



FINAL REMEDIATION REPORT

WORK ASSIGNMENT D003825-1

**FORT EDWARD LANDFILL
FORT EDWARD (T)**

**SITE NO. 5-58-001
WASHINGTON (C), NY**

Prepared for:
NEWYORKSTATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road, Albany, New York

John P. Cahill, Commissioner

DIVISION OF ENVIRONMENTAL REMEDIATION

Michael J. O'Toole, Jr., P.E. - Director

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282 Delaware Avenue
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**FINAL
August 1999**

STATE SUPERFUND WORK ASSIGNMENT

D003825-1

FINAL REMEDIATION REPORT

FOR

CONSTRUCTION PHASE ENGINEERING SERVICES

FORT EDWARD LANDFILL

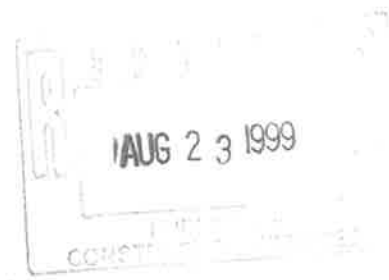
DEC SITE NO. 5-58-001

FORT EDWARD (T), WASHINGTON (C), NEW YORK

SUBMITTED BY:

**URS GREINER CONSULTANTS, INC.
282 DELAWARE AVENUE
BUFFALO, NEW YORK 14202-1805**

AUGUST 1999



**CERTIFICATION OF
CONSTRUCTION QUALITY ASSURANCE**

AT

**FORT EDWARD LANDFILL
REMEDIAL ACTION CONSTRUCTION
TOWN OF FORT EDWARD, NEW YORK**

URS Greiner Consultants, Inc. (URSG) personnel and its subcontractors have inspected the remedial action construction at the Fort Edward Landfill according to generally accepted practices. Based on field observations and inspections made by onsite personnel, field and laboratory test data, and data provided by the Contractor and its subcontractors, URSG certifies that the remedial action construction at the site has been performed in substantial compliance with the NYSDEC-approved Contract Documents and as stated in this report.

The start-up, operation and testing of the groundwater/leachate collection, pretreatment and treatment systems are not covered by this certification.

SEAL




Signature

AUGUST 1999

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FINAL REMEDIATION REPORT
FORT EDWARD LANDFILL REMEDIAL ACTION
NYSDEC SITE NO. 5-58-001

1.0 INTRODUCTION

This report documents the remedial activities completed at the Fort Edward Landfill. URS Greiner Consultants, Inc. (URSG) provided construction engineering and oversight services under New York State Department of Environmental Conservation (NYSDEC) Work Assignment No. D003825-1.

This report was prepared in accordance with the Project Management Work Plan and Budget for Construction Phase Engineering Services (URSG, 1997). In accordance with Task 5 as outlined in that plan, this report includes a site description, the name of the Contractor, the amount of the low bid, a brief narrative summary of the work performed at the site, a summary of the major variations from the Contract Documents, and a discussion of any change orders including the dollar value of change orders. The report will summarize in tabular form all confirmatory sampling results, location of confirmatory samples, etc. The report will discuss only the period of construction at the site and will not include the 4-month start-up period which will be described in the Start-up Completion Report.

1.1 Remedial Construction Contractors

The Remedial Action was performed under two contracts:

- Contract G for General Construction, awarded to the approved low bidder, Kubricky Construction Corporation (KCC) of Glens Falls, NY, for a bid amount of \$6,550,675.00.

- Contract E for Electrical Construction, awarded to the approved low bidder, Brunswick Electric of Troy, NY for a bid amount of \$209,000.00.

The date established for commencement of the project in the Notice to Proceed was August 4, 1997. The project was deemed substantially complete on September 15, 1998.

1.2 Site Description

The Fort Edward Landfill is an approximately 25-acre, former municipal landfill located between the Villages of Hudson Falls and Fort Edward in the Town of Fort Edward, Washington County, New York. The Landfill is located on Leavy Hollow Road off Burgoyne Avenue in a primarily semi-rural residential district. Adjacent and to the north of the site is the Glens Falls Feeder Canal, which flows into the Old Champlain Canal at the northeast corner of the site. The nearest residences are located across Leavy Hollow Road to the south and west of the landfill. It was concluded during the remedial and pre-design investigations performed by URSG that landfill-derived contaminants, including PCBs, are migrating from the site through the pathways of groundwater and leachate seepage to surface water. The landfill was therefore listed as a Class 2 site in the State Registry of Inactive Hazardous Waste Sites. Class 2 indicates significant threat to public health or the environment.

Prior to remedial construction, the landfill was generally covered by a relatively thin layer of paper sludge/sandy soil mixture. Leachate/groundwater seeps appeared to be common to the east side of the landfill presenting further potential for human contact. The landfill likely was also emitting gases and organic compounds.

1.3 Description of the Remedial Action

The remedial action was designed to address the threats to public health and the environment identified during the remedial investigation and pre-design investigation. The remedial action consisted of the following major components by the general construction contractor:

- Prepare and implement necessary plans such as Erosion and Sedimentation Control Plan, Environmental Protection Plan, and site Health and Safety Plan (HASP).
- Strip existing vegetation and topsoil, stockpile, store and replace the topsoil on areas to receive topsoil. Perform grubbing as necessary.
- Dispose of the following materials on site prior to the multi-layer cap construction: surficial debris, chipped trees, excavated waste, and any other debris or soil excavated and considered contaminated.
- Perform rough grading, placement and compaction of stripped and/or excavated on-site materials, and, as applicable, placement and compaction of clean off-site soil to regrade the landfill.
- Construct a multi-layer cap over the entire landfill and tie it into perimeter structures and drainage features.
- Construct a leachate collection system, including extraction wells, stone-filled trenches, sheetpile cutoff wall, gravity pipe mains, force mains, appurtenances, and connections.
- Construct a leachate treatment system, including three 1.5 acre constructed wetland treatment system (CWTS) cells, a pump house and air stripper.
- Construct new wetland areas adjacent to existing ones, place stripped hydric topsoil and establish hydrophytic vegetation in them.
- Construct permanent drainage swales, channels, gutters, downchutes, stilling basins, culverts, and related structures for control of site-related drainage.

- Regrade and stabilize existing slopes adjacent to the landfill where required.
- Construct a gas collection and treatment system including a subsurface cut-off trench, gas cutoff barrier, cap vents, header piping and treatment units.
- Create crushed stone-paved roads on site and, as applicable, repair existing paved roads from damage due to construction activities.
- Construct a permanent security fence around the landfill, including locked gates at designated access points.
- Remove from site all contractor equipment, temporary facilities and utilities connections, and restore site to original or specified conditions.
- Dispose of all construction water including dewatering and decontamination water to the landfill surface, where possible, or to a licensed disposal facility.
- Install all enclosures, instrumentation, control wiring and conduit required for controls at the site.

The electrical contractor was to perform, under a separate contract, the following activities as part of the remedial construction:

- Provide all permanent electrical power, and distribution for the installation, operation, and maintenance of the leachate collection, transfer and pretreatment/treatment systems.
- Provide telephone service.
- Provide all temporary site electrical services as necessary.

2.0 PRE-CONSTRUCTION ACTIVITIES

2.1 Pre-Construction Meeting

On July 25, 1997, a pre-construction meeting was held at the NYSDEC offices at 50 Wolf Road, Albany, NY. In attendance were representatives of NYSDEC, KCC, and URSG. Items of discussion included the following: the responsibilities of project participants and lines of communication; Minority/Women's Business Enterprises (M/WBE) and Equal Employment Opportunity (EEO) goals; contract time; progress schedules; working hours; approval of subcontractors; maintenance of as-built drawings; submittal requirements; changes in the work; payments; completion of the work and final acceptance; dispute resolution; limits of disturbance; easement requirements; pollution liability insurance.

3.0 CONSTRUCTION ACTIVITIES

The majority of the remedial construction was performed in accordance with the Contract Documents (including the five addenda, all issued prior to bid award). The following paragraphs contain a general description of the construction, and a discussion of the significant variations (administrative agreements, field clarifications, change orders, approved substitutions, etc.) from the Contract Documents (plans and specifications). URSG maintained a resident engineer/inspector on site during all construction activities. Daily inspection reports were submitted separately to NYSDEC during the construction period.

Included in this section, where applicable, are discussions of the results of any Construction Quality Assurance/Construction Quality Control (CQA/CQC) testing, and the means and methods of construction. A discussion of change orders and their associated value is included.

Accompanying this report are the project Record Drawings. Those include the following:

- Those prepared by URSG from the redline mark-ups maintained by the Construction Contractors.
- The record drawings of the polyethylene liners of the cap and the CWTS cells, prepared by Solmax, the geosynthetic installation subcontractor.
- Maps prepared by URSG of the property takings/easements along the north and south boundaries of the site.

3.1 Narrative Description of Construction

Following the Notice to Proceed letter dated August 4, 1997, the General Contractor set up temporary facilities during the first week of August, 1997. These facilities included job trailers for the contractor and URSG/NYSDEC. At this time, KCC "flagged" all existing wetlands which were to remain. When flagging was completed, clearing, grubbing and chipping operations were

conducted, all wood chips were stockpiled on site and were later used as mulch. Stumps were disposed of in a spoil area in the northwest corner of the site, outside of the limits of proposed capping operations.

With clearing operations complete, KCC began stripping hydric topsoil from existing wetland areas on which would be located the CWTS. The hydric topsoil was stockpiled on site and later used in constructing the wetland expansion areas.

KCC began constructing the CWTS cells with onsite material. The cells cut and fill quantities nearly balanced; no offsite material was needed. While construction continued on the CWTS cells, KCC began hauling gas vent sand onto the existing cap. Gas wells were installed into the existing cap and Schedule 80 PVC 6-inch diameter slotted pipe was installed. Similar pipe was used for laterals from these wells. These laterals and wells were connected to carbon canister treatment units, which treat landfill gases prior to releasing them to the atmosphere. Once the wells and laterals were installed, KCC placed 1-foot of approved gas vent layer sand over the existing cap. This layer formed the foundation for the rest of the cap system.

The project included two separate groundwater/leachate collection systems. The first system consists of a groundwater cutoff wall with groundwater collection piping; the second system comprises three leachate/groundwater extraction wells.

The groundwater/leachate cutoff wall was installed along the south-eastern and southern boundaries of the existing landfill outside the limit of waste. This system utilizes a PVC sheeting cutoff wall driven to predetermined elevations. The sheets used an interlock sealant for seam waterproofing. The Contract Documents originally specified a steel sheetpile cutoff wall, but upon demonstration of equivalence and advancement of a sufficient credit, NYSDEC approved KCC's substitution of the PVC sheeting.

A Schedule 80 PVC 6-inch diameter slotted pipe was installed at the base of the sheeting wall and was backfilled with filter sand. The pipe will convey groundwater/leachate from within the landfill to a collection sump from where it is pumped to the pretreatment building.

Three groundwater extraction wells were installed within the limits of waste along the eastern slopes of the existing cap. Boreholes were drilled and continuously sampled and logged prior to well construction. The borehole information allowed URSG engineers and geologists to design filter pack requirements and well depths. Each well consists of a 15-inch diameter steel casing, a 6-inch diameter well screen and a ½-horsepower well pump. These wells will transfer groundwater via a 2-inch diameter PVC force main to the pretreatment building.

Following the construction of the groundwater/leachate cutoff wall and extraction wells, KCC's geosynthetic-installation subcontractor, Solmax, began geomembrane installation in the CWTS cells and on the landfill cap. A high density polyethylene (HDPE) geomembrane was used in the CWTS cells, and a textured linear low density polyethylene (LLDPE) geomembrane was used in the landfill cap system.

Solmax's QA/QC personal were onsite daily to monitor the installation. Information provided to URSG contained the following: daily reports showing geomembrane deployed, daily weld test records, records of field seam testing (destructive and non-destructive) and laboratory seam test results.

After installation of the HDPE, KCC installed force main and collection piping in each of the three CWTS cells. The force main consists of 2-inch diameter PVC Schedule 80 piping inside of a 4-inch diameter containment pipe. The collection piping is 6-inch diameter slotted Schedule 80 PVC. The force main and collection piping were backfilled as specified.

A soil "matrix" was then placed in the CWTS cells. The matrix is a mixture of peat, topsoil, sands and clay. Common reed (*Phragmites australis*) were then planted in the cell matrix. This combination of soil matrix and plants will treat groundwater collected by the groundwater/leachate cut-off wall, collection piping and extraction wells.

During construction of the leachate/groundwater force main, collection system and matrix installation of the CWTS cells, Solmax was deploying LLDPE on the landfill cap directly over the gas vent sand layer. The geomembrane received an additional geosynthetic drainage composite

layer at areas on the cap that had a slope of 12% or greater. The geomembrane and composite layers were covered by a 2-foot layer of granular material. The first 1-foot lift was made up of onsite material taken from the bluff area in the northwest portion of the site. The second layer was a siltier material brought onto the site from a local source. During installation of this material, in-place density tests were performed to verify conformance with the specifications. This 2-foot cover material is called the barrier protection layer. That layer was then covered with 6 inches of topsoil, then seeded and mulched.

Other operations that were in progress while the geomembrane and barrier protection layer were installed include the following: excavation of the effluent polishing pond; construction of the expanded wetland areas, level control sumps; water, electrical, phone service; construction of the pretreatment building.

- The polishing pond is a basin, approximately 2-feet deep, which acts as a final detention area for treated leachate/groundwater before it flows to the feeder canal.
- The expanded wetland areas were constructed to compensate for the wetlands filled during remedial construction. The hydric topsoil stockpiled at the start of the project was replaced into the excavations and a special wetland seed mix was sown in these areas.
- The level control sumps were installed at the outlet ends of the piping from the CWTS cells.
- Water, electrical and phone lines were run near the access road through the site. A 2-inch diameter PVC water line runs down the center of the access road from through Leavy Hollow Road to the pretreatment building. Power lines and telephone cables from Leavy Hollow Road to the pretreatment building also are buried alongside the access road.

- The pretreatment building is a pre-engineered building consisting of a poured concrete foundation, and slab floor. The structure is steel framed, with steel roof panels and siding. This building houses a motor control center, the programmable logic center (PLC), flow meters, pressure gauges, holding tank, emergency shower eyewash station, air stripper, chemical tank and computer.

After the forenamed operations were completed, the groundwater collection and treatment system was put on line. Results of the start-up testing and other activities of the leachate collection and treatment system will be documented in a separate report (Startup Completion Report) to be prepared at the end of the start-up period.

3.2 Submittals

3.2.1 Shop Drawings

The approved shop drawings document many of the minor details of the construction (e.g., the exact configuration of the wall and ceiling panels of the pre-engineered building, the construction of the flexible couplings of the cap drainage piping and gas header piping, etc.). Those details are not discussed in this report.

The required shop drawings were received from KCC and Brunswick, and reviewed by URSG, in a timely manner. All the required shop drawings were ultimately approved by URSG.

3.2.2 Plans

Prior to commencement of general construction, the plans required by the Contract Documents were submitted by KCC and approved. Those plans included the Work Plan, HASP, Erosion and Sediment Control Plan, Sampling and QA/QC Plan, Spill Control Plan, and the Environmental Protection Plan. A HASP was also received from Brunswick Electric and approved prior to their activities on site.

3.3 Constructed Wetland Treatment System (CWTS)

3.3.1 Contract Modifications

Three minor modifications were made to the design of the CWTS cells:

1. Within the perimeter road surrounding the cells, the upper layer of the two layers of the subgrade stabilization fabric was eliminated. This modification resulted in a credit to the project of \$2,626.50.
2. The vertical side slopes within the cells, around the perimeters and along the central troughs, were sloped moderately, in order to facilitate construction.
3. The perimeter access road between cells 2 and 3 was raised one foot.

These changes were performed at no cost or credit to the project.

3.3.2 Construction

The CWTS soil matrix was graded in the cells using a "Sno-Cat": low ground pressure equipment designed to groom ski slopes. It exerts a ground pressure of approximately 1.4 pounds per square foot. The CWTS vegetation was planted by workers wearing snow shoes.

3.3.3 COA/CQC Testing and Results

Several sources of soil matrix were evaluated before an acceptable material was identified. The selected material was obtained from a private landowner to the northeast of the site. The material was transported to the site where it was mixed with on-site sands before being tested and placed into the cells. The selected material met all of the chemical concentrations specified in Section 02483, Table 1, except for a few Target Analyte List Metals. After evaluating materials from several local sources, the NYSDEC determined that the Maximum Allowable Soil

Concentrations specified for those compounds were not representative of local background conditions.

Seams of the HDPE liner of the CWTS cells were destructively and non-destructively tested in accordance with the Contract Specifications. The results of all testing met the Contract requirements.

3.4 Groundwater/Leachate and Gas Collection Trenches

3.4.1 Contract Modifications

Based upon a substitution proposed by KCC, the groundwater and gas collection trenches were constructed with PVC sheetpiling in place of steel sheetpiling. The substitution resulted in a credit of \$79,251 to the project.

The only non-conformance of the project occurred in the initial construction of the groundwater collection trench: from Station E0+00 to approximately E1+30 the trench was backfilled with NYSDOT No. 1 stone rather than the filter sand and on-site sands as specified. This non-conformance was not considered to require excavation and replacement.

3.4.2 Construction

The PVC sheeting for the groundwater/leachate collection trench was installed within the excavation for the groundwater collection pipe. The trench was excavated to the design depth using a standard trench box. The collection pipe was installed, bedded with filter sand, and covered with an additional 5 feet of on-site sand. The PVC sheetpiling was then driven to design depth through those sands, and the remainder of the trench depth was backfilled to design grade with more on-site sand.

The gas collection trench was installed, as specified, in the western slope adjacent to the landfill. The grades of that slope were modified by KCC activities prior to installation of the PVC sheeting. The revised grades are shown on the Record Drawing of the cutoff wall.

3.5 Groundwater Extraction Wells

3.5.1 Contract Modifications

The groundwater extraction wells were installed in accordance with the specifications; no change orders, variances or other changes were approved. Final well installation logs are included in Appendix A.

3.5.2 Construction

The outer protective casings for the monitoring wells were not driven or spun into place, but were installed by excavation. Deep holes with almost vertical sides were excavated by KCC to the bottom of waste. The protective casings were placed into the holes, and backfilled with the cuttings. Plumbness was checked regularly during backfilling. The monitoring wells were subsequently installed through the casings.

3.6 Pre-Engineered Building

3.6.1 Contract Modifications

The pre-engineered building was constructed in accordance with the Contract Documents and approved submittals. The approved submittals themselves detail the minor variations from the Contract Documents approved by URSG in wall panel and roof construction and other aspects of the building design.

3.6.2 Construction

The building foundation was poured in the winter of 1997 - 1998. Acceptable temperature for curing was maintained within a temporary structure erected over the foundation, and heated with portable heaters. High-low thermometers were checked daily to confirm that acceptable temperatures were maintained.

3.7 Final Cover

3.7.1 Contract Modifications

The final cover, including the gas vent layer, was constructed in close conformance with the Contract Documents. No substitutions, variances, or change orders were approved for that portion of the Contract.

3.7.2 Construction

Final cover components were placed, and seamed or compacted, in accordance with the methods specified in the Contract Documents.

3.7.3 CQA/CQC Testing and Results

In-place density testing was performed where required, on the gas vent sand layer and the barrier protection layer. All such testing met the specified criteria.

3.8 Buried Piping

3.8.1 Contract Modifications

Minor modifications were made to the alignment of some of the force-mains conveying groundwater/leachate and treated water, as was anticipated in the Contract Documents. The revised

alignments are shown on the Record Drawings. The Record Drawings also show the locations of the leak detection ports installed in the secondary containment piping of forcemains conveying untreated leachate. The leak detection ports were located by KCC at all low points in the alignment of those forcemains.

3.8.2 COA/COC Testing and Results

Pressure testing of the buried piping was performed by KCC in accordance with the specifications. All buried piping, including the outer, containment pipe, passed the testing.

3.9 Utilities

3.9.1 Electric and Telephone

Electric and telephone service to the pretreatment building was installed by Brunswick Electric via buried wires from Leavy Hollow Road.

3.9.2 Water

Water service to the pretreatment building was installed by KCC beneath the centerline of the perimeter access road. The original design specified that the waterline be installed along the right (generally south) side of the road. The modification was made to facilitate installation and to reduce crowding of the utility lines. The installed waterline was disinfected and tested in accordance with the specifications.

3.10 Other Items

3.10.1 Perimeter Access Road

The alignment of the perimeter access road was modified at the start of the project in order to simplify construction and to eliminate two culverts. The revised alignment is shown on the Record Drawings. This change was performed at no cost or credit to the project.

3.10.2 Stormwater Management System

With the following two exceptions, the stormwater management system, including the swales and downchutes on the cap, and the perimeter drainage channels, culverts, etc., was constructed in conformance with the Contract Documents:

- Two culverts were eliminated from the southwest portion of the perimeter drainage channel, as noted in the preceding paragraph
- The soil profile beneath the 33" x 49" corrugated metal pipe arch at the southeastern corner of the landfill was modified as shown on the Record Drawings.

3.10.3 Perimeter Fence

The proposed alignment of the perimeter fence was modified in several places, as shown on the Record Drawings, for ease of construction and to reduce the quantity of materials required. Additionally, the fence design was modified to include a top rail and bottom tension wire.

3.11 Wetland Expansion Areas

3.11.1 Construction

The wetland expansion areas were constructed in accordance with the Contract Documents and as required by US Army Corps of Engineers (USACE) Permit No. 95-05610 to provide compensatory mitigation for the filling of the pre-existing wetlands. A copy of the permit is contained in Appendix B. No modifications to the approved plans or specifications were made after award of the Contract. Piezometers and permanently-marked photo stations, required by the permit to document the effectiveness of the mitigation measures, have not yet been installed. Upon their installation, the "Compliance Certification and Report Form" attached to the permit must be filled out and returned to the USACE.

3.11.2 CQA/CQC Testing and Results

No CQA/CQC testing was required for the construction of the wetland expansion areas, though periodic monitoring of the new wetlands will be performed to document the effectiveness of the mitigation, to identify problems, and to recommend any necessary remedial measures. Post-construction survey by KCC determined that the total area of the wetland expansion areas was greater than the minimum mitigation area of 1.9 acres required by the permit.

3.12 Confirmatory Sampling

No unanticipated buried drums or other such wastes were encountered or moved during remedial construction, so no confirmatory sampling was required or performed.

3.13 Final Change Orders

Final change orders have been negotiated for the electrical and the general contracts, as summarized below.

Electrical Contract

The new contract price for the electrical contract is \$202,135.86, which is \$6,197.86 less than the original contract price. Changes for this contract include the following items:

- A single main conduit was used for a portion of the extraction well wiring, in place of three separate conduits (\$568.00 credit).
- The cost for power installation by Niagara Mohawk was less than anticipated (\$16,192.00 credit).
- A larger drive unit in the effluent sump power panel (\$1,547.00 increase).
- Fans and louvers in the extraction wells and collection sump panel boxes (\$2,151.00 increase).
- A 9-Kw generator, single-phase heater, and transfer switch in the pretreatment building (\$6,197.86 increase).
- An increase in contract time of 157 days.

General Contract

The new contract price for the general contract is \$6,426,434.66, which is \$124,240.34 less than the original contract price. Changes for this contract include the following items:

- The subbase stabilization fabric between the structural fill berm and the aggregate roadway in the berm areas of the CWTS cells was deemed unnecessary by the Engineer and eliminated (\$2,626.50 credit).
- A PVC sheet pile cutoff wall was substituted for steel sheeting (\$79,256.11 credit).