WORK PLAN

Former Outfall 004 Pipeline Interim Remedial Measure

General Electric Company
Electrical Distribution and Control
Fort Edward, New York

August 1995

O'BRIEN & GERE
ENGINEERS, INC.

5731.032

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22 Computer Drive West
Albany, New York 12205

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1. Introduction

This Interim Remedial Measures (IRM) Work Plan was prepared by O'Brien & Gere Engineers, Inc. (O'Brien & Gere) on behalf of the General Electric Company (GE). The IRM Work Plan was developed in accordance with Order on Consent Index #A5-0316-94-06 (Order) which has been executed between GE and the New York State Department of Environmental Conservation (NYSDEC). The Order was signed June 13, 1995.

The proposed IRM will be performed in the vicinity of the abandoned sewer outfall pipeline which runs west of the GE Fort Edward facility. The pipeline formerly discharged facility wastewater to the Hudson River at Outfall 004. The overall purpose of the IRM is to remove residual PCB contamination associated with the former Outfall 004 pipeline and to eliminate a preferential pathway (or conduit) for potentially contaminated ground water toward the Hudson River and into deeper ground water units. The IRM includes removal and off-site disposal of soil and pipe bedding containing PCBs in excess of 25 mg/kg (wet weight basis) and management of construction water associated with excavation activities. Figure 1 is a site plan showing the former Outfall 004 pipeline area.

1.1. Background

In 1942, approximately 1,460 feet of 30-inch diameter pipe was installed at the GE Fort Edward facility to convey storm water and industrial wastewater from the former Aircraft Turret Plant to the Hudson River. The outfall pipeline originally included seven manholes and extended from manhole MH-7, where three on-site facility drainage pipes converged, to the outfall itself where plant effluent was discharged into the Hudson River.

Between manholes MH-7 and MH-1 the pipe was constructed of 30-inch ID vitrified clay pipe (VCP). From MH-1 to the concrete thrust block at the top of the bank, the pipe was constructed of 30-inch ID reinforced cast concrete pipe (RCCP). Along the length of the steep bank, the pipe was constructed of 30-inch ID corrugated metal pipe (CMP) which terminated in a concrete flume near the toe of the cliff. The outfall

originally discharged below the surface of the river but became exposed after the Fort Edward Dam, south of the outfall, was removed in 1973 and the river water level dropped.

Between 1976 and 1977, the former 30-inch outfall pipeline was abandoned west of Lower Allen Street to MH-1 and wastewater was rerouted to a newly constructed wastewater collection and treatment system. Treated effluent was discharged through a new 6-inch DIP which terminated at manhole MH-1. The original 30-inch CMP outfall pipe was utilized to convey wastewater from MH-1 down the bank to the river.

Currently, all industrial wastewater and stormwater generated on-site are directed to the equalization basin, treated at the treatment plant, and discharged to the Hudson River under a State Pollution Discharge Elimination System (SPDES) permit issued by the NYSDEC (SPDES #NY-0007048). The treatment system provides settling, filtration, and granular activated carbon adsorption.

1.2. Recent Investigations Relating to the Former Outfall 004 Pipeline

On November 18, 1993, the NYSDEC and GE collected soil and water samples from several locations near Outfall 004 for PCB analysis and petroleum identification. Composite water samples collected near the concrete outfall at the bottom of the bank contained low levels of PCBs. Total PCB concentrations in soil samples collected near the outfall ranged from 148 to 5,571 mg/kg.

During a meeting with the NYSDEC on December 6, 1993, GE offered to evaluate the source and extent of the PCBs. A Work Plan detailing the investigative scope of work was prepared and submitted to the NYSDEC for their approval on December 10, 1993. A revised Work Plan was submitted to the NYSDEC on February 3, 1994. Final approval of the Work Plans was given in a letter to GE dated February 22, 1994. On March 11, 1994, Consent Order Index #A5-0313-93-12 (004 Order) between the NYSDEC and GE was signed.

As a NYSDEC-approved IRM under the 004 Order, GE installed a temporary outfall diversion pipe in April 1994. The IRM consisted of a new piping system constructed of 6-inch diameter flexible PVC to divert discharge away from the 30-inch pipeline that extended down the steep bank from manhole MH-1 to the Hudson River.

Subsequently, Dames and Moore performed a subsurface investigation of the 004 outfall and associated pipeline. This investigation has been summarized in a report entitled "Outfall 004 Investigation Report" submitted to the NYSDEC on October 28, 1994. The investigation included sampling and analysis of ground water seeps at the top of the steep bank, excavation of test pits along the abandoned outfall pipeline, and sampling and analysis of soil from within the test pits. Pipe bedding samples collected during test pit activities exhibited total PCB concentrations ranging from less than detected at 1 mg/kg to 21,300 mg/kg while reported concentrations of PCB in soil samples collected adjacent to the pipe bedding were between 1 and 3 mg/kg. A water sample collected from the downstream end of the pipe bedding material contained 13 ug/L PCB.

Based on the findings of the test pit sampling, an IRM was proposed and implemented in July 1994 with NYSDEC approval and oversight. The IRM consisted of removing the 30-inch CMP from the steep bank, removing the thrust block and concrete saddle, removing several 4-ft sections of 30-inch RCCP back to MH-1, and a section of 6-inch VCP drainage tile. Excavated materials were handled as PCB waste and disposed off-site. The excavation was backfilled with a 60/40 percent mixture of carbon and sand wrapped in filter fabric as a construction measure.

As a continuation of the investigation started by Dames & Moore, O'Brien & Gere developed a plan to collect additional subsurface information pertaining to the former Outfall 004 pipeline. This investigation was also conducted pursuant to the existing 004 Order. The scope of work was presented as Addendum A to the approved Outfall 004 Investigation Work Plan and was approved by the NYSDEC in a letter dated December 7, 1994.

The subsurface investigation included the following field tasks:

- installation and development of three monitoring well clusters (nine total wells) near the former outfall pipeline

- collection of two rounds of ground water samples from eight of the nine new wells (OBG-44S, OBG-44BS, OBG-44BD, OBG-45S, OBG-45BS, OBG-45BD, OBG-48S, and OBG-48BS) and three pre-existing wells (GM-3, GM-4, and GM-6)

- installation of twenty-five soil borings in the vicinity of the former 004 pipeline to bedrock

- sampling and analysis of soil representing fill, pipe bedding, and undisturbed soil beneath the pipe for PCBs

The results of soil sampling indicated PCB concentrations ranging from less than 1 to 20,000 mg/kg. The highest PCB concentrations were measured in samples of pipe bedding material and undisturbed soil below the 30-inch VCP. The fill material above the top of the pipe was generally clean (less than detected). PCBs were also detected in samples of till (18 to 22 ft below land surface [bls]) obtained 10 to 14 ft north and south of MH-2 at concentrations as high as 12,000 mg/kg in sample B-10-95. Soil samples collected approximately 40 ft north and south of manhole MH-2 did not contain detectable concentrations of PCB (with the exception of one sample at 2.3 mg/kg).

Results of ground water sampling indicated concentrations of PCBs between 0.553 and 110 ug/L in ground water from monitoring wells located adjacent to the pipeline trench (OBG-44S and OBG-48S) while shallow ground water north or south of the trench appeared to be relatively unimpacted. This was consistent with results of previous seep sampling and analysis conducted by Dames & Moore and indicates that the most probable source of PCB contamination in the seeps observed at the top of the bank is contaminated bedding materials and soils underlying the former 004 pipeline.

Shallow bedrock well OBG-48BS and deep bedrock well OBG-44BD (both outside the approximate trench boundary) also contained low levels of PCB (3.6 and 0.097 ug/L, respectively) indicating that a pathway may exist for PCBs to migrate into the bedrock from upper zones and that contaminated bedding materials may be a likely source of PCBs detected in shallow bedrock ground water.

The results of these investigations indicate that the extent of impacted soils is limited to a narrow conduit formed by the former pipeline trench. In addition, a limited area of contamination exists around manhole MH-2.

1.3. Pipeline Configuration

Based on the original outfall pipeline construction drawings prepared by James E. Stewart, Inc. in 1942, the sewer pipeline was intended to pitch downward at a slope of 1 ft vertical for every 200 ft horizontal, or 0.005 ft/ft. According to the 1942 construction drawings, the invert (inside of bottom lip of pipe) elevation of the 30-inch ID pipe at MH-4 was to be 247.85 ft msl and 244.68 ft msl at MH-1. The drawings also indicate that between MH-3 and MH-1, the pipe was placed on a bed of 1-ft thick concrete and 7-inches of compacted earth at the bottom of the trench and backfilled to the surface with fill. Beneath the railroad tracks, the pipe was to be fully encased in concrete.

Based on records of pipe invert elevations measured by GE facilities personnel and the inferred hydrogeologic cross-section, the former Outfall 004 pipeline lies below the ground water table and the top of the natural clay surface. To maintain the desired slope in the sewer, the trench for the pipe was excavated to a depth of between 14 and 19 ft bls between manholes MH-4 and MH-1. The trench appears to have been cut through the varved clay and, in some sections (near OBG-44S, for example) intersects bedrock. Given these conditions, a preferential ground water migration pathway or conduit likely exists along the length of the former outfall pipeline and pipe bedding.

In their 004 investigation report, Dames & Moore notes that during test pitting, ground water was encountered within the abandoned pipe trench, although it was difficult to differentiate between ground water infiltrating from above and water which may have already been flowing within the backfilled trench.

Based on available historical information, the original 30-inch ID sewer pipe was constructed of 3-ft long sections of VCP with bell and socket joints. Reportedly, a television inspection of on-site portions of the original sewer pipeline in the early 1970s indicated that many of these joints were open and that roots had penetrated into the pipe interior. Hydrostatic pressure on the submerged pipeline would likely favor ground water infiltration through such openings resulting in a potential migration pathway for ground water while PCBs, being heavier than water, apparently leaked out of the pipe and into the surrounding soil.

Soil borings completed by O'Brien & Gere as part of the subsurface investigations provided supplemental information on the pipe's configuration. Information obtained from borings augered adjacent to the

pipe bedding was generally consistent with historical descriptions of the pipe's construction, location, and pitch. The condition of the 30-inch VCP was difficult to ascertain based on the soil borings, however.

A generalized subsurface profile based on boring log data, recent ground water elevation measurements, and a 1942 drawing describing the layout of the proposed 30-inch sewer is shown in Figure 2.

1.4. IRM Objectives

The objectives of the proposed IRM are to:

- remove PCB-containing soil, pipe, and pipe bedding associated with the former Outfall 004 pipeline.
- eliminate the former pipeline and pipe bedding as a preferential ground water migration pathway to the Hudson River.
- collect and treat ground water derived during excavation and removal activities

2. Interim Remedial Measure

The pipeline removal IRM will be implemented through a competitive bidding process by soliciting input from contractors experienced in conducting remedial measures. Performance specifications and technical drawings will be prepared and submitted to the NYSDEC to describe the conditions under which the work is to be constructed and the standards for acceptance of the components of construction. The performance specifications will identify specific performance criteria and will provide the bidding contractors flexibility to propose specific means and methods which will optimize the pipeline excavation and removal process.

Bids will be based on the general procedures presented in this work plan. Bids for the use of alternative procedures will be accompanied by a detailed description of the benefits of implementing such an alternative. If the selected contractor proposes alternative procedures, an addendum to this work plan will be prepared and submitted by GE to the NYSDEC.

Because of differences in accessibility, nature and extent of contamination, and subsurface conditions along the length of pipeline to be removed, it is proposed that the pipe removal IRM project be divided into five work areas or zones as described in Table 1. An IRM construction plan showing the five work areas is presented as Figure 3.

Table 1. *Five Work Areas for 004 Pipeline Removal.*

Area	Description	Approx. Length of Pipe Section
Area 1	east of Lower Allen Street to railroad right-of-way	75 ft
Area 2	within Lower Allen Street	35 ft
Area 3	between street and manhole MH-2	200 ft
Area 4	vicinity of manhole MH-2	25 ft
Area 5	west of manhole MH-2 to top of bank	290 ft

2.1. Site Preparation

Prior to excavation activities, utilities potentially impacted by the pipe removal will be located. These include underground water and sewer mains, overhead power, cable, and phone lines, and natural gas lines, if any. Care will be exercised to prevent any damage to these utility conduits during construction. Staging areas, support facilities, and work areas will be established and marked in addition to areas designated for stockpiling and segregating soil and debris.

For work in Lower Allen Street, traffic control and site security will be provided, as needed. Necessary permits will be obtained from the Town of Fort Edward by the contractor prior to any work in the street.

Several large trees and stumps need to be cleared, especially in Area 1, before excavation can begin. Clusters of trees standing directly above the old pipeline will be cut down to the ground surface. Roots will be removed during excavation of the pipe as necessary.

2.2. Construction Water Management

An important factor in the successful implementation of this IRM is effective trench dewatering and construction water management during excavation below the static ground water elevation. Dewatering operations could potentially generate construction water containing detectable levels of PCBs. It is estimated that a maximum of 20 gpm will be generated. Construction water will be conveyed to the GE Fort Edward treatment plant for treatment prior to discharge to the Hudson River via GE's existing SPDES regulated outfall. SPDES approval will be obtained for this modification.

The construction water management system proposed to handle such water will consist of temporary ground water recovery points or portable centrifugal pumps, a temporary pretreatment unit, a temporary storage tank or containment sump with a submersible pump (into which construction water will be discharged), and a double-walled elevated pipeline to convey water across the railway to manhole MH-4 and into the on-site sewer system.

It is anticipated that one or more temporary ground water recovery points or portable centrifugal pumps will be utilized as appropriate to effectively dewater the work areas during construction. The number and

configuration of the temporary points or pumps will be determined in the field based on subsurface conditions encountered. At a minimum, one recovery point will be located on the plant site near manhole MH-4 to dewater Area 1 and provide a degree of hydraulic control with respect to on-site ground water migration.

Before it can be accepted by the treatment plant, construction water will be pretreated to remove suspended solids to a total suspended solids (TSS) level of 200 mg/L. Removal of solids to this concentration should limit the amount of PCBs being discharged to the GE Fort Edward treatment plant, as well. Pretreatment may also include activated carbon to further reduce PCB mass loading to the treatment plant. Effluent from the temporary pretreatment unit will be monitored for TSS once daily during the first week of operation and weekly thereafter during construction.

It is proposed to locate a temporary above ground storage tank or underground containment sump near manhole MH-3, as close as practicable to the railroad right-of-way to contain construction water. The actual location will be determined during design considering constraints associated with construction adjacent to the railroad. Prior to installation of a more permanent containment system, temporary storage tank(s) may be utilized to contain construction water.

Water from the containment sump will be conveyed over the railroad tracks to manhole MH-4 via a temporary elevated pipe carrier. The double-walled force main piping will be sloped toward manhole MH-4 so that, in the event of a leak occurring in the piping, it will drain to a location at which the leak will be contained. Therefore, no leak detection system is proposed for the new piping system. A diagram depicting the proposed pipe crossing is shown in Figure 4. The minimum height of the temporary support structure will be 22 feet above the top of rail elevation or 274.05 ft msl. The exact location of the crossing will be established during design based on field conditions and discussions with Delaware & Hudson engineers. The elevated pipeline crossing will be installed in accordance with applicable Delaware & Hudson engineering specifications, and NYSDOT requirements. A technical document will be submitted to Delaware & Hudson describing the proposed railway crossing to allow them to review and approve the project prior to implementation.

2.3. Pipeline Excavation

Excavation will begin at Area 1 near the railroad tracks and progress westward. Because of projected difficulties excavating under and near the railroad tracks, the 40-ft section of 30-inch VCP extending from the east end of Area 1 to manhole MH-4 will remain in place. Between MH-4 and MH-3, the pipeline will be filled with flowable concrete grout. The end abutting Area 1 will be sealed with a water-tight grout plug. The pipe bedding will also be sealed with grout keyed into the native clay or bedrock to prevent the pipe bedding from acting as a potential conduit in the future.

It is anticipated that above the water table, excavation will be open with no sheeting or shoring, to the extent allowed under OSHA regulations. Below the water table, however, sheeting or shoring will be necessary to facilitate visual inspection during excavation and assist in dewatering operations.

The horizontal extent of excavation will be 4 feet to either side of the pipe centerline along its length, except in Area 4 (around manhole MH-2) where data indicates PCB contamination extending laterally beyond 10 ft of the pipe centerline. In Area 4, excavation will extend laterally 15 ft to either side of the pipe centerline. Because of the configuration of the pipeline and the limited lateral distribution of subsurface PCBs (as defined by the analytical data), confirmatory sampling for PCBs will not be performed along the trench sidewalls. The possible use of sheeting or shoring during construction will limit the practicality of sidewall sampling.

Excavation will proceed vertically to a depth required to facilitate safe removal of the piping as well as contaminated bedding and soil (as determined by confirmatory sampling) or until competent bedrock is encountered. Where current analytical data shows PCB contamination extending to the bedrock surface, excavation of as much material as practicable to the bedrock surface will be attempted, however, no confirmatory sampling is planned. To define the vertical limits of excavation in areas where analytical data indicate that PCB contamination does not extend to bedrock, confirmatory samples will be collected along the bottom of the trench. Confirmatory samples will be collected approximately every 25 feet along the bottom of the excavation with a target cleanup level of 25 mg/kg PCB.

To minimize the volume of soil requiring disposal as PCB waste, soil excavated from the ground surface to the top of the pipe will be segregated from PCB-containing material removed from adjacent to and below the pipe and stockpiled for later use as backfill. Composite samples collected during the test boring program representing soil above the pipe invert elevation indicate that above the pipe, the soil generally contains less than 1 mg/kg PCB. (The highest PCB concentration detected was 10 mg/kg in one composite sample.) The use of soils containing less than 10 mg/kg PCB as backfill has been allowed by the NYSDEC under similar conditions during a pipeline excavation IRM conducted at the GE Hudson Falls site.

With the trench open, the bottom of the trench will be backfilled with a low permeability clay. Low permeability backfill will be used from the bottom of the trench to just above the natural, undisturbed clay surface. The depths of backfilled clay material will vary to provide a sealer and leveling coarse such that the upper surface lies approximately 10 feet bls. From the top of the clay the trench will be backfilled with the previously segregated clean fill and, as needed, clean soil from off-site to a depth of 2 to 3 ft bls. An impermeable layer of clay or geosynthetic membrane will be installed on top of the fill to minimize percolation of rain and melting snow through the backfilled zone. The impermeable layer will then be covered with clean fill and topsoil from off-site to finished grade. Figure 5 is a cross-sectional schematic representing a typical excavation and backfill detail.

Contaminated pipe, pipe bedding, and soils will be combined and managed as PCB waste and disposed off-site in a GE-approved, TSCA permitted facility.

3. Special Considerations

3.1. Worker Health and Safety

Potential hazards associated with the pipeline removal IRM include working near earth-moving equipment and open excavations. Health and safety procedures for mitigating these potential hazards will be addressed in a site-specific Health and Safety Plan (HASP) to be developed by the contractors working at the site. The contractor selected to perform the IRM will be responsible for the development, implementation, and enforcement of the HASP for the contractor's activities at the site in accordance with 29 CFR 1910.120.

3.2. Access and Security

Site security, except for contractor's equipment, will be the responsibility of GE. To minimize the potential for vandalism and possible risk to the public, access to the site will be controlled by a 6-ft high chain link fence installed around the perimeter of the GE property. A lockable gate with no trespassing and warning signs will also be installed and maintained.

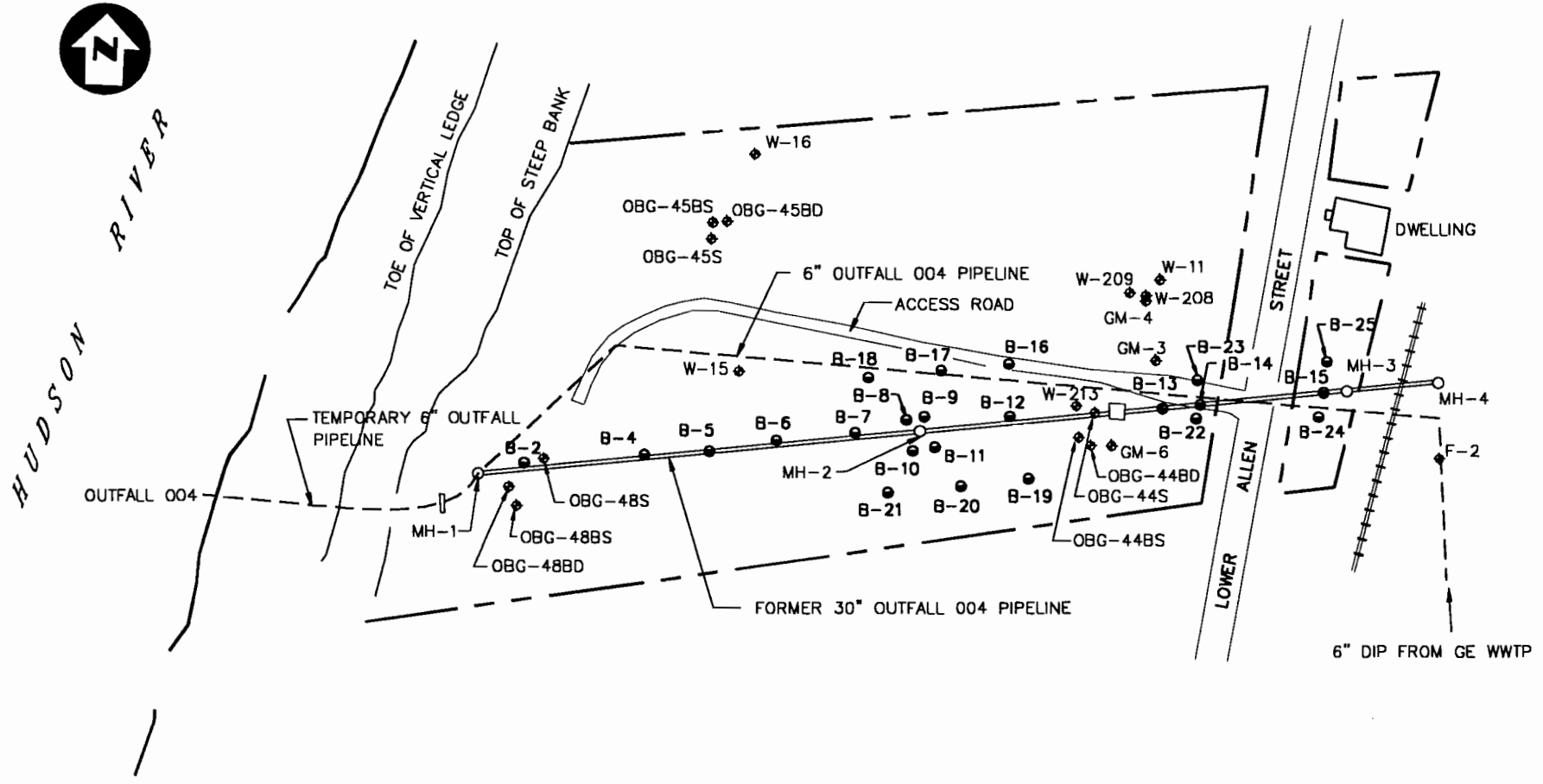
If the work schedule permits, open excavations will not be left unattended overnight. To maintain a safe work site, temporary fencing and lights will be installed and maintained around any open excavations or other hazards to limit trespassing and safeguard the public. Plant security personnel will check the work area regularly during the night to make sure it is secure. Once work in each area is complete, access to the site will be controlled by perimeter fencing as previously described.

4. Schedule

A proposed schedule for the IRM is presented in Figure 6. The IRM will be completed within approximately one calendar year and stretch over two construction seasons. This schedule may be impacted by the time required for NYSDEC review and approval, obtaining permits and other approvals, managing unanticipated field conditions, and inclement weather.

It is planned to complete construction activities associated with the water management system, including the new ground water monitoring well and railroad crossing, and excavation in Areas 1 and 2 during the 1995 construction season. Excavation and continued operation of the construction water management system in the remaining areas will be completed the following year.

Figures



KEY

- EXISTING MONITORING WELL
- SOIL BORING
- GE PROPERTY LINE
- FORMER 30" OUTFALL PIPELINE
- RAILROAD
- MANHOLE

NOTE: ADAPTED FROM THE DANIEL & MOORE "OUTFALL 004 INVESTIGATION REPORT" DATED OCTOBER 16, 1984

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ENGINEERS, INC.

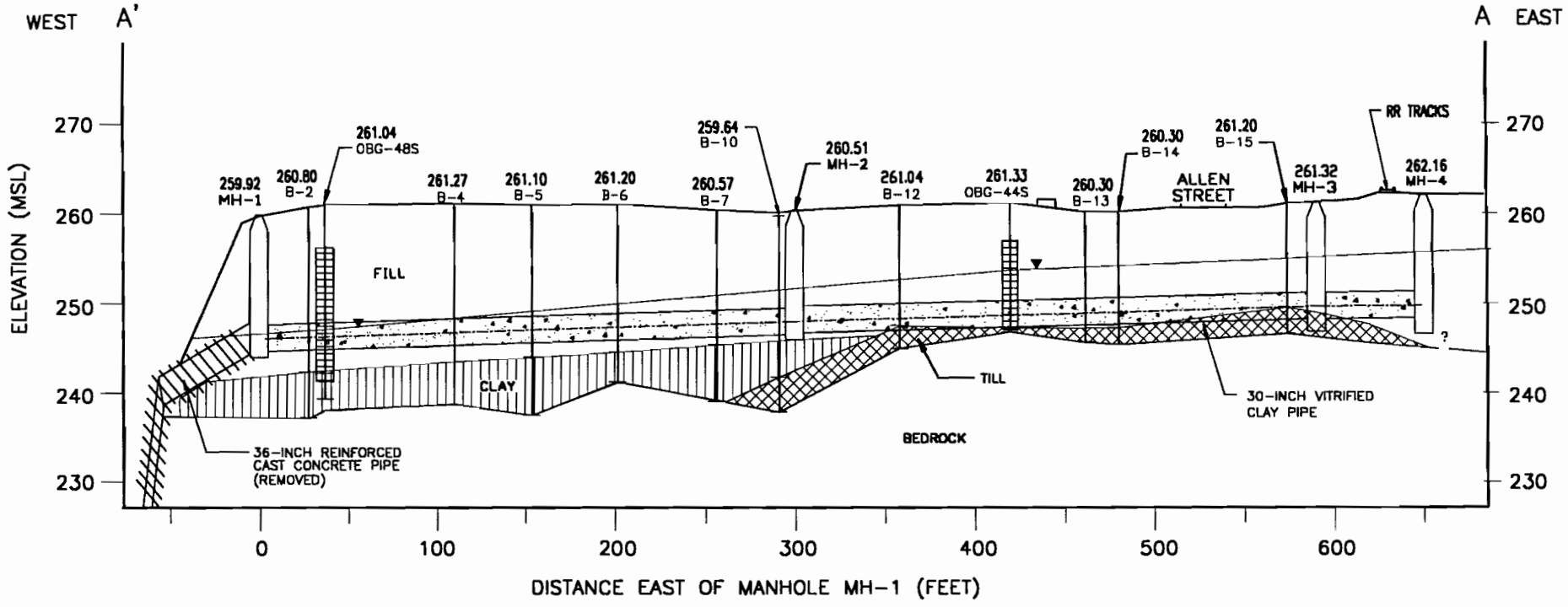
50 0 50
Scale in Feet

FORMER OUTFALL 004 PIPELINE IRM
SITE PLAN
FORT EDWARD, NEW YORK

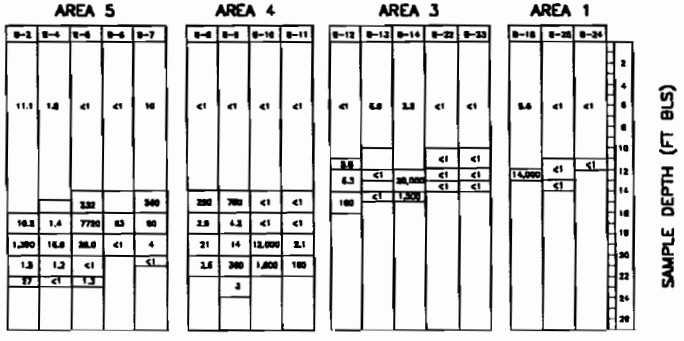
FILE NO. 5731.032

DATE JUNE-1995

FIG 1



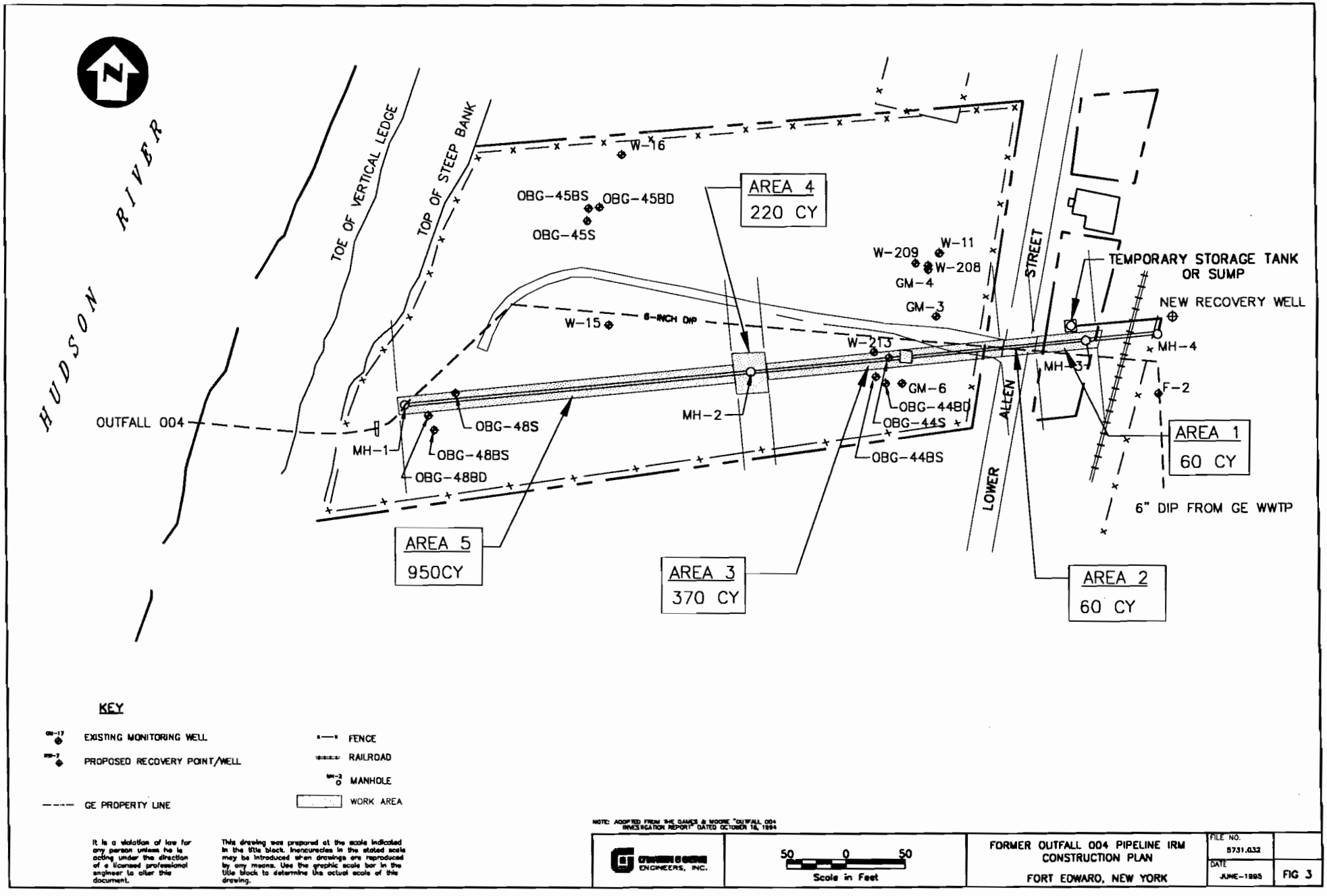
PCB CONCENTRATION IN SOIL BORINGS (MG/KG)



KEY

- FILL
- CLAY
- TILL
- SHALE
- APPROX. WATER TABLE ELEVATION
- FORMER OUTFALL PIPELINE

GZA GEOENVIRONMENTAL ENGINEERS, INC.	SCALE AS NOTED	CROSS-SECTION ALONG FORMER OUTFALL D04 PIPELINE GENERAL ELECTRIC COMPANY FORT EDWARD, NEW YORK	FILE NO. 8731.023	
			DATE JUNE_1995	FIG 2



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NOTE: ADOPTED FROM THE DAMES & MOORE "OUTFALL 004 INVESTIGATION REPORT" DATED OCTOBER 18, 1994

GERAGHTY & MILLER ENGINEERS, INC.

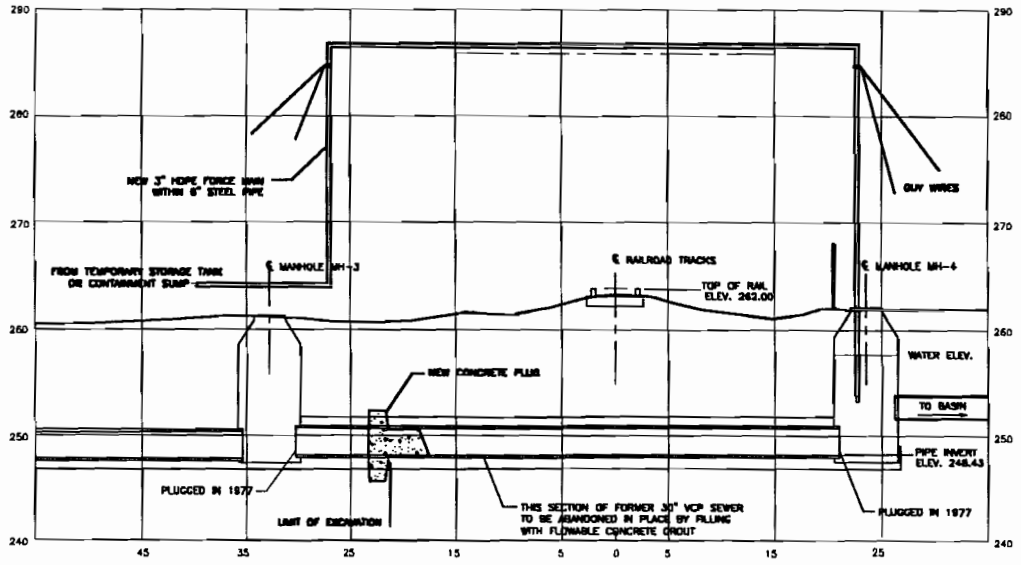
FORMER OUTFALL 004 PIPELINE IRM CONSTRUCTION PLAN

FORT EDWARD, NEW YORK

FILE NO. 5731.032

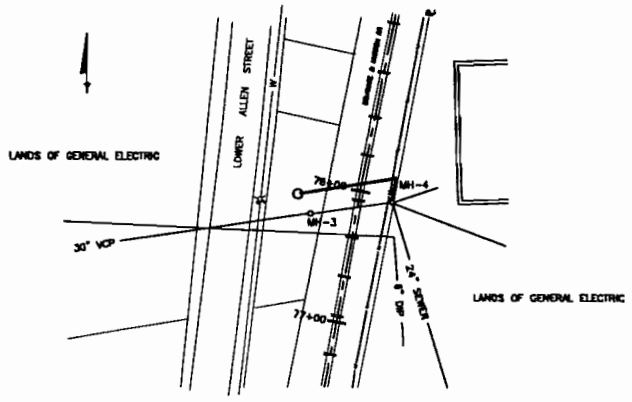
DATE JUNE-1995

FIG 3



PROFILE

SCALE 1"=10'



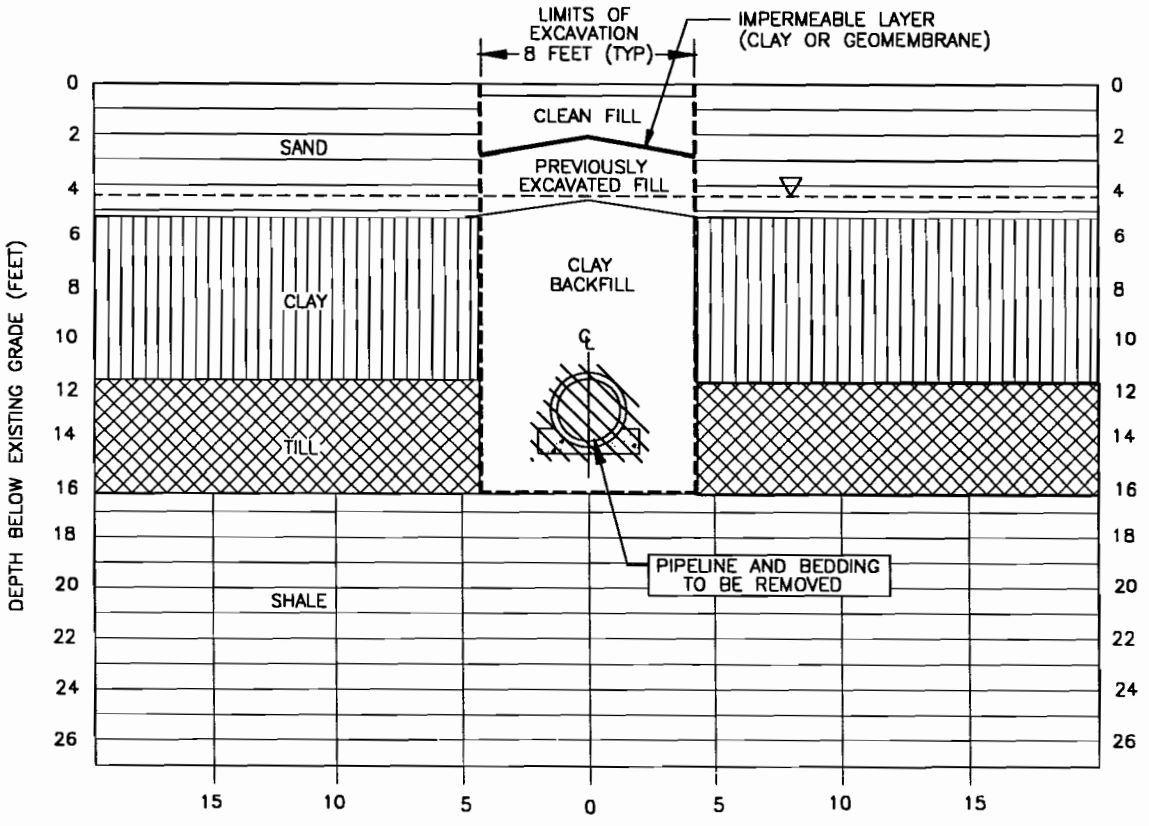
PLAN

SCALE 1"=40'

GANNETT FLEMING ENGINEERS, INC.	SCALE_AS_NOTED	GENERAL ELECTRIC COMPANY FORMER OUTFALL 004 PIPELINE IRM PROPOSED RAILROAD CROSSING	FILE NO. 5731.032 DATE JULY-1995	FIG 4

EGH C:\1\FTED\004\RAW\FIGS.DWG 8/11/95

FIGURE 5



KEY

SAND

NATURAL CLAY

TILL

SHALE

APPROX. WATER TABLE ELEVATION

GENERAL ELECTRIC COMPANY
FORT EDWARD, NEW YORK

GENERIC EXCAVATION AND BACKFILL DETAIL

0 5 10

SCALE IN FEET

FILE NO. 5731.032

O'BRIEN & GERE ENGINEERS INC.