

ABB ENVIRONMENTAL SERVICES

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION SUPERFUND STANDBY CONTRACT

LOVE CANAL UNITS B9 AND 18

Niagara Falls, New York

WORK ASSIGNMENT NO. D002472-7.1

FINAL REPORT FOR
REMEDICATION OF FRONTIER AVE./100TH ST.
AND EDA 4 HOUSE LOTS
VOLUME I

SEPTEMBER 1993

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NIAGARA FALLS, NEW YORK**

VOLUME I

Submitted to:

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Albany, New York

Submitted by:

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Portland, Maine

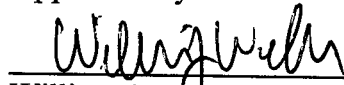
September 1993

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1.0 INTRODUCTION**1.1 GENERAL**

Beginning in 1942, the Love Canal site (Site) landfill was used by Hooker Chemicals and Plastics (now Occidental Chemical Corporation) for the disposal of over 21, 000 tons of various chemical wastes, including dioxins. The fenced 70-acre Site, encompassing the original 16-acre hazardous waste landfill, is currently covered with a 40-acre clay/synthetic liner cap. A leachate collection and treatment system is in place and operating. The area near the Site was extensively developed, which included the construction of an elementary school and numerous homes. Problems with odors and residues began occurring during the 1960's and 1970's, with migration of contaminants to the surface. Runoff drained into the Niagara River, approximately 3 miles upstream of the intake tunnels for the Niagara Falls water treatment plant. Dioxin and other contaminants migrated from Love Canal to the sewers, which had outfalls into nearby creeks. Approximately 950 families were evacuated from the area surrounding the canal. Approximately 10,000 people are located within a mile of Love Canal; 70,000 people live within 3 miles. The Niagara Falls water treatment plant serves 77,000 people. The Site is 1/4 mile north of the Niagara River.

The Site is addressed in seven stages: 1) initial actions and six long-term remedial phases; 2) landfill containment with leachate collection, treatment, and disposal (continuing); 3) cleanup of the sewers and creeks sediments (completed); 4) thermal treatment of the sewers and creeks sediments (to be completed); 5) cleanup of the 93rd Street School soils (completed); 6) home maintenance of

properties in the Emergency Declaration Area (EDA) (continuing); and 7) buyout of homes and other properties in the EDA (continuing).

The three short-term remedial actions that are the subject of this remedial action report have been completed: 1) the Frontier Avenue/100th St. sewer remediation, 2) the EDA 4 soil removal, and 3) the repair of a portion of the Love Canal cap.

1.2 SUMMARY OF WORK

The New York State Department of Environmental Conservation (NYSDEC) received sealed bids for furnishing all labor, equipment, tools, materials and supplies necessary to complete the Remediation of Frontier Ave./100th St. and EDA 4 Lots. Seven bids were received by NYSDEC. Entech Management Services Corp. (ENTECH) of Buffalo, New York was the low bidder. On June 26, 1992 NYSDEC sent out notification of lowest bid and began work to secure a contract with ENTECH. The intent was to have a contract in place within 45 days and begin work within 14 days thereafter. A contract was finally secured with ENTECH beginning on October 16, 1992, and was for a duration of 180 calendar days. A preconstruction meeting was held on October 21, 1992 and mobilization began on October 29, 1992.

ABB Environmental Services (ABB-ES) was contracted by NYSDEC to prepare conceptual designs, construction drawings and specifications, and provide construction monitoring services for the remedial construction of Frontier Ave/100th St. and EDA 4 Lots.

The Love Canal Site, located within the City of Niagara Falls, New York, is an inactive hazardous waste landfill site. Within the Love Canal Emergency Declaration Area (EDA 4), a number of operable units have been created to address the various remedial activities required. This contract addresses (1) Operable Unit No. 18, the Frontier Avenue storm sewer, (2) Operable Unit No. B9, soil removal in Love Canal EDA 4, and (3) an additional remedial action involving the repair of an area of the Love Canal Cap.

Frontier Avenue is located at the southern boundary of the Love Canal Site. Contaminated storm sewer pipe bedding was discovered during past investigations of the storm sewer located in Frontier Avenue. Contamination was specifically identified at the intersection on Frontier Avenue and 100th St. and east along Frontier Avenue from the intersection. Under this contract, the storm sewer piping and contaminated bedding were removed and replaced with uncontaminated materials. Diversion of stormwater was necessary during the period of pipe removal and replacement. As an optional work item test pits were dug to determine if contamination existed in the pipe bedding of the 42-inch storm sewer under the LaSalle Expressway downstream of Frontier Ave., the intention of the test pitting was that if contamination was identified the bedding would be isolated through the installation of a pipe liner and cutoff walls. Observations during test pitting and analytical results of test pit samples indicate that contamination was not present, so the pipe was not lined and cutoff walls were not installed. The inside of the pipe was hydraulically cleaned and the waste water transported to the Love Canal Leachate Treatment Facility and treated.

EDA 4 is located approximately 300-feet north of the Love Canal Site. As a result of the Habitability Study of the neighborhood, a determination was made

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that 2 lots, #1044 100th St. and #9909 Black Creek Drive contain elevated levels of benzene hexachloride. The New York State Department of Health (NYSDOH) reviewed results of field investigations and recommended that certain areas of the fill surrounding the houses and a portion of lot #9903 Black Creek Drive be excavated and disposed of off site. NYSDEC identified limits of remedial construction based on the NYSDOH recommendations. Under this contract, the contaminated soils were removed and replaced with clean compacted fill. Sidewalks, driveway and vegetation replacement was also performed.

During excavation of soils in #9903 Black Creek Drive, a black ash material was encountered. NYSDEC conducted a subsurface investigation to identify the limits of the material and collect samples for analysis. The results of the investigation indicated that some of the samples of black ash contained elevated concentrations of mercury but were not hazardous according to the Toxicity Characteristic Leaching Procedure (TCLP). NYSDEC identified limits of removal and issued ENTECH a Field Order to remove the ash material from #9903 Black Creek Drive which was subsequently completed. The work was inspected and accepted on August 24, 1993.

The Love Canal Cap repair area is located at the south end of the Love Canal Site. A small area, approximately 30-feet by 60-feet in plan, had settled approximately one foot. As a result of the settlement, water was ponding on the cap surface. The cap repair was performed by excavating the topsoil and removing the HDPE liner. The area was then filled and compacted to achieve uniform grading with the surrounding area, and the HDPE liner and vegetative cover were replaced.

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Copies of weekly construction reports are included in Appendix A. As-built record drawings are provided in Appendix L.

2.0 WORK PERFORMED

2.1 BASIS OF REMEDIATION

Remedial activities were undertaken to satisfy the 1985 Record of Decision (ROD), public concerns, and site maintenance requirements. Specific descriptions for the basis of remediation are contained in the Conceptual Design Report (E.C. Jordan, Co., 1992) included as Appendix B and summarized as follows:

Frontier Ave./100th St. The remediation of the Frontier Avenue and 100th St. sewers is a remedial action that stemmed from the 1985 ROD, which concerned the remediation of the sanitary and storm sewers surrounding the Love Canal site. Past investigation of the storm sewer located in Frontier Ave., west of 100th St., had discovered contaminated storm sewer pipe bedding. Previous work to address this situation included the installation of various pipe bedding and trench cutoff walls. During the installation of a cutoff wall at the west side of manhole 412, located at the intersection of 100th St. and Frontier Ave., additional contamination was discovered in the storm sewer bedding. Based on that discovery, four test pits were excavated in 1990 downstream (east) of manhole 412 to manhole 406 to provide a limited indication of the extent of contamination. Three of the four test pits exposed contamination including the pit on the downstream

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(south) side of manhole 406. In 1991 four additional test pits were excavated to further define the limits of contaminant migration in the pipe bedding. No evidence of contamination was found in any of these test pits. NYSDEC therefore decided to remove, dispose and replace the Frontier Ave./100th St. contaminated sewer pipe and bedding within the limits defined by the uncontaminated test pit locations.

EDA 4

The remediation of Area 4 of the EDA resulted in concern expressed by the Expert Panel at a May 10-11, 1989 meeting of the Love Canal Technical Review Committee of areas of higher concentrations of BHCs that were identified in the Habitability Study. After subsequent investigations, EPA, NYSDEC and NYSDOH determined that the lots at #1044 100th St. and #9903 and #9909 Black Creek Drive required remediation, including excavation and ultimate disposal.

Love Canal Cap

NYSDEC has historically been directed to pursue any remediation necessary in order to maintain and ensure the integrity of the Love Canal cap. This integrity was undermined as a result of settling. The remediation required was appropriate to the existing capping procedures that were followed during the installation of the original cap.

2.2 HEALTH AND SAFETY

The potential risks involved in the work performed required ENTECH to implement health and safety measures in accordance with the Contract Documents. A Health and Safety Plan (HASP) was prepared by ENTECH and reviewed by NYSDEC and ABB-ES. ABB-ES required ENTECH to have an on-site Health and Safety Officer during the course of work. The responsibilities of the Health and Safety Officer included the following:

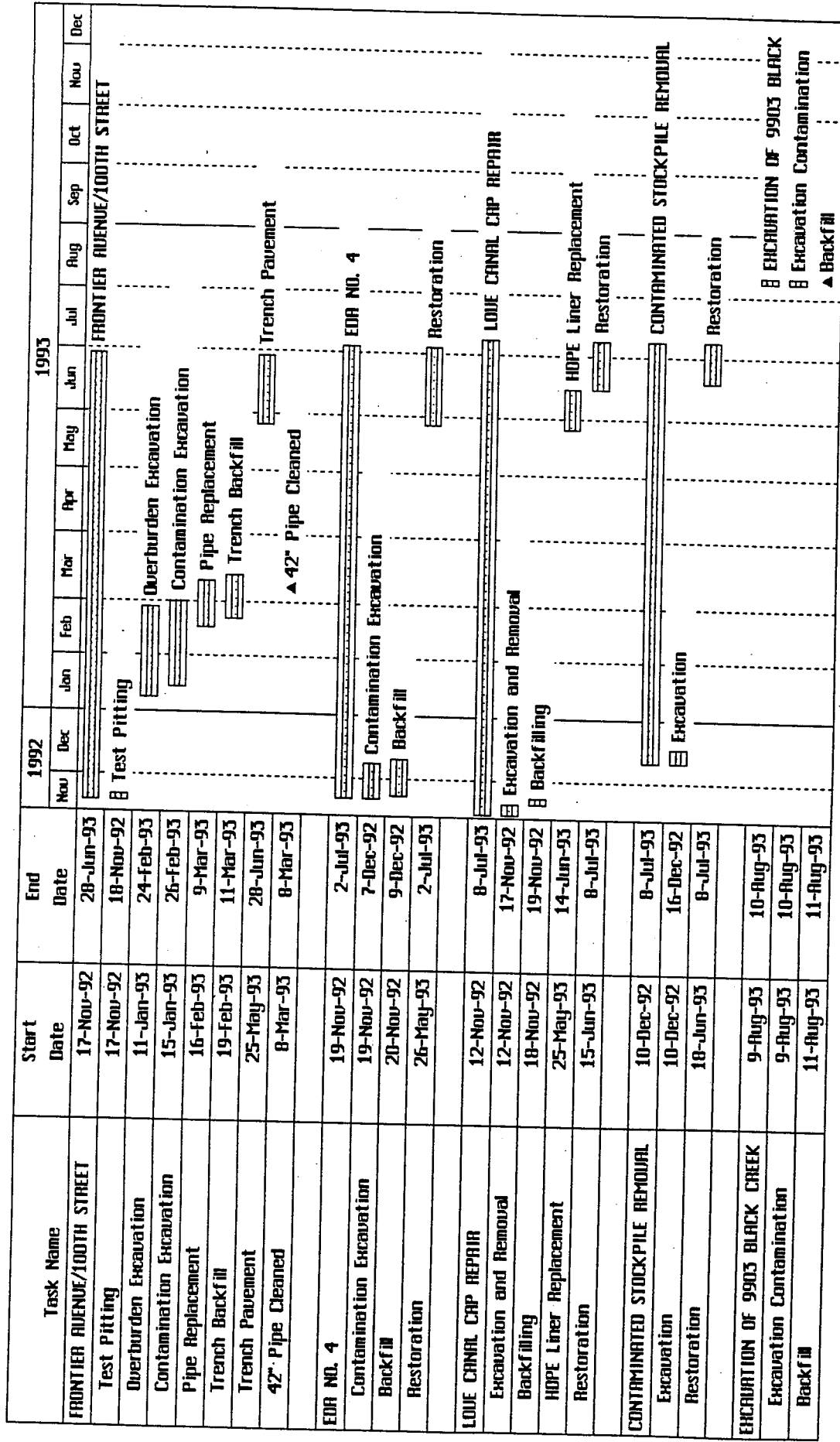
- Implementation of the HASP.
- Monitoring of air quality on-site and around the perimeter of the site. See Appendix C for air monitoring records.
- Initial training of on-site workers with respect to the contents of the HASP.
- Maintain and distribute personnel protective equipment.
- Maintain daily records of health and safety concerns.

Appendix D contains decontamination certificates, confined space entry permits, and safety sign-in sheets for the remedial construction.

2.3 SCHEDULE

See Figure 2-1 for the schedule of work completed.

FIGURE 2-1
LOUE CANAL REMEDIATION
 FRONTIER AVENUE/100TH STREET AND EDA NO. 4
 SCHEDULE OF WORK COMPLETED



2.4 MOBILIZATION

ENTECH mobilized equipment and personnel to perform work at Frontier Ave./100th St., the cap repair, EDA 4 house lots, and removal of two stockpiles of materials located near the Love Canal Treatment Plant Facility. Construction office, storage, and personnel decontamination trailers were provided by ENTECH.

Equipment decontamination was performed at the Love Canal Treatment Facility decontamination pads. Decontamination fluids as well as any dewatering effluent generated by working operations were disposed at the Love Canal Treatment Plant Facility.

A Security Guard was posted at the construction office trailers to sign in all personnel working on the site, and to guard against access by unauthorized personnel.

2.5 OPTIONAL WORK INVESTIGATIONS

Test pits were completed at the north edge of manhole number 404 and south of manhole number 406 to determine if the soils surrounding the 42-inch RCP storm sewer pipe under the LaSalle Expressway were contaminated with Love Canal related compounds. No visual sign of contamination was observed during test pitting. A soil sample obtained by NYSDEC from the test pit at manhole number 404 was analyzed by NYSDEC for Love Canal site related compounds. The analytical results supported the visual observations and did not suggest that Love Canal site related contaminants were present in the test pit. The analytical report

is included in Appendix E. The absence of contamination in these areas confirmed that the optional phase of construction would not be necessary. The optional phase of construction would have consisted of replacement of manhole number 404, installation of concrete cutoffs at the two test pit locations, cleaning of the 42-inch storm sewer pipe and inversion lining of the 42-inch storm sewer pipe. Though the bedding material below the pipe was determined to be free from contamination the interior walls of the pipe were hydraulically cleaned as required by the project specifications.

2.6 HANDLING AND DISPOSAL OF CONTAMINATED MATERIALS

All contaminated materials except contaminated water were disposed of by Occidental Chemical Company (OXY). Contaminated water was disposed at the Love Canal Leachate Treatment Facility. Excavated materials were placed in lined rolloff containers for transportation. The rolloff containers were then staged at the staging area of the Love Canal Leachate Treatment Facility until OXY could receive delivery of the materials at their main plant on Buffalo Avenue in Niagara Falls, New York. At completion of the on-site work 11 of the containers were transported to OXY by Buffalo Fuel Corporation as a subcontractor to ENTECH. Originally OXY was to take delivery of thirteen containers during construction but only took eleven due to lack of storage capacity. The remaining rolloff containers were stored at the Love Canal Leachate Treatment Facility until OXY could receive them.

The materials excavated and removed from the EDA 4 house lots were hauled and dumped at OXY'S 102nd Street Landfill Located in Niagara Falls New York.

All transportation of materials was manifested as required. See Appendix F for copies of manifests.

2.7 EXCAVATION OF MATERIALS FROM FRONTIER AVE./100TH ST.

Asphalt and concrete were cut along the alignment of the storm sewer on Frontier Ave. and 100th St. Both asphalt and concrete were excavated and hauled to A. L. Subar Company located in Lockport, New York and Medsger Recycling located in Niagara Falls, New York for disposal. Overburden soils above the spring line of the pipe were free from contamination and were excavated and hauled to the stockpile at the northeast corner of the Love Canal Cap. The excavated contaminated soils, pipe, and manholes were placed in 10 mil polyethylene lined rolloff containers and staged at the designated area at the Love Canal Treatment Plant Facility. Excavation and removal extended from: manhole 412 north, 96-feet on 100th St.; between manholes 412 and 406 on Frontier Ave.; and 65-feet east of manhole 412 on Frontier Ave. Manholes 412 and 406 were removed and replaced with new manholes. Manhole covers and rims were reused. The extent of excavation was based on the previous test pitting investigation conducted by ABB-ES in 1991.

Concrete and asphalt was removed an additional 40-feet west on Frontier Ave beyond the contract limits. The additional cost for replacement of the over excavation was incurred by ENTECH.

During the excavation to remove manhole 412 on Frontier Ave., water and NAPL were observed entering the trench around the existing cutoff wall west of the manhole. The scope of work was amended to include removal and replacement

of the cutoff wall and replacement with a new concrete cutoff wall. The new wall was installed cutting a one foot deep key-way into the naturally deposited undisturbed clay soil along the bottom and sides of the trench.

2.8 REPLACEMENT OF STORM SEWER PIPE AND MANHOLES

The 18-inch diameter clay tile storm sewer pipe in 100th St. was replaced with new 18-inch schedule 40 PVC pipe in accordance with the contract drawings. The reinforced concrete pipe in Frontier Ave. was replaced with same size new RCP. Manholes 412 and 406 were replaced with precast concrete manholes, and were set in cast in place concrete bases. The pipe trenches were backfilled and compacted in accordance with the project specifications. ENTECH subcontracted to Professional Services Industries, Inc of Tonawanda, New York to perform the necessary in-place field unit weight density tests. The results of those tests are included in Appendix G. The concrete and asphalt roadway were replaced to meet the requirements of the City of Niagara Falls. It was also necessary to replace the curb and curb drain adjacent to the Frontier Ave. trench.

Caving of the 100th St. excavation caused disturbance to an existing ductile iron water pipe along the east edge of the street. The damaged pipe was replaced and inspected by the City Water District prior to backfilling. Caving of the Frontier Ave. trench caused a two foot long break in an existing 8-inch diameter clay tile sewer pipe north of manhole number 406. The break was repaired using PVC pipe and Fernco couplings.

2.9 STORM WATER CONTROL

All water encountered during excavation and storm water entering the excavation was collected by vacuum truck or pumped into 55-gallon drums. Collected water was transported to the Love Canal Treatment Plant Facility for disposal in accordance with the requirements of the contract.

2.10 CAP REPAIR

The area of settlement at the south end of the Love Canal cap was excavated, the topsoil stockpiled on-site, and the HDPE liner was removed and disposed at OXY's 102nd Street Landfill. The area was then filled and compacted to achieve uniform grading with the surrounding area. The fill materials used consisted of a mixture of excavated cap soils, and clean stockpile soil from the northeast corner of the cap.

Solmax Geosynthetics, Inc (SOLMAX) of Newtonville, New York subcontracted to ENTECH to replace the HDPE liner. National Seal Company, manufacturer of the HDPE geomembrane material, provided manufacturer's certification that the new materials supplied met the requirements of the project specification. During installation, SOLMAX performed the required destructive and non-destructive testing in compliance with the project specification. Three samples of seam welds from the installed liner were sent to J.L.T. Testing Company of Canonsburg, Pennsylvania. The results indicated one failed test for number D-2. The appropriate repairs were performed subsequent to the failed test. Two additional tests samples were taken from the repaired area and the laboratory

results indicated the repairs brought the newly installed liner into compliance with the project specification. See Appendix H for liner information and test results.

Upon completion of the HDPE liner installation the area was filled, loamed, and seeded.

2.11 CONTAMINATED STOCKPILE REMOVAL

Two soil stockpiles, located within the Love Canal Site designated A and B were loaded into rolloff containers and staged at the Love Canal Treatment Plant Facility. The materials will be moved to OXY for disposal at a later date. The areas where materials were removed were regraded, loamed, and seeded.

2.12 EDA 4 HOUSE LOTS

EDA 4 is located approximately 300-feet north of the Love Canal Site. Investigations of the neighborhood determined that 2 house lots, 1044 100th St. and #9909 Black Creek Drive contained elevated levels of benzene hexachloride. The NYSDOH reviewed the results of field investigations and recommended that certain areas of the fill surrounding the houses and a portion of lot #9903 be excavated and disposed off site. The NYSDOH recommendation is included in Appendix I. NYSDEC identified limits of remedial construction based on the NYSDOH recommendations. The Contractor removed the contaminated soils and replaced them with clean compacted fill. Sidewalk, driveway and vegetation replacement were performed in accordance with the requirements of both the City of Niagara Falls and the Love Canal Revitalization Agency.

During excavation of contaminated soils at #9909 Black Creek Drive several rusted and crushed drums were removed. One intact drum was exposed and punctured. All of the drums were placed into overpack containers. The contents and contaminated soils associated with the punctured drum were also placed in an overpack container. A sample of the drum contents was obtained and analyzed by NYSDEC. Analytical results are included in Appendix J. The overpacked drums were stored at the Love Canal Drum Storage Facility and are to be transported to OXY for disposal.

During excavation of soils in #9903 Black Creek Drive, a black ash material was encountered. NYSDEC conducted a subsurface investigation to identify the limits of the material and collect samples for analysis. The results of the investigation indicated that some of the samples of black ash contained elevated concentrations of mercury but were not hazardous according to the TCLP. NYSDEC identified limits of removal and issued ENTECH a Field Order to remove 238 cubic yards of the ash material from #9903 Black Creek Drive. The excavated ash material was disposed at the 102nd Street Landfill. Appendix J contains the subsurface investigation boring logs, sample location plan, analytical results, and NYSDEC's requirements for remedial construction.

2.13 PERFORMANCE STANDARDS AND CONSTRUCTION QUALITY CONTROL

The Conceptual Design Report (E. C. Jordan, Co., 1992) presented the performance standards for each of the remedial construction activities. In summary those standards were:

For the remediation of Frontier Ave./100th St., contaminated storm sewer pipe and bedding were removed to the limits of visual contamination (vertically and horizontally) and to the locations of specific test pits which had been found to be free of contamination during previous investigations.

For the EDA 4 house lots #9909 Black Creek Drive and #1044 100th St., contaminated soils were removed to specific depths and limits recommended by the NYSDOH in a letter to NYSDEC dated March 25, 1991 (Appendix I). For the black ash material in #9903 Black Creek Drive, the ash material was removed to the specific depths and limits identified by NYSDEC based on their subsurface investigation (Appendix J).

For the Love Canal Cap Repair, the area was to be reconstructed to provide positive drainage and maintain the integrity of the cover system.

Construction quality control was the responsibility of ENTECH in accordance with Technical Specification Section 01440 of the Contract Documents. ENTECH prepared and followed a Contractor Quality Control Plan (CQCP) which identified ENTECH's Quality Assurance/Quality Control Plan (QA/QC Plan). A copy of the plan is included in Appendix K.

2.14 CHANGE ORDERS

At the time of the publication of this document the final approval for change order requests was not complete. The items listed are requests by ENTECH and may or may not be approved by NYSDEC.

- Credit for deletion of item No. 020: lining of 42-inch storm sewer.
- Credit for deletion of item No. 021: Replacement of manhole number 404.
- Additional test pit excavated on the north side of manhole No. 404 to allow additional inspection of 42-inch storm sewer bedding.
- Frontier Avenue contaminated pipe and bedding removal. An additional quantity of excavation was necessary to remove the existing crushed stone pipe bedding between manholes 406 and 412. Also, an additional quantity of pipe bedding material was required to backfill the excavation.
- 100th St. storm sewer pipe replacement: Additional 6 feet of pipe removed to accommodate installation to a sound pipe joint.
- Trench pavement replacement: Additional pavement due to extended trench width removing crushed stone pipe bedding between manholes 406 and 412.

- EDA 4 contaminated soil removal: Additional excavation performed to remove contamination from the house lots, and the subsequent additional backfilling.
- Additional excavation and backfilling to remove additional contamination at 9903 Black Creek Drive.
- Additional square footage of Cap Repair area to facilitate the necessary grading.
- Additional Rolloff containers required to transport contaminated materials.
- Drums, drum liners, and overpacks required to remove unexpected contamination encountered at the EDA house lots. The material encountered was a drum of black highly viscous liquid. Also compensation to ENTECH for additional time required to perform the removal of the unexpected materials.
- Due to seasonal restrictions resulting from the late start date of the project, the placement of trench pavement needed to be delayed until warm weather. It was necessary to put a temporary paving patch over the trench in the interim. The temporary patch was not part of the original scope of work.
- Due to seasonal restrictions resulting from the late start date of the project, the installation of HDPE liner was delayed until warmer

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weather. The cap area was covered and protected for the winter. The work to winterize the cap area was not part of the original scope of work.

- During the excavation to remove manhole number 412 it was necessary to remove and replace the adjacent cutoff wall. ENTECH performed the work.
- An employee of ENTECH contacted ABB-ES and stated that due to trench caving in Frontier Ave. damage was done to the existing sanitary sewer and was backfilled without repair. ENTECH performed investigative work and demonstrated the pipe had not been damaged. The additional work to verify the condition of the pipe was extra work beyond the scope of the project.
- Due to seasonal restrictions resulting from the late start date of the project, the contract duration was extended until July 1, 1993.

2.15 QUANTITY OF MATERIALS

The final quantity of materials associated with this project are itemized on the following table:

Type of Work	Actual Quantity
Test Pit Type A	3
Test Pit Type B	2
Frontier Overburden Removal	294 cu. yd.

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Type of Work	Actual Quantity
Frontier Contam. Removal	120 cu. yd.
Frontier Sewer Pipe	165 lin. ft.
Frontier Trench Backfill	216 cu. yd.
100th St. Overburden Removal	113 cu. yd.
100th St. Removal	23 cu. yd.
100th St. Pipe Replace	90 lin. ft.
100th St. Trench Backfill	94 cu. yd.
Manhole Replace	2
Trench Replace	275 cu. yd.
EDA Contamination Removal	1,005 cu. yd.
EDA Backfill	1,005 cu. yd.
EDA Restoration	1
Cap Repair	1
Roll-Off	35
Contaminated Stock Pile	120 cu. yd. est.
#9903 Black Creek Drive Cont. Soil Removal	238 cu. yd.
#9903 Black Creek Drive Backfill	238 cu. yd.

2.16 FINAL CONTRACT COST

NYSDEC approval of Change Order 3 and 4 were outstanding at the time of this report. The estimated final construction contract cost is:

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Contract amount including Change Orders 1 and 2	\$298,178.08
Pending Change Order 3	47,430.11
Pending Change Order 4	62,403.49
Sampling of black ash by URS Consultants, Inc.	<u>13,000.00</u>
Total	\$421,011.68

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3.0 CONCLUSIONS

A final inspection was conducted on July 13, 1993. In attendance were Rick Day of ABB Environmental Services, Ben Loreda and Brian Sadowski of NYSDEC. As a result of the Final Inspection NYSDEC accepted the work with the exception of those areas which had not developed sufficient vegetative cover.

Remedial construction activities were completed by ENTECH in general conformance with the contract drawings and specifications. Contaminated materials were removed from Frontier Avenue, 100th St., and the EDA 4 house lots to the limits specified by the Contract Documents and Change Orders. The Love Canal Cap repair has re-established the surface drainage slope of the cap. The storm sewers, EDA 4 house lots and the Love Canal Cap are operational and no further monitoring or maintenance of those areas specific to the construction contract should be necessary. The exception to this is that the establishment of vegetative cover at those areas which were seeded and mulched had not received final acceptance by NYSDEC at the time this report was prepared.