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December 22, 1993
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Ms. Ann K. Masse, Ph.D.
E.I. du Pont de Nemours and Company, Inc.
26th Street and Buffalo Avenue
Niagara Falls, New York 14302

Mr. James Brown
Olin Corporation
1186 Lower River Road
Charleston, Tennessee 37310

Subject: Gill Creek Remediation Project - Final Report

Dear Dr. Masse and Mr. Brown:

Please find attached a draft of the Gill Creek Remediation Project - Final Report. Please note that we have structured this report so that the actual documents constituting Appendix A (the "Final Approved Plan") are in a separate volume.

Please advise if you have additional comments or questions. We appreciate this opportunity to be of service to DuPont and Olin.

Very truly yours,

Martin S. Leonard, P.E.
Senior Project Engineer

James F. Roetzer, Ph.D.
Senior Associate

MSL/JFR:jee

VOLUME 1 - MAIN REPORT

■ ■ ■ ■ ■ ■

GILL CREEK REMEDIATION PROJECT FINAL REPORT

Prepared for:
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26th Street and Buffalo Avenue
Niagara Falls, New York 14302

and

Olin Corporation
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December 1993

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Project Number 92C2255-6

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1.0
INTRODUCTION

E.I. du Pont de Nemours and Company (DuPont) and Olin Corporation (Olin) undertook the remediation of contaminated sediments in Gill Creek. In accordance with the terms of Order on Consent No. B9-0206-90-01 (March 20, 1991), DuPont and Olin agreed to cooperate with the New York State Department of Environmental Conservation (NYSDEC) in implementing the remediation program described in the Gill Creek Plans and Specifications, (WCC, April 1992). DuPont and Olin have prepared this Final Report documenting the Gill Creek remediation activities.

The project site is located southeast of the City of Niagara Falls, New York. Gill Creek flows adjacent to and through the adjoining properties of DuPont and Olin before discharging into the Niagara River (Figure 1-1).

1.1 OBJECTIVE

The goals of the remediation as stated in the Proposed Remedial Action Plan (PRAP) were to:

- Minimize the potential for both short- and long-term human exposure to chemicals in the creek sediments.

- Reduce to the maximum extent practicable, the release of chemicals to the aquatic environment by removing sediments in the creek, therefore restoring the affected area to a productive aquatic environment.

- Minimize and/or stop the potential for migration of chemicals/sediments to the Niagara River.

- Permanently treat and/or dispose of sediments in a manner consistent with all state and federal regulations.

- Restore the site to a condition allowing productive use in accordance with local zoning laws and with minimal site restrictions or institutional controls.

1.2 REMEDIATION AREA

In the section of Gill Creek passing through and adjacent to the DuPont and Olin plants, three sediment contamination areas were delineated. Area 1 is between the Niagara River and the north side of Staub Road; the northern end of Area 1 corresponds to the edge of the clay layer placed over the creek bottom after the 1981 remediation of the creek. Area 2 is divided into Area 2 upstream (2U), covering the area between Adams Avenue and Buffalo Avenue, and Area 2 downstream (2D), covering the area north of the Staub Road bridge to 40 feet to the south of the Adams Avenue bridge. Area 3 is located below and 40 feet south of Adams Avenue (see Figure 1-2).

1.3 REMEDY DESCRIPTION

The project involved constructing a series of temporary diversion structures from north of Buffalo Avenue to the mouth of Gill Creek and temporarily diverting the creek flow into the Buffalo Avenue Diversion Sewer. Non-contact cooling water from the Niachlor operation, a joint venture between DuPont and Olin, flows into the creek adding approximately 67 cfs south of Adams Avenue. This discharge was relocated to the Niagara River for the duration of the project.

The contaminated sediments were removed by vacuum dredging, mechanical excavation, and high pressure water sprays. Liquids draining from the sediments were treated on-site and then discharged to the Niagara Falls Publicly Owned Treatment Works (POTW). A temporary water treatment system (WTS) was constructed to treat all remediation waters. The WTS included activated carbon filtration systems, sand filters, lamella clarifiers, filter presses, and air strippers.

The excavated sediments were transported from within DuPont/Olin property via trucks to a RCRA and TSCA permitted landfill for disposal, with the exception of a small volume of sediment from Area 3 which exhibited the hazardous waste characteristic of EP Toxicity for gamma-BHC. These sediments were disposed off-site in a RCRA/TSCA permitted incinerator. After the sediment removal was completed, the creekbed was restored to approximately its pre-remediation conditions. The diversion structures were removed and the creek flow restored. The activities started in July and were completed by December 17, 1992.

The remediation included Areas 1, 2D, and 3 as shown in Figure 1-2. The sediments in Areas 1 and 3 were mechanically excavated after the creek had been diverted and the remaining creek water removed. A thin layer of sediments in Area 2D was hydraulically removed by a combination of water spray and vacuum dredging techniques (vacuum truck). Inflow water into the creek during the remediation was treated at the on-site treatment plant and discharged to the POTW.

1.4 SCHEDULE

Remediation activities began in July 1992 with the construction of the cofferdam in the Niagara River. Completion of the cofferdam and diversion of the creek water occurred approximately 1 month after initial construction activities (August 1992). The sediment removal was accomplished from September through October 1992. Removal of the diversion structures and restoration of creek flow was completed by December 17, 1992.

1.5 FINAL APPROVED PLAN

The Gill Creek remediation project was completed in accordance with the "Final Approved Plan", which consisted of the construction plans and specifications, as well as numerous supporting documents, including correspondence between DuPont/Olin and various public entities. A complete listing of the documents comprising the final approved plan is provided in Appendix A. Copies of the documents, with the exception of the construction plans and specifications, are included in Volume 2 of this report.

2.0 DIVERSION STRUCTURES AND OUTFALL RELOCATION

2.1 GENERAL

Five temporary diversion structures were constructed to divert Gill Creek and Niagara River flows from the remediation area and to manage water-handling operations during the remediation of Gill Creek (Figure 2-1). Several additional sandbag diversion structures were also constructed with the prior approval of the NYSDEC to further isolate work areas and facilitate water management (September 29, 1992 letter from L.A. Warner to M.J. Hinton, included in Appendix A).

At the time of the remediation project, two DuPont SPDES outfalls (006 and 007) discharged non-contact cooling water from the Niachlor area directly into Gill Creek. These outfalls were temporarily removed from Gill Creek to facilitate the Gill Creek remediation project. To accomplish this, a permanent 36-inch diameter carbon steel pipe was installed along the west side of Gill Creek on DuPont property, and then under the Robert Moses Parkway (RMP) in a 42-inch secondary containment casing, terminating at the south side of the RMP. From the termination point of the steel pipe, a temporary outfall structure consisting of a 36-inch high density polyethylene (HDPE) pipe was constructed to a temporary discharge point beyond the west side of the Niagara River cofferdam, downstream of the mouth of Gill Creek. At the completion of the remediation project, the SPDES discharges were returned to Gill Creek, and the temporary HDPE pipe was removed. A permanent outfall was later constructed to permanently relocate the discharges to the river.

A storm water runoff discharge, located within the median of the Robert Moses Parkway (RMP), discharges into the creek beneath the RMP bridge. This discharge was collected and conveyed to the Niagara River outside the cofferdam.

Diversion Structure No. 1, located upstream of Buffalo Avenue, diverted Gill Creek flows to the Buffalo Avenue Diversion Sewer, through an inlet structure located approximately 400 feet upstream of Buffalo Avenue. Diversion Structure No. 2, (the cofferdam), located in the Niagara River at the mouth of Gill Creek, separated the Niagara River from the Gill Creek channel. Diversion Structures No. 3, 3A, and 4, separated the construction areas and prevented the migration of contaminated sediments and water from one area to another. Final engineering drawings were included in the Construction Certification Package submitted to the NYSDEC on March 17, 1993.

2.2 DIVERSION STRUCTURE NO. 1

Diversion Structure No. 1 was located immediately upstream of Buffalo Avenue in the vicinity of two existing concrete bridge abutments. The structure was approximately 4 feet high with a nominal 4-foot-wide crest at elevation 564.0 feet (Edward Dean Adams Station Datum).

Diversion Structure No. 1 was constructed of sandbags filled with granular materials placed to form an embankment with side slope of 1:1 (horizontal to vertical) and a nominal 4-foot crest width. The diversion structure was encased within 36 mil Hypalon industrial grade liner material to reduce the risk of contamination by contact with remediation water contained in the creekbed. Construction proceeded in a manner which minimized disturbance of the materials located on the existing creek banks.

One layer of sandbags (approximately 8 inches high) was added to Diversion Structure No. 1 during a rain event in September, and removed upon storm subsidence.

2.3 COFFERDAM (DIVERSION STRUCTURE NO. 2)

Several alternative cofferdam technologies to exclude the Niagara River from the Gill Creek channel were presented in the Gill Creek Remediation Plans and Specifications (P&S). The P&S specified an earthfill/rockfill dam as the preferred alternative. However, after further consideration, a cellular sheet-pile cofferdam with a grout curtain was selected and constructed. The advantages of the cellular cofferdam include reduced suspended solids release to the river during installation and removal; lower volume of materials needed for construction (approximately 4,000 cubic yards versus 13,000 cubic yards for the rockfill design); reduced risk of cofferdam material contamination during sediment removal; faster drawdown of water in Gill Creek; and shorter cofferdam construction schedule. All necessary permits were modified to reflect this deviation from the P&S.

A diagram of the 10-celled cofferdam is shown in Figure 2-2. The crest of the dam was about 2 feet above the ordinary high water (OHW) level of the Niagara River. As-built elevations at various cells on the dam were as follows:

Cofferdam Cell Number	As-Built Elevations (feet)
2	564.9
4	563.1
6	563.0
9	565.1
sand bag crest	565.5

Construction of the cofferdam started at the bank of the Niagara River just east of Gill Creek. Construction of the cells at each end of the cofferdam involved the placement of sheet piling into the banks. A template was set up for each cell of the cofferdam which allowed the sheet piles to be connected as a self-standing cylinder. The cellular cofferdam extended into the bank of the Niagara River. Sheet pile walls were constructed along the bank of the Niagara to minimize the infiltration of groundwater into the remediation area. The sheet pile walls extended from the outer edge of the cofferdam to the wing-walls of the Robert Moses Parkway (RMP). Boreholes were drilled in the upper 30 feet of bedrock adjacent to the sheet pile wall and were used to grout the upper bedrock, in an effort to reduce infiltration.

The cofferdam cells were filled with clean earthfill consisting of clayey sands and gravels with approximately 20 percent fines (percent passing No. 200 sieve) and maximum size of 3 inches. The crest of the cofferdam was capped with 6-inches of concrete.

The interior of the creekside face of the cellular cofferdam was lined with a geomembrane to protect the earthfill inside the sheet piling from contamination due to the remediation activities and also to divert any seepage to a drain at the toe, referred to as the toe-drain, of the cofferdam (see Figure 2-3). The liner was anchored at the dam crest and weighted down with gravel-filled bags at the bottom, to prevent movement during cell filling.

Both the creek and river side of the cofferdam were inspected by a diver to verify the integrity of the sheet piling installations. The river side inspection revealed that 6 to 8 sheets had not been driven completely to the river bottom. Divers placed bentonite bags in the voids to minimize loss of cell fill and to close the gap. Periodic inspections to monitor this repair verified that it was effective. Bedrock was grouted to form a seepage barrier below the cofferdam by drilling and grouting through pipes attached to the sheet piles on the interior (Gill Creek) side of the cells.

A toe drain system was installed to collect infiltrating river water before it reached the remediation area. The toe drain system consisted of a slotted 6-inch PVC pipe embedded in clean sands and gravels to collect seepage and route it to a sump from which it was pumped back to the Niagara River. An unexpected upwelling from the riverbed resulted in more inflowing river water than was anticipated. It was not believed that additional grouting would be adequate to reduce the inflows to a more manageable level. As a result, the toe drain was extended to intercept the upwelling and return the upwelling water to the river along with the rest of the toe drain water, with prior approval from NYSDEC (Figure 2-3). This deviation from the P&S was detailed in correspondence dated September 30, 1992 from L.A. Warner to M.J. Hinton (see Appendix A).

A spillway section was constructed in the center portion of the cofferdam (cells 4, 5, 6, and 7) to pass any stormwaters from Gill Creek that might exceed the upstream creek diversion capacity. The crest of the spillway was at elevation 563.0 feet. A sandbag structure was placed along the crest to an elevation of 565.5 feet to minimize overtopping from the Niagara River. The P&S called for the removal of the sandbags in the event of an overflow from the creekside; no such overtopping event occurred. On November 12, 1992, wave action in the Niagara River caused substantial flow over the cofferdam and filled the creek.

A 50-foot-wide emergency breach section at the west end of the cofferdam was provided to increase flood handling capacity. The breach section was designed to be at elevation 561.0 feet and would have required underwater cutting of the sheet piling. As a result, an increase of the cutoff elevation to 562.0 feet was approved by NYSDEC, to allow cutting piles above water if done when river levels were lowest. This higher breach elevation increased the predicted flood water elevations by less than 0.5 feet at the RMP, and less than 0.1 foot in areas north of Buffalo Avenue.

2.4 DIVERSION STRUCTURES NO. 3, 3A, AND 4

Diversion Structures No. 3, 3A, and 4 were constructed in a similar manner to Diversion Structure No. 1. These structures consisted of sandbag dikes enclosed within 36 mil Hypalon impermeable liner material.

The as-built crest elevations of Diversion Structures 3 and 4 were 562.9 feet; the crest elevation of Diversion Structure 3A was 562.7 feet.

Verbal permission was granted from the NYSDEC on September 16, 1992 to add an additional diversion structure downstream of Diversion Structure No. 4 to hold Area 1 water downstream and to facilitate the installation of the creek access ramp from the sediment staging pad. NYSDEC allowed the installation of two small diversion structures on either side of Diversion Structure No. 3A as well.

2.5 NIACHLOR OUTFALL RELOCATION

To facilitate remediation activities, two DuPont SPDES outfalls (006 and 007), discharging to Gill Creek, were temporarily rerouted to the Niagara River. Water Quality Certification obtained for the Gill Creek Remediation Project encompassed this activity. A significant portion of the installations necessary to relocate these outfalls was designed to be permanent in anticipation of future relocation of these discharges to the Niagara River.

A permanent 36-inch diameter carbon steel pipe was installed along the west side of Gill Creek on DuPont property, extending under the Robert Moses Parkway (RMP) in a 42-inch secondary containment casing, terminating at the south side of the RMP. The end of the pipe was designed so that either a blind flange or an extension could be installed easily.

From the termination of the permanent carbon steel pipe, a temporary section of the discharge line was installed. This section consisted of a 36-inch HDPE pipe running parallel to the Niagara River. The temporary piping extended to a temporary discharge location 180 feet to the west of the mouth of Gill Creek.

Non-contact cooling water discharges to Gill Creek were re-routed to the Niagara River through this temporary outfall during the week of August 10, 1992. The flows were returned to their permitted discharge points in Gill Creek and the temporary piping removed during the week of November 30, 1992.

Stormwater outfalls under the Robert Moses Parkway and in the DuPont plant were also relocated, as discussed in Section 4.5.

3.0
MANAGEMENT OF UPSTREAM WATERSHED

3.1 CREEK DIVERSION PLAN

Gill Creek waters north of the Buffalo Avenue Bridge were managed under written agreement with the City of Niagara Falls and in consultation with the New York Power Authority (NYPA). Specific provisions of the management plan included:

- Diverting normal creek flows through an existing sewer inlet to the Buffalo Avenue Diversion Sewer and away from the downstream project areas. This activity was monitored and controlled to ensure that the diversion sewer capacity was not exceeded. The Diversion Sewer was closed to creek flows during the week of November 23, 1992, returning normal creek flow to Gill Creek.

- Drawing down and maintaining the level of Hyde Park Lake 2 feet below the height of the Hyde Park Lake Spillway. The drawdown provided additional storage capacity for the accumulation of runoff from the Hyde Park Lake watershed.

- Reducing baseflow of Gill Creek. NYPA maintains the baseflow of Gill Creek through controlled discharge from the NYPA reservoir. Because of the higher than normal precipitation during the summer of 1992, no water was discharged from the reservoir to Gill Creek.

3.2 FLOOD CONTROL

It was predicted during the design phase of the project that the installation of the various diversion structures in Gill Creek could increase flood heights in the upstream watershed in the event of a flood. A Floodplain Management Plan to mitigate the impact of flooding was developed and submitted to the City of Niagara Falls as part of the Flood Plain Development Permit. All conditions of the permit were met (Reference letter dated November 9, 1992 from F. Schieppati to A.K. Masse included the final authorized Floodplain Development Permit Application and Certificate of Compliance, (see Appendix A).

DuPont and Olin received permission from the Power Authority to allow one additional foot of elevation above normal flood stage north of Buffalo Avenue. The City of Niagara Falls approved the construction in the Floodplain Development Permit. Approvals were also received from the NYSDEC and COE. A public notice to property owners was placed in the local newspaper (The Niagara Gazette) September 1 and 2, 1992. No calls or questions were received.

No significant storm events which resulted in flooding occurred. However, there were a few rain events which resulted in the overtopping of remediation project diversion structures. These events are described in Section 4.4.

4.0 WATER MANAGEMENT

4.1 GENERAL

The various water inflows that were managed during the remediation activities are identified as follows:

- Area 2U water.
- Initial pumpdown water - initial creek water contained between Diversion Structures No. 1 and No. 2.
- Stormwater which overtopped diversion structures (except Area 3).
- Surface water run-off and direct precipitation (RMP area).
- Remediation water - inflows to creekbed after initial pumpdown water has been removed including:
    - Groundwater infiltration
    - Water draining from excavated sediments
    - Seepage through diversion structures
    - Decontamination water
    - Surface water run-off and direct precipitation (plant area).
    - Stormwater which overtopped diversion structures into Area 3.

The management of each water type is described in this section.

4.2 AREA 2U WATER

Area 2U is between Buffalo Avenue and Adams Avenue. This area was remediated by Olin in 1981 and was not subject to further remediation activities under this order.

Existing creek water and water entering Area 2U were not considered remediation water, and thus were managed by pumping directly to the Niagara River.

4.3 INITIAL PUMPDOWN WATER

Existing creekwater trapped in the creekbed between Diversion Structures No. 1 and No. 2 was pumped down in phases to expedite remedial activities. The phased drawdown of the existing creekwater was approved by the NYSDEC.

Area 3 was isolated for dewatering by installing two temporary sandbag diversion structures, one upstream of the proposed location of Diversion Structure 3A, and one downstream of the proposed location of Diversion Structure 3. The water between these structures was pumped to the Gill Creek Water Treatment System (WTS) where it was treated.

Creek water south (downstream) of Area 3 was managed by pumping to the Niagara River to a level 4 to 6 inches above the creekbed at the mouth. The Gill Creek Sampling and Analysis Plan (SAP) (Appendix C) required that the initial pumpdown water discharged to the river be monitored every 20 minutes for turbidity. Discharge of water to the Niagara River ceased when a turbidity of 16.5 NTU or greater (modification to SAP) was measured, at which time the water was managed by pumping to a central collection point in the creekbed of Area 1 before being pumped to the WTS. The collection point was initially a 500 gallon polyethylene tank under Staub Road bridge. A compartmentalized rolloff box was installed later to help with sediment control.

NYSDEC approved a modified pumping scheme in which the initial pumpdown water could be filtered through sand filters to further reduce the turbidity (see letter dated September 24, 1992 from L.A. Warner to M.J. Hinton). This helped to expedite creek pumpdown so that excavation activities could commence, and reduced the amount of water to be treated at the WTS. Water pumped to the Niagara River did not exceed the 16.5 NTU turbidity level. Sediments removed by the filter were disposed of along with the Area 1 and Area 2d sediments, as described in Section 6.

4.4 STORMWATER WHICH OVERTOPPED DIVERSION STRUCTURES

Stormwaters overtopped diversion structures on four occasions during the construction activities of the project. Heavy rains on September 18, September 21, and September 22, 1992 resulted in the overtopping of Diversion Structures 1, 3, 3A, and 4; Diversion Structure 2 (the cofferdam) was not overtopped during these rains, hence potentially contaminated flows were contained and either treated or pumped down following the stormwater plan. Contaminated water and sediments from Area 3 did not overtop into any other creekbed areas. Stormwater that accumulated in Area 2U (between Diversion Structure 1 and Diversion Structure 3A) was pumped to the Niagara River without turbidity measurements per the approved P&S. Water that accumulated in Area 3 was pumped to the WTS. Water that accumulated between Diversion Structure 3 and the cofferdam (Area 1 and 2D) was managed in the same manner as initial pumpdown water.

The overtopping of diversion structures was described to David Leemhuis (NYSDEC, Region 9) during an on-site inspection September 25, 1992; no further follow-up was requested.

Heavy rains on November 3, 1992 resulted in the overtopping of all diversion structures, except the cofferdam (Diversion Structure 2). Remediation and restoration activities in Area 2D were complete; therefore, the water was not removed from that area. In Area 1 sediment removal was complete and restoration activities had begun. Water was managed in Area 1 as needed by pumping to the Niagara River through the cofferdam toe-drain without turbidity measurements per the P&S.

Due to high southwesterly winds, wave action in the Niagara River overtopped the cofferdam into Area 1 on November 12, 1992. At this time, remediation activities were complete.

4.5 ON-SITE SURFACE WATER RUNOFF

Existing stormwater runoff swales to Gill Creek located on the DuPont Niagara plant site project area were not rerouted away from the creek as proposed in the P&S. Direct precipitation and runoff through these swales were managed along with other remediation water as appropriate.

Runoff from the Robert Moses Parkway was rerouted through an 18-inch pipe to the Niagara River to the east of the cofferdam. The discharge was returned to its normal configuration upon completion of the project.

4.6 REMEDIATION WATER

Remediation water consisted of the following inflows to the creekbed after the initial creek drawdown:

- Groundwater infiltration
- Water draining from sediments
- Infiltration through diversion structures
- Decontamination waters
- Stormwater which overtopped diversion structures into Area 3
- Surface water runoff from plant areas and direct precipitation

These inflows were treated at the WTS. The method used to manage the water from each remediation area is described below.

4.6.1 Area 3

4.6.1.1 Infiltration Through Diversion Structures 3 and 3A

A temporary sandbag diversion structure was installed north of Diversion Structure 3A to isolate Area 3 for initial pumpdown. The diversion structure was left in place throughout the project to reduce inflows of water from Area 2U into the Area 3 work area by isolating the inflows north of Diversion Structure 3A and pumping the water back upstream. This plan was relatively effective, but some water from 2U continued to infiltrate into Area 3.

To address the excess infiltration, a small trench (approximately 2 to 6 inches deep by

8 inches wide by 55 feet across) was installed immediately downstream of Diversion Structure 3A. The trench was separated from the Area 3 excavation work by a gravel and dirt berm. A 2-inch submersible pump, installed in the trench, pumped the infiltration water to the WTS for treatment.

On one occasion, the correct procedures for pumping the water in the trench were inadvertently not followed. On September 17, 1992, the discharge line from the pump was observed to be located north of the temporary sandbag structure upstream of Diversion Structure 3A. The water depth in the trench was 1 to 2 inches. It was estimated that the pump had been running for approximately 30 minutes.

The pump was not completely submersed, and therefore, was pumping less than 2 gpm. The volume of water discharged was conservatively estimated to be no more than 50 gallons. The source of the water in the trench was most likely from Area 2U. Details of this incident and corrective actions were documented in a letter dated September 29, 1992, from L.A. Warner to M.J. Hinton (see Appendix A).

4.6.1.2 Groundwater Infiltration

Groundwater was observed to be seeping into Area 3 in two locations, under the west bay of the Adams Avenue Bridge and along the west bank of the creek adjacent to the bridge. These waters were pumped directly to the WTS, until they were contained. Containment of the seeps is described in Section 7.1.

4.6.1.3 Water Draining From Sediments

In Area 3 excavated sediments were drained within the immediate remediation area. Water draining from these sediments was pumped to the WTS for treatment.

4.6.1.4 Decontamination Water

Once sediment excavation activities had been completed in Area 3, the bedrock was powerwashed with a high pressure water spray. The wash water was collected and pumped to the WTS for treatment. All equipment used in this area was brushed and then washed before leaving the Area. All wash waters were collected and pumped to the WTS.

4.6.2 Area 2D

Area 2D sediments were accumulated on the sediment staging pad with Area 1 sediments and allowed to drain to Area 1 where the drain water was collected and pumped to the WTS. All runoff and groundwater infiltration waters were pumped to the WTS for treatment.

There was significant groundwater infiltration through seeps in the banks and on the bed of the creek in Area 2D. The groundwater from these seeps was pumped to the water treatment plant until the seeps were contained. Details on the groundwater seeps and the methods used to contain the seepage are in Section 7.1.

4.6.3 Area 1

Infiltration from the Niagara River through Diversion Structure 2 was pumped back to the Niagara River through the toe-drain system described in Section 2.3. Approximately 600 gpm of Niagara River water was pumped through the toe-drain system. Infiltration through Diversion Structure 4 was not observed.

Remaining creekwater after initial drawdown, water draining from the sediments on the sediment staging pad, and precipitation and runoff into Area 1 was managed by pumping the waters to a central collection point located in the Area 1 creekbed before being pumped to the WTS for treatment.

Once sediment was removed, the bedrock was powerwashed with a high pressure water spray. This wash water was pumped to the WTS for treatment.

5.0 REMEDIATION WATER TREATMENT SYSTEM

5.1 INTRODUCTION

Remediation water managed via the Water Treatment System (WTS) consisted of the following:

- Water remaining above the sediments after drawdown
- Groundwater seepage along the creek banks and creekbed
- Direct precipitation within the creek and surface runoff from immediately adjacent areas
- Stormwater which overtopped the diversion structures (Area 3 only)
- Water draining from the sediments
- Seepage through the diversion structures

Additionally, for a brief period, water from on-site groundwater well PW-35 was introduced to evaluate the impact of increased PW-35 pumping rates on seeps observed on the west bank of Gill Creek within Area 2D. This test was conducted following approval by NYSDEC.

Daily flow of remediation waters to the WTS averaged approximately 220,000 gallons, and peaked at approximately 302,000 gallons. On several occasions, operation of the WTS was ceased due to lack of remediation water in the creek or low flow conditions. In all, approximately 11.3 million gallons of contaminated water were successfully treated and discharged within outfall 023 pollutant limits between September 17, 1992 and November 8, 1992.

In general, the WTS consisted of primary clarification and filtration to remove solids, followed by air stripping and granular-activated carbon absorption to remove dissolved organics. The system was designed to handle average daily flows of 345,600 gallons and peak daily flows of 720,000 gallons. Two treatment contingencies were also provided for organics removal: granular-activated carbon absorption followed by steam-stripping and treatment by granular-activated carbon alone. Neither of these contingencies was ever employed during normal operations. However, some modification to the design and operation of the WTS was necessary to effectively manage greater than anticipated solids loadings. Table 5-1 illustrates a comparison between the design basis estimate and the water quality actually observed.

Carbon vessel changeout was required on three occasions in order to maintain operability and ensure compliance with outfall 023 pollutant limits.

Based upon operating experience, WTS monitoring followed Table 5-1 of the Gill Creek Remediation Sampling and Analysis Plan (SAP) dated August 17, 1992, (Appendix B) for the entire project (see Figure 5-1). In October, analysis for PCBs was added to sample point GCWT8-# (air stripper effluent) in an effort to quantify PCB loading to the granular-activated carbon treatment units. Additionally, analysis for hexachloroethane was added to the list of semi-volatiles being monitored for evaluation of estimated emission levels from the air strippers.

5.2 OVERALL PROCESS DESCRIPTION

5.2.1 Design

Final engineering drawings were submitted to NYSDEC in the Final Certification Package (dated 3/17/93). Reduced versions of the drawings listed below are included as Figures 5-2, 5-3, and 5-4.

Water Treatment System P & I D, Sheet 1 of 3 (No. 02-04-003)

Water Treatment System P & I D, Sheet 2 of 3 (No. 02-04-004)

Water Treatment System P & I D, Sheet 3 of 3 (No. 02-04-005)

Remediation waters were pumped from the creekbed to a 12,000 gallon horizontal-flow, rectangular clarifier (TK-101A). After initial settling, flow was directed to one of two 49,000 gallon nominal capacity, open top surge tanks ("Modu-Tanks", TK-101B/C). In some instances, remediation waters were pumped directly to a Modu-Tank. After equalization, water was pumped to one or two inclined plate Lamella clarifiers (CL-101A/B), depending upon flow rate, where polymer (American Cyanamid Magnifloc 1598C) was injected at the inlet via chemical feed pumps. Polymer was withdrawn from chemical storage tanks TK-106 and TK-107. Solids collected in the lower thickener, while clarified water overflowed into open top transfer tank TK-102.

A pump located in the transfer tank fed clarified water to three of four sand filters (F-101A/B/C/D) operated in parallel for removal of residual suspended solids. Filtered water was then pumped to a 12,000 gallon open top transfer tank (TK-105) before being pumped through an array of twelve bag filters (two passes of six 10 micron units in parallel, followed by six 5 micron units in parallel). After leaving the bag filters, water was introduced to one of two counter-current air strippers (T-201A/B) for volatile organics removal. Feed to the air strippers was maintained at a pH between 5 and 7 s.u. using concentrated sulfuric acid (93 percent), as needed.

Process waters which collected in the bottom of the air strippers were pumped to three parallel trains of three granular-activated carbon (GAC) vessels each operated in series (V-202/201A/B; V-203/205A/B; V-204/206A/B). The purpose of the first carbon vessel (guard vessel) in each parallel train was to remove PCBs, while the remaining two carbon vessels (referred to as lead and polishing vessels, respectively) in each parallel train were intended for residual organics removal. A minimum flow of 2 gallons per minute per square foot was maintained to prevent channeling. Each vessel was able to accommodate flows up to 150 gallons per minute. Flexibility to alter flow configuration within each series of carbon vessels was also provided so that contaminated water always passed through the most recently changed bed last.

Effluent from the polishing GAC vessels was either transferred to a 12,000 gallon open top holding tank (TK-120) for use as backwash water to the sand filters (F-101A/B/C/D) or discharged to Outfall 023.

The air stream from the air strippers was released directly to the atmosphere after passing through a fiberglass reinforced plastic (FRP) demister.

As mentioned previously, two treatment contingencies to air stripping were provided for organics removal, but were never utilized:

- Granular-activated carbon adsorption followed by use of the on-site steam-stripper

- Treatment by granular-activated carbon alone

Solids which accumulated in the horizontal-flow, rectangular clarifier (TK-101A), the surge tanks (TK-101B/C) and the lower thickener of the Lamella clarifiers (CL-101A/B) were transferred to a 10,000 gallon open top sludge holding tank (TK-103) using diaphragm pumps. Polymer was available to assist in achieving maximum settling, but was never used. Supernatant decanted to an open top holding tank (TK-104) for eventual transfer back to surge tanks TK-101B/C. A diaphragm pump was used to feed thickened solids to two recessed chamber-plate filter presses (F-102/103). Filter aid (Enviroguard Maxflow^{R}) was added in the ratio of one pound of filter aid per pound of sludge prior to introduction to the filter presses.

Filtrate from the filter presses was recycled back to the horizontal-flow, rectangular clarifier (TK-101A). Residual solids (filter cake) were conveyed to bins and disposed of off-site with Gill Creek sediments.

All tanks managing contaminated water, including the air strippers, were equipped with high/low level switches and high level audible alarms on the treatment pad, with the exception of the sludge settling tank (TK-103), the filtrate hold tank (TK-104) and open top holding tank TK-120. TK-103 was designed such that it would decant to TK-104. TK-104 was equipped with a high/low level switch and was interlocked with high level alarms in the rectangular clarifier (TK-101A) and the surge tanks (TK-101B/C). TK-120 was also interlocked with high level alarms in the horizontal-flow, rectangular clarifier (TK-101A) and the surge tanks (TK-101B/C).

A continuous pH monitor was also installed at the discharge point from the WTS. High and low alarm set points were 9 s.u. and 6 s.u., respectively. The response procedure established is included in Section XVI of the <u>Gill Creek Remediation Safety and Health</u>

Plan.

5.2.2 Modifications to Design

Modifications to design and operation of the WTS listed below were required in order to effectively manage greater than anticipated solids loadings from the creekbed. Increased solids loadings were most likely the result of sediment disturbance during the removal phase and less than ideal pumping conditions. Modifications included:

- Initial dosing of remediation waters with polymer in TK-101A to promote optimal settling in TK-101B and C, (9/24/92).

- Placement of 6-inches of granular-activated carbon on top of sand in the sand filters to prevent filter blinding, control solids loading on GAC vessels, and increase filter up-time, (9/24/92).

- Use of a compartmented roll-off container as the central collection point in the creekbed (9/28/92).

- Installation of a hydrocyclone and cartridge filter used in conjunction with the compartmented roll-off prior to pumping collected water to TK-101A (10/1/92).

- Installation of an arrangement of six 10 micron bag filters in parallel, followed by six 5 micron bag filters in parallel for more effective solids filtration (10/1/92).

5.3 WTS OPERATION

5.3.1 Performance Test

Performance testing of the WTS followed the Wastewater Treatment Start-up Plan dated August 20, 1992 (Appendix C). The objective of this plan was to complete all mechanical, electrical, instrumentation, and operational checks for each piece of equipment prior to normal operations.

The first of three contaminated water test runs commenced on September 8, 1992. Contaminated water was pumped from just south of the Staub Road Bridge (Area 1) to a 500 gallon polyethylene tank in the creekbed prior to being transferred to the horizontal, rectangular clarifier (TK-101A) via a 3-inch line (3-inch line was designed to convey contaminated waters from the WTS pad to the steam-stripper). Contaminated water from TK-101A was transferred to open top surge tank TK-101B before introduction to the Lamella clarifier. Aqueous treatment for dissolved organics was performed using only the 84-inch diameter air stripper and two trains of carbon. Effluent from the carbon vessels was collected in open top surge tank TK-101C. One round of samples was collected following Table 5-1 of the Gill Creek Remediation Sampling and Analysis Plan (dated August 17, 1992) in Appendix B. Analytical results obtained indicated compliance with Outfall 023 permit limits.

This performance test was ceased at approximately 5 a.m. on September 9, 1992 due to a small flange leak in the vicinity of the air stripper column lifting lug. Approximately 2 gallons of contaminated water was released to the WTS containment pad over a 1 hour period and was immediately returned to TK-101A via the WTS pad sumps. The flange was cleaned and resealed and tested with potable water prior to column reuse.

A second contaminated water test run commenced on September 10, 1992. Contaminated waters from Area 3 were collected in tank trucks and subsequently transferred to open top surge tank TK-101B. Aqueous treatment began using only the 54-inch diameter air stripper and two trains of carbon. Effluent from the carbon vessels was collected in open top surge tank TK-101C.

Approximately 3 hours after start-up, operation was ceased due to problems associated with discharge piping and column level controllers. Approximately 1 gallon of contaminated water was released via the air blower inlet to the WTS containment pad and was returned to TK101A via the WTS pad sumps. A smaller volume of contaminated water was released outside the WTS containment pad, absorbed with Dry-All^R and disposed of with Gill Creek sediment.

At this point in the second test run, it was decided to run the WTS for approximately 4 hours using carbon alone treatment. One round of samples was collected following Table 5-1 of the SAP (Appendix B) for sample points GCWT7-# thru GCWT11A/B-# (see Figure 5-1). A sample was also collected directly from open top surge tank TK-101B to represent WTS influent. Analytical results obtained indicated compliance with Outfall 023 permit limits.

The third and final contaminated water run commenced on September 11, 1992 with the WTS operating in a total recycle mode (effluent from carbon vessels was directed back to the horizontal, rectangular clarifier TK-101A). As needed, additional contaminated waters were provided from Areas 1 and 3.

After 46 hours of near continuous operation, one grab sample was collected from sample point GCWT11D-# (Figure 5-1) and analyzed following Table 5-1 of the SAP (see Appendix B). Analytical results obtained indicated compliance with Outfall 023 permit limits.

Operations monitoring for the third contaminated water run are summarized in Appendix D. WTS Operations Logs were not completed for the previous two contaminated water runs.

Normal Operations

The WTS operated almost continuously from September 17, 1992 through November 8, 1992, during which time approximately 11.3 million gallons of contaminated water was successfully treated. During this period, treated remediation water and DuPont plant process water discharges through DuPont Outfall 023 were within the modified and approved City of Niagara Falls POTW pollutant discharge limitations. On three occasions, September 28 and 29 and October 1, 1992, the WTS was inadvertently operated with only one train of granular-activated carbon vessels on-line during periods of low flow.

As indicated above, both suspended solid and contaminant loadings were well above the design basis of the system (see Table 5-1) for most of the project and resulted in modifications being made to the original design. Appendix E provides a summary of maximum, minimum and average concentrations observed throughout the project for each contaminant monitored at their respective monitoring points, as identified in Figure 5-1. As was described in monthly progress reports submitted to the NYSDEC, these higher than expected contaminant loadings resulted in nine exceedences of estimated air emissions from the air strippers. However, in all cases compliance with New York State Short-Term Guideline Concentrations (SGCs) was maintained.

Review of data showed that on average nearly 90 percent of suspended solid present in the influent to the WTS was removed prior to introduction of contaminated water to the air strippers, and that nearly 50 percent of the contamination associated with tetrachloroethene and PCB 1248 in the WTS influent was present in the form of suspended solids. On the average the air strippers removed more than 87 percent of most volatile organics present in the feed stream, and the removal of semi-volatile organics present in the air stripper influent varied from 15 percent for hexachlorobenzene to 87 percent for 1,2-dichlorobenzene, on average.

Plate and frame filter presses employed to dewater sludges generated from the operation of the Lamella clarifiers were operated less than 10 percent of the total WTS operating time and used a 1:1 filter aid to sludge ratio. In all, approximately 84,000 gallons of sludge was successfully processed and disposed of along with contaminated sediment.

5.4 DECOMMISSIONING

Decommissioning of the WTS commenced on November 9, 1992 and followed Decontamination Procedures for the Water Treatment Equipment at the DuPont - Gill Creek Remediation Project (dated November 5, 1992) in Appendix F. In order to perform unit-specific decontamination as outlined in the above referenced document, an agreement was reached with the POTW to allow accumulation of decontamination waters in open top holding tank TK-120 before processing through one carbon vessel and discharge to Outfall 023. No monitoring was required or performed. Decommissioning of the WTS was completed on November 17, 1992.

Decontamination of the WTS containment pad was performed concurrently. Sampling and analysis was performed in accordance with Section 6.2 of the SAP (see Appendix B). All results were non-detect.

6.0
SEDIMENT REMOVAL

This section presents information on the removal and handling of sediments from Areas 1, 2D, and 3, as well as information on the removal and handling of the cobblebar, riverbank materials, and gabions.

6.1 VOLUME OF SEDIMENTS

The volume of sediment removed was approximately double the estimated amount presented in the P&S. The sediments were generally deeper and covered a broader area than expected. Table 6-1 compares the estimated volume disposed of to the volume that was originally estimated in the P&S. The table also presents the total weights of the removed sediments. The estimated volumes disposed of and the total weight includes the volumes and weight of the stabilizers (fly ash, kiln dust) added to each container. The total weights presented in Table 6-1 are the sums of the scale weights on the hazardous waste manifests.

Based on prior analyses of Gill Creek sediments, key parameters for the management of sediment wastes were PCBs, gamma BHC, tetrachloroethylene, and trichloroethylene.

6.2 AREA 3

6.2.1 Area 3 Sediments

Expected Area 3 sediment contaminant levels were above 50 ppm for PCB, above the Toxicity Characteristic (TCLP) regulatory levels for tetrachloroethylene (PCE) and trichloroethylene (TCE), and generally below the EP Toxicity regulatory level for gamma-BHC. Of the approximate total of 230 cubic yards removed, approximately 40 cubic yards of material exceeded the EP Toxicity regulatory level for gamma-BHC. These wastes were classified as NF225A (gamma-BHC contaminated Gill Creek sediments), and disposed by incineration at Westinghouse Environmental Systems and Services in Utah. The remaining sediments excavated were below the EP Toxicity regulatory level for gamma-BHC. These sediments were classified as newly identified Toxicity Characteristic wastes for TCE and PCE and as PCB wastes, and were disposed of in a RCRA/TSCA permitted landfill, per the P&S.

The contaminated sediments in Area 3 were described as black, oily, fine-grained, organic material mixed with some sand and gravel, and were easily distinguished from the stone covering the creek bottom upstream of the Adams Avenue bridge (Area 2U) and the clay lining the bottom of the creek 35 feet south of the bridge (Area 2D). Black sediment covered the bedrock under the entire expanse of the bridge to a depth of 2 to 3 feet. Beyond 35 feet downstream from the bridge, the bottom of the creek consisted of a red-brown clay with little visible accumulation of sediments. The red-brown clay material was compacted in the creekbed after the sediment removal activities were completed by DuPont in 1981.

The red-brown clay marked the downstream edge of Area 3. The upstream edge of Area 3 was located just upstream of the Adams Avenue Bridge, and was delineated by the edge of the stone fill placed by Olin in 1981.

6.2.2 Area 3 Management and Sediment Removal

Area 3 was isolated for dewatering by installing two temporary diversion structures, one upstream of the location of diversion structure 3A and one downstream of the location of diversion structure 3. The creek was initially dewatered by pumping water trapped between the temporary diversion structures to tank trucks and later discharging it into the WTS for treatment. Once the water was removed, Diversion Structures 3 and 3A were installed.

Diversion Structure 3 was constructed approximately 40 feet downstream of the Adams Avenue Bridge and 3A was constructed 10 feet upstream of the bridge (Figure 2-1). Water inflow to Area 3 was pumped to the WTS for treatment as described in Section 4.6.1.

Exposed sediments were covered with plastic sheeting whenever practical to minimize volatile organic emissions. Perimeter air monitoring with an HNu meter indicated minimal volatile emissions, the readings were typically non-detect and the maximum reading was between 0.2 to 0.3 ppm.

Sediments south of the Adams Avenue Bridge were excavated to bedrock using small earthmoving equipment while sediments under the Adams Avenue bridge had to be removed by vacuum dredging due to low clearance. Sediments were consolidated in a pile in the creekbed south of the Adams Avenue Bridge and allowed to drain. Water draining from the sediments was collected and treated at the WTS. Field testing using the Paint Filter Liquids Test (PFLT) was conducted to ensure that the sediments were adequately drained prior to loading the sediment into roll-off containers and adding any additives, such as fly ash or kiln dust.

Sediments were loaded into roll-off containers placed immediately adjacent to the creek to the east. The east creek bank from the edge of the bedrock at the creek bottom to the edge of the roll-off container was covered with plastic sheeting to collect sediments that could potentially fall from equipment during sediment loading. The plastic sheeting was periodically replaced and disposed of with the Area 3 sediments. Full roll-offs were placed at the Olin staging area prior to results of EP Toxicity testing and disposal.

Loose and spalling concrete was removed from under the Adams Avenue Bridge. The concrete was loaded into roll-off containers and managed in the same manner as Area 3 sediments.

A representative composite sample was collected from each roll-off container of materials removed from Area 3 before stabilizers (flyash or kilndust) were added and analyzed for gamma-BHC using the EP Toxicity Test. Four roll-off containers were determined to contain gamma-BHC above the EP Toxicity regulatory limit of 0.4 mg/l. These roll-off containers were sent off-site to be incinerated. The remaining roll-offs were shipped to a permitted RCRA/TSCA landfill for disposal.

Final cleanup of Area 3 consisted of powerwashing the exposed bedrock and vacuuming the remaining sediments and wash water off the creek bottom. WCC inspected the creekbed and determined that the excavation of sediment was complete in accordance with the P&S. The inspection report is in Appendix G.

6.3 AREA 2D

6.3.1 Area 2D Sediments

Expected Area 2D sediment contaminant levels were below 50 ppm for PCB and below Toxicity Characteristic regulatory levels for TCE and PCE. Therefore, Area 2D sediment wastes were classified as non-hazardous.

Sediments in Area 2D were unevenly distributed as a thin layer up to a few inches thick over the red-brown clay layer that was compacted over bedrock during the 1981 remediation of Gill Creek. The sediment layer was thickest at the downstream end of 2D south of the railroad bridge.

6.3.2 Area 2D Sediment Removal

Area 2D sediments were removed by vacuum dredging. A vacuum truck was fitted with flexible hose which entrained sediments primarily by air. Sediments were sucked into the vacuum truck and transported to the sediment staging pad. Laborers assisted the sediment removal using shovels and water sprays to move sediments to the center of the creek from areas where the vacuum dredging head could not reach. The removal of sediments began at the upstream end of Area 2D and proceeded downstream in a sweeping pattern.

For logistical reasons it was impossible to segregate the sediments from Areas 1 and 2D on the sediment staging pad; therefore, the Area 2D sediments were handled as Area 1 sediments. Sediments on the sediment staging pad were allowed to drain to the creek. When they passed the PFLT they were mixed with fly ash or kiln dust to prevent separation of liquids during transport and then transferred to dump trailers. All sediments from Areas 1 and 2D were landfilled at a TSCA/RCRA permitted facility.

The removal of sediments in 2D occurred concurrently with removal of sediments from Area 3 and Area 1.

The area was visually inspected by WCC and determined to be remediated in accordance with the P&S (see inspection report in Appendix G).

6.4 AREA 1

Expected Area 1 sediment contaminant levels were above 50 ppm for PCBs, below the EP Toxicity regulatory level for gamma-BHC, and above the Toxicity Characteristic regulatory levels for PCE and TCE. Based on these characteristics, Area 1 sediment wastes were classified as newly identified Toxicity Characteristic wastes for PCE and TCE and as PCB wastes.

The majority of sediments were located under and just upstream from the Robert Moses Parkway bridge. Sediment depth ranged from 6 to 8 feet deep in this area. The downstream end of Area 1 was delineated by the upstream edge of the cobblebar. The upstream end of Area 1 was delineated by the downstream end of the clay layer placed in the creekbed during the 1981 remediation. This area was located a few feet downstream of the Staub Road bridge.

6.4.2 Area 1 Management and Sediment Removal

The water in Area 1 was removed during the initial creek pumpdown as described in Section 4.3. After the creek was pumped down, Diversion Structure 4 was installed 70 feet north of Staub Road to isolate Area 1 from Area 2D. While the original upstream end of Area 1 was downstream of Staub Road, the area between Staub Road and Diversion Structure 4 provided the best access for equipment to move sediments from the creekbed to the sediment staging pad. This area was used to maneuver the sediment removal equipment and to pile the sediments for draining. Because of this, the effective boundary between Areas 1 and 2D was shifted upstream, to Diversion Structure 4.

Two ramps were constructed to access Area 1. Both were located on the east bank of Gill Creek on the DuPont plant site. One was north of Staub Road and directly connected to the sediment staging pad. Remediation water draining from the sediments drained back to Area 1 along this route. Sediments were transferred from the creek to the staging area using this ramp. The ramp was constructed of an HDPE liner covered with stone and concrete. The concrete was covered with a layer of asphalt. The other ramp was south of Staub Road and used for personnel and equipment access to the creek during the remediation and restoration activities.

Throughout remediation and restoration activities perimeter monitoring was conducted for volatile organics as specified in the approved Health and Safety Plan. No readings above 0.3 ppm were measured.

Sediments were excavated using backhoes and front end loaders starting at the upstream end of Area 1 and working downstream to the upstream edge of the cobblebar. At the cobblebar a clay plug was placed in the creek channel that cut through the cobblebar to prevent contaminated Area 1 water from entering the toe-drain.

Excavated sediment was consolidated in piles on the creekbed in Area 1 before being transferred to the sediment staging pad. Water draining from the sediments was collected and treated in the WTS.

Visual observations and PFLT testing was conducted to ensure that the sediments were adequately drained. Additives, such as fly ash and kiln dust, were mixed with the sediments to prevent the separation of liquid from the sediment waste due to vibration during shipment.

Backhoes and front-end loaders scraped the sediments from the bedrock surface. The surface of the bedrock was irregular with mounding along the east side and depressions under the RMP bridge. The relief was on the order of 3 to 4 feet. The bedrock was washed with high pressure sprays and the sediments loosened were vacuum dredged from the surface.

WCC inspected the creekbed and determined that the remediation was complete in accordance with the P&S (see Appendix G).

6.4.3 Cobblebar and Riverbank Material

The cobblebar, located at the mouth of Gill Creek, was the eroded remnant of a past Niagara River shoreline. The cobblebar was found to be composed of shot rock and soil. The rocks were smaller and less numerous than expected and the cobblebar configuration was different than the expected configuration (see Figure 6-1). Following NYSDEC approval (letter from M.J. Hinton to A.K. Masse dated October 6, 1992, Appendix A), a clay plug was placed in the creek channel separating the east and west portions of the cobblebar to prevent remediation water from entering the toe drain system.

After Area 1 had been remediated, the clay plug was removed and the cobblebar was excavated to the maximum extent practicable. Details of the cobblebar excavation are documented in a letter from A.K. Masse (DuPont) to M.J. Hinton (NYSDEC) dated November 9, 1992 (Appendix A). Further excavation of the cobblebar and underlying riverbank material would have allowed unmanageable Niagara River infiltration through the underlying bedrock.

The cobblebar material passed PFLT testing in the field, and was therefore loaded directly into dump trailers. The material was given the same waste classification as Area 1 sediment and was shipped off-site for disposal in a RCRA/TSCA permitted landfill.

The riverbank material to the west of the creek mouth was excavated to facilitate the installation of the bulkhead for the planned DuPont plant 008 outfall. The material passed PFLT testing in the field, and was loaded directly to roll-off containers. The material was given the same waste classification as Area 1 sediments and was shipped offsite for disposal in a RCRA/TSCA permitted landfill.

Two representative samples were collected from the riverbank to the east of the creek mouth, one was collected from the 0 to 2 foot depth and the other was collected from the 2 to 4 foot depth. Samples were analyzed as specified in the SAP for cobblebar material. The results indicate that the material was non-hazardous, but contaminated; therefore, the material was classified as NF108C (Table 6-2). The east riverbank was excavated to the maximum extent practical and shipped offsite to be landfilled.

6.5 SEDIMENT STAGING AREA

Contiguous to the creek, the Sediment Staging Area is part of the same area of contamination (AOC) as the sediments prior to excavation (Figure 6-2).

The area was graded and covered by 60 mil Hypalon liner. This liner was protected on both sides with a needle punched non-woven geotextile liner and covered with a 6-inch layer of gravel. The gravel was covered with steel reinforced concrete which in turn was covered by a layer of asphalt.

The pad was sloped so that it drained to the creek and into a collection point in Area 1. The collection point was downstream of Diversion Structure 4. Drainage water was pumped to the WTS for treatment. The surfaces over which the drainage flowed were covered by a geomembrane to protect the creek bank from contamination. The asphalt paved area was contained by a series of 32-inch high Jersey barriers on all sides except around the access ramp from the pad to Area 1.

Sediments on the staging pad were covered with plastic sheeting whenever possible to minimize the emissions of volatile organics and to prevent saturation of the sediments by precipitation. Perimeter monitoring using and OVA or PID was conducted throughout the sediment draining and loading activities. Readings were typically non-detect with maximum levels at 1.5 ppm.

Kiln dust and fly ash were stored and handled on the staging pad. Perimeter monitoring was conducted for respirable dust. Elevated levels activated dust control procedures specified in the Health and Safety Plan.

6.6 SUMMARY

Table 6-2 summarizes the amount of sediment removed, the waste characterization, and the method of disposal. These amounts include the weight of stabilizers (fly ash, kiln dust) added prior to transportation.

7.0 GROUNDWATER SEEPS AND CREEK RESTORATION

During the project several groundwater seeps were observed. This section of the report covers the physical characteristics of the seeps and how they were managed. Creek restoration consisted of removing and disposing of the diversion structures and cofferdam fill material and recontouring the creekbed.

7.1 GROUNDWATER SEEPS

Groundwater seeps were observed in Areas 2D and 3 during the project. Table 7-1 and Figure 7-1 summarize the seep locations, characteristics of the seeps, and the sample identification code used. A letter sent to M.J. Hinton (NYSDEC) from A.K. Masse (DuPont) dated November 5, 1992, documented analytical results of the samples collected from the seeps.

7.1.1 Area 2D Seeps

The analytical results for seeps 2DS-1 and 2DS-2 in Area 2D are similar in both constituents and concentration to DuPont Niagara Plant groundwater, with the exception that the concentrations of metals, particularly iron and aluminum, are a factor of ten higher than typical plant groundwater concentrations. Seeps 2DS-1 and 2DS-2 are located below the natural water level of Gill Creek.

Seeps 2DS-1 and 2DS-2 were isolated to prevent potential recontamination of the remediated area while long-term mitigation plans were developed. Seep 2DS-1 located in the middle of the creekbed, had an open ended salvage drum placed around it. The water level in the drum rose to less than a foot deep and maintained that level for over a week. Prior to rewatering the creek, the drum was removed and a 25 foot by 75 foot impermeable liner was centered over the seep area. The liner was made of 40 mil low density polyethylene material. The liner was covered with approximately 6 inches of stone. The details of this installation is documented in a letter to M.J. Hinton (NYSDEC) from A.K. Masse (DuPont) dated November 13, 1992 (Appendix A).

The 2DS-2 seep, located at the base of the northeast wing wall of the railroad bridge, was packed with clay and a layer of gravel was placed over it. Once this was complete no further seepage was observed.

The seeps in Area 2D near the brine tank were above the normal water level of Gill Creek. The constituents of the seep water were similar to groundwater in a nearby DuPont plant groundwater well (PW-35), but the concentrations of organics were a factor of ten lower. The flow was concentrated into two distinct seeps by packing the other seeps with clay. The estimated flow rate combined from the two seeps ranged from 5 to 30 gallons per minute.

It was believed that because of the high rate of flow observed and the relatively low concentration of organics that there was additional source of water being introduced locally. The following steps were taken to determine the source of the water:

- A check for conductivity of the seepage water indicated that brine was not the source. The seep area was adjacent to the brine processing area of the plant and a 10 million gallon brine storage tank.

- The bank surrounding the seep was packed with clay and the seep was isolated to flow into the bottom of an open bottom salvage drum. Seepage water entered the drum and stabilized at a height of about a foot below the drum top. This water level was determined to be approximately 1 foot above the height of the Niagara River; therefore, the Niagara River was eliminated as a potential source.

- Underground fire and city water lines were targeted as possible sources of underground leakage. Several activities (valving out sections of lines, testing for leaks with infrared thermography and sonic leak detection) verified the integrity of the underground lines in the area.

- Approximately 15 feet to the west of the seep is a groundwater recovery well (PW-35), which is part of the DuPont Niagara Plant Groundwater Remediation program. Water level in the well had been approximately 3 to

6 feet higher than normal during the month of October. It is believed that the high water level was caused by a restriction in the header line to the treatment system.

To determine whether maintaining a low water level in the well would reduce the flow from the seep, it was proposed that the water from PW-35 be pumped directly from the well to the Gill Creek Remediation Water Treatment Plant. The most recent analytical results from PW-35 indicate that the levels of organics in the groundwater were within the specifications of the Gill Creek Remediation Water Treatment Plant. In separate telephone conversations this test was presented to M.J. Hinton (NYSDEC, Region 9), D. Leemhuis (NYSDEC, Region 9), and A.C. Zaepfel (City of Niagara Falls, Wastewater Treatment Plant). Verbal approval to conduct the test was received from all.

By pumping to the Gill Creek Remediation Water Treatment Plant, low water levels were maintained in the well for over 4 days; however, there was little change in the flow rate of the seep. Results of the test are documented in a letter from A.K. Masse to M.J. Hinton dated November 4, 1993 (Appendix A).

Since the source could not be determined, the seep was contained with clay and the drum. A permanent collection system that would be tied into the DuPont Plant Groundwater Remediation System was installed in November 1993.

7.1.2 Area 3 Seeps

Two seeps were observed in Area 3 on September 30, 1992 and sampled on October 1, 1992. These seeps are no longer flowing. One seep, denoted NORTH, contained visible non-aqueous phase liquid (NAPL). Analytical results showed the NAPL sample to be predominately chlorobenzenes. The seep was located below the southwest wing wall of the Adams Avenue Bridge. The second seep, denoted SOUTH, did not contain visible NAPL. This seep contained approximately 50 ppm volatiles and 10 ppm chlorobenzenes.

A second inspection of the area under the Adams Avenue Bridge was conducted on October 12, 1992. The NORTH and SOUTH seeps were no longer flowing; however, a steady flow of approximately 2 gallons per minute was flowing from under the west bay of the bridge. The location of the seep or seeps could not be determined, so a sample of the standing water in a depression under the bridge was gathered. This sample contained approximately 100 ppm volatiles and about 0.5 ppm chlorobenzenes.

To identify the source of the NAPL, the soil between the southwest wing wall of the Adams Avenue Bridge and the exposed bedrock at the creekbed was excavated by hand. The soil appeared to be wet with organic liquid. As the hand excavation continued into the creek bank, organic liquid was no longer visible. No NAPL seeps were observed while excavating the soil. Based on these observations it appears that the source of the observed NAPL was from residual soil that became saturated from some past discharge into the creek, rather than from the soils behind the creek bank. (Based on the predominance of chlorobenzenes, it seems likely that the NAPL originated from the Solvent Chemical outfall, located on the east bank of Gill Creek to the north of Adams Avenue).

The seepage and NAPL areas were isolated from remediated sections of the creek with a sandbag berm and absorbent booms to prevent potential recontamination until long-term mitigation plans could be developed and implemented.

The long-term solution consisted of excavating further into the creek bed to remove residual soil in the vicinity of the Adams Avenue Bridge and covering the exposed bedrock in Area 3 and the west bank of the creek from the southern portion on the bridge to the northern edge of Area 2D with 40 mil LDPE. Under the bridge and along the bank the liner was covered with 6 to 10 inches of concrete. Clay was packed to a depth of 6 inches over the liner in the remainder of Area 3.

Two groundwater monitoring wells were installed on either side of the creek north of the Adams Avenue Bridge. These wells were installed to examine groundwater levels to determine whether there is evidence of additional groundwater seepage into the creek after flow was returned to the creek. A third well was installed adjacent to the west bank of Gill Creek north of Adams Avenue. This well is specifically designed to observe whether NAPL is migrating toward the creek in the top-of-rock zone. Analytical data shows no NAPL was encountered during installation. More details on these activities are discussed in a letter to M.J. Hinton (NYSDEC) from A.K. Masse (DuPont) dated November 4, 1992. Groundwater analytical results for these wells have been reported to NYSDEC as part of the ongoing Olin RCRA Facility Investigation.

7.2 DIVERSION STRUCTURE AND COFFERDAM DECOMMISSIONING

Diversion Structures 3, 3A, and 4 and associated temporary sandbag structures were removed by November 12, 1992. Diversion Structure 1 was removed on November 25. Demolition of the cofferdam began with the removal of cell fill material on November 16, 1992. The cofferdam was completely removed by December 2, 1992.

Sandbag and cofferdam fill materials were tested according to the SAP and determined to be non-hazardous. These materials were shipped off-site and landfilled at Occidental Chemical's 102nd Street Landfill. Occidental had prior approval from the USEPA for landfilling this type of material at this site. The key communication from Occidental regarding disposal of this material is listed in Appendix A.

7.3 CREEKBED RESTORATION

7.3.1 Area 1

The contaminated sediment in Area 1 was removed to bedrock using earth moving equipment. After the sediment had been scraped off the bedrock and the walls of the Robert Moses Bridge to the maximum extent practical, workers used shovels and high pressure water streams to loosen and remove additional sediment. When this was complete a Woodward-Clyde Consultants engineer inspected the bedrock to certify that all sediment had been removed to the maximum extent practicable.

At the mouth of the creek where the bedrock intersected the riverbottom, the riverbottom was scraped with a clean bucket of a backhoe and clay was compacted over the top. The remaining areas of Area 1 were filled with approximately 4,000 tons of stone. The banks of the creek were repacked with clay and covered with gravel. New gabions were installed where the old ones had been removed. All gabions removed as part of the creek remediation were disposed of along with the Area 1 sediment.

7.3.2 Area 2D

Approximately 2 to 6 inches of clay was compacted along the bank and bed of the creek in Area 2D. A layer of gravel was placed on top of the compacted clay along the banks.

7.3.3 Area 3

Restoration of Area 3 began on November 5. The details of the restoration are provided in Section 7.1.2.

8.0 CONTAINER HANDLING AND DECONTAMINATION

8.1 CONTAINER HANDLING

Sediment containers were managed in the following three locations during the Gill Creek project: the Sediment Loading Area, the DuPont West Yard, and the Olin RCRA/PCB storage area. Descriptions of the sediment management practices for each is discussed below. Sediments were accumulated in accordance with 6NYCRR 373-1.1(d)(1)(iii), and TSCA (40 CFR 761.65(c)).

8.1.1 Sediment Containers

Rolloff containers and dump trailers were used to accumulate Gill Creek sediments on site in accordance with 6NYCRR 373-1.1(d)(1)(iii). Containers and excavated sediments likely to contain PCBs in concentrations greater than 50 ppm met the applicable TSCA requirements. Furthermore, the rolloff containers and dump trailers complied with all relevant DOT container specifications.

Throughout the entire project, none of the containers of sediment sent offsite for disposal leaked or presented threat of exposure to the environment.

Solid waste generated from the remediation Water Treatment System (e.g., filter cake, spent granulated activated carbon) was accumulated and sent offsite in rolloff boxes or dump trailers which met the applicable requirements of TSCA, DOT, and NYSDEC hazardous waste regulations.

8.1.2 Loading Area on the Sediment Staging Pad

The location of the Loading Area on the sediment staging pad is shown in Figure 6-2. Rolloff boxes and dump trailers were loaded with sediment from the sediment staging area. The loading area met the technical requirements for 90-day container accumulation areas of 6NYCRR 373-1.1(d)(1)(iii)(c) and TSCA. The typical duration of a container in this area was less than a day, since sediment was only loaded when a truck was scheduled to take the material immediately offsite for disposal.

8.1.3 DuPont West Yard

Containerized material that could not be immediately transferred offsite was temporarily stored in the DuPont West Yard. This material was primarily solid waste generated during the decommissioning of the WTS. The DuPont West Yard met the technical requirements for 90-day container accumulation areas of 6NYCRR 373-1.1(d)(1)(iii)(c) and TSCA.

8.1.4 Storage Area for EP Toxicity Sediments

Four containers of Area 3 sediments exhibited the hazardous waste characteristic of EP Toxicity for gamma-BHC. These containers were stored on a curbed, concrete pad at the Olin plant site until they were sent offsite for incineration. Each container was covered with a structure consisting of a roof and four walls, in compliance with 40 CFR 761.65(b)(1) [TSCA], until they were shipped offsite for disposal.

Container storage of these sediments met applicable requirements of 6NYCRR 373-1.1(d)(1)(iii) and TSCA.

8.2 DECONTAMINATION

8.2.1 Sediment Containers

Prior to removing containers from the Sediment Loading Area, the outside surface of the containers were brushed to remove visible solid waste. The outside surface of the containers were high pressure washed or steam-cleaned to remove all visible solid waste residue. This procedure includes the tires and the outer surface of the hauling truck.

8.2.2 Sediment Removal Equipment

Prior to moving equipment used for sediment removal out of the remediation work area, the outside of the equipment was brushed, rinsed with a high pressure water stream and steam-cleaned. PPE was decontaminated after each use with water and Alconox solution at the exit of each exclusion zone. All personnel exiting through this point had to be decontaminated.

8.2.3 Water Treatment Plant

Decommissioning and decontamination of the water treatment plant and the sediment staging pad is discussed in Section 5.4.

8.2.4 Decontamination Residues

During the remediation project, wastewater resulting from steam-cleaning or water washing of contaminated surfaces was collected and treated in the WTS. Solid waste residues were collected and disposed of with the sediments.

9.0
CONSTRUCTION SEQUENCE

The general construction sequence for the Gill Creek sediment remediation project was as follows:

- Early 1992 construction began to relocate the non-contact cooling water discharges from the creek to the Niagara River.

JUNE

- In June of 1992, site preparation activities began with grading and installation of staging areas and preparations to install power lines and construction trailer offices.

JULY

- In the first week of July 1991, traffic patterns on the Robert Moses Parkway were rerouted to accommodate remedial activities. Traffic was restricted to one-lane in the east-bound direction for approximately a quarter of a mile in the vicinity of the mouth of Gill Creek. A concrete divider and chain-link fence segregated the traffic from the remediation area.

- Excavations above the high water mark on the riverbanks for the grout curtain and cutoff wall installation began during the week of July 6, 1992.

- Water Treatment Plant (WTS) construction began during the week of July 20, 1992.

- Excavation for temporary piping for the non-contact cooling water outtall to the Niagara River was completed during the week of July 27, 1992.

- Installation of sheetpiling for the first cell of the cellular cofferdam began during the week of July 27, 1992. Installation started on the east riverbank with the installation of cell #10. Installation of the cellular cofferdam took approximately 5 weeks, with approximately an additional 3 weeks for wingwall grouting.

AUGUST

- A NYSDEC inspector visited the project site on August 7, 1992 and authorized DuPont to divert flows through the temporary outfall piping.

- Niachlor non-contact cooling waters permitted to discharge at two locations in Gill Creek (Outfalls 006 and 007) were diverted from their permitted locations in Gill Creek to a temporary discharge point in the Niagara River during the week of August 10, 1992.

- Verbal approval was granted from the NYSDEC to commence construction of Diversion Structures 1, 3, and 3A and to divert upstream Gill Creek waters through the Buffalo Avenue Diversion Sewer, on August 25, 1992.

- Verbal approval was granted from the NYSDEC to conduct clean water tests of the WTS prior to full project approval being granted, on August 26, 1992.

- Construction of Diversion Structure No. 1 started on August 26, 1992. Installation took less than 1 week.

SEPTEMBER

- Construction of Diversion Structure Nos. 3 and 3A started September 5, 1992. NYSDEC approved the installation of additional sandbag diversion structures to aid in the construction of Diversion Structures Nos. 3 and 3A, and to aid in water management in Area 3. Installation of these diversion structures took slightly more than 2 days.

- Area 3 drawdown commenced during the week of September 7, 1992. Water was pumped to a tank truck and later treated at the WTS.

- Full operation of the WTS began with a 48-hour performance test run of contaminated waters through the WTS, which took place starting September 7, 1992.

- Remediation of Area 3 commenced on September 12, 1992. Due to a larger than anticipated remediation area and inclement weather, remediation of Area 3 took approximately 2 and 1/2 weeks.

- Initial pumpdown of creek water to the Niagara River from Area 1 commenced on September 13, 1992.

- Construction of Diversion Structure No. 4 and remediation of Area 2D commenced on September 19, 1992. Area 2D remediation work began at the south side of Diversion Structure 3. Temporary sandbag structures were placed as remediation progressed to separate the remediated areas from the unremediated areas. Heavy rains delayed the completion of Diversion Structure No. 4 until September 27, 1992, and the completion of Area 2D sediment removal until September 30, 1992.

- The addition of one layer of sandbags on top of Diversion Structure No. 3 was approved during the week of September 21, 1992, to prevent the water level in Area 3 from overtopping Diversion Structure No. 3 and entering 2D. In the event of a flood situation in the creek this layer was to have been breached.

- Area 1 remediation began the week of September 28, 1992, working north to south. Removal of sediments per the original project scope was complete by October 22, 1992.

OCTOBER

- Removal of cobblebar material and the adjacent riverbank was completed by October 30, 1992.

- Restoration of the creekbed was completed in phases (as areas were remediated and seeps controlled); all areas were restored by November 9, 1992.

NOVEMBER

- Decommissioning of the WTS and sediment staging pad began November 9, 1992. Decontamination of the WTS and sediment staging pad was complete the week of November 16, 1992.

- Diversion Structures 3, 3A, and 4 and associated temporary sandbag dams in the creekbed were removed by November 12, 1992.

- Cofferdam demolition began with the removal of cell fill material on November 16, 1992. The cofferdam was completely removed by December 2, 1992.

- Diversion Structure 1 was removed November 25, 1992.

- Normal creek flow which had been diverted to the Buffalo Avenue Diversion Sewer was returned to Gill Creek on November 30, 1992.

DECEMBER

- Niachlor non-contact cooling water discharges were returned to their permitted discharge locations in Gill Creek on December 4, 1992.

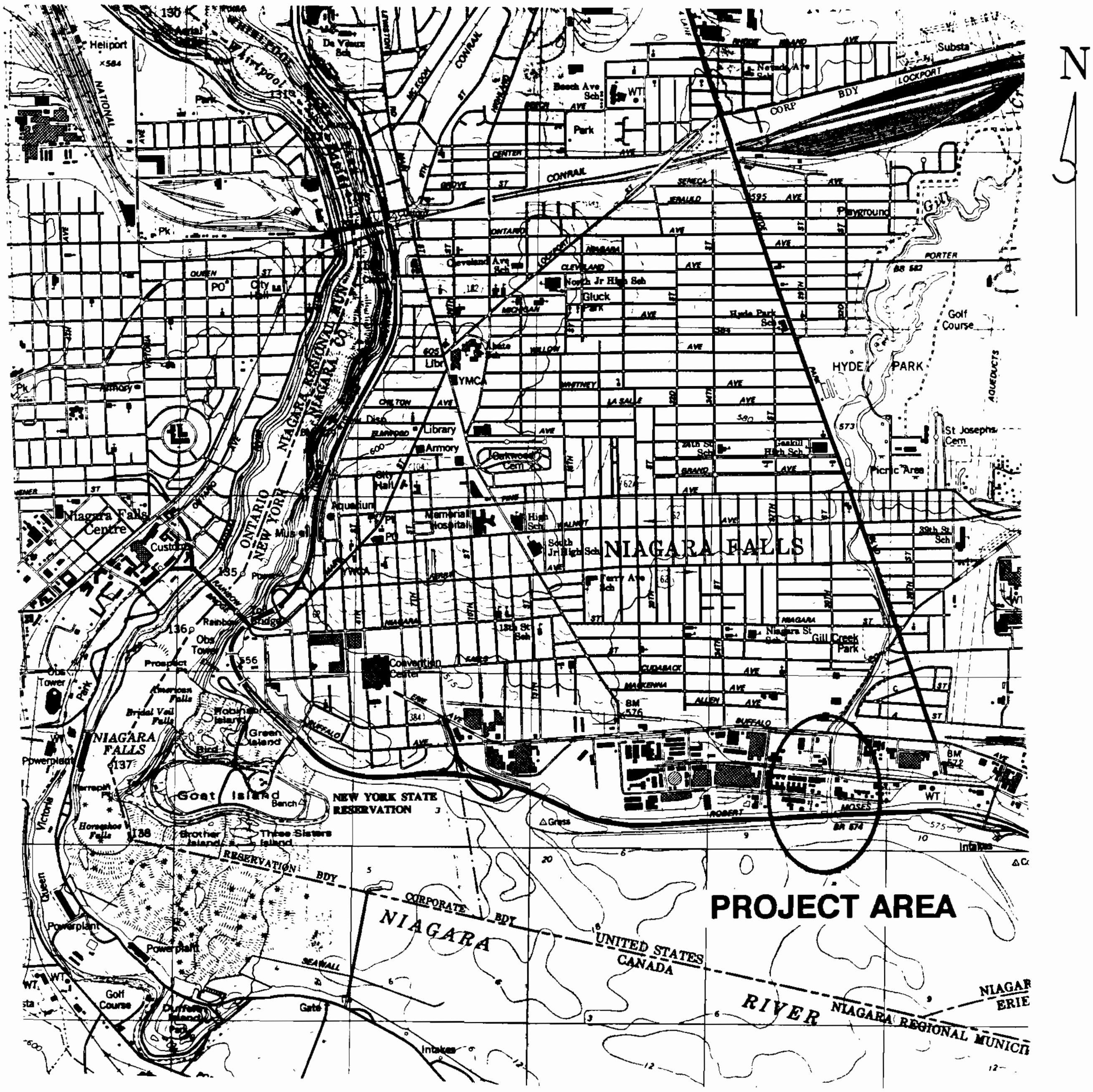
- Temporary piping for the non-contact cooling water outfall to the Niagara River was removed on December 7, 1992.

- The construction area along the Robert Moses Parkway was regraded the week of December 7, 1992. The area was reseeded in the spring (1993).

- Traffic was restored to two lanes on the eastbound section of the Robert Moses on December 15, 1992.

- Construction, decontamination, and decommissioning were completed December 17, 1992.

Figures



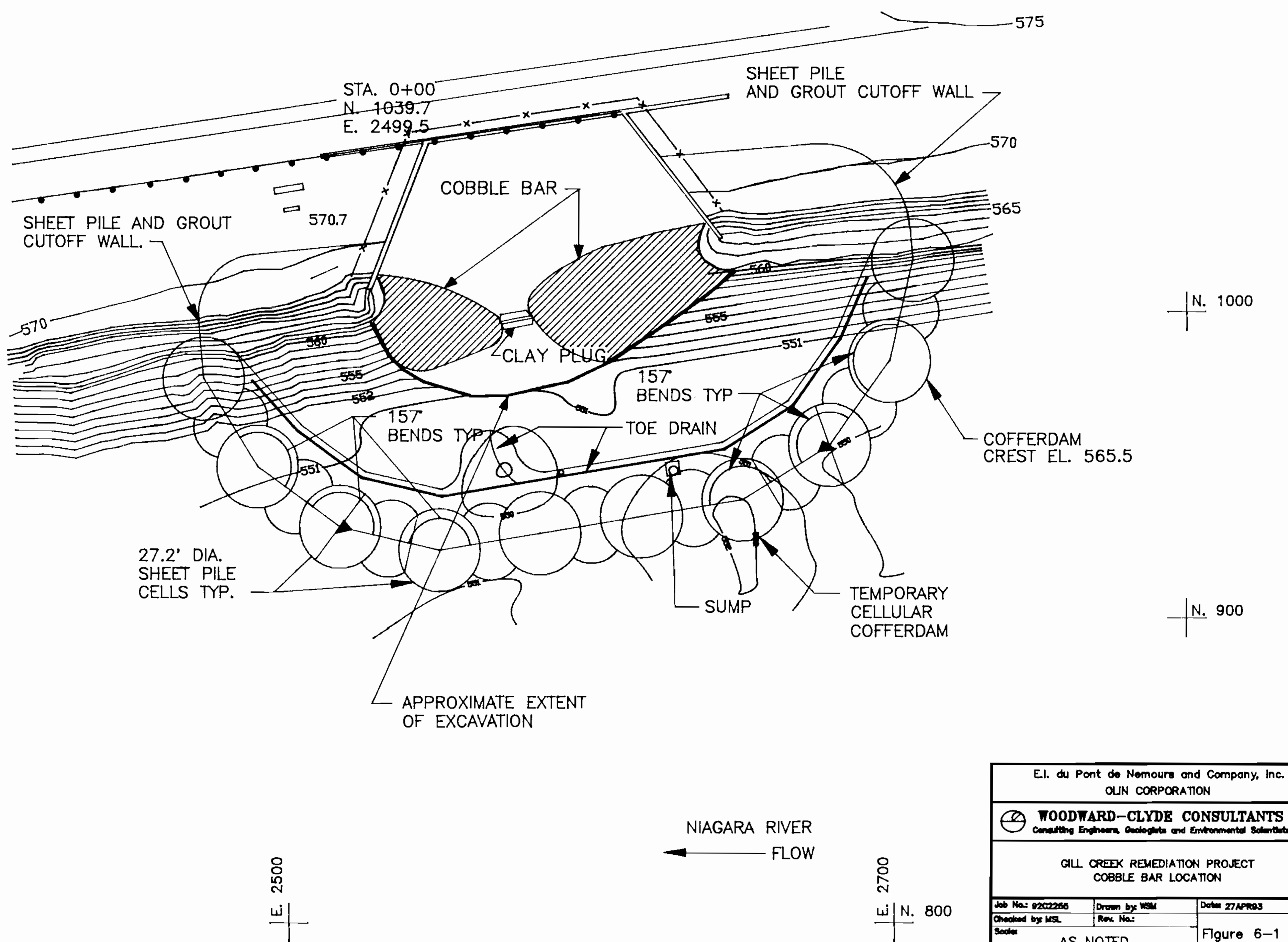
1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

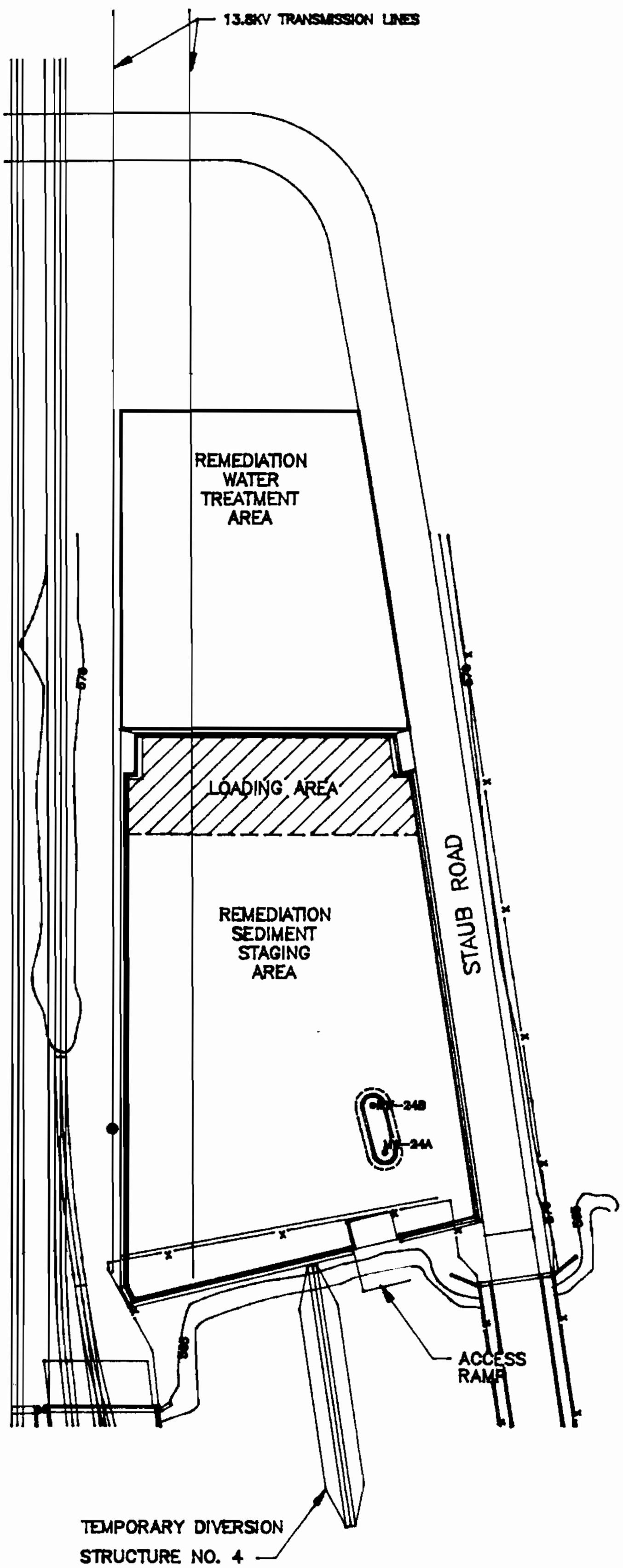
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET IN THE UNITED STATES AND 10 FEET IN CANADA
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET–DATUM IS LOW WATER 568.6 FEET

E.I. du Pont de Nemoures and Company, Inc. Olin Corporation		
WOODWARD-CLYDE CONSULTANTS Consulting Engineers, Geologists and Environmental Scientists		
REGIONAL LOCATION PLAN		
Job No.: 92C2255	Drawn by: WSM	Date: 30APR93
Checked by: MSL	Rev. No.:	Figure 1-1
Scale: AS NOTED		



E.I. du Pont de Nemours and Company, Inc. OLIN CORPORATION		
WOODWARD-CLYDE CONSULTANTS Consulting Engineers, Geologists and Environmental Scientists		
GILL CREEK REMEDIATION PROJECT COBBLE BAR LOCATION		
Job No.: 92C2256	Drawn by: WSM	Date: 27APR93
Checked by: MSL	Rev. No.:	
Scale: AS NOTED		Figure 6-1



NOTES:

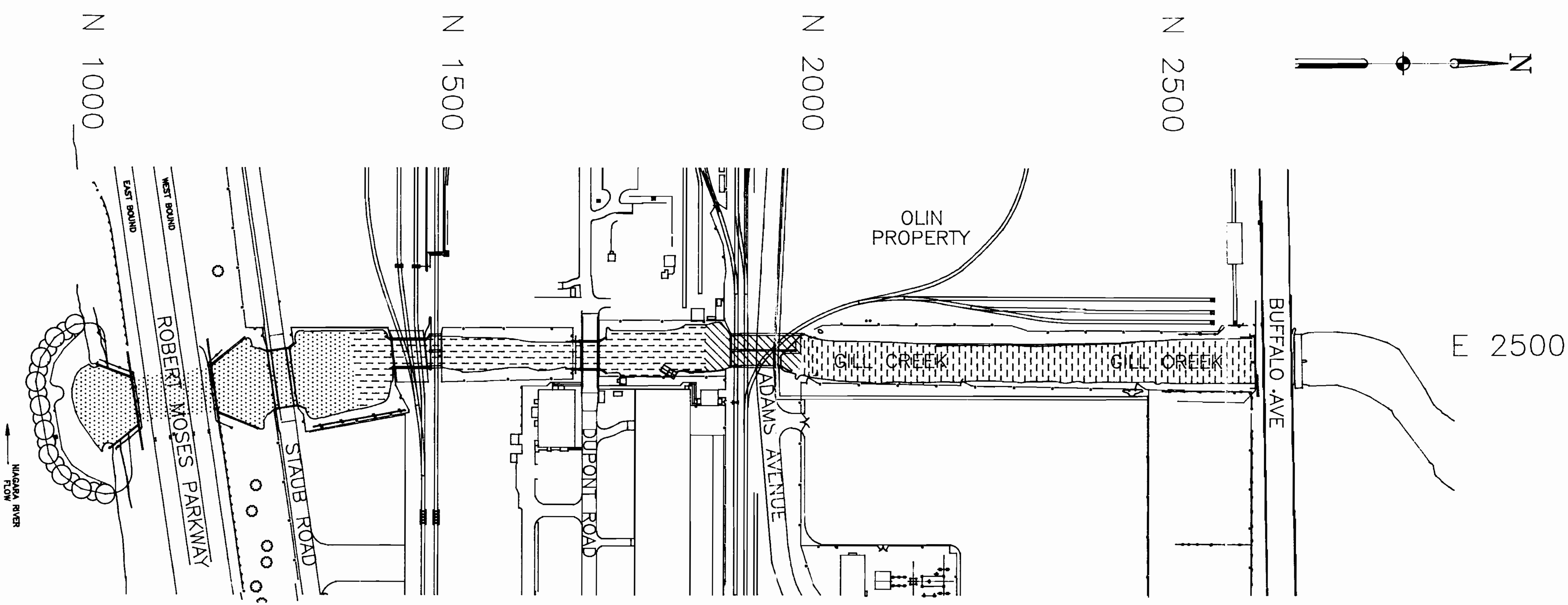
1. CONTRACTOR TO MAINTAIN 15 FOOT, DISTANCE FROM POWER LINE POLES.
2. CLEARANCE UNDER 13.8KV POWER LINES IS 40 FEET, CONTRACTOR TO MAINTAIN 15 FOOT (MINIMUM) DISTANCE FROM POWER LINES.
3. CONTRACTOR TO PROTECT MONITORING WELLS. SEE DRAWING 03-02-008 FOR DETAIL.
4. RAMP REMOVED AND PERIMETER CURBING COMPLETED AT END OF PROJECT.

E.I. du Pont de Nemours and Company, Inc.
Olin Corporation

WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

GILL CREEK REMEDIATION
REMEDIATION WORK AREA
PLAN VIEW

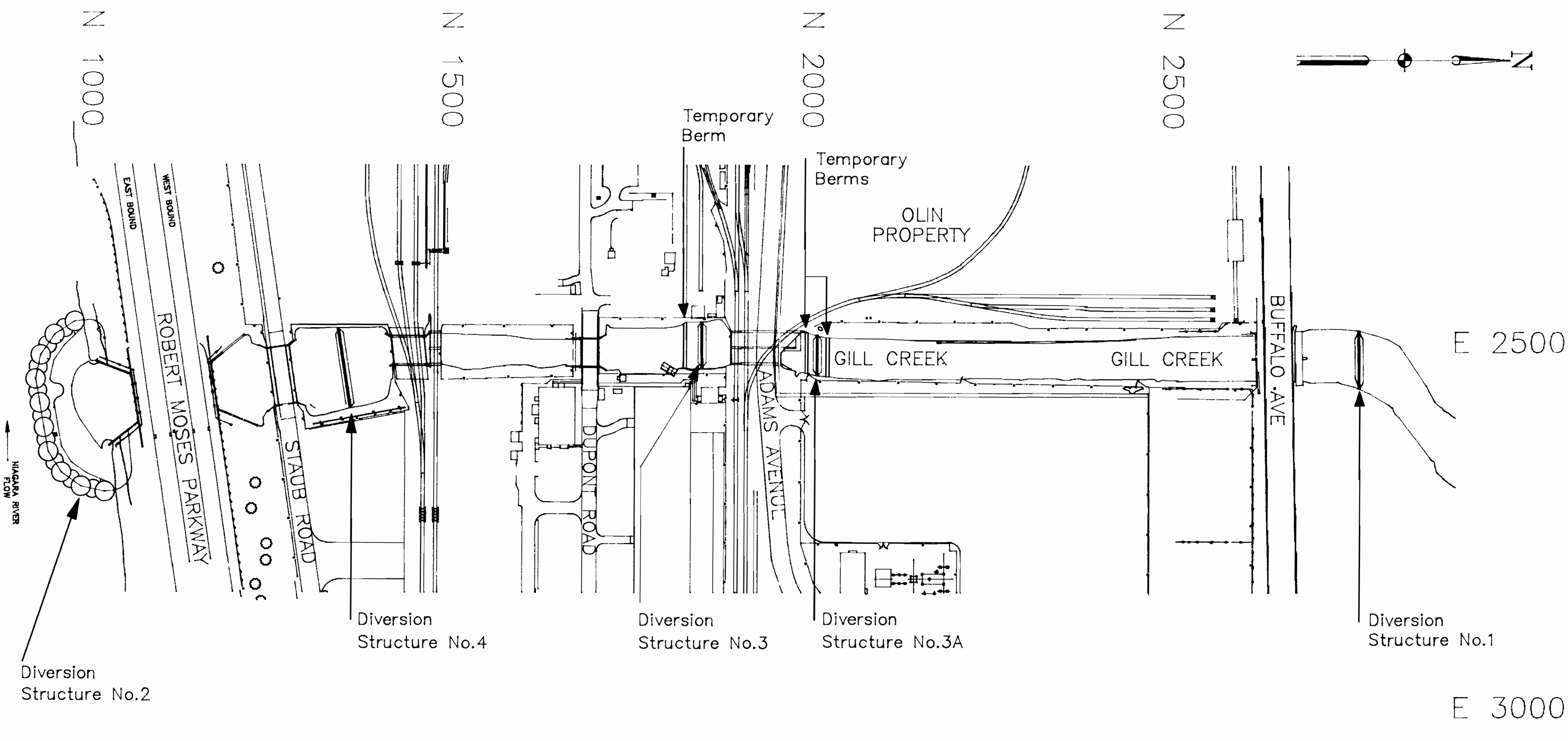
Job No.: 92C2255	Drawn by: WSM	Date: 29APR93
Checked by: MSL	Rev. No.:	Figure 6-2
Scale: 40 0 40'		



LEGEND:

- Area 1
- Area 2D
- Area 2U
- Area 3

E.I. du Pont de Nemours and Company, Inc. Olin Corporation		
WOODWARD-CLYDE CONSULTANTS Consulting Engineers, Geologists and Environmental Scientists		
GILL CREEK REMEDIATION PROJECT REMEDIATION AREAS		
Job No.: 92C2255	Drawn by: WSM	Date: 17MAY93
Checked by:	Rev. No.:	Figure 1–2
Scale: AS NOTED		



E.I. du Pont de Nemours and Company, Inc. Olin Corporation		
WOODWARD-CLYDE CONSULTANTS Consulting Engineers, Geologists and Environmental Scientists		
GILL CREEK REMEDIATION PROJECT DIVERSION STRUCTURES		
Job No.: 92C2255	Drawn by: WSM	Date: 19APR93
Checked by:	Rev. No.:	Figure 2-1
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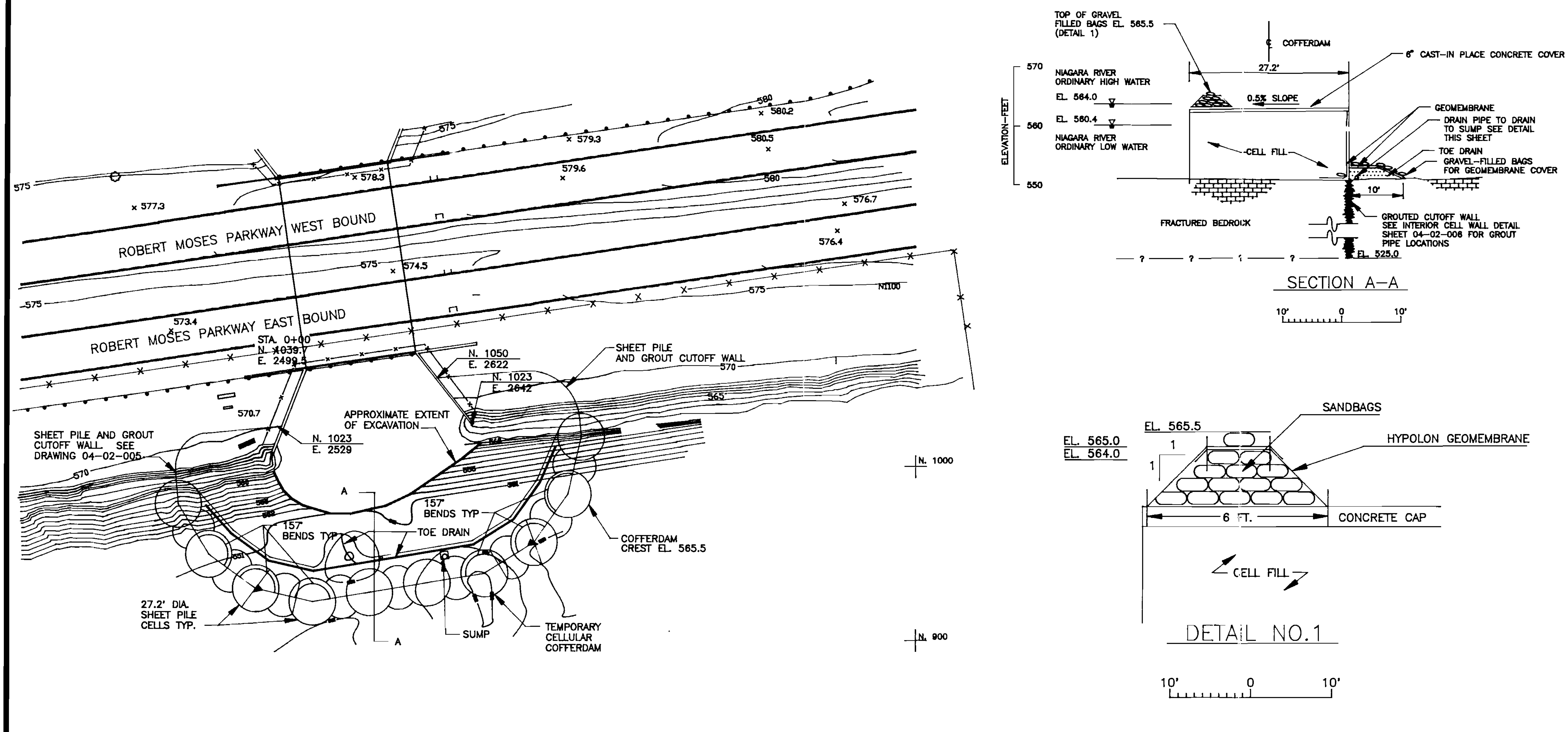

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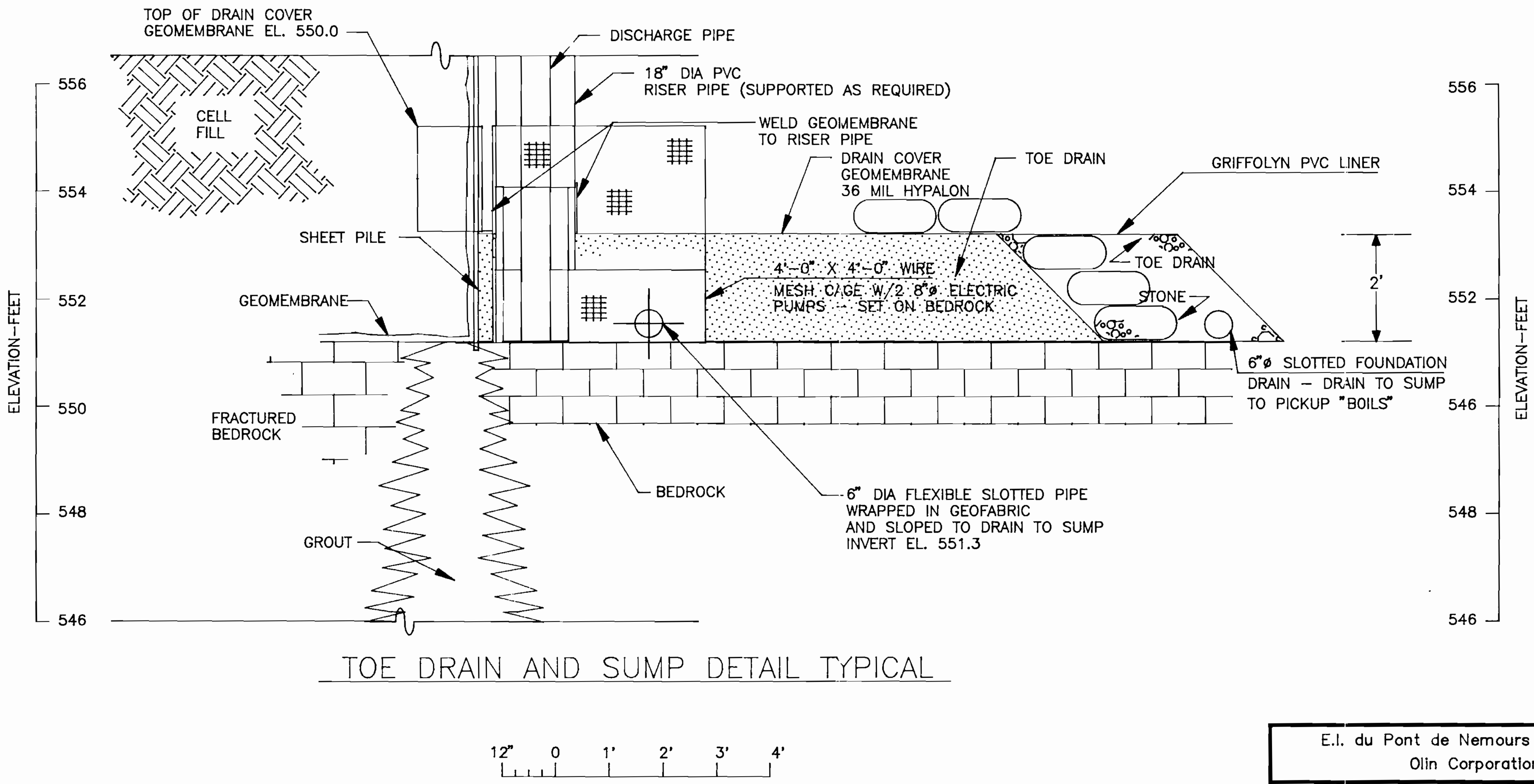
GILL CREEK REMEDIATION PROJECT
CELLULAR COFFER DAM

Job No.: 92C2255	Drawn by: WSM	Date: 16APR93
Checked by: CHECKBY	Rev. No.:	Figure 2-2
Scale: AS NOTED		



TOE DRAIN AND SUMP DETAIL TYPICAL

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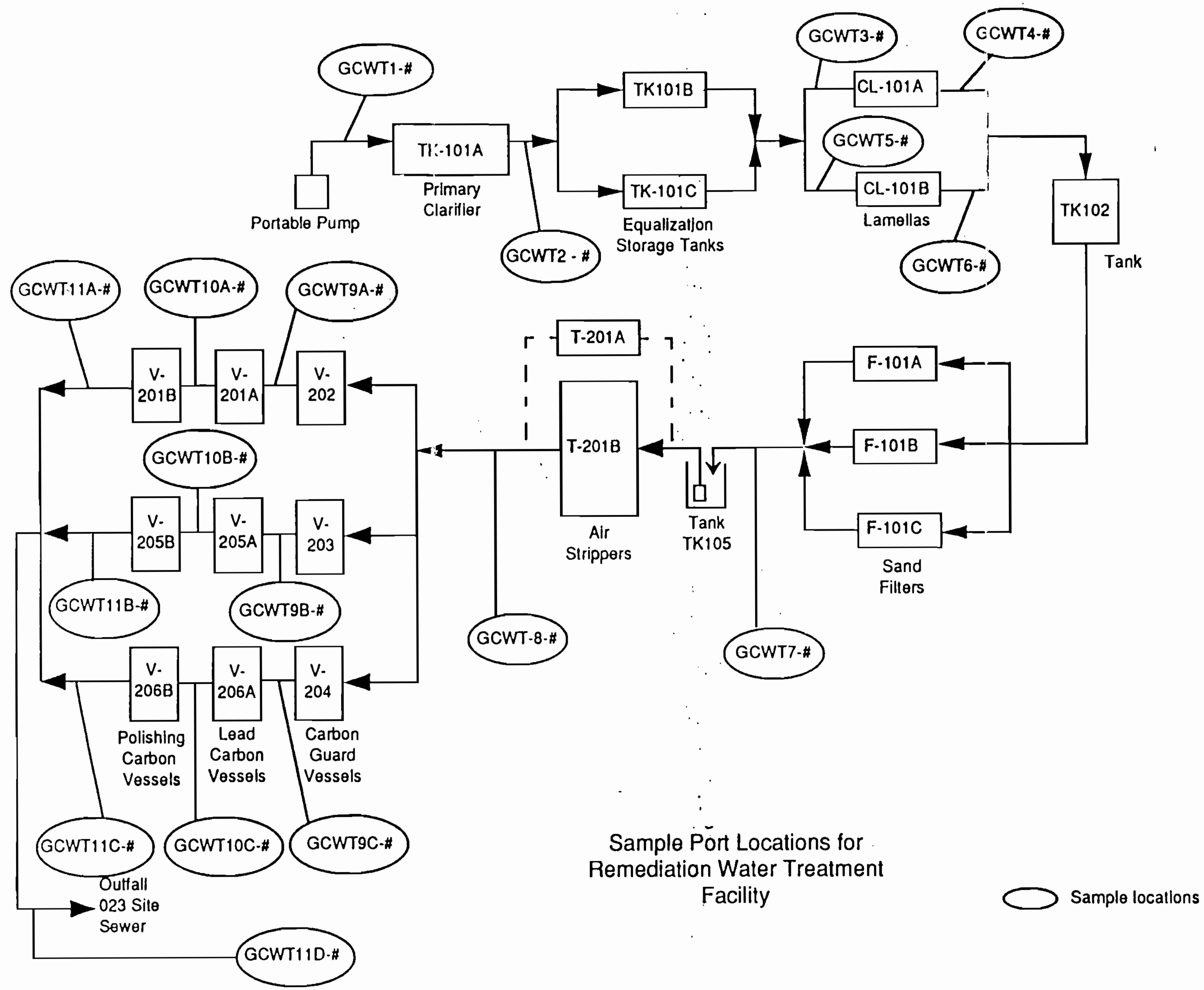
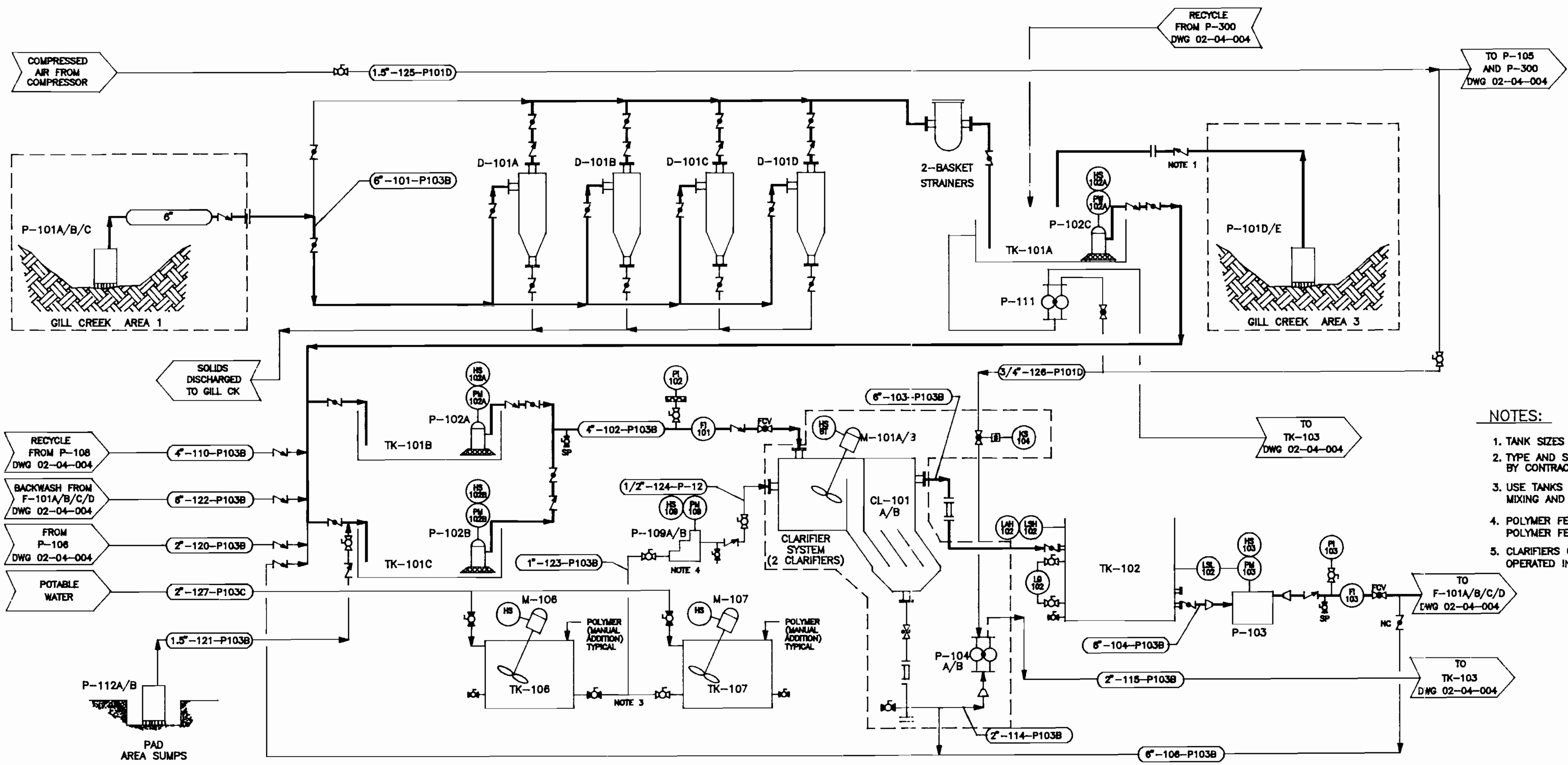
GILL CREEK REMEDIATION PROJECT
TOE DRAIN & SUMP DETAIL

Job No.: 92C2255	Drawn by: WSM	Date: 16APR93
Checked by:	Rev. No.:	Figure 2-3
Scale: AS NOTED		



Sample Port Locations for Remediation Water Treatment Facility

E.I. du Pont de Nemours and Company, Inc. Olin Corporation		
WOODWARD-CLYDE CONSULTANTS Consulting Engineers, Geologists and Environmental Scientists		
GILL CREEK REMEDIATION PROJECT WATER TREATMENT SYSTEM PROCESS FLOW DIAGRAM		
Job No.: 92C2255	Drawn by: WSM	Date: 21APR93
Checked by:	Rev. No.:	Figure 5–1
Scale: NOT TO SCALE		



D-101A/B/C/D
CYCLONE SEPARATORS

TK-101A
HORIZONTAL CLARIFIER
SEE NOTE 1

TK-101B/C
INFLUENT STORAGE TANKS
SEE NOTE 1

TK-102
CLARIFIED WATER STORAGE TANK
SEE NOTE 1

TK-106/107
POLYMER FEED TANKS
SEE NOTE 1

CL-101A/B
CLARIFIERS

NOTES:

1. TANK SIZES SELECTED BY CONTRACTOR
2. TYPE AND SIZE OF PUMP SELECTED BY CONTRACTOR
3. USE TANKS ALTERNATELY FOR BATCH POLYMER MIXING AND CONTINUOUS FEEDING.
4. POLYMER FEED PUMP A FEEDS CLARIFIER A; POLYMER FEED PUMP B FEEDS CLARIFIER B.
5. CLARIFIERS CL101A & CL101B WERE OPERATED IN PARALLEL.

P-101A/B/C/D/E
SUMP PUMPS IN CREEK
SEE NOTE 2

P-112A/B
SUMP PUMPS ON PAD
SEE NOTE 2

M-101A/B
CLARIFIER FLASH MIXER (CL-101)

M-106
POLYMER MIXER (TK-106)

M-107
POLYMER MIXER (TK-107)

P-102A/B
CLARIFIER FEED PUMP
SEE NOTE 2

P-103
SAND FILTER FEED PUMP
SEE NOTE 2

P-104A/B
CLARIFIER UNDERFLOW PUMP
SEE NOTE 2

P-109A/B
CLARIFIER POLYMER FEED PUMP
SEE NOTE 2

P-111
HORIZONTAL CLARIFIER UNDERFLOW PUMP
SEE NOTE 2

P-112A/B
PAD SUMP PUMP
SEE NOTE 2

DWG 02-04-003

E.I. du Pont de Nemours and Company, Inc.
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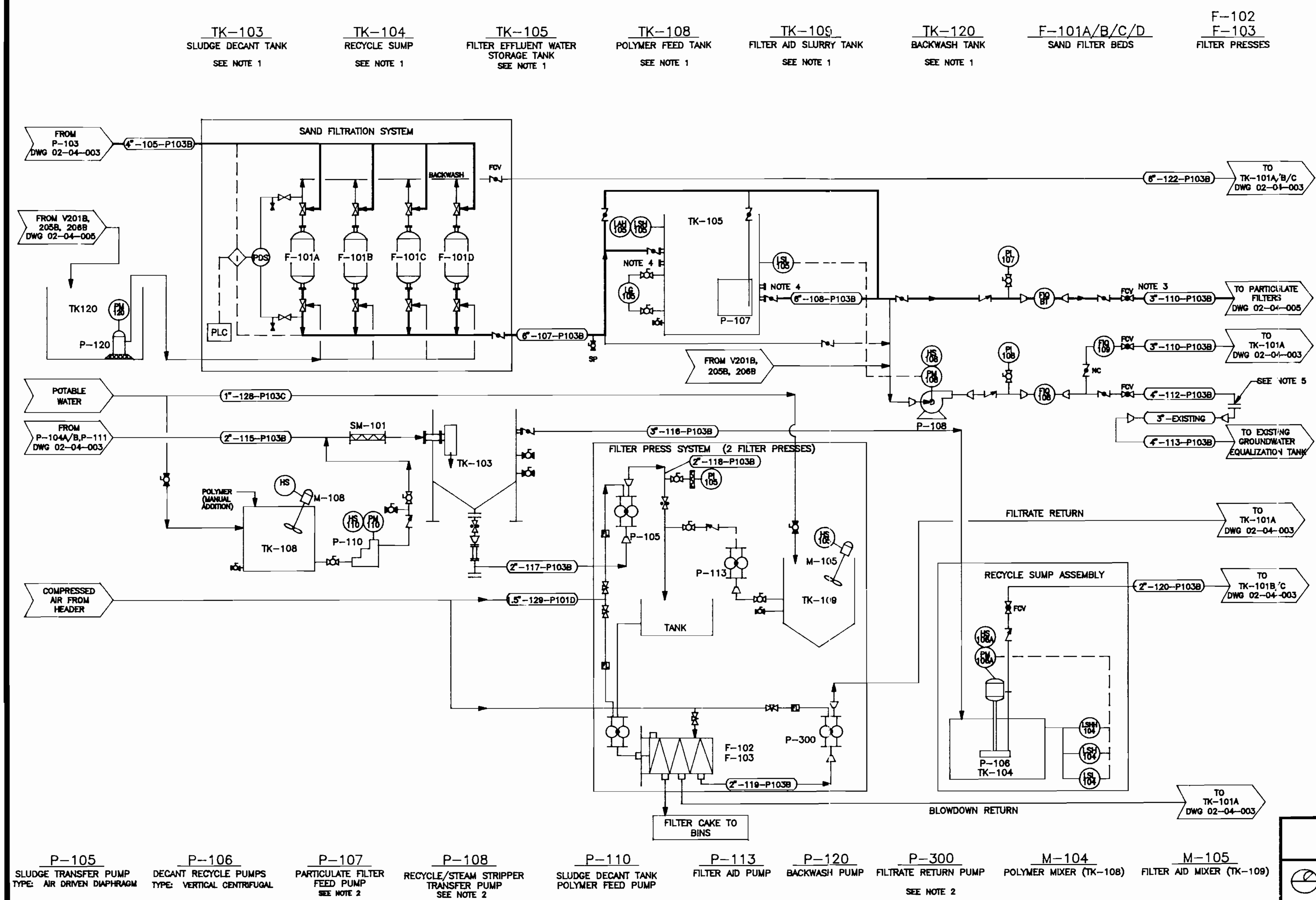
Consulting Engineers, Geologists and Environmental Scientists

GILL CREEK REMEDIATION PROJECT
WATER TREATMENT SYSTEM
P & ID SHEET 1 OF 3

Job No.: 92C2255	Drawn by: WSM	Date: 21APR93
Checked by:	Rev. No.:	
Scale: NOT TO SCALE		Figure 5-2



NOTES:

1. TANK SIZES SELECTED BY CONTRACTOR
2. TYPES/SIZES OF PUMPS SELECTED BY CONTRACTOR.
3. FILTER PRESSES F102 & F103 WERE OPERATED IN PARALLEL.

DWG 02-04-004

E.I. du Pont de Nemours and Company, Inc.
Olin Corporation

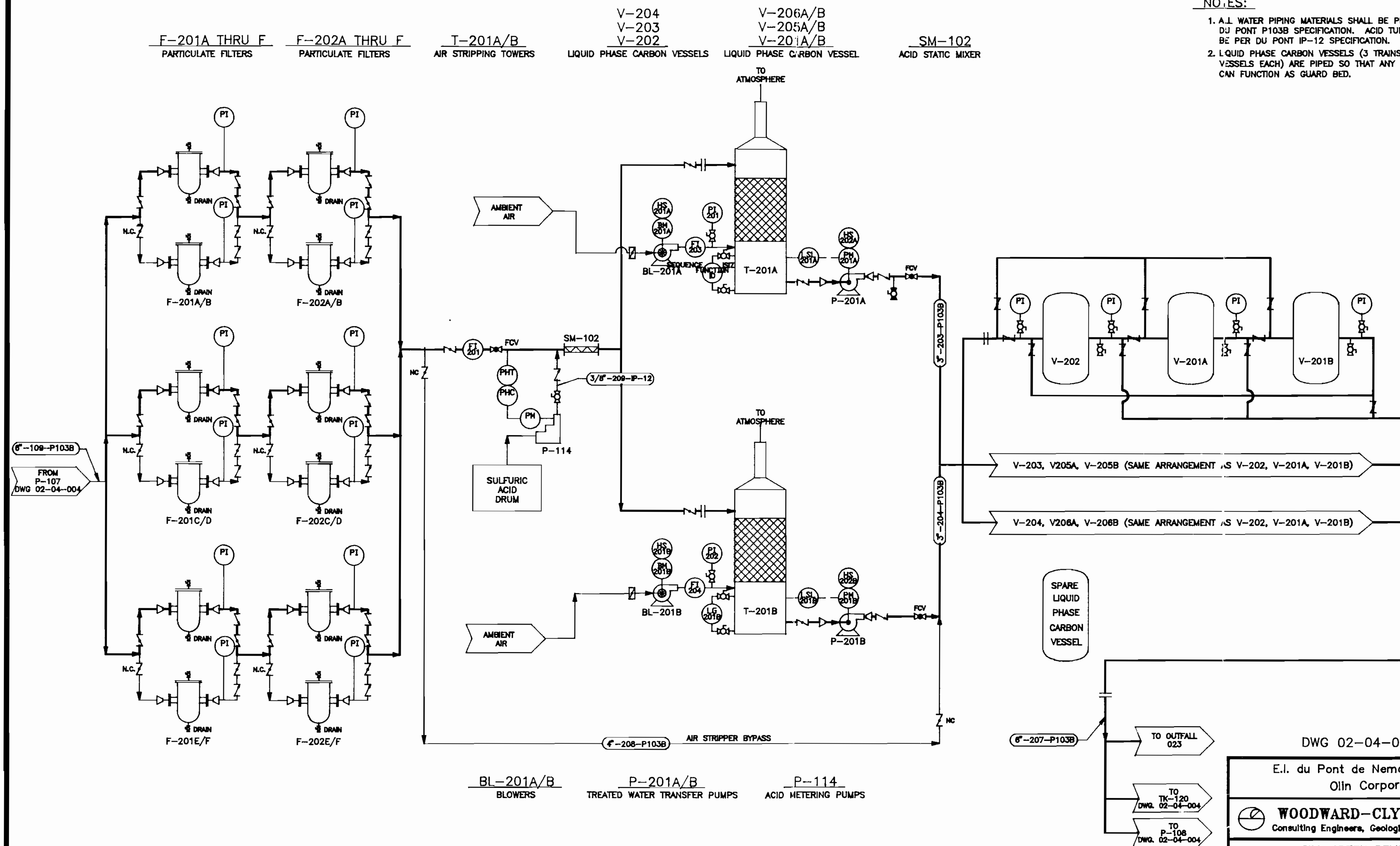
WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

GILL CREEK REMEDIATION PROJECT
WATER TREATMENT SYSTEM
P & ID SHEET 2 OF 3

Job No.: 92C2255	Drawn by: WSM	Date: 21APR93
Checked by:	Rev. No.:	Figure 5-3
Scale: NOT TO SCALE		

NOTES:

1. ALL WATER PIPING MATERIALS SHALL BE PER DU PONT P103B SPECIFICATION. ACID TUBING SHALL BE PER DU PONT IP-12 SPECIFICATION.
2. LIQUID PHASE CARBON VESSELS (3 TRAINS OF 3 VESSELS EACH) ARE PIPED SO THAT ANY UNIT CAN FUNCTION AS GUARD BED.



DWG 02-04-005

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Olin Corporation

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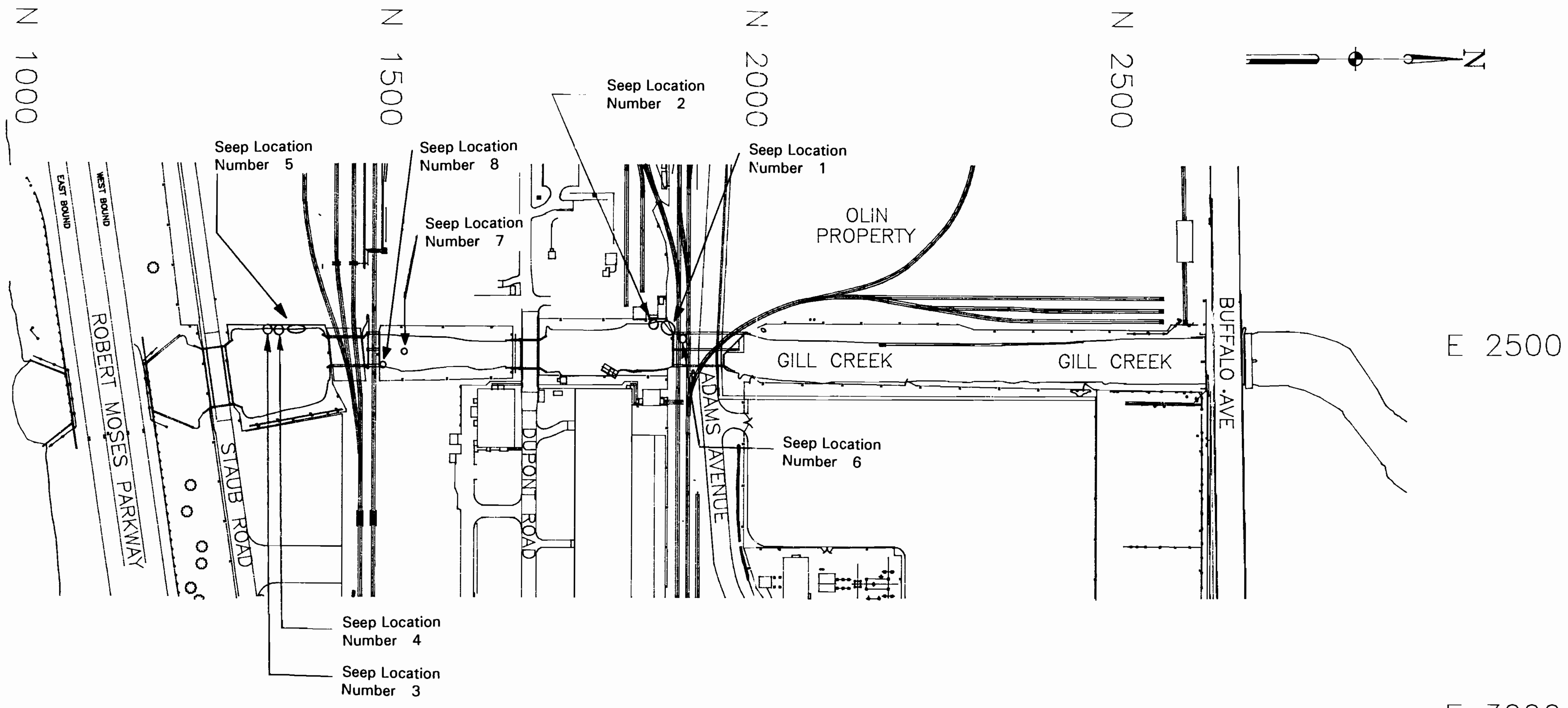
Consulting Engineers, Geologists and Environmental Scientists

GILL CREEK REMEDIATION PROJECT
WATER TREATMENT SYSTEM
P & ID SHEET 3 OF 3

Job No.: 92C2255	Drawn by: WSM	Date: 21APR93
Checked by:	Rev. No.:	Figure 5-4
Scale: NOT TO SCALE		



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Olin Corporation

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Consulting Engineers, Geologists and Environmental Scientists

GILL CREEK REMEDIATION PROJECT
GROUNDWATER SEEP LOCATIONS

Job No.: 92C2255	Drawn by: WSM	Date: 19APR93
Checked by:	Rev. No.:	Figure 7–1
Scale: AS NOTED		

Tables

TABLE 5-1

WATER QUALITY COMPARISON DATA (μg/l)

Chemical Names	Actual	Design
Method 624 - Volatile Organics (Aqueous)		
1,1,1-Trichloroethane	675.8	296
1,1,2,2-Tetrachloroethane	3498.7	7076
1,1-Dichloroethene	511.9	148
Benzene	784.8	5477
Carbon Tetrachloride	517.3	136
Chlorobenzene	486.7	1959
Chloroform	603.9	862
cis-1,2-Dichloroethene	7914.8	5501*
Methylene chloride	5441.2	2649
Tetrachloroethene	18838.1	7205
trans-1,2-Dichloroethene	287.0	-----
Trichloroethene	23927.3	22624
Vinyl chloride	725.8	2832
Method 625 - Semivolatile Organics (Aqueous)		
1,2,3-Trichlorobenzene	48.3	499
1,2,4-Trichlorobenzene	218.5	894
1,2-Dichlorobenzene	138.5	558
1,3-Dichlorobenzene	26.8	173
1,4-Dichlorobenzene	124.0	387
2-Chlorophenol	12.3	8.58
Acenaphthene	7.1	1.36
Anthracene	7.1	0.46
Fluoranthene	8.2	6.8
Hexachlorobenzene	16.2	16.5
Hexachlorobutadiene	227.4	357
Hexachloroethane	92.2	111
Naphthalene	6.2	3.85
Phenanthrene	20.1	3.76
Pyrene	6.4	3.7

TABLE 5-1 (continued)

WATER QUALITY COMPARISON DATA (μg/l)

Chemical Names	Actual	Design
Method 608 - Pesticides/PCBs (Aqueous)		
alpha-BHC	386.9	182
Aroclor 1248	938.9	909
Aroclor 1254	114.1	41.3
beta-BHC	28.6	181
delta-BHC	11.0	58.6
gamma-BHC (Lindane)	32.1	32.7
Total Metals		
Aluminum - Total	19565.0	73200
Cadmium - Total	3.0	10
Chromium - Total	79.8	90
Copper - Total	201.6	2100
Iron - Total	27699.6	114000
Lead - Total	227.9	1610
Mercury - Total	86.2	22700
Nickel - Total	47.1	530
Silicon - Total	45702.1	-----
Zinc - Total	963.9	4560
Wet Chemistry Analysis		
Cyanide - Total	1074.9	310
Non-Filterable Residue (103°C)	887036.0	-----
pH	9.2	7.29
Total Alkalinity	196440.0	132000
Total Recoverable Phenolics	21.2	380

* Total 1,2-Dichloroethene

TABLE 6-1

COMPARISON OF ESTIMATED VOLUMES TO BE REMOVED TO ACTUAL VOLUMES DISPOSED OF

	Estimated Volume (cy)	Disposed Volume (cy)	Total Weight[2] (tons)
Area 1	3,400	6,500	12,878[3]
Area 2D	160	1,170	
Area 3	40	230	316
Riverbank	NE[1]	120	240
Total	**3,600**	**8,020**	**13,434**

1 Not estimated
2 Includes fly ash and kiln dust
3 Includes Area 1, Area 2D

TABLE 6-2
SEDIMENT REMOVAL SUMMARY

Area	Volume (cy)	Weight (tons)	Char. Code	Disposal Method
1, 2D	7,670	12,878	NF225	Landfill
3	190	252	NF225	Landfill
	40	64	NF225A	Incineration
East Riverbank	120	240	NF108C	Landfill

TABLE 7-1

CHARACTERISTICS OF SAMPLES OF WATER SEEPAGE COLLECTED BY WOODWARD-CLYDE CONSULTANTS FROM THE GILL CREEK CHANNEL DURING THE REMEDIATION PROJECT

Map Key[1]	Date Collected	Sample ID	Location	Estimated Flow Rate (GPM)	Sample Characteristics
1	10/1/92	North	Area 3 - west bank, immediately downstream of bridge	<0.1	Sample appeared to contain primarily non-aqueous phase liquid. Approximately 80 ml collected. WCC could not ascertain whether source of NAPL was seepage into the bank from the contaminated sediment formerly in the stream or migration from adjacent groundwater.
2	10/1/92	South	Area 3 - west bank, 15 ft downstream of bridge	0.2	High turbidity water
3	10/6/92	Seep #6	Area 2d, near brine tank	3.0	Clear, low turbidity water, high rate of seepage
4	10/6/92	Seep #4	Area 2d, near brine tank	3.0	Clear, low turbidity water, high rate of seepage
5	10/6/92	Seep #2	Area 2d, near brine tank	2.5	Clear, low turbidity water, high rate of seepage
6	10/13/92	SW-1	Area 3, under west culvert	2[2]	Water was sampled from puddles rather than from the pumpstream, sample was of moderate turbidity (cloudy)
7	10/13/92	2DS-1	Central portion of area 2d	0.2	Water was upwelling from a depression in the creek bed. Color ranged from orange to dark red/brown. Samples contained suspended solid or semi-solid material.
8	10/13/92	2DS-2	Area 2d, under upstream end of railroad bridge	<0.1-1.0	Bright orange stain trailing from the corner of the bridge. Seepage rate very low. Standing water in the stained area was sampled. Samples contained large amounts of suspended sediments.

(1) See Figure 7-1
(2) Estimated flow rate of water being pumped from west culvert

Appendices

APPENDIX A

APPENDIX A

Documents Constituting the Final Approved Plan
(Documents are included in Volume 2 of this report)

1. Letter to Yavuz Erk (NYSDEC) from Leslie A. Warner (Du Pont) and James C. Brown (Olin) dated April 28, 1992, transmitting "Gill Creek Remediation, Construction Plans and Specifications".*

2. Letter to Albert C. Zaepfel (City of Niagara Falls) from Marit P. Crowe (DuPont) dated April 16, 1992, regarding SIU Permit No. 7.

3. Letter to Marit P. Crowe (DuPont) from Albert C. Zaepfel (City of Niagara Falls) dated April 24, 1992, regarding wastewater discharge.

4. Letter to Albert C. Zaepfel (City of Niagara Falls) from Marit P. Crowe (DuPont) dated May 5, 1992, regarding SIU Permit No. 7.

5. Letter to David E. Leemhuis (NYSDEC), from Albert C. Zaepfel (City of Niagara Falls), dated May 28, 1992, regarding Significant Industrial User Permit No. 7 - Amendment, dated May 27, 1992.

6. Letter to William Hinkle (NYPA) from Paula Daukas (WCC), dated June 2, 1992, requesting work permit modification related to cellular cofferdam.

7. Letter to Gary McDannell (Corps of Engineers) from Paula Daukas (WCC) dated June 2, 1992, for permit modification related to cellular cofferdam.

8. Letter to Michael J. Hinton (NYSDEC) from Leslie A. Warner (Du Pont) dated June 5, 1992, transmitting "Safety & Health Plan".

9. Letter to Michael J. Hinton (NYSDEC) from Leslie A. Warner (Du Pont) dated June 18, 1992, requesting approval of reduced reserve capacity in Hyde Park Lake.

10. Letter to Hank Mazzucca (EPA) from Max Vermersch (WCC) dated June 18, 1992, regarding remediation water treatment system plans and specification, sampling and analysis plan, and OHM equipment proposal.

APPENDIX A (continued)

Documents Constituting the Final Approved Plan

11. Letter of Transmittal to Michael Hinton (NYSDEC) from Paula Daukas (WCC) dated June 19, 1992, transmitting cellular cofferdam plans and specifications. *

12. Letter to Michael J. Hinton (NYSDEC) from Leslie A. Warner (Du Pont), dated June 26, 1992, transmitting Air Permit Application (Forms 76-19-3) and related information.

13. Letter to Leslie A. Warner (Du Pont) from Michael J. Hinton (NYSDEC), dated June 30, 1993, authorizing site preparation and cofferdam construction.

14. Letters to David Leemhuis (NYSDEC), Albert C. Zaepfel (City of Niagara Falls), Ed Struzeski (SAIC), and Hank Mazzucca (EPA), from David Spanfelner, dated July 17, 1992; and to Michael J. Hinton (NYSDEC) from Leslie Warner, dated July 22, 1992, transmitting "Remediation Bench-Scale Testing Report".*

15. Letter to Frank Shiapetti (City of Niagara Falls) from Leslie A. Warner (DuPont), dated July 21, 1992, transmitting "Floodplain Development Permit Application".

16. Letter to Albert Zaepfel (City of Niagara Falls) from Leslie A. Warner (DuPont), dated July 21, 1992, regarding contingency plan for use of steam stripper for water treatment.

17. Letter to Leslie A. Warner (DuPont) from Michael J. Hinton (NYSDEC) dated July 31, 1992, regarding required revisions to Health and Safety Plan.

18. Letter to Frank Shiapetti (City of Niagara Falls) from Leslie A. Warner (DuPont), dated August 4, 1992, transmitting corrected figures for "Floodplain Development Permit Application".*

APPENDIX A (continued)

Documents Constituting the Final Approved Plan

19. S.I.U. Permit No. 7 Amendment, issued by City of Niagara Falls on August 5, 1992.

20. Letter to Michael J. Hinton (NYSDEC) from Joseph D. Clark (DuPont), dated August 14, 1992, regarding modifications to "Safety and Health Plan".

21. Letter to David Leemhuis (NYSDEC) from David P. Spanfelner (DuPont), dated August 20, 1992, transmitting Sampling and Analysis Plan.*

22. Letter to Michael J. Hinton (NYSDEC) from Leslie A. Warner (DuPont), dated August 28, 1992, regarding request for change in cofferdam design (breach elevation).

23. Letter from Michael J. Hinton (NYSDEC) to Leslie A. Warner (DuPont) and James Brown (Olin), dated August 31, 1992, regarding approval of "Gill Creek Remediation Plans and Specifications".

24. Letter to Larry Stiller (NYSDEC) from Susan Dreyer (DuPont), dated September 2, 1992, regarding air monitoring plan proposal.

25. Letter to Leslie Warner (DuPont) from Albert C. Zaepfel (City of Niagara Falls), dated September 3, 1992, S.I.U. Permit No. 7 Amendment.

26. Letter to Michael J. Hinton (NYSDEC) from Leslie Warner (DuPont) dated September 8, 1992, regarding "August Progress Report".

27. Letter to Larry Stiller (NYSDEC) from Susan E. Dreyer (DuPont), dated September 9, 1992, regarding revisions to air monitoring plan.

28. Letter to Michael J. Hinton (NYSDEC) from Leslie A. Warner (DuPont), dated September 9, 1992, transmitting signed copy of NYSDEC Final Approval.*

APPENDIX A (continued)

Documents Constituting the Final Approved Plan

29. Letter to Michael J. Hinton (NYSDEC) from James C. Brown (Olin), dated September 9, 1992, transmitting signed copy of NYSDEC final approval. *

30. Letter to Leslie Warner (DuPont) from Michael J. Hinton (NYSDEC) dated September 10, 1993, regarding NYSDEC approval of increase in cofferdam breach elevation.

31. Letter to Leslie A. Warner (DuPont) from Michael J. Hinton (NYSDEC) to Leslie Warner (Du Pont) dated September 10, 1993, regarding NYSDEC approval of air monitoring plan.

32. Letter to Leslie A. Warner (DuPont) from Michael J. Hinton (NYSDEC) dated September 14, 1993, regarding revisions to air discharge emission limits.

33. Letter to Michael J. Hinton (NYSDEC) from Leslie A. Warner (DuPont) dated September 24, 1992, regarding approved discharges to the Niagara River.

34. Letter to Michael J. Hinton (NYSDEC) from Leslie A. Warner (DuPont) dated September 28, 1992, regarding notification of a change in designated addresses.

35. Letter to Michael Hinton (NYSDEC) from Leslie A. Warner (DuPont) dated September 29, 1992, report of deviation from approved plans and specifications.

36. Fax transmittal to Michael J. Hinton (NYSDEC) from Leslie Warner (DuPont), dated September 30, 1993, regarding proposed changes to plans.

37. Letter to Leslie Warner (DuPont) from Michael J. Hinton (NYSDEC) dated October 6, 1992, regarding approval for changes to approved plan and specifications.

APPENDIX A (continued)

Documents Constituting the Final Approved Plan

38. Letter to Michael J. Hinton (NYSDEC) from Ann K. Masse (DuPont) dated October 12, 1992, regarding "Monthly Progress Report - September 1992.

39. Letter to Michael J. Hinton (NYSDEC) from Susan E. Dreyer (DuPont) dated October 16, 1992, regarding revised air modeling calculation.

40. Letter to Michael J. Hinton (NYSDEC) from Ann K. Masse (DuPont) dated October 21, 1992, regarding alternate procedures for exclusion zone air monitoring.

41. Letter to Michael J. Hinton (NYSDEC) from Ann K. Masse (DuPont) dated November 5, 1992, regarding Area 2D and Area 3 seeps.

42. Area 2D and Area 3 seeps, in a letter from Ann Masse (Du Pont) to Michael Hinton (NYSDEC) dated November 5, 1992.

43. Letter to Michael J. Hinton (NYSDEC) from Ann K. Masse (DuPont) dated November 9, 1992, regarding Gill Creek remediation/cobblebar removal.

44. Letter to Ann K. Masse (DuPont) from Frank Shiapetti (City of Niagara Falls), dated November 9, 1993, transmitting Floodplain Development Permit Application.

45. Letter to Michael J. Hinton (NYSDEC) from Ann K. Masse (DuPont) dated November 10, 1992, regarding "Monthly Progress Report - October 1992".

46. Letter to Michael J. Hinton (NYSDEC) from Ann K. Masse (DuPont) dated November 13, 1992, regarding Area 2D seeps.

APPENDIX A (continued)

Documents Constituting the Final Approved Plan

47. Letter to David L. Cummings, from Alan F. Weston (OxyChem) dated December 2, 1992, regarding fill disposed at 102nd Street Landfill.

48. Letter to Michael J. Hinton (NYSDEC) from Ann K. Masse (DuPont) dated December 14, 1992, regarding "Monthly Progress Report - November 1992".

49. Letter to Michael J. Hinton (NYSDEC) from Ann K. Masse (DuPont) dated March 17, 1993, transmitting Construction Certification Package prepared by Woodward-Clyde Consultants.*

50. Letter to Ann K. Masse (DuPont) from Michael J. Hinton (NYSDEC) dated May 21, 19XX, regarding approval of Construction Certification.

51. Letter to Michael J. Hinton (NYSDEC) from Ann K. Masse (DuPont) dated July 29, 1993, transmitting Post-Remediation Monitoring Plan. *

52. Letter to Ann K. Masse (DuPont) from Michael J. Hinton (NYSDEC) dated August 6, 1993, regarding Approval of Post-Remediation Monitoring Plan.

53. Letter to Michael J. Hinton (NYSDEC) from Ann K. Masse (DuPont) dated September 2, 1993, submitting supplemental figures.

* Cover letter only in Volume 2

Appendix B

GILL CREEK REMEDIATIION
SAMPLING AND
ANALYSIS PLAN

August 17, 1992

E. I. du Pont de Nemours and Co., Inc.
and Olin Corporation

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1.0 INTRODUCTION

1.1 PURPOSE

E.I. du Pont de Nemours and Company, Inc. (Du Pont) and Olin Corporation (Olin) are undertaking the remediation of contaminated sediments in Gill Creek. This document outlines the sampling and analysis procedures for the following major components of the remediation activities:

- construction of temporary structures,
- removal of remediation water from the creek,
- removal of sediment from the creek bed,
- operation of a remediation water treatment system, and
- demobilization of the temporary structures.

The purpose of this plan is to provide guidance on the sampling protocols and analytical requirements associated with site remediation. This plan is to be used by personnel involved in sampling and/or analysis during the remediation activities.

1.2 SAMPLING PLAN

The remainder of this document defines the objectives, location and frequency, designations, sampling equipment and procedures, and analytical requirements for each type of sample to be collected during remediation work at the Gill Creek site. Remaining general information for all samples is provided below.

1.2.1 Sample Documentation and Chain of Custody

Samples collected by field personnel should be documented in a Field Log Notebook. Documentation for each sample collected should include name of sampler, sample date and time, sample location, brief description of any unusual conditions, and results of all field measurements (e.g, turbidity and Paint Filter Liquid Test).

Samples collected for contract laboratory analysis should be tracked from the field to the laboratory following chain-of-custody procedures, including completion of chain-of-custody forms (Figure 1-1). All information required by the form should be completed. Completed chain-of-custody forms should be signed, dated, and enclosed in sealable plastic bags and placed in sample transport containers prior to shipment to the contract laboratory. Copies of completed chain-of-custody forms should be provided to a designated site contact each sampling day.

1.2.2 Sample Containers, Preservation, and Holding Times

Samples should be collected in appropriate clean containers. Specific containers to be used depends on analyses to be performed. Preservatives should be supplied by the laboratory in the sample containers or for addition following sample collection. It is important that samples be sent to the laboratory in a timely manner such that holding times are not exceeded. The holding time is the elapsed time from the time of sample collection to the laboratory analysis of the sample.

Appropriate containers, preservatives, and holding times for Remediation Water Treatment Facility samples are specified in 40 CFR 136. Container, preservation, and holding time requirements for sediment and solids-related samples are shown in Table 1-1.

1.3 QUALITY CONTROL SAMPLES

Quality control (QC) samples, consisting of field and trip blanks, duplicates, and matrix spikes, should be collected as a part of this sampling plan. Samples should be collected for each medium at frequencies defined in Table 1-2.

1.3.1 Blanks

Field blanks are prepared by pouring analyte-free water from a storage container into the sample container at the same location where a sample is collected. Analyte-free water is defined as water which does not contain a higher concentration of the analytes of interest than the recommended reporting limit.

Trip blanks for volatile organic analyses are prepared by the laboratory prior to the field sampling and accompany the sample bottles through the sampling and shipping process. They are not opened at any time after their preparation until they are analyzed.

1.3.2 Field Duplicates

Field duplicates are prepared in the field in order to assess the precision of the sampling procedures and the analytical system. Duplicates are prepared by placing equal amounts of a homogenized sample into two sets of glassware. When composite samples are being collected, the duplicate should come from the composited sample. Since samples for volatile organic analyis should not be homogenized or composited, a field duplicate for volatile organic analysis should consist of a second grab sample taken from the same location immediately after the first grab.

1.3.3 Matrix Spikes

Samples designated for matrix spike analysis are sent to the laboratory from the field in order to assess laboratory accuracy. A sample designated for matrix spike analysis should consist of an additional amount of homogenized sample in duplicate bottleware. The sample should be identified for use as a matrix spike. The laboratory will be responsible for spiking and analyzing the sample according to analytical method protocols.

1.4 SAMPLE ANALYSIS

Samples collected for contract laboratory analysis will be sent to a laboratory specified by the Owner. Analytical methods for Remediation Water Treatment Facility samples are defined in 40 CFR 136. Analytical methods for sediment and solids-related samples are defined in SW-846, Third Edition (and EPA proposed revisions for methods not included in the Third Edition). The TCLP procedure is defined in 40 CFR 261, Appendix II. See Table 1-1.

Suggested project-specific reporting limits for selected analytes in Remediation Water Treatment Facility appear in Table 1-3. Deviations from these detection or reporting limits must be by the Owner prior to analysis. Reporting limits for TCLP and EP Toxicity analytes must be less than or equal to the regulatory levels for these analytes as defined at 40 CFR 261.24. Reporting limits for other analytes are as suggested in the respective methods or laboratory standard operating procedures.

Suggested reporting limits are necessary to achieve the following project objectives:

- Monitor compliance with the City of Niagara Falls Publicly Owned Treatment Works (POTW) discharge limits,

- Sample materials used in construction to evaluate their acceptability,

- Identify disposal requirements for Area 3 sediments and for riverbank materials removed as part of the remediation project, and

- Identify potential for re-use or disposal requirements for materials generated during demobilization.

Except as noted in Section 5.0, turnaround time for analysis and reporting of laboratory results should not exceed four weeks.

1.5 EQUIPMENT DECONTAMINATION

Sampling equipment should be decontaminated using the following procedure:

1. If the equipment was used to sample sediments/solids, scrape or brush off and collect loose solid particles. Collected solid particles from sampling should be placed in the corresponding sediment or solids waste container. For example, sediments brushed off and collected from sampling of Area 3 sediment should be placed into a sediment container for Area 3 sediment waste.

2. Wash the equipment in detergent water (Alconox solution) followed by a distilled or deionized water rinse. Additional rinsing may be required under the applicable

requirements of 40 CFR 136 or SW-846. Sampling equipment too large for such washing should be cleaned with a steam cleaner.

3. Store decontaminated equipment in such a way to avoid contact with potentially contaminated surfaces and potential cross-contamination (e.g., the equipment may be wrapped in new aluminum foil for storage).

4. Sampling equipment rinse waters may be disposed by adding them to the storage tanks at the front end of the Remediation Water Treatment Facility.

TABLE 1-1

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES FOR SEDIMENT AND SOLIDS-RELATED SAMPLES FROM GILL CREEK REMEDIATION

Method	Parameter	Number & Type of Containers[1]	Preservation	Holding Time
8240	Volatile organics	2-40 ml glass VOA vials with Teflon-lined septa (liquids)	4°C + 4 drops of conc. HCl	14 days from collection
		Stainless steel sleeve with open end covered with Teflon film & plastic cap (solids)	4°C	14 days from collection
TCLP/ 8240	Volatile organics	Stainless steel sleeve with open end covered with Teflon film & plastic cap (solids)	4°C	Collection to Extraction- 14 days Extraction to Analyis - 14 days
8080	gamma-BHC/ PCBs	1-1 liter glass bottle with Teflon lined cap (liquids)	4°C[2]	Collection to Extraction- 7 days Extraction to Analysis - 40 days
		1-8 oz wide-mouth glass jar with Teflon liner (solids)	4°C	Collection to Extraction- 14 days Extraction to Analysis - 40 days
EPTOX/ 8080	gamma-BHC	1-8 oz wide-mouth glass jar with Teflon liner (solids)	4°C	Not specified in method; recommend: Collection to Extraction - 14 days Extraction to Analysis - 40 days
9060	Total Organic Carbon	1-1 liter glass bottle (liquids)	Filter sample, then 4°C and H_2SO_4 to pH<2	28 days from collection
		1-4 oz wide-mouth glass jar with Teflon liner (solids)	4°C	28 days from collection

1 Separate sample volumes must be collected for each type of analysis if sample is analyzed for total analyte content as well as by TCLP or EPTOX procedures.

2 If residual chlorine is present, samples will be dechlorinated with sodium thiosulfate as specified in SW-846 (third edition).

TABLE 1-2

FREQUENCY OF FIELD QC SAMPLES
GILL CREEK REMEDIATION

QC Sample	Sample Medium	Frequency
Field Blank	water	1 per 20 samples per analysis per medium
Field Duplicate	water ; sediments/solids	1 per 20 samples per analysis per medium
Trip Blank	water	1 per cooler of volatile organic samples submitted to laboratory
Matrix Spike/ Matrix Spike Duplicate	water ; sediments/solids	1 per 20 samples per analysis per medium
TCLP Matrix Spike	sediment/solids	1 per sample per analysis type per medium

TABLE 1-3

ANALYTES AND SUGGESTED REPORTING LIMITS FOR SELECTED INDICATOR PARAMETERS[1] PROCESS WATER CONFIRMATION SAMPLES GILL CREEK REMEDIATION PROJECT

Parameter	Suggested Reporting Limits (ug/l)
Volatile Organics	
Benzene	10
Carbon Tetrachloride	10
Monochlorobenzene	5
Chloroform	10
1,1-Dichloroethene	10
cis-1,2-Dichloroethene	10
trans-1,2-Dichloroethene	10
1,1,2,2-Tetrachloroethane	10
Tetrachloroethene	10
1,1,1-Trichloroethane	10
Trichloroethylene	10
Methylene Chloride	10
Vinyl Chloride	5
Semivolatile Organics	
2-Chlorophenol	5
1,2-Dichlorobenzene	2
1,3-Dichlorobenzene	2
1,4-Dichlorobenzene	2
Acenaphthene	3
Anthracene	1
Fluoranthene	1
Naphthalene	1

TABLE 1-3
(Continued)

Parameter	Suggested Reporting Limits (ug/l)
Pyrene	1
Phenanthrene	1
1,2,3-Trichlorobenzene	10
1,2,4-Trichlorobenzene	10
Hexachlorobutadiene	1
Hexachlorobenzene	1
<u>PCBs and Pesticides</u>	
Hexachlorocyclohexane (BHC)	
alpha-BHC	0.05
beta-BHC	0.05
delta-BHC	0.05
gamma-BHC	0.05
PCBs	
Aroclor-1248	1
Aroclor-1254	1
<u>Metals</u>[2]	
Cadmium	0.5
Total Chromium	10
Copper	25
Lead	100
Mercury	0.2
Nickel	40
Zinc	20
Aluminum (Startup only)	500
Silica (Startup only)	500
Iron (Startup only)	500

TABLE 1-3
(Concluded)

Parameter	Suggested Reporting Limits (ug/l)
Other Parameters	
Total Alkalinity	10,000
Total cyanide	10
Total phenols	10
Total suspended solids (TSS)	10,000
pH	0-14 S.U.

1 Indicator parameters selected on basis of prior detection in water samples at site and/or existence of effluent limits for discharge to the Publicly Owned Treatment Works (POTW). The list of indicator parameters may be adjusted based on experience gained during remediation.

2 Metals samples are unfiltered (i.e. Total Metals).

2.0
TEMPORARY STRUCTURES
CONSTRUCTION SAMPLING AND ANALYSIS

2.1 CONSTRUCTION MATERIALS SOURCE TESTING

2.1.1 Sampling Objective

The materials acquired from off-site to be used for construction in the Gill Creek Remediation are to be sampled and analyzed. The chemical analytical data will be used to evaluate the acceptance of the construction materials. If the material source is a previous remediation site or otherwise potentially contaminated, the prior analytical results will be reviewed to determine if any additional sampling and analysis is required.

2.1.2 Sampling Location and Frequency

The cofferdam construction materials to be sampled include:

rockfill
earthfill
filter materials, and
sand bag fill materials.

The diversion structures construction materials to be sampled are:

sand bag fill materials.

The temporary work area structures construction materials will come from borrow sources to be identified by the Contractor. The materials to be sampled are:

drain gravel aggregate, and
aggregate for concrete and asphaltic pavements

A minimum of five grab samples per material type will be collected and composited prior to analysis. Additionally, one field duplicate of the earthfill and one of the drain gravel aggregate will be collected.

2.1.3 Sample Designation

All samples will have a label attached which will be filled out using waterproof ink. The sample identification numbers will be proceeded by the letters GCCM. The sample designation shall be recorded on the Field Sampling Form (Figure 1-1).

2.1.4 Sampling Equipment and Procedures

Composited grab samples will be collected from potential borrow sources. This section describes the equipment required and the procedures for collection of the materials.

Equipment List

Shovel
Stainless steel bulk sample mixing containers (bowl)
Stainless steel trowels or spoons
Stainless steel instrument to crush samples (if necessary)
Sample containers
Sample labels
Sealable plastic bags
Ice chest (sample shuttle)
Ice, blue ice, or other cooling substance
Field sampling forms
Appropriate health and safety equipment
Appropriate decontamination equipment

Procedure

The potential borrow sources will be identified, and the appropriate decontaminated sampling equipment will be collected prior to proceeding to a sample location. Samples of potential construction materials shall be taken from representative areas of identified sources.

For the composited grab samples, at each desired location, clear the surface of debris and nonrepresentative material with a decontaminated shovel or trowel. The grab samples will be collected into the stainless steel mixing container using a second trowel or spoon. Repeat for each of the five areas selected for grab samples. When the five grab samples of the material are collected into the mixing container, mix the material. Scoop the mixed material into the appropriate sample container. The sample containers will be labeled and placed in an ice chest with ice packs for storage and shipment to the analytical laboratory under chain-of-custody procedures.

A minimum volume of 32 ounces will be collected of each material. The maximum dimension allowed for the sample particles is one centimeter. Material larger than this must be crushed prior to shipment to the laboratory. Samples collected for volatile organics analysis will not be crushed.

After each sample is obtained, equipment used in the sampling process, including trowels, shovels, and the hand-driven sampler will be decontaminated prior to reuse. Sampling equipment decontamination will be completed according to the decontamination procedures specified in Section 1.5.

2.1.5 Sample Handling and Analysis

Samples will be collected into sample containers supplied by the laboratory and preserved as specified in Table 1-2. After collection, samples for chemical analysis will be stored, handled, shipped and tracked according to Section 1.2.

Samples will be analyzed for the following parameters by the methods listed in Table 1- 4:

- Toxicity Characteristic Leachate Potential (TCLP) - analytes listed in Table 1-7
- Total Priority Pollutant List compounds (40 CRF Part 122, Appendix D)
- Target Analyte List Metals - (U.S. EPA Contract Laboratory Program Statement of Work for Inorganics Analysis 788 Rev. 2/89 and 6/89)
- Target Compound List Organics - (U.S. EPA Contract Laboratory Program Statement of Work for Organics Analysis OLMO1.0 Rev. OLMO1.1.)
- PCBs per Table 1-8
- Cyanide (total, amenable and reactive)

Sulfide reactivity
Total Chlorinated Hydrocarbon (TCH) Scan - per Du Pont's specifications
pH

If the source of the material is potentially contaminated, the Owner must be consulted to determine if additional analysis will be required.

2.2 RIVER BANK MATERIALS REMOVED DURING COFFERDAM CONSTRUCTION

2.2.1 Sampling Objective

The materials removed from the river bank during construction of the cofferdam will need to be properly disposed. The purpose of this sampling is to characterize the soils for disposal approval based on RCRA and TSCA requirements.

2.2.2 Sample Location and Frequency

Five composited soil samples from the west bank of Gill Creek were obtained in March 1992 during test pit excavations for the 006/007 outfall relocation. These data were summarized in a May 4, 1992 summary report by Du Pont, and are considered to adequately characterize the soils that may be removed from the bank during the cofferdam construction.

The soils from the east bank require characterization. To acquire the additional data, two composited soil samples and one duplicate and one spike will be collected. Two locations will be selected and soil samples to bedrock will be collected by coring.

2.2.3 Sample Designation

All samples will have a label attached which will be filled out using waterproof ink. The sample identification numbers will be sequential and will be proceeded by the letters PCS.

2.2.4 Sampling Equipment and Procedures

Composited soil samples will be collected from the cores. This section describes the equipment required, and the procedures for collection of the materials.

A decontaminated split spoon sampler on a 2-1/2" ID hollow stem auger will be advanced in accordance with ASTM D-1586. A composited sample of a minimum volume of 32 ounces will be collected from the entire length of each core. Rocks, fill, etc. will not be included into the composite sample.

Prior to moving to a new sample location, equipment used in the sampling process, including the split spoon sampler and the hollow stem auger will be thoroughly decontaminated prior to reuse. Sampling equipment decontamination will be completed according to the decontamination procedures specified in Section 1.5.

2.2.5 Sample Handling and Analysis

Samples will be collected into sample containers supplied by the laboratory and preserved according to Table 1-2.

The samples will be analyzed for the following parameters using the methods specified in Table 1-4 and 1-5:

- Toxicity Characteristic Leachate Potential (TCLP) - analytes listed in Table 1-7
- Total Priority Pollutant List compounds (40 CRF Part 122, Appendix D)
- Target Analyte List Metals - (U.S. EPA Contract Laboratory Program Statement of Work for Inorganic Analysis 788 Rev. 2/89 and 6/89)
- Target Compound List Organics (U.S. EPA Contract Laboratory Program Statement of Work for Organics Analysis OLMO1.0

Rev. OLMO1.1.)

PCBs per Table 1-8

Cyanide (total, amenable and reactive)

Sulfide reactivity

Total Chlorinated Hydrocarbon (TCH) Scan - per Du Pont's specifications

pH

3.0 CREEK DRAWDOWN SAMPLING AND ANALYSIS

3.1 DRAWDOWN WATER TURBIDITY SAMPLING

3.1.1 Sampling Objective

The purpose of this sampling is to establish the baseline and maximum turbidities for discharge of drawdown waters from unremediated areas to the Niagara River. Drawdown waters from remediated areas may be pumped directly to the Niagara River without measuring discharge turbidities.

3.1.2 Sample Location and Frequency

Samples should be collected within the unremediated area(s) by field personel at four equally spaced locations along the extent of the creek bed covered with water, and the turbidity measured using a portable turbidity meter. The average turbidity measurement in each area will be considered the baseline turbidity.

During discharge of the drawdown water to the Niagara River, the turbidity meter will be used to measure the turbidity of samples collected every 20 minutes from each discharge line to the river.

3.1.3 Sample Designation

Turbidity readings should be identified with the letters GCW followed by sequential numbering. As the readings are taken, the time, reading identification, and results will be recorded in a Field Log Notebook.

3.1.4 Sampling Equipment and Procedures

The manufacturer's instruction booklet for the use of the turbidity meter shall be strictly followed for calibration of and acquiring measurements with the instrument. Records of turbidity meter calibration should be maintained in the Field Log Notebook.

Equipment List

Portable turbidity meter measuring in NTUs
Field Log Notebook and location map
Appropriate health and safety equipment
Appropriate decontamination equipment
Turbidity Standards

Procedure

To establish the baseline turbidity, turbidity will be measured separately on samples taken from four equally spaced locations within the unremediated area(s) along the extent of the creek bed covered with water. Measurements should be made on samples collected from as near to mid-depth and the centerline of the creek as possible. The four readings from each unremediated area should be averaged to establish the baseline turbidity.

During drawdown of Gill Creek, samples should be collected and analyzed every 20 minutes for each discharge line to the river. If any turbidity measurement should exceed 17 NTU's or exceed the baseline turbidity by more than 10 NTUs, whichever is more stringent, another sample should be taken and the Owner notified immediately. Discharge to the river from the corresponding unremediated area will be ceased if the subsequent sample also exceeds 17 NTU's or exceeds the baseline turbidity by 10 NTU's.

4.0
SEDIMENT REMOVAL SAMPLING AND ANALYSIS

4.1 AREA 3 SEDIMENT SAMPLING

4.1.1 Sampling Objective

Sediments removed from Area 3 should be sampled to verify that they are non-liquid and to determine if they are subject to land disposal restrictions.

4.1.2 Sample Location and Frequency

A minimum of one grab sample should be collected from the sediments when they are stockpiled in the creek bed to conduct the Paint Filter Liquids Test (PFLT). Additional PFLT samples may be required at different drain times to determine the length of time the sediments should typically drain prior to removal from the creek bed and at different points in time during transfer from the pile to the sediment container.

One composite sample should be be collected from each bin (e.g., railcar bin or rolloff box) containing sediments and analyzed for EP Toxicity - gamma-BHC. Additionally, one duplicate sample should be collected from one of the bins and submitted for the same analysis.

4.1.3 Sample Designation

All PFLT samples should be collected by field personnel, and PFLT results be recorded in the Field Log Notebook.

All samples for EP toxicity - gamma-BHC analysis should be collected by contract laboratory personnel and should have a label attached (filled out using waterproof ink). Sample identification numbers should be sequential and proceeded by the characters GCS3. The sample designation should be recorded on a Chain-of-Custody record (Figure 1-1).

4.1.4 Sampling Equipment and Procedures

Equipment required and the procedures for sample collection and field testing are presented below.

Equipment List

Sample containers
Sample labels
Sample seals
Sealable plastic bags
Ice chest (sample shuttle)
Ice, blue ice, or other cooling substance
Field Log Notebook
Chain-of-Custody Records
Appropriate health and safety equipment
Appropriate decontamination equipment
Stainless steel trowel or scoop
PFLT equipment:
- Beaker or other glass or stainless steel collection vessel
- Conical paint filters - mesh number 60 (fine meshed size)
- Glass funnel
- Ring stand and ring, or tripod
- Graduated beaker
- Graduated cylinder:

Sample collection and compositing equipment
- Sampling trier (36 to 48 inches long)
- Stainless steel mixing container (bowl)
- Stainless steel spatula or spoon

Procedures

Prior to proceeding to a sampling location, appropriate clean sampling equipment and health and safety equipment should be obtained.

Field personnel should collect grab sample(s) from sediments stockpiled in the creek bed using a clean trowel or scoop and conduct the PFLT in accordance with the procedures outlined in EPA Method 9095 included in Appendix A.

At the end of each sampling day for Area 3 sediment, all sampling equipment must be decontaminated as specified in Section 1.5.

Contract laboratory personnel should use a sampling trier to collect grab samples from each bin for compositing. The clean sampling trier should be inserted into the sediments at a 0 to 45 degree angle to minimize sample spillage. The trier should be rotated once or twice to cut a core of material and slowly withdrawn, making sure that the slot is facing upward. The sample should be transferred into a stainless steel mixing container with the aid of a clean spatula or spoon. Trier grab sampling should be repeated at 6 to 8 different points in each bin, and the grab samples should be combined in the same mixing container. When all samples for a bin have been gathered, the contents of the mixing container should be thoroghly mixed with a clean stainless steel spatula or spoon and transferred into an appropriate sample container. The sample container should be capped and the label and seal attached. The sample container should be placed into a sealable plastic bag and into an ice chest cooled with ice or blue ice.

If sampling using the trier fails, then a composite sample should be obtained by gathering six to eight grab samples with a clean stainless steel trowel or scoop from various locations and depths in the bin. The grab samples should be placed into a stainless steel mixing container, thoroghly mixed with a clean stainless steel spatula or spoon, and tranferred into an appropriate sample container. The sample container should be capped and the label and seal attached. The sample container should be placed into a sealable plastic bag and into an ice chest cooled with ice or blue ice.

Prior to collecting EP toxicity - gamma-BHC samples from the next bin, all sampling equipment must be decontaminated as specified in Section 1.5.

4.1.5 Sample Handling and Analysis

Samples should be collected and preserved in appropriate containers (supplied by the laboratory) as specified in Table 1-1.

After collection and preservation, samples should be stored, handled, shipped, and tracked according to Section 1.2.1.

Samples should be analyzed for the following parameters:

- PFLT (conducted in the field on stockpiled sediments)
- gamma-BHC using EP Toxicity procedure

4.2 AREA 1 SEDIMENT SAMPLING

4.2.1 Sampling Objective

Sediments removed from Area 1 should be sampled to verify that they are non-liquid.

4.2.2 Sample Location and Frequency

A minimum of one grab sample should be collected from each sediment pile in the Sediment Staging Area to conduct the PFLT. Additional PFLT samples may be required at different drain times to determine the length of time the sediments should typically drain and at different points in time during transfer from the pile to the sediment container. Based on the experience gained in analyzing samples for PFLT, the Owner may revise the frequency of sampling for PFLT.

4.2.3 Sample Designation

All PFLT samples should be collected by field personnel, and PFLT results should be recorded in the Field Log Notebook.

4.2.4 Sampling Equipment and Procedures

Equipment required and the procedures for sample collection and field testing are presented below.

Equipment List

Field Log Notebook
Appropriate health and safety equipment
Appropriate decontamination equipment
Stainless steel trowel or scoop
PFLT equipment:
- Beaker or other glass or stainless steel collection vessel
- Conical paint filters - mesh number 60 (fine meshed size)
- Glass funnel
- Ring stand and ring, or tripod
- Graduated beaker

Procedure

Prior to proceeding to a sampling location, appropriate clean sampling equipment and health and safety equipment should be obtained.

Field personnel should collect grab sample(s) from sediments stockpiled in the Sediment Staging Area using a clean trowel or scoop and conduct the PFLT in accordance with the procedures outlined in EPA Method 9095 included in Appendix A.

At the end of each sampling day for Area 1 sediment, all sampling equipment must be decontaminated as specified in Section 1.5.

4.3 COBBLE BAR SAMPLING

4.3.1 Sampling Objective

The purpose of this sampling is to establish if there is a need for removal of the cobble bar and management options for cobble bar materials.

4.3.2 Sample Location and Frequency

The Owner will visually inspect the cobble bar materials. If the Owner decides to pursue leaving the materials in-place, a representative grab sample of the material should be collected. If the Owner decides to decontaminate and reuse the material, a representative sample of cobble bar rinsate should be collected.

(Decontamination of cobble bar material moved from Gill Creek to the Sediment Staging Area would include a final rinse, and a representative grab sample of this final rinsate should be collected.) If the Owner decides to dispose of the material based on visual inspection, sampling of this material is not necessary.

4.3.3 Sample Designation

Samples should be collected by contract laboratory personnel and should have a label attached (filled out using waterproof ink). Sample identification numbers should be sequential and proceeded by the characters GCCB. The sample designation should be recorded on a Chain-of-Custody record (Figure 1-1).

4.3.4 Sampling Equipment and Procedures

Equipment List

Sample containers
Sample labels
Sealable plastic bags
Ice chest (sample shuttle)
Ice, blue ice, or other cooling substance
Chain-of-Custody Records
Appropriate health and safety equipment
Appropriate decontamination equipment
Shovel
Stainless steel trowels, spatulas, or spoons
Rock hammer
Glass or stainless steel dipper (or scoop)

Procedure

Prior to proceeding to a sampling location, appropriate clean sampling equipment and health and safety equipment should be obtained.

If the Owner decides to pursue leaving the materials in-place, a representative grab sample of cobble bar material should be collected directly into the sample container using a clean stainless steel trowel or spoon. If necessary, larger size material may be sampled by breaking off a piece of a cobble with a rock hammer. The laboratory will be responsible for crushing and homogenizing the sample. The sample container should be capped and the label and seal attached. The sample container should be placed into a sealable plastic bag and into an ice chest cooled with ice or blue ice.

If the Owner decides to decontaminate and reuse the material, a representative sample of cobble bar final rinsate should be collected. Final rinsate should be sampled using a clean large stainless steel dipper scooped beneath the surface of the accumulated rinsate, being cautious not to stir or disturb the rinsate unnecessarily. The collected rinsate should be poured into appropriate sample containers, again minimizing disturbance and aeration of the rinsate as it is poured. The sample containers should be capped and the label and seal attached. The sample containers should be placed into sealable plastic bags and into the ice chest cooled with ice or blue ice.

After a representative sample is obtained, all sampling equipment must be decontaminated as specified in Section 1.5.

4.3.5 Sample Handling and Analysis

Samples should be collected and preserved in appropriate containers (supplied by the laboratory) as specified in Table 1-1. After collection and preservation, samples should be stored, handled, shipped, and tracked according to Section 1.2.1.

Samples should be analyzed for the following parameters using methods outlined in Section 1.4:

PCBs
Trichloroethylene (total composition)
Tetrachloroethylene (total composition)
gamma-BHC (total composition and EP toxicity)
Total Organic Carbon

For a rinsate sample, gamma-BHC EP toxicity analysis is not required.

4.4 GABION DECONTAMINATION SAMPLING

4.4.1 Sampling Objective

The purpose of this sampling is to verify gabion decontamination and to facilitate reuse beneath the Staub Road bridge.

4.4.2 Sample Location and Frequency

Decontamination of gabions moved from Gill Creek to the Sediment Staging Area will include a final rinse. A representative grab sample of the final rinsate should be collected.

4.4.3 Sample Designation

Samples should be collected by contract laboratory personnel and should have a label attached (filled out using waterproof ink). Sample identification numbers should be sequential and proceeded by the characters GCG. The sample designation should be recorded on a Chain-of-Custody record (Figure 1-1).

4.4.4 Sampling Equipment and Procedures

Depending upon the rinsate collection point and field conditions, alternative procedures and equipment may be required.

Equipment List

Sample containers
Sample labels
Sealable plastic bags
Ice chest (sample shuttle)
Ice, blue ice, or other cooling substance
Chain-of-Custody Records
Appropriate health and safety equipment
Appropriate decontamination equipment
Glass or stainless steel dipper (or scoop)

Procedure

Prior to proceeding to a sampling location, appropriate clean sampling equipment and health and safety equipment should be obtained.

Final rinsate should be sampled using a clean large stainless steel dipper scooped beneath the surface of the accumulated rinsate, being cautious not to stir or disturb the rinsate unnecessarily. The collected rinsate should be poured into appropriate sample containers, again minimizing disturbance and aeration of the rinsate as it is poured. The sample containers should be capped and the label and seal attached. The sample containers should be placed into sealable plastic bags and into an ice chest cooled with ice or blue ice.

After a representative sample is obtained, all sampling equipment must be decontaminated as specified in Section 1.5.

4.4.5 Sample Handling and Analysis

Samples should be collected and preserved in appropriate containers (supplied by the laboratory) as specified in Table 1-1. After collection and preservation, samples should be stored, handled, shipped, and tracked according to Section 1.2.1.

Samples should be analyzed for the following parameters using methods outlined in Section 1.4:

PCBs
Trichloroethylene (total composition)
Tetrachloroethylene (total composition)
gamma-BHC (total composition)
Total Organic Carbon

5.0 REMEDIATION WATER TREATMENT FACILITY SAMPLING AND ANALYSIS

This section summarizes the sampling and analyses required for the remediation water treatment facility (RWTF). During start-up, the first 2-3 weeks of operation as directed by the Owner, samples will be collected to confirm the design basis and evaluate equipment performance. After start-up, sampling will be performed to provide spot checks of equipment. POTW permit parameters, as modified by City of Niagara Falls letter of August 5, 1992, will be monitored at the 023 outfall during the remediation on a quarterly basis.

Start-up RWTF samples should be collected according to Table 5-1 and analyzed for the parameters listed in Table 1-3. Suggested reporting limits in Table 1-3 were selected on the basis of previous experience at the site and POTW effluent limits, but may not be achievable due to detectability of analytical equipment, matrix interferences, etc..

After start-up, RWTF samples should be collected according to Table 5-2 and analyzed for the parameters listed in Table 1-3. Should operating experience warrant, Owner will revise the list of parameters for analysis appropriately.

Quick turnaround of analytical results is also needed. Fastest turnaround (maximum 72 hours from sample collection) is needed throughout the project life for carbon bed samples (GCWT9A,B,C-# through GCWT11A,B,C,D-#). Turnaround for all other sample analyses should not exceed five (5) days during start-up and should not exceed 4 weeks thereafter.

5.1 WATER SAMPLING PROCEDURE

The equipment used during sampling includes:

pH meter (with automatic temperature compensation)
Specific conductivity meter
Thermometer

- Turbidimeter
- Sample bottles
- Sample labels
- Polyethylene or glass jar for pH measurement of samples
- Plastic squeeze bottle filled with deionized or distilled water
- Cooler with ice
- Chain of Custody form
- Waterproof pen
- Field Log Notebook

Two types of samples will be collected: grabs and 24 hour composites. Grab samples will be used to collect a given volume of water at one point in time. Twenty-four hour composite samples will consist of grab samples collected every eight hours and composited at the end of twenty-four hours. Samples will be collected from in-line sample ports. The locations of these ports are shown on the design drawings and in Figure 5-1. Observations made during sample collection will be recorded on the chain-of-custody record or other appropriate form.

Before collecting samples, the sampler shall verify that the electronic equipment (i.e., pH meter with temperature scale, turbidimeter and a conductivity meter) is operating properly. The pH and conductivity meters require calibration every day prior to use and must be recalibrated if they have been turned off. Calibration records (times and readings) should be maintained. Calibration shall be performed per the manufacturer's instructions.

To obtain a sample, the following procedure will be used:

1. Obtain sample bottles with preservative from the analytical laboratory. Several extra sample containers should be obtained in case of breakage or other problem.

2. Ensure that the treatment system has been in operation for at least 15 minutes prior to sampling.

3. Open the appropriate sampling port and let run for 1 minute and 45 seconds. Purge water should be collected and emptied into the influent storage tanks.

4. Fill the decontaminated sample bottle directly from the port. Cap the sample bottle and close the sampling port. VOA vials should be filled completely, inverted, and flicked with a finger to ensure no air bubbles are present. Presence of air bubbles necessitates resampling.

5. Place the sample on ice in a cooler.

6. Record flow meter readings and sample collection, including field measurements of pH, conductivity turbidity and temperature.

5.2 CARBON VESSEL START-UP

Each carbon vessel must be properly primed and prepared per carbon suppliers instructions when initially brought on line. This usually involves presoaking the carbon. Whenever a newly charged carbon vessel is brought on line, its effluent will be sampled according to Table 5-3 (in addition to other samples as required by Tables 5-1 or 5-2 or as requested by the Owner) to check for channeling.

5.3 SAMPLING FOR STEAM STRIPPER ALTERNATIVE

(RESERVED)

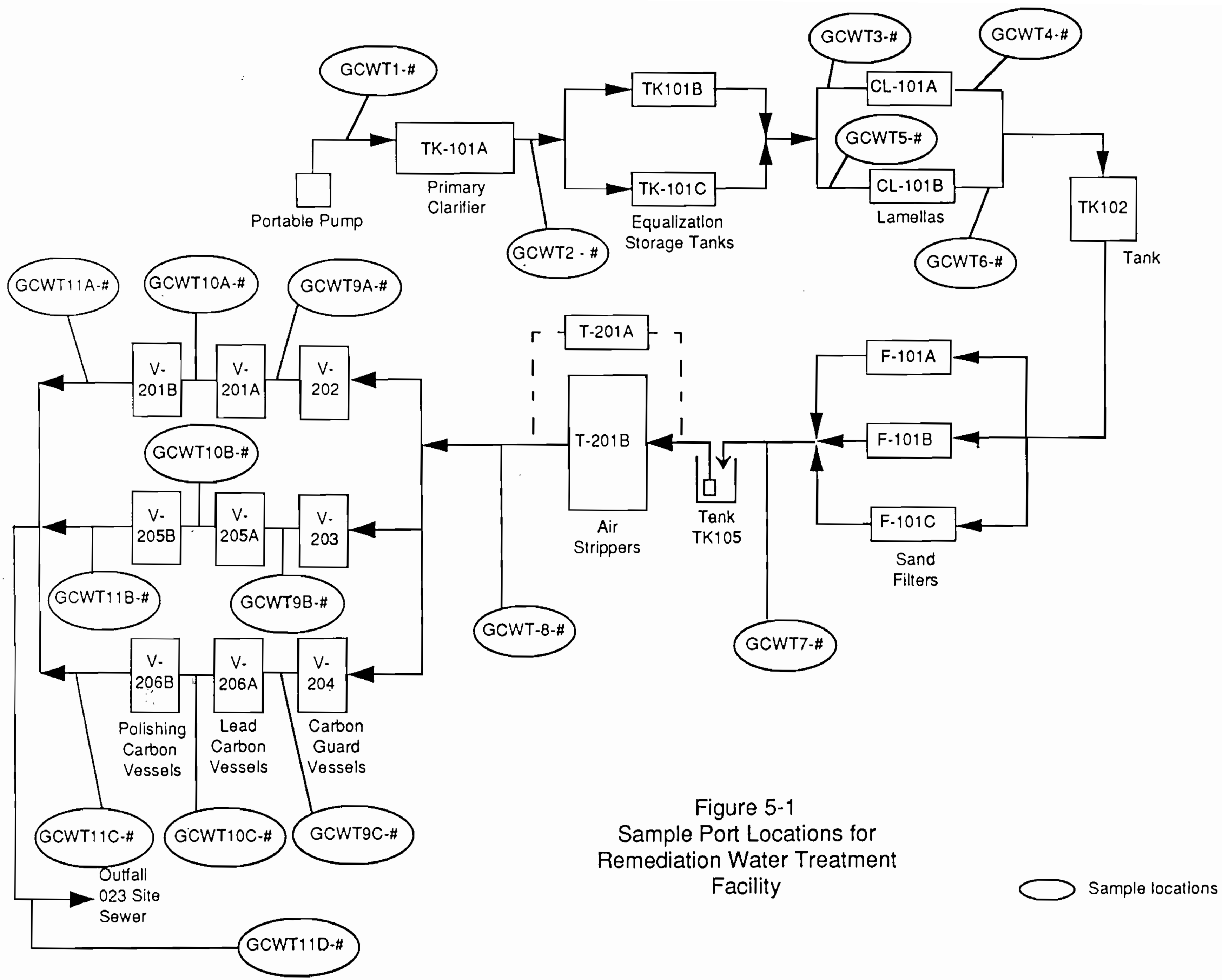

Figure 5-1
Sample Port Locations for
Remediation Water Treatment
Facility

TABLE 5-1

SAMPLING PROTOCOL FOR STARTUP OF REMEDIATION WATER TREATMENT FACILITY[4]

Sample Location No.	Sample Location/Description	Frequency	Indicator Analytical Parameters[3]	Type of Sample
GCWT1-#	Primary Clarifier Influent	1 per week (M)	Volatile Organics	Grab
			Semivolatile Organics	24 hr composite[1]
			Pesticides/PCBs	24 hr composite[1]
			Total Phenols	Grab
			Total Metals	24 hr composite[1]
			Total Cyanide	Grab
			Total Alkalinity	Grab
			pH[2]	Grab
			TSS	24 hr composite[1]
		3 per week (M,W,F)	Turbidity[2]	Grab
GCWT2-#	Primary Clarifier Effluent	1 per week (M)	TSS	24 hr composite[1]
		Daily	Turbidity[2]	Grab
GCWT3-#	Lamella Clarifier (CL-101A) Influent	Daily	Turbidity[2]	Grab
		3 per week (M,W,F)	TSS	24 hr composite[1]
GCWT4-#	Lamella Clarifier (CL-101A) Effluent	Daily	Turbidity[2]	Grab
		3 per week (M,W,F)	TSS	24 hr composite[1]
GCWT5-#	Lamella Clarifier CL-101B) Influent	Daily	Turbidity[2]	Grab
		3 per week (M,W,F)	TSS	24 hr composite[1]

TABLE 5-1
(Continued)

Sample Location No.	Sample Location/Description	Frequency	Indicator Analytical Parameters[3]	Type of Sample
GCWT6-#	Lamella Clarifier (CL101B) Effluent	Daily	Turbidity[2]	Grab
		3 per week (M,W,F)	TSS	24 hr composite[1]
GCWT7-#	Sand filter Effluent	3 per week (M,W,F)	Volatile Organics	Grab
			Semivolatile Organics	24 hr composite[1]
			Pesticides/PCBs	24 hr composite[1]
			Total Phenols	Grab
			Total Metals	24 hr composite[1]
			TSS	24 hr composite[1]
			Total Alkalinity	Grab
			pH[2]	Grab
		Daily	Turbidity[2]	Grab
GCWT8-#	Air Stripper Effluent	3 per week (M,W,F)	Volatile Organics	Grab
			Semivolatile Organics	24 hr composite[1]
GCWT9A-# GCWT9B-# GCWT9C-#	Carbon Guard Bed Effluent	3 per week (M,W,F)	Volatile Organics	Grab
			Pesticides/PCBs	24 hr composite[1]
			Semivolatile Organics	24 hr composite[1]
GCWT10A-# GCWT10B-# GCWT10C-#	Lead Carbon Vessel Effluent	3 per week (M,W,F)	Volatile Organics	Grab
			Semivolatile Organics	24 hr composite[1]
			Pesticides/PCBs	24 hr composite[1]

TABLE 5-1
(Concluded)

Sample Location No.	Sample Location/Description	Frequency	Indicator Analytical Parameters[3]	Type of Sample
GCWT11A-#	Polishing Carbon	3 per week	Volatile Organics	Grab
GCWT11B-#	Vessel Effluent	(M,W,F)	Semivolatile Organics	24 hr composite[1]
GCWT11C-#	Discharge to		Pesticides/PCBs	24 hr composite[1]
	Outfall 023		Total Metals	24 hr composite[1]
			Total Phenols	Grab
			Total Alkalinity	Grab
			pH	Continuous
			Total Cyanide	Grab

1 Grab samples for 24-hour composite shall be collected approximately every 8 hours and composited at the end of 24 hours. A single grab sample may be used in leiu of a composite sample upon the approval or direction of the Owner.

2 Field analysis.

3 Indicator parameters are given in Table 1-2.

4 Frequency and type of sampling may vary from that detailed above as directed and approved by Owner.

TABLE 5-2

SAMPLING PROTOCOL FOR NORMAL OPERATION OF REMEDIATION WATER TREATMENT FACILITY[4]

Sample Location No.	Sample Location/Description	Frequency	Indicator Analytical Parameters[3]	Type of Sample
GCWT1-#	Primary Clarifier Influent	1 every 2 weeks (M)	Volatile Organics	Grab
			Semivolatile Organics	24 hr composite[1]
			Pesticides/PCBs	24 hr composite[1]
			Total Phenols	Grab
			Total Metals	24 hr composite[1]
			Total Cyanide	Grab
			TSS	24 hr composite[1]
			Total Alkalinity	Grab
			pH[2]	Grab
		2 per week (M, Th)	Turbidity[2]	Grab
GCWT2-#	Primary Clarifier Effluent	1 every 2 weeks (M)	TSS	24 hr composite[1]
		2 per week (M, Th)	Turbidity[2]	Grab
GCWT3-#	Lamella Clarifier (CL-101A) Influent	Daily	Turbidity[2]	Grab
GCWT4-#	Lamella Clarifier (CL-101A) Effluent	Daily	Turbidity[2]	Grab
GCWT5-#	Lamella Clarifier (CL-101B) Influent	Daily	Turbidity[2]	Grab

TABLE 5-2
(Continued)

Sample Location No.	Sample Location/Description	Frequency	Indicator Analytical Parameters[3]	Type of Sample
GCWT6-#	Lamella Clarifier (CL-101B) Effluent	Daily	Turbidity[2]	Grab
GCWT7-#	Sand Filter Effluent	1 every 2 weeks (M)	Volatile Organics	Grab
			Semivolatile Organics	24 hr composite[1]
			Pesticides/PCBs	24 hr composite[1]
			Total Metals	24 hr composite[1]
			TSS	24 hr composite[1]
		Daily	Total Alkalinity	Grab
			pH[2]	Grab
			Turbidity[2]	Grab
GCWT8-#	Air Stripper Effluent	3 per week (M,W,F)	Volatile Organics	Grab
			Semivolatile Organics	24 hr composite[1]
GCWT9A-# GCWT9B-# GCWT9C-#	Carbon Guard Bed Effluent	3 per week (M,W,F)	PCBs	24 hr composite[1]
GCWT10A-# GCWT10B-# GCWT10C-#	Lead Carbon Vessel Effluent	3 per week (M,W,F)	Volatile Organics	Grab
			Semivolatile Organics	24 hr composite[1]
			Pesticides/PCBs	24 hr composite[1]

TABLE 5-2
(Concluded)

Sample Location No.	Sample Location/Description	Frequency	Indicator Analytical Parameters[3]	Type of Sample
GCWT11A-# GCWT11B-# GCWT11C-#	Polishing Carbon Vessel Effluent Discharge to Outfall 023	1 per week (M) 1 every 2 weeks (M)	Volatile Organics	Grab
			Semivolatile Organics	24 hr composite[1]
			Pesticides/PCBs	24 hr composite[1]
			Total Metals	24 hr composite[1]
			Total Cyanide	Grab
			Total Phenols	Grab
			pH	Continuous
			Total Alkalinity	Grab

1 Grab samples for 24-hour composite shall be collected every 8 hours and composited at the end of 24 hours.

2 Field analysis.

3 Indicator analytical parameters are listed in Table 1-2.

4 Frequency and type of analysis may vary from above based on experience gained during operations. Any changes shall require approval by Owner.

TABLE 5-3

CARBON ADSORPTION SYSTEM STARTUP PERFORMANCE MONITORING

Sample Location No.	Sample Location/Description	Frequency	Indicator Analytical Parameters[1]
GCWT9A-# GCWT9B-# GCWT9C-#	Carbon Guard Bed Effluent	after 3 bed volumes	Volatile Organics
GCWT10A-# GCWT10B-# GCWT10C-#	Lead Carbon Vessel Effluent	after 3 bed volumes	Volatile Organics
GCWT11A-# GCWT11B-# GCWT11C-#	Polishing Carbon Vessel Effluent Discharge to Outfall 023	after 3 bed volumes	Volatile Organics

1 All samples will be grab type.
Indicator analytical Parameters are listed in Table 1-2.

6.0 DEMOBILIZATION/DECONTAMINATION SAMPLING AND ANALYSIS

This section presents the sampling and analysis to be performed during the demobilization of the creek diversion structures and decontamination of the remediation work areas.

6.1 DIVERSION STRUCTURE DEMOBILIZATION SAMPLING AND ANALYSIS

6.1.1 Sampling Objective

The objective of this sampling is to enable the Owner to determine how to manage diversion structure (including cofferdam) materials.

6.1.2 Sample Location and Frequency

One representative grab sample should be collected from the sandbag fill material on creekside face of the cofferdam (Diversion Structure No. 2). Additionally, Owner may direct sampling of other cofferdam material if the Owner is concerned about potential contamination of other parts of the structure (e.g., if there has been a significant overtopping event).

One representative grab sample should be collected from sandbag fill material on the downstream (southern) face of Diversion Structure No. 1. For Diversion Structures Nos. 3, 3A (if constructed), and 4, one representative grab sample of sandbag fill material should be collected from each side (face) of the diversion structures. Additionally, one duplicate and one matrix spike sample of sandbag fill material from Diversion Structure No. 3 or 4 should be collected.

For sandbags that the Owner intends to dispose of, sampling is not necessary. (The Owner can instead consider available sediment data from the adjacent area.)

Appendix D

APPENDIX D

OPERATION MONITORING DATA FOR WATER TREATMENT SYSTEM TEST RUN

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	CHEMICAL NAME	FIELD BLANK	ID	GCWT-01 (AVERAGE) (ppb)	ID	GCWT-02 (ppb)	ID	GCWT-03 (ppb)	ID	GCWT-04 (ppb)	ID	GCWT-05 (ppb)	ID	GCWT-06 (ppb)	ID	GCWT-07 (AVERAGE) (ppb)	ID	GCWT-08 (ppb)	ID
2	METHOD 624 - VOLATILE ORGANICS (AQUEOUS)																		
3	1,1,1-Trichloroethene	3.80000	U	95.00000	U	-	-	-	-	-	-	-	-			285.00000	U	3.80000	U
4	1,1,2,2-Tetrachloroethene	6.90000	U	3,000.00000		-	-	-	-	-	-	-	-			14,000.00000	E	3.60000	J
5	1,1-Dichloroethene	2.80000	U	70.00000	U	-	-	-	-	-	-	-	-			210.00000	U	2.80000	U
6	Benzene	4.40000	U	110.00000	U	-	-	-	-	-	-	-	-			236.50000	J	4.40000	U
7	Carbon Tetrachloride	2.80000	U	70.00000	U	-	-	-	-	-	-	-	-			210.00000	U	2.80000	U
8	Chlorobenzene	6.00000	U	60.00000	J	-	-	-	-	-	-	-	-			220.00000	J	6.00000	U
9	Chloroform	1.60000	U	170.00000		-	-	-	-	-	-	-	-			285.00000		1.60000	U
10	cis-1,2-Dichloroethene	1.60000	U	1,400.00000		-	-	-	-	-	-	-	-			665.00000		1.60000	U
11	Methylene chloride	2.80000	U	760.00000		-	-	-	-	-	-	-	-			210.00000	U	2.80000	U
12	Tetrachloroethene	4.10000	U	1,500.00000		-	-	-	-	-	-	-	-			1,950.00000		4.10000	U
13	trans-1,2-Dichloroethene	1.60000	U	39.00000	J	-	-	-	-	-	-	-	-			113.00000	J	1.60000	U
14	Trichloroethene	1.90000	U	3,800.00000		-	-	-	-	-	-	-	-			6,650.00000		1.90000	U
15	Vinyl chloride	5.00000	U	150.00000	J	-	-	-	-	-	-	-	-			375.00000	U	5.00000	U
16	METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)																		
17	1,2,3-Trichlorobenzene	1.90000	U	92.50000		-	-	-	-	-	-	-	-			195.00000	E	1.90000	U
18	1,2,4-Trichlorobenzene	1.90000	U	785.00000	E	-	-	-	-	-	-	-	-			1,500.00000	E	24.00000	
19	1,2-Dichlorobenzene	1.90000	U	510.00000	E	-	-	-	-	-	-	-	-			1,250.00000	E	1.90000	U
20	1,3-Dichlorobenzene	1.90000	U	66.50000		-	-	-	-	-	-	-	-			155.00000	E	1.90000	U
21	1,4-Dichlorobenzene	4.40000	U	395.00000	E	-	-	-	-	-	-	-	-			1,000.00000	E	4.40000	U
22	2-Chlorophenol	3.30000	U	18.15000	U	-	-	-	-	-	-	-	-			81.65000	U	3.30000	U
23	Acenaphthene	1.90000	U	10.45000	U	-	-	-	-	-	-	-	-			48.45000	U	1.90000	U
24	Anthracene	1.90000	U	10.45000	U	-	-	-	-	-	-	-	-			48.45000	U	1.90000	U
25	Fluoranthene	2.20000	U	12.10000	U	-	-	-	-	-	-	-	-			56.10000	U	2.20000	U
26	Hexachlorobenzene	1.90000	U	10.45000	U	-	-	-	-	-	-	-	-			48.45000	U	1.90000	U
27	Hexachlorobutadiene	.90000	U	4.95000	U	-	-	-	-	-	-	-	-			29.00000		.90000	U
28	Hexachloroethane	1.60000	U	8.40000		-	-	-	-	-	-	-	-			12.00000		1.60000	U
29	Naphthalene	1.60000	U	8.80000	U	-	-	-	-	-	-	-	-			40.80000	U	1.60000	U
30	Phenanthrene	5.40000	U	28.15000	J	-	-	-	-	-	-	-	-			137.70000	U	5.40000	U
31	Pyrene	1.90000	U	10.45000	U	-	-	-	-	-	-	-	-			48.45000	U	1.90000	U
32	METHOD 608 - PESTICIDES/PCBS (AQUEOUS)																		
33	alpha-BHC	.00500		260.00000	D*	-	-	-	-	-	-	-	-			800.00000	D*	-	-
34	Aroclor 1248	.05000	U	28.00000		-	-	-	-	-	-	-	-			2.50000		-	-
35	Aroclor 1254	.05000	U	5.00000	U	-	-	-	-	-	-	-	-			.50000	U	-	-
36	beta-BHC	.00500	U	26.00000	D*	-	-	-	-	-	-	-	-			55.00000	D*	-	-
37	delta-BHC	.00500	U	3.70000	DJ*	-	-	-	-	-	-	-	-			16.00000	DJ*	-	-
38	gamma-BHC (Lindane)	.00200	J	70.00000	D*	-	-	-	-	-	-	-	-			225.00000	D*	-	-

DNI 6037505

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	CHEMICAL NAME	FIELD BLANK	ID	GCWT-01 (AVERAGE) (ppb)	ID	GCWT-02 (ppb)	ID	GCWT-03 (ppb)	ID	GCWT-04 (ppb)	ID	GCWT-05 (ppb)	ID	GCWT-06 (ppb)	ID	GCWT-07 (AVERAGE) (ppb)	ID	GCWT-08 (ppb)	ID
39	TOTAL METALS																		
40	Aluminum - Total	60.00000	U	6,860.00000		-	-	-	-	-	-	-	-			1,070.00000		-	-
41	Cadmium - Total	.30000	U	.40000		-	-	-	-	-	-	-	-			.90000		-	-
42	Chromium - Total	10.00000	U	44.00000		-	-	-	-	-	-	-	-			110.00000		-	-
43	Copper - Total	10.00000	U	50.00000		-	-	-	-	-	-	-	-			37.00000		-	-
44	Iron - Total	30.00000	U	8,050.00000		-	-	-	-	-	-	-	-			864.00000		-	-
45	Lead - Total	2.00000		260.00000		-	-	-	-	-	-	-	-			13.00000		-	-
46	Mercury - Total	.20000	U	1.80000		-	-	-	-	-	-	-	-			.50000		-	-
47	Nickel - Total	30.00000	U	37.00000		-	-	-	-	-	-	-	-			30.00000	U	-	-
48	Silicon - Total	550.00000		28,700.00000		-	-	-	-	-	-	-	-			18,600.00000		-	-
49	Zinc - Total	20.00000	U	394.00000		-	-	-	-	-	-	-	-			78.00000		-	-
50	WET CHEMISTRY ANALYSIS																		
51	Cyanide - Total	10.00000	U	10.00000	U	-	-	-	-	-	-	-	-			-	-	-	-
52	Non-Filterable Residue (103oC)	4,000.00000	U	254,000.00000		156,000.00000		26,000.00000		20,500.00000		30,000.00000				25,000.00000		-	-
53	pH																		
54	Total Alkalinity	92,400.00000		210,000.00000		-	-	-	-	-	-	-	-			326,000.00000		-	-
55	Total Recoverable Phenolics	6.00000	U	18.00000		-	-	-	-	-	-	-	-			6.40000		-	-
56																			
57																			
58	Total hours of Flow	0.00																	
59																			
60																			
61																			
62																			
63																			
64																			
65																			
66																			
67																			
68																			
69																			
70																			
71	Lab Name: Recra Environmental, Inc.																		
72	Lab Id: RECNY																		
73	Customer:																		
74	Job No: A92-2857																		
75	SDG No: 091819																		

DNI 6037506

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
1	CHEMICAL NAME	GCWT-09A (ppb)	ID	GCWT-09B (ppb)	ID	GCWT-09C (ppb)	ID	GCWT-10A (ppb)	ID	GCWT-10B (ppb)	ID	GCWT-10C (ppb)	ID	GCWT-11A (ppb)	ID	GCWT-11B (ppb)	ID	GCWT-11C (ppb)	ID
2	METHOD 624 - VOLATILE ORGANICS (AQUEOUS)																		
3	1,1,1-Trichloroethane	3.80000	U	3.80000	U			3.80000	U	3.80000	U			3.80000	U	3.80000	U		
4	1,1,2,2-Tetrachloroethane	6.90000	U	6.90000	U			6.90000	U	6.90000	U			6.90000	U	6.90000	U		
5	1,1-Dichloroethene	2.80000	U	2.80000	U			2.80000	U	2.80000	U			2.80000	U	2.80000	U		
6	Benzene	4.40000	U	4.40000	U			4.40000	U	4.40000	U			4.40000	U	4.40000	U		
7	Carbon Tetrachloride	2.80000	U	2.80000	U			2.80000	U	2.80000	U			2.80000	U	2.80000	U		
8	Chlorobenzene	6.00000	U	6.00000	U			6.00000	U	6.00000	U			6.00000	U	6.00000	U		
9	Chloroform	1.60000	U	1.60000	U			1.60000	U	1.60000	U			1.60000	U	1.60000	U		
10	cis-1,2-Dichloroethene	1.60000	U	1.60000	U			1.60000	U	1.60000	U			1.60000	U	1.60000	U		
11	Methylene chloride	2.80000	U	2.80000	U			2.80000	U	2.80000	U			2.80000	U	2.80000	U		
12	Tetrachloroethene	4.10000	U	4.10000	U			4.10000	U	4.10000	U			4.10000	U	4.10000	U		
13	trans-1,2-Dichloroethene	1.60000	U	1.60000	U			1.60000	U	1.60000	U			1.60000	U	1.60000	U		
14	Trichloroethene	1.90000	U	1.90000	U			1.90000	U	1.90000	U			1.90000	U	1.90000	U		
15	Vinyl chloride	5.00000	U	5.00000	U			5.00000	U	5.00000	U			5.00000	U	5.00000	U		
16	METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)																		
17	1,2,3-Trichlorobenzene	1.90000	U	1.90000	U			1.90000	U	1.90000	U			1.90000	U	1.90000	U		
18	1,2,4-Trichlorobenzene	1.90000	U	1.90000	U			1.90000	U	1.90000	U			1.90000	U	1.90000	U		
19	1,2-Dichlorobenzene	1.90000	U	1.90000	U			1.90000	U	1.90000	U			1.90000	U	1.90000	U		
20	1,3-Dichlorobenzene	1.90000	U	1.90000	U			1.90000	U	1.90000	U			1.90000	U	1.90000	U		
21	1,4-Dichlorobenzene	4.40000	U	4.40000	U			4.40000	U	4.40000	U			4.40000	U	4.40000	U		
22	2-Chlorophenol	3.30000	U	3.30000	U			3.30000	U	3.30000	U			3.30000	U	3.30000	U		
23	Acenaphthene	1.90000	U	1.90000	U			1.90000	U	1.90000	U			1.90000	U	1.90000	U		
24	Anthracene	1.90000	U	1.90000	U			1.90000	U	1.90000	U			1.90000	U	1.90000	U		
25	Fluoranthene	2.20000	U	2.20000	U			2.20000	U	2.20000	U			2.20000	U	2.20000	U		
26	Hexachlorobenzene	1.90000	U	1.90000	U			1.90000	U	1.90000	U			1.90000	U	1.90000	U		
27	Hexachlorobutadiene	.90000	U	.90000	U			.90000	U	.90000	U			.90000	U	.90000	U		
28	Hexachloroethane	1.60000	U	1.60000	U			1.60000	U	1.60000	U			1.60000	U	1.60000	U		
29	Naphthalene	1.60000	U	1.60000	U			1.60000	U	1.60000	U			1.60000	U	1.60000	U		
30	Phenanthrene	5.40000	U	5.40000	U			5.40000	U	5.40000	U			5.40000	U	5.40000	U		
31	Pyrene	1.90000	U	1.90000	U			1.90000	U	1.90000	U			1.90000	U	1.90000	U		
32	METHOD 608 - PESTICIDES/PCBS (AQUEOUS)																		
33	alpha-BHC	.52000		.71000				.37000		.33000	D*			.21000	D*	.24000	D*		
34	Aroclor 1248	1.30000		1.80000				1.40000		1.10000				.88000		.86000			
35	Aroclor 1254	.50000	U	.50000	U			.50000	U	.05000	U			.05000	U	.05000	U		
36	beta-BHC	.14000		.18000				.11000		.12000				.07900		.09000			
37	delta-BHC	.04700	J	.05900				.03800	J	.03800				.02600		.02600			
38	gamma-BHC (Lindane)	.17000		.23000				.13000		.14000				.08100		.09900			

DNI 6037507

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
1	CHEMICAL NAME	GCWT-09A (ppb)	ID	GCWT-09B (ppb)	ID	GCWT-09C (ppb)	ID	GCWT-10A (ppb)	ID	GCWT-10B (ppb)	ID	GCWT-10C (ppb)	ID	GCWT-11A (ppb)	ID	GCWT-11B (ppb)	ID	GCWT-11C (ppb)	ID
39	TOTAL METALS																		
40	Aluminum - Total	-	-	-	-			-	-	-	-			604.00000		533.00000			
41	Cadmium - Total	-	-	-	-			-	-	-	-			.30000		.30000	U		
42	Chromium - Total	-	-	-	-			-	-	-	-			10.00000	U	10.00000	U		
43	Copper - Total	-	-	-	-			-	-	-	-			10.00000	U	10.00000	U		
44	Iron - Total	-	-	-	-			-	-	-	-			546.00000		489.00000			
45	Lead - Total	-	-	-	-			-	-	-	-			12.00000		10.00000			
46	Mercury - Total	-	-	-	-			-	-	-	-			.30000		.20000	U		
47	Nickel - Total	-	-	-	-			-	-	-	-			30.00000	U	30.00000	U		
48	Silicon - Total	-	-	-	-			-	-	-	-			19,800.00000		20,200.00000			
49	Zinc - Total	-	-	-	-			-	-	-	-			45.00000		55.00000			
50	WET CHEMISTRY ANALYSIS																		
51	Cyanide - Total	-	-	-	-			-	-	-	-			10.00000	U	10.00000	U		
52	Non-Filterable Residue (103eC)	-	-	-	-			-	-	-	-			-	-	-	-		
53	pH																		
54	Total Alkalinity	-	-	-	-			-	-	-	-			282,000.00000		273,000.00000			
55	Total Recoverable Phenolics	-	-	-	-			-	-	-	-			8.60000		9.60000			
56																			
57																			
58	Total hours of Flow																		
59																			
60																			
61																			
62																			
63																			
64																			
65																			
66																			
67																			
68																			
69																			
70																			
71	Lab Name: Recra Environmental, I																		
72	Lab Id: RECNY																		
73	Customer:																		
74	Job No: A92-2857																		
75	SDG No: 091819																		

DNI 6037508

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB
1	CHEMICAL NAME	METHOD BLANK (ppb)	ID	METHOD BLANK (ppb)	ID	TRIP BLANK-01 (ppb)	ID	TRIP BLANK-02 (ppb)	ID	TRIP BLANK-03 (ppb)	ID	TRIP BLANK-04 (ppb)	ID	% removal by TK-101A (Primary Clarifier)	% removal by equalization storage tanks	% removal by CL-101A Lamella	% removal by CL-101B Lamella	% removal by sand filters
2	METHOD 624 - VOLATILE ORGANICS (AQUEOUS)																	
3	1,1,1-Trichloroethane	3.80000	U			3.80000	U	3.80000	U	3.80000	U							
4	1,1,2,2-Tetrachloroethane	6.90000	U			6.90000	U	6.90000	U	6.90000	U							
5	1,1-Dichloroethene	2.80000	U			2.80000	U	2.80000	U	2.80000	U							
6	Benzene	4.40000	U			4.40000	U	4.40000	U	4.40000	U							
7	Carbon Tetrachloride	2.80000	U			2.80000	U	2.80000	U	2.80000	U							
8	Chlorobenzene	6.00000	U			6.00000	U	6.00000	U	6.00000	U							
9	Chloroform	1.60000	U			1.60000	U	1.60000	U	1.60000	U							
10	cis-1,2-Dichloroethene	1.60000	U			1.60000	U	1.60000	U	1.60000	U							
11	Methylene chloride	2.80000	U			2.80000	U	2.80000	U	2.80000	U							
12	Tetrachloroethene	4.10000	U			4.10000	U	4.10000	U	4.10000	U							
13	trans-1,2-Dichloroethene	1.60000	U			1.60000	U	1.60000	U	1.60000	U							
14	Trichloroethene	1.90000	U			1.90000	U	1.90000	U	1.90000	U							
15	Vinyl chloride	5.00000	U			5.00000	U	5.00000	U	5.00000	U							
16	METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)																	
17	1,2,3-Trichlorobenzene	1.90000	U			-	-	-	-	-	-							
18	1,2,4-Trichlorobenzene	1.90000	U			-	-	-	-	-	-							
19	1,2-Dichlorobenzene	1.90000	U			-	-	-	-	-	-							
20	1,3-Dichlorobenzene	1.90000	U			-	-	-	-	-	-							
21	1,4-Dichlorobenzene	4.40000	U			-	-	-	-	-	-							
22	2-Chlorophenol	3.30000	U			-	-	-	-	-	-							
23	Acenaphthene	1.90000	U			-	-	-	-	-	-							
24	Anthracene	1.90000	U			-	-	-	-	-	-							
25	Fluoranthene	2.20000	U			-	-	-	-	-	-							
26	Hexachlorobenzene	1.90000	U			-	-	-	-	-	-							
27	Hexachlorobutadiene	.90000	U			-	-	-	-	-	-							
28	Hexachloroethane	1.60000	U			-	-	-	-	-	-							
29	Naphthalene	1.60000	U			-	-	-	-	-	-							
30	Phenanthrene	5.40000	U			-	-	-	-	-	-							
31	Pyrene	1.90000	U			-	-	-	-	-	-							
32	METHOD 608 - PESTICIDES/PCBS (AQUEOUS)																	
33	alpha-BHC	.00500	U			-	-	-	-	-	-							
34	Aroclor 1248	.05000	U			-	-	-	-	-	-							
35	Aroclor 1254	.05000	U			-	-	-	-	-	-							
36	beta-BHC	.00500	U			-	-	-	-	-	-							
37	delta-BHC	.00500	U			-	-	-	-	-	-							
38	gamma-BHC (Lindane)	.00500	U			-	-	-	-	-	-							

DNI 6037509

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB
1	CHEMICAL NAME	METHOD BLANK (ppb)	ID	METHOD BLANK (ppb)	ID	TRIP BLANK-01 (ppb)	ID	TRIP BLANK-02 (ppb)	ID	TRIP BLANK-03 (ppb)	ID	TRIP BLANK-04 (ppb)	ID	% removal by TK-101A (Primary Clarifier)	% removal by equalization storage tanks	% removal by CL-101A Lamella	% removal by CL-101B Lamella	% removal by sand filters
39	TOTAL METALS																	
40	Aluminum - Total	60.00000	U			-	-	-	-	-	-							
41	Cadmium - Total	.30000	U			-	-	-	-	-	-							
42	Chromium - Total	10.00000	U			-	-	-	-	-	-							
43	Copper - Total	10.00000	U			-	-	-	-	-	-							
44	Iron - Total	30.00000	U			-	-	-	-	-	-							
45	Lead - Total	2.00000	U			-	-	-	-	-	-							
46	Mercury - Total	.20000	U			-	-	-	-	-	-							
47	Nickel - Total	30.00000	U			-	-	-	-	-	-							
48	Silicon - Total	500.00000	U			-	-	-	-	-	-							
49	Zinc - Total	20.00000	U			-	-	-	-	-	-							
50	WET CHEMISTRY ANALYSIS																	
51	Cyanide - Total	10.00000	U			-	-	-	-	-	-							
52	Non-Filterable Residue (103eC)	4,000.00000	U			-	-	-	-	-	-			38.58268	82.05128	21.15385	100.00000	-21.95122
53	pH																	
54	Total Alkalinity	5,000.00000	U			-	-	-	-	-	-							
55	Total Recoverable Phenolics	5.00000	U			-	-	-	-	-	-□							
56																		
57																		
58	Total hours of Flow																	
59																		
60																		
61																		
62																		
63																		
64																		
65																		
66																		
67																		
68																		
69																		
70																		
71	Lab Name: Recra Environmental, I																	
72	Lab Id: RECNY																	
73	Customer:																	
74	Job No: A92-2857																	
75	SDG No: 091819																	

DNI 6037510

2/23/93

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM
1	CHEMICAL NAME	% removal by air strippers	% Removal - Guard A	% Removal - Guard B	% Removal - Guard C	% Removal - Lead A	% Removal - Lead B	% Removal - Lead C	% Removal - Polishing A	% Removal - Polishing B	% Removal - Polishing C	% Removal - Overall Solids
2	METHOD 624 - VOLATILE ORGANICS (AQUEOUS)											
3	1,1,1-Trichloroethane	98.66667	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-200.00000
4	1,1,2,2-Tetrachloroethane	99.97429	-91.66667	-91.66667	100.00000	.00000	.00000		.00000	.00000		-366.66667
5	1,1-Dichloroethene	98.66667	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-200.00000
6	Benzene	98.13953	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-115.00000
7	Carbon Tetrachloride	98.66667	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-200.00000
8	Chlorobenzene	97.27273	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-266.66667
9	Chloroform	99.43860	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-67.64706
10	cis-1,2-Dichloroethene	99.75940	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		52.50000
11	Methylene chloride	98.66667	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		72.36842
12	Tetrachloroethene	99.78974	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-30.00000
13	trans-1,2-Dichloroethene	98.58407	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-189.74359
14	Trichloroethene	99.97143	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-75.00000
15	Vinyl chloride	98.66667	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-150.00000
16	METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)											
17	1,2,3-Trichlorobenzene	99.02564	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-110.81081
18	1,2,4-Trichlorobenzene	98.40000	92.08333	92.08333	100.00000	.00000	.00000		.00000	.00000		-91.08280
19	1,2-Dichlorobenzene	99.84800	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-145.09804
20	1,3-Dichlorobenzene	98.77419	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-133.08271
21	1,4-Dichlorobenzene	99.56000	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-153.16456
22	2-Chlorophenol	95.95836	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-349.86226
23	Acenaphthene	96.07843	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-363.63636
24	Anthracene	96.07843	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-363.63636
25	Fluoranthene	96.07843	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-363.63636
26	Hexachlorobenzene	96.07843	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-363.63636
27	Hexachlorobutadiene	96.89655	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-485.85859
28	Hexachloroethane	86.66667	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-42.85714
29	Naphthalene	96.07843	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-363.63636
30	Phenanthrene	96.07843	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-389.16519
31	Pyrene	96.07843	.00000	.00000	100.00000	.00000	.00000		.00000	.00000		-363.63636
32	METHOD 608 - PESTICIDES/PCBS (AQUEOUS)											
33	alpha-BHC		99.93500	99.91125	100.00000	28.84615	53.52113		43.24324	27.27273		-207.69231
34	Aroclor 1248		48.00000	28.00000	100.00000	-7.69231	38.88889		37.14286	21.81818		91.07143
35	Aroclor 1254		.00000	.00000	100.00000	.00000	90.00000		90.00000	.00000		90.00000
36	beta-BHC		99.74545	99.67273	100.00000	21.42857	33.33333		28.18182	25.00000		-111.53846
37	delta-BHC		99.70625	99.63125	100.00000	19.14894	35.59322		31.57895	31.57895		-332.43243
38	gamma-BHC (Lindane)		99.92444	99.89778	100.00000	23.52941	39.13043		37.69231	29.28571		-221.42857

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Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM
1	CHEMICAL NAME	% removal by air strippers	% Removal - Guard A	% Removal - Guard B	% Removal - Guard C	% Removal - Lead A	% Removal - Lead B	% Removal - Lead C	% Removal - Polishing A	% Removal - Polishing B	% Removal - Polishing C	% Removal - Overall Solids
39	TOTAL METALS											
40	Aluminum - Total				100.00000							84.40233
41	Cadmium - Total				100.00000							-125.00000
42	Chromium - Total				100.00000							-150.00000
43	Copper - Total				100.00000							26.00000
44	Iron - Total				100.00000							89.26708
45	Lead - Total				100.00000							95.00000
46	Mercury - Total				100.00000							72.22222
47	Nickel - Total				100.00000							18.91892
48	Silicon - Total				100.00000							35.19164
49	Zinc - Total				100.00000							80.20305
50	WET CHEMISTRY ANALYSIS											
51	Cyanide - Total											
52	Non-Filterable Residue (103eC)				100.00000							90.15748
53	pH											
54	Total Alkalinity				100.00000							-55.23810
55	Total Recoverable Phenolics				100.00000							64.44444
56												
57												
58	Total hours of Flow											
59												
60												
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71	Lab Name: Recra Environmental, I											
72	Lab Id: RECNY											
73	Customer:											
74	Job No: A92-2857											
75	SDG No: 091819											

DNI 6037512

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX
1	CHEMICAL NAME	flow data: GCWT-01 (gpd)	flow data: GCWT-07 (gpd)	flow data: GCWT-08 (gpd)	flow data: GCWT-11D (gpd)	stripper emissions (ppd)	stripper emissions (pph)	No. GAC trains on line	PCB Guard (ppd)	GAC Loading: Lead A (ppd)	GAC Loading: Lead B (ppd)	GAC Loading: Lead C (ppd)
2	METHOD 624 - VOLATILE ORGANICS (AQUEOUS)	0.00	99,000.00	88,900.00	88,100.00							
3	1,1,1-Trichloroethane					.23250		2	.00000	.00000	.00000	.00000
4	1,1,2,2-Tetrachloroethane					11.55657		2	-.00121	.00000	.00000	.00000
5	1,1-Dichloroethene					.17131		2	.00000	.00000	.00000	.00000
6	Benzene					.19201		2	.00000	.00000	.00000	.00000
7	Carbon Tetrachloride					.17131		2	.00000	.00000	.00000	.00000
8	Chlorobenzene					.17720		2	.00000	.00000	.00000	.00000
9	Chloroform					.23413		2	.00000	.00000	.00000	.00000
10	cis-1,2-Dichloroethene					.54788		2	.00000	.00000	.00000	.00000
11	Methylene chloride					.17131		2	.00000	.00000	.00000	.00000
12	Tetrachloroethene					1.60700		2	.00000	.00000	.00000	.00000
13	trans-1,2-Dichloroethene					.09211		2	.00000	.00000	.00000	.00000
14	Trichloroethene					5.48923		2	.00000	.00000	.00000	.00000
15	Vinyl chloride					.30592		2	.00000	.00000	.00000	.00000
16	METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)											
17	1,2,3-Trichlorobenzene					.15959		2	.00000	.00000	.00000	.00000
18	1,2,4-Trichlorobenzene					1.22070		2	.00812	.00000	.00000	.00000
19	1,2-Dichlorobenzene					1.03067		2	.00000	.00000	.00000	.00000
20	1,3-Dichlorobenzene					.12657		2	.00000	.00000	.00000	.00000
21	1,4-Dichlorobenzene					.82240		2	.00000	.00000	.00000	.00000
22	2-Chlorophenol					.06497		2	.00000	.00000	.00000	.00000
23	Acenaphthene					.03859		2	.00000	.00000	.00000	.00000
24	Anthracene					.03859		2	.00000	.00000	.00000	.00000
25	Fluoranthene					.04469		2	.00000	.00000	.00000	.00000
26	Hexachlorobenzene					.03859		2	.00000	.00000	.00000	.00000
27	Hexachlorobutadiene					.02328		2	.00000	.00000	.00000	.00000
28	Hexachloroethane					.00872		2	.00000	.00000	.00000	.00000
29	Naphthalene					.03250		2	.00000	.00000	.00000	.00000
30	Phenenthrene					.10969		2	.00000	.00000	.00000	.00000
31	Pyrene					.03859		2	.00000	.00000	.00000	.00000
32	METHOD 608 - PESTICIDES/PCBS (AQUEOUS)											
33	alpha-BHC							2	.29368	.00006	.00014	.00000
34	Aroclor 1248							2	.00035	-.00004	.00026	.00000
35	Aroclor 1254							2	.00000	.00000	.00017	.00000
36	beta-BHC							2	.02015	.00001	.00002	.00000
37	delta-BHC							2	.00586	.00000	.00001	.00000
38	gamma-BHC (Lindane)							2	.08259	.00001	.00003	.00000

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX
1	CHEMICAL NAME	flow data: GCWT-01 (gpd)	flow data: GCWT-07 (gpd)	flow data: GCWT-08 (gpd)	flow data: GCWT-11D (gpd)	stripper emissions (ppd)	stripper emissions (pph)	No. GAC trains on line	PCB Guard (ppd)	GAC Loading: Lead A (ppd)	GAC Loading: Lead B (ppd)	GAC Loading: Lead C (ppd)
39	TOTAL METALS											
40	Aluminum - Total							2				.00000
41	Cadmium - Total							2				.00000
42	Chromium - Total							2				.00000
43	Copper - Total							2				.00000
44	Iron - Total							2				.00000
45	Lead - Total							2				.00000
46	Mercury - Total							2				.00000
47	Nickel - Total							2				.00000
48	Silicon - Total							2				.00000
49	Zinc - Total							2				.00000
50	WET CHEMISTRY ANALYSIS											
51	Cyanide - Total							2				.00000
52	Non-Filterable Residue (103eC)											
53	pH					.00000						
54	Total Alkalinity							2				.00000
55	Total Recoverable Phenolics							2				.00000
56												
57												
58	Total hours of Flow											
59												
60												
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71	Lab Name: Recra Environmental, I											
72	Lab Id: RECNY											
73	Customer:											
74	Job No: A92-2857											
75	SDG No: 091819											

DNI 6037514

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	BY	BZ	CA	CB	CC	CD	CE	CF
1	CHEMICAL NAME	GAC Loading: Polishing A(ppd)	GAC Loading: Polishing B (ppd)	GAC Loading: Polishing C (ppd)	To 023 from A Train (ppd)	To 023 from B Train (ppd)	To 023 from C Train (ppd)	Total Loading to 023 (ppd)	% Removal: Overall
2	METHOD 624 - VOLATILE ORGANICS (AQUEOUS)								
3	1,1,1-Trichloroethane	.00000	.00000	.00000	.00140	.00140	.00000	.00279	96.00000
4	1,1,2,2-Tetrachloroethane	.00000	.00000	.00000	.00253	.00253	.00000	.00507	99.77000
5	1,1-Dichloroethene	.00000	.00000	.00000	.00103	.00103	.00000	.00206	96.00000
6	Benzene	.00000	.00000	.00000	.00162	.00162	.00000	.00323	96.00000
7	Carbon Tetrachloride	.00000	.00000	.00000	.00103	.00103	.00000	.00206	96.00000
8	Chlorobenzene	.00000	.00000	.00000	.00220	.00220	.00000	.00441	90.00000
9	Chloroform	.00000	.00000	.00000	.00059	.00059	.00000	.00118	99.05882
10	cis-1,2-Dichloroethene	.00000	.00000	.00000	.00059	.00059	.00000	.00118	99.88571
11	Methylene chloride	.00000	.00000	.00000	.00103	.00103	.00000	.00206	99.63158
12	Tetrachloroethene	.00000	.00000	.00000	.00151	.00151	.00000	.00301	99.72667
13	trans-1,2-Dichloroethene	.00000	.00000	.00000	.00059	.00059	.00000	.00118	95.89744
14	Trichloroethene	.00000	.00000	.00000	.00070	.00070	.00000	.00140	99.95000
15	Vinyl chloride	.00000	.00000	.00000	.00184	.00184	.00000	.00367	96.66667
16	METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)								
17	1,2,3-Trichlorobenzene	.00000	.00000	.00000	.00070	.00070	.00000	.00140	97.94595
18	1,2,4-Trichlorobenzene	.00000	.00000	.00000	.00070	.00070	.00000	.00140	99.75796
19	1,2-Dichlorobenzene	.00000	.00000	.00000	.00070	.00070	.00000	.00140	99.62745
20	1,3-Dichlorobenzene	.00000	.00000	.00000	.00070	.00070	.00000	.00140	97.14286
21	1,4-Dichlorobenzene	.00000	.00000	.00000	.00162	.00162	.00000	.00323	98.88608
22	2-Chlorophenol	.00000	.00000	.00000	.00121	.00121	.00000	.00242	81.81818
23	Acenaphthene	.00000	.00000	.00000	.00070	.00070	.00000	.00140	81.81818
24	Anthracene	.00000	.00000	.00000	.00070	.00070	.00000	.00140	81.81818
25	Fluoranthene	.00000	.00000	.00000	.00081	.00081	.00000	.00162	81.81818
26	Hexachlorobenzene	.00000	.00000	.00000	.00070	.00070	.00000	.00140	81.81818
27	Hexachlorobutadiene	.00000	.00000	.00000	.00033	.00033	.00000	.00066	81.81818
28	Hexachloroethane	.00000	.00000	.00000	.00059	.00059	.00000	.00118	80.95238
29	Naphthalene	.00000	.00000	.00000	.00059	.00059	.00000	.00118	81.81818
30	Phenanthrene	.00000	.00000	.00000	.00198	.00198	.00000	.00397	80.81705
31	Pyrene	.00000	.00000	.00000	.00070	.00070	.00000	.00140	81.81818
32	METHOD 608 - PESTICIDES/PCBS (AQUEOUS)								
33	alpha-BHC	.00006	.00003	.00000	.00008	.00009	.00000	.00017	99.91346
34	Aroclor 1248	.00019	.00009	.00000	.00032	.00032	.00000	.00064	96.89286
35	Aroclor 1254	.00017	.00000	.00000	.00002	.00002	.00000	.00004	99.00000
36	beta-BHC	.00001	.00001	.00000	.00003	.00003	.00000	.00006	99.67500
37	delta-BHC	.00000	.00000	.00000	.00001	.00001	.00000	.00002	99.29730
38	gamma-BHC (Lindane)	.00002	.00002	.00000	.00003	.00004	.00000	.00007	99.87143

DNI 6037515

Sampling Data for 9/18/92 - - Gill Creek Remediation

	A	BY	BZ	CA	CB	CC	CD	CE	CF
1	CHEMICAL NAME	GAC Loading: Polishing A(ppd)	GAC Loading: Polishing B (ppd)	GAC Loading: Polishing C (ppd)	To 023 from A Train (ppd)	To 023 from B Train (ppd)	To 023 from C Train (ppd)	Total Loading to 023 (ppd)	% Removal: Overall
39	TOTAL METALS								
40	Aluminum - Total			.00000	.22190	.19581	.00000	.41771	91.71283
41	Cadmium - Total			.00000	.00011	.00011	.00000	.00022	25.00000
42	Chromium - Total			.00000	.00367	.00367	.00000	.00735	77.27273
43	Copper - Total			.00000	.00367	.00367	.00000	.00735	80.00000
44	Iron - Total			.00000	.20059	.17965	.00000	.38024	93.57143
45	Lead - Total			.00000	.00441	.00367	.00000	.00808	95.76923
46	Mercury - Total			.00000	.00011	.00007	.00000	.00018	86.11111
47	Nickel - Total			.00000	.01102	.01102	.00000	.02204	18.91892
48	Silicon - Total			.00000	7.27406	7.42102	.00000	14.69508	30.31359
49	Zinc - Total			.00000	.01653	.02021	.00000	.03674	87.30964
50	WET CHEMISTRY ANALYSIS								
51	Cyanide - Total			.00000	.00367	.00367	.00000	.00735	.00000
52	Non-Filterable Residue (103oC)							.00000	
53	pH							.00000	
54	Total Alkalinity			.00000	103.60031	100.29392	.00000	203.89424	-32.14286
55	Total Recoverable Phenolics			.00000	.00316	.00353	.00000	.00669	49.44444
56									
57									
58	Total hours of Flow								
59									
60									
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									
71	Lab Name: Recra Environmental, I								
72	Lab Id: RECNY								
73	Customer:								
74	Job No: A92-2857								
75	SDG No: 091819								

DNI 6037516

Appendix E

APPENDIX E

SUMMARY OF REMEDIATION WATER CONCENTRATIONS

Summary of Gill Creek Remediation - Concentrations (ppb)

CHEMICAL NAMES	GCWT-01			GCWT-02			GCWT-03		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
METHOD 624 - VOLATILE ORGANICS (AQUEOUS)									
1,1,1-Trichloroethane	12.50000	3800.00000	675.84615	150.00000	150.00000	150.00000	0.00000	0.00000	#DIV/0!
1,1,2,2-Tetrachloroethane	190.00000	21000.00000	3498.65385	690.00000	690.00000	690.00000	0.00000	0.00000	#DIV/0!
1,1-Dichloroethene	28.00000	2800.00000	511.94423	110.00000	110.00000	110.00000	0.00000	0.00000	#DIV/0!
Benzene	6.60000	4400.00000	784.77115	180.00000	180.00000	180.00000	0.00000	0.00000	#DIV/0!
Carbon Tetrachloride	28.00000	2800.00000	517.28654	110.00000	110.00000	110.00000	0.00000	0.00000	#DIV/0!
Chlorobenzene	2.00000	3140.00000	486.71154	240.00000	240.00000	240.00000	0.00000	0.00000	#DIV/0!
Chloroform	24.00000	1600.00000	603.88462	640.00000	640.00000	640.00000	0.00000	0.00000	#DIV/0!
cis-1,2-Dichloroethene	270.00000	37000.00000	7914.80769	1500.00000	1500.00000	1500.00000	0.00000	0.00000	#DIV/0!
Methylene chloride	27.00000	18000.00000	5441.19231	230.00000	230.00000	230.00000	0.00000	0.00000	#DIV/0!
Tetrachloroethene	230.00000	92500.00000	18838.07692	4900.00000	4900.00000	4900.00000	0.00000	0.00000	#DIV/0!
trans-1,2-Dichloroethene	3.00000	1600.00000	286.98077	64.00000	64.00000	64.00000	0.00000	0.00000	#DIV/0!
Trichloroethene	480.00000	110000.00000	23927.30769	4900.00000	4900.00000	4900.00000	0.00000	0.00000	#DIV/0!
Vinyl chloride	27.00000	3150.00000	725.75000	110.00000	110.00000	110.00000	0.00000	0.00000	#DIV/0!
METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)									
1,2,3-Trichlorobenzene	2.00000	590.00000	48.30400	2.00000	3.00000	2.50000	0.00000	0.00000	#DIV/0!
1,2,4-Trichlorobenzene	1.90000	2100.00000	218.54200	4.00000	14.00000	9.00000	0.00000	0.00000	#DIV/0!
1,2-Dichlorobenzene	1.90000	1300.00000	138.50400	3.00000	3.00000	3.00000	0.00000	0.00000	#DIV/0!
1,3-Dichlorobenzene	1.00000	230.00000	26.76600	2.00000	3.00000	2.50000	0.00000	0.00000	#DIV/0!
1,4-Dichlorobenzene	3.00000	955.00000	123.98400	3.00000	6.00000	4.50000	0.00000	0.00000	#DIV/0!
2-Chlorophenol	3.30000	43.05000	12.27400	3.30000	5.20000	4.25000	0.00000	0.00000	#DIV/0!
Acenaphthene	1.90000	25.20000	7.06600	1.90000	3.00000	2.45000	0.00000	0.00000	#DIV/0!
Anthracene	1.90000	25.20000	7.06660	1.90000	3.00000	2.45000	0.00000	0.00000	#DIV/0!
Fluoranthene	2.20000	28.90000	8.20200	2.20000	3.40000	2.80000	0.00000	0.00000	#DIV/0!
Hexachlorobenzene	1.90000	74.00000	16.16400	2.00000	3.00000	2.50000	0.00000	0.00000	#DIV/0!
Hexachlorobutadiene	0.90000	830.00000	227.37000	59.00000	90.00000	74.50000	0.00000	0.00000	#DIV/0!
Hexachloroethane	1.60000	280.00000	92.24000	14.00000	91.00000	52.50000	0.00000	0.00000	#DIV/0!
Naphthalene	1.60000	20.70000	6.15400	1.60000	2.50000	2.05000	0.00000	0.00000	#DIV/0!
Phenanthrene	5.40000	71.70000	20.06600	5.40000	8.40000	6.90000	0.00000	0.00000	#DIV/0!
Pyrene	1.90000	25.20000	6.41000	1.90000	3.00000	2.45000	0.00000	0.00000	#DIV/0!
METHOD 608 - PESTICIDES/PCBS (AQUEOUS)									
alpha-BHC	1.60000	4500.00000	386.94400	65.00000	67.00000	66.00000	0.00000	0.00000	#DIV/0!
Aroclor 1248	1.10000	9600.00000	938.92400	270.00000	390.00000	330.00000	0.00000	0.00000	#DIV/0!
Aroclor 1254	1.10000	330.00000	114.08400	100.00000	150.00000	125.00000	0.00000	0.00000	#DIV/0!
beta-BHC	1.80000	60.00000	28.55200	11.00000	15.00000	13.00000	0.00000	0.00000	#DIV/0!
delta-BHC	0.20000	34.00000	11.04000	10.00000	15.00000	12.50000	0.00000	0.00000	#DIV/0!
gamma-BHC (Lindane)	0.87000	260.00000	32.06680	10.00000	15.00000	12.50000	0.00000	0.00000	#DIV/0!

Summary of Gill Creek Remediation - Concentrations (ppb)

CHEMICAL NAMES	GCWT-01			GCWT-02			GCWT-03		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
TOTAL METALS									
Aluminum - Total	531.00000	111000.00000	19565.04167	1380.00000	3330.00000	2355.00000	0.00000	0.00000	#DIV/0!
Cadmium - Total	0.20000	13.50000	2.96667	0.20000	0.70000	0.45000	0.00000	0.00000	#DIV/0!
Chromium - Total	10.00000	451.00000	79.79167	10.00000	12.00000	11.00000	0.00000	0.00000	#DIV/0!
Copper - Total	14.00000	1300.00000	201.62500	14.00000	40.00000	27.00000	0.00000	0.00000	#DIV/0!
Iron - Total	740.00000	143000.00000	27699.58333	2360.00000	6060.00000	4210.00000	0.00000	0.00000	#DIV/0!
Lead - Total	16.00000	1050.00000	227.91667	21.00000	45.00000	33.00000	0.00000	0.00000	#DIV/0!
Mercury - Total	0.70000	802.00000	86.22083	3.50000	25.80000	14.65000	0.00000	0.00000	#DIV/0!
Nickel - Total	15.00000	191.00000	47.08333	30.00000	30.00000	30.00000	0.00000	0.00000	#DIV/0!
Silicon - Total	7250.00000	198000.00000	45702.08333	9200.00000	10400.00000	9800.00000	0.00000	0.00000	#DIV/0!
Zinc - Total	50.00000	5860.00000	963.91667	54.00000	190.00000	122.00000	0.00000	0.00000	#DIV/0!
WET CHEMISTRY ANALYSIS									
Cyanide - Total	10.00000	10100.00000	1074.92000	10.00000	60.00000	35.00000	0.00000	0.00000	#DIV/0!
Non-Filterable Residue (103øC)	16000.00000	4020000.00000	887036.00000	41800.00000	22000000.00000	1643262.50000	8000.00000	4200000.00000	614740.00000
pH	9.20000	9.20000	9.20000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Total Alkalinity	114000.00000	649000.00000	196440.00000	87800.00000	159000.00000	123400.00000	0.00000	0.00000	#DIV/0!
Total Recoverable Phenolics	4.70000	64.00000	21.22400	5.40000	6.70000	6.05000	0.00000	0.00000	#DIV/0!

Summary of Gill Creek Remediation - Concentrations (ppb)

CHEMICAL NAMES	GCWT-04 MIN	GCWT-04 MAX	GCWT-04 AVG	GCWT-05 MIN	GCWT-05 MAX	GCWT-05 AVG	GCWT-06 MIN	GCWT-06 MAX	GCWT-06 AVG
METHOD 624 - VOLATILE ORGANICS (AQUEOUS)									
1,1,1-Trichloroethane	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
1,1,2,2-Tetrachloroethane	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
1,1-Dichloroethene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Benzene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Carbon Tetrachloride	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Chlorobenzene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Chloroform	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
cis-1,2-Dichloroethene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Methylene chloride	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Tetrachloroethene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
trans-1,2-Dichloroethene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Trichloroethene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Vinyl chloride	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)									
1,2,3-Trichlorobenzene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
1,2,4-Trichlorobenzene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
1,2-Dichlorobenzene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
1,3-Dichlorobenzene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
1,4-Dichlorobenzene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
2-Chlorophenol	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Acenaphthene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Anthracene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Fluoranthene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Hexachlorobenzene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Hexachlorobutadiene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Hexachloroethane	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Naphthalene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Phenanthrene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Pyrene	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
METHOD 608 - PESTICIDES/PCBS (AQUEOUS)									
alpha-BHC	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Aroclor 1248	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Aroclor 1254	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
beta-BHC	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
delta-BHC	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
gamma-BHC (Lindane)	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!

Summary of Gill Creek Remediation - Concentrations (ppb)

	GCWT-04			GCWT-05			GCWT-06		
CHEMICAL NAMES	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
TOTAL METALS									
Aluminum - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Cadmium - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Chromium - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Copper - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Iron - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Lead - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Mercury - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Nickel - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Silicon - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Zinc - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
WET CHEMISTRY ANALYSIS									
Cyanide - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Non-Filterable Residue (103øC)	5600.00000	222000.00000	61260.00000	10000.00000	7840000.00000	747604.16667	8000.00000	320000.00000	81652.17391
pH	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Total Alkalinity	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Total Recoverable Phenolics	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!

Summary of Gill Creek Remediation - Concentrations (ppb)

CHEMICAL NAMES	GCWT-07			GCWT-08			GCWT-09A			GCWT-09B		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
METHOD 624 - VOLATILE ORGANICS (AQUEOUS)												
1,1,1-Trichloroethane	8.00000	835.00000	328.30769	3.80000	92.00000	10.82400	3.80000	10.00000	4.42000	3.80000	10.00000	4.29600
1,1,2,2-Tetrachloroethane	110.00000	14000.00000	3246.92308	2.00000	665.00000	254.72400	1.30000	10.00000	6.94500	1.70000	11.00000	7.08000
1,1-Dichloroethene	14.00000	690.00000	250.19231	2.80000	14.00000	5.47600	2.80000	10.00000	3.52000	2.80000	10.00000	3.37600
Benzene	5.90000	1120.00000	384.61731	4.40000	22.00000	8.44800	4.40000	10.00000	4.96000	4.40000	10.00000	4.84800
Carbon Tetrachloride	14.00000	690.00000	250.11538	2.80000	14.00000	5.47600	2.80000	10.00000	3.52000	2.80000	10.00000	3.37600
Chlorobenzene	0.80000	1246.50000	260.33462	0.80000	30.00000	10.57640	5.00000	6.00000	5.90000	5.00000	6.00000	5.92000
Chloroform	12.00000	900.00000	310.03846	0.47000	10.00000	3.25280	1.60000	10.00000	2.44000	1.60000	10.00000	2.27200
cis-1,2-Dichloroethene	130.00000	13000.00000	4398.46154	0.40000	68.00000	15.47520	1.60000	10.00000	2.44000	1.60000	10.00000	2.27200
Methylene chloride	13.00000	9850.00000	3435.59615	1.20000	52.00000	15.12200	0.89000	10.00000	3.46950	0.80000	10.00000	3.35200
Tetrachloroethene	70.00000	35500.00000	9228.26923	0.67000	255.00000	35.91920	1.00000	10.00000	4.60000	1.20000	10.00000	4.42800
trans-1,2-Dichloroethene	1.00000	365.00000	127.08654	1.60000	10.00000	3.31200	1.60000	10.00000	2.44000	1.60000	10.00000	2.27200
Trichloroethene	220.00000	44000.00000	13075.76923	1.60000	185.00000	47.06400	1.90000	10.00000	2.73000	0.92000	10.00000	2.51280
Vinyl chloride	6.00000	1195.00000	341.43846	5.00000	25.00000	9.36800	5.00000	5.00000	5.00000	5.00000	5.00000	5.00000
METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)												
1,2,3-Trichlorobenzene	1.90000	285.00000	27.20192	1.50000	5.10000	2.16400	1.90000	2.80000	1.99048	1.90000	3.20000	1.99600
1,2,4-Trichlorobenzene	2.40000	1500.00000	145.66923	1.00000	38.00000	6.97600	1.90000	2.80000	1.99048	1.90000	3.20000	1.99600
1,2-Dichlorobenzene	2.40000	1250.00000	103.72115	1.90000	5.10000	2.18000	1.90000	2.80000	1.99048	1.90000	3.20000	1.99600
1,3-Dichlorobenzene	0.90500	155.00000	15.77904	1.90000	5.10000	2.18000	1.90000	2.80000	1.99048	1.90000	3.20000	1.99600
1,4-Dichlorobenzene	5.50000	1000.00000	88.20769	4.40000	11.00000	5.02800	4.40000	6.40000	4.60952	4.40000	7.30000	4.62000
2-Chlorophenol	3.30000	81.65000	9.02692	3.30000	8.90000	3.79600	3.30000	4.80000	3.46190	3.30000	5.50000	3.46800
Acenaphthene	1.90000	48.45000	5.25577	1.90000	5.10000	2.18000	1.90000	2.80000	1.99048	1.90000	3.20000	1.99600
Anthracene	1.90000	48.45000	5.25577	1.90000	5.10000	2.18000	1.90000	2.80000	1.99048	1.90000	3.20000	1.99600
Fluoranthene	2.20000	56.10000	6.07692	2.20000	5.90000	2.52800	2.20000	3.20000	2.30000	2.20000	3.70000	2.30800
Hexachlorobenzene	1.00000	48.45000	5.70577	1.90000	5.10000	2.42400	1.90000	2.80000	1.99048	1.90000	3.70000	2.01600
Hexachlorobutadiene	0.90000	200.00000	65.10673	0.90000	33.00000	4.52760	0.90000	1.30000	0.94143	0.90000	1.50000	0.94440
Hexachloroethane	1.60000	180.00000	44.37308	1.60000	4.30000	1.84800	1.60000	2.30000	1.64762	1.60000	2.70000	1.66000
Naphthalene	1.00000	40.80000	4.75000	1.60000	4.30000	1.84000	1.60000	2.30000	1.67619	1.60000	2.70000	1.68400
Phenanthrene	5.40000	137.70000	14.84231	5.40000	14.00000	6.19200	5.40000	7.80000	5.65714	5.40000	9.00000	5.67600
Pyrene	1.90000	48.45000	5.25577	1.90000	5.10000	2.18000	1.90000	2.80000	1.99048	1.90000	3.20000	1.99600
METHOD 608 - PESTICIDES/PCBS (AQUEOUS)												
alpha-BHC	1.40000	800.00000	159.90000	61.00000	260.00000	124.45455	0.00300	2.50000	0.56511	0.00700	4.60000	0.43884
Aroclor 1248	1.10000	420.00000	124.11154	50.00000	380.00000	136.63636	0.05000	34.00000	3.99629	0.05000	80.00000	4.44048
Aroclor 1254	0.50000	290.00000	95.08077	50.00000	83.00000	57.09091	0.05000	1.40000	0.36248	0.05000	2.90000	0.25344
beta-BHC	1.20000	55.00000	17.32692	5.00000	52.00000	20.63636	0.00280	0.56000	0.13950	0.00500	1.00000	0.11009
delta-BHC	0.13000	29.00000	10.12423	5.00000	10.00000	6.16364	0.00500	0.14000	0.03812	0.00310	0.29000	0.03129
gamma-BHC (Lindane)	0.58000	225.00000	29.15885	5.00000	19.00000	8.88182	0.00200	0.17000	0.05690	0.00200	0.47000	0.05260

Summary of Gill Creek Remediation - Concentrations (ppb)

	GCWT-07			GCWT-08			GCWT-09A			GCWT-09B		
CHEMICAL NAMES	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
TOTAL METALS												
Aluminum - Total	58.50000	3515.00000	956.50000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Cadmium - Total	0.10000	0.90000	0.28600	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Chromium - Total	6.50000	130.00000	25.54000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Copper - Total	10.00000	44.00000	20.76000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Iron - Total	237.00000	4325.00000	1394.36000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Lead - Total	2.00000	100.00000	12.44000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Mercury - Total	0.20000	10.20000	1.60400	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Nickel - Total	15.00000	40.00000	27.16000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Silicon - Total	3880.00000	102000.00000	15272.00000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Zinc - Total	10.00000	156.00000	52.86000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
WET CHEMISTRY ANALYSIS												
Cyanide - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Non-Filterable Residue (103øC)	4000.00000	137000.00000	33576.92308	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
pH	9.14000	9.14000	9.14000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Total Alkalinity	110000.00000	326000.00000	165000.00000	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Total Recoverable Phenolics	5.10000	51.00000	14.89231	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!

Summary of Gill Creek Remediation - Concentrations (ppb)

CHEMICAL NAMES	GCWT-09C			GCWT-10A			GCWT-10B			GCWT-10C		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
METHOD 624 - VOLATILE ORGANICS (AQUEOUS)												
1,1,1-Trichloroethane	3.80000	3.80000	3.80000	1.40000	10.00000	4.27619	3.80000	10.00000	4.29600	3.80000	3.80000	3.80000
1,1,2,2-Tetrachloroethane	0.82000	19.00000	8.51455	6.90000	10.00000	7.19524	6.90000	10.00000	7.14800	1.40000	6.90000	6.65000
1,1-Dichloroethene	2.80000	2.80000	2.80000	2.80000	10.00000	3.48571	2.80000	10.00000	3.37600	2.80000	2.80000	2.80000
Benzene	4.40000	4.40000	4.40000	4.40000	10.00000	4.93333	4.40000	10.00000	4.84800	4.40000	4.40000	4.40000
Carbon Tetrachloride	2.80000	2.80000	2.80000	2.80000	10.00000	3.48571	2.80000	10.00000	3.37600	2.80000	2.80000	2.80000
Chlorobenzene	6.00000	6.00000	6.00000	5.00000	6.00000	5.90476	5.00000	6.00000	5.92000	6.00000	6.00000	6.00000
Chloroform	1.60000	1.60000	1.60000	1.60000	10.00000	2.40000	1.60000	10.00000	2.27200	1.60000	1.60000	1.60000
cis-1,2-Dichloroethene	0.85000	1.60000	1.54773	1.60000	10.00000	2.40000	1.60000	10.00000	2.27200	1.60000	1.60000	1.60000
Methylene chloride	0.76000	6.00000	2.99818	2.80000	10.00000	3.48571	2.80000	10.00000	3.37600	2.80000	2.80000	2.80000
Tetrachloroethene	1.20000	6.30000	4.01818	4.10000	10.00000	4.66190	4.10000	10.00000	4.57200	4.10000	4.10000	4.10000
trans-1,2-Dichloroethene	1.60000	1.60000	1.60000	1.60000	10.00000	2.40000	1.60000	10.00000	2.27200	1.60000	1.60000	1.60000
Trichloroethene	0.63000	4.90000	2.01955	1.90000	10.00000	2.67143	1.90000	10.00000	2.54800	1.90000	1.90000	1.90000
Vinyl chloride	5.00000	10.00000	5.22727	5.00000	5.00000	5.00000	5.00000	5.00000	5.00000	5.00000	5.00000	5.00000
METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)												
1,2,3-Trichlorobenzene	1.90000	2.70000	1.96364	1.90000	2.70000	2.00000	1.90000	2.70000	1.96000	1.90000	2.60000	1.97273
1,2,4-Trichlorobenzene	1.90000	2.70000	1.96364	1.90000	2.70000	2.00000	1.90000	2.70000	1.96000	1.90000	2.60000	1.97273
1,2-Dichlorobenzene	1.90000	2.70000	1.96364	1.90000	2.70000	2.00000	1.90000	2.70000	1.96000	1.90000	2.60000	1.97273
1,3-Dichlorobenzene	1.90000	2.70000	1.96364	1.90000	2.70000	2.00000	1.90000	2.70000	1.96000	1.90000	2.60000	1.97273
1,4-Dichlorobenzene	4.40000	6.30000	4.55455	4.40000	6.30000	4.63333	4.40000	6.30000	4.54000	4.40000	6.00000	4.57273
2-Chlorophenol	3.30000	4.70000	3.41818	3.30000	4.70000	3.47619	3.30000	4.70000	3.40400	3.30000	4.50000	3.43182
Acenaphthene	1.90000	2.70000	1.96364	1.90000	2.70000	2.00000	1.90000	2.70000	1.96000	1.90000	2.60000	1.97273
Anthracene	1.90000	2.70000	1.96364	1.90000	2.70000	2.00000	1.90000	2.70000	1.96000	1.90000	2.60000	1.97273
Fluoranthene	2.20000	3.10000	2.26818	2.20000	3.10000	2.30952	2.20000	3.10000	2.26800	2.20000	3.00000	2.27727
Hexachlorobenzene	1.90000	2.70000	1.96364	1.90000	2.70000	2.00000	1.90000	2.70000	1.96000	1.90000	2.60000	1.97273
Hexachlorobutadiene	0.90000	1.30000	0.93182	0.90000	3.40000	1.04714	0.90000	1.30000	0.92840	0.90000	1.20000	0.93182
Hexachloroethane	1.60000	2.30000	1.65000	1.60000	2.30000	1.65238	1.60000	2.30000	1.63600	1.60000	2.20000	1.64545
Naphthalene	1.60000	2.30000	1.65909	1.60000	2.30000	1.69048	1.60000	2.30000	1.65200	1.60000	2.20000	1.66364
Phenanthrene	5.40000	7.70000	5.58636	5.40000	7.70000	5.68571	5.40000	7.70000	5.57600	5.40000	7.40000	5.60909
Pyrene	1.90000	2.70000	1.96364	1.90000	2.70000	2.00000	1.90000	2.70000	1.96000	1.90000	2.60000	1.97273
METHOD 608 - PESTICIDES/PCBS (AQUEOUS)												
alpha-BHC	0.00550	33.00000	4.01990	0.00360	1.30000	0.10870	0.00200	0.59000	0.05018	0.00500	2.90000	0.22247
Aroclor 1248	0.05000	61.00000	5.39445	0.05000	9.40000	0.92257	0.05000	4.90000	0.55156	0.05000	1.50000	0.53395
Aroclor 1254	0.05000	7.10000	1.50936	0.05000	0.50000	0.09948	0.05000	0.50000	0.07296	0.05000	0.25000	0.06095
beta-BHC	0.00500	3.30000	0.53319	0.00500	0.61000	0.04297	0.00500	0.31000	0.02460	0.00500	0.40000	0.04388
delta-BHC	0.00200	1.30000	0.20359	0.00330	0.06000	0.01158	0.00500	0.06000	0.01019	0.00500	0.02700	0.00718
gamma-BHC (Lindane)	0.00500	8.90000	0.57182	0.00230	0.37000	0.03540	0.00110	0.17000	0.01978	0.00210	0.40000	0.03820

Summary of Gill Creek Remediation - Concentrations (ppb)

CHEMICAL NAMES	GCWT-09C			GCWT-10A			GCWT-10B			GCWT-10C		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
TOTAL METALS												
Aluminum - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Cadmium - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Chromium - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Copper - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Iron - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Lead - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Mercury - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Nickel - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Silicon - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Zinc - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	10.00000	10.00000	10.00000
WET CHEMISTRY ANALYSIS												
Cyanide - Total	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Non-Filterable Residue (103øC)	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
pH	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Total Alkalinity	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
Total Recoverable Phenolics	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!

Summary of Gill Creek Remediation - Concentrations (ppb)

CHEMICAL NAMES	GCWT-11A			GCWT-11B			GCWT-11C		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
METHOD 624 - VOLATILE ORGANICS (AQUEOUS)									
1,1,1-Trichloroethane	3.10000	10.00000	4.35714	3.80000	10.00000	4.29600	3.80000	3.80000	3.80000
1,1,2,2-Tetrachloroethane	6.90000	10.00000	7.19524	6.90000	10.00000	7.14800	6.90000	6.90000	6.90000
1,1-Dichloroethene	2.80000	10.00000	3.48571	2.80000	10.00000	3.37600	2.80000	2.80000	2.80000
Benzene	4.40000	10.00000	4.93333	4.40000	10.00000	4.84800	4.40000	4.40000	4.40000
Carbon Tetrachloride	2.80000	10.00000	3.48571	2.80000	10.00000	3.37600	2.80000	2.80000	2.80000
Chlorobenzene	5.00000	6.00000	5.90476	5.00000	6.00000	5.92000	6.00000	6.00000	6.00000
Chloroform	1.60000	10.00000	2.40000	1.60000	10.00000	2.27200	1.60000	1.60000	1.60000
cis-1,2-Dichloroethene	1.60000	10.00000	2.40000	1.60000	10.00000	2.27200	1.60000	1.60000	1.60000
Methylene chloride	2.80000	10.00000	3.48571	2.80000	10.00000	3.37600	2.80000	2.80000	2.80000
Tetrachloroethene	2.60000	10.00000	4.59048	4.10000	10.00000	4.57200	4.10000	4.10000	4.10000
trans-1,2-Dichloroethene	1.60000	10.00000	2.40000	1.60000	10.00000	2.27200	1.60000	1.60000	1.60000
Trichloroethene	1.75000	10.00000	2.66429	1.90000	10.00000	2.54800	1.90000	1.90000	1.90000
Vinyl chloride	5.00000	5.00000	5.00000	5.00000	5.00000	5.00000	5.00000	5.00000	5.00000
METHOD 625 - SEMIVOLATILE ORGANICS (AQUEOUS)									
1,2,3-Trichlorobenzene	1.90000	2.70000	1.99524	1.90000	2.50000	1.96400	1.90000	2.80000	1.96364
1,2,4-Trichlorobenzene	1.90000	2.70000	1.99524	1.90000	2.50000	1.96400	1.90000	2.80000	1.96364
1,2-Dichlorobenzene	1.90000	2.70000	1.99524	1.90000	2.50000	1.96400	1.90000	2.80000	1.96364
1,3-Dichlorobenzene	1.90000	2.70000	1.99524	1.90000	2.50000	1.96400	1.90000	2.80000	1.96364
1,4-Dichlorobenzene	4.40000	6.30000	4.61905	4.40000	5.80000	4.54800	4.40000	6.40000	4.54545
2-Chlorophenol	3.30000	4.70000	3.46667	3.30000	4.30000	3.40800	3.30000	4.80000	3.41364
Acenaphthene	1.90000	2.70000	1.99524	1.90000	2.50000	1.96400	1.90000	2.80000	1.96364
Anthracene	1.90000	2.70000	1.99524	1.90000	2.50000	1.96400	1.90000	2.80000	1.96364
Fluoranthene	2.20000	3.10000	2.30476	2.20000	2.90000	2.27200	2.20000	3.20000	2.26818
Hexachlorobenzene	1.90000	2.70000	1.99524	1.90000	2.50000	1.96400	1.90000	2.80000	1.96364
Hexachlorobutadiene	0.90000	1.30000	0.94571	0.90000	1.20000	0.92840	0.90000	1.30000	0.92955
Hexachloroethane	1.60000	2.30000	1.65238	1.60000	2.10000	1.63200	1.60000	2.30000	1.64091
Naphthalene	1.60000	2.30000	1.68571	1.60000	2.10000	1.65600	1.60000	2.30000	1.65455
Phenanthrene	5.40000	7.70000	5.67619	5.40000	7.10000	5.58400	5.40000	7.80000	5.57727
Pyrene	1.90000	2.70000	1.99524	1.90000	2.50000	1.96400	1.90000	2.80000	1.96364
METHOD 608 - PESTICIDES/PCBS (AQUEOUS)									
alpha-BHC	0.00330	0.69000	0.05441	0.00270	0.27000	0.02844	0.00450	0.07100	0.01513
Aroclor 1248	0.05000	6.70000	0.55081	0.05000	2.80000	0.35864	0.05000	1.15000	0.31795
Aroclor 1254	0.05000	0.10000	0.05652	0.05000	0.10000	0.05536	0.05000	0.07100	0.05205
beta-BHC	0.00500	0.33000	0.02869	0.00500	0.13000	0.01686	0.00235	0.02400	0.00798
delta-BHC	0.00335	0.06000	0.01095	0.00310	0.06000	0.01026	0.00320	0.00720	0.00522
gamma-BHC (Lindane)	0.00220	0.14000	0.01839	0.00220	0.09900	0.01295	0.00405	0.03900	0.00741

Summary of Gill Creek Remediation - Concentrations (ppb)

CHEMICAL NAMES	GCWT-11A			GCWT-11B			GCWT-11C		
	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG
TOTAL METALS									
Aluminum - Total	35.00000	4080.00000	499.04762	30.00000	2450.00000	356.54000	30.00000	1100.00000	279.20455
Cadmium - Total	0.10000	0.50000	0.20238	0.10000	3.00000	0.32000	0.10000	2.15000	0.28409
Chromium - Total	4.00000	48.00000	10.26190	5.00000	14.00000	7.94000	5.00000	16.00000	7.79545
Copper - Total	5.00000	73.00000	15.02381	5.00000	26.00000	11.18000	5.00000	34.00000	10.95455
Iron - Total	29.00000	4820.00000	643.76190	26.00000	5010.00000	612.28000	50.00000	1070.00000	375.97727
Lead - Total	1.00000	100.00000	7.92857	2.00000	100.00000	6.60000	2.00000	4.00000	2.36364
Mercury - Total	0.20000	0.50000	0.25714	0.20000	0.40000	0.20800	0.20000	0.40000	0.20909
Nickel - Total	15.00000	40.00000	27.38095	15.00000	36.00000	26.92000	15.00000	30.00000	25.93182
Silicon - Total	3250.00000	50000.00000	12564.04762	3100.00000	49500.00000	11433.20000	2900.00000	14000.00000	6994.31818
Zinc - Total	5.00000	75.00000	22.02381	8.00000	58.00000	17.27083	6.00000	84.50000	17.70455
WET CHEMISTRY ANALYSIS									
Cyanide - Total	10.00000	430.00000	31.04762	10.00000	3400.00000	145.60000	10.00000	480.00000	35.66667
Non-Filterable Residue (103øC)	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!	0.00000	0.00000	#DIV/0!
pH	9.10000	9.10000	9.10000	9.17000	9.17000	9.17000	0.00000	0.00000	#DIV/0!
Total Alkalinity	102000.00000	354000.00000	170428.57143	95000.00000	273000.00000	158180.00000	105500.00000	235000.00000	150238.09524
Total Recoverable Phenolics	6.00000	9.60000	6.49286	5.00000	17.00000	7.27200	5.00000	32.00000	8.59286

Appendix F

Ann MASSE

DECONTAMINATION PROCEDURES for the WATER TREATMENT EQUIPMENT at the DU PONT - GILL CREEK REMEDIATION PROJECT

November 5, 1992

Prepared for:

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1.0 INTRODUCTION

This document is provided to Sevenson Environmental Services Corporation (Sevenson) and describes the decommissioning procedures that will be implemented by OHM Remediation Services Corporation (OHM) for the Water Treatment System (WTS) equipment at the Du Pont - Gill Creek remediation project. The procedures prescribe that the equipment be dismantled, decontaminated and either demobilized from the site to the appropriate OHM warehouse (OHM equipment only) or staged on the WTS pad for demobilization by Du Pont or others. Each specific operation included herein is described with the understanding that the Gill Creek Remediation Health & Safety Plan will be implemented during all activities, and that personal safety and health protection procedures take precedence over operational or scheduling considerations.

2.0 EQUIPMENT DECONTAMINATION FACILITIES AND PROCEDURES

2.1 General Discussion

Upon reception of the written notice to shut down the operation of the WTS, all the influent water to the WTS from the remediation operations will be ceased within 24 hours. Upon cessation of influent water being directed to the WTS, all the remaining contaminated water and sludge in the WTS will then be treated and/or removed for the following 48 hours prior to commencing the decommisioning procedure.

Following is a list of all equipment which will be decontaminated by OHM:

1. TK-102/105 (two - 12,000 gallon transfer tanks)
2. BF-101 A/B, BF-102 A/B, BF-103 A/B, BF-051 A/B, BF-052 A/B, BF-053 A/B (12 - bag filter units)
3. T-201 A/B (two - air strippers)
4. TK-103/109 (two - 10,000 gallon cone-bottom tanks)
5. F-102/103 (two - filter presses)
6. F-101 A/B/C/D (four - sand filters)
7. TK-106/107/108 (three - 1,000 gallon polymer mix tanks)
8. CL-101 A/B (two - inclined plate clarifiers)
9. TK-101 A (horizontal clarifier)
10. TK-101 B/C (two - 50,000 gallon modular tanks)
11. TK-120 (12,000 gallon transfer tank)
12. V-201 A/B, V-202, V-203, V-204, V-205 A/B, V-206 A/B, Spare (ten - liquid phase carbon adsorbers)
13. Submersible pumps (six - 6 inch diameter, two - 2 inch diameter)
14. Double-diaphragm pumps (five - 2 inch diameter)
15. Chemical metering pumps, level sensors, hose, static mixers, pH sensors, acid injection equipment, pressure gauges, miscellaneous equipment and materials owned by OHM.

Piping, valves, electrical wiring/conduit, structural supports, wooden structures and materials, fire extinguishers, and all other equipment and materials not owned by OHM will be decommissioned (dismantled, decontaminated and demobilized) by others. Du Pont capitalized equipment will be decontaminated and staged on the WTS pad for demobilization by Du Pont. This equipment includes the following:

16. seven sets - water level sensors and controls,
17. two - 10,000 gallon FRP cone-bottom tanks,
18. one - HDPE tank,
19. two - static mixers,
20. three - tank mixers,
21. three - chemical storage tanks,
22. three - 6 inch diameter and two - 4 inch diameter flow meters, and
23. other instruments and controls (pressure gauges, etc),

The WTS pad will be used as the decontamination facility. Initial decontamination will include processing potable water through the intact WTS. Following this procedure, all systems and utilities entering or leaving the WTS pad will be disconnected and locked-out as appropriate. All WTS equipment and associated equipment will be dismantled by others. The equipment listed above will then be decontaminated by OHM utilizing a General and Unit Specific Decontamination Procedures described below in Sections 2.4 and 2.5. Major equipment will be decontaminated in place, and small and accessory equipment (i.e. pumps, hoses, etc.) will be relocated to the north side of the WTS pad, as space becomes available, for subsequent decontamination. Upon completion of the equipment decommisioning, the decontamination of the WTS pad will be conducted by others.

All decommissioning activities will be conducted utilizing Federal Regulation 40 CFR parts 761, NYSDEC regulations and the Site Specific Health and Safety Plan as guidelines. Demobilization of OHM's equipment will not occur until all the decontamination criteria, as set forth in Section 5, have been met completely.

2.2 Health and Safety

All decommissioning activities will be conducted within the parameters of the Gill Creek Remediation Health & Safety Plan. In general, prescribed personal protection during the decontamination procedures described below will be modified Level D. Whenever direct contact or the potential for liquid spraying exists (i.e. during use of the high pressure "hydroblaster" or steam generator), the Level C personal protection will be prescribed.

Additional personal safety concerns include the potential for physical impact during mobilization of heavy equipment. All regularly required personal protective equipment including hard hat, steel-toed work boots and long sleeve shirts will be worn by every employee during all on-site activities. Further, all personnel will made aware of general demobilization activities planned for each day prior to beginning work and as work progresses as appropriate.

2.3 Initial Potable Water Rinsing Procedure

The procedure described in this section is intended to provide initial rinsing of process components and equipment. Prior to conducting this procedure, sludge and gross debris will be pumped/removed completely from all the equipment. This material will be either treated in the WTS filter press or removed form the WTS pad for treatment and disposal by others. Cone-bottom tanks TK-103/109 will be rinsed with potable water, utilizing a hose. This water will be passed through the filter presses prior to being directed through the WTS system for treatment. The filter press units and associated fixtures (i.e. filter-aid mix tanks, conveyors, air compressors, trailer structures, etc.) will be rinsed off utilizing a water hose. The excess polymer solution remaining in the chemical storage tanks TK-106/107/108 will be removed and stored for subsequent off-site disposal by others. These chemical storage tanks will then be filled with potable water and drained to remove residual polymer. In addition, inclined plate clarifiers CL-101 A/B, horizontal clarifier TK-101A, modular tanks TK-101 B/C, and tanks TK-102/105 will be rinsed with potable water utilizing a hose. All the drained and rinsed water will be directed to TK-101A for subsequent processing through the WTS prior to discharge to Outfall 023.

The water level in all units will then be drawn down, utilizing process pumps, to the lowest level allowed by the water level sensors/pump control devices. Further, process water remaining in each unit will be pumped downstream using portable submersible pumps to achieve absolute minimum water levels prior to conducting the potable water rinsing procedure.

Potable water will then be fed to the horizontal clarifier at the maximum deliverable flow rate (approximately 150 GPM) for a 12 hour duration. The WTS will be operated under normal process conditions throughout this procedure. 50,000 gallon modular tanks TK-101 B and C will be utilized exclusively for 6 hours each during the process. Sand filters F-101 A, B, C and D will be utilized for approximately 6 hours each during the process (i.e. two will be on-line at any one time). All bag filter units will remain on-line during the process. Each of the air strippers T-201 A/B will be utilized for approximately 6 hours each during the process. Two trains of carbon filters will be on-line at any one time and operated in an alternating mode such that each of the three trains are utilized for an approximately equal duration throughout the process.

Upon completion of the initial potable water rinsing procedure, all equipment, except the carbon units, will be pumped down to the lowest achievable level or drained completely. The drained water will be directed to tank TK-105 via a sump pump and through the liquid phase carbon filter system prior to discharge to Outfall 023. Subsequently, tank TK-105 will be drawn down to the lowest achievable level. The water in the carbon units will be drained by introducing compressed air, at approximately 20 psig, to the guard vessel to force the water through the lead and polish vessels prior to discharging to Outfall 023. This process will minimize the exposure of the PCBs contaminated water to be pad. One of the carbon vessel, along with the tank TK-120, will be kept to treat any contaminated water generated in the subsequent General Decontamination Procedure. A schematic drawing to reflect this residual water treatment, is included in Appendix A, herein. Equipment dismantling will then be implemented by others prior to performing the General and Unit Specific Decontamination Procedures described below in Sections 2.4 and 2.5, respectively.

2.4 General Decontamination Procedure

The General Decontamination Procedure will be conducted utilizing a butyl-type biodegradable detergent (i.e. Clearmagic made by Clear Magic, Inc.) sprayed on both the interior and exterior of all the equipment and left on the surface for an hour to allow the detergent to cut residual contamination remaining on the surface. A material safety data sheet for the detergent is included in Appendix B, herein. This will be followed by potable water rinsing of the equipment with a high pressure "hydroblaster" capable of generating up to 8,000 psig of water pressure and with a hot water pressure washer. The combined steps of applying detergent and wash-off will be repeated, if necessary, based on visual evaluation made by the site supervisor or engineer. All the rinse water generated from this procedure will be collected in the tank TK-120 via the WTS pad sump pumps. It is estimated that approximately 50,000 gallons of water will be generated from this procedure.

Once the equipment is inspected by the OHM site supervisor or engineer and declared visually clean, wipe sampling procedures will be implemented as described below in Section 5.0, Sampling and Analysis. Final declaration of "acceptable" of the equipment decontamination will be made by the site supervisor or engineer upon evaluating the analytical results of the wipe sample.

2.5 Unit-Specific Decontamination Procedure

Upon completion of the initial potable water rinsing procedure, equipment decommissioning will be implemented. This section describes the sequence of WTS equipment decommissioning and associated tasks required to be conducted for each piece of equipment. All the equipment to be loaded to the trucks will be conducted by others.

2.5.1 TK-102/105 (12,000 Gallon Transfer Tanks)

These tanks will be decommissioned first in order to provide working space for subsequent decommissioning operations. Upon completion of the initial potable water rinsing procedure, each tank will be pumped to low level utilizing the in-tank process pumps, and then pumped dry using a portable submersible pump. Pumps P-103/107, water level sensing and control devices, and all associated and/or proximal process piping and electrical equipment, not including the main pipe rack or electrical chase installation, will be dismantled by others. Further, the sand media used to support these two tanks will be removed and disposed by others.

The tank liners will be removed and folded inward, so as to minimize dispersement of debris onto the WTS pad. Stabilizing material (i.e. kiln dust) will be applied prior to removal. Tank panels will be dismantled and staged for decontamination. The General Decontamination Procedure will be applied to all components, assembly parts of each tank, pumps P-103 and P-107, water level sensors and control panels. No wipe samples will be taken due to the reason that these tanks have never contacted with contaminated water during the WTS operation. Upon receiving a declaration as "acceptable" following visual evaluation by OHM's site supervisor or engineer, decontaminated tank panels, parts and pumps will be demobilized from the WTS pad by OHM to our Winsdor, New Jersey warehouse.

2.5.2 BF-101 A/B, BF-102 A/B, BF-103 A/B, BF-051 A/B, BF-052 A/B, BF-053 A/B (Bag Filter Units)

During the potable water rinsing procedure, clean filter bags will be installed in the bag filter housings. Subsequently, the bags will be removed for disposal and all associated and/or proximal process piping and electrical equipment will be dismantled for subsequent decontamination by others. Each of the bag filter housings will undergo the General Decontamination Procedure by OHM personnel. Only one wipe sample will be taken for all of the bag filters. Upon receiving a declaration as "acceptable" from the site supervisor or engineer, based on evaluation of wipe sample analytical results, the units will be demobilized from the WTS pad by OHM to our Findlay, Ohio warehouse.

2.5.3 T-201 A/B (Air Strippers)

Air stripper blowers (B-201 A/B), and all associated and/or proximal process piping and electrical equipment will be dismantled by others. The blowers, top-cones and ancillary air stripper components will be relocated on the WTS pad for subsequent decontamination by OHM. Air stripper packing will be removed via vac-truck by Sevenson for disposal by others. The air strippers will be laid on separate flat-bed trucks, for demobilization to the sediment staging pad by others.

The strippers will be remobilized to the WTS for decontamination following demobilization of other equipment. The General Decontamination Procedure will be applied to each section of air strippers and all ancillary parts. One wipe sample will be taken for each of the air stripper columns. Upon receiving a declaration as "acceptable", based on evaluation of wipe sample analytical results, decontaminated air stripper sections and appurtenances will be demobilized from the WTS pad by OHM to our Findlay, Ohio warehouse.

2.5.4 TK-103/109 (10,000 Gallon Cone-Bottom Tanks)

Sludge and gross debris will have been removed prior to initiation of the potable water rinsing. Double-diaphragm pumps P-105 and P-113 as well as all associated and/or proximal process piping and electrical equipment will be dismantled by others.

The cone-bottom tanks will be laid horizontally on the ground. The General Decontamination Procedure will be applied to each of the cone-bottom tanks, the stands and pumps P-113 and P-105. One wipe sample will be taken for each of the tanks. Upon receiving a declaration as "acceptable", based on evaluation of wipe sample analytical results, the decontaminated cone-bottom tanks will be demobilized by Du Pont.

2.5.5 F-102/103 (Filter Presses)

Initially, all non-permanent connected or port roximal piping and electrical equipment will be disconnected from the filter presses by others. The General Decontamination Procedure will be applied to each of the filter presses and permanent fixtures. Two wipe samples will be taken for each of the filter presses. Upon receiving a declaration as "acceptable", based on evaluation of wipe sample analytical results, the decontaminated filter presses will be demobilized from the WTS pad by OHM to our Port Allen, Louisiana warehouse.

2.5.6 F-101 A/B/C/D (Sand Filters)

Prior to implementation of the initial potable water rinse procedure the sand filters will each be backwashed to minimize internal contaminant and sediment loading. Following the initial potable water rinse procedure , the sand filter media will be removed from the sand filters via vac truck by Sevenson and disposal by others. All connected and proximal piping and appurtenances, including the main pipe rack and electrical chase will be dismantled by others. Each vessel will then be rinsed with potable water utilizing a hose to remove any bulk contaminants. The rinsate will be directed to tank TK-120 via sump pump. The General Decontamination Procedure will be applied to each of the sand filters. One wipe sample will be taken on each of the sand filters. Upon receiving a declaration as "acceptable", based on evaluation of wipe sample analytical results, the decontaminated sand filters will be demobilized from the WTS pad by OHM to our Findlay, Ohio warehouse.

2.5.7 TK-106/107/108 (1,000 Gallon Polymer Mix Tanks)

Upon completion of initial potable water rinsing procedure, mixers M-106/107/108, pumps P-109 A/B and P-110, and all associated and/or proximal process piping and electrical equipment will be dismantled by others. The tanks will be removed from the inclined plate clarifier truck structure and will be decontaminated according to the General Decontamination Procedure. No wipe sample will be taken due to the reason that these tanks have never contacted with contaminated water during the WTS operation. Upon receiving a declaration as "acceptable" following visual evaluation by OHM's site supervisor or engineer, the tanks will be demobilized by Du Pont.

2.5.8 CL-101 A/B (Inclined Plate Clarifiers)

Upon completion of the initial potable water rinsing procedure, the double-diaphragm pumps P-104 A/B and all associated and/or proximal process piping and electrical equipment will be dismantled by others. Plastic plates located inside the tanks will be dismantled by OHM and disposed by others. The clarifiers housings and P-104 A/B will then undergo the General Decontamination Procedure. One wipe sample will be taken for each of the clarifier. Upon receiving a declaration as "acceptable", based on evaluation of wipe sample analytical results, the decontaminated clarifier will be demobilized from the WTS pad by OHM to our Findlay, Ohio warehouse.

2.5.9 TK-101 A (Horizontal Clarifier)

Upon completion of the potable water rinsing procedure, submersible pump P-101 C, water level sensing and control devices, double-diaphragm pump P-111 and all associated and/or proximal process piping and electrical equipment will be dismantled by others. The clarifier, P-101 C, P-111 and water level sensing and control panels will then undergo the General Decontamination Procedure. One wipe sample will be taken for the tank. Upon receiving a declaration as "acceptable", based on evaluation of wipe sample analytical results, the decontaminated clarifier will be demobilized from the WTS pad by OHM to our Windsor, New Jersey warehouse.

2.5.10 TK-101 B/C (50,000 Gallon Modular Tanks)

Upon completion of the potable water rinsing procedure, each tank will be pumped to low level utilizing the in-tank process pumps, and then pumped dry using a portable submersible pump. Pumps P-101 A/B, respectively, water level sensing and control devices, and all associated and/or proximal process piping and electrical equipment will be dismantled by others.

The tank liners will be removed and folded inward, so as to minimize dispersement of debris onto the WTS pad. Tank panels will be dismantled and staged for decontamination. The General Decontamination Procedure will be applied to each tank panel, all assembly parts of each tank, P-101 A/B and water level sensors and control panels. No wipe sample will be taken for the panels. Upon receiving a declaration as "acceptable" following visual evaluation by OHM's site supervisor or engineer, decontaminated tank panels and parts will be demobilized from the WTS pad by OHM to our Findlay, Ohio warehouse.

2.5.11 V-201 A/B, V-202, V-203, V-204, V-205 A/B, V-206 A/B, Spare (Liquid Phase Carbon Adsorbers)

Subsequent to implementation of the initial potable water rinsing procedure, granular activated carbon media will be removed from the filter vessels and all connected and proximal piping and appurtenances will be dismantled by others. Each vessel will then be rinsed with potable water utilizing a hose. The rinsate will be directed to tank TK-120 for subsequent disposal. The General Decontamination Procedure will be applied to each of the vessels. One wipe sample will be taken for each vessel. Upon receiving a declaration as "acceptable", based on evaluation of wipe sample analytical results, the decontaminated vessels will be demobilized from the WTS pad by OHM to our Findlay, Ohio warehouse.

2.5.12 TK-120 (12,000 Gallon Transfer Tank)

Upon completion of the potable water rinsing procedure, the tank will be pumped to low level utilizing the in-tank process pump, P-120, and then pumped dry using a portable submersible pump. Pump P-120, and all associated and/or proximal process piping and electrical equipment will be dismantled by others.

The tank will be kept as the storage tank for the decontamination rinse water. The tank will undergo dismantling and the General Decontamination Procedure following completed decontamination of other WTS equipment and rinse water disposal by others. The tank liner will be removed and folded inward, so as to minimize dispersement of debris onto the WTS pad. No wipe sample will be taken for the tank. Upon receiving a declaration as "acceptable" following visual evaluation by OHM's site supervisor or engineer, the tank will be demobilized by OHM to our Windsor, New Jersey warehouse.

3.0 DECONTAMINATION SUPPORT PERSONNEL

OHM will provide one supervisor to oversee the procedures outlined herein, and to coordinate decommissioning with other contractors. Four technicians will be provided to perform equipment decontamination and demobilization. In addition, one chemist will be provided to conduct the wipe sampling. A WTS Decommissioning Log will be maintained by OHM staff throughout equipment decommissioning. A blank sample log is included in **Appendix C**, herein. One log will be kept for each equipment item and the supervisor or engineer will sign off the log at each relocation/mobilization step and each decontamination step.

4.0 DISPOSAL

All rinse water, cleaning solution, and final wash water generated during the General Decontamination Procedures will be collected in tank TK-120 via a portable sump pump and treated by a train of carbon units prior to discharging to the Outfall 023. In addition, all the sand and carbon media, air stripper packing material, interconnecting piping as well as the pool liners will be disposed by others.

5.0 SAMPLING AND ANALYSIS

Following decontamination of WTS equipment identified above in Section 2.0, Equipment Decontamination Facilities and Procedures, wipe samples will be obtained from equipment as indicated in Section 2.5, Unit Specific Decontamination Procedure, of this plan. Wipe samples will be collected by OHM personnel who will log each sample on a chain-of-custody form prior to shipment to OHM's Findlay laboratory. Wipe samples will be collected as follows:

1. Cut out a 4"x4" (101.6 cm square) section from a piece of clean cardboard.
2. Don a clean pair of disposable latex (not PVC) sample gloves.
3. Obtain a 4"x4", or similar size, sterile gauze pad. Saturate with hexane (pesticide grade) using Teflon rinse bottle.
4. Applying moderate pressure, wipe the surface, within the boundaries of the 4" square. Wipes will consist of 10 horizontal swaths (back and forth) across the square; 10 vertical swaths will follow across the square. The entire area within the 4 inch square will have be wiped over.
5. Place the gauze pad into a 16-oz. sample container. Cap and seal the container.
6. Label each container with the sample number, sample location, sampler's initials, date, and time of sampling. Sample labels should be prepared and affixed to the sample containers prior to sampling.
7. A field blank will be included with each batch (no more than twenty samples per batch) of wipe samples. The field blank will be prepared by passing the hexane over a gauze pad into an empty sample container. The hexane will be analyzed as a control sample. This will help identify potential introduction of contaminants through the sampling method, contributions from the gauze pad, hexane, and/or sample container.
8. Fill out chain-of custody form accurately based on the above sampling information.
9. Pack sample containers in cooler. Maintain temperature at 4 C with the addition of "Blue ice" to container. Seal container with duct tape.
10. Ship sample cooler via Federal Express, or other similar air carrier, to OHM's laborotary at Findlay, Ohio.

The field blank will consist of a gauze pad wetted with the chosen solvent (see Table 5.1) and placed into a prepared sample container.

Additionally, one duplicate sample will be collected per ten samples. Duplicates will be collected in an area within approximately one inch of the original sample location. Based on the sampling specified within Section 2.5, Unit Specific Decontamination Procedure, three duplicate samples will be collected.

Table 5.1
Wipe Sample Solvent Selection

Analyte	Solvent
semi- and volatile organic compounds; PCBs, pesticides	hexane
cyanide	0.125 M NaOH

Wipe sampling and analytical methods will follow the protocol established under Federal Regulation 40 CFR 761 and EPA standard analytical methods. All the wipe sample test and analytical work will be performed by OHM. Laboratory analyses will be requested on 24 hours turnaround for quick receipt of analytical results. If any analytical results indicate that specific equipment items remain contaminated, then the contaminated equipment item will be subjected to another decontamination cycle as specified in Section 2.5, Unit Specific Decontamination Procedure. Costs for additional labor and materials for re-decontamination will be charged on a time and material basis.

Based upon the Sampling and Analysis Plan (Sevenson, August 17, 1992), OHM will select the following parameters as the decontamination criteria for the WTS equipment:

- PCBs
- pesticide (Gamma BHC)
- cyanide
- trichloroethylene (TCE)
- tetrachloroethylene (PCE)

Decontamination guideline for PCBs will be evaluated based on regulations pursuant to 40 CFR Part 761 Subpart G - PCB Spill Cleanup Policy. More specifically, pursuant to Part 761.123, Definitions, WTS equipment is considered to consist of low-contact, outdoor industrial surfaces due to (1) the impervious material composition of the equipment (i.e. metal), (2) the equipment being touched or contacted directly for only short periods of time due to process waste being in contact with internal equipment components or tank interiors and (3) the use of the equipment outdoors. Using 40 CFR Part 761.125(c)(3)(iv) as a guideline, all surface are required to be cleaned to 100 ug/100 cm^2.

In addition, decontamination guidelines for pesticide (Gamma BHC) and cyanide are set at 100 ug/100 cm^2 and 5 mg/100 cm^2, respectively. The decontamination guideline for TCE and PCE is set at 1 mg/100cm^2 each.

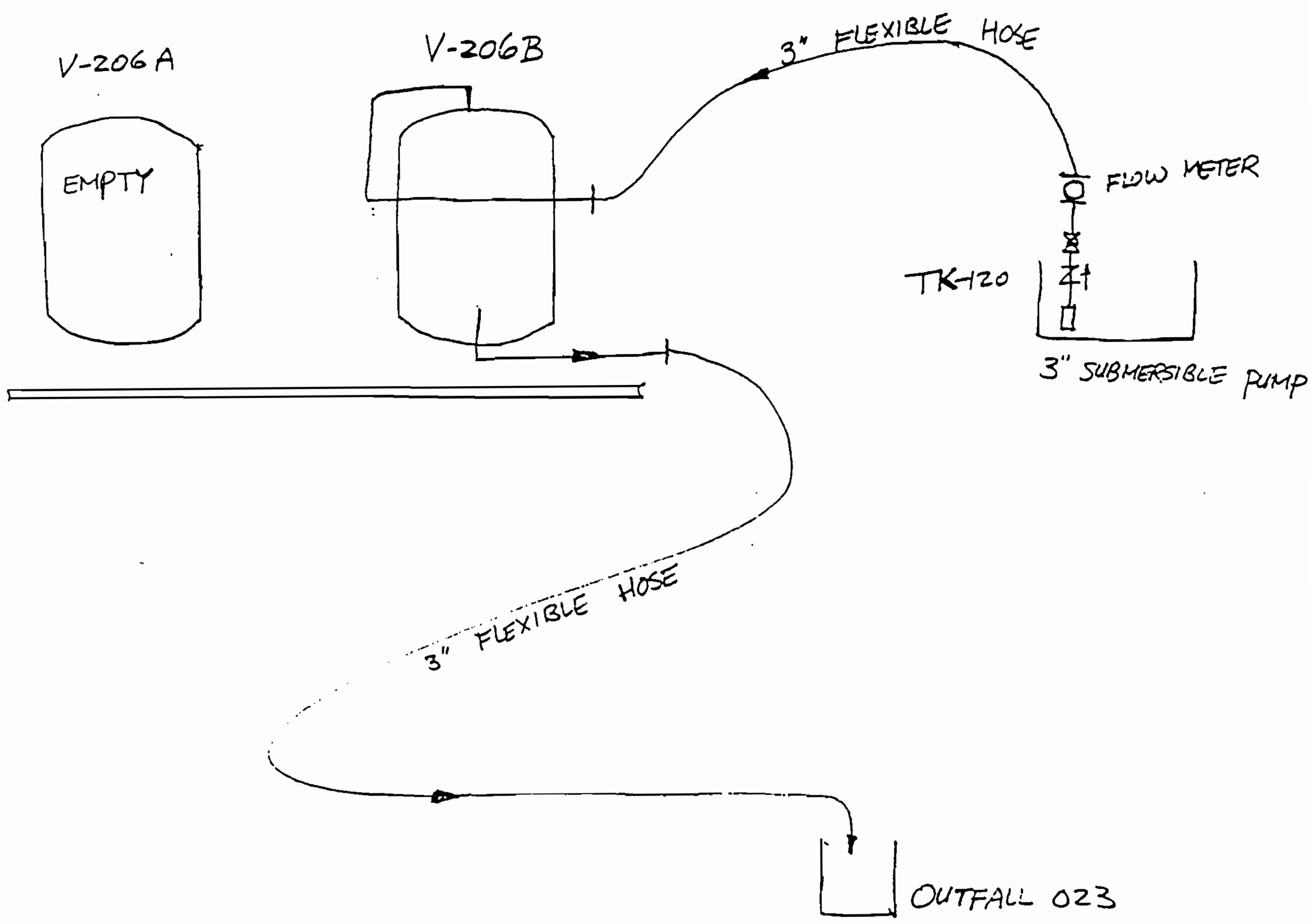
Analytical methods to be used for the parameters set forth above are EPA standard methods as indicated in Table 5.2 below.

Table 5.2
Wipe Sample Analytical Methods

Analyte	Analytical Method
PCB	SW/846/8080
Pesticide (Gamma BHC)	SW/846/8080
Cyanide	SW/846/9010
Trichloroethylene	SW/846/8240
Tetrachloroethylene	SW/846/8240

Appendix A

Residual Water Treatment Configuration Schematic Drawing



RESIDUAL WATER TREATMENT SCHEMATICS

Appendix B
Clear Magic Material Safety Data Sheet

Blue Coral, Inc.

DATA SHEET

IDENTITY (As Used on Label and List)	STOCK NUMBER
CLEAR MAGIC INDUSTRIAL	W376E, W377E, W378E, W379E

SECTION I

MANUFACTURER'S NAME BLUE CORAL, INC.	EMERGENCY TELEPHONE NUMBER 216) 641-5490
ADDRESS (Number, Street, City, State, and ZIP Code) 5300 HARVARD AVENUE	TELEPHONE NUMBER FOR INFORMATION 216) 641-5490
CLEVELAND, OH 44105	DATE PREPARED DECEMBER 17, 1991
U.S.A.	SIGNATURE OF PREPARER (Optional) [signature]

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

HAZARDOUS COMPONENTS	CAS NUMBER	OSHA PEL	ACGIH TLV
WATER	7732-18-5	-	-
ETHOXYLATED ALCOHOL	68439-46-3	**NOT ESTABLISHED**	
DIPROPYLENE GLYCOL MONOMETHYL ETHER	34890-94-8	SKIN 100 PPM	SKIN 100
ISOPROPYL ALCOHOL	67-63-0	400 PPM	400 PPM

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT	208°	SPECIFIC GRAVITY (H_2O = 1)	1.00
VAPOR PRESSURE (mm Hg.)	N/A	MELTING POINT	20°
VAPOR DENSITY (AIR = 1)	N/A	EVAPORATION RATE (Butyl Acetate = 1)	1
SOLUBILITY IN WATER	COMPLETE	pH	6.5

APPEARANCE AND ODOR

COLORLESS TRANSPARENT LIQUID WITH CITRUS ODOR

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used)	FLAMMABLE LIMITS	LEL	UEL
NONE	N/A	N/A	N/A

EXTINGUISHING MEDIA

N/A

SPECIAL FIRE FIGHTING PROCEDURES

N/A

UNUSUAL FIRE AND EXPLOSION HAZARDS

N/A

SECTION V - REACTIVITY DATA

STABILITY	UNSTABLE		STABLE	CONDITIONS TO AVOID
			X	NONE KNOWN TO BLUE COARL, INC.

INCOMPATIBILITY (Materials to Avoid)

NONE KNOWN TO BLUE CORAL, INC.

HAZARDOUS DECOMPOSITION OR BYPRODUCTS

NONE KNOWN TO BLUE CORAL, INC.

HAZARDOUS POLYMERIZATION	MAY OCCUR		WILL NOT OCCUR	CONDITIONS TO AVOID
			X	NONE KNOWN TO BLUE CORALL, INC.

SECTION VI - HEALTH HAZARD DATA

HEALTH HAZARDS (Acute and Chronic)

N/A

SIGNS AND SYMPTOMS OF EXPOSURE

N/A

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

N/A

EMERGENCY AND FIRST AID PROCEDURES

WASH SKIN WITH SOAP AND WATER. IN CASE OF CONTACT WITH EYES, REMOVE CONTACT LENSES AND FLUSH WELL WITH WATER FOR AT LEAST 15 MINUTES. IN CASE OF INGESTIONS, RINSE MOUTH WITH WATER AND THEN DRINK (1) GLASS OF WATER. CALL PHYSICIAN.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

WASH AWAY WITH WATER, OR APPLY INERT ABSORBENT

WASTE DISPOSAL METHOD

RINSE DOWN SEWER OR SWEEP UP AND CARRY TO LAND FILL OR ACCORDING TO LOCAL, STATE AND FEDERAL POLLUTION CONTROL REGULATIONS.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

STORE AT AMBIENT TEMPERATURE AWAY FROM FOOD AND DRINK.

OTHER PRECAUTIONS

KEEP FROM FREEZING. KEEP AWAY FROM CHILDREN.

SECTION VIII - CONTROL MEASURES

RESPIRATORY PROTECTION (Specify Type)

NONE REQUIRED WITH NORMAL USE.

VENTILATION	LOCAL EXHAUST	MECHANICAL (General)
	N/A	N/A
	SPECIAL	OTHER
	N/A	N/A

PROTECTIVE GLOVES	EYE PROTECTION	OTHER PROTECTIVE CLOTHING OR EQUIPMENT
RECOMMENDED	SAFETY GLASSES	NONE

WORK/HYGIENIC PRACTICES

DO NOT STORE NEAR FOOD OR DRINK. WASH EXPOSED SKIN FOR HYGENIC PURPOSES.

SECTION IX - UNIFORM HANDLING AND SHIPPING INFORMATION

HMIS (1)	NFPA (2)		
1	1	DOT PROPER SHIPPING NAME	NONE
0	0	DOT HAZARD CLASS	N/A
0	0	DOT I.D. NO.	N/A
B	NONE	IATA PROPER SHIPPING NAME	NONE
		IATA HAZARD CLASS	N/A
		IMO NO.	N/A

HAZARD RATING KEY:

0 = INSIGNIFICANT; 1 = SLIGHT; 2 = MODERATE; 3 = HIGH; 4 = EXTREME

(1) HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (NATIONAL PAINT AND COATING ASSOCIATION) RATING APPLIES TO PRODUCT "AS PACKAGED" (I.E., AMBIENT TEMP.)

(2) NATIONAL FIRE PROTECTION ASSOCIATION RATING IDENTIFIES THE SEVERITY OF HAZARDS OF MATERIAL DURING A FIRE EMERGENCY (I.E., ON FIRE)

Appendix C

Sample WTS Decommissioning Log

Mobilization and Decontamination Sign Off Log

Water Treatment System
Du Pont – Gill Creek Remediation Project

EQUIPMENT ITEM: ______________________

MOBILIZATION SIGN OFF SCHEDULE

MOBILIZATION DATE	MOBILIZATION FROM	MOBILIZATION TO	CONDUCTED BY	SUPERVISOR SIGN OFF

DECONTAMINATION SIGN OFF SCHEDULE

DECON DATE	DECON PROCEDURE	CONDUCTED BY	SUPERVISOR SIGN OFF

6.1.3 Sample Designations

All samples should be collected by contract laboratory personnel and should have a label attached (filled out using waterproof ink). Sample identification numbers should be sequential and proceeded by the characters GCDS#, where # is the Diversion Structure number. (For example, the sample identification number for the first grab sample from Diversion Structure 3 would be GCDS3-1.) The sample designation should be recorded on a Chain-of-Custody record (Figure 1-1).

6.1.4 Sampling Equipment and Procedures

Equipment required and the procedures for sample collection are presented below.

Equipment List

Sample containers
Sample labels
Sealable plastic bags
Ice chest (sample shuttle)
Ice, blue ice, or other cooling substance
Chain-of-Custody Records
Appropriate health and safety equipment
Appropriate decontamination equipment
Shovel
Stainless steel trowels or spoons
Knife or other bladed instrument for cutting sandbags
Hand auger or hand driven tube sampler
Brass liners
Plastic end caps
Teflon film
Vinyl tape

Procedure

Prior to proceeding to a sampling location, appropriate clean sampling equipment and health and safety equipment should be obtained.

Hand-driven tube samplers should be used to collect samples of sandbag fill materials for volatile analysis. A clean brass liner should be placed into a clean hand-driven sampler, and the sampler should be driven into the material to a depth ensuring the liner will be filled. The sampler should then be removed from the material carefully, yet quickly, to avoid losing any portion of the sample. The liner should be then removed from the hand-driven sampler, and the liner ends quickly covered with Teflon film. The liner ends should then be capped with plastic end caps, and any exposed Teflon tape should be trimmed away. The caps should then be secured to the liners with vinyl tape. The liners should be labeled, placed into sealable plastic bags, and placed in an ice chest coolrd with ice or blue ice.

All other grab samples should be collected directly into appropriate sample containers. Each sample container should be capped and the label and seal attached. Sample containers should be placed into sealable plastic bags and into an ice chest cooled with ice or blue ice.

Prior to sampling the next diversion structure, all sampling equipment must be decontaminated as specified in Section 1.5.

6.1.5 Sample Handling and Analysis

Samples should be collected and preserved in appropriate containers (supplied by the laboratory) as specified in Table 1-1. After collection and preservation, samples should be stored, handled, shipped, and tracked according to Section 1.2.1.

For sandbag fill materials that the Owner decides to pursue using for creek bed recontouring or creek bank restoration, samples should be analyzed for the following parameters using methods outlined in Section 1.4:

PCBs
Trichloroethylene (total composition)
Tetrachloroethylene (total composition)
gamma-BHC (total composition)
Total Organic Carbon

For sandbag fill materials that the Owner decides to pursue reusing elsewhere, samples should be analyzed for the following parameters using methods outlined in Section 1.4:

PCBs
Trichloroethylene (TCLP)
Tetrachloroethylene (TCLP)
gamma-BHC (EP toxicity) for Area 3-side faces of Diversion Structures No. 3 and 3A

Sandbag fill material from diversion structure faces not in contact with Area 3 do not need to be analyzed for gamma-BHC (EP toxicity).

6.2 REMEDIATION WORK AREAS DECONTAMINATION SAMPLING

6.2.1 Sampling Objective

The purpose of this sampling is to verify that the Remediation Work Areas have been decontaminated.

6.2.2 Sample Location and Frequency

Decontamination of each Remediation Work Area will include a final rinse. A representative grab sample of the final rinsate from the Remediation Water Treatment Area pad and from the Sediment Staging Area pad should be collected. Additionally, one duplicate and one field blank should be collected from the final rinsate of each of these two pads.

6.2.3 Sample Designation

Samples should be collected by contract laboratory personnel and should have a label attached (filled out using waterproof ink). Sample identification numbers for the samples from the Remediation Water Treatment Area pad should be sequential and preceeded by the characters GCRWT. Sample identification numbers for the samples from the Sediment Staging Area pad should be sequential and preceeded by the characters GCSSA. Sample designation should be recorded on a Chain-of-Custody record (Figure 1-1).

6.2.4 Sampling Equipment and Procedures

Depending upon the rinsate collection point and field conditions, alternative procedures and equipment may be required.

<u>Equipment List</u>

Sample containers
Sample labels
Sealable plastic bags
Ice chest (sample shuttle)
Ice, blue ice, or other cooling substance
Chain-of-Custody Records
Appropriate health and safety equipment
Appropriate decontamination equipment
Glass or stainless steel dipper (or scoop)

<u>Procedure</u>

Prior to proceeding to a sampling location, appropriate clean sampling equipment and health and safety equipment should be obtained.

Final rinsate should be sampled using a clean large stainless steel dipper scooped beneath the surface of the accumulated rinsate, being cautious not to stir or disturb the rinsate unnecessarily. The collected rinsate should be poured into appropriate sample containers, again minimizing disturbance and aeration of the rinsate as it is poured. The sample containers should be capped and the label and seal attached. The sample containers should be placed into sealable plastic bags and into an ice chest cooled with ice or blue ice.

After a representative sample is obtained, all sampling equipment must be decontaminated as specified in Section 1.5.

6.2.5 Sample Handling and Analysis

Samples should be collected and preserved in appropriate containers (supplied by the laboratory) as specified in Table 1-1.

After collection and preservation, samples should be stored, handled, shipped, and tracked according to Section 1.2.1.

Samples should be analyzed for the following parameters using methods outlined in Section 1.4:

PCBs
Trichloroethylene (total composition)
Tetrachloroethylene (total composition)

For these rinsate samples, total composition analysis is equivalent to TCLP analysis.

APPENDIX A
PAINT FILTER LIQUIDS TEST

METHOD 9095

PAINT FILTER LIQUIDS TEST

1.0 SCOPE AND APPLICATION

1.1 This method is used to determine the presence of free liquids in a representative sample of waste.

1.2 The method is used to determine compliance with 40 CFR 264.314 and 265.314.

2.0 SUMMARY OF METHOD

2.1 A predetermined amount of material is placed in a paint filter. If any portion of the material passes through and drops from the filter within the 5-min test period, the material is deemed to contain free liquids.

3.0 INTERFERENCES

3.1 Filter media were observed to separate from the filter cone on exposure to alkaline materials. This development causes no problem if the sample is not disturbed.

4.0 APPARATUS AND MATERIALS

4.1 Conical paint filter: Mesh number 60 (fine meshed size). Available at local paint stores such as Sherwin-Williams and Glidden for an approximate cost of $0.07 each.

4.2 Glass funnel: If the paint filter, with the waste, cannot sustain its weight on the ring stand, then a fluted glass funnel or glass funnel with a mouth large enough to allow at least 1 in. of the filter mesh to protrude should be used to support the filter. The funnel is to be fluted or have a large open mouth in order to support the paint filter yet not interfere with the movement, to the graduated cylinder, of the liquid that passes through the filter mesh.

4.3 Ring stand and ring, or tripod.

4.4 Graduated cylinder or beaker: 100-mL.

5.0 REAGENTS

5.1 None.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 All samples must be collected according to the directions in Chapter Nine of this manual.

6.2 A 100-mL or 100-g representative sample is required for the test. If it is not possible to obtain a sample of 100 mL or 100 g that is sufficiently representative of the waste, the analyst may use larger size samples in multiples of 100 mL or 100 g, i.e., 200, 300, 400 mL or g. However, when larger samples are used, analysts shall divide the sample into 100-mL or 100-g portions and test each portion separately. If any portion contains free liquids, the entire sample is considered to have free liquids.

7.0 PROCEDURE

7.1 Assemble test apparatus as shown in Figure 1.

7.2 Place sample in the filter. A funnel may be used to provide support for the paint filter.

7.3 Allow sample to drain for 5 min into the graduated cylinder.

7.4 If any portion of the test material collects in the graduated cylinder in the 5-min period, then the material is deemed to contain free liquids for purposes of 40 CFR 264.314 and 265.314.

8.0 QUALITY CONTROL

8.1 Duplicate samples should be analyzed on a routine basis.

9.0 METHOD PERFORMANCE

9.1 No data provided.

10.0 REFERENCES

10.1 None required.

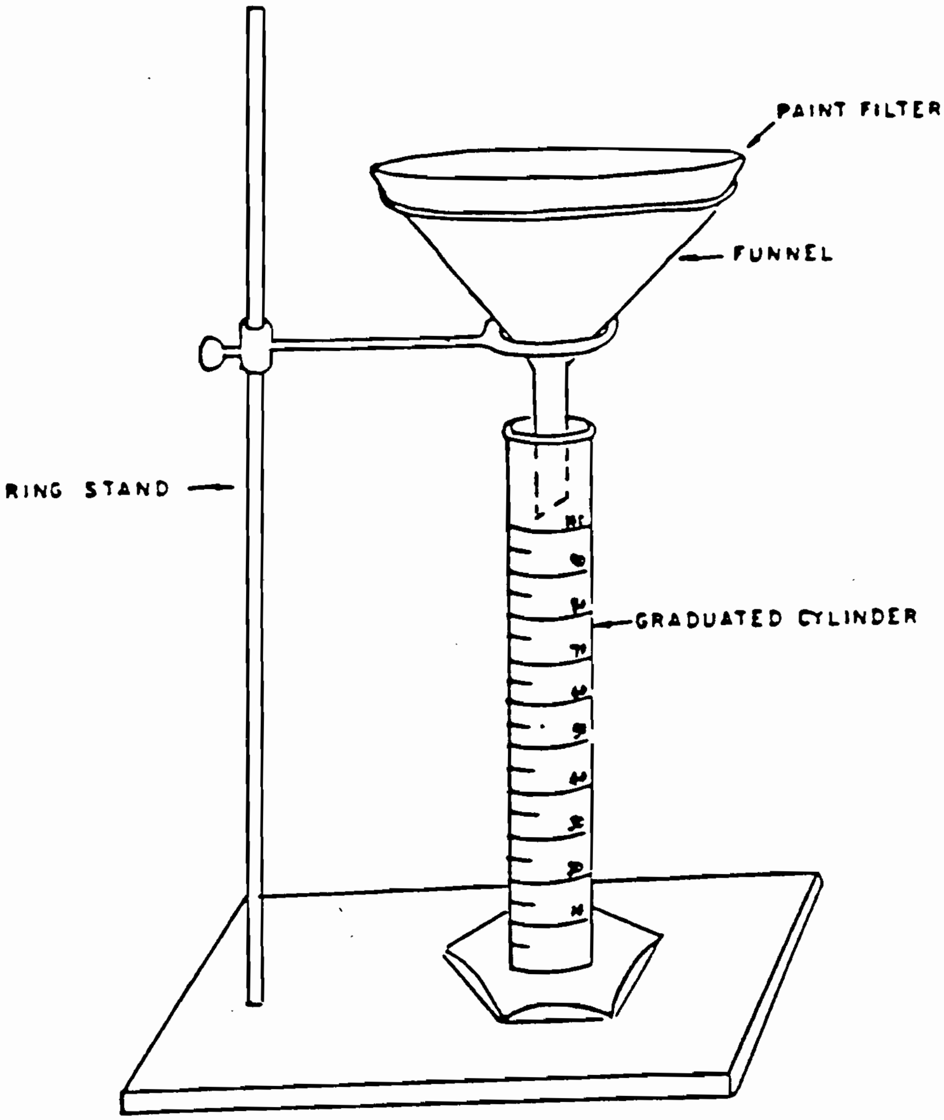
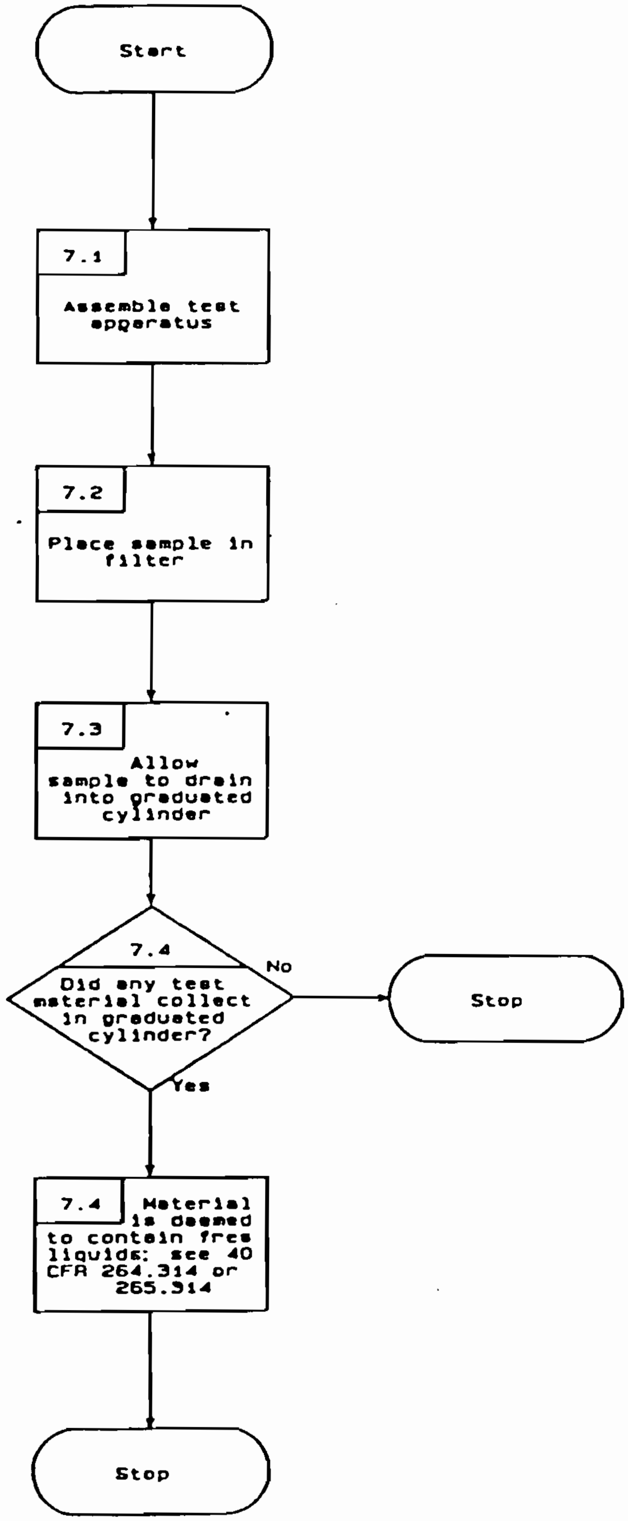


Figure 1. Paint filter test apparatus.

METHOD 9095

PAINT FILTER LIQUIDS TEST



EME[illegible]ION [illegible]LIANCE REQU[illegible]ENTS

8-13 .2 REVISED

Contaminant	REGULATORY CONSTRAINTS CONC. (ppb)	MASS (ppd) max	MASS (ppd) avg	BASIS (MAIL, 023 023+024)	1991 ANNUAL DISCH. IN PPD	ACTUAL MAX DAY IN 90-91 IN PPD	SEE NOTE 1: MAX ALLOW EFFLUENT CONC (PPB) W/O CONSIDER ACTUAL MAX DAY	SEE NOTE 2: MAX ALLOW EFFLUENT CONC (PPB) CONSIDERING ACTUAL MAX DAY	SEE NOTE 5: MAX ALLOW EFFLUENT CONC (PPB) CONSIDERING DILUTION AT 023 1MGD	SEE NOTE 7: SUGGESTED INTERNAL END O' PIPE LIMITS (PPB) AT 240 GPM
1,1 DICHLOROETHENE		2.1	0.84	023+024	0.022	0.13	291.9	246.7		100
1,1,1 TRICHLOROETHANE		0.73	0.292	023+024		0.028	101.5	91.7		50
1,1,2,2-tetrachloroethane		5.33	2.13	023	1.33	3.41	740.2	-444.8		300
1,2,3 Trichlorobenzene(REV)		3	1.5	023		0.015	521.3	516.0		250
1,2,4 trichlorobenzene(REV)		3	1.5	023		0.015	521.3	516.0		250
1,2-dichlorobenzene	3	0.016		MAIL		0.015	5.6	0.3	8.6	3
1,3-dichlorobenzene	3	0.016		MAIL		0.015	5.6	0.3	8.6	3
1,4-dichlorobenzene	3	0.016		MAIL		0.015	5.6	0.3	8.6	3
2-chlorophenol (REVISED)		0.2	0.1	023		0.015	34.0	29.5		15
acenaphthene	10	0.024		MAIL		0.015	8.3	3.1	28.6	3
alpha-BHC	1	0.014		MAIL		0.002	4.9	4.2	2.9	3
ANTHRACENE *	3	0.009		MAIL		0.015	3.1	-2.1	8.6	2.5
benzene	25	0.062		MAIL		0.007	21.5	19.1	71.4	15
BETA-BHC	1	0.014		MAIL		0.002	4.9	4.2	2.9	3
BIS(2-ETHYLHEXYL)PHTHALATE		1.25	0.5	023+024	0.53	1.02	173.8	-180.7		50
CARBON TETRACHLORIDE		1.1	0.44	023	0.05	0.23	152.9	73.0		50
chlorobenzene	25	0.2		MAIL		0.336	69.5	-47.3	71.4	10
CHLOROFORM		19.2	7.69	023+024	1.67	3.92	2672.3	1310.1		500
cis-1,2-Dichloroethene		2.1	0.84	023+024	0.022	0.13	291.9	246.7		100
DELTA-BHC	1	0.014		MAIL		0.002	4.9	4.2	2.9	2
FLUORANTHENE	3	0.009		MAIL		0.015	3.1	-2.1	8.6	2.5
GAMMA-BHC (REVISED)		0.25	0.16	023		0.002	55.6	54.9		25
hexachlorbenzene		2.5	1	023	0.17	0.28	347.5	250.2		50
hexachlorobutadiene		1	0.4	023	0.03	0.055	139.0	119.9		50
METHYLENE CHLORIDE	187	0.15		MAIL	0.116	0.48	52.1	-114.7	535.0	15
napthalene	10	0.022		MAIL		0.015	7.6	2.4	28.6	5
PCB 1254		0.05	0.02	023	0.009	0.014	7.0	2.1		1
PCB-1248		0.05	0.02	023	0.009	0.014	7.0	2.1		1
PHENANTHRENE	3	0.017		MAIL		0.015	5.9	0.7	8.6	2.5
PYRENE	10	0.009		MAIL		0.015	3.1	-2.1	28.6	3
tetrachloroethene		5.73	2.29	023	0.81	1.92	795.8	128.6		75
TOTAL PHENOL		7.05	2.82	023	0.03	0.041	980.0	965.7		500
trans 1, 2 Dichloroethene		2.1	0.84	023+024	0.022	0.13	291.9	246.7		100
trichloroethene		13	5.18	023+024	2.48	6.28	1800.1	-382.3		500
vinyl chloride	37.5	0.03		MAIL		0.107	10.4	-26.8	107.1	5
Cadmium	10	0.008		MAIL	0.006	0.006	2.0	0.7	28.6	1
Chromium (REVISED)		2	1	023	0.2	0.23	347.5	267.6		150
Copper (REVISED)		18	13	023	0.2	0.2	4517.5	4448.0		2000
Lead (REVISED)		19.5	10	023	1.6	2.09	3475.0	2748.7		1500
Mercury (REVISED)		1.5	0.6	023	0.018	0.072	208.5	183.5		150
Nickle (REVISED)		6	4	023	1.29	0.264	1390.0	1298.3		650
Zinc (REVISED)		30	25	023	0.06	0.24	8687.5	8604.1		4000

GILL CREEK REMEDIATION COMPLIANCE REQUIRMENTS

Contaminant	REGULATORY CONSTRAINTS: CONC. (ppb)	REGULATORY CONSTRAINTS: MASS (ppd) max avg	REGULATORY CONSTRAINTS: BASIS (MAIL, 023 023+024)	1991 ANNUAL DISCH. IN PPD	ACTUAL MAX DAY IN 90-91 IN PPD	SEE NOTE 1: MAX ALLOW EFFLUENT CONC (PPB) W/O CONSIDER ACTUAL MAX DAY	SEE NOTE 2: MAX ALLOW EFFLUENT CONC (PPB) CONSIDERING ACTUAL MAX DAY	SEE NOTE 5: MAX ALLOW EFFLUENT CONC (PPB) CONSIDERING DILUTION AT 023 1MGD	SEE NOTE 7: SUGGESTED INTERNAL END O' PIPE LIMITS (PPB) AT 240 GPM

NOTES:

1. THESE ARE CONCENTRATIONS DETERMINED AT THE 240 GPM REMEDIATION WATER FLOW RATE AND ASSUMING THAT NO OTHER SITE SOURCES EXIST AND THE MAXIMUM DAY (OR ANNUAL AVERAGE LIMIT, IF IT EXISTS) PERMIT LIMIT

2. THESE ARE THE CONCENTRATIONS AT 240 GPM CONSIDERING OTHER SITE MAX DAY SOURCES SUBTRACTED FROM MAX DAY (OR ANNUAL AVERAGE, IF LIMIT EXISTS)

3. ACTUAL SITE DISCHARGES SHOWN IN THE ABOVE CHART DEFAULTED TO DETECTION LIMITS IF NONDETCTED

4. PARAMETERS MARKED AS 'REVISED' ARE AS PER REQUESTED PERMIT MODIFICATIONS

5. THESE ARE MAXIMUM ALLOWABLE CONCENTRATION IN DISCHARGE FROM REMEDIATION AT 240 GPM CONSIDERING THAT NO OTHER SITE SOURCES EXIST AND 1 MGD THROUGH 023 OUTFALL.

6. * = THESE POTW LIMITS ARE FOR BENZ (A) ANTHRACENE, NOT ANTHRACENE. THERE ARE NO LIMITS FOR ANTHRACENE

7. THESE END OF PIPE LIMITS ARE TO BE USED FOR COMPARISON TO THE SAMPLE RESULTS TAKEN FROM BETWEEN THE LEAD AND POLISHING GAC VESSELS TO DETERMINE THE NEED TO CHANGE OUT CARBON

FILE:COMPLY-SORT.W20

DE MINIMIS VALUES

PARAMETER	DE MINIMIS 0.2% OF APPROVED MAIL (AVG. LBS/DAY)
Volatile Organics	
Benzene	0.062
Carbon Tetrachloride	0.046
Chlorodibromomethane	0.015
Monochlorobenzene	0.200
Dichlorobromomethane	0.011
Chloroform	0.055
Dichloroethylene	0.065
Bromoform	0.020
Dichloropropylene	0.065
Ethyl benzene	0.047
Tetrachloroethane	0.027
Tetrachloroethylene	0.114
Tolune	0.344
Trichloroethane	0.020
Trichloroethylene	0.088
Methylene Chloride	0.150
Vinyl Chloride	0.030
Acid Extractable Organics	
Monochlorophenol	0.063
Dichlorophenol	0.038
Monochlorocresol	0.036
Trichlorophenol	0.102
Pentachlorophenol	0.038
Base/Neutral Extractable Organics	
Dimethyl Phthalate	0.052
Butyl Benzyl Phthalate	0.102
Dibutyl Phthalate	0.052
Diethyl Phthalate	0.204
Dioctyl Phthalate	0.052

DE MINIMIS VALUES

PARAMETER	DE MINIMIS 0.2% OF APPROVED MAIL (AVG. LBS/DAY)
Monochlorotoluene	1.400
Nitrosodiphenylamine	0.025
Dichlorobenzene	0.016
Dichlorotoluene	0.016
Acenaphthane	0.024
Fluorathene	0.009
Chrysene	0.009
Naphthalene	0.022
Benz (a) Anthracene	0.009
Pyrene	0.009
Phenanthrene	0.017
Trichlorobenzene	0.076
Trichlorotoluene	0.076
Hexachlorobutadiene	0.009
Tetrachlorobenzene	0.076
Hexachlorocyclopentadiene	0.088
Hexachlorobenzene	0.009
Monochlorobenzotrifluoride	0.200
Dichlorobenzotrifluoride	0.200
PCB's and Pesticides	
Hexachlorocyclohexane	0.014
PCB	0.006
Endosulfan	0.002
Endosulfan Sulfate	0.002
Mirex	0.006
Dechlorane Plus	0.006
Heptachlor	0.002
Metals	
Cadmium	0.008
Total Chromium	0.040

DE MINIMIS VALUES

PARAMETER	DE MINIMIS 0.2% OF APPROVED MAIL (AVG. LBS/DAY)
Copper	0.965
Lead	0.320
Mercury	0.008
Nickel	0.400
Zinc	1.380
Cyanide	0.155
Other	
Total Phenols	0.474
Soluble Organic Carbon	48.8
Total Suspended Solids	200.0
Phosphorus	2.0

F. Discharge Limitations & Monitoring Requirements

During the period beginning the effective date of this Permit and lasting until the expiration date, discharge from the permitted facility outfall(s) shall be limited and monitored by the permittee as specified below.

Outfall Number &	Effluent Parameter	Discharge Limitations Annual Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
024	Cadium	0.872	2.18	lbs/day	1/Qtr.	3
	Copper	3.88	9.70	lbs/day	1/Qtr.	3
	Lead	Included with 023,024			1/Qtr.	3
	Phosphorous	1.0	2.50	lbs/day	1/Qtr.	3
023 + 024	Flow	2.90	7.25	MGD	Continuous	N/A
	Total Suspended Solids	8,000	20,000	lbs/day	5/Qtr.	7
	Soluble Organic Carbon	2,000	2,500	lbs/day	5/Qtr.	7
	Total Cyanide	20.0	50.0	lbs/day	1/Qtr.	2
	Chloroform	7.69	19.2	lbs/day	6/Qtr.	2
	Dichloroethylene	0.84	2.1	lbs/day	1/Qtr.	2
	Trichloroethylenes	5.18	13.0	lbs/day	6/Qtr.	2
	Trichloroethanes	0.292	0.73	lbs/day	1/Qtr.	2
	Dioctyl Phthalate	0.50	1.25	lbs/day	1/Qtr.	3
025	Hexachlorocyclohexane	0.01	0.025	lbs/day	1/Qtr.	Grab
	Total Cyanide	Included with 023,024			1/Qtr.	Grab
* F	Total Cyanide	0.002	0.005	lbs/day	1/Qtr.	2
* F	All Other Parameters	40CFR 414.75		Monitor **	2/Year	2

Note: * OCPSF Limitation Effective 11/5/90

KJG/File 52150
Kw: POTW permit

City of Niagara Falls, New York

CC: J. Brown
DPS
RSS

September 3, 1992

Mrs. Leslie Warner
E. I. duPont de Nemours, Inc.
MPO Box 787
Niagara Falls NY 14302

Dear Mrs. Warmer:

Attached is a revised copy of the approval for the Gill Creek remediation wastestream.

After discussions with Mr. Henry Mazzucca of Region II USEPA and Mr. David Leemhuis of Region 9 NYSDEC, it was agreed that the changes were necessary to clarify the sampling frequency and reporting requirements.

If you have any questions please contact me at 286-4978.

Sincerely,

DEPARTMENT OF WASTEWATER FACILITIES

Albert C Zaepfel

Albert C. Zaepfel
Industrial Monitoring Coordinator

ACZ:mjl
cc: File 7A
D. Leemhuis DEC Region 9

City of Niagara Falls, New York

September 3, 1992

E. I. duPont de Nemours & Co. Inc. Significant Industrial User Permit No. 7 is hereby amended as follows:

Permission is hereby granted to discharge, to the City's combined sewer on Buffalo Avenue, pretreated wastewater generated from the remediation of Gill Creek, subject to the following conditions:

A) The approval is temporary and is granted only for the life of the creek remediation project.

B) Wastewater from infiltration, storm water runoff, dredged creek bed soil drainage, seepage from the diversion (dam) structures, etc. shall receive pretreatment via equalization, clarification, and sand filtration or its equivalent. Followed by either:
   1) an air stripper unit, followed by granular activated carbon[1], or
   2) GAC guard beds[2] followed by a steam stripper unit; or
   3) granular activated carbon only[3], prior to discharge to the City sewer via outfall 023 (MS #2).

C) Because this pretreated wastewater is expected to contain additional pollutant loads, the discharge limitations and monitoring requirements at 023 (MS #2) have been modified. The new (temporary) limits and monitoring frequencies are listed on the table entitled "Temporary Limitations at 023 Gill Creek Remediation." In addition, the sampling and analysis of the wastewater treated at the pretreatment system shall be conducted as outlined in sections 1 and 5 of the "Gill Creek Remediation Sampling and Analysis Plan" dated August 17, 1992. The results of this sampling and analysis shall be submitted to the City as soon as available and may be used to evaluate compliance with the above noted limits. Upon completion of project, discharge limitations, monitoring and reporting requirements shall revert to the original limits and requirements.

---

[1] The activated carbon treatment unit shall have three parallel lines of three beds each in series (nine Carbon beds). At least two lines (six carbon beds) shall be in service at all times of discharge.

[2] There shall be three guard beds available, and at least two guard beds shall be in service at all times.

[3] Same as footnote 1, above.

D) All monitoring results shall be reported in the company's Quarterly Self-Monitoring Report.

E) DuPont shall continuously monitor creek flow to the diversion sewer by use of a remote flow level sensor located in the sewer which detects high flow levels. In the event of high flow levels (storms), DuPont personnel shall act immediately to take all necessary actions to prevent a surcharged condition in the diversion sewer.

AZ:mjl

az196

TEMPORARY LIMITATIONS AT 023

GILL CREEK REMEDIATION

POLLUTANT MONITORING AT 023 (MS #2)	ANNUAL AVG	DAILY MAX	UNITS	MEASUREMT FREQUENCY	SAMPLE TYPE
Phosphorous	15.0	38.0	lbs/d	1/Qtr	3
Carbon Tetrachloride	0.44	1.10	lbs/d	1/Qtr	2
Dichlorobromomethane	0.144	0.36	lbs/d	1/Qtr	2
Tetrachloroethylenes	2.29	5.73	lbs/d	1/Qtr	2
Tetrachloroethane	2.13	5.33	lbs/d	1/Qtr	2
Hexachlorobutadiene	0.40	1.00	lbs/d	1/Qtr	2
PCB's	0.02	0.05	lbs/d	1/Qtr	3
T. Phenols	2.82	7.05	lbs/d	1/Qtr	3
*Chromium	1.0	2.0	lbs/d	1/mo	3
*Lead	10.0	19.5	lbs/d	1/mo	3
*Mercury	0.6	1.5	lbs/d	1/mo	3
*Zinc	25.0	30.0	lbs/d	1/mo	3
Residual Chlorine	300	750	lbs/d	2/shift	Grab
Hexachlorobenzene	1.00	2.50	lbs/d	1/Qtr	3
**Copper	13.0	18.0	lbs/d	1/mo	3
**Nickel	4.0	6.0	lbs/d	1/mo	3
**Trichlorobenzenes	1.5	3.0	lbs/d	1/mo	2
**Hexachlorocyclohexane	0.16	0.25	lbs/d	1/mo	3
**2-chlorophenol	0.1	0.2	lbs/d	1/mo	3

* Existing Pollutant Limitations modified for Gill Creek Project

**Pollutant Limitations added for Gill Creek Project

New York State Department of Environmental Conservation
270 Michigan Avenue, Buffalo, NY 14203

Thomas C. Jorling
Commissioner

September 14, 1992

SED
DPS
SWC

Ms. Leslie A. Warner
DuPont Chemicals
P.O. Box 787
Niagara Falls, NY 14320-0787

Mr. James Brown
Olin Corporation
Lower River Road
P.O. Box 248
Charleston, TN 37310

Dear Ms. Warner/Mr. Brown:

Gill Creek Remediation
Site #932013

Attached for your use is a revised Air Discharge Emission Limits for the above referenced project.

This Emission Limit table is to be included in the project approval letter dated August 31, 1992.

If you have any questions please call me at 851-7220.

Sincerely,

Michael J Hinton

Michael J Hinton, P.E.
Environmental Engineer II

MJH/ad

cc: Mr. E. Joseph Sciascia
Mr. V.J. Thakkar
Mr. Lawrence Stiller

AIR DISCHARGE EMISSION LIMITS

Emission Point A: 84" Dia., 40' stack height
Emission Point B: 54" Dia., 40' stack height

	Max. Hourly Emissions (lbs/hour)		Max. Annual Emissions (lbs/year)	
Contaminant	Point A	Point B	Point A*	Point B*
Vinyl Chloride	0.707	0.354	2.038×10^3	1.018×10^3
1,1-Dichloroethene	0.037	0.018	1.064×10^2	0.531×10^2
Dichloromethane	0.655	0.329	1.887×10^3	0.947×10^3
Chloroform	0.214	0.107	6.159×10^2	3.08×10^2
1,1,1-Trichloroethane	0.074	0.037	2.126×10^2	1.06×10^2
Carbon Tetrachloride	0.034	0.017	97.77	48.81
Trichloroethylene	5.64	2.817	16.24×10^3	8.113×10^3
Tetrachloroethylene	1.797	0.897	5.175×10^3	2.583×10^3
1,1,2,2-Tetra-chloroethane	1.037	0.652	2.985×10^3	1.879×10^3
Chlorobenzene	0.483	0.243	1.391×10^3	0.689×10^3
Hexachloroethane	0.028	0.014	79.47	39.66
1,4-Dichlorobenzene	0.094	0.048	2.707×10^2	1.37×10^2
1,2-Dichlorobenzene	0.132	0.068	3.80×10^2	1.95×10^2
Benzene	0.127	0.068	3.65×10^2	0.196×10^3
Hexachlorobutadiene	0.089	0.045	2.56×10^2	1.28×10^2
1,2-Dichloroethene	1.370	0.685	3.94×10^3	1.973×10^3
Hexachlorobenzene	0.004	0.002	10.72	5.653
1,3-Dichlorobenzene	0.042	0.022	1.222×10^2	0.619×10^2
1,2,4-Trichlorobenzene	0.201	0.107	5.798×10^2	3.07×10^2

* Revised 9/14/92

Appendix C

WASTEWATER TREATMENT SYSTEM
START-UP PLAN

DUPONT GILL CREEK
REMEDIATION PROJECT

AUGUST 20, 1992

SUBMITTED BY:

OHM REMEDIATION SERVICES CORP.
4 RESEARCH WAY
PRINCETON, NJ 08540

OHM PROJECT NO. 12870

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1.0 INTRODUCTION

2.0 SYSTEM DESCRIPTION

3.0 START-UP METHODOLOGY

4.0 MECHANICAL START-UP CHECK OUT

5.0 ELECTRICAL START-UP CHECK OUT

APPENDIX A

APPENDIX B

1.0 INTRODUCTION

OHM Remediation Services Corporation (OHM) has developed a start-up procedure and methodology for the Wastewater Treatment System (WTS) at the Dupont Gill Creek Remediation Site. This document summarizes OHM's proposed start-up of the WTS and contains the general start-up tasks with checklists located in the Appendices.

OHM's start-up is to complete mechanical, electrical, and instrumentation check out for each piece of equipment followed by operational tests using potable water and contaminated water.

2.0 SYSTEM DESCRIPTION

Contaminated water will be pumped from Gill Creek to a horizontal-flow, rectangular clarifier (TK-101A). After the initial settling the flow is directed to two (2) 49,000 gallon nominal capacity, open top surge tanks in parallel. The tanks are square 40- by 40 foot "Modu-Tank" and 6-feet, 3-inches high. The clarifier measures 26 feet long, 8 feet wide, and 8 feet deep, and has a capacity of 12,000 gallons. The clarifier serves as a primary settling/clarification unit.

The flow is equalized in TK-101B and TK-101C, then pumped by 6-inch submersible pump (P-102B) to two (2) Lamella clarifiers. Polymer will be injected at the inlet of the Lamella clarifiers independently via chemical pumps (P-109A/B). The pumps P-109A and P-109B draw polymer from chemical storage tanks TK-106 and TK-107, respectively. The Lamella inclined plate clarifiers use inclined plates to enhance settling and slow water velocity. The sludge collects in a lower thickener, while the clarified water overflows from a weir into a transfer tank (TK-102).

A 6-inch submersible pump (P-103) located in the transfer tank will feed clarified water to four (4) sand filters for removal of residual suspended solids. Each filter vessel is a cylindrical carbon steel pressure vessel, 72 inches in diameter and 72 inches in column height, with flanged and dashed top and bottom heads. During the operation of peak flow rate at 500 gpm, each vessel has a design rate of 4.4 gpm/square foot when all three vessels are in service. Under the same condition, the design rate will increase to 5.9 gpm/square foot per vessel when one vessel is shut down for backwashing while the other three vessels are in service.

Filtered water enters a 12,000 gallon transfer tank (TK-105). Process water will then be pumped by a 6-inch submersible pump (P-107) to two (2) of the air strippers (T-201A/B). At this point, process water can be diverted to either the existing steam stripper or back to the surge tank (TK-101B/C) for recycling. The line to the existing steam stripper contains a pressure switch followed by a centrifugal pump (P-108) to pump the process water to the steam stripper, if necessary. The pressure switch is to ensure that the centrifugal pump can only be operated under adequate inlet pressure. Besides, the air strippers are designed so that they can be totally by-passed.

One 84-inch diameter and one 54-inch air stripper will be provided. The 54-inch unit will handle a low flow rate of 250 gpm while the 84-inch unit will handle a peak flow rate of 500 gpm. The contaminated water is pumped to the top of the column and then cascades downward over the packing material. At the same time, fresh air is blown counter-current to the water flow through the base of the air stripper. Typically, 75 to 99+ percent removal efficiencies are reached for volatile chemicals. The air strippers use Jaeger Tripacs packing material which allows for a high surface area and void volume, low pressure drop, and maximum-transfer capabilities for the volatile organics. The off-gas from the air strippers will be released to atmosphere.

The process water will be collected at the bottom of the air strippers and pumped again via 6-inch submersible pumps (P-201A/B) to three sets of carbon units in parallel (V-202/203/204). Following the three carbon units are another three sets of dual carbon units in parallel (V-201A/B, V-205A/B, and V-206A/B). Each 84-inch diameter carbon vessel has 38.5 square feet of surface area in a 6-foot column with a design rate of 2 to 4 gpm/square foot. Each vessel has a capacity of 8,000 pounds of activated carbon. The first three vessels are especially designed to remove and accumulate PCBs. The following three dual sets of carbon units are mainly for organics removal. The spent carbon from vessels will be disposed by Dupont.

The effluent of carbon cells will be discharged depending on spent carbon analysis to the location at Outfall 023. Sampling will be done from the discharge line to ensure the effluent meets the discharge criteria. The discharge line will also be branched to a 12,000 gallon holding tank (TK-120) which will be used to store the backwashing water for sand filters.

During normal operations, sludge will accumulate at the bottom of primary clarifier (TK-101A) and secondary Lamella clarifier (CL-101A/B). Sludge will be pumped by air-operated diaphragm pumps (P-111 and P-104A/B) respectively to a 10,000 gallon conical bottom (90 degree angle) sludge holding tank. Polymer will be injected into the feed line before the sludge holding tank to assist in achieving maximum sludge settlement. Decanted water will flow by gravity to recycle sump (TK-104). The pump (P-106) inside the sump will be used to pump the decanted water to surge tanks (TK-101B/C). A 3-inch diaphragm pump (P-105) will feed thickened sludge to the filter press (F-102).

A 60-cubic foot and an 80-cubic foot standby plate and frame filter pres will be used to dewater the clarifier sludge. An electrically powered hydraulic ram, using 480 volt, 3-phase power, closes the plates. Enviroguard's Maxflow will be added as filter aid. Filtrate from the press will be directed to TK-101A. When a filter press cycle is complete, the dewatered sludge cake will be dropped onto a hopper and transferred to the sediment staging area. The sludge cake then will be ready for off-site disposal by others.

3.0 START-UP METHODOLOGY

The start-up will be initiated with mechanical and electrical check out for each major equipment. Potable water will be pumped to vessels and storage tanks for leak tests. All the wirings for motor and instruments will be checked and documented. In addition, motor rotation will be checked.

After completion of mechanical and electrical checkout, testing of the system will begin by operating with potable water and chemicals. Instruments interlocking verification will also be performed at that time.

Upon completion of the potable water testing, 7,000 gallons of contamin[illegible] will be introduced into the Horizontal Clarifier for performance testing. The syst[illegible] operated at flow rate of 100 gallons per minute in a recirculation fashion. In[illegible] effluent samples will be taken and analyzed to verify the performance of the sy[illegible]

4.0 START-UP EQUIPMENT CHECKOUT

4.1 MECHANICAL

Major process units of the WTS will be leak tested with potable water. The leak test will be performed to demonstrate that the process vessel's welds and pipe connections are tight at the unit's full capacity condition.

In addition, motor rotation, oil and/or lubricant level, and correct belt tension will be checked.

The checklists for different process units can be found at Appendix A.

Records of [illegible] Readings [illegible] high [illegible] and [illegible] low limits

Calibration of All Gauges [illegible] At [illegible]

5.0 ELECTRICAL START-UP CHECKOUT

1. Electrical contractor will megger all motors and cables. A copy of the m[illegible] will be given to Dupont.

2. Electrical power and control one-line drawings will be filed with Du[illegible] energizing any circuits.

3. A complete list of motors has been developed by OHM in the form o[illegible] to be utilized in assuring proper operation of all motors in the proces[illegible], ... serve as a record that this has been done. OHM and CIR Electric will check each pump/motor for proper rotation and/or operation by energizing the motor in the manual mode and observing the operation, making note of any unusual noise, vibration, etc. A representative from both OHM and CIR will sign off on the checklist. This will provide a certification that the unit is ready to be put into service.

4. Upon energizing control panel, all level controls should be in a low alarm status (all tanks empty). Potable water will be added to each tank until low alarm clears, and then until a high level alarm sounds. OHM will provide a checklist for noting that alarms are triggered at proper levels and that the high level alarms properly interlock the respective upstream pumps.

Instrumentation

After chemical feed pumps have been checked in the manual mode for proper operation, they will be verified for proper calibration in the automatic mode as follows. After WTS flow rate has settled to an even flow, chemical drum will be gauged. System will run for one 8-hour shift. Drum will be gauged again and amount of chemical consumed will be calculated. This will be checked against flow meter readings for accuracy of chemical injection rate.

pH probes will be calibrated with buffer solutions and alarm setpoint on pH controller will be checked.

Daily

As found As left recorded

Full load readings [illegible] vs name plate

HORIZONTAL CLARIFIER FIELD TEST
PHYSICAL AND PERFORMANCE

PHYSICAL TEST: (WITH POTABLE WATER)

DATE: ______________________

WATER FLOW RATE ______________ (GPM)

REMARKS (i.e., TEST PROCEDURE, PROBLEMS ENCOUNTERED, CORRECTIVE ACTIONS):

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____

PERFORMANCE TEST: (WITH CONTAMINATED WATER)

DATE: ______________________

CONTAMINATED WATER SOURCE: ______________

INFLUENT FLOW RATE: ______________ (GPM)

INFLUENT CONCENTRATIONS:

TSS ________ (PPM)
PH ________ SU

EFFLUENT FLOW RATE: ______________ (GPM)

EFFLUENT CONCENTRATIONS:

TSS ________ (PPM)
PH ________ SU

SLUDGE FLOW RATE: ______________ (GPM)

SLUDGE CONCENTRATIONS:

TSS ________ (PPM)
BOD ________ (PPM)
TOC ________ (PPM)

LAMELLA CLARIFIER FIELD TEST
PHYSICAL AND PERFORMANCE

PHYSICAL TEST: (WITH POTABLE WATER)

DATE: ______________________

WATER FLOW RATE ______________ (GPM)

REMARKS (i.e., TEST PROCEDURE, PROBLEMS ENCOUNTERED, CORRECTIVE ACTIONS):

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PERFORMANCE TEST: (WITH CONTAMINATED WATER)

DATE: ______________________

CONTAMINATED WATER SOURCE: ______________

INFLUENT FLOW RATE: ____________ (GPM)

INFLUENT CONCENTRATIONS:

TSS ________ (PPM)
PH ________ SU

EFFLUENT FLOW RATE: ____________ (GPM)

EFFLUENT CONCENTRATIONS:

TSS ________ (PPM)
PH ________ SU

SLUDGE FLOW RATE: ____________ (GPM)

SLUDGE CONCENTRATIONS:

TSS ________ (PPM)

SAND FILTER FIELD TEST
PHYSICAL AND PERFORMANCE

PHYSICAL TEST: (WITH POTABLE WATER)

DATE: ______________________________

WATER FLOW RATE __________________ (GPM)

REMARKS (i.e., TEST PROCEDURE, PROBLEMS ENCOUNTERED, CORRECTIVE ACTIONS):

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PERFORMANCE TEST: (WITH CONTAMINATED WATER)

DATE: ______________________________

CONTAMINATED WATER SOURCE: __________________

INFLUENT FLOW RATE: ________________ (GPM)

INFLUENT CONCENTRATIONS:

TSS _________ (PPM)
PH _________ SU

EFFLUENT FLOW RATE: ________________ (GPM)

EFFLUENT CONCENTRATIONS:

TSS _________ (PPM)
PH _________ SU

REMARKS (i.e., TEST PROCEDURE, SAMPLING LOCATIONS):

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____

TEST PERFORMED BY: __________________________________

CARBON FILTER TEST
PHYSICAL AND PERFORMANCE

PHYSICAL TEST: (WITH POTABLE WATER)

DATE: ______________________

WATER FLOW RATE ______________ (GPM)

REMARKS (i.e., TEST PROCEDURE, PROBLEMS ENCOUNTERED, CORRECTIVE ACTIONS):

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PERFORMANCE TEST: (WITH CONTAMINATED WATER)

DATE: ______________________

CONTAMINATED WATER SOURCE: ______________

INFLUENT FLOW RATE: ____________ (GPM)

INFLUENT CONCENTRATIONS:

TSS ________ (PPM)
PH ________ SU

EFFLUENT FLOW RATE: ____________ (GPM)

EFFLUENT CONCENTRATIONS (FROM CARBON FILTER 2):

TSS ________ (PPM)
PH ________ SU

REMARKS (i.e., TEST PROCEDURE, SAMPLING LOCATIONS):

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TEST PERFORMED BY: __________________________

AIR STRIPPER COLUMNS
PERFORMANCE TESTING

INITIAL AND DATE THE FOLLOWING RESULTS:

REMARKS (i.e., TEST PROCEDURE, PROBLEMS ENCOUNTERED, CORRECTIVE ACTIONS):

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PHYSICAL TEST: (WITH POTABLE WATER)

DATE: ______________________________

WATER FLOW RATE: ____________________ (GPM)

REMARKS (i.e., TEST PROCEDURE, PROBLEMS ENCOUNTERED, CORRECTIVE ACTIONS):

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PERFORMANCE TEST: (WITH CONTAMINATED WATER)

DATE: ______________________________

CONTAMINATED WATER SOURCE: __________________

INFLUENT FLOW RATE: ________________ (GPM)

INFLUENT CONCENTRATIONS:

TSS __________ (PPM)
PH __________ SU

EFFLUENT FLOW RATE: ______________ (GPM)

EFFLUENT CONCENTRATIONS (FROM CARBON FILTER 2):

TSS ________ (PPM)
PH ________ SU

REMARKS (i.e., TEST PROCEDURE, SAMPLING LOCATIONS):

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TEST PERFORMED BY: ______________________________

TANK LEAK TEST RESULT SHEET

Procedure Number: ____________ Procedure Section: ____________

Procedure Title: ____________

Tank Number: ____________ Name: ____________

Tank Leak Check Start Time/Date: ____________ ____________

Tank Leak Check Stop Time/Date: ____________ ____________

Note: Tank must be filled with water for a minimum of 4 hours.

Indicate any problems found and corrective action taken:

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Pass ____________ Fail ____________

Test Completed by: ____________ Date: ____________

Test Witnessed by: ____________ Date: ____________

AIR COMPRESSOR CHECK LIST

EQUIPMENT NUMBER: ______________ DATE: ______________

ENTER MEASUREMENTS AND SIGN AND DATE ALL THE ENTRIES:

GROUNDING:

STATUS: ______________________________

BELT TENSION:

INITIAL: __________ FINAL: __________ SPECIFICATION: __________

OIL LEVEL IN THE OIL RESERVOIR:

BEFORE TURNING ON THE COMPRESSOR: ______________

AFTER TURNING ON THE COMPRESSOR: ______________

RELIEF VALVE SETTING (PSIG): ______________

AIR RECEIVER TANK RELIEF VALVE SETTING (PSIG): ______________

FINAL EQUIPMENT CHECK OUT DATE: ______________

CHECKED BY: ______________________________

Full load amps vs name plate

Noise level checked below 90 DB or [illegible]

APPENDIX B

INTERLOCK TEST

DATE: ____________________

EQUIPMENT NUMBER: ___________ EQUIPMENT DESCRIPTION: __________________________

EQUIPMENT TYPE: ______________

LIST OF ASSOCIATED INTERLOCKS AND THEIR RESPONSE:

INTERLOCK DESCRIPTION	FUNCTION	RESPONSE

Green Line
P & ID
And
Schematics
- Check Fail status of I
via turning off Power

NOTES (i.e., TEST PROCEDURE, PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS):

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TEST PERFORMED BY: ______________________________

(EXAMPLE)

	MOTOR	ROTATION/OPERATION	COMMENTS
480 V 30	P102A CLARIFIER FEED PUMP		
480 V 30	P102B CLARIFIER FEED PUMP		
480 V 30	P102C INF. STORAGE TANK DISCHARGE PUMP		
480 V 30	P103 SAND FILTER FEED PUMP		
480 V 30	P107 AIR STRIPPER FEED PUMP		
480 V 30	P120 BACKWASH PUMP		
480 V 30	P108 STEAM STRIPPER TRANSFER PUMP		
480 V 30	CP101 AIR COMP.		
480 V 30	M106 POLYMER FEED TANK 106 MIXER		

Full load Amps vs Nameplate

INTERLOCK CHECKLIST

HIGH LEVEL	STOPS PUMP
T-101A	P-101 A, B, C
T-101B, C	P-102 C
T-102	P-102 A,B
T-105	P-103
T-201 A or B	P-107
T-101 A, B, or C	P-106

P-107 - Must be running to operate acid feed pump

Appendix G

3571 Niagara Falls Boulevard
North Tonawanda
New York 14120
(716) 692-7170
Fax (716) 692-1512

Woodward-Clyde Consultants

October 28, 1992
92C2255-6

Dr. Ann Masse
E.I. du Pont de Nemours & Company, Inc.
26th Street and Buffalo Avenue
Niagara Falls, New York 14302

Mr. James Brown
Olin Corporation
Lower River Road
Charleston, Tennessee 37310

Re: Inspection Report - Gill Creek Sediment Removal - Areas 2d and 3

Dear Dr. Masse and Mr. Brown:

On October 13, 1992, Woodward-Clyde Consultants (WCC) inspected the reach of Gill Creek from north of Adams Avenue (the north end of Area 3) to south of the railroad bridge (the south end of Area 2d) as indicated on Figure 1. The purpose of this inspection was to verify that contaminated sediments had been removed from the creek in accordance with the plans and specifications. Specifically, the specifications (Gill Creek Remediation Plans and Specifications, WCC, April 1992) require that sediments in Area 3 be removed to bedrock. In Area 2d, sediments are to be removed to the underlying clay which was placed in the creek channel in 1981 during the earlier remedial efforts. These specifications also establish the methods to be used for sediment removal. In Area 3, sediments are to be excavated, with final cleanup achieved by water spraying and vacuuming. In Area 2d, sediments are to be removed with vacuum dredging techniques. The specifications do not establish absolute standards for removal of sediments: WCC's opinion regarding the adequacy of sediment removal is based on the level of removal practically achievable given the site-specific conditions, and technologies employed.

Creek Sediment Removal Inspection

Based on our visual inspection of Area 3, sediments have been removed to the bedrock surface, which is characterized by rounded masses known as stromatolites. The only identifiable unconsolidated materials remaining in the area are present in small quantities in the narrow (approximately 0.5 feet or less) depressions between the stromatolites under the bridge. The depth of sediment or soil in these depressions rarely exceeds 1 inch. Depressions between the stromatolites were clean in Area 3 downstream of the Adams Avenue Bridge. Based on our examination, it was apparent that the bedrock under the bridge had been subjected to a pressure wash and vacuum, meeting the project specifications. In Area 2d, our visual inspection indicated that sediments had been removed to the underlying clay.

It is WCC's opinion that the sediments in Areas 3 and 2d have been removed in accordance with the specifications.

If you have any questions or comments concerning this inspection report, please feel free to call.

Very truly yours,

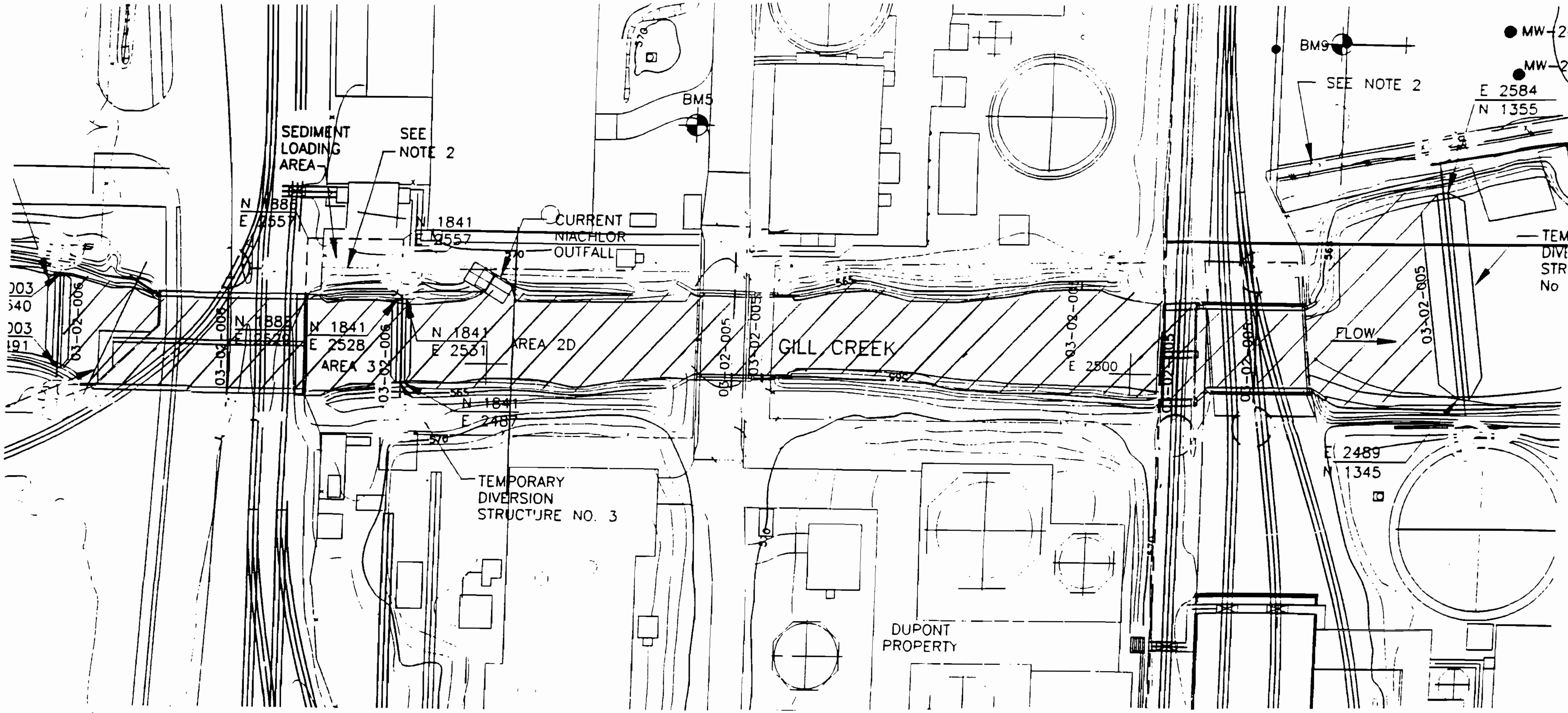
Martin S. Leonard, P.E.
Senior Project Engineer

Kelly R. McIntosh, P.E.
Associate

MSL/KRM:jee

cc: Mr. Jim McClincy (Du Pont - Niagara Falls)
Mr. Tony Wolfskill (WCC - Houston)

Gcinspec.let



AREA INSPECTED

E. I. DuPONT de NEMOURS & COMPANY NIAGARA FALLS, NEW YORK		
WOODWARD-CLYDE CONSULTANTS Consulting Engineers, Geologists and Environmental Scientists		
GILL CREEK INSPECTION AREA		
Job No.: 92C2255	Drawing No. 22552001	Date:
Checked by:	Rev. No.:	
Scale: NOT TO SCALE		FIGURE 1

1571 Niagara Falls Boulevard
North Tonawanda
New York 14120
(716) 692-7170
Fax (716) 692-1510

Woodward-Clyde Consultants

November 11, 1992
92C2255-6

Dr. Ann Masse
E.I. du Pont de Nemours & Company, Inc.
26th Street and Buffalo Avenue
Niagara Falls, New York 14302

Mr. James Brown
Olin Corporation
Lower River Road
Charleston, Tennessee 37310

Re: Inspection Report - Gill Creek Sediment Removal - Area 1

Dear Dr. Masse and Mr. Brown:

On October 30 and 31, 1992, Woodward-Clyde Consultants (WCC) inspected the reach of Gill Creek from south of the Robert Moses Parkway (the south end of Area 1) to south of diversion structure number 4, as indicated on Figure 1. The purpose of this inspection was to verify that contaminated sediments had been removed from the creek in accordance with the plans and specifications. Specifically, the specifications (Gill Creek Remediation Plans and Specifications, WCC, April 1992) require that sediments in Area 1 be removed to bedrock. The specifications also establish the methods to be used for sediment removal. In Area 1, sediments are to be excavated, with final cleanup achieved by water spraying and vacuuming. The specifications do not establish absolute standards for removal of sediments; WCC's opinion regarding the adequacy of sediment removal is based on the level of removal practically achievable given the site-specific conditions, and technologies employed.

Creek Sediment Removal Inspection

Based on our visual inspection of Area 1, sediments have been removed to the bedrock surface, which is characterized by rounded masses known as stromatolites. The only identifiable unconsolidated materials remaining in the area are present in small quantities in localized depressions in the bedrock surface. The depth of sediment or soil in these depressions rarely exceeds 1 inch. Based on our examination, it was apparent that the bedrock surfaces had been subjected to a pressure wash and vacuum, meeting the project specifications.

Gcinspec.let

It is WCC's opinion that the sediments in Area 1 have been removed in accordance with the specifications.

If you have any questions or comments concerning this inspection report, please feel free to call.

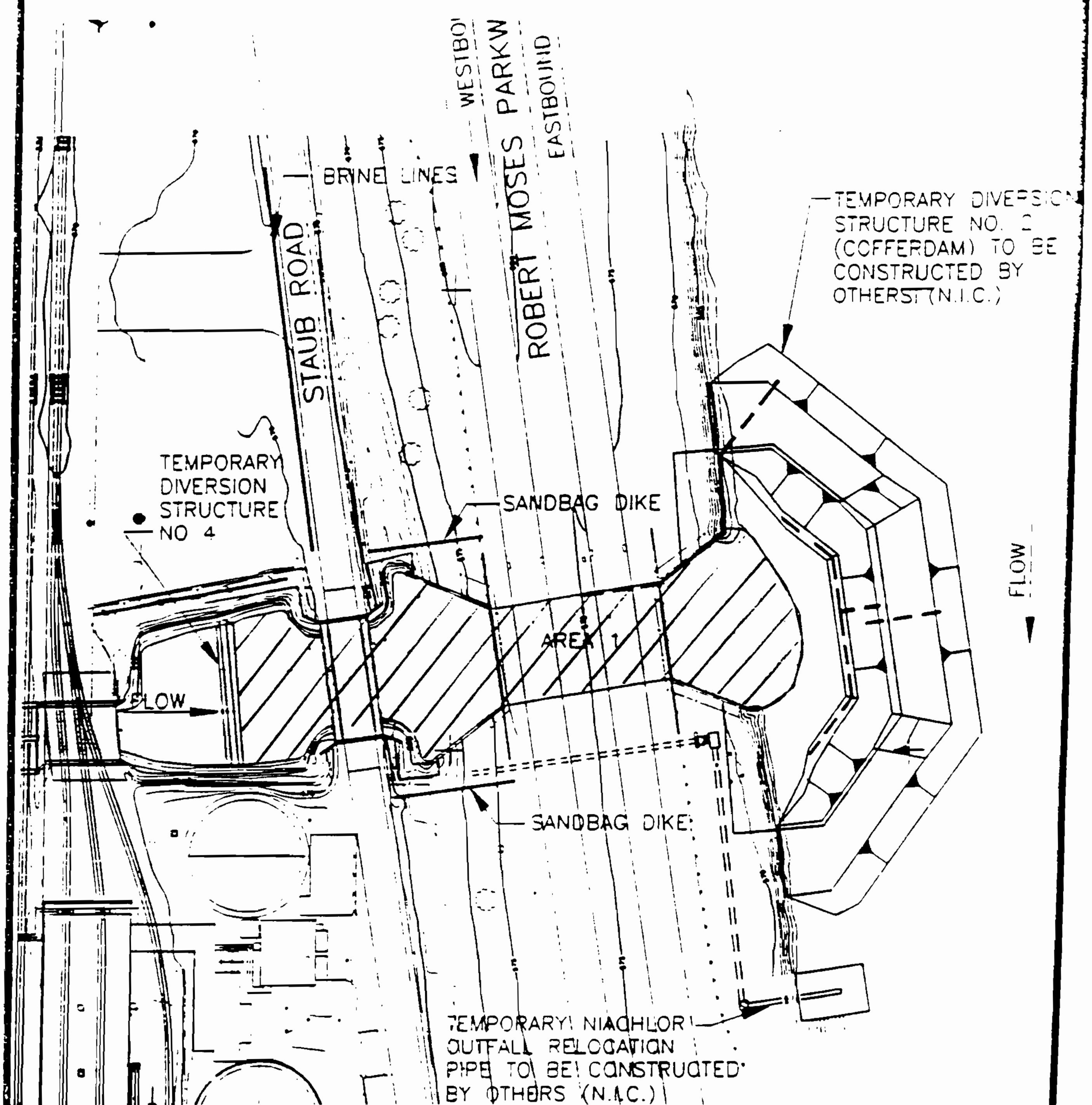
Very truly yours,

Martin S. Leonard, P.E.
Senior Project Engineer

Kelly R. McIntosh, P.E.
Associate

MSL/KRM:jee

cc: Mr. Jim McClincy (Du Pont - Niagara Falls)
Mr. Tony Wolfskill (WCC - Houston)



AREA INSPECTED

E. I. DuPONT de NEMOURS & COMPANY
NIAGARA FALLS, NEW YORK

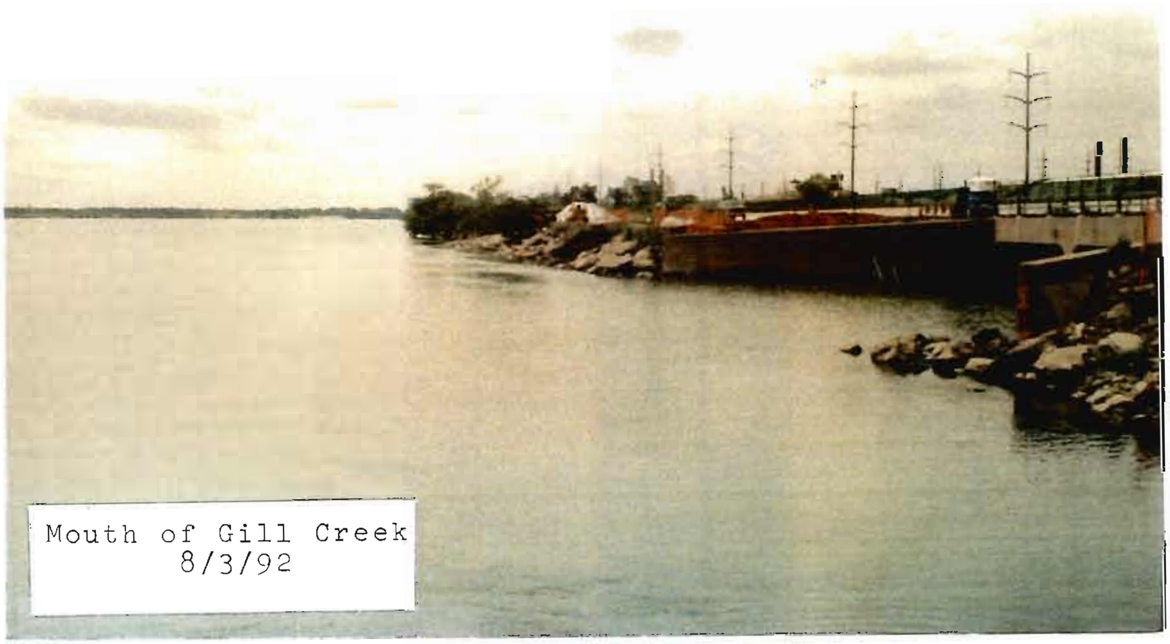
WOODWARD-CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

GILL CREEK INSPECTION AREA

Job No.: 92C2255	Drawing No. 22552001	Date:
Checked by:	Rev. No.:	
Scale: NOT TO SCALE		FIGURE 1

Appendix H

Gill Creek Looking South
Towards Niagara River 8/3/92



Mouth of Gill Creek
8/3/92

Gill Creek Intermediate Dam
9/92

Gill Creek Drained
Looking South 9/92

Wastetreatment (foreground)
Cofferdam (background)
9/92

Completed Coffer Dam 9/92

Gill Creek
Sediment Removal
10/92

Waste Treatment Plant
Operation 10/92

Creek Sediment Removal
Under Parkway 10/92

Creek Sediment Stockpile
Before Loading 10/92

Cell Coffer Dam in
The Niagara River

Gill Creek At The Mouth
To Niagara River 10/92

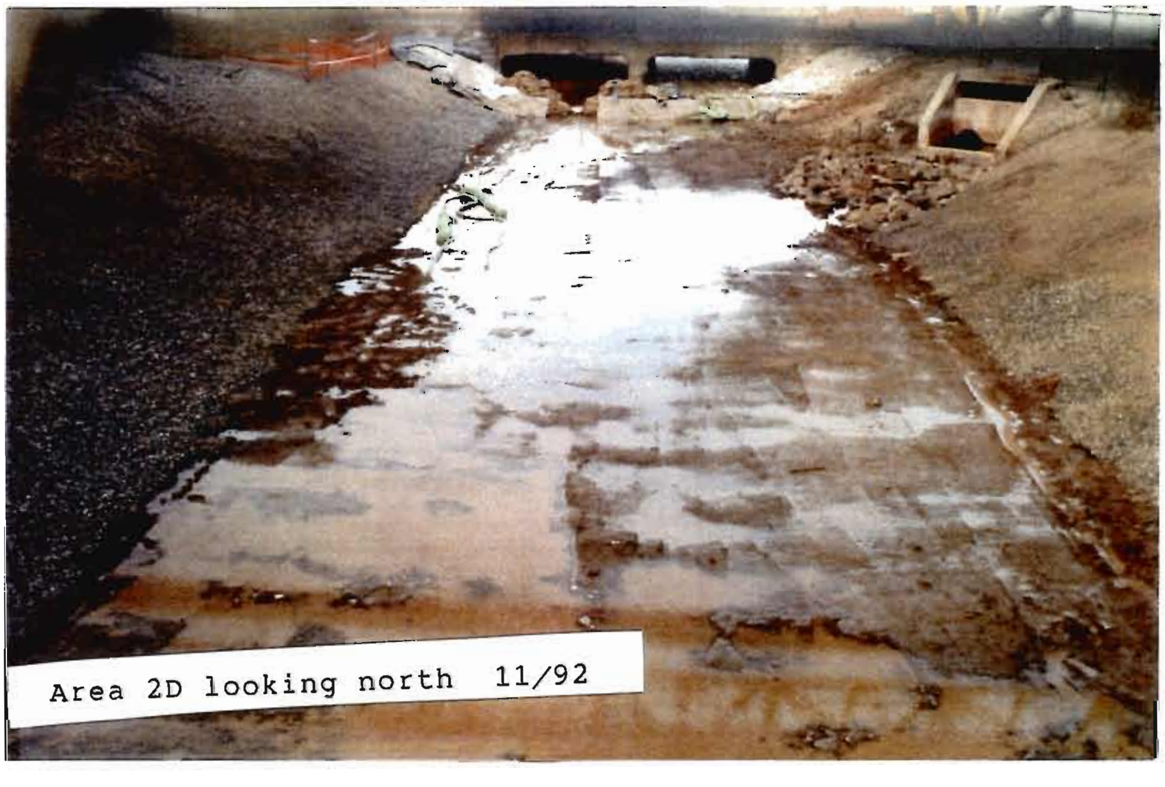

Sediment Stockpile On
Staging Pad 10/92


A Section of Gill Creek
Remediated & Restored
10/92


Gill Creek Restoration 10/92


Gill Creek Restoration 10/92

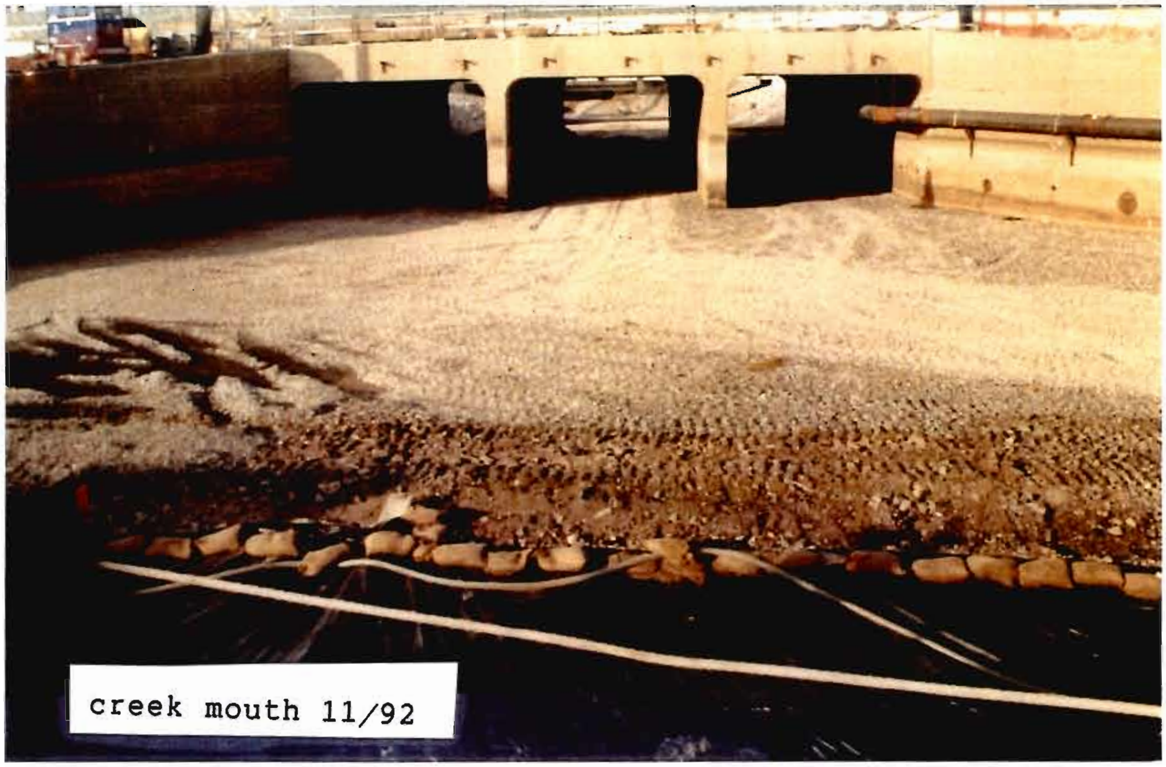
Area 3 - Concrete bank 11/92



Area 2D looking north 11/92

Area 2D liner installation over seep 11/92

Area 1 creek bed restoration 11/92



creek mouth 11/92

Toe Drain of Cofferdam 11/92

Cleaned Sediment Staging Pad 11/92

Cleaning Water Treatment Plant 11/92

Cofferdam 11/92