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March 25, 1991

Mr. James Drumm, Project Manager
New York State Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233-7010

RE: PRP Oversight Contract
Charles Gibson Site
W.A No. D002237-2
Final Remediation Summary Report

Dear Mr. Drumm:

Rizzo Associates Engineering, P.C. is pleased to submit this revised Final Remediation Summary Report for the Charles Gibson Site (also referred to as the Pine and Tuscarora Site) in Niagara Falls, New York. The report summarizes the remediation controls implemented at the Site by the PRP (Olin Chemicals), their engineer (Woodward-Clyde), and their contractors (IT Corporation and Sevenson), during the period that oversight was provided by Rizzo Associates and our subcontractor, Larsen Engineers. Also, this report incorporates comments from your office outlined in letters to Rizzo Associates, dated December 17, 1990 and January 9, 1991.

Please contact us should you have any questions after reviewing the report. It has been a pleasure providing these services to you.

Very truly yours,

Michael J. Hudson
Senior Project Geologist

Richard J. Hughto, Ph.D., P.E.
Project Manager

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1.0 INTRODUCTION

Rizzo Associates Engineering, P.C. (Rizzo Associates) was contracted by the New York State Department of Environmental Conservation (NYSDEC) to oversee the remediation at the Pine and Tuscarora Site in Niagara Falls (the Site) being conducted by the Potentially Responsible Party (PRP), Olin Chemicals, under Work Assignment Number D002237-2. The Site is also commonly referred to as the Charles Gibson Site.

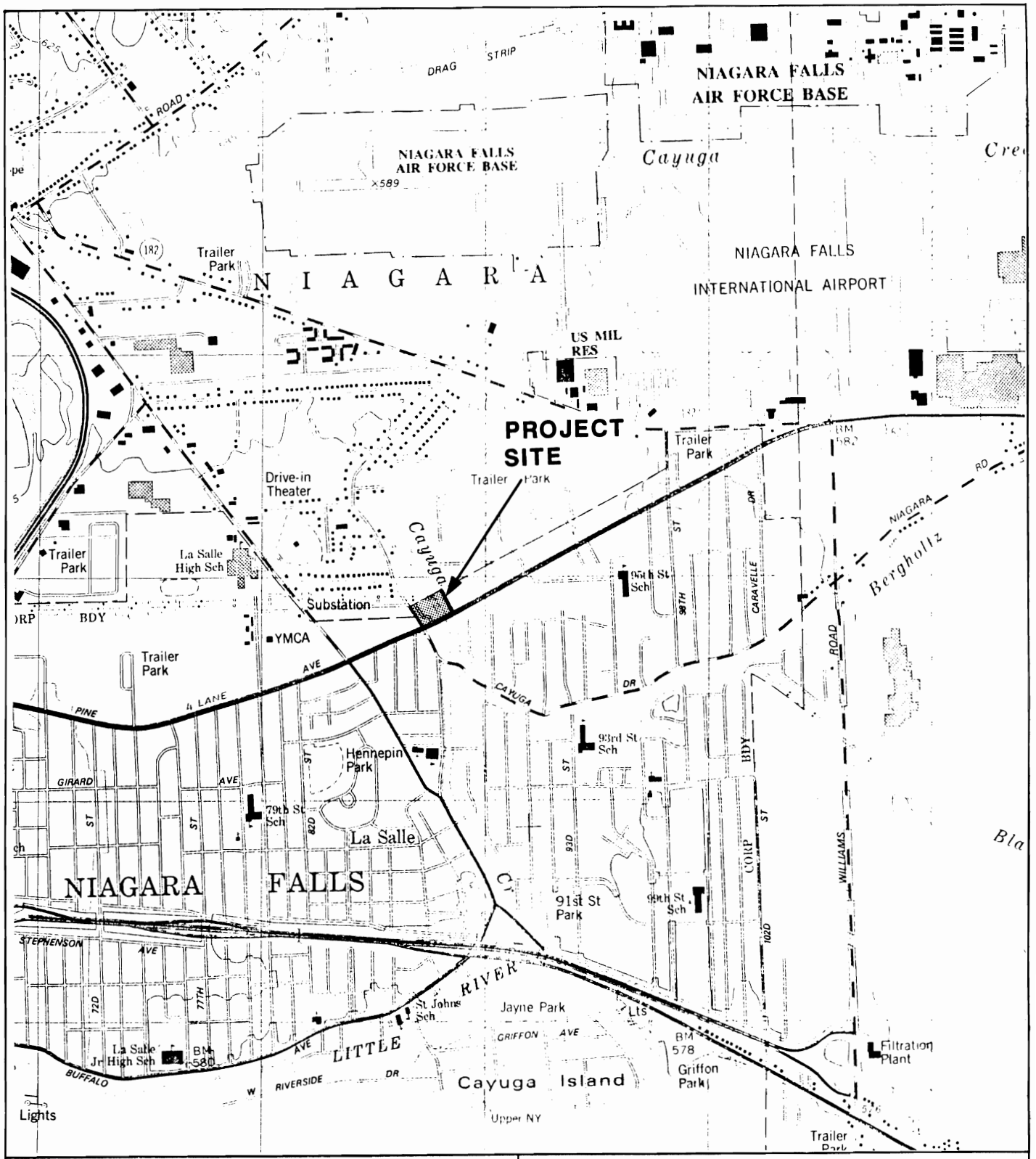
The key project oversight staff included the following:

- Anthony Andronico and James Decoulos, Rizzo Associates - Site Management and NYSDEC coordination
- Rex Griffith, Larsen Engineers - Field Oversight
- James Collins, James Collins & Associates - Consulting on Slurry Wall Problems

In addition to the field oversight by Mr. Griffith, coordination of field staff, NYSDEC liaison, and quality control were performed by the Rizzo Associates management staff. This Report summarizes the remediation controls implemented at the Site and the problems that were encountered by the PRP and his Contractor during those activities while Rizzo Associates' staff were present on the Site.

The Charles Gibson Site is located in a commercial/residential area of Niagara Falls, New York. The Site is bounded to the north and east by Cayuga Creek, to the south by Niagara Falls Boulevard and to the west by Tuscarora Road. An eighty foot wide Niagara Mohawk Power (NMP) easement, running east to west, divides the Site. Olin Chemicals owns the land north of the NMP easement and private landowners occupy the land south of the easement. The entire Site, including the NMP easement, consists of approximately four acres. A locus map of the Site area can be found on Figure 1. A general Site plan is shown on Figure 2.

Approximately 438 drums of hexachlorobenzene (HCB) were buried at the Gibson Site in 1957. These drums were buried in the northeast portion of the Site as depicted on Figure 2. The drums were covered with an estimated 1,010 tons of hexachlorocyclohexane (BHC) isomers cake consisting primarily of the alpha and beta isomers. The tops of the drums were reported to be three to five feet below ground surface.



Base Map: USGS Topographic Map
Tonawanda, New York Quadrangle

0 2000
Scale In Feet

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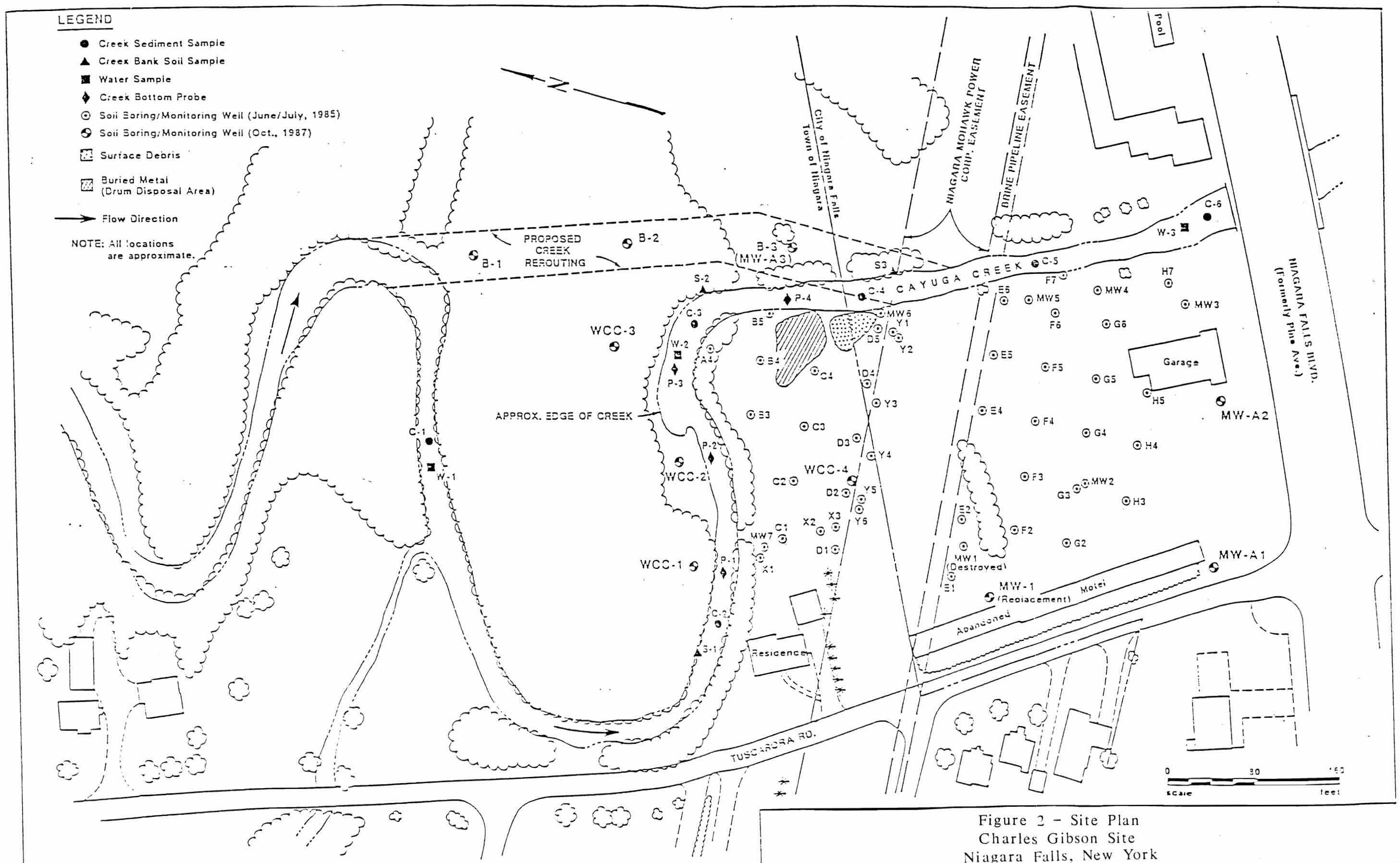
Figure 1:

Locus Map



REFERENCE: Topographic Map, McIntosh & McIntosh, P.C., June, 1987.

Figure 2 – Site Plan
Charles Gibson Site
Niagara Falls, New York

Base Map: "Site Plan – Gibson Site, Niagara Falls, New York," Harding Lawson Associates

2.0 CONSTRUCTION ACTIVITIES FOR 1989

2.1 PROJECT EXECUTION PLAN

The original plans for 1989 were revised in June 1989 to address concerns expressed by the NYSDEC. The NYSDEC requested the PRP to bifurcate the project schedule to fast-track the project. Creek diversion and drainage system installation were to be completed in 1989.

A Phase I execution schedule was developed for activities through the end of 1989. This detailed schedule was devised during a kick-off meeting held on September 6, 1989. Eleven tasks were identified for completion by the end of the year.

2.2 PROJECT VARIATIONS

On December 1, 1989, G. Blaine Butaud, Senior Environmental Project Specialist with the Olin Corporation, submitted a letter to Mr. James Van Hoesen of the NYSDEC detailing deviations that occurred from the original Phase I execution schedule. The deviations resulted from a combination of permitting delays, property right-of-way acquisition delays, labor disputes, severe natural weather complications (rain), pump reliability problems, and inadequate preparation by the Contractor, IT Corporation. The letter informed Mr. Van Hoesen that construction activities for the 1989 construction season had been suspended. This was previously agreed upon by all parties after a meeting on November 8, 1989.

The pump reliability problems could have been avoided if pumps with adequate capacity had been specified. Stream flow data for Cayuga Creek were readily available to Olin Chemicals and the pumps should have been specified as such. A back-up pump would have also avoided delays.

Advance weather conditions during the fall of 1989 should have also been anticipated by Olin Chemicals and its contractor. Several weeks of fair weather was encountered after work had been suspended for the season at the Site.

Several other general construction management practices were not utilized to avoid delays. A lack of communication for design changes caused delays. The Right-of-Way access agreement could have been started during the design phase to avoid scheduling conflicts. Also, diesel powered generators and cellular phones could have minimized on-site utility problems.

Olin Chemicals had soil borings for the proposed creek bed. Officials from the NYSDEC warned Olin of the type of clay that would be encountered during excavation. Construction activities could have been planned to avoid delays involving this wet clay.

A list of tasks that were originally scheduled during the September 6 meeting and tasks actually completed for the year appears in Table 1.

TABLE 1

1989 PROJECT EXECUTION PLAN SCHEDULE

	Activity	Scheduled Completion	Actual Completion
1.	Kick off meeting	9/6/89	9/6/89
2.	Mobilization Site set-up	9/6/89	9/21/89
3.	Install temporary fence	9/15/89	9/22/89
4.	Cleaning & Grubbing	9/18/89	10/6/89
5.	Install creek diversion system	9/26/89	10/12/89
6.	Clean/Stabilize creek bottom	10/4/89	
7.	Install drainage pipe/manholes	10/6/89	
8.	Excavate new creek/fill old creek	10/11/89	
9.	Install fabric/rip-rap new creek	10/20/89	
10.	Remove diversion system	10/25/89	
11.	Demobilize	10/27/89	

3.0 CONSTRUCTION ACTIVITIES DURING 1990

3.1 PROJECT EXECUTION PLAN

The plans for 1990 were developed during the November 8, 1989 meeting. The execution schedule was much more conservative and comprehensive than the 1989 plan. It allowed seven months to complete the remediation project with the creek diversion taking place at the beginning of the summer. The plan also called for closer correspondence and review by the NYSDEC. Three assumptions were made for the 1990 execution plan:

1. The NYSDEC would approve any design changes for separation between the existing creek and the new creek channel.

2. The NYSDEC would allow additional staging areas for excavated materials.

3. Diversion of the old creek to the new channel could be performed prior to the July 1 start date stipulated by the New York State Department of Fish and Wildlife in 1989 meetings.

A list of scheduled tasks from the 1990 execution plan is in Table 2.

TABLE 2

1990 ORIGINAL EXECUTION PLAN SCHEDULE

	Activity	Scheduled Date
1.	Conceptual design submittal to NYSDEC	1/12/90
2.	Response from NYSDEC on conceptual design	2/12/90
3.	Design changes resolved	3/2/90
4.	Design documents finalized	3/16/90
5.	Final design package submitted to NYSDEC	3/16/90
6.	Final approval granted from NYSDEC	3/20/90
7.	Site mobilization	4/2/90
8.	New creek channel construction begins	4/30/90
9.	Creek diverted to new channel	6/4/90
10.	Project completion; contractor demobilizes	11/16/90

3.2 PROJECT VARIATIONS

Due to a prolonged review process, the Site mobilization did not begin until April 16. All other activities were subsequently delayed as well. Olin provided a revised 1990 execution schedule on April 19 to more accurately reflect the probable site conditions (Table 3).

On-site activities for the end of April and the month of May proceeded smoothly and efficiently. Work zones were delineated; the diversion of Cayuga Creek was completed; geotextile fabric was laid on the new creek side slopes; and rip-rap was placed on top of the fabric. On May 10 the creek was diverted to the new location.

The installation of the drainage system then began at the top of the existing north and east slopes within the old pathway of the creek. Two manholes were installed on May 15, and the drainage system was completed shortly thereafter.

Olin Chemicals had water from manholes "A" and "B" tested for BHC. After the water had passed EP Toxicity, Olin discharged the water to the sanitary sewer. This procedure was repeated later by Olin. Because BHC was detected, NYSDEC considered this water hazardous (derivative rule). The Niagara Falls Publicly Owned Treatment Works (POTW) accepted this water and reported no upsets.

TABLE 3

1990 ACTUAL PROJECT SCHEDULE AND COMPLETION DATES

Activity		Start Date	Completion Date
1.	Mobilization	4/16/90	4/25/90
2.	Construction of new creek channel	4/25/90	5/10/90
3.	Initial cap construction	4/30/90	5/08/90
4.	Install drainage system and fill existing creek channel	5/11/90	5/21/90
5.	Slurry wall construction	6/04/90	6/06/90
6.	Cap, liner, and piezometers installed	6/11/90	9/21/90
7.	Slope failure shutdown	6/18/90	9/04/90
8.	Top soil, seeding, and landscaping	10/02/90	11/15/90
9.	Larsen leaves Site	9/28/90	
10.	Fence	10/11/90	10/24/90
11.	Demobilize	10/02/90	10/22/90

The slurry wall construction proceeded on the northwestern portion of the Site on June 4. The construction progressed southerly along the western border with no problems observed. The slurry wall was completed on June 6.

Geotextile and rip-rap were then completely placed along the embankments of the outer side of the slurry wall. Following that placement, six piezometers were drilled on June 11 and 12 by Empire Soils.

The next activity was the installation of the clay cap. It was closely monitored for proper compaction and was continually kept wet during the installation to prevent desiccation from the high temperatures. This task was completed on June 15.

On June 18, Rex D. Griffith, Field Engineer for Larsen Engineers, measured an average settlement of 3.5 inches along 150 feet of the northwestern portion of the slurry wall. Four readings were taken, and NYSDEC was informed of the slurry settlement on June 19.

The installation of the HDPE cap then began, and the work crews were instructed to remain 20 feet southeast of the slurry wall until the cause of the slight slurry wall settlement was understood. With the exception of the portion nearest the slurry wall, the liner installation was completed on June 26. On that day, the placement of the

structural fill on top of the HDPE liner was initiated.

On June 27, Mr. Griffith noted that the slurry wall had moved approximately three feet north. To relieve pressure on the north side of the slurry wall, material was excavated and removed.

The movement of the slurry wall was a serious setback that warranted quick response. A meeting took place the following day at the Site to discuss the repair of the wall. Representatives from NYSDEC, Rizzo Associates, Olin, Sevenson (the PRP Contractor), and Woodward-Clyde (the PRP Engineer) were in attendance. Corrective actions were discussed, and as a result of discussions, Frank Waller of Woodward-Clyde announced that he would have a revised plan to stabilize the slurry wall by July 9.

Because of the critical nature of the slurry wall failure, all activities on-site were ceased for an indefinite period on July 3. Start up would not begin until the cause of failure was identified and corrected.

The original submittal by Woodward-Clyde for corrective actions on the failed slurry wall presented a number of assumptions that were not agreed upon by either Jeffrey Mirarchi, NYSDEC, or Rizzo Associates' geotechnical subconsultant, James P. Collins. Two specific components of the analysis that were in disagreement were the selection of the failure surface of the side slope and the shear strength reduction factors. Woodward-Clyde resubmitted reconstruction guidelines for the failed slurry wall that addressed the concerns of Mr. Mirarchi and Mr. Collins.

By the third week of August, the slurry wall reconstruction guidelines were approved by NYSDEC, and the Contractor began remobilizing field equipment to complete the assignment.

Field work resumed on September 4. Specific measures to correct the slurry wall settlement problem were implemented, including the placement of ground stabilization fabrics and geogrids on the side slopes, steel decking and an eight-inch reinforced concrete slab over the slurry wall, and increased use of 80-mil geomembranes to provide further stabilization of the side slopes. NYSDEC personnel conducted follow-up inspections of the slurry wall area.

After the corrective actions taken for the slurry wall settlement, the HDPE liner placed on top of the Site was completely sealed. All of the HDPE geomembrane liners, geogrids, and soil stabilization fabrics were fully in place on September 21.

The structural fill was then placed on top of the synthetic cap on September 24. This work, along with the positioning of the rip-rap along the embankments, was completed on September 28. At this point, NYSDEC concluded that Rizzo Associates' oversight activities were no longer required.

4.0 SUMMARY

Rizzo Associates Engineering, P.C.'s role in providing oversight of the remediation of the Pine and Tuscarora Site in Niagara Falls by Olin Chemical, the PRP, is complete. We did not observe any deviation from the original or modified plans and specifications during completion of the closure and capping process.

Problems relating to ambitious schedules and adverse weather conditions delayed the construction activities during 1989. Unexpected subsurface conditions accelerated the difficulties.

Early 1990 activities proceeded smoothly as a result of lessons learned from the previous year. In the middle of June 1990, slope stability problems relating to the support of the slurry wall on the northwestern border of the Site delayed the Project over eight weeks. The final reconstruction procedures to resolve the problem were a result of extensive geotechnical analysis.

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