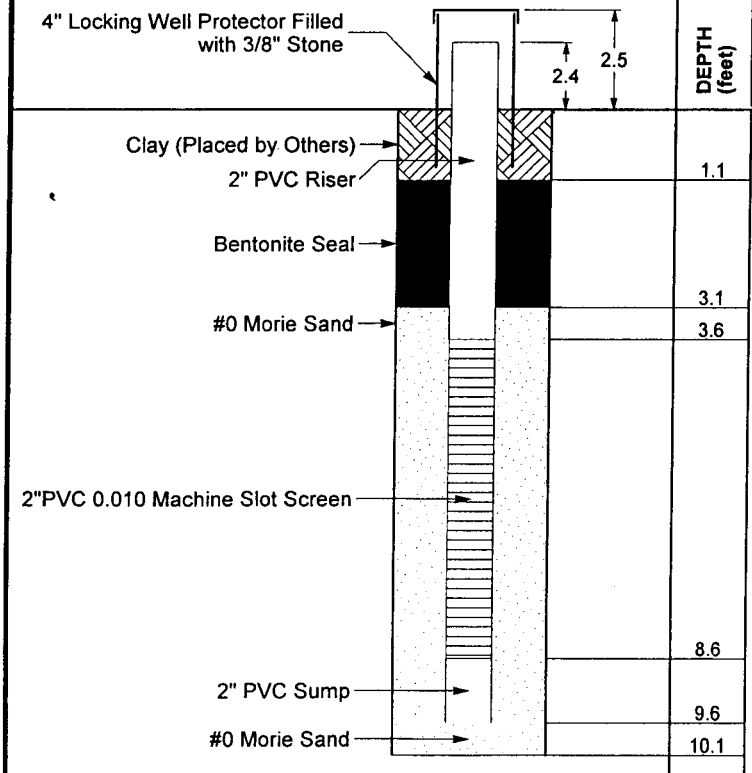
Ground Elevation: 205.3

Top of Casing Elevation: 207.8

PVC Elevation: 207.70

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

1.1
3.1
3.6
8.6
9.6
10.1

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 10.1 feet.

Brown mf SAND; and mf GRAVEL; some SILT; little CLAY

Numerous Cobbles from 2' to 5.5'.

Boring terminated at 10.1 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce; Paul McAloon

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Piezometer Installation

Report No.: CD2150-5-02

Client: Bechtel Environmental

Well Location: As Staked on Landfill

Project: Piezometer Installation

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 5/21/2002 Finish Date: 5/21/2002

Monitoring Well No.: PZ-22 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Northing: 16340294.20 Easting: 1703835.91

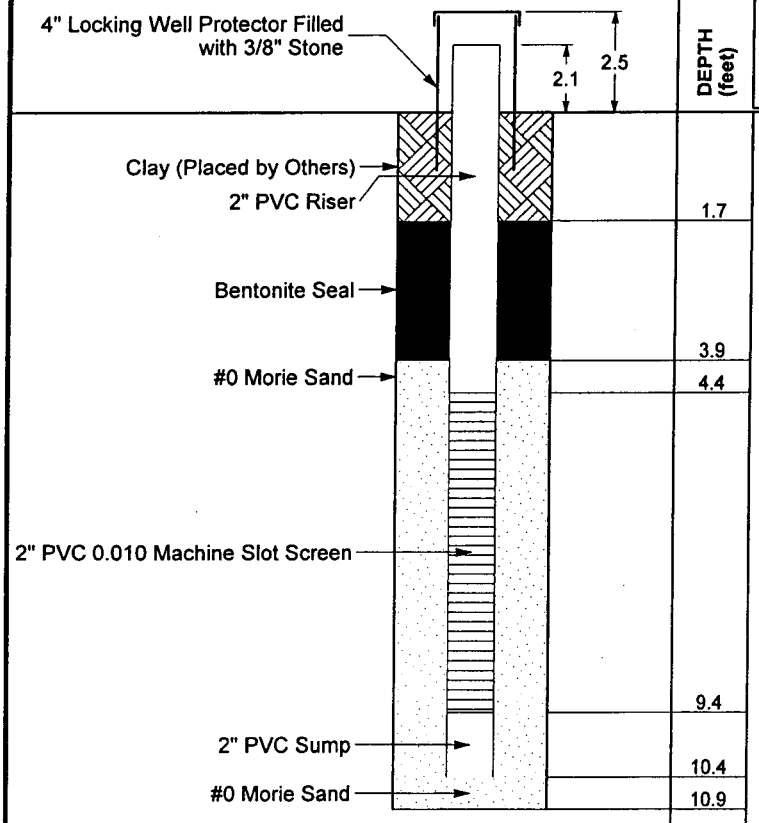
Ground Elevation: 205.6

Top of Casing Elevation: 208.1

PVC Elevation: 207.65

Boring Advance By: 4-1/4" Auger

Installation Details



DEPTH (feet)

1.7
3.9
4.4
9.4
10.4
10.9

Installation Procedure

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Advanced 4-1/4" Augers with auger plug to 10.9 feet.

Brown mf SAND; and mf GRAVEL; some SILT; little CLAY

Numerous COBBLES and BOULDERS from 2.5' to 8.5'.

Boring terminated at 11.7 feet.

Note:
1. Soil classifications based on drillers field logs.

Drillers: Robin Pryce

Inspector:

ATL-MW CD2150.GPJ ATL-WELL.GDT 10/18/02

Monitoring Wells Abandoned during the Summer of 2002

Well ID	Location
LFOF-1902	SE of Landfill
MW-4S	SE of Landfill
LFOK-1204	NW of Landfill
BMPB-1	NW of Black Mud Pond
BMPB-2	W of Black Mud Pond
TB-6	Wetlands
TB-6A	Wetlands
TB-7	NW of Landfill
NWP-1A	Borrow Pit Area
NWP-1B	Borrow Pit Area
NWP-2A	Borrow Pit Area
NWP-2B	Borrow Pit Area
NWP-3A	Borrow Pit Area
NWP-3B	Borrow Pit Area
NWP-4A	Borrow Pit Area
NWP-4B	Borrow Pit Area
NWP-5A	Borrow Pit Area
NWP-5B	Borrow Pit Area
NWP-6A	Borrow Pit Area
NWP-6B	Borrow Pit Area
NWP-7A	Borrow Pit Area
NWP-7B	Borrow Pit Area
WLP-1A	Wetlands
WLP-1B	Wetlands
WLP-2A	Wetlands
WLP-2B	Wetlands
WLP-3A	Wetlands
WLP-3B	Wetlands
WLP-4A	Wetlands
WLP-4B	Wetlands
WLP-5A	SE of Landfill/Wetlands
WLP-5B	SE of Landfill/Wetlands

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: SE of Landfill

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/6/2002 Finish Date: 6/10/2002

Boring No.: LFOF-1902 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By: 4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled 4" Protector and some PVC.	
2								Advanced 4-1/4" Augers with auger plug to 15.0 feet.	
3								Advanced 4-1/4" Augers to 53.0'.	
4									
5								Boring terminated at 53.0 feet.	
6									
7								Note:	
8								1. It was noted that the 2" PVC and Well Screen had been previously filled by others with bentonite chips.	
9								2. Borehole was backfilled upon completion with cement bentonite grout.	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine, m - medium, c - course
and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/21/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: SE of Landfill

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/6/2002 Finish Date: 6/6/2002

Boring No.: MW-4S Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By: 4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled out 4" protector, retrieved 2" PVC and screen. Advanced 4-1/4" Augers with auger plug to 19.0 feet.	
2									
3								Boring terminated at 19.0 feet.	
4									
5								Note:	
6								1. Borehole backfilled upon completion with cement bentonite grout.	
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine, m - medium, c - course
and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: NW of Landfill

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 6/11/2002 Finish Date: 6/12/2002

Boring No.: LFOK-1204 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - course; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%)	Recovery (Inches)
1								Pulled Out 4" Protector.	
2								Advanced 4-1/4" Augers to 57.0 feet.	
3									
4								Boring terminated at 57.0 feet.	
5									
6								Note:	
7								1. It was noted that the 2" PVC and Well Screen filled with bentonite chips.	
8								2. Borehole grouted upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: NW of Black Mud Pond

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 6/13/2002 Finish Date: 6/13/2002

Boring No.: BMPB-1 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 3 Protective Ballards.	
2								Pulled Out 4" Protector, 2" PVC and Well Screen.	
3								Advanced 4-1/4" Augers with auger plug to 18.0 feet.	
4									
5								Boring terminated at 18.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with Cement Bentonite Grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: W of Black Mud Pond

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 6/12/2002 Finish Date: 6/12/2002

Boring No.: BMPB-2 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 3 Protective Ballards.	
2								Pulled Out 4" Protector, 2" PVC & Well Screen.	
3								Retrieved All Pipe.	
4								Advanced 4-1/4" Aguers with auger plug to 20.0 feet.	
5									
6								Boring terminated at 20.0 feet.	
7									
8								Note:	
9								1. Borehole backfilled upon completion with Cement Bentonite Grout.	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Wetlands

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 7/8/2002 Finish Date: 7/9/2002

Boring No.: TB-6 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 4" Protector.	
2								Pulled Out 2" PVC and well screen.	
3								Retrieved all pipe	
4								Advanced Augers with auger plug to 43 feet.	
5									
6								Boring terminated at 43.0 feet.	
7									
8								Note:	
9								1. Borehole backfilled upon completion with cement bentonite grout.	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/21/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Wetlands

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 7/8/2002 Finish Date: 7/8/2002

Boring No.: TB-6A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out Some 2" PVC.	
2								Advanced Augers with auger plug to 48 feet.	
3									
4									
5								Boring terminated at 48.0 feet.	
6									
7								Note:	
8								1. It was noted there was no well protector.	
9								2. Borehole backfilled upon completion with cement bentonite grout.	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: NW of Landfill

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/13/2002 Finish Date: 6/13/2002

Boring No.: TB-7 Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 4" Protector	
2								Pulled Out Some PVC	
3								Advanced 4-1/4" Augers with auger plug to 28.0.	
4									
5								Boring terminated at 28.0 feet.	
6									
7								Note:	
8								1. It was noted the well was damaged.	
9								2. Borehole backfilled upon completion with cement bentonite grout.	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine, m - medium, c - course
and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 7/16/2002 Finish Date: 7/16/2002

Boring No.: NWP-1A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1	AUGER							Pulled Out 4" Protector, Unable to pull PVC	
2								Advanced 4-1/4" Augers over PVC pipe to 10 feet.	
3								Pulled Out PVC and Well Screen.	
4								Retrieve all pipe	
5									
6									
7									
8									
9									
10								Borehole terminated at 10 feet.	
11									
12								Note:	
13								1. Borehole backfilled upon completion with cement bentonite grout.	
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine, m - medium, c - course
and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Corey Murray; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 2/3/03

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 7/16/2002 Finish Date: 7/16/2002

Boring No.: NWP-1B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1	AUGER							Pulled Out 4" Protector, Unable to pull PVC	
2								Advanced 4-1/4" Augers over PVC pipe to 19 feet.	
3								Pulled Out PVC and Well Screen.	
4								Retrieved all pipe.	
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19								Boring terminated at 19 feet.	
20									
21								Note:	
22								1. Borehole backfilled upon completion with cement bentonite grout.	
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Corey Murray; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 2/3/03

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 6/19/2002 Finish Date: 6/19/2002

Boring No.: NWP-2A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 4" Protector	
2								Pulled Out 2" PVC and Well Screen	
3								Retrieved All Pipe	
4								Advanced 4-1/4" Augers with auger plug to 10.0 feet.	
5									
6								Boring terminated at 10.0 feet.	
7									
8								Note:	
9								1. Borehole backfilled upon completion with cement bentonite grout.	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 6/20/2002 Finish Date: 6/24/2002

Boring No.: NWP-2B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
								f - fine m - medium c - course and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	
1								Pulled out 4" protector	
2								Advanced 4-1/4" augers over PVC to 21.0'	
3								Pulled out 2" PVC and well screen.	
4								Retrieved all pipe.	
5									
6								Boring terminated at 21.0 feet.	
7									
8								Note:	
9								1. Borehole backfilled upon completion with cement bentonite grout.	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 6/19/2002 Finish Date: 6/19/2002

Boring No.: NWP-3A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 4" Protector	
2								Pulled Out PVC	
3								Advanced 4-1/4" Aguers with auger plug to 12'	
4									
5								Boring terminated at 12.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 6/19/2002 Finish Date: 6/19/2002

Boring No.: NWP-3B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 4" Protector, Unable to Pull PVC	
2								Advanced 4-1/4" Augers over PVC Pipe to 22.0 feet.	
3								Pulled Out PVC and Well Screen.	
4								Retrieved All Pipe	
5									
6								Boring terminated at 22.0 feet.	
7									
8								Note:	
9								1. Borehole backfilled upon completion with cement bentonite grout.	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/17/2002 Finish Date: 6/17/2002

Boring No.: NWP-4A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By: 4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
1								Pulled Out 4" Protector	
2								Pulled Out 2" Riser	
3								Advanced 4-1/4" Augers with auger plug to 18.0 feet.	
4									
5								Boring terminated at 18.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 6/17/2002 Finish Date: 6/17/2002

Boring No.: NWP-4B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 4" Protector	
2								Advanced 4-1/4" Augers Over PVC Pipe to 22.5 feet.	
3								Auger Refusal Encountered	
4								Pulled Out 2" PVC and Well Screen	
5								Retrieved All Pipe	
6								Boring terminated at 22.5 feet.	
7								Note:	
8								1. Borehole backfilled upon completion with Cement Bentonite Grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course
and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/26/2002 Finish Date: 6/26/2002

Boring No.: NWP-5A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
								f - fine m - medium c - course and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	
1								Pulled out 6" protector.	
2								Pulled out some 2" PVC.	
3								Advanced 4-1/4" augers with auger plug to 13.0'.	
4									
5								Boring terminated at 13.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/26/2002 Finish Date: 6/26/2002

Boring No.: NWP-5B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled out 6" protector.	
2								Pulled out some 2" PVC.	
3								Advanced 4-1/4" augers with auger plug to 22.0'.	
4									
5								Boring terminated at 22.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 6/18/2002 Finish Date: 6/18/2002

Boring No.: NWP-6A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 4" Protector	
2								Advanced 4-1/4" Augers Over PVC to 16.0 feet.	
3								Pulled Out PVC and Well Screen	
4									
5								Boring terminated at 16.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

CLASSIFICATION OF MATERIAL: f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloön

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/18/2002 Finish Date: 6/18/2002

Boring No.: NWP-6B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 6" Protector	
2								Pulled Out Some PVC	
3								Advanced 4-1/4" Augers with auger plug to 27.0 feet.	
4									
5								Boring terminated at 27.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine, m - medium, c - course
and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 6/24/2002 Finish Date: 6/24/2002

Boring No.: NWP-7A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled out 6" protector	
2								Pulled out 2" PVC and some well screen	
3								Advanced 4-1/4" augers with auger plug to 29.0.	
4									
5								Boring terminated at 29.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Borrow Pit

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/24/2002 Finish Date: 6/24/2002

Boring No.: NWP-7B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled out 6" protector	
2								Advanced 4-1/4" augers over PVC to 12'	
3								Pulled out 2" PVC and well screen.	
4								Retrieved all pipe.	
5									
6								Boring terminated at 12.0 feet.	
7									
8								Note:	
9								1. Borehole backfilled upon completion with cement bentonite grout.	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Wetlands

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 7/10/2002 Finish Date: 7/10/2002

Boring No.: WLP-1A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By: 4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out 4" Protector.	
2								Pulled Out 2" PVC and well screen.	
3								Advanced Augers with auger plug to 9.5 feet.	
4									
5								Boring terminated at 9.5 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine, m - medium, c - course
and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Wetlands

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 7/10/2002 Finish Date: 7/10/2002

Boring No.: WLP-1B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled out 4" Protector.	
2								Pulled out some 2" PVC.	
3								Advanced 4-1/4" Augers with auger plug to 20 feet.	
4									
5								Boring terminated at 20.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine, m - medium, c - course
and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Wetlands

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 7/3/2002 Finish Date: 7/3/2002

Boring No.: WLP-2A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
1								Pulled out 4" protector.	
2								Pulled out 2" PVC and well screen.	
3								Advanced 4-1/4" augers with auger plug to 10'.	
4									
5								Boring terminated at 10.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Wetlands

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 7/3/2002 Finish Date: 7/3/2002

Boring No.: WLP-2B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
1								Pulled out 4" protector.	
2								Pulled out 2" PVC and well screen.	
3								Advanced 4-1/4" augers to 21.0'	
4									
5								Boring terminated at 21.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Wetlands

Project: Monitor Well Abandonment
Various Areas
ALCOA East Plant, Massena, NY

Start Date: 7/1/2002 Finish Date: 7/1/2002

Boring No.: WLP-3A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled out 4" protector.	
2								Pulled out some 2" PVC.	
3								Advanced 4-1/4" augers with auger plug to 9.0'.	
4									
5								Boring terminated at 9.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine, m - medium, c - course
and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Wetlands

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 7/1/2002 Finish Date: 7/1/2002

Boring No.: WLP-3B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
1								Pulled out 4" protector.	
2								Pulled out some 2" PVC.	
3								Advanced 4-1/4" augers with auger plug to 20.0'.	
4									
5								Boring terminated at 20.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Wetlands

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 7/3/2002 Finish Date: 7/3/2002

Boring No.: WLP-4A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled out 4" protector.	
2								Pulled out 2" PVC and well screen.	
3								Advanced 4-1/4" augers with auger plug to 9.0'.	
4									
5								Boring terminated at 9.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: Wetlands

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 7/2/2002 Finish Date: 7/2/2002

Boring No.: WLP-4B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
								f - fine m - medium c - course and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	
1								Pulled out 4" protector.	
2								Pulled out 2" PVC and well screen.	
3								Advanced 4-1/4" augers with auger plug to 20.0'.	
4									
5								Boring terminated at 20.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: SE of Landfill/Wetlands

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/11/2002 Finish Date: 6/11/2002

Boring No.: WLP-5A Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
1								Pulled Out Protector, 2" PVC and Well Screen. Advanced 4-1/4" Augers with Auger Plug to 11.0 feet.	
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
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14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

Boring terminated at 11.0 feet.

Note:
1. Borehole backfilled upon completion with cement bentonite grout.

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

ATLANTIC TESTING LABORATORIES, Limited

Monitor Well Abandonment

Report No.: CD2150-5-02

Client: Bechtel Environmental

Boring Location: SE of Landfill/Wetlands

Project: Monitor Well Abandonment

Various Areas

ALCOA East Plant, Massena, NY

Start Date: 6/10/2002 Finish Date: 6/10/2002

Boring No.: WLP-5B Sheet 1 of 1

Groundwater Observations

Date	Time	Depth	Casing at

Casing Hammer
Weight: _____ lbs.
Fall: _____ in.

Sampler Hammer
Weight: _____ lbs.
Fall: _____ in.

Ground Elev.: _____

Boring Advance By:
4-1/4" Auger

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
								f - fine m - medium c - course and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	
1								Pulled Out 4" Protector, some PVC.	
2								Advanced 4-1/4" Augers with auger plug to 22.0 feet.	
3									
4									
5								Boring terminated at 22.0 feet.	
6									
7								Note:	
8								1. Borehole backfilled upon completion with cement bentonite grout.	
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: Robin Pryce; Paul McAloon

Inspector: _____

ATL-LOG1 CD2150.GPJ ATL-WELL.GDT 10/18/02

APPENDIX F

SCHEDULE AND COST ESTIMATE

FOR

POST-REMEDIAL ACTIVITIES

APPENDIX F

SCHEDULE AND COST ESTIMATE FOR POST-REMEDIAL ACTIVITIES

Post-Remedial Inspection and Monitoring Schedule

Table 1 of this appendix is the April 2000 schedule for formal inspections, taken directly from the Quarterly Operations, Maintenance, and Monitoring Report. Table 2 of this appendix provides details of the items that make up the operating, maintenance, and monitoring requirements for the Reynolds remediation.

Post-Remedial Operations, Maintenance, and Monitoring Cost Estimate

Section XII.F of the Order on Consent requires that, after completion of the construction activities identified in the Remedial Design, Reynolds shall "...provide a cost estimate for the Operation and Maintenance Period...." The contents of this appendix satisfy that requirement.

During the preparation of the Feasibility Study, Woodward-Clyde Consultants estimated the long-term post-remedial operating, monitoring, and maintenance costs for a variety of possible remedies. NYSDEC included cost estimates for the selected alternatives in the ROD. NYSDEC estimates presented in the ROD were based on the estimates developed by Woodward-Clyde in the Feasibility Study. Table 3 of this appendix compares by area the 1992 estimate from the ROD with the year 2000 estimate. The totals of the two estimates deviate by less than two percent from the mean.

This section assumes an unknown number of years during which Reynolds will be responsible for inspections, operation, and upkeep of certain onsite items or structures, including the closure caps and the leachate pumping and treating equipment. The costs given in Tables 4, 5, and 6 of this appendix are present day costs, based on present day processes and practices.

Reynolds has installed treatment systems that are used exclusively for post-remedial treatment (e.g., the activated carbon filtration system and the cyanide destruct system.) The costs associated with these systems are fully reflected in the tables. Reynolds has also installed treatment systems that, in addition to treating the remediation wastewater, are also used to treat other wastewater streams not associated with remediation. The remediation waste streams have a small impact on the total cost of operations of these systems; their operation and maintenance costs are ignored in this report.

Tables for Appendix F

- Table 1 – Post-Remedial Inspection and Monitoring Schedule
- Table 2 – Descriptions of Long-Term Tasks
- Table 3 – Comparison of Annual Cost Estimates for Post-Remedial Work (1992 ROD vs. 2000 Current)
- Table 4 – Costs for Area Inspections, Monitoring, and Management
- Table 5 – Costs for Operations
- Table 6 – Cost for Maintenance

Table 1
Post-Remedial Inspection and Monitoring Schedule
(from April 2000)

Activity	Schedule Requirement	Planned Schedule											
		J	F	M	A	M	J	J	A	S	O	N	D
Surface Water (Note 1)													
Inspect surface water monitoring stations	Annually					✓							
Monitor surface water chemistry from Rectifier Yard Pond (pond east of Landfill)	Quarterly (revised July 1999)	✓			✓			✓			✓		
Groundwater													
Inspect monitoring wells/piezometers	Annually					✓							
Monitor groundwater chemistry	Quarterly	✓			✓			✓			✓		
Measure water levels in wells/piezometers	Quarterly	✓			✓			✓			✓		
See also under "BMP" and "Landfill" below													
General Area Inspections													
Inspect Area North of Haverstock Road	Inspection period ended 10/99												
Inspect Rectifier Yard Ditch	Inspection period ended 10/99												
Inspect 002 Diversion Area	Spring and fall through 06/00				✓								
Inspect Black Mud Pond cap and area	Spring and fall				✓						✓		
Inspect Landfill and area (before closure)	Monthly (weekly during disposal)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Inspect Landfill and area (after closure)	Monthly (unless snow-covered) for 1 year; spring and fall thereafter												
Inspect area north of the Landfill	Spring and fall through 2003					✓					✓		
Inspect North Yard and tank containments	Annually					✓							
Inspect North Yard west and east sumps	Quarterly	✓			✓			✓			✓		
Inspect Potliner Storage Pad and area	Annually					✓							
Inspect Rectifier Yard and area	Annually					✓							
Black Mud Pond Leachate Removal													
Measure leachate elevations inside pond	Monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Record leachate transfer quantity from pond	Monthly	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Inspect discharge line from pond sump	Quarterly	✓			✓			✓			✓		
Landfill Leachate & Stormwater Removal													
Measure groundwater elevations around Landfill	Monthly after Landfill is capped	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Record quantity of leachate and stormwater transferred from Landfill (Note 2)	Weekly through 6 months after capping, and monthly thereafter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Inspect leachate collection and removal system and leachate transfer line	Quarterly	✓			✓			✓			✓		
Wetlands													
Maintain and inspect Borrow Area prior to conversion to wetlands	Spring and fall					✓				✓			
Check water levels in remediated Wetlands	Monthly during growing season through year 2000					✓	✓	✓	✓	✓			
Inspect remediated Wetlands	Annually in the spring					✓							
Conduct fauna observations (informal)	During other entries into wetlands					✓		✓		✓			

(1) SPDES surface water monitoring is performed and reported separately.
(2) After the Landfill is capped, transfer will consist only of leachate (i.e., no stormwater).

Table 2A - Area Inspections, Maintenance, and Management Requirements

Area	Cost Category							
	Groundwater Elevations	Groundwater Chemistry	Informal Inspections	Scheduled Inspections	Management Review	OM&M Report Preparation	Equipment Maintenance	Grounds Maintenance
Black Mud Pond	23 Wells	5 Monitoring Wells	Daily	Quarterly	Quarterly	Quarterly	Pumps, pipelines, meters, wells	Mowing, drainage erosion protection
Landfill	25 Wells	3 Monitoring Wells	Daily	Quarterly	Quarterly	Quarterly	Pumps, pipelines, flowmeters, wells	Mowing, drainage erosion protection
Wetlands Remediation Area	3 Wells	None required	During entries into Wetlands	Annually until fully revereted to healthy, wild state	Annually	Annually	Wells	None
Borrow Area (future wetlands creation site)	2 Wells	None required	None required	Semi-annually prior to conversion to wetlands	Semi-annually	Semi-annually	Wells	None
Potliner Storage Pad	7 Wells	7 Monitoring Wells	None required	Annually	Quarterly	Quarterly	Monitoring wells	Concrete pavement, crushed stone, liners
North Yard	8 Wells	7 Monitoring Wells	Daily	Quarterly	Quarterly	Quarterly	Pumps, pipelines, flowmeters, wells	Mowing, drainage, liners, crushed stone, erosion prevention
002 Diversion Area	None required	None required	None required	None	None	None	None required	Mowing, erosion prevention
Rectifier Yard & Rectifier Yard Ditch	None required	None required	Daily	Quarterly - surface water, Annually - area	Quarterly	Quarterly	None required	None required
Area North of Haverstock Road	None required	None required	None required	None required	None required	None required	None required	None required
Site-Wide	1 Well	None required	None required	Annually (all wells)	Annually	Annually	Monitoring wells	None required

Table 2B - Operations and Maintenance Details

System	Operating Requirements	Operating Schedule	Maintenance Requirements
Landfill leachate extraction and pumping system	Capture, collect, pump, store, and treat Landfill leachate as long as necessary.	24 hrs/day, 7 days/wk, 365 days/yr (except maintenance shutdowns)	Collection sump, pumphouse, pumps, valves, instruments, controls, power, freeze protection, transfer pipeline and inspection manholes, access roadway
Black Mud Pond leachate extraction and pumping system	Capture, collect, pump, store, and treat Black Mud Pond leachate indefinitely.	24 hrs/day, 7 days/wk, 365 days/yr (except maintenance shutdowns)	Collection sump and pump, valves, flowmeter, pump hourmeter, power supply, pump controls, pipes, tanks, freeze protection, double containment transfer line
West Sump groundwater operations	Capture, collect, pump, store, and treat groundwater from the Potliner Storage Pad area, the North Yard, and the Thickener Area indefinitely.	24 hrs/day, 7 days/wk, 365 days/yr (except maintenance shutdowns)	Sump structure, backflow prevention valves on french drains, pumps, controls, power supply, instruments, pipes to Blue Tank, freeze protection
Pre-treatment storage and pumps	Control level in storage tank. Monitor pumps and controls. Monitor flow rates.	24 hrs/day, 7 days/wk, 365 days/yr (except maintenance shutdowns)	Tank structure, level controls and instruments, freeze protection, pumps, valves, transfer pipeline, pumphouse structure, power
Treatment systems	Operate system, and monitor pumps, controls, turbidity, chemical additives, pressures, flows, & discharge quality.	24 hrs/day, 7 days/wk, 365 days/yr. (except maintenance shutdowns)	Flow rate controls, chemical feed systems, prefilter and controls, pumps, cyanide destruction unit, fluoride removal, carbon filters, discharge lines
Treatment discharge	Monitor quality, rate, and total volume discharged to river.	24 hrs/day, 7 days/wk, 365 days/yr (except maintenance shutdowns)	Flowmeter, sampling stations
Monitoring wells	None	None	Casing, lock, baler, surface seal
Grounds and Fences	None	None	Mowing, fence posts, fabric, and gates

Table 3 - Comparison of Annual Cost Estimates for Post-Remedial Work (1992 ROD vs. 2000 Current)

Area of Concern	Record of Decision (from ROD Sect. VII, p. 42)		April 2000 Estimated Annual Cost (from Tables 4 - 6)				Increase or (Decrease) in Annual Cost (2000 over 1992)
	Alternative	Annual Cost	Inspection	Operation	Maintenance	Annual Cost	
Black Mud Pond	2A	$170,000	$38,000	$181,000	$28,000	$247,000	$77,000
Landfill	1B	$220,000	$27,000	$187,000	$89,000	$303,000	$83,000
Wetlands	2A	$60,000	$10,000	$0	$0	$10,000	($50,000)
Potliner Storage Pad	3B	$74,000	$19,000	$23,000	$13,000	$55,000	($19,000)
North Yard	2A	$230,000	$23,000	$53,000	$23,000	$99,000	($131,000)
Miscellaneous Areas	4	$0	$17,000	$0	$5,000	$22,000	$22,000
ANNUAL TOTAL	--	**$754,000**	**$134,000**	**$444,000**	**$158,000**	**$736,000**	($18,000)

Table 4 - Cost for Area Inspections, Monitoring, and Management

Cost Item	Area							TOTAL ANNUAL COST
	Black Mud Pond	Landfill	Wetlands	Potliner Storage Pad	North Yard	Rectifier Yard	Site-Wide	
4.1 Measure groundwater elevations monthly.	X	X	X					$7,000
4.2 Measure groundwater elevations quarterly.	X	X	X	X	X		X	$12,000
4.3 Sample and analyze groundwater chemistry quarterly.	X	X		X	X		X	$20,000
4.4 Sample and analyze surface water chemistry quarterly.						X		$7,000
4.5 Perform frequent informal inspections.	X	X	X	X	X	X		$36,000
4.6 Perform formal scheduled inspections.	X	X	X	X	X	X		$29,000
4.7 Prepare reports.	X	X	X	X	X	X	X	$23,000
TOTAL ANNUAL COST - INSPECTIONS, MONITORING, & MANAGEMENT								**$134,000**

Table 5 - Cost for Operations

	Cost Item	Operation						TOTAL ANNUAL COST
		Landfill Leachate Extraction & Pumping System	BMP Leachate Extraction and Pumping System	West Sump Groundwater Operations	Pre-treatment Storage and Pumps	Treatment Systems	Treatment Discharge	
5.1	Capture, collect, pump, store, treat Landfill leachate indefinitely. Monitor volume.	X						$142,000
5.2	Capture, collect, pump, store, treat Black Mud Pond leachate indefinitely. Monitor volume.		X					$136,000
5.3	Capture, collect, pump, store, treat groundwater from the North Yard and Thickener Area indefinitely.			X				$31,000
5.4	Control level in storage tank. Monitor pumps and controls. Monitor flow rates.				X			$45,000
5.5	Operate pumps; add chemicals; control turbidity, pressures, flows, and discharge quality.					X	X	$90,000
TOTAL ANNUAL COST - OPERATIONS								**$444,000**

This estimate is for the costs to operate the temporary and permanent facilities as required to assure the continued effectiveness of the remedial work per the tabulation on sheet one of this document.

Total annual costs are for all items marked "X."

Table 6 - Cost for Maintenance

System		Maintenance Required on These Items for the System	Total Annual Cost
6.1	Landfill leachate collection and pumping system	Collection sump, pumphouse, pumps, valves, instruments, controls, power, freeze protection, transfer pipeline and inspection manholes, access roadway	$50,000
6.2	Black Mud Pond leachate extraction and pumping system	Collection sump and pump, valves, flowmeter, pump hourmeter, power supply, pump controls, pipes, tanks, freeze protection, double containment transfer line	$20,000
6.3	West Sump groundwater operations	Sump structure, backflow prevention valves on french drains, pumps, controls, power supply, instruments, pipes to blue tank, freeze protection	$22,000
6.4	Pre-treatment storage and pumps	Tank structure, level controls and instruments, freeze protection pumps, valves, transfer pipeline, pumphouse structure, power	$18,000
6.5	Treatment systems	Flow rate controls, chemical feed systems, prefilter and controls, pumps, carbon filters, discharge lines	$12,000
6.6	Treatment discharge	Flowmeter, sampling stations	$6,000
6.7	Grounds & fences - Landfill, Black Mud Pond, Potliner Storage Pad, North Yard, and 002 Diversion Area	Mow, repair fences, restore vegetation in eroded or damaged areas; repair pavement in areas where maintenance of surface integrity is required by Remedial Design	$24,000
6.8	Monitoring Wells	Casings, locks, balers, surface seals	$6,000
TOTAL ANNUAL COSTS - MAINTENANCE			**$158,000**

This estimate is for the costs to maintain the temporary and permanent facilities as required to assure the continued effectiveness of the remedial work per the tabulation on Table 2

APPENDIX G

CHEMICALS OF CONCERN AND CLEANUP GOALS

APPENDIX G

CHEMICALS OF CONCERN AND CLEANUP GOALS

Area	Chemical of Concern			
	PCBs[1]	PAHs[2]	Anions[3]	Dioxins[4]
Area North of Haverstock Road	1	✓		
Black Mud Pond – consolidation areas only		✓	✓	
Landfill – south toe of Landfill	(Same as for Wetlands RR-6)			
Landfill – north consolidation area	1	✓		
Landfill – Former Material Stockpile Area	1	✓		
North Yard – Area 1	25 [5]	✓		✓
North Yard – Area 2	10	✓		
Potliner Storage Pad – original area	10	✓	✓	
Potliner Storage Pad – area south of Digging Building	1			
Rectifier Yard	1	✓		
Rectifier Yard Ditch (RYD)	1	✓		
RYD – east extension into Wetlands RR-6	(Same as for Wetlands RR-6)			
Wetlands – within Wetlands RR-6	0.1 [6]	✓	✓	
Wetlands – Area West of Landfill	1	✓		
002 Diversion Area	10	✓		

(1) Values listed under "PCBs" are the cleanup goals for Total PCBs in ppm.

(2) PAH cleanup goal:

Benzo(b)fluoranthene	0.330 ppm
Benzo(k)fluoranthene	0.330 ppm
Chrysene	0.330 ppm
Fluoranthene	19.0 ppm
Pyrene	6.5 ppm

(3) Anion residual concentrations are for comparison with New York State groundwater effluent standards (6 NYCRR Part 703.6). Analyses on the soil and sediment were performed using a modified toxicity characterization leaching procedure (TCLP) leachate extraction per Section V of the ROD. Goals for comparison are:

Cyanide	0.4 mg/L
Fluoride	3.0 mg/L
Sulfate	500 mg/L

(4) Dioxin cleanup goal:

Dibenzo-P-dioxins (PCDD)	0.0005 ppm
2,3,7,8 TCDD	0.0005 ppm

(5) For North Yard Area 1, the design required excavating to predetermined limits (i.e., horizontally within the 100-ppm PCB footprint and vertically down to 25 ppm PCBs).

(6) For Wetlands remediation, the *target* cleanup goal for PCBs was 0.1 ppm. The ROD, however, deemed that such a low value was impractical and stipulated that a 1.0 ppm *practical* cleanup goal be used.

APPENDIX H

TECHNICAL SPECIFICATIONS

APPENDIX H

TECHNICAL SPECIFICATIONS

Number	Title	Revision	Date
CSP-001	Furnishing and Delivering Ready-Mixed Concrete (superseded by CSP-021)	--	--
CSP-002	Concrete Work (superseded by CSP-021)	--	--
CSP-003	Excavation, Filling, and Backfilling (superseded by CSP-024)	--	--
CSP-004	Grading (superseded by CSP-024)	--	--
CSP-005	Onsite Transport of Contaminated Material	1	08-Jul-94
CSP-006	Chain-Link Fence	0	30-Apr-02
CSP-007	Turf Establishment	1	10-Jun-94
CSP-008	Earthwork for Roadways and Railroads (never issued for construction)	--	--
CSP-009	Bituminous Prime Coat (never issued for construction)	--	--
CSP-010	Bituminous Tack Coat	0	12-Mar-95
CSP-011	Excavation, Trenching, and Backfilling for Utilities (never issued for construction)	--	--
CSP-012	Storm Sewers	0	26-Apr-94
CSP-013	Clearing (never issued for construction)	--	--
CSP-014	Demolition	0	05-Jun-95
CSP-015	Patching of Rigid Pavements (never issued for construction)	--	--
CSP-016	Bituminous Paving for Roads, Streets, and Open Areas	0	12-Mar-95
CSP-017	Material Testing	1	05-Jun-94
CSP-018	Material Field Testing	0	07-Jul-92
CSP-019	Surveying Services	1	08-Jun-94
CSP-020	Topographic Mapping	0	15-Jun-92
CSP-021	Reinforced Concrete – Furnishing, Forming, Placing, and Curing	0	26-May-94
CSP-022	Bathymetric Survey (not used for this project)	0	03-Sep-93
CSP-023	Repair of the Temporary Storage Pad	0	29-Sep-93
CSP-024	Uncontaminated Earthwork	4	11-Jul-95
CSP-025	Contaminated Earthwork	3	21-Oct-96
CSP-026	Masonry (never issued for construction)	--	--
CSP-027	L/FPS Area Cutoff Wall and Leachate Collection and Removal System (superseded by CSP-031)	--	--
CSP-028	Furnishing and Installing Geomembrane Liner and Geonet Drainage Layer	3	24-Aug-95
CSP-029	Well Closure/Decommissioning (never issued for construction)	--	--

Number	Title	Revision	Date
CSP-030	Soil Conditioning Study	2	11-Jul-95
CSP-031	Landfill/Former Potliner Storage Area Leachate Collection and Removal System	2	27-Mar-95
CSP-032	Soil Conditioning	0	02-Aug-93
CSP-033	Graded Crushed Aggregate Subbase Course	0	13-Apr-95
CSP-034	Establishment of Wetland Vegetation	1	21-Jul-95
CSP-035	Black Mud Pond Dewatering System	1	01-Aug-95
CSP-036	Controlled Low-Strength Material (never issued for construction)	--	--
CSP-037	Furnishing and Installing a Hazardous Waste Landfill Cover	5	29-Apr-02
CSP-038	Turf Establishment for Closure Caps	0	08-Nov-95
ESP-001	Chemical Analytical Services	3	29-Mar-95
ESP-002	Data Validation and Verification (never issued for construction)	--	--
ESP-003	Excavation and Sampling of Surface Soils at the 006 Outfall Modification	1	01-Jun-92
ESP-004	Data Review	1	20-Sep-93
GSP-001	Well Installation	3	13-Jun-96
GSP-002	Geotechnical Soil Testing	2	04-Mar-94
XSP-001	Contractor Quality Control	0	08-Feb-95
XSP-002	Construction Quality Control	0	08-Feb-95

APPENDIX I

AS-BUILT DRAWINGS

APPENDIX I

AS-BUILT DRAWINGS

Drawing Number	Revision	Drawing Title
Area North Of Haverstock Road		
ATL-ANHR-01	1	Sample Location Plan, Eastern Half
ATL-ANHR-02	1	Sample Location and Site Plan, West Half
ATL-ANHR-03	1	Final Volume Calculation Survey, Plan Views
ATL-ANHR-03-X1	1	Final Cross-Sections 0+20 - 4+20
ATL-ANHR-03-X2	1	Final Cross-Sections 4+40 - 6+40
ATL-ANHR-03-X3	1	Final Cross-Sections 6+60 - 8+20
ATL-ANHR-03-X4	1	Final Cross-Sections 8+40 - 10+00
ATL-ANHR-03-X5	1	Final Cross-Sections 10+20 - 12+00
ATL-ANHR-04	1	Final Restoration Surface Topographic Survey
Black Mud Pond		
Y-BPY-002	2	Dewatering Plan
Y-BPY-003	2	Dewatering Sections A through F
Y-BPY-004	2	Dewatering Details
Y-BPY-007	2	Closure Cap Limits and Final Grading Plan
Y-BPY-008	2	Closure Cap Sections and Detail
Y-BPY-009	1	Closure Cap Section and Details
Y-BPY-011	1	Sump Discharge Line Plan, Sections, and Details
Y-BPY-012	1	Sump Discharge Line Details
ATL-BMP-04	1	North Consolidation Area Excavated Surface and Consolidation Sample Locations
ATL-BMP-05	2	1996 As-Built Topographic Survey of Finished Surface
002 Diversion Area		
ATL-DAY-01	1	002 Diversion Area, Verification Sample Locations, Plan Review
ATL-DAY-02	1	002 Diversion Area Topographic Survey, Plan View and Section Location

Drawing Number	Revision	Drawing Title
ATL-DAY-X1	1	002 Diversion Area, Cross Sections
ATL-ENG-01	1	Building 30 Area Plan View, Verification Sample Locations
ATL-ENG-02	1	Building 30 Area, Original, Excavated, and Restored Ground Surfaces, Plan View
ATL-ENG-X1	1	Building 30 Area, Cross Sections
ATL-LBO-04	1	Laboratory Area Plan View, Final Excavation Surface
ATL-LBO-05	1	Laboratory Area Plan View, As-Built Topographic Survey, Restoration Surface
ATL-LBO-06	1	Laboratory Area Plan View, Verification Sample Locations
Landfill/Former Potliner Storage Area		
Y-LFY-003	6	L/FPS Area LCRS, Layout Plan and Sections
Y-LFY-004	5	L/FPS Area LCRS, Leachate Drain Profile
Y-LFY-005	6	L/FPS Area LCRS, Sections
Y-LFY-009	1	L/FPS Area Berm, Layout Plan and Section
Y-LFY-024	2	Leachate Transfer Line, Plan and Profile No. 1
Y-LFY-025	2	Leachate Transfer Line, Plan and Profile No. 2
Y-LFY-026	2	Leachate Transfer Line, Plan and Profile No. 3
Y-LFY-027	5	Leachate Transfer Line, Details
ATL-LFP-04	1	1996 Topographic Survey of Landfill and Area North of Landfill, Restored Ground Surface
ATL-LFY-01	1	Landfill Area Leachate Collection and Removal System, As-Built
ATL-LFY-02	1	Landfill Area Leachate Collection and Removal System, As Built Profiles and Elevation Tables
ATL-LFY-03	1	Leachate Transfer Line Plan View Stations 6+99 to 40+35
ATL-LFY-04	1	Landfill and Black Mud Pond Leachate Transfer Line Profiles
ATL-NLF-01	1	Area North of Landfill Verification Sample Locations and Excavated Surface
ATL-NLF-02	1	Area North of Landfill Original Ground Surface

Drawing Number	Revision	Drawing Title
ATL-NLF-03	1	Area North of Landfill Final Excavated Surface
ATL-NLF-X1	1	Area North of Landfill Cross Sections
CK2060-LF-SUB-10-02	2	Map Showing Subgrade As-Built Topography – Landfill Closure Project
CK2060-LF-FINAL-10-02	2	Map Showing Final As-Built Topography – Landfill Closure Project
CK2060-LF-LEACH-12-02	2	Map Showing Final As-Built Location – New Leachate Transfer Line (two sheets)
North Yard		
Y-NYY-001	2	North Yard Remediation Project, Site Plan
Y-NYY-002	2	North Yard Remediation Project, Area 1 and Area 2
Y-NYY-003	2	North Yard Remediation Project, Construction Phasing Schedule
Y-NYY-005	3	North Yard Remediation Project, Pavement, Railroad Track, and Storm Structure Demolition Plan
Y-NYY-006	3	North Yard Remediation Project, Grid Excavation Summary
Y-NYY-007	4	North Yard Remediation Project, Grading and Restoration Plan
Y-NYY-008	3	North Yard Remediation Project, Pavement Restoration Plan
Y-NYY-009	4	North Yard Remediation Project, Utility Restoration Plan
Y-NYY-011	2	North Yard Remediation Project, Railroad Track Profiles and Section
Y-NYY-012	3	North Yard Remediation Project, Finish Grade Sections
Y-NYY-013	3	North Yard Remediation Project, Sections and Details
Y-NYY-014	3	North Yard Remediation Project, Sections and Details
Y-NYY-019	2	North Yard Remediation Project, North Yard West Sump
Y-NYY-020	3	North Yard Remediation Project, Containment Dike Layout
Y-NYY-021	3	North Yard Remediation Project, Sections and Details
Y-NYC-001	2	North Yard Remediation Project, Containment Dikes Plans, Sections, and Details

Drawing Number	Revision	Drawing Title
Y-NYC-002	1	North Yard Remediation Project, Pitch Storage Tanks Pipe Support System, Sections and Details
ATL-NYD-01	0	North Yard Area Original Ground Surface
ATL-NYD-02	0	North Yard Area Plan View Final Excavated Surface
ATL-NYD-03	0	North Yard Area Western Portion of Restored Ground Surface
ATL-NYD-04	0	North Yard Area Eastern Portion of Restored Ground Surface
ATL-NYD-05	0	North Yard Area French Drain Plan & Profile South of Haverstock Road
ATL-NYD-06	0	North Yard Area Verification Sample Locations
ATL-NYD-07	0	North Yard Area As-Built Surface of Geomembrane Liner
ATL-NYD-X1	0	North Yard Area Cross-Sections Location Map Sheet 1 of 7
ATL-NYD-X2	0	North Yard Area Cross-Sections Location Map Sheet 2 of 7
ATL-NYD-X3	0	North Yard Area Cross-Sections Location Map Sheet 3 of 7
ATL-NYD-X4	0	North Yard Area Cross-Sections Location Map Sheet 4 of 7
ATL-NYD-X5	0	North Yard Area Cross-Sections Location Map Sheet 5 of 7
ATL-NYD-X6	0	North Yard Area Cross-Sections Location Map Sheet 6 of 7
ATL-NYD-X7	0	North Yard Area Cross-Sections Location Map Sheet 7 of 7
Potliner Storage Pad		
ATL-PPY-01	0	Area South of Cathode Digging Building, Verification Sampling Location, Plan View, Final Excavation Surface
ATL-PPY-02	0	Area South of Cathode Digging Building, Topographic and Volume Survey, Plan View and Section Location, Original Ground and Profiles
ATL-PPY-03	0	Area South of Cathode Digging Building, Topographic and Volume Survey, Plan View and Section Location, Excavation and Restoration Surfaces
ATL-PPY-X1	0	Area South of Cathode Digging Building, Topographic and Volume Survey, Cross-Sections
ATL-PPZ-01	0	Potliner Storage Pad Area, Verification Sampling Locations, Plan View, Final Excavation Surface

Drawing Number	Revision	Drawing Title
ATL-PPZ-02	0	Potliner Storage Pad Area, Topographic and Volume Survey, Plan View and Section Location, Original and Excavated Surfaces
ATL-PPZ-03	0	Potliner Storage Pad Area, Topographic and Volume Survey, Plan View and Section Location, Restored Ground Surface
ATL-PPZ-03B	0	Potliner Storage Pad Area, Topographic and Volume Survey, Plan View and Section Location, Restored Ground Surface
ATL-PPZ-X1	0	Potliner Storage Pad, Topographic and Volume Survey, Cross-Sections, Sheet 1 of 2
ATL-PPZ-X2	0	Potliner Storage Pad, Topographic and Volume Survey, Cross-Sections, Sheet 2 of 2
Y-PPY-002	2	Potliner Storage Pad Area - Excavation Plans 0–1 ft and 1–2 ft
Y-PPY-003	1	Potliner Storage Pad Area - Excavation Plans 2–3 ft and 3–4 ft
Y-PPY-004	2	Potliner Storage Pad Area - Restoration Plan, Section, and Details
Y-PPY-005	1	Potliner Storage Pad Area - Miscellaneous Sections and Details
Y-PPY-006	2	Potliner Storage Pad Area - Proposed Sewer Plan, Profiles, and Sections
Y-PPY-007	2	Area South of Digging Building - Excavation Plan
Y-PPC-001	2	Potliner Storage Pad Area - Plan, Sections, and Details
Rectifier Yard Ditch		
ATL-RYD-01	3	Sample Location and Site Plan, North Section
ATL-RYD-02	3	Sample Location and Site Plan, South Section
ATL-RYD-03	2	Final Volume Calculation Survey, Phases 2 & 3
ATL-RYD-04	1	Final Volume Calculation Survey, Phases 4 – 6
ATL-RYD-04-X1	0	Final Cross-Sections, Phases 4 – 6
ATL-RYD-05	2	Final Volume Calculation Survey, Culvert Area
ATL-RYD-06	0	Final Volume Calculation Survey, Phases 7 – 17
ATL-RYD-06-X1	0	Final Cross-Sections 0+00 - 2+20, Phases 7 – 15
ATL-RYD-06-X2	0	Final Cross-Sections 2+40 - 4+20, Phases 7 – 15

Drawing Number	Revision	Drawing Title
ATL-RYD-06-X3	0	Final Cross-Sections 4+40 - 5+40, Phases 7 – 15
ATL-RYD-06-X4	0	Final Cross-Sections 5+60 - 7+20, Phases 7 – 15
ATL-RYD-06-X5	0	Final Cross-Sections 7+20 - 8+40, Phases 7 – 15
		Final Cross-Sections 0+20 - 1+60, Phase 16
ATL-RYD-06-X6	0	Final Cross-Sections 0+00 - 2+80, Phase 17
ATL-RYD-06-X7	0	Final Cross-Sections 3+00 - 5+00, Phase 17
ATL-RYD-07	2	Final Restoration Surface
ATL-RYD-08	0	Limits of Excavation within Wetlands, Phases 8 – 17
Rectifier Yard		
ATL-RYY-01	1	Rectifier Yard Area Verification Sample Locations
ATL-RYY-02	1	Excavated Surface Survey and Volume Calculations, Phases 1 – 7
ATL-RYY-03	1	Topographic Survey, Restored Ground Surface, Excavation Phases 1 – 7
ATL-RYY-04	2	Design for Rectifier Yard Stormwater Monitoring Station
ATL-RYY-05	1	As-Built of Rectifier Yard Stormwater Monitoring Station
ATL-RYY-X1	1	Excavation Cross-Sections, Phases 1 – 5
ATL-RYY-X2	1	Excavation Cross-Sections, Phases 6 – 7
Y-RYY-005	2	Excavation Plan, Sections and Detail
Y-RYY-006	2	Restoration Plan and Sections
Y-RYY-007	1	Containment Wall Plan, Sections and Details
Soil Stockpile		
ATL-SSP-01	0	Soil Stockpile Sample Locations and Volume Surveys
Wetlands		
ATL-PIT-01	0	Borrow Area Topographic Survey Excavated Surface as of November 1996
ATL-WLZ-01	2	Wetland Area 1995 Verification Sample Locations and Final Excavated Surface
ATL-WLZ-02	1	Wetland Area 1995 Remediation Original Ground Surface

Drawing Number	Revision	Drawing Title
ATL-WLZ-02B	1	Wetland Area 1995 Remediation Final Excavated Surface and Section Locations
ATL-WLZ-03	1	Wetland Area 1995 Remediation Restored Ground Surface
ATL-WLZ-04	2	Wetlands Area 1996 Additional Excavation Verification Sample Locations and Final Excavated Surface
ATL-WLZ-05	1	Wetlands Area 1996 Additional Excavation Original Ground Surface
ATL-WLZ-06	1	Wetlands Area 1996 Additional Excavation Final Excavated Surface
ATL-WLZ-07	1	Wetlands Area 1996 Holding Cell Excavation Original Ground Surface
ATL-WLZ-08	1	Wetlands Area 1996 Holding Cell Excavation Final Excavated Surface
ATL-WLZ-09	1	Wetlands Area 1996 Additional Excavation Restored Surface
ATL-WLZ-10	1	Detention Pond West of Landfill Topographic Surveys for Original and As-Built Surfaces
ATL-WLZ-X1	1	Wetlands Area 1995 Remediation Cross Sections
ATL-WLZ-X2	1	Wetlands Area 1995 Remediation Cross Sections
ATL-WLZ-X3	1	Wetlands Area 1995 Remediation Cross Sections
ATL-WLZ-X4	1	Wetland Area 1996 Additional Excavation Cross Sections
ATL-WLF-01	1	Area West of Landfill Verification Sample Locations and Final Excavated Surface
ATL-WLF-02	1	Area West of Landfill Southern Portion Original Ground and Final Excavated Surfaces
ATL-WLF-03	1	Area West of Landfill Northern Portion Original Ground and Final Excavated Surfaces
ATL-WLF-04	1	Area West of Landfill Restored Ground Surface
ATL-WLF-X1	1	Area West of Landfill Southern Portion Cross Sections
ATL-WLF-X2	1	Area West of Landfill Southern Portion Cross Sections
ATL-WLF-X3	1	Area West of Landfill Northern Portion Cross Sections
ATL-WLF-X4	1	Area West of Landfill Northern Portion Cross Sections
ATL-WLF-X5	1	Area West of Landfill Northern Portion Cross Sections

APPENDIX J
FIELD CHANGE REQUESTS
AND
FIELD CHANGE NOTICES

APPENDIX J

FIELD CHANGE REQUESTS AND FIELD CHANGE NOTICES

Number	Description	Area
FCR-001	Eliminated the air/outlet valve to prevent fluid release from the original 4-in. leachate transfer line.	Landfill
FCN-002	Extended heat tracing and insulation on a portion of the underground 4-in. ESW pipe.	Waste Water Treatment Plant
FCR-003	Installed a pressure relief valve to prevent air slugs from flowing through the clarifier in the wastewater treatment plant.	Waste Water Treatment Plant
FCN-004	Relocated the surge basin for the 008 Outfall to the north and reconfigured it to achieve design depth and capacity.	Interim remedial measure
FCR-005	Miscellaneous changes to project specification GSP-002, Geotechnical Soil Testing.	General
FCR-006	Voided.	NA
FCR-007	Changes to project specification ESP-001, Chemical Analytical Services, to become more flexible on Lotus Software version.	General
FCR-008	Changes to project procedure GP-001, Subsurface Soil Sampling Using a Drill Rig, to cross reference.	General
FCN-009	Voided.	NA
FCN-010	Changes to project specification GSP-002, Geotechnical Soil Testing, to include more up-to-date ASTM geotechnical changes.	General
FCN-011	Changes to project specification CSP-022 to include data submittal to Bechtel after completion of field work.	General
FCR-012	Changes to project specification GSP-001, Well Installation, to delete the need for crossbars at the tops of barriers.	General
FCN-013	Changes to project procedures to streamline the process of contract development with field CI program.	General
FCN-014	Changes to project procedures to correct purchase order confirmation.	General
FCN-015	Changes to Sampling and Analysis Plan in sample identification definition.	General
FCN-016	Changes to project procedure EP-003, Equipment Decontamination, on procedure number and attachments and consistency with other plans and procedures.	General
FCN-017	Changes to project specification CSP-019, Surveying Services, to include reference to attachments.	General
FCN-018	Changes to project specification ESP-001, Chemical Analytical Services, to include Figure 3-1 in contents.	General

Number	Description	Area
FCN-019	Changes to project procedures regarding Attachment 6, Master Distribution Schedule.	General
FCN-020	Changes to project procedure EP-004, Chain of Custody, to include project name and correct procedure number in chain-of-custody heading.	General
FCN-021	Changes to project procedure GP-001, Subsurface Soil Sampling Using a Drill Rig, to change depth of soil samples and process for collecting soil samples.	General
FCN-022	Changes to project specification CSP-007, Turf Establishment, to a higher pH range for topsoil.	General
FCN-023	Changes to project specification CSP-023, Repair of the Temporary Storage Pad, to change diameter of pavement specimens to be 2 in.	General
FCN-024	Changes to project specification CSP-023, Repair of the Temporary Storage Pad, to change final thickness of repair asphalt pad.	General
FCR-025	Not used.	NA
FCN-026	Supplementary information and clarifications covered in the pre-bid meeting for 001 sediment basin. (See Note 1 on final page of this appendix)	001 Sediment Basin
FCN-027	Changes to the ANHR Verification Sampling Plan to allow simultaneous compositing of a sample for PCB and PAH analysis.	Area North of Haverstock Road
FCN-028	Changed coarse aggregate size in project specification CSP-024, Uncontaminated Earthwork.	General
FCR-029	Modified grade elevation tolerances in project specification CSP-025, Contaminated Earthwork.	Landfill
FCN-030	Changed duration of warranty for geomembrane in project specification CSP028, Furnishing and Installing Geomembrane Liner and Geonet Drainage Layer.	General
FCR-031	Clarified crushed stone size and placement used as backfill.	Rectifier Yard Ditch
FCN-032	Revised power supply configuration at sampling building to eliminate duct bank and make consistent with existing.	001 Sediment Basin
FCN-033	Revised allowable stone size in backfill for deep excavations.	Area North of Haverstock Road
FCR-034	Revised piping configuration at MH-91.	001 Sediment Basin

Number	Description	Area
FCN-035	Added construction joints and water stops to facilitate concrete pouring sequence.	001 Sediment Basin
FCN-036	Eliminated the need for sandblasting and bush hammering at joints in concrete slabs.	001 Sediment Basin
FCN-037	Revised air monitoring plan to use EPA Method T0-4.	General
FCN-038	Revised sand gradation specification in project specification GSP-001, Well Installation.	General
FCN-039	Revised bedding material requirements for 48-in. reinforced concrete pipe (RCP).	001 Sediment Basin
FCN-040	Revised concrete reinforcement requirements for sand filter and grit chamber.	001 Sediment Basin
FCN-041	Revised Borrow Area Use Plan to add an inlet to collection pond, clarify use of stabilized construction entrance, and modify silt fencing.	Borrow Area
FCN-042	Clarified size of pipe from detention pond.	001 Sediment Basin
FCN-043	Clarified dowel size in grit chamber.	001 Sediment Basin
FCN-044	Revised flexible connection requirement where 48-in. RCP ties into grit chamber.	001 Sediment Basin
FCN-045	Allowed use of alternate manufacturer for flexible connection.	001 Sediment Basin
FCN-046	Eliminated the need for a flexible connection at the outlet.	001 Sediment Basin
FCN-047	Not used.	NA
FCN-048	Revised analytical method for total organic carbon and clarified sampling depth in the Wetlands Characterization Plan.	Wetlands
FCN-049	Revised the slug test procedure in the Wetlands Characterization Plan.	Wetlands
FCN-050	Revised design of weir.	001 Sediment Basin
FCN-051	Voided.	NA
FCN-052	Revised compaction requirements for material used in earthen berms.	001 Sediment Basin
FCN-053	Revised earthen berm configuration on southeastern side.	001 Sediment Basin
FCN-054	Revised stone specification for underdrain.	001 Sediment Basin

Number	Description	Area
FCN-055	Revised drawings to reflect the as-built conditions of bar joists to columns.	Drying Beds
FCN-056	Revised handrail detail.	001 Sediment Basin
FCN-057	Revised anchoring procedure of geomembrane to side walls.	001 Sediment Basin
FCN-058	Revised berm width and height on southern side of Landfill to function as a haul road during Wetlands remediation.	Landfill
FCN-059	Replaced geonet with geotextile on sides and base of groundwater relief system.	001 Sediment Basin
FCN-060	Revised location of precast concrete piping to match field conditions.	001 Sediment Basin
FCN-061	Revised backfill elevation and liner anchor arrangement to match field conditions.	001 Sediment Basin
FCN-062	Not used.	NA
FCN-063	Revised sampling number scheme in project Sampling and Analysis Plan.	General
FCR-064	Provided for islands in the Rectifier Yard Ditch east extension (part of Wetlands RR-6) using wetlands soils containing seedbank material.	Rectifier Yard Ditch
FCN-065	Increased number of samples for geotechnical properties in the southern and eastern berms of the Black Mud Pond.	Black Mud Pond
FCN-066	Changed project procedure EP-003, Equipment Decontamination, to allow use of pesticide-grade solvent.	General
FCN-067	Changed project procedure GSP-001, Well Installation, to clarify determination of well completion.	General
FCN-068	Changed ESW-001, Chemical Analytical Services, to add performance of other analyses and to add schedule of prices.	General
FCR-069	Added remediation of the "Stressed Area" adjacent to Cell 1 to the work scope.	Wetlands
FCN-070	Changed Scope of Work for Geotechnical and Material Services to allow additional analyses.	General
FCR-071	Added remediation of the Area West of Landfill to the work scope.	Wetlands
FCN-072	Changed scope of work to accurately reflect calibrations on the different Aroclors.	General

Number	Description	Area
FCN-073	Revised project specification CSP-031, Landfill/Former Potliner Storage Area Leachate Collection and Removal System, requiring that a manufacturer's representative be present for the installation of the high-density polyethylene leachate collection drain.	Landfill
FCN-074	Reduced an 18-in. reinforced concrete pipe storm drain to 12 in. due to limited height of manhole.	Potliner Storage Pad
FCN-075	Changed concrete reinforcement from 6x6-W4.5xW4.5 welded wire fabric (WWF) to 6x6-W4.0xW4.0 WWF due to availability of materials.	Potliner Storage Pad
FCN-076	Added a geotextile layer between the geomembrane liner and the stone in the retention pond to reduce the chance of the stone puncturing the liner.	Potliner Storage Pad
FCR-077	Changed concrete reinforcement from 6x6-W4.5xW4.5 welded wire fabric (WWF) to 6x6-W4.0xW4.0 WWF due to availability of materials.	Rectifier Yard
FCR-078	Changed design of containment wall footing to improve resistance to freeze/thaw cycles.	Rectifier Yard
FCR-079	Revised Phase III sampling requirements based on existing conditions.	Rectifier Yard
FCN-080	Voided.	NA
FCN-081	Corrected Verification Sampling Plan, Figure 5, to show symbol for PAH sample.	Rectifier Yard
FCN-082	Replaced keyway in slab construction joint with roughened surface to improve constructibility.	Rectifier Yard
FCN-083	Relocated Phase III verification sample for TCLP parameters to area with previously higher fluoride levels.	Potliner Storage Pad
FCN-084	Added a drainage trench with a grate and curb to maintain conditions similar to the original at the Potliner Storage Pad.	Potliner Storage Pad
FCR-085	Revised alignment of west end of LCRS to key into lower-permeability soils.	Landfill
FCN-086	Added lip extension from base of high-density polyethylene manhole (MH 602) to provide means for antiflotation anchor.	Landfill
FCN-087	Revised stone requirements in project specification CSP-031, Landfill/Former Potliner Storage Area Leachate Collection and Removal System.	Landfill
FCN-088	Added the telecommunications duct bank to run parallel to the planned drain line connecting to the Remediation Office.	Potliner Storage Pad
FCN-089	Installed two 12-in. RCP pipes connecting catch basin 163 to existing catch basin 8 to redirect storm flow to the 001 discharge system.	Potliner Storage Pad

Number	Description	Area
FCN-090	Substituted a larger stone for backfilling lateral connecting trenches.	Landfill
FCN-091	Enhanced drainage of surface water from the Wetlands prior to remediation by installing a temporary drainage path.	Wetlands
FCN-092	Corrected the inverts in manholes (MHs) 244 and 245.	Potliner Storage Pad
FCN-093	Installed bollards west of the Potliner Storage Pad around the retention pond for safety.	Potliner Storage Pad
FCN-094	Revised excavation boundary at the northern portion of the Area West of the Landfill to follow the existing topography.	Wetlands
FCN-095	Revised excavation limits of existing gravel road from plant to Black Mud Pond to remove culverts and 10-ft length of road during remediation of Area West of the Landfill.	Wetlands
FCN-096	Changed the slope at the basin north of the railroad tracks due to existing conditions, and used riprap instead of crushed stone for increased slope stability.	Potliner Storage Pad
FCN-097	Changed project specification CSP-014, Demolition, regarding the Demolition Plan.	General
FCN-098	Deleted the installation of bollards at the hopper east of the Crusher Building and changed the geomembrane anchoring detail at the detention pond.	Potliner Storage Pad
FCN-099	Changed project Construction Quality Assurance Plan to match current practices.	General
FCN-100	Superseded by FCR-116.	NA
FCN-101	Voided.	NA
FCN-102	Voided.	NA
FCN-103	Voided.	NA
FCR-104	Superseded by FCN-107.	NA
FCN-105	Allowed NYSDOT Table 703-4, Size No. 2 stone as substitute for Type I underdrain stone when Type I was not available.	North Yard
FCN-106	Revised geonet composite type and geotextile overlap.	North Yard
FCN-107	Revised anchor bolt spacing for anchoring liner.	North Yard
FCN-108	Added new concrete slabs for equipment laydown east of unloading shed.	North Yard
FCN-109	Revised thickness of stone on the bottom of the retention pond; added riprap at pond inlets and outlets; and modified RCP to use a pipe boot where the pipe penetrates the geomembrane liner.	Potliner Storage Pad

Number	Description	Area
FCN-110	Revised design to allow railroad tracks to be installed over the top of catch basin 89.	North Yard
FCR-111	Provided for the removal of catch basins and drain pipes from diked areas.	North Yard
FCN-112	Revised Figure 26 in Remedial Design to correct the column labels.	North Yard
FCR-113	Voided.	NA
FCN-114	Replaced catch basin 71 to improve surface drainage.	North Yard
FCR-115	Allowed placement of geotextile fabric and crusher run over subballast stone.	North Yard
FCR-116	Revised rail yard storm drainage to flow directly to 001 Sediment Basin System.	North Yard
FCR-117	Defined disposal requirements for asphalt excavated as part of the remediation.	North Yard
FCN-118	Clarified that area beneath an existing slab for a diesel fuel tank did not need to be remediated.	North Yard
FCR-119	Superseded by FCR-134.	NA
FCR-120	Provided for leaving access road in place to facilitate access to monitoring wells (Note: This FCR was disapproved and never implemented.)	Wetlands
FCN-121	Clarified that area beneath existing hose houses did not need to be remediated.	North Yard
FCN-122	Improved surface drainage around catch basin 54.	North Yard
FCN-123	Superseded by FCN-133.	NA
FCN-124	Voided.	NA
FCN-125	Allowed concrete and asphalt to be used interchangeably for restoration.	North Yard
FCR 126	Voided.	NA
FCR 127	Voided.	NA
FCR-128	Added east-west horizontal drain lines to improve leachate collection capability.	Black Mud Pond
FCR-129	Revised typical railroad roadbed section to clarify minimum ballast thickness and minimum slopes in swales toward catch basins.	North Yard
FCN-130	Clarified that area beneath existing concrete ramp into Facility 35A did not require excavation.	North Yard
FCN-131	Voided.	NA
FCN-132	Provided drainage improvement south of Unloading Shed.	North Yard

Number	Description	Area
FCN-133	Clarified that existing concrete ramp into Facility 24E was to be removed to allow excavation; clarified that area beneath asphalt paving near coke storage silos did not need to be excavated. (Note: Asphalt was removed and replaced with concrete paving.)	North Yard
FCR-134	Eliminated new valve vaults.	North Yard
FCN-135	Installed a PVC pipe to provide drainage from the sump in the northern end of the Crusher Building to the trench drain at the Potliner Storage Pad.	Potliner Storage Pad
FCR-136	Revised excavation boundary at Cell 4A to follow the existing topography.	Wetlands
FCR-137	Revised location of west sump next to surge tank; added french drain along toe of slope to sump; and eliminated gravity-flow inlet to tank.	North Yard
FCN-138	Revised the requirement in specification CSP-016, Bituminous Paving for Roads, Streets, and Open Areas, for a tack coat between binder and top courses in asphalt pavement.	General
FCN-139	Installed catch basin to improve surface drainage in area east of coke storage silos.	North Yard
FCR-140	Temporarily substituted a modular tank for Lamella clarifier to pretreat water for total suspended solids. (See related FCR-170.)	Black Mud Pond
FCN-141	Provided additional excavation and sampling in Cell 1 to remove fluoride and cyanide.	Wetlands
FCR-142	Installed new leachate transfer line from L/FPS Area to surge tank of granular activated carbon treatment system.	Landfill
FCN-143	Removed stone beneath transformers.	Rectifier Yard
FCR-144	Connected north-south horizontal drains to dewatering sump. (Later modified by FCR-154.)	Black Mud Pond
FCN-145	Voided.	NA
FCN-146	Modified boundaries of construction phases.	North Yard
FCN-147	Installed valve in drainline for visual inspection of water prior to releasing. [A subsequent letter of clarification was issued from A. Yazdi to P. Waite on January 15, 1996 (Bechtel file no. 005769) requiring that the valve will normally be closed. FCN-147 was effectively canceled by the sampling station/pond for stormwater runoff.]	Rectifier Yard
FCR-148	Added double-walled discharge line from Black Mud Pond dewatering sump to MH 607 (previously numbered MH 7) of leachate transfer line.	Black Mud Pond and Landfill
FCN-149	Voided.	NA

Number	Description	Area
FCR-150	Provided for construction necessary to relocate ponded water within Cell 1, allowing soil excavation.	Wetlands
FCR-151	Added excavation of drainage path between Cells 1 and 2.	Wetlands
FCN-152	Voided.	NA
FCN-153	Voided.	NA
FCR-154	Used a sand-filled trench to connect horizontal drain lines A-2, A-3, and A-4 to dewatering sump.	Black Mud Pond
FCR-155	Replaced earthen dikes with concrete slabs and walls for secondary containment of pitch and fuel oil storage tanks.	North Yard
FCN-156	Changed project procedure GSP-001, Well Installation, to minimize effects of frost on monitoring wells and to mark remote monitoring wells.	General
FCR-157	Revised testing method for secondary containment pipe from low-pressure air test to high-pressure hydrostatic test.	Landfill
FCR-158	Modified screen specification in Specification GSP-001, Well Installation.	General
FCN-159	Revised leachate transfer line alignment to allow the existing 4-in. pipe to be gradually bent downwards for connection at MH 604.	Landfill
FCR-160	Voided by NCR-002.	NA
FCR-161	Deleted requirement for *interim* connection of new double-walled leachate transfer line with original single-walled line. Allowed new line to be constructed independent of the old line.	Landfill
FCN-162	Relocated MH 608 southward to avoid interference with Massena Electric power pole and underground cable; changed leachate transfer line inverts for improved frost protection; and relocated path of leachate transfer line to avoid laydown area.	Landfill
FCR-163	Modified excavation plan for area around the fuel oil dikes.	North Yard tanks
FCR-164	Superseded by FCR-190.	NA
FCR-165	Revised horizontal and vertical alignment of Black Mud Pond sump discharge line.	Black Mud Pond
FCN-166	Revised location of power source and controls for Black Mud Pond dewatering sump.	Black Mud Pond
FCR-167	Revised limits of Area 1 and Area 2; added supplemental verification sampling plan.	North Yard
FCN-168	Eliminated MH 611 and updated limits of existing 8-in. PVC pipe sleeve. (Note: FCN-168 was effectively negated by FCR-194.)	Landfill

Number	Description	Area
FCR-169	Eliminated Outfall 007 and catch basin 123 with runoff routed via new swale to 001 Sediment Basin system.	North Yard
FCR-170	Installed Lamella clarifier and temporary piping with secondary containment.	Black Mud Pond
FCN-171	Deleted leak detection assembly for double-walled sump discharge line at MH 607 because open end of outer pipe at sump provided leak detection.	Landfill
FCN-172	Revised design so groundwater collected in east sump drains by gravity into sanitary sewer.	North Yard
FCN-173	Clarified use of releasing agent on concrete construction formwork in specification CSP-021, Reinforced Concrete - Furnishing, Forming, Placing, and Curing.	General
FCN-174	Clarified placement of horizontal reinforcing bars in containment dike walls.	North Yard
FCN-175	Modified wall joint detail resulting from use of a Westec® waterstop for the tank containments.	North Yard
FCN-176	Conditioned wet materials with lime.	Black Mud Pond
FCN-177	Extended cap limits southward and eastward to key into undisturbed material at dikes.	Black Mud Pond
FCR-178	Revised requirements for preparation of the subgrade for the geosynthetic layers.	North Yard
FCN-179	Extended horizontal drain risers above cap for continued pumping.	Black Mud Pond
FCR-180	Changed maximum spacing between nested piezometers.	Black Mud Pond
FCN-181	Extended cap limits northward to accommodate total volume of material placed within cap.	Black Mud Pond
FCR-182	Allowed soil excavated from outside faces of dikes to be used as subbase for perimeter road.	Black Mud Pond
FCR-183	Clarified compaction requirements for wet material.	Black Mud Pond
FCR-184	Changed the required compaction for fill in the northern end to 85%.	Black Mud Pond
FCN-185	Voided.	NA
FCN-186	Modified floor slab elevations at concrete containments for the pitch tank.	North Yard
FCR-187	Voided.	NA
FCN-188	Allowed french drain to be excavated in general fill material rather than in sand backfill.	North Yard

Number	Description	Area
FCN-189	Allowed use of hay mulch for seeding topsoil surface per specification CSP-038, Turf Establishment for Closure Caps.	Landfill and Black Mud Pond
FCR-190	Defined requirements and sampling plan for consolidation of the area north of the Landfill.	Landfill
FCN-191	Revised size of concrete slab under fuel oil piping by Pitch Pumphouse.	North Yard
FCN-192	Modified coating system to be used to cover joint between base of tank and slab.	North Yard tanks
FCN-193	Added parking area in eastern portion of the area north of the Landfill.	Landfill
FCR-194	Provided leak-detection manhole (MH 611) to reduce distance between leak-detection points (MH 610 and MH 612).	Landfill
FCR-195	Relocated emergency spillway for stormwater retention pond to native soil.	Rectifier Yard
FCN-196	Added perimeter fence.	Black Mud Pond
FCN-197	Increased erosion protection in the spillway of the sampling station west of Landfill.	Black Mud Pond
FCR-198	Moved monitoring wells MW-39S and MW-40S closer to Landfill.	Landfill
FCR-199	Investigated the Former Materials Stockpile Area.	Landfill
FCR-200	Remediated the Former Materials Stockpile Area.	Landfill
FCR-201	Raised the access road/dike south of the Landfill.	Landfill
FCR-202	Remedial excavation and turf establishment for 005 drainage basin.	002 Diversion Area
FCR-203	Turf establishment at area east of MW-31S.	Wetlands
FCR-204	Sampling North Yard Grid G41and Vicinity	North Yard
FCR-205	Voided.	NA
FCR-206	Remediation of North Yard Grid G41and Vicinity.	North Yard
FCR-207	Voided.	NA
FCR-208	Upgrading of leachate transfer line.	Landfill
FCN-209	Area excavation for water storage tank installation.	North Yard
FCN-210	Pipeline excavation north of sewage treatment plant drying beds.	002 Diversion Area
FCN-211	Remediation of locker facility.	002 Diversion Area
FCR-212	Update of Landfill cap design.	Landfill
FCR-213	Intermediate drain for Landfill closure cap.	Landfill

Number	Description	Area
FCR-214	Changes to Specification CSP-037, Furnishing and Installing a Hazardous Waste Landfill Cover.	Landfill
FCR-215	Correction of survey data for Landfill cap design.	Landfill
FCR-216	Modifications of Landfill cap design to ensure cover over leachate collection and recovery system.	Landfill
FCN-217	Modifications to perimeter drain for northwest portion of Landfill cap.	Landfill
FCR-218	Modified compaction requirements for cover soils in Landfill cap.	Landfill
FCN-219	Allow placing some GCL on the Landfill with the woven side up.	Landfill

Note

1. The 001 Sediment Basin construction was done as part of the site's discharge water quality management program, *not* as a direct part of compliance with the Order on Consent. Because Bechtel managed both construction programs simultaneously, some of the same construction control documents were used universally. Except where work was similarly intermingled, details of the 001 Sediment Basin construction are omitted from this report.

APPENDIX K
NONCONFORMANCE REPORTS

APPENDIX K

NONCONFORMANCE REPORTS

Number	Description	Area
NCR-001	A 1-ft-thick layer of sub-ballast beneath railroad tracks was not compacted to the density required by Specification CSP-024 because of the soft underlying clay fill. Subsequent inspections found the condition to be acceptable. (Note: This work did not pertain to the remediation.)	Potliner Storage Pad
NCR-002	Bedding material for leachate transfer line along east side of Black Mud Pond (from Sta. 22+50 to Sta. 26+00) was not compacted per specification because of hazardous working conditions not allowing laborers to enter trench.	Landfill
NCR-003	Because of existing utilities encountered during excavation, approximately 280 ft of the leachate transfer line in the North Yard was installed without the required slope to leak-detection manholes. Another leak-detection manhole (MH 611) was added in the area to provide the requisite monitoring; that work was performed under FCR-194.	Landfill
NCR-004	Reinforcement dowels were displaced during concrete pour for the concrete containments around the tanks; additional dowels were installed (drilled holes and epoxied in place) at proper locations.	North Yard
NCR-005	Nine cuts in the geomembrane were found along the alignment of the intermediate and perimeter drains. The cuts are attributable to cutting of the overlying geocomposite. Cuts were repaired and retested.	Landfill
NCR-006	Some river sediment was hauled to the Landfill based on preliminary results that indicated the material was <50 ppm PCBs. Final results showed the material to be ≥50 ppm. The material was removed and disposed of offsite. [For more information, see Section 2.2 of *Landfill Cap Installation Addendum to the Area-Specific Completion Report for Remediation of the Landfill/Former Potliner Storage Area (Bechtel 2003b).*]	River*

* NCR-006 was written against the St. Lawrence River Remediation Project. It is included here because of its interface with the Site Remediation Project.

APPENDIX L
PHOTOGRAPHS

Photo Number: 22 Date: March 1, 1990 Work Area: 002 Outfall Swale
Description: Looking upstream from east end of swale before start of remediation.

Photo Number: 228 Date: December 8, 1990 Work Area: 002 Outfall Swale
Description: Looking upstream from east end of swale after remedial excavation and where restoration was completed.

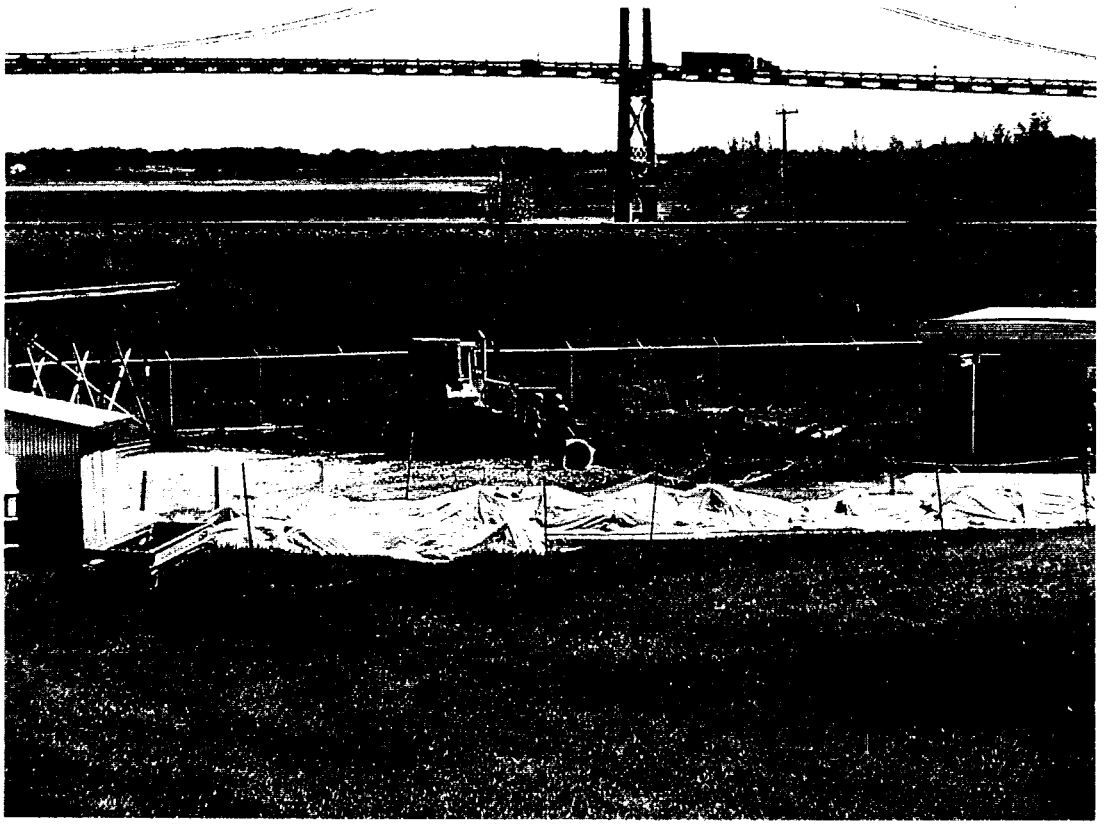

Photo Number: 1460 Date: June 3, 2002 Work Area: 002 Diversion Area
Description: Backfilling following remedial excavation near Waste Water Treatment Plan.

Photo Number: 340 Date: February 25, 1992 Work Area: Soil Stockpile
Description: One of the ROD "Miscellaneous Areas." This stockpile, off the southwest corner of the Black Mud Pond, was later transferred to the Landfill.

Photo Number: 532 Date: September 23, 1992 Work Area: Black Mud Pond & Soil Stockpile
Description: Black mud surrounded by moat of storm water prior to start of remedial activities. Soil Stockpile covered with membrane in lower left corner.

Photo Number: 1005 Date: August 30, 1995 Work Area: Black Mud Pond
Description: Trenching machine for installation of horizontal drains for dewatering the black mud. Drains consist of a perforated collection pipe wrapped in filter fabric at the bottom of a sand-filled French drain.

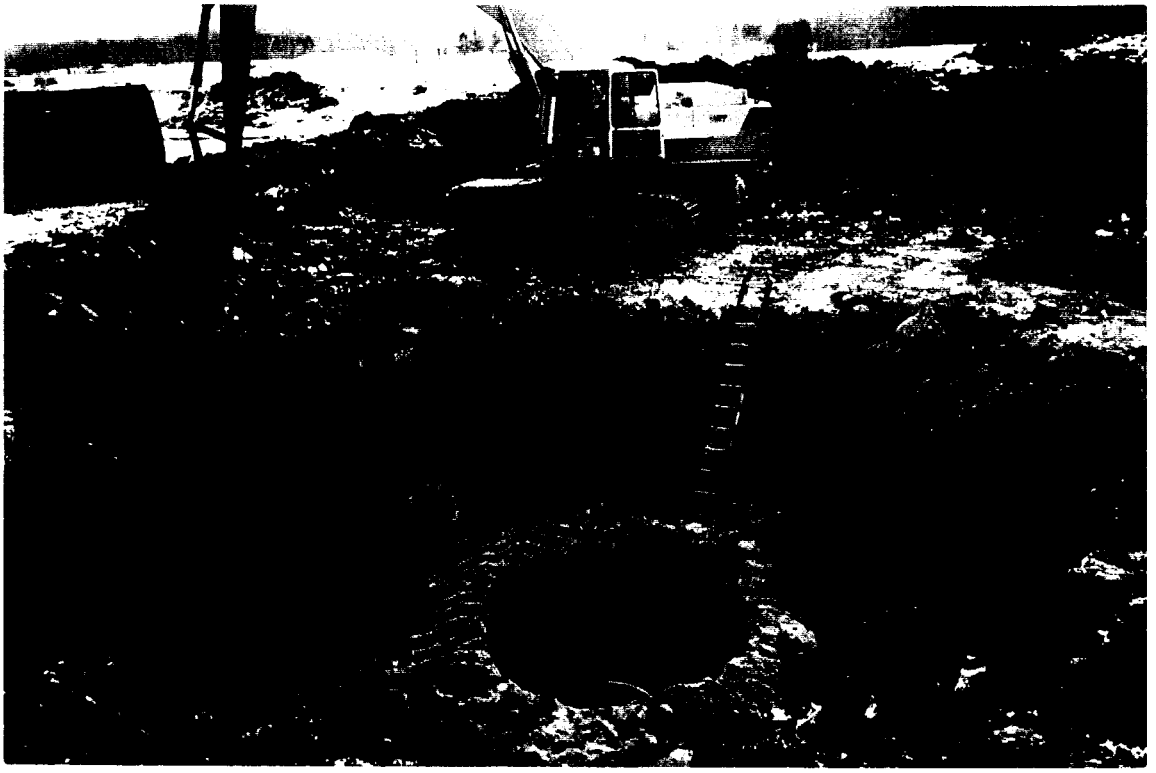

Photo Number: 1050 Date: February 16, 1996 Work Area: Black Mud Pond
Description: Installing sump for collection and removal of black mud leachate. A network of over 2,200 linear feet of horizontal drains (photo # 1005, above) converges on this sump as part of the leachate extraction system.

Photo Number: 1234 Date: August 9, 1996 Work Area: Black Mud Pond
Description: Installation of RCRA cap. Various layers of the cap are visible.

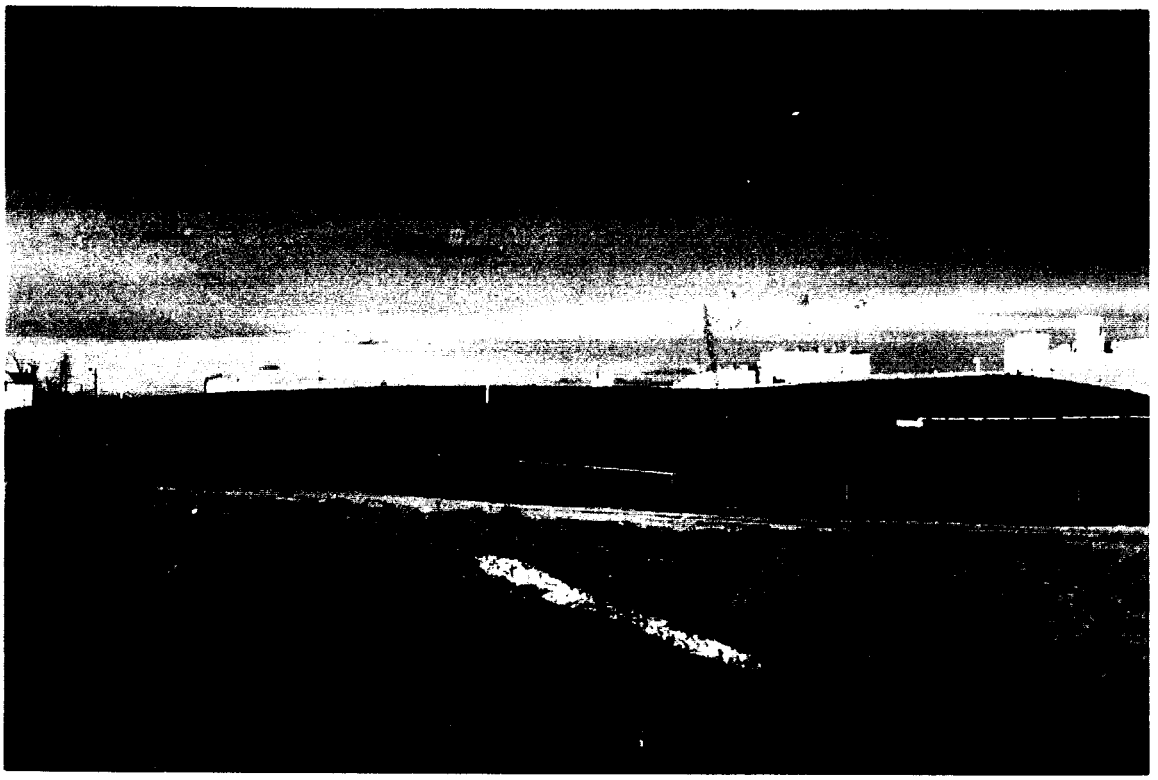

Photo Number: 1431 Date: November 17, 1999 Work Area: Black Mud Pond
Description: Healthy vegetation covering the Black Mud Pond cap. Leachate extraction sump (photo # 1050) shown in right center of photo.

Photo Number: 1000 Date: August 23, 1995 Work Area: North Yard
Description: Excavation of rail yard area, looking west from southwest corner of the Unloading Shed (Facility 25A).

Photo Number: 1007 Date: August 30, 1995 Work Area: North Yard
Description: Placing "flowable fill" near Carbon Plant Facility 22. This innovative, high-quality backfill material allowed critical remediation areas to be quickly returned to service.

Photo Number: 1010 Date: September 3, 1995 Work Area: North Yard
Description: Restoration of the busy rail yard, including grading the cured flowable fill and installing geotextile cushion and geomembrane liner. Note that the rail tracks are temporarily removed.

Photo Number: 1013 **Date: September 6, 1995** **Work Area: North Yard**
Description: Re-installing tracks in the rail yard following remediation and backfilling.

Photo Number: 1021 **Date: September 28, 1995** **Work Area: North Yard**
Description: Deep excavations near Pitch Pumphouse (Facility 22A).

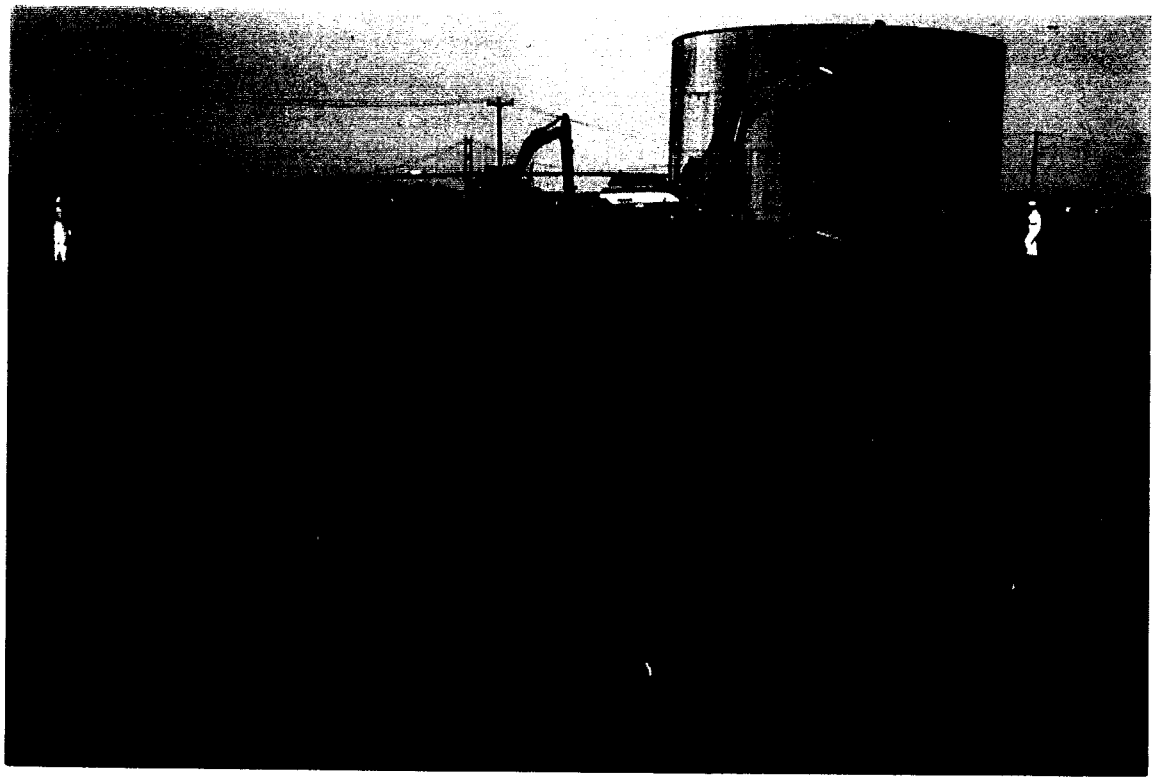

Photo Number: 1105 Date: May 8, 1996 Work Area: North Yard
Description: Excavation near fuel oil storage tanks. One tank was permanently removed.

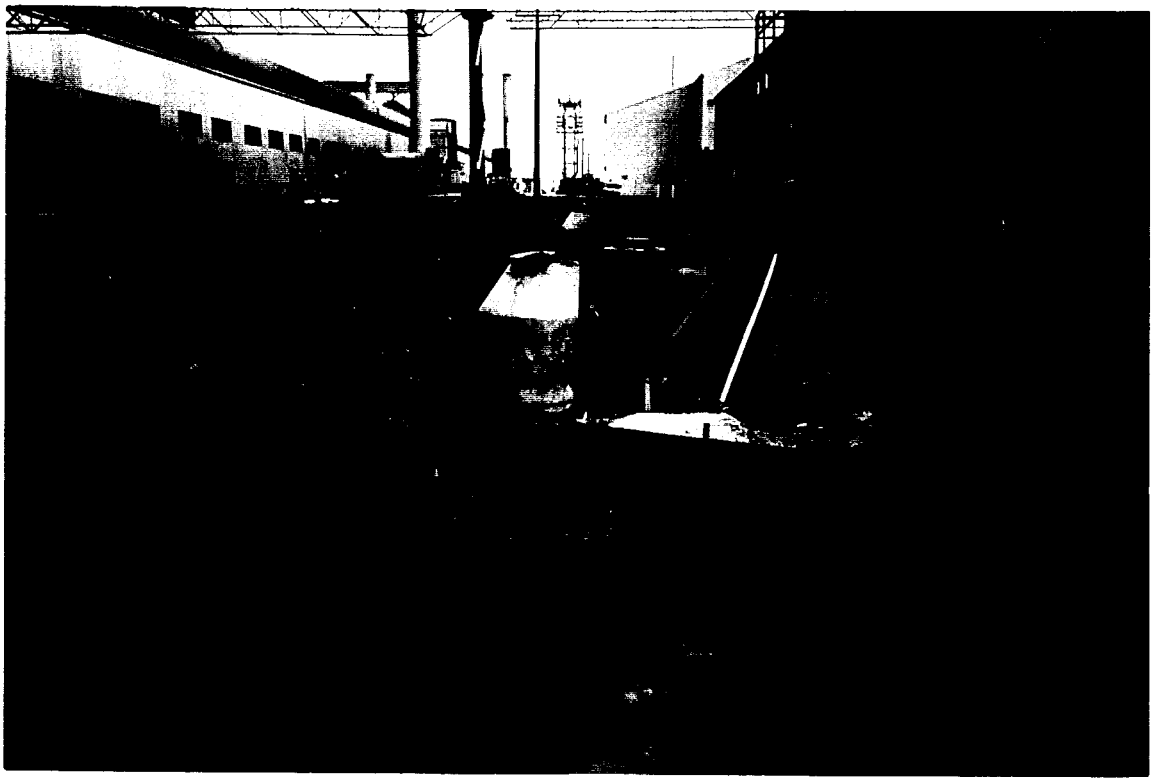

Photo Number: 961 Date: July 7, 1995 Work Area: Potliner Storage Pad
Description: Excavation completed, and restoration underway.

Photo Number: 1339 Date: November 11, 1996 Work Area: Rectifier Yard
Description: Storm water holding pond and ROD sample station, located east of the Landfill and south of the Rectifier Yard.

Photo Number 849 Date: September 9, 1994 Work Area: Rectifier Yard Ditch
Description: One of the ROD "Miscellaneous Areas." Remedial excavation in progress. Note the extensive use of sediment barriers, coverings over waste piles, sumps, and loading ramps to minimize truck contamination.

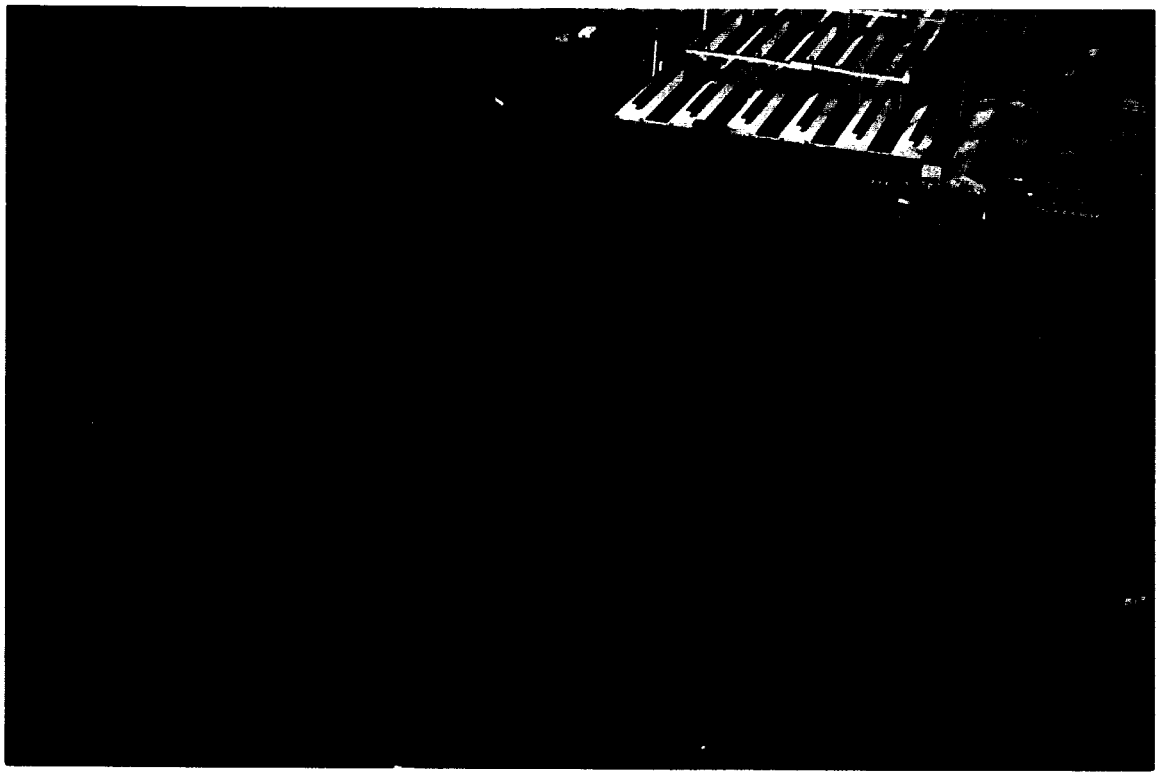

Photo Number: 664 Date: October 14, 1993 Work Area: Wetlands, Landfill, & Rectifier Yard Ditch
Description: Aerial photo taken before start of remedial activities.

Photo Number: 878 Date: October 19, 1994 Work Area: Landfill
Description: Remediation of Landfill "toe of slope" prior to construction of dike, road, and leachate collection/removal system. Wetlands "stressed area" at left prior to remediation.

Photo Number 923 **Date: May 16, 1995** **Work Area: Landfill**
Description: Leachate collection trench with perforated pipe, drainage stone, filter fabric, and monitoring manhole (MH-602) installed. Wetlands "stressed area" prior to final remediation at left. Clay dike between Landfill and Wetlands.

Photo Number: 1211 **Date: August 9, 1996** **Work Area: Landfill**
Description: Disposing of excavation spoils from various onsite remediations in the Landfill. Recovering Wetlands to the left with vegetation growing on the islands created in the formerly "Stressed Area."

Photo Number: 1318 **Date: September 26, 1996** **Work Area: Landfill**
Description: Consolidating northern section of Landfill toward the south to reduce the overall Landfill footprint.

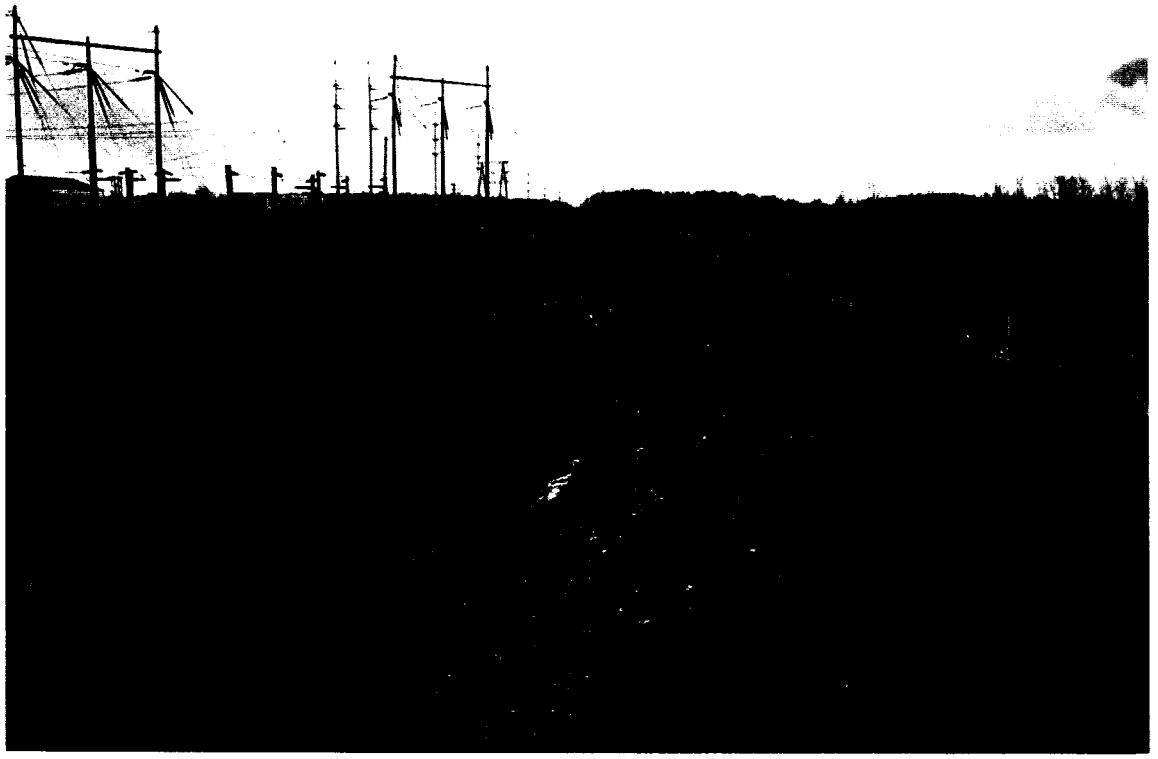

Photo Number: 1342 **Date: November 13, 1996** **Work Area: Landfill**
Description: Consolidation at northern section of Landfill, with the restoration complete. Looking east with Landfill on the right.

Photo Number: 1550 Date: July 31, 2002 Work Area: Landfill
Description: Installation of RCRA cap. Prepared subgrade on the right. Geomembrane liner on the left. Horizontal benches on the slopes.

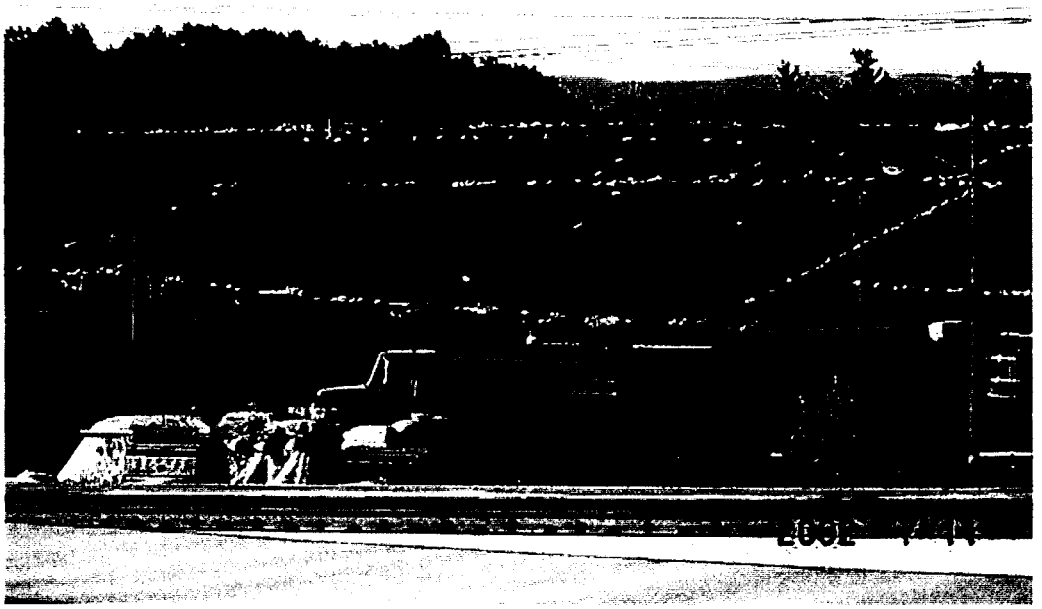

Photo Number: 1500 Date: July 11, 2002 Work Area: Landfill
Description: Installation of RCRA cap. Geonet drainage layer on north side ready for soil cover.

Photo Number: 1594 **Date: September 9, 2002** **Work Area: Landfill**
Description: Installation of RCRA cap. North side of Landfill seeded and mulched.

Photo Number: 1630 **Date: October 7, 2002** **Work Area: Landfill**
Description: Manhole MH-601 of the leachate collection and removal system. Piezometer nest straddling the leachate collection trench for monitoring Landfill performance. Installation of fencing to protect Landfill.

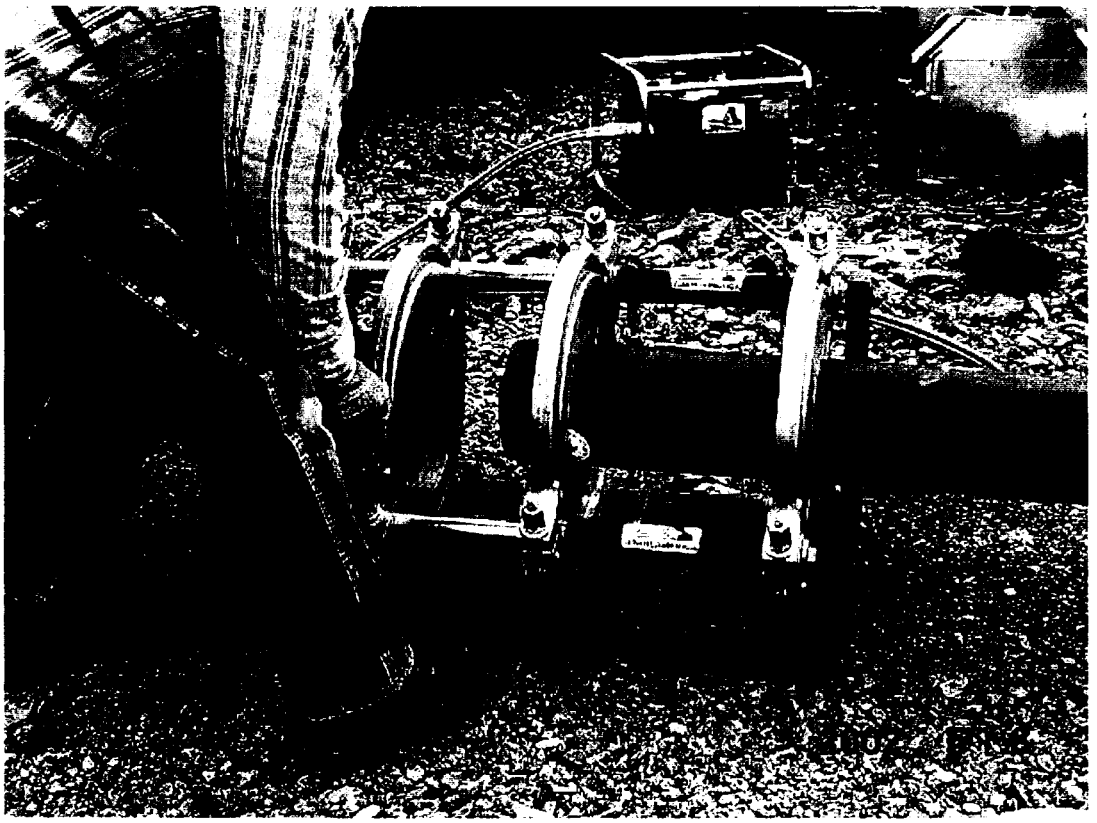

Photo Number: 1445 Date: May 6, 2002 Work Area: Landfill
Description: Welding the double-walled pipe for upgrading the Landfill leachate transfer line. The entire leachate transfer line is now double-walled with leak detection.

Photo Number: 949 Date: June 22, 1995 Work Area: Wetlands (Area West of Landfill)
Description: Deep excavation of soils containing PCBs from southwest corner of Black Mud Pond.

Photo Number: 966 Date: July 19, 1995 Work Area: Wetlands (Area West of Landfill)
Description: Excavating the southern sector. Landfill to the left.

Photo Number 995 Date: August 15, 1995 Work Area: Wetlands
Description: Excavation in Cell 1 of the Wetlands. Landfill (bottom of picture) seeded and mulched for erosion control.

Photo Number: 1047 Date: February 12, 1996 Work Area: Wetlands
Description: Second excavation of Cell 1, including "Stressed Area." Thick ice provided access road during winter work.

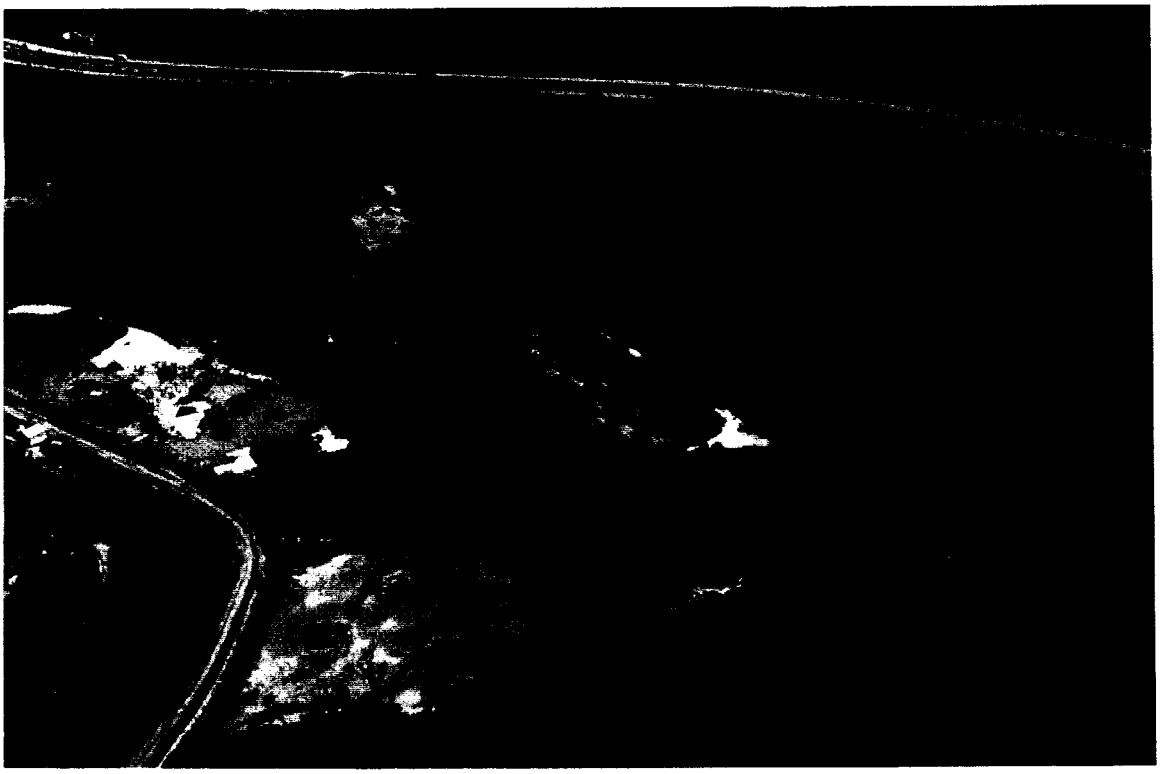

Photo Number: 1253 Date: August 9, 1996 Work Area: Wetlands
Description: All cells (1, 1A, 2, 3, 3A, 4, 4A, and 5) and the Rectifier Yard Ditch extension are prominent in this aerial photo taken 6 months after final remedial excavation work in the Wetlands. Created islands and new growth show recovery in the "Stressed Area." Landfill in lower left.

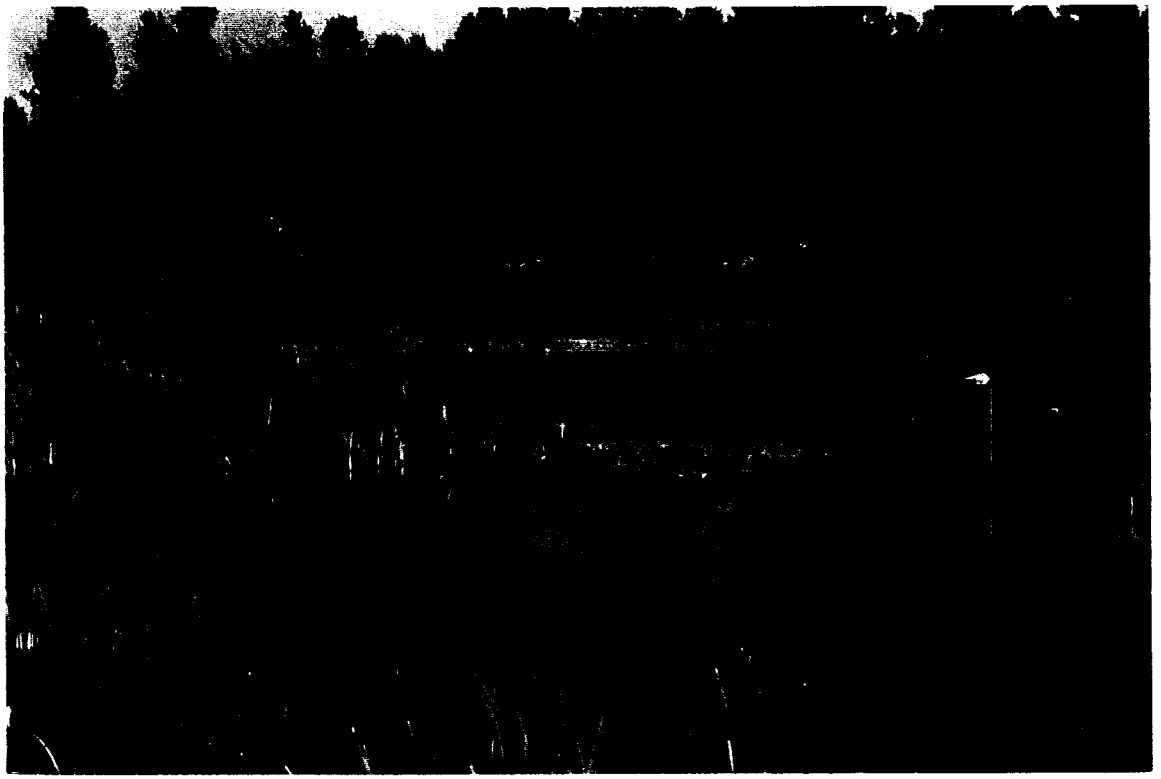

Photo Number: 1420 Date: July 29, 1999 Work Area: Wetlands
Description: Ponds and vegetation recovered to healthy natural wetlands state in Cell 1. Mallard duck sitting on rock at right.

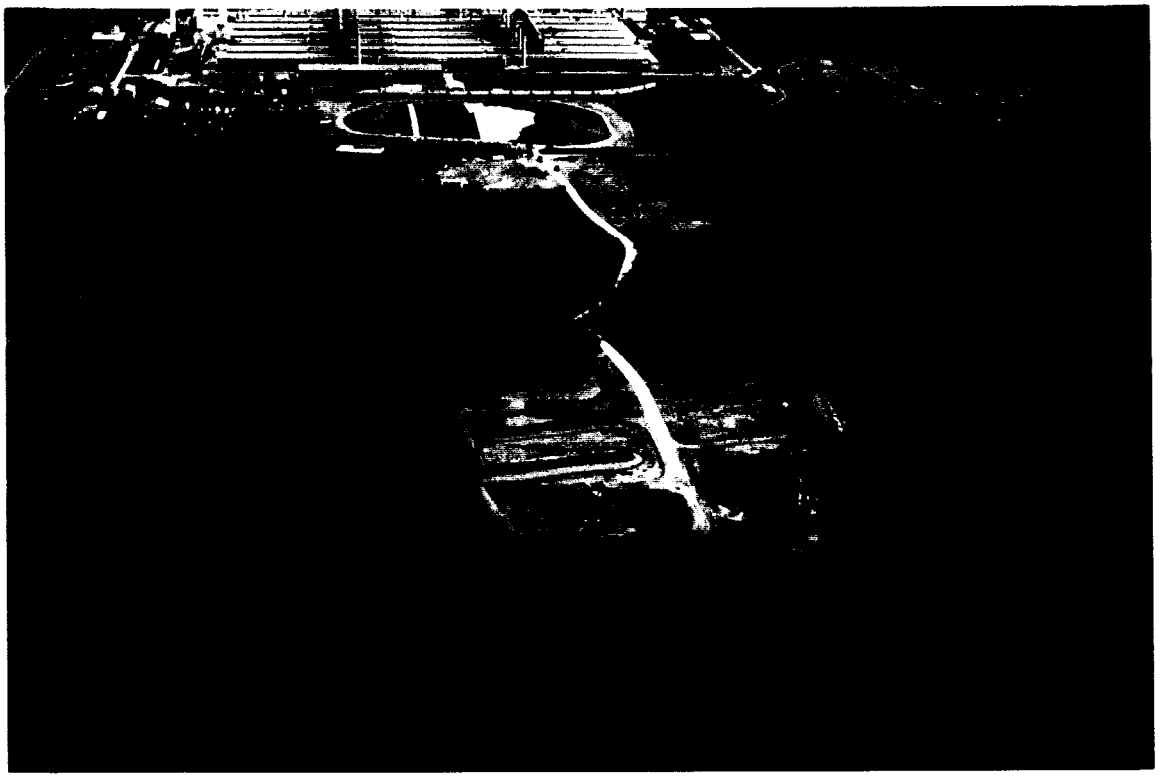

Photo Number: 1255 Date: August 9, 1996 Work Area: Wetlands (Mitigation Area)
Description: Controlled development and ongoing excavation from Borrow Pits, which will later be converted to new wetlands. Capping of Black Mud Pond in background.