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Engineering Report

REMEDIAL DESIGN ENGINEERING REPORT

COLUMBUS MCKINNON CORPORATION
TONAWANDA, NEW YORK

JUNE 1993
REVISED NOVEMBER 1993

MALCOLM PIRNIE, INC.

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ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

MALCOLM
PIRNIE

REMEDIAL DESIGN ENGINEERING REPORT

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1332-013-102

COLUMBUS MCKINNON CORPORATION
REMEDIAL DESIGN ENGINEERING REPORT

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1.0 INTRODUCTION

1.1 STUDY AREA DESCRIPTION

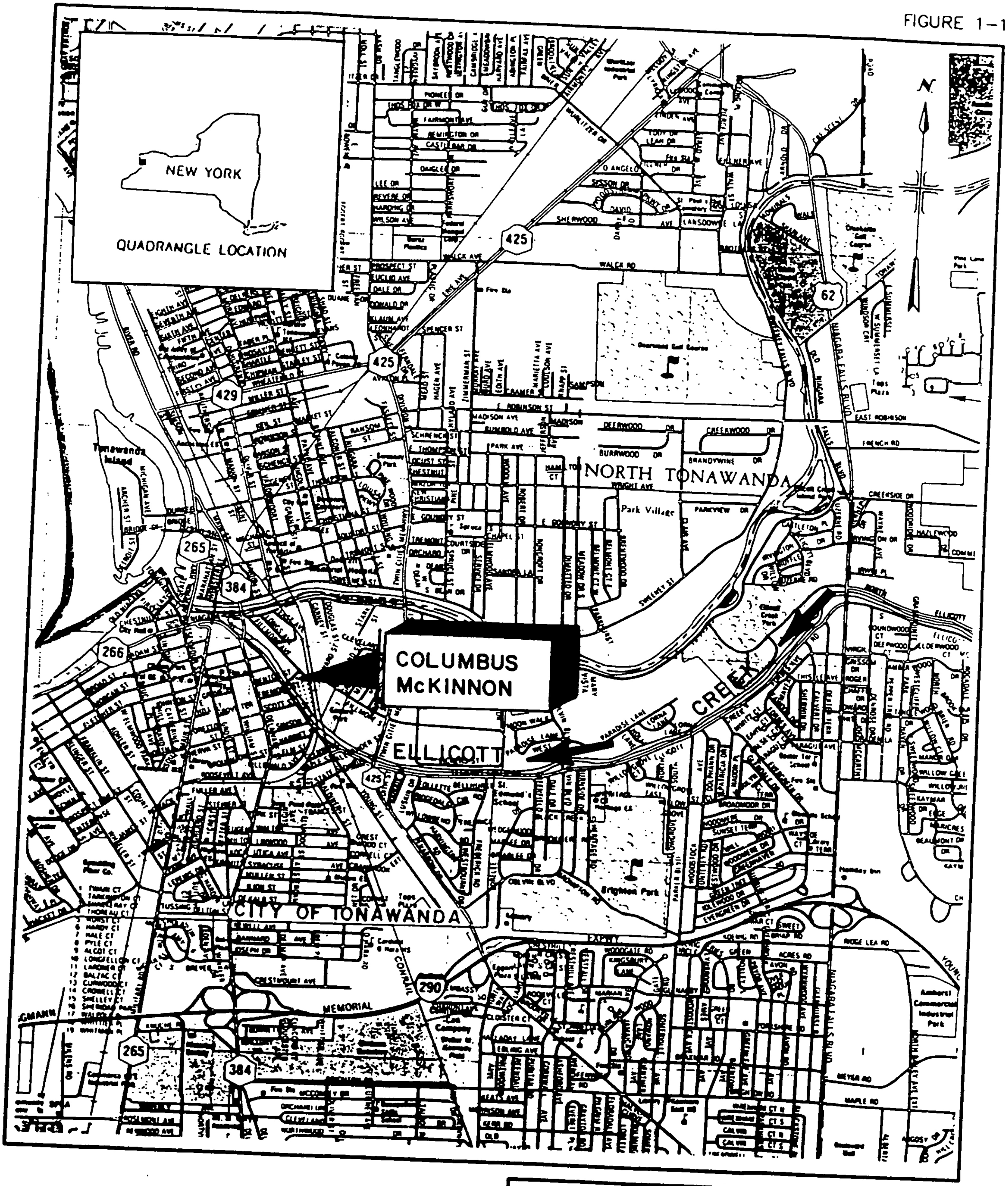
1.1.1 Background

A Study Area located along Ellicott Creek (Figure 1-1), which encompasses an alleged former waste oil disposal area at the Columbus McKinnon Corporation (CM), Tonawanda, New York facility, has been listed by the New York State Department of Environmental Conservation (NYSDEC) on the New York State Registry of Inactive Hazardous Waste Disposal Sites (Study Area Number 915016). The NYSDEC has classified the Study Area as "Class 2", having found that portions of the Study Area present a significant threat to the public health or the environment. Subsequently, CM entered into an Order-on-Consent dated October 2, 1989 (Index No. B9-0240-88-10) with NYSDEC to: a) conduct a Remedial Investigation/Feasibility Study for the alleged former waste oil disposal area; and b) design and implement an Interim Remedial Measure (IRM) to mitigate erosion of Ellicott Creek bank soils. CM contracted with Malcolm Pirnie, Inc. to conduct the required Remedial Investigation/Feasibility Study and implement the IRM. The IRM was constructed by H.F. Darling, Inc. in the Fall of 1990. Malcolm Pirnie conducted the field investigation activities required by the Remedial Investigation scope of work during the months of April to August 1990, and completed the Feasibility Study in April, 1992. NYSDEC issued the Record of Decision (ROD) for the Study Area on October 30, 1992.

1.1.2 Study Area and Study Area History

The Study Area is located along Ellicott Creek at CM's industrial facility at One Fremont Street in the City of Tonawanda, New York (Figure 1-2). The Study Area, as defined in the NYSDEC-approved RI Work Plan (Malcolm Pirnie, 1989), encompasses the area of known or suspected contamination determined by previous investigations. These investigations have documented the occurrence of contaminants within an area approximately 320 feet by 60 feet which includes a portion of the CM property located between the CM facility and Ellicott Creek and a triangular-shaped parcel owned by the Consolidated Railway Corporation (Conrail) located south of and adjacent to the CM property. The

FIGURE 1–1



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COL–01–MAP

COLUMBUS McKINNON PLANT SITE

GENERAL LOCATION MAP

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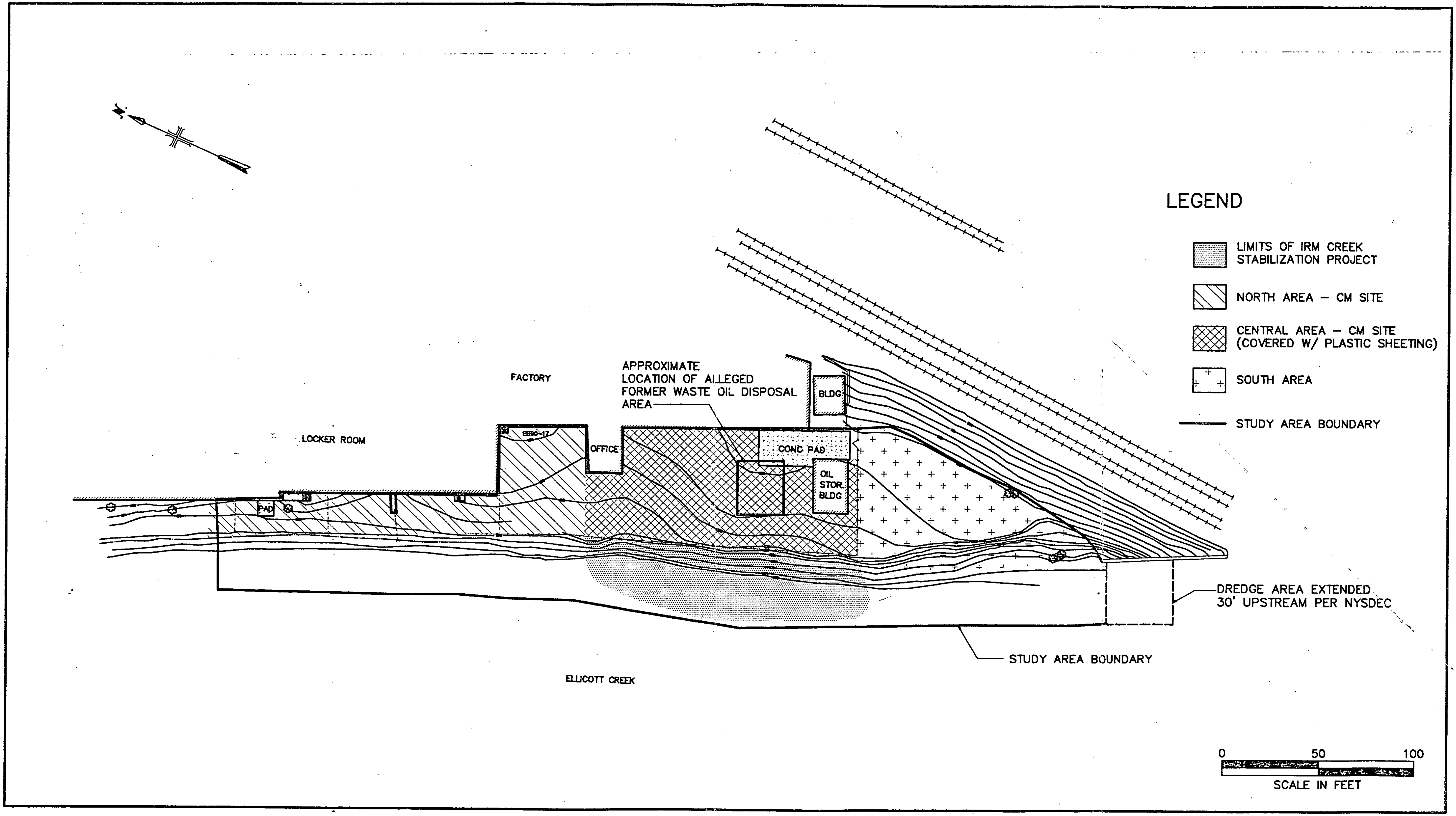
FIGURE 1–2



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PROJECT STUDY AREA

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Study Area boundaries are defined by the foundations of CM buildings, the Conrail railroad embankment, and the near-shore areas of Ellicott Creek as shown on Figure 1-2. Other than the portions of the Study Area extending into Ellicott Creek, the entire Study Area is fenced and can be accessed only through the building or the storage yard located immediately north of the main building.

CM's facility was operated until 1984 for the manufacture of a variety of chain products. Since 1984, the facility has been used by CM to house a small forging, metal fabrication, and heat treating operation, and for the storage of CM products for sale. A portion of the property is leased by CM to other companies for warehousing and light manufacturing purposes.

From 1930 through 1965, a small area of the plant property was allegedly used for the disposal of spent water soluble cutting oils (see Figure 1-2). Reportedly, the alleged waste oil disposal area was a shallow depression on the order of one (1) foot deep. 270,000 gallons of oils were reportedly disposed of in the alleged waste oil disposal area through approximately 1965. In February 1983 PCB contamination was discovered in the alleged waste oil disposal area. It was covered with a durable plastic film to prevent soil migration to Ellicott Creek.

Pursuant to its NYSDEC Order-on-Consent, CM completed IRM construction intended to further mitigate erosion of Ellicott Creek bank soils during the period of October - November 1990. The selected IRM consisted of grading of the creek bank to uniform slopes and installation of filter fabric and riprap to provide erosion protection. The filter fabric prevents erosion by overland flow, as well as channel and wave erosion caused by stream flow in Ellicott Creek. The IRM is described in the IRM Work Plan (Malcolm Pirnie, February 1990) and IRM Construction Bid Package (Malcolm Pirnie, May 1990).

Based upon the contaminant characterization results and the exposure pathways and risk evaluation presented in the Remedial Investigation report, a Feasibility Study was completed in April, 1992 which identified three (3) media or Study Area components requiring further remedial action:

- The portion of the creek bank adjacent to the Study Area.
- Study Area soils.

- The narrow band of Ellicott Creek sediments adjacent to the Study Area which has exhibited elevated PCB concentrations.

1.2 REMEDIAL ACTION PLAN

The selected remedial action plan for the CM Study Area is presented for each of the media below. The remedial measures to be implemented include:

STUDY AREA SOIL:

- Installation of sheetpiling at the top of the creek bank and the use of caisson techniques along the building foundation for structural support during the excavation.
- Removal of PCB-contaminated soil at or above 10 mg/kg with off-site disposal in a TSCA/RCRA approved landfill.
- Provide a minimum of 1 foot of cover with clean soil for all surficial soil with PCB concentrations above 1 ppm.

CREEK BANK SOIL AND CREEK SEDIMENT:

- Installation of a temporary silt curtain to control the migration of disturbed sediment particles during removal of the existing IRM and sediment dredging operation.
- Removal of the existing IRM from the creek bank and creek bed.
- Installation of sheetpiling on the creek bank at water level and at the top of the creek bank.
- Removal of all contaminated creek bank soil with PCB concentrations at or above 10 mg/kg between the two rows of sheetpiling and backfill with clean fill. Contaminated soils will be taken off-site for disposal in a TSCA/RCRA approved landfill and the area between the sheetpiling will be backfilled with clean fill.
- Construction of a dredged creek sediment dewatering basin facility in the Study Area. Following the excavation of PCB-contaminated soil in the Study Area, the resulting depression will be graded, compacted and lined with a 40-mil HDPE single liner.
- Dredging of PCB-contaminated sediment. This sediment will be pumped to the dewatering facility with final disposition in an off-site TSCA/RCRA approved landfill. The water will be treated to within appropriate effluent limits and discharged to Ellicott Creek.

1.3 PURPOSE AND ORGANIZATION

The purpose of this document is to provide greater detail to the conceptual remedial design presented in the Feasibility Study and ROD prior to completion of the design plans and specifications. Specifically, this report has been prepared to: describe the means for executing and coordinating the various phases of remediation at the Columbus McKinnon site; provide a basis for the design and operation of the sediment dewatering basin and the associated dredge return water treatment plant; and present the verification sampling plan for each environmental medium of concern. This report consists of eight (8) sections. Section 1 presents a summary of the site background and defines the goals of the report. A brief description of the remaining Sections is as follows:

- Section 2.0 presents the results of the bench-scale treatability study which was performed to support the sediment dewatering basin design and to provide the remedial contractor with sufficient data to design and construct a dredge return water treatment plant.
- Section 3.0 presents the study area creek bank and soils excavation plan as well as the sampling techniques which will be implemented to verify achievement of the cleanup goals for these media.
- Section 4.0 presents the details of the IRM removal and creek sediment dredging operation as well as the sampling techniques which will be implemented to verify achievement of the cleanup goal for the sediments.
- Section 5.0 presents the details of the basin design including the liner system, the pump station, and closure requirements.
- Section 6.0 summarizes the design requirements for the dredge return water treatment plant and describes the sampling efforts which will be undertaken to verify the quality of the treatment plant effluent.
- Section 7.0 identifies the elements of the bid/award process and the format of the contract documents.
- Section 8.0 presents a remedial design construction schedule for the site.

2.0 PRE-DESIGN TREATABILITY STUDY

2.1 PURPOSE AND SCOPE

Remediation of the creek sediments will require hydraulic dredging within the confines of the extended Study Area in Ellicott Creek as shown in Figure 1-2. The dredged sediments will be directed to a lined earthen basin constructed in the Study Area soils for dewatering. A treatment system will be constructed at CM's facility to remove trace concentrations of PCBs which may be present in the residual water generated from the sediment dewatering process prior to its return to Ellicott Creek. A treatability study was conducted in January 1993 to determine the settling characteristics, particle size distribution and PCB content of the dredge spoils as required for the design of an effective water treatment train.

The initial portion of the treatability study involved jar testing of PCB-spiked sediment samples to collect settleability and PCB distribution data. PCB spiking was necessary as a composite sample representative of the Study Area sediments collected for this test contained only a trace amount of PCBs (0.4 mg/kg PCB 1254 on a dry weight basis). The second part of the test involved sieve and hydrometer testing of unspiked sediment to obtain the particle size distribution of the sediment matrix. The detailed procedures for the bench tests are presented in the Sediment Disposition Treatability Study Work Plan attached as Appendix A. The results of the study are presented below.

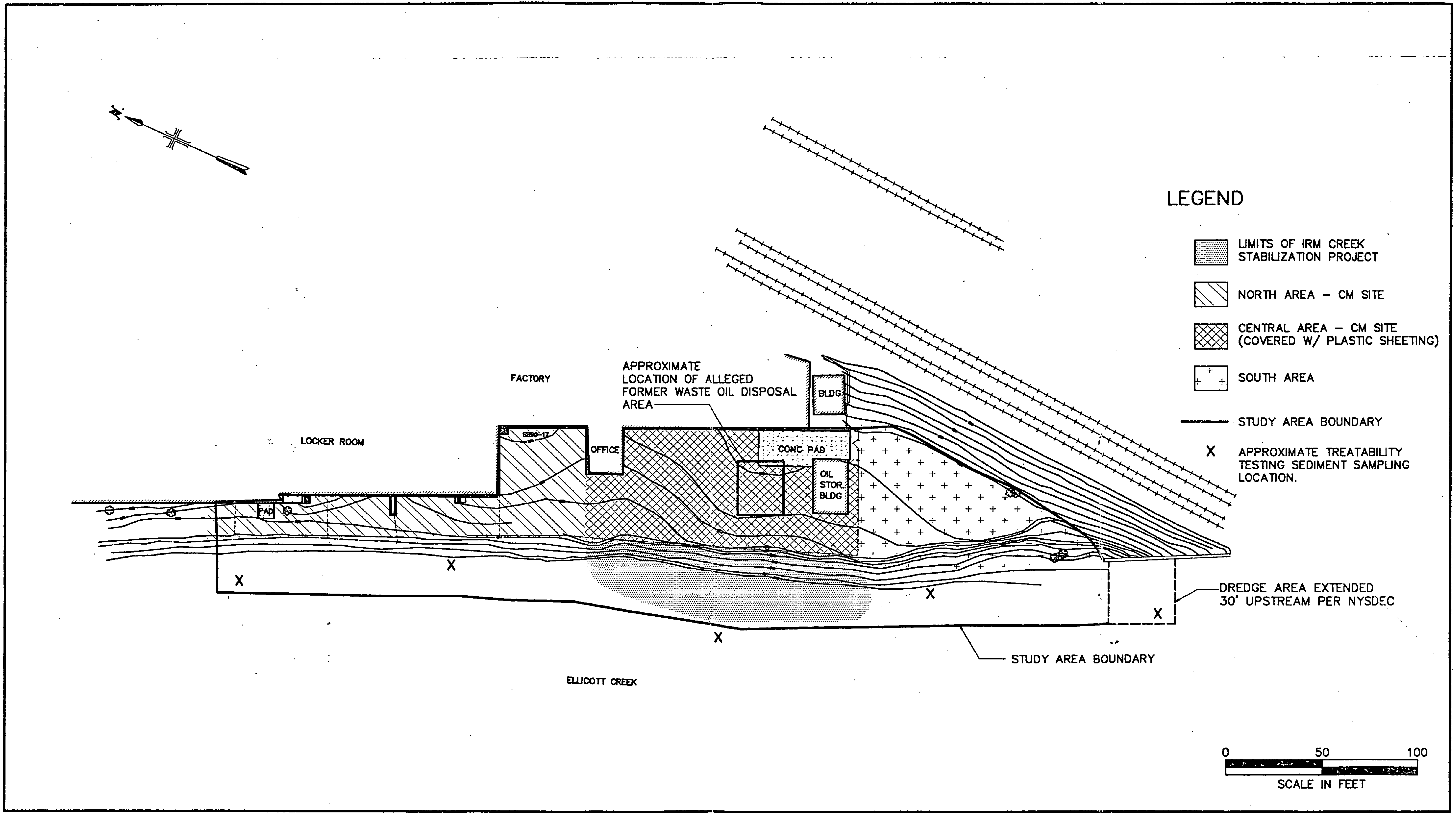
2.2 SETTLEABILITY AND PCB DISTRIBUTION RESULTS

The analytical results generated by the treatability study are summarized in this section. Complete analytical results and bench scale test observations are provided in Appendix B.

2.2.1 Raw Sediment PCB Concentration

Prior to conducting the bench scale settling tests, a composite creek sediment sample, comprised of five discrete samples collected along the length of the Study Area, was analyzed to determine which PCB congeners were initially present in the raw sediment and their concentrations (see Figure 2-1). The total solids content of the raw sediment was

FIGURE 2-1



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REMEDIAL ENGINEERING DESIGN REPORT

TREATABILITY TESTING SEDIMENT SAMPLING LOCATIONS

COLUMBUS McKINNON CORPORATION APRIL 1993 analyzed as well, so that the PCB concentrations could be reported on a dry weight basis. The analysis revealed that only PCB-1254 was present, at a dry weight concentration of 0.4 mg/kg. However, it should be noted that historical and RI sample data for the sediments have indicated higher PCB concentrations beneath the IRM and at other locations within the creek Study Area. The June 1991 Remedial Investigation Report for the Columbus McKinnon Site should be reviewed for a more detailed discussion of PCB concentration data for the creek sediments.

2.2.2 Initial Water/Sediment Solutions

Eight 2-liter solutions containing 10 percent by volume of raw sediment and 90 percent by volume of creek water were prepared for the bench scale settling test. The total solids concentrations of these solutions ranged from 2.0 percent (19,630 mg/l) to 3.2 percent (31,980 mg/l) and are presented in Table 2-1. The average total solids content of the prepared solutions was 2.2 percent, or an average total solids concentration of 21,570 mg/l. Solution #8, which had a total solids content of 3.2 percent, was considered to be an outlier and thus was excluded from the calculation of the average concentration.

2.2.3 Settling Tests

After preparing the eight water/sediment solutions, each of the 2 liter mixtures were spiked with 21.331 mg of PCB-1254 and mixed at approximately 100 rpm for more than 24 hours using a Phipps and Bird paddle-type gang stirrer apparatus. Stirring was terminated and the solutions were allowed to settle. The height of the sediment/supernatant interface was recorded in each beaker at regular intervals until the designated sampling time. At each designated sampling time (1.5, 3, 5, 10, 20, 60, 180 and 600 minutes), one beaker was sacrificed. The supernatant was pumped out of the test beaker into a separate vessel. As much supernatant as possible was decanted without withdrawing settled sediment. The supernatant was divided into aliquots for total suspended solids and insoluble and soluble PCB concentration analyses. "Insoluble PCBs" refers to those PCBs extracted from the supernatant suspended solids retained on a 0.45 micron filter, while "soluble PCBs" refers to the PCBs which remained in the aqueous phase after filtering out the suspended solids. The settled sediment which remained in the test beaker was transferred to a 1 liter amber jar for PCB and total solids analyses.

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TABLE 2-1

INITIAL ELLICOTT CREEK WATER/SEDIMENT SOLUTIONS

Solution Number	Initial Total Solids (percent)	Initial Total Solids (mg/l)
1	2.0	20080
2	2.0	19720
3	2.1	21340
4	2.2	21520
5	2.3	23480
6	2.0	19630
7	2.5	25230
8	3.2	31980

2.2.3.1 Observations

The eight test beakers were visually observed during the settling tests. The sediment appeared to settle quickly, with a clear sediment/supernatant interface representing 25% of the height of the beaker becoming visible after approximately 2.5 minutes of settling.

2.2.3.2 Total Suspended Solids

The supernatant total suspended solids (TSS) are presented in Table 2-2 and Figure 2-2 as a function of time. As can be seen in Figure 2-2, the supernatant TSS decreased rapidly during the first 20 minutes of settling. The TSS continued to decline until the 180 minute (3 hour) sampling time, although at a slower rate. The majority of settleable solids present in the samples had settled within the first 3 hours, evidenced by the lack of change of TSS over the 180 minute to 600 minute (10 hour) interval.

2.2.3.3 PCB Distribution

PCB concentrations and masses for the soluble and insoluble fractions of the supernatant and the settled sediments are presented in Appendix C. Appendix C provides an explanation of all PCB concentration correction factors and mass calculations. In general, PCB-contaminated sediment settled out of the water quickly. Analysis of the supernatant and settled sediments showed that in general 97% or more of the total PCB mass for each sample jar is associated with the settled sediment fraction.

2.3 PARTICLE SIZE ANALYSIS

The grain size distribution of the creek sediment was analyzed to provide data on the size of particles remaining in the supernatant as a function of settling time. The grain size distribution data and TSS data from the settling tests, along with a specified detention (settling) time, will be used to predict the mass loading and particle size distribution which could be expected in the influent to the dredge water treatment plant. The grain size distribution of the creek sediment was determined using sieve and hydrometer methods (ASTM D422) as described in the treatability study work plan. Complete analytical results, including grain size distribution curves, are presented in Appendix D. The creek sediment was composed of approximately 10 percent gravel, 22 percent sand, 53 percent silt and 15

TABLE 2-2

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SETTLEABILITY TEST RESULTS

Time (min.)	Supernatant TSS (mg/l)
1.5	4145
3	1983
5	997
10	610
20	348
60	252
180	88
600	84

FIGURE 2-2
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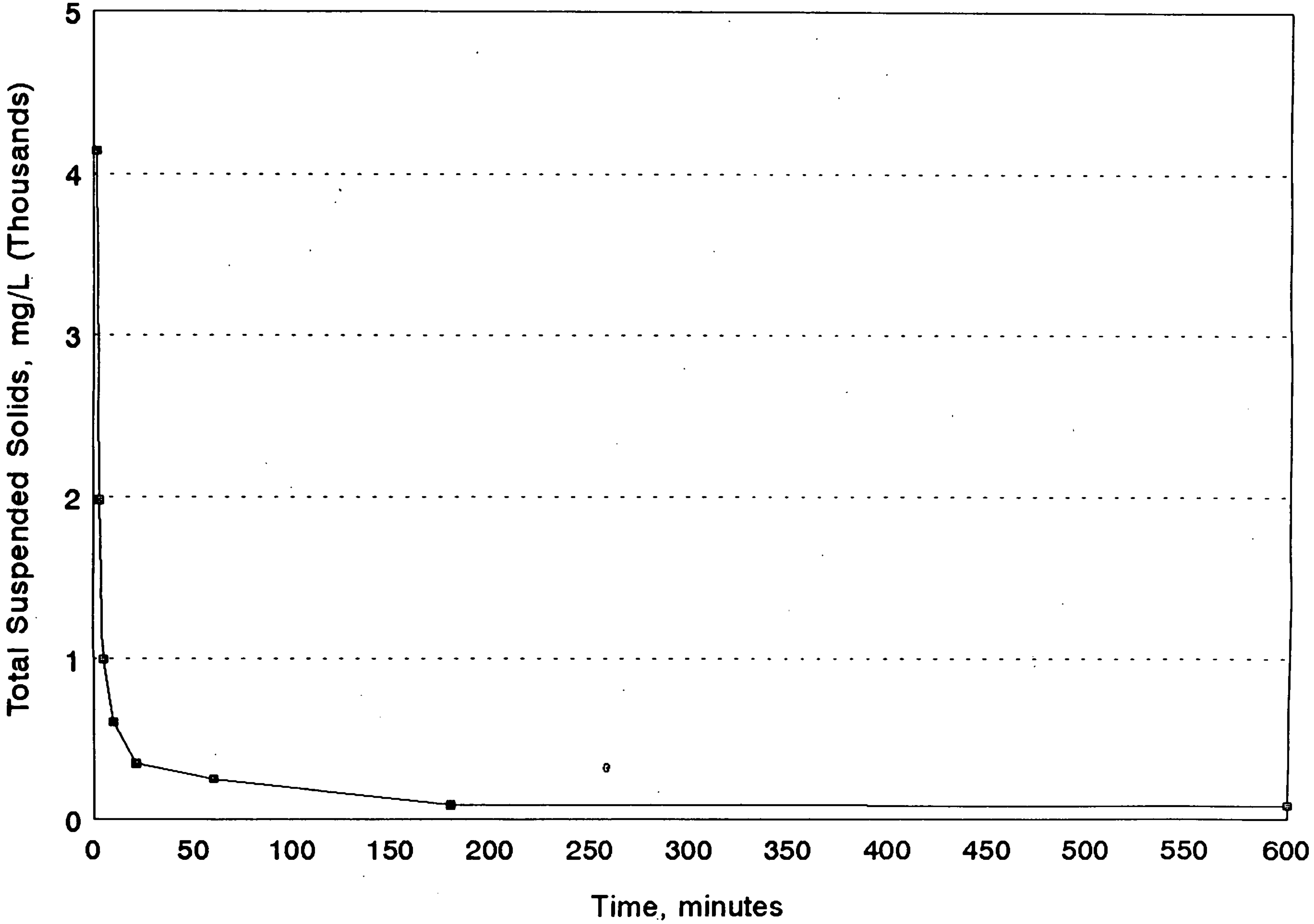
CREEK SEDIMENT SETTLEABILITY TEST RESULTS



percent clay-sized particles, as summarized in Table 2-3. Based on the hydrometer portion of the grain size distribution curve, the diameter of particles remaining in the supernatant to be removed by the treatment system at the estimated maximum detention time of the dewatering basin of 6.5 hours (see Section 6.0) would be 0.075 millimeters or less. Thus, the treatment system must be capable of removing solids less than 0.075 millimeters in diameter.

2.3.1 Solids Mass Loading

The mass loading of solids to the dredge water treatment plant will depend on the TSS of the dewatering basin supernatant and the rate at which the supernatant is pumped to the treatment plant. The flow rate will be determined by the dredging contractor. Referring to the TSS data presented in Table 2-2 and Figure 2-1, the supernatant TSS which could be expected with a dewatering basin detention time of 6.5 hours is 85 mg/l, or 0.0007 pounds per gallon. However, this TSS concentration may vary depending on the nature of the dredged material.

2.4 CONCLUSIONS

It is evident from the results of the jar testing that the PCB mass in the jar test settled solids is high in comparison to the PCB mass in the jar test supernatant. This condition occurs almost immediately after the onset of settling, indicating that a substantial portion of the spiked PCB mass adhered to the sand-sized particle fraction, or that some sweep flocculation occurred during settling which caused PCB contaminated silt and clay-sized particles to be settled with the larger particles. In either case, it is anticipated that PCBs which may be present in the full-scale dredge spoils will settle in the basin fairly quickly, and there will be little PCB mass (i.e., less than 3% of the total mass) in the supernatant. Based on the trace level PCB concentration of the composite sample representing the entire length of the Study Area, it is anticipated that only trace PCB concentrations will be present in the full-scale settled sediments collected in the dewatering basin. However, as discussed in Section 2.2.1, historical and RI data have indicated the potential for certain portions of the Creek Study Area sediments to exhibit elevated PCB concentrations.

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TABLE 2-3

SUMMARY OF SEDIMENT GRAIN SIZE DISTRIBUTION

Particle Class	Particle Size (mm)	Weight Percent in Sediment
Gravel	>4.75	10
Sand	0.075 to 4.75	22
Silt	0.002 to 0.075	53
Clay	<0.002	15

3.0 SOILS EXCAVATION PLAN

3.1 GENERAL

To determine the areas of the creek bank to be excavated, a contoured excavation plan was prepared for the Study Area soils in the Feasibility Study report based on the results of historical and Remedial Investigation (RI) data (see Plate 1). This plan takes into consideration all data points indicating PCB contamination at and above 10 mg/kg, as well as the physical constraints of the Study Area including maintaining 2:1 slopes at the building foundation and at all depressions (necessary to protect the integrity of the structures and/or prevent cave-in at the depressions).

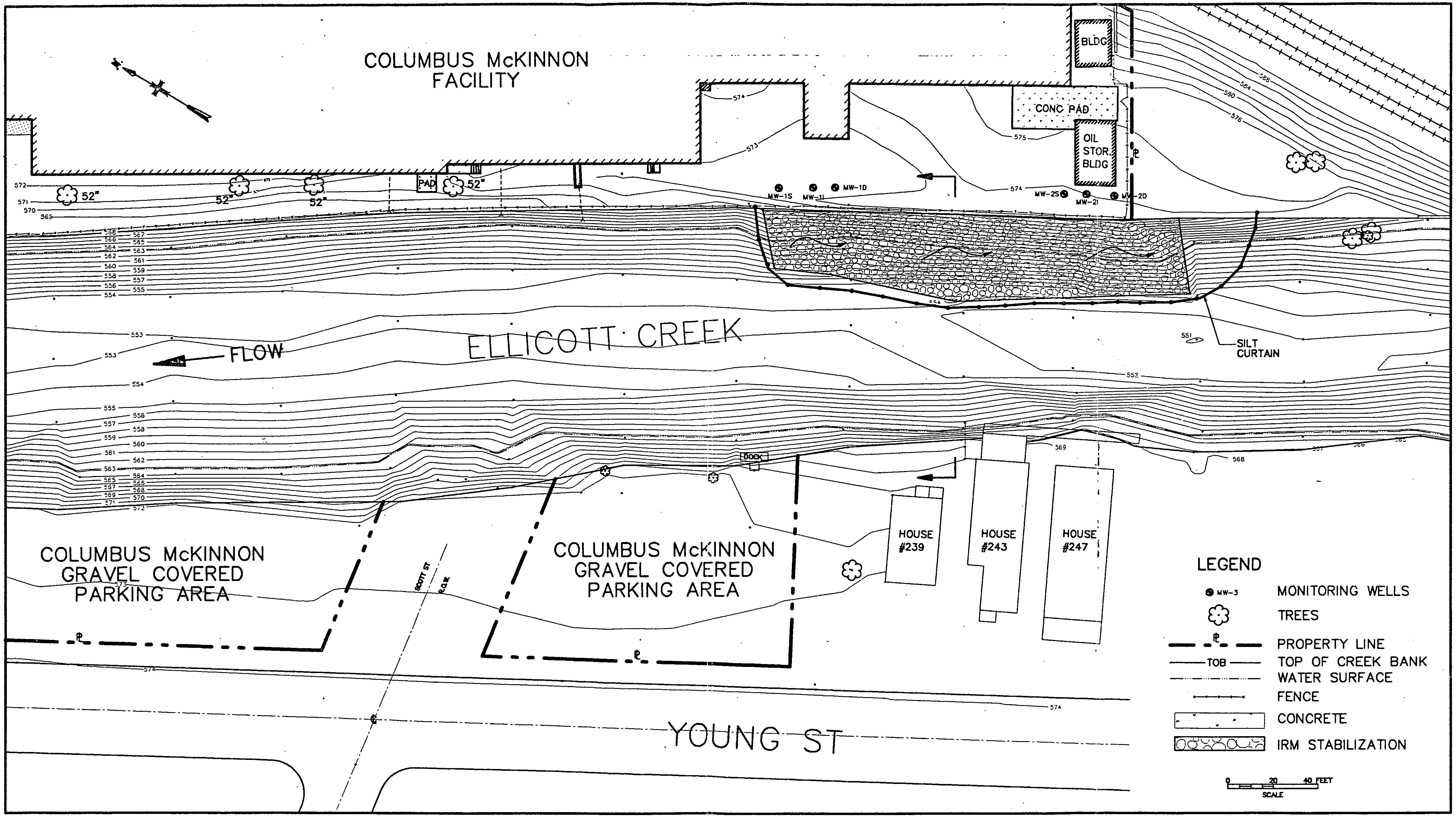
Isolated pockets of contamination at and above the 10 mg/kg cleanup criteria (identified on Plate 1) within the wedge of soil at the building foundation which remain due to the 2:1 side slope will be removed using either caisson borings or other methods to achieve the cleanup goal while maintaining the integrity of the foundation. As indicated in Plate 1, caisson borings will also be utilized at two isolated locations on Conrail property and at select locations within the CM Study Area to eliminate the unnecessary excavation of large volumes of soil. The placement of two rows of sheetpiling along the creek bank eliminates the need for a 2:1 slope in that area.

3.1.1 Creek Bank Soils

The creek bank soil excavation will first require removal of the IRM above the water line using light duty mechanical equipment. The riprap above the water line will be staged in the Conrail-owned portion of the Study Area and used to stabilize the creek bank south of the Study Area (i.e., downstream of the sheetpile wall). The erosion control fabric will be cut at the water line and handled in a manner similar to the contaminated soils. Re-suspension of sediment generated by disruption of the above-water IRM will be retained by a silt curtain situated at the toe of the creek bank (See Figure 3-1).

Following removal of the IRM above the water line, sheetpiling will be installed at the water line and at the top of the creek bank. A separate purchase specification will be prepared for pre-purchasing the sheetpiling. The pre-purchased steel sheets will be made available to the contractor upon mobilization to the Study Area.

FIGURE 3–1



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PLAN VIEW OF SILT CURTAIN
FOR REMOVAL OF IRM

COLUMBUS McKINNON CORP. APRIL 1993

The outer sheetpiling wall will be installed at the water line and will prevent sloughing of the bank soils into the creek during the excavation activities, provide permanent erosion protection to the site from the creek, and protect the site excavation from intrusion of creek water. The sheetpiling wall will be installed at the top of the bank to stabilize the outer sheetpile wall and allow excavation of site soils and serve as the outer wall of the sediment dewatering basin. Installation of the sheetpiling will require some land-based construction, however it is anticipated that the contractor will perform the majority of this work from a barge.

Excavation of creek bank soils above the water elevation will be performed between the rows of sheetpiling in accordance with the contoured excavation plan presented as Plate 1. Due to the potential problems associated with land-access, excavation equipment will likely be brought to the Study Area with a barge and remain there until completion of the construction. The sampling and verification plan for the creek bank soils (see Section 3.2) will be implemented to ensure conformance with the PCB cleanup goal of 10 mg/kg. As the excavation is performed, the completed areas will be backfilled with clean soil to ensure maximum stabilization. As indicated on Plate 1, there are three (3) portions of the Study Area where soils will be overexcavated due to the need to maintain a 2:1 sideslope in the excavated depression. At these locations, upper layer soil having PCB concentrations below 10 mg/kg is being removed to excavate deeper soils with PCB concentrations above the cleanup goal. Therefore, the upper layer soil at these locations will be excavated separately from the lower contaminated soils and will be placed in roll-off boxes. These soils will be characterized and, if determined to contain PCB concentrations less than 10 mg/kg, will be used as the backfill in the soils excavation area. In addition, the soils under the office portion of the building, although not yet characterized, will be partially removed to maintain the continuity of the excavation grade in this location. These soils will also be staged in roll-off boxes separately from other excavated soils for characterization and potentially used as backfill in the soils excavation area.

The soils will be containerized in roll-off boxes which will be covered and lifted from the Study Area by a barge-mounted crane, transported across the creek, and staged in CM's Young Street parking area for sampling and analysis. The soils with PCB contamination at or above the 10 mg/kg cleanup goal, as determined by the RI and historical data, will be transported off-site to a TSCA/RCRA permitted landfill.

Following completion of the excavation, the backfilled soils between the sheetpiling will be compacted to project specification requirements. The double row of sheetpiling and clean earth fill will remain as a permanent erosion barrier.

3.1.2 Study Area Soils

Upon completion of the creek bank excavation/backfilling operation, Study Area soils will be excavated in accordance with the contoured excavation plan. During excavation of the Study Area soils, the existing groundwater monitoring wells within the Study Area will be decommissioned. Excavated soil will be containerized in covered roll-off boxes and staged either in the Study Area or in CM's Young Street parking lot, and will be transported off-site to a TSCA/RCRA-permitted landfill by a licensed hazardous waste transporter. As discussed in Section 3.1.1, to achieve consistent excavation contours it is estimated that up to 106 cubic yards of soils having less than 10 mg/kg PCBs will also be excavated (see Plate 1). Sampling of individual roll-off boxes containing these soils will be performed to verify conformance with the cleanup criteria. These soils will remain in the Study Area or in CM's Young Street Parking Lot and be used as backfill in the excavation area. The soil sampling and verification plan will document conformance with the PCB cleanup goal.

Following excavation operations, the resulting depression will be graded and compacted to achieve basin design elevations and slopes.

3.1.3 Foundation Soils

In accordance with OSHA 29 CFR 1926.652, any excavation into loose soils (as is the case for the soil and fill at the CM Study Area) which is not shored or otherwise stabilized must be performed such that a slope is maintained to prevent cave-in. Due to the fine, loose nature of the soil and fill in the Study Area, it is anticipated that a maximum 2:1 (horizontal:vertical) slope will be required during excavations adjacent to structures. This slope would be necessary immediately adjacent to buildings for prevention of structural failure of the foundation.

Isolated pockets of contamination at or above the 10 mg/kg cleanup criteria within the wedge of soil remaining at the building foundation will be removed using caisson borings to achieve the cleanup goal while maintaining the integrity of the foundation (see Plate 1). Caisson boring techniques utilize a drill rig equipped with a 4-foot caisson auger head. The head bores a 4-foot diameter hole through a hollow exterior steel casing. The excavated soils are forced up through the center of the casing and deposited outside the perimeter of the hole. Upon completion of the boring to the required depth, the hole is backfilled with clean soil and the casing is removed. The depressions resulting from the excavation of soils will be backfilled, graded and compacted as necessary for the construction of the sediment dewatering basin.

3.2 SAMPLING AND VERIFICATION

The contoured excavation plan was developed with the goal of removal of soils with PCB concentrations greater than 10 mg/kg. The contours were established taking into account all historical and RI data. Following excavation of an area, sampling of the remaining soils will be conducted to verify that the concentration of PCBs is less than 10 mg/kg. Should the analysis indicate the presence of PCBs in excess of 10 mg/kg, additional excavation will be required. This section describes the sample locations, sampling methodology, analytical methodology and data interpretation that will be employed during the verification sampling.

3.2.1 Sample Locations and Collection Methodology

3.2.1.1 Study Area Soils

The soils in the central portion of the Study Area which are presently covered by plastic sheeting will be divided into 20x10-foot grids for the purposes of verification sampling. Soils in the other portions of the Study Area will be divided into 20x20 grids. One (1) grab sample will be collected representing zero to 6 inches below the excavated ground surface from within each grid. The grid system and typical sample locations within each grid are illustrated on Plate 1. Due to the shallow depth at which the samples will be collected, use of a hand auger is not anticipated to be required. Thus, the samples will be collected by hand using a precleaned stainless steel trowel. The trowel will be cleaned with a non-phosphate soap solution and deionized water prior to use at the next grid.

The grab sample will be transported to an independent, NYSDOH-approved laboratory for PCB analysis in accordance with the methodology prescribed in Section 3.2.2.

Soils that are excavated from Conrail property will also be subject to verification sampling. Excavation on Conrail property is limited, however, making the use of 20x20-foot sampling grids impractical for this area. Thus, verification samples will be collected approximately from the locations indicated on Plate 1. At least one sample will be collected every 20-feet parallel to the creek bank.

In addition to post-excavation verification sampling, soils below the sediment dewatering basin (see Section 5.0) will be sampled following decommissioning of the basin to verify that no leakage of PCB-contaminated water/sediment to the underlying soils occurred. These underlying soils will be sampled in the same manner as described above (i.e., grid sampling with PCB analyses by an independent laboratory) and checked for conformance with the 10 mg/kg PCB cleanup goal. Section 5.7 describes this post-dewatering soil sampling in greater detail.

3.2.1.2 Creek Bank Soils

Creek bank soils will be excavated from within the confines of the inner and outer sheet pile walls according to the excavation plan presented in Plate 1. Verification sampling will be conducted in 20-foot intervals parallel to the creek bank, as illustrated on Plate 1. One soil sample representing zero to 6-inches below ground surface will be collected from within each interval. To avoid the need for sampling personnel to enter the space between the sheetpiles, sample will be collected using a long-handle hand auger. The procedure for collecting hand auger samples is presented in Appendix E1. The hand auger will be cleaned with a non-phosphate soap solution and deionized water prior to use at the next grid. The samples will be analyzed for PCBs by an independent, NYSDOH-approved laboratory in accordance with the methodology prescribed in Section 3.2.2.

3.2.1.3 Roll-Off Boxes

The over-excavated soils from the areas indicated on Plate 1 which, on the basis of the RI and historical data, are believed to be in conformance with the soil cleanup goal will be excavated separately from other Study Area soils, containerized in roll-off boxes and staged in the Study Area or in CM's parking area on the opposite bank of Ellicott Creek. The soil in these roll-off boxes will be subject to verification sampling to determine if they can, in fact, be used as backfill in the Study Area. One (1) grab sample will be collected from the surface of the roll-off box. Similar to the collection of Study Area soils, the sample will be collected by hand using a precleaned stainless steel trowel. Decontamination of the trowel between boxes will be conducted as discussed in Section 3.2.1.1. The grab sample will be analyzed by an independent NYSDOH-approved laboratory. If the sample is found to have less than 10 mg/kg PCBs, the contents of the roll-off box may be used as backfill in the Study Area.

3.2.2 Analytical Laboratory Methodology/Detection Limits

Soil samples will be analyzed for PCBs by a New York State Department of Health ELAP-certified laboratory. Table 3-1 identifies the method, method reference, detection limit, holding time, preservative and container specifications for PCB analysis of these soil samples. As indicated in Table 3-1, PCB analyses will be performed using USEPA SW-846 methodology. Because these samples will be used to determine the need for additional excavation, 24-hour turnaround of the results will be required.

3.2.3 Data Interpretation

The cleanup goal for the Study Area soils has been established as 10 mg/kg PCBs. Thus, if the PCB concentration of the remaining soils following excavation is below 10 mg/kg for a particular grid, the excavation will be considered complete for that area. If the PCB concentration at the bottom of the excavation is greater than 10 mg/kg, however, an additional 6 inches of soil will be excavated from the grid following the contour of the initial excavation and the grid will be retested.

TABLE 3-1

COLUMBUS MCKINNON CORPORATION
REMEDIAL DESIGN REPORT

ANALYTICAL METHODS & PROTOCOLS FOR SOIL VERIFICATION SAMPLING

Parameter	Method	Method Ref.	Maximum Detection Limit	Holding Time	Preservation	Container
PCBs - Soils	8080	1	1 mg/kg	Note 1	Cool to 4°C	1-liter amber glass jar with teflon-lined lid

NOTES:

(1) Samples submitted for PCB analysis shall be extracted within seven (7) days of sample receipt and analyzed within 40 days of extraction. Sample extraction will be performed in accordance with USEPA Method 3550.

METHOD REFERENCES:

(1) USEPA SW-846, Third Edition

4.0 CREEK DREDGING OPERATION

4.1 IRM REMOVAL/SPOILS DISPOSITION

As part of the interim remedial measures (IRM) undertaken at the Study Area, the creek bank along the Central Area and along a portion of the South Area has been stabilized with erosion control fabric and riprap to mitigate the off-site migration of soil potentially contaminated with PCBs. The removal of the IRM above the water line will have been conducted prior to dredging to facilitate excavation of creek bank soils as discussed in Section 3.1. Removal of the IRM below the water line will be necessary before undertaking the hydraulic dredging. Prior to performing any activities related to IRM removal, a silt curtain will be installed at the perimeter of the Study Area. A description of the silt curtain is provided in Section 4.2.

The removed riprap below the water line will be pressure washed to remove solids and sediments, with the rinse water directed to the dewatering basin. The riprap will then be staged in the Conrail-owned portion of the Study Area for use as backfill during closure activities. The erosion control fabric will be disposed off-site along with soil contaminated at or above the cleanup goal of 10 mg/kg PCBs.

4.2 SILT CURTAIN

Silt curtains will be used to enclose all areas in which sediments will be disturbed to mitigate the release of potentially PCB-contaminated sediments outside the Study Area. Two (2) silt curtains will be placed around the perimeter of the Study Area in the creek and will remain there during all dredging activities. The silt curtains will be made of coated fabric, typically nylon covered with vinyl. Strategically-located water-permeable "windows" may be included within the curtain at the contractor's discretion to minimize the difference in hydrostatic pressure inside and outside of the enclosed area. Hydrostatic pressure differential occurs as a result of removing large volumes of sediment and water from within the impermeable curtain. Replacement of the water by either pumping in water from outside the curtain or using water permeable windows is necessary to prevent collapse of the curtain when dredging. The silt curtain will be weighted at the bottom and will have flotation devices attached to the top.

Hydraulic dredging will be initiated in the upstream portion of the Study Area. Upon completion of the dredging work in a portion of the Study Area, the barge will be moved to the next downstream area scheduled for dredging. A silt curtain will be installed perpendicular to the creek bank to isolate the area being dredged. This procedure will be repeated as necessary to minimize potential re-contamination of creek sediments (see Figure 4-1).

4.3 DREDGE METHODS AND OPERATION

4.3.1 Hydraulic Dredge Equipment

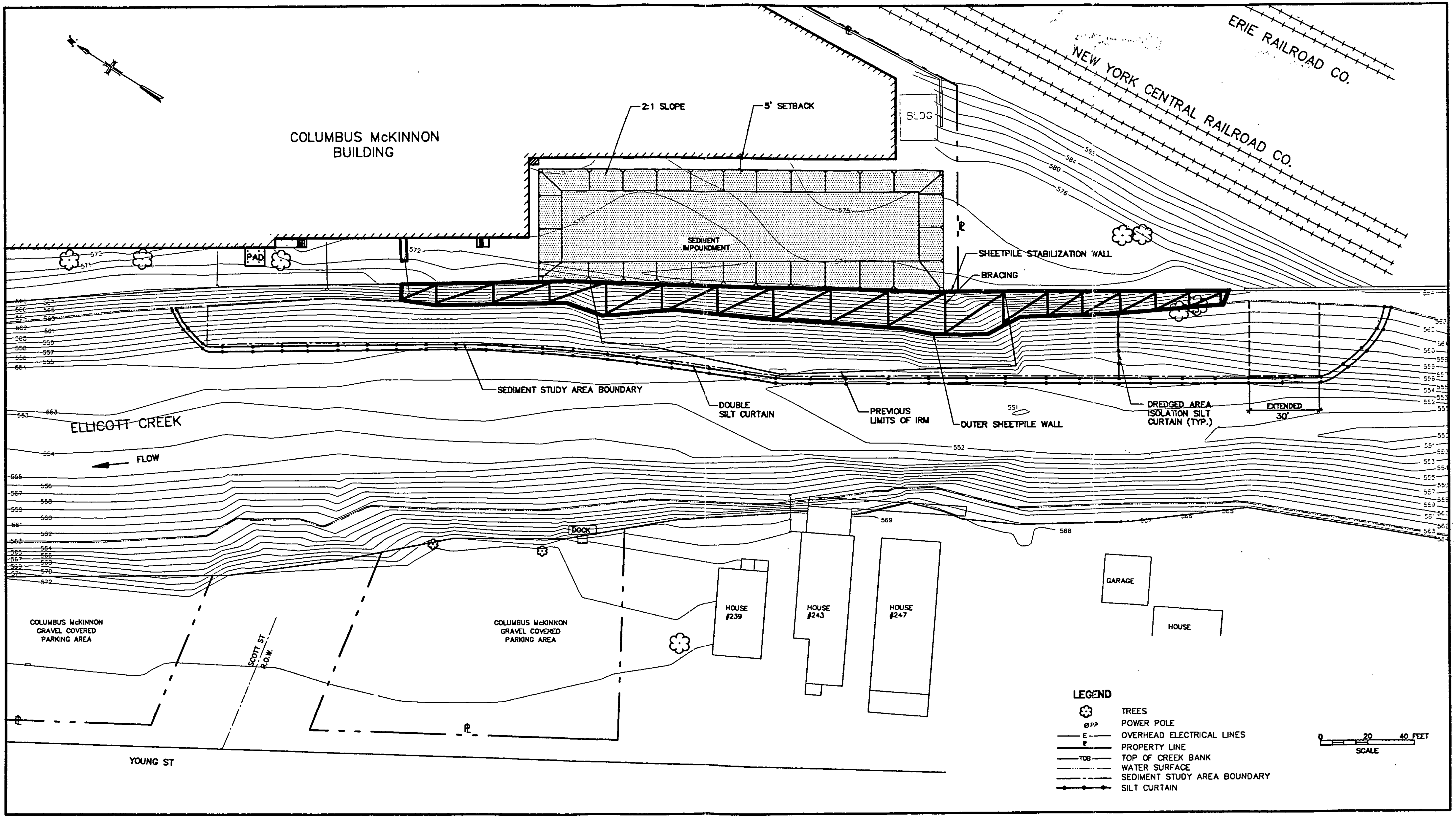
The hydraulic dredge consists of an auger/cutter assembly and submersible pump mounted at the end of a rigid boom arm. The minimum achievable pumping rate of the water/sediment mixture ranges from 600 gpm to 1,000 gpm, depending on the type of dredge utilized. Auger assemblies range in width from 3 feet to 8 feet. The boom arm is nominally 8 feet long, however, lengths up to 30 feet are available. The boom is centrally-mounted between the pontoons of the dredge barge. The auger/cutter assembly dislodges sediments and sweeps the sediments into the pump intake. The pump discharges into a welded PVC pipe which will convey the dredge spoils to the sediment basin. Small hydraulic dredging barges typically range in size from 7.5 feet by 20 feet to 8 feet by 32 feet.

4.3.2 Dredge Methods and Operation

Dredging will be initiated in the upstream portion of the Study Area after installing the silt curtain. The upstream area will be dredged first.

Minimum hydraulic dredging rates are typically 600 to 1,000 gpm. The actual dredge operation schedule will depend on the capacity and performance of the return water treatment system operating in series with the basin and dredge, which will be specified by the contractor. Dredged sediment slurry, which will consist of approximately 5% - 20% solids, will be directed to the basin where most of the suspended sediment will quickly settle out. It is likely that dredging will be conducted for a portion of a 24-hour day (eg., 4 - 8 hours), with treatment of the dewatering basin supernatant being conducted during the

FIGURE 4-1



MALCOLM PIRNIE

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PLAN VIEW OF OUTER SILT CURTAINS
FOR HYDRAULIC DREDGING

COLUMBUS McKINNON CORP.

APRIL 1993

remaining portion of the day, or on a continuous basis. Dredging of the entire extended Study Area is expected to take approximately one week to complete. The entire Study Area will be dredged once.

4.4 SEDIMENT SAMPLING AND VERIFICATION

The cleanup goal for the creek sediments is 1 mg/kg PCBs on a dry weight basis. Thus, to verify conformance with this goal, sampling and analysis of the creek bed sediments will be conducted following dredging. This section describes the sampling and analytical methods which will be employed.

4.4.1 Sample Locations

After the dredging in a portion of the creek Study Area has been completed, a silt curtain will be installed perpendicular to the creek bank to isolate this area and verification sampling of the creek bed sediments will be conducted. The isolated area will be divided into 20-foot long intervals, and at each interval one sample will be collected near the shore, and a second will be collected from a location further out into the creek, as illustrated in Figure 4-2. Each sample will be analyzed separately (viz., not composited) for PCBs.

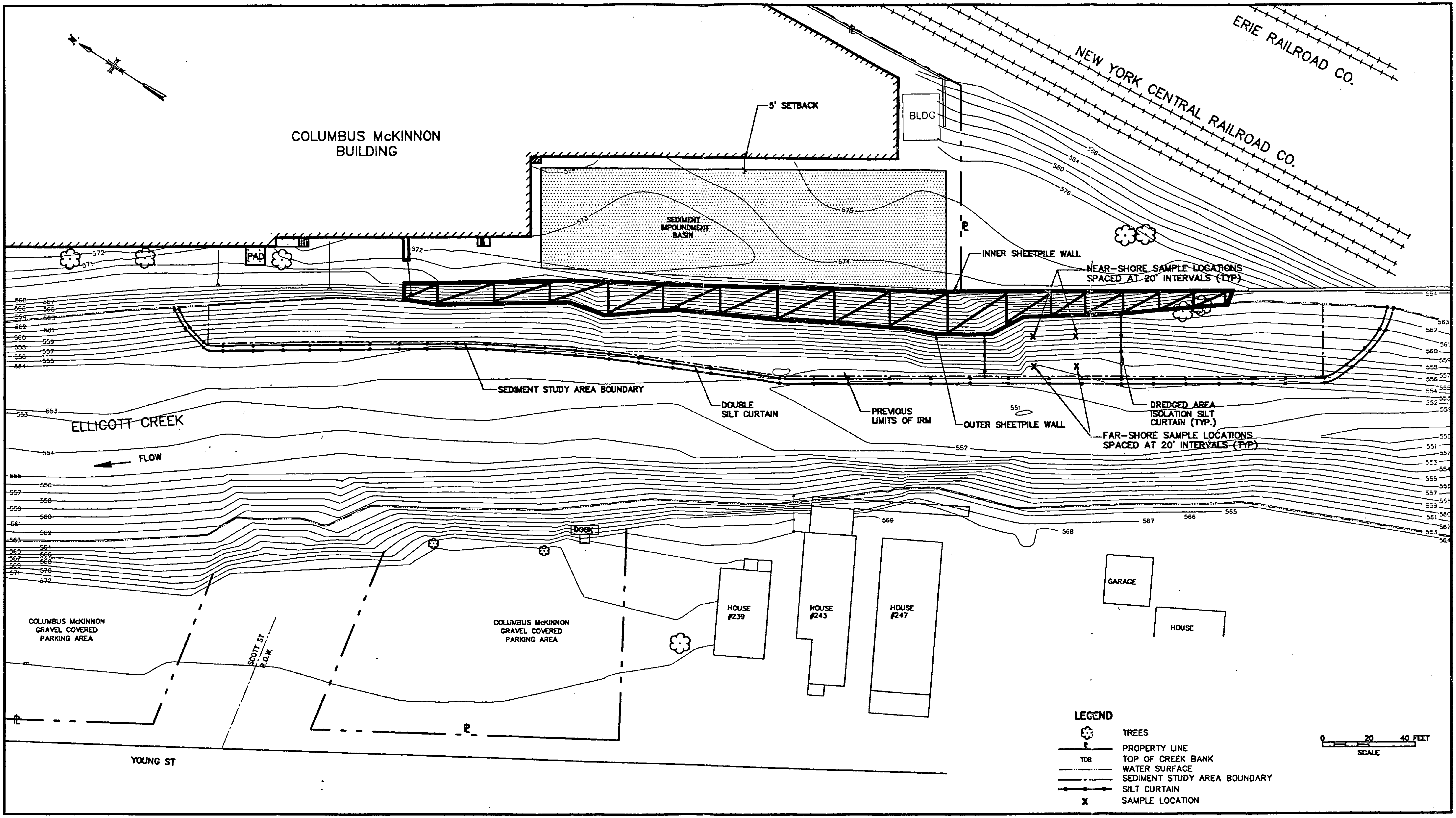
4.4.2 Sample Collection Methodology

Sediment samples will be collected from the creek bed immediately following the termination of the dredging in a given portion of the creek Study Area. The sample locations will be accessed using the dredge barge or a row boat stabilized and positioned with bow and stern lines. A ponar dredge will be used to collect each sediment sample according to the standard operating procedure outlined in Appendix E4. Sample containers will be labelled according to the procedure presented in Appendix E2 and shipped to the laboratory in accordance with the procedure outlined in Appendix E3.

4.4.3 Analytical Methodology and PCB Detection Limits

Sediment samples to be analyzed for PCBs will be tested by a New York State Department of Health ELAP-certified laboratory. Table 4-1 identifies the method, method reference, holding time, preservative and container specifications for PCB analysis of

FIGURE 4-2



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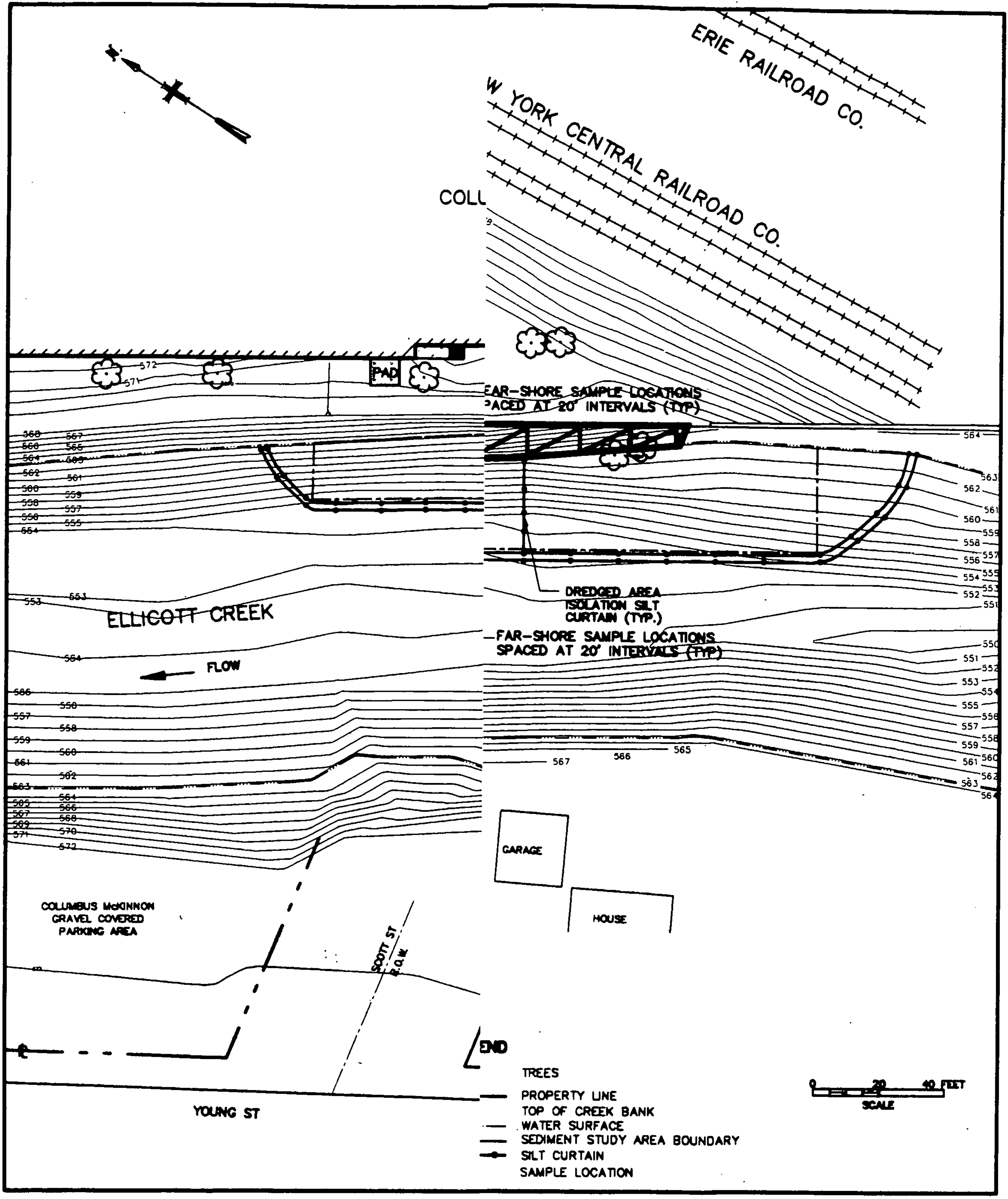
CREEK BED SEDIMENT SAMPLING PLAN

COLUMBUS McKINNON CORP. SEPTEMBER 1993



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CREEK BED SEDIMENT
SAMPLING PLAN

COLUMBUS McKINNON CORP. SEPTEMBER 1993

sediment samples. As indicated in Table 4-1, PCB analyses will be performed using USEPA SW-846 methodology. Because additional dredging may be required based on the results of the verification sampling, 24-hour turnaround of the results will be required. The sample results will be reported on a dry weight basis. The target detection limit will be 0.2 mg/kg on a wet weight basis. This equates to a dry weight detection limit of 1 mg/kg with sediments consisting of 20 percent solids.

4.4.4 Data Interpretation

The specified cleanup goal for the creek sediments is 1 mg/kg PCBs on a dry weight basis. The detection of PCBs at dry weight concentrations equal to or greater than 1 mg/kg in any of the far-shore or near-shore samples within an isolated area will necessitate further dredging and re-sampling until all sediment samples indicate conformance with the cleanup goal in the portion of the Study Area being tested. If one or more near-shore samples and one or more far-shore samples indicate non-conformance with the PCB cleanup goal, that entire portion of the Study Area will be re-dredged and re-sampled until the cleanup goal is achieved. If only one or more of the near-shore samples or one or more of the far-shore samples indicates non-conformance with the PCB cleanup goal, the re-dredging and re-sampling will be limited to the near-shore or far-shore sediments, depending on which samples fail to meet the cleanup goal.

TABLE 4-1

COLUMBUS MCKINNON CORPORATION
REMEDIAL DESIGN REPORT

ANALYTICAL METHODS & PROTOCOLS FOR SEDIMENT VERIFICATION SAMPLING

Parameter	Method	Method Ref.	Maximum Detection Limit	Holding Time	Preservation	Container
PCBs - Sediment	8080	1	0.2 mg/kg	Note 1	Cool to 4°C	1-liter amber glass jar with teflon-lined lid

NOTES:

(1) Samples submitted for PCB analysis shall be extracted within seven (7) days of sample receipt and analyzed within 40 days of extraction. Sample extraction will be performed in accordance with USEPA Method 3550.

METHOD REFERENCES:

(1) USEPA SW-846, Third Edition

5.0 DEWATERING BASIN DESIGN

An earthen sediment dewatering basin will be constructed in the Study Area to dewater dredge spoils generated by the hydraulic dredging of the creek sediments, as illustrated in Figure 5-1. Described in this section are the size and dimensions of the basin, the liner system, the outlet structure, the dewatering process, sediment and debris disposition, and restoration. All dimensions provided in this section are preliminary and are subject to change in the actual design plans.

5.1 GENERAL

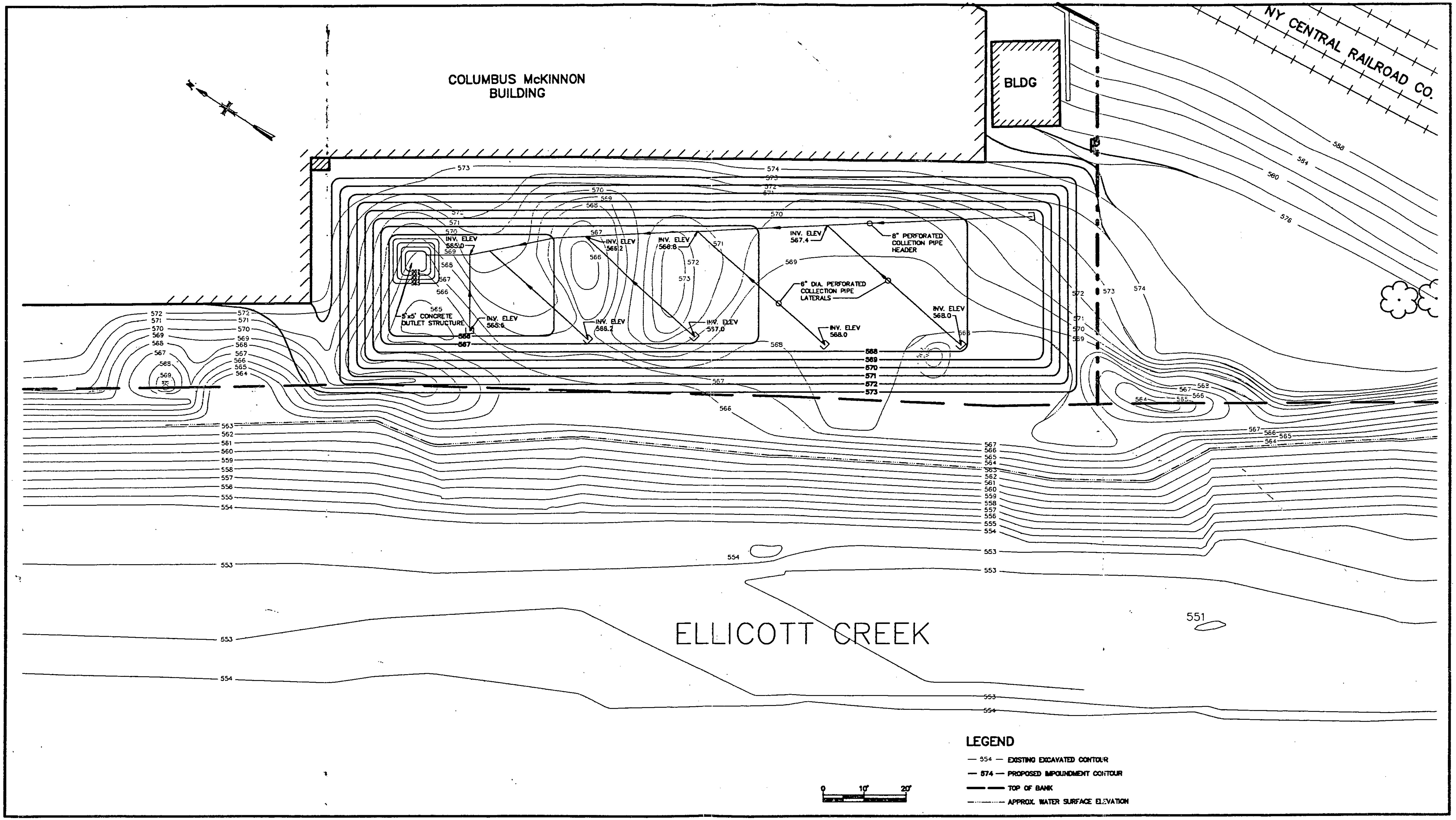
To maximize the area available for the construction of the basin, an existing oil storage building, concrete pad and office portion of the CM facility will be demolished. The basin will be constructed following the excavation of PCB-contaminated Study Area soils according to the contoured excavation plan supplemented with caisson excavations as noted. Excavation of the contaminated soils will create depressed areas which will be graded to form the basin subgrade. Graded soils will be moved to each of the four sides of the basin to create basin walls having a 2:1 slope. The dewatering basin will be lined with a single 40-mil HDPE liner system and equipped with an outlet structure situated in the northeast corner of the basin to collect and discharge accumulated supernatant. Final grade will slope toward the outlet structure.

5.2 SIZE AND DIMENSIONS

The basin will be designed to be the maximum size basin which can be accommodated by the depression created during the excavation step in order to maximize the dewatering basin detention time. This design will minimize the solids loading to the dredge water treatment plant.

The outer dimensions of the basin will be approximately 170 feet by 50 feet, as illustrated in Figure 5-1. The basin will be situated a minimum of 5 feet from CM's south property line and 5 feet from the facility. The maximum depth to the subgrade will be approximately 5 feet. The dimensions of the basin are limited by the extent of soil

FIGURE 5-1



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REMEDIAL DESIGN REPORT

DEWATERING BASIN PLAN VIEW

COLUMBUS McKINNON CORPORATION JUNE 1993

excavation necessary to achieve removal of all soils having PCB contamination at or above 10 mg/kg as well as slope and stability requirements. Given that the walls of the basin will have a 2:1 slope, the dimensions of the bottom of the basin will be approximately 150 feet by 30 feet. The usable volume of the basin is anticipated to be approximately 1,000 cubic yards, or 202,000 gallons with one foot of freeboard.

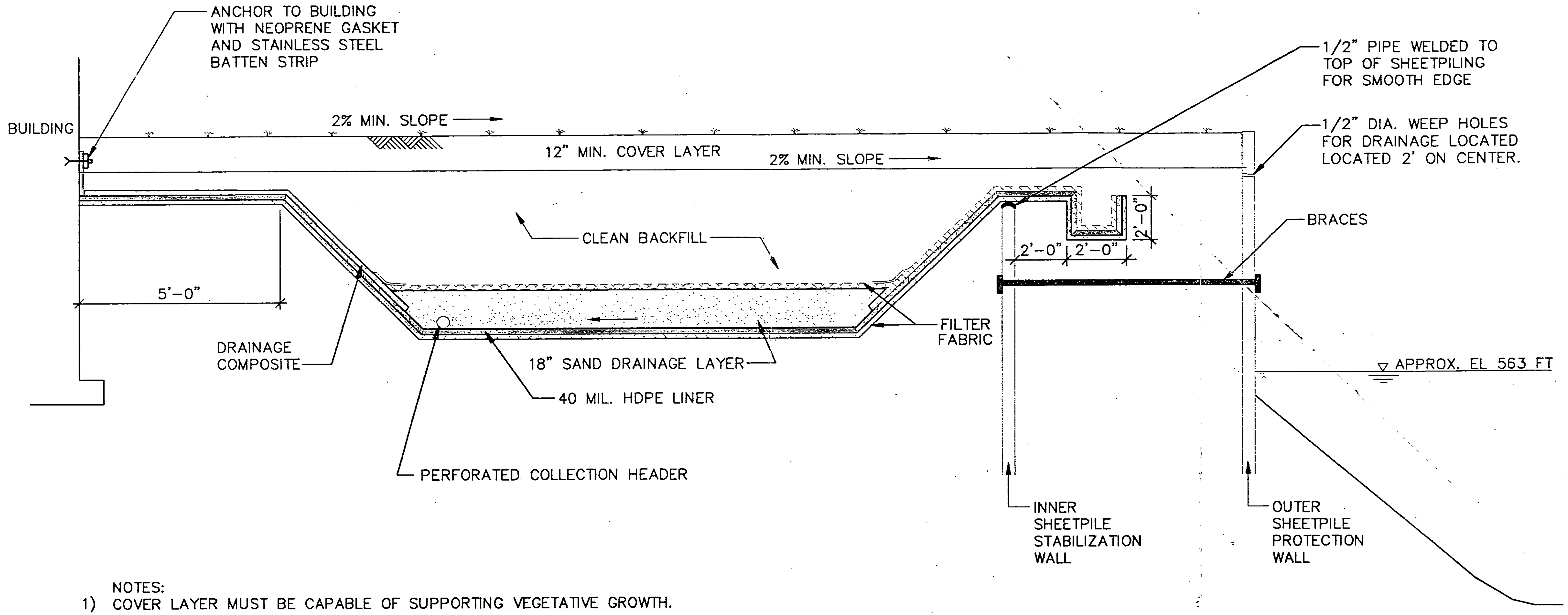
5.3 LINER SYSTEM

The basin will be lined with a single HDPE liner system, illustrated in Figure 5-2. The liner will consist of a 40-mil HDPE layer over a filter fabric layer. The 40-mil HDPE will be overlain by an 18-inch sand drainage layer followed by filter fabric. An underdrain consisting of corrugated, perforated polyethylene collector pipes connected to a corrugated, perforated polyethylene header pipe will be installed within the sand drainage layer and will be sloped toward the header. The pipes will be wrapped with filter fabric to minimize the amount of solids entering the collection system. On the sloped sides of the basin, the sand layer will be replaced with a synthetic drainage media composed of a synthetic drainage grid sandwiched between layers of filter fabric. All other layers (i.e., HDPE and filter-fabric layers) will be continuous.

5.4 OUTLET STRUCTURE

An HDPE or precast concrete outlet structure having an adjustable overflow weir and sump pump will be installed in the northeast corner of the basin. The overflow weir will control the rate of discharge of supernatant from the basin. The outlet structure will also be penetrated by the sand drainage layer header pipe stub to receive water which percolates through the settled sediment and is collected by the sand drainage layer. One wall of the structure will be fitted with an adjustable overflow weir to allow for decanting of the sediment supernatant.

FIGURE 5-2



NOTES:

1) COVER LAYER MUST BE CAPABLE OF SUPPORTING VEGETATIVE GROWTH.
2) LINER, DRAINAGE LAYER & SEDIMENT TO BE REMOVED FOLLOWING SEDIMENT DEWATERING OPERATION AND DEPRESSION BACKFILLED WITH CLEAN MATERIAL.

NOT TO SCALE

TONAWANDA FACILITY

DEWATERING BASIN LINER SYSTEM

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JUNE 1993

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5.5 SUMP PUMP

The sizing and design of the sump pump will depend upon the rate at which the dewatering basin supernatant will be treated. The treatment rate, and thus the sump pump sizing and design, will be determined by the remediation contractor.

5.6 DEWATERING

Following the completion of the dredging operation and supernatant treatment, the solids remaining in the sediment basin will be allowed to dewater by gravity under quiescent conditions. Additional water collected through the drainage system will be treated prior to discharge to the creek, until no standing water remains over the sediments in the basin at this point. Following dewatering of the sediments to the point that they are acceptable for secure landfill disposal, the contractor will excavate the sediments and place them in roll-off boxes for off-site disposal.

5.7 RESTORATION

Following dewatering and excavation of the dredge spoils, the contractor will decommission the basin by placing the basin liner, drainage system and outlet structure in roll-off boxes for off-site disposal in a TSCA/RCRA-permitted landfill. The basin subgrade will then be re-sampled according to the procedure presented below and the depression will be backfilled with clean fill, including riprap from the former creek bank stabilization and excavated soils which meet the PCB cleanup goal of 10 mg/kg. The fill will be graded and compacted to design specifications, and a minimum of one foot of clean soils capable of supporting vegetative growth will be placed over the Study Area. The cover soils will then be seeded to promote vegetation and prevent surface erosion.

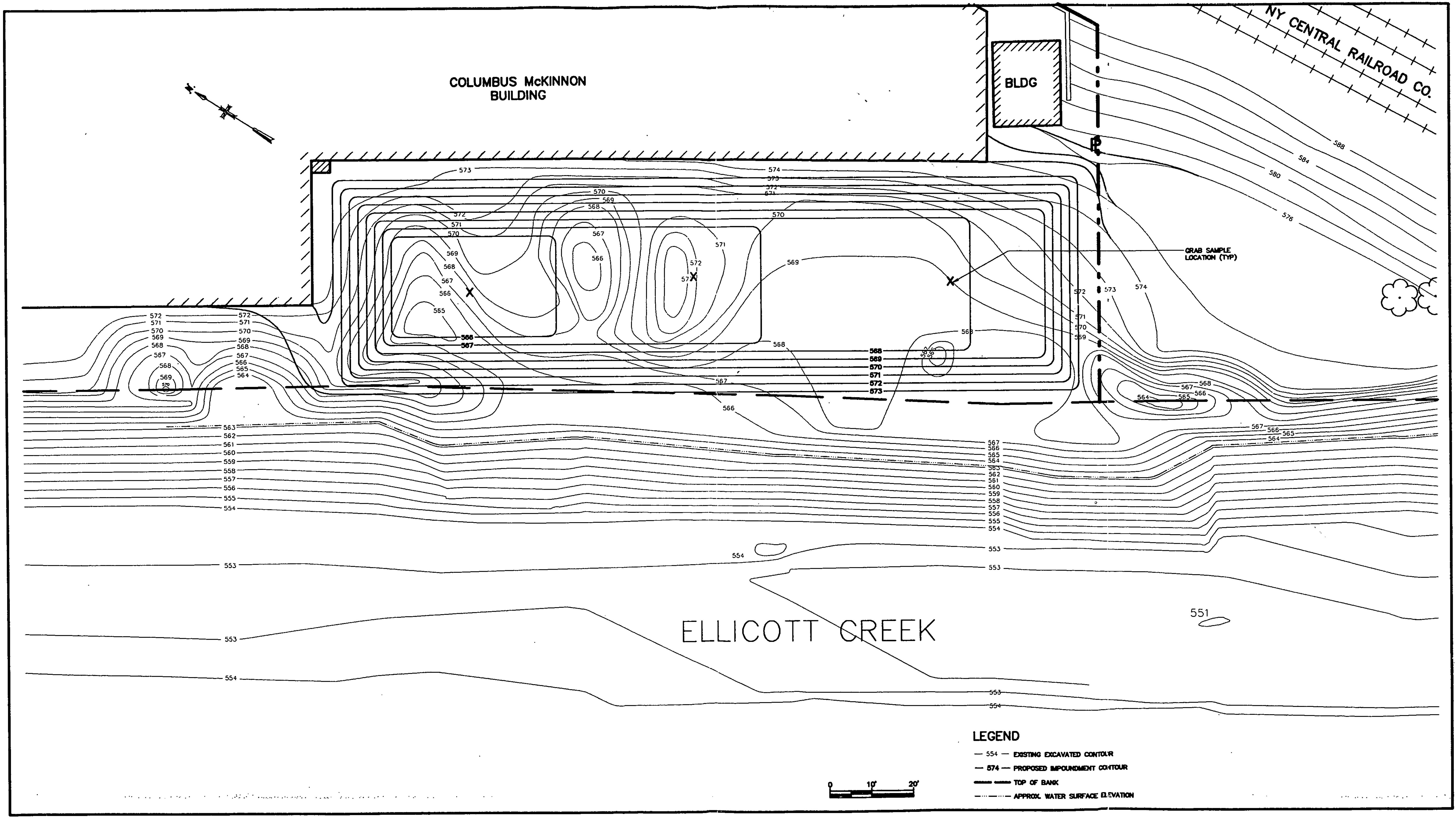
As indicated in Section 3.1.2, existing groundwater monitoring wells in the Study Area will be decommissioned during soils excavation activities. Since all PCB-contaminated soils above the cleanup goal will have been removed from the Study Area (as validated through the Verification Sampling Plan), no post-remedial monitoring will be conducted following restoration of the Study Area.

5.7.1 Verification Sampling

Following removal of the basin liner and dewatering layers, the underlying soils will be sampled to ensure that no leakage of PCB-contaminated water or sediment occurred from the basin that resulted in exceedance of the soil cleanup goal in the subgrade. If visual evidence of leakage (e.g., soil staining) is present, three (3) separate grab samples will be collected within the area believed to be contaminated and analyzed for PCBs. If no evidence of leakage exists, the grab samples will be collected across the bottom of the impoundment as illustrated in Figure 5-3. All grab samples will be collected from a depth of zero to 6 inches below ground surface using a stainless steel trowel. The trowel will be cleaned between sample locations using a non-phosphate soap and deionized water.

Each grab sample will be analyzed by an independent, NYSDOH-approved laboratory in accordance with the methodology prescribed in Section 3.2.2. If the samples indicate PCB concentrations less than 10 mg/kg, the underlying soils will be in conformance with the cleanup goal and no additional soil excavation will be necessary. If any of the samples indicate PCB concentrations equal to or above 10 mg/kg, an additional 6 inches of soil will be excavated in the vicinity of the sample(s) not meeting the cleanup goal and the soils will be re-tested.

FIGURE 5-3



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REMEDIAL DESIGN REPORT

DEWATERING BASIN SAMPLING PLAN

COLUMBUS McKINNON CORP. SEPTEMBER 1993

6.0 DREDGE RETURN WATER TREATMENT SYSTEM

6.1 GENERAL

As indicated in Section 2.0, the remedial construction contractor will have ultimate responsibility for the design and operation of the dredge return water treatment plant. A performance specification will be prepared as part of the design package which will delineate the requirements of the treatment system, including: solids handling; minimum effluent quality; operator attention; and coordination with the dredging operation to ensure impoundment and treatment plant hydraulic capacity limits are not exceeded. Additional information pertinent to the design of the treatment system will be provided in the bid package, including design criteria (see Section 6.2), the proposed treatment plant location plan and electrical power availability.

Dredge water will be pumped to the treatment plant from the basin outlet structure. Both supernatant and water which migrates through the basin sand drainage layer will supply the outlet well; however, supernatant will be the primary feed source. The treated water will be returned to Ellicott Creek within the confines of the silt curtain. The frequency and duration of treatment system use will be the primary feed source. The treated water will be returned to Ellicott Creek within the confines of the silt curtain. The frequency and duration of treatment system use will depend on the hydraulic dredge operation. Treatment system effluent monitoring will be conducted to demonstrate compliance with the performance specification and any additional NYSDEC Division of Water effluent quality requirements. The treatment system will remain operative through the dewatering step.

6.2 DESIGN CRITERIA

The bench-scale treatability study results presented in Section 2.0 will be referenced in the performance specification for the contractor's use in designing the treatment system. These results ill include jar test supernatant TSS concentration with time, sieve and hydrometer test results (for supernatant particle size determination), and soluble and insoluble PCB distribution in the jar test supernatant. The usable volume of the dewatering basin will be limited by the extent of soil excavation necessary to achieve removal of all soils having PCB contamination at or above 10 mg/kg as well as slope and stability requirements. As discussed in Section 5.0, the capacity of the empty basin is anticipated to be approximately 1,000 cubic yards. Based on the anticipated removal of 450 cubic yards of sediment from the creek, however, the capacity of the basin near the end of the dredging task will be approximately 550 cubic yards.

The data collected from the bench-scale treatability test indicated that greater than 97% of the PCBs are associated with the settled sediment particles. Therefore, the treatment scheme will require physical separation treatment to effect solids removal followed by physical or chemical treatment to remove the remaining soluble PCBs (if any). Several unit processes may be considered appropriate from each treatment requirement. The contractor will be required to submit shop drawings for the Engineer's review for his recommended treatment process which employ these minimum treatment technologies.

6.3 PERFORMANCE AND OPERATION CRITERIA

The contractor will be responsible for compliance with certain minimum treatment system performance and operation criteria. These criteria will be incorporated into the performance specification and will include the following:

- The treatment system will be designed, constructed, started, operated and decommissioned by the remedial construction contractor. The remedial contractor shall coordinate the design, construction, and start-up of the treatment system with the owner (CM) and with all other project tasks in every way required to assure satisfactory, expeditious completion of the project within the contract time.
- The remedial construction contractor will ensure that the equipment will perform the service for which it is intended and designed, and should it fail to do so, will modify or replace the treatment units at no cost to the owner.
- Materials used in the treatment system shall be tested in accordance with and certified to conform to the applicable ASTM specifications.
- Defective material shall not be repaired and used in the construction of the treatment system without prior approval of the owner.

- The treatment system will be operated in accordance with all applicable Federal, State and local rules and regulations, including the Occupational Safety and Health Act of 1970.

- The treatment system will be manned on a full-time basis during operation by a qualified operator familiar with the treatment units and experienced in such applications.

- The treatment will be fitted with an emergency shut-off switch that, upon activation, will de-energize all feed pumps, treatment equipment, discharge pumps and ancillary equipment.

- The treatment system will be fitted with sample ports located ahead of all major treatment units to allow for efficiency sampling of these units.

- The treatment system will be fitted with a real-time flowmeter with totalizer.

- Treatment system effluent will be discharged to Ellicott Creek within the confines of a silt curtain. The effluent will meet the requirements discussed in Section 6.5.

6.4 TREATMENT SYSTEM RESIDUALS

All sediment-based solids generated as a result of treatment of the basin supernatant will be deposited in the basin at completion of the treatment process. This includes any media backwash, such as sand media or synthetic filter media, which contains creek sediment. Activated carbon will be deposited in the basin as well.

6.5 DREDGE RETURN WATER SAMPLING AND VERIFICATION

The effluent from the treatment plant will be sampled to ensure compliance with NYSDEC Division of Water requirements regardless of the type of treatment system selected by the remedial contractor. Copies of all analytical reports related to the sampling will be transmitted to NYSDEC as they are received. This section describes the sampling and analytical methods which will be employed.

6.5.1 Sample Locations

Grab samples will be collected from the treated effluent on a daily basis during operation of the return water treatment plant. The samples will be collected from an effluent sample port provided by the contractor, and will be representative of the final effluent water quality at the point of discharge to Ellicott Creek.

6.5.2 Sample Methodology

One (1) grab sample will be collected from the effluent monitoring station on each day of treatment plant operation. The sample will be collected during normal treatment plant operating conditions by filling the laboratory-supplied sample collection jar from the effluent sample port.

The collected sample will be labeled and shipped to the analytical laboratory. SOPs to be followed for sample labeling and shipping are presented in Appendices E3 and E4, respectively.

6.5.3 Analytical Methodology/Detection Limits

Aqueous samples will be analyzed for PCBs by a New York State Department of Health ELAP-certified laboratory. Table 6-1 identifies the method, method reference, holding time, preservative and container specifications for PCB analysis of aqueous process outfall samples. As indicated in Table 6-1, PCB analyses will be performed using USEPA Methodology as published in 40 CFR Part 136 methodology. As continued operation of the treatment plant will be based on the results of the verification sampling, 24-hour turnaround of the results will be required. The target analytical detection limit will be 0.065 ug/l.

6.5.4 Data Interpretation

The effluent return water quality limit for PCBs will be less than 65 parts per trillion (i.e., non-detectable concentrations) as determined using the methodology specified in Table 6-1. The analytical laboratory will make every effort to attain the maximum detection limit of 65 parts per trillion; however, the detection limit is highly matrix-dependent and, therefore, may not be achievable. The detection of PCBs at concentrations greater than the 65 ppt detection limit for each grab sample analyzed will require cessation of the treatment plant discharge to Ellicott Creek until corrective measures are taken. Treatment plant effluent will be recycled back to the sediment dewatering basin until analytical testing indicates conformance with the discharge limits.

TABLE 6-1

COLUMBUS MCKINNON CORPORATION
REMEDIAL DESIGN REPORT

ANALYTICAL METHODS & PROTOCOLS FOR DREDGE RETURN WATER VERIFICATION SAMPLING

Parameter	Method	Method Ref.	Maximum Detection Limit	Holding Time	Preservation	Container
PCBs - Aqueous	608	1	0.065 ug/l	Note 1	Cool to 4°C	Four 1-liter amber glass jars with teflon-lined lids

NOTES:

(1) Samples submitted for PCB analysis shall be extracted within seven (7) days of sample receipt and analyzed within 40 days of extraction. Sample extraction will be performed in accordance with USEPA Method 3510.

METHOD REFERENCES:

(1) Method 608 - Guidelines Establishing Test Procedures for the Analysis of Pollutants under the Clean Water Act, 40 CFR Part 136, October 1984.

7.0 CONTRACT DOCUMENTS

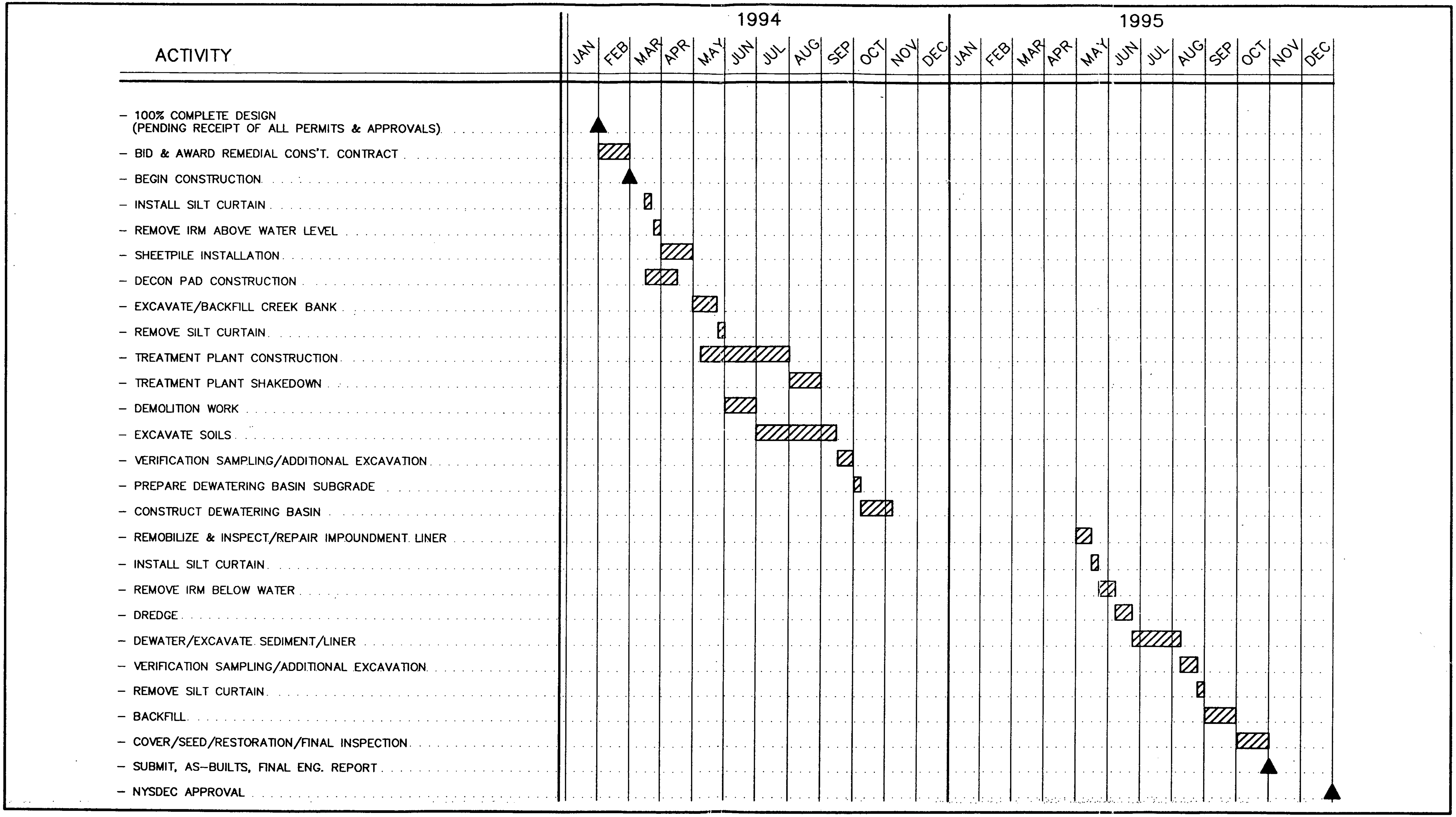
Separate contract documents will be prepared for the remedial construction and the transport/disposal of contaminated materials. The contract documents will consist of engineering plans, a construction contract and technical specifications, all of which will be signed and sealed by a Professional Engineer licensed in New York State. The design plans will be 24"x 36" mylar based drawings. All specifications will be prepared in CSI format.

Solicitation of bidders will be on an invitation basis. The Engineer shall recommend to Columbus McKinnon Corporation a list of not less than five qualified bidders to invite to bid for the on-site remedial work and the transport/disposal work, respectively; and shall advise Columbus McKinnon regarding the quality of bids submitted by the invitees. Award of the final contracts shall be made by Columbus McKinnon Corporation.

8.0 REMEDIAL CONSTRUCTION SCHEDULE

A tentative schedule for the remedial construction activities is presented as Figure 8-1. Design documents cannot be finalized and construction contracts cannot be awarded, however, until the following permits and approvals are received:

- Written permission from Conrail Corp. to perform work on its property.
- An individual or National permit from the U.S. Army Corps of Engineers (33 CFR 330.5) and NYSDEC (Section 401 (a)(1) of the Clean Water Act of 1977) to perform work in Ellicott Creek is secured (this permit has already been issued).
- A building permit as required by the City of Tonawanda is secured.
- NYSDEC approval of discharge of dredge return treatment plant effluent to Ellicott Creek.



COL-01-RE2

TONAWANDA FACILITY

REMEDIATION CONSTRUCTION SCHEDULE

COLUMBUS McKINNON CORP. SEPTEMBER 1993

all entries. Information to be recorded in the Field Book should include:

- name and location of project site, and appropriate project job number;
- listing of key project, client and agency personnel and telephone numbers;
- (on a daily basis) date and time of arrival and departure, name of person keeping the log, names and affiliation of persons on site (purpose of visit if applicable), weather conditions, outline of project activities to be completed;
- details of any variations to the procedures/protocols presented in the Work Plan or Field Operations Plans and basis for the changes;
- all field generated data relating to implementation of the field program including sample locations, sample descriptions, field measurements, instrument calibration, etc.; and
- a record of all photographs taken in the field which includes date, time, photographed by, site location and orientation, sequential number of photograph and roll number.

Upon completion of the site activities, the Field Book should be placed in the project files.

4.0 EQUIPMENT REQUIREMENTS

- wooden stakes
- hammer
- personal protective garment and gear (if applicable)

GEOTECHNICAL LABORATORY TEST PROCEDURES

MALCOLM PIRNIE
RAW SEDIMENT SAMPLE
File No. 6032.00

1. The following tests were performed with the noted ASTM test designation:

TEST	ASTM DESIGNATION
Grain Size Analysis	D 422-63 (see Item 2)

2. Test Procedures for Combined Sieve and Hydrometer Analysis

When both sieve and hydrometer analyses are required a combined mechanical analysis is performed. The sample was prepared using Procedure B of ASTM D 2217-85 (wet preparation of soil sample for grain-size analysis and determination of soil constants).

The hydrometer analysis was performed in accordance with ASTM D 422-63. Additional hydrometer readings were obtained at requested time intervals.

Two grain-size curves were plotted. Sample 01253-1 was derived using the readings obtained at the standard time intervals. The data obtained at the requested time intervals were plotted as sample 01253-1A.

APPENDIX A

TREATABILITY STUDY WORK PLAN

COLUMBUS MCKINNON SITE
DREDGE SPOILS TREATABILITY STUDY

1.0 STUDY OBJECTIVES

The New York State Department of Environmental Conservation's (NYSDEC's) Record of Decision (ROD) for the Columbus McKinnon site states that hydraulic dredging of sediments in Ellicott Creek within the confines of the Study Area depicted on Plate No. 1 will be performed as part of the remediation of the site. The dredged sediments will be directed to a lined earthen impoundment constructed on-site for dewatering. A treatment system will be constructed on-site to remove PCBs from the dredge water generated from the sediment dewatering process prior to its return to Ellicott Creek. To collect the information needed to determine the proper handling and disposal of the dredged spoils, this study has been designed to achieve two primary objectives:

- establish the settling characteristics of the dredge spoils to select the most appropriate treatment train; and
- to establish the proportion of the total PCBs of dredged spoils that are associated with the material that will remain in the impoundment in order to determine the most appropriate final disposition of the dewatered dredged spoils.

2.0 TREATABILITY TESTING PLAN

2.1 INTRODUCTION

PCBs have an affinity for adsorbing to the clay and silt fraction of a sediment matrix. If a sediment matrix consisting of sands, gravel, clays and silts is mixed with water under turbulent conditions such as those resulting from hydraulic dredging and then allowed to settle, the clay and silt fraction typically remains suspended or settles at a much slower rate than the sand and gravel fraction. Thus, the majority of the PCBs will be suspended with the clay and silts. As discussed in Section 1.0, this phenomena will impact the approach to the dredged sediment dewatering portion of the remediation at the Columbus McKinnon Corporation site due to the following:

- the sizing and selection of the water treatment equipment will be impacted by the quantity and size of particles remaining in the aqueous phase of the impoundment as well as the PCB content of the suspended solids; and
- the PCB concentration of the sediments remaining in the impoundment will dictate the final disposition of this material.

The treatability study will provide the data on which to address these design issues. The general treatability study approach is discussed in Section 2.2. Details of the specific elements of the study are presented in Sections 2.2.1 through 2.2.3.

2.2 GENERAL APPROACH

The first step in the treatability testing will involve collection of sediment and water from Ellicott Creek near the Columbus McKinnon Corp. Study Area to obtain a sediment/water mix representative of that which will be produced by the hydraulic dredge. In general, a hydraulic dredge collecting relatively shallow depths of sediment will remove approximately 1 part sediment for every 9 parts of water, or a 10% sediment solution. Therefore, the initial step in the test will be to collect sediment and water samples from Ellicott Creek and make approximately 9 1-liter samples of 10% sediment solution. Although it is unlikely that the collected sediments will be contaminated with a significant quantity of PCBs, one (1) non-diluted sediment composite will be analyzed for PCBs to provide a baseline sediment PCB concentration.

Nine (9) of the prepared 10% sediment samples will be spiked to a total sample concentration of 10 ppm PCB-1254. One sample will be analyzed following completion of the spiking procedure to determine whether adequate adsorption of PCBs onto sediment was achieved. The remaining eight samples will be used to establish the settling characteristics of the dredge spoils. Following spiking, the eight samples will be mixed in a jar test apparatus and allowed to settle at varying durations up to 10 hours. At the appropriate settling time, a portion of the supernatant from each jar will be measured for total suspended solids. The remaining portion of the supernatant will be filtered and the filtrate will be analyzed for PCBs to determine the concentration of soluble PCBs. The solids retained on the filter will be analyzed for PCB content, as will the settled solids. The moisture content of the settled solids will be determined such that the PCB concentrations can be reported on a dry weight basis. From these data, the optimum settling time for treatment will be determined (i.e., the settling time which corresponds to the maximum proportion of PCBs in the supernatant with the lowest TSS). A gain size and hydrometer analysis of the raw sediment will be performed to generate particle size distribution information. Hydrometer readings will be taken at the optimum settling time as well as ASTM-established time intervals.

2.2.1 Jar Testing With Spiked Samples

The procedure for jar testing the spiked samples is presented below. These samples have been spiked with PCBs, which are suspected carcinogens. Appropriate health and safety precautions must be adhered to during the handling of these samples.

1. Place the first four beakers containing the spiked sediment solutions under the jar test apparatus and lower the mixing paddles into the beakers. Initiate mixing at 75 RPM for approximately 2 minutes.

2. Stop the mixing and remove the paddles from the samples. Using a stopwatch, record the height of the apparent sediment/water interface at T=30 seconds, 1 min., 1.5 min, 2.0 min, 3.0 min, 5.0 min and 10.0 min.

3. Decant the supernatant from the first four beakers using a mini-peristaltic pump fitted with tygon tubing at the following time intervals (stop-mix time is T=0): Beaker 1 - 1.5 minutes; Beaker 2 - 3 minutes; Beaker 3 - 5 minutes; Beaker 4 - 10 min. Use new tubing for each sample. Record the height of sample remaining in the beaker and the height of the apparent sediment/water interface after drawing off the supernatant.

4. Transfer 100 mls of decanted supernatant from each beaker into separate beakers for TSS analysis. Transfer the remaining supernatant into a clean, 1-liter amber glass bottles for analysis. Cross-reference the bottle label with the corresponding initial sample sediment weight. This sample will be filtered and the filtrate will be analyzed to determine the soluble PCB concentration. The solids retained on the filter also will be analyzed for PCB content. The PCBs targeted for analysis will be determined based on the results of the initial PCB screening of the non-diluted sediment composite.

5. Perform a TSS analysis on the supernatant samples in accordance with the procedure presented in Appendix A4.

6. Transfer the settled sediment to a clean, 1-liter amber glass bottle for analysis of PCBs and moisture content. Cross-reference the bottle label with the corresponding initial sample sediment weight.

7. Repeat the procedure above for the remaining 4 spiked samples. The time to extraction of supernatant, however, will be as follows: Beaker 5 - 20 minutes; Beaker 6 - 1 hour; Beaker 7 - 3 hours; Beaker 8 - 10 hours. Record the sediment/water interface levels on a 30-minute basis following decanting the Beaker 5 sample.

8. Transfer all supernatant and sediment samples to the laboratory in accordance with the procedure identified in Section 3.2.1

2.2.2 PCB Data Analysis

PCB concentration data obtained from the laboratory for the supernatant will be statistically normalized on the basis of the initial sediment mass. This will allow for correction of data variability associated with elevated PCB concentrations in those samples which contained less sediment (i.e., less surface area for PCB adsorption). The PCB and TSS data will be plotted against settling time for both the supernatant and the settled solids to determine the relationship among these parameters. An economic and technical feasibility assessment of the impoundment design will then be formulated on the basis of this data. In addition, an estimate can be made as to the PCB content of the dredge spoils which settle in the impoundment. This information will aid in determining the options for the final disposition of this material.

2.2.3 Particle Size Analysis

Upon completion of the PCB data evaluation discussed in Section 3.2.3, an optimum sediment settling time will be selected. This selection will provide the basis for completion of the particle size analysis to determine the anticipated mass loading and the suspended particle size distribution in the supernatant to be treated on-site. This information will be particularly helpful in selecting and sizing the proper particulate/PCB treatment equipment. The particle analysis will include both a sieve analysis to yield the weight percent of gravel, sand and fines; and a hydrometer analysis to yield the percent by weight of silt and clay. The results of these analyses will yield the particle size distribution of the solids remaining in solution at the optimum settling time. The procedure to be followed is presented below.

Sieve Analysis (ASTM D421, D422)

1. Oven dry a representative sample of the raw sediment for at least 16 hours.
2. Soak the oven-dried sample and wash through a #200 sieve (75 micron).
3. Oven dry the material retained on the #200 sieve and pass through a nest of sieves to yield percent by weight of gravel, sand and fines.

Hydrometer Analysis (ASTM D421, D422)

1. Air dry a representative sample of the raw sediment and pass through #10 sieve.
2. Obtain the moisture content of the air-dried sample.
3. Mix 50 grams of the dried sample with 125 mL of sodium hexametaphosphate and soak for 16 hours.
4. Shake the sample and place in a graduated cylinder. Take hydrometer readings at ASTM-specified intervals (2, 5, 15, 30, 60, 250, and 1440 minutes), jar test sampling intervals (1.5, 3, 5, 10, 20, 60, 180, and 600 minutes), and at the optimized settling time determined from the jar testing.
5. Calculate percent by weight of material in suspension and particle size for each reading.

3.0 SAMPLING AND ANALYSIS METHODOLOGY

3.1 SAMPLE COLLECTION

The bench-scale study will require physical and chemical testing of sediment samples. Based on the protocol presented in Section 2.0, it is estimated that approximately 5 liters of sediment representative of the characteristics of the segment of Ellicott Creek adjacent to Columbus McKinnon will need to be collected as well as 50 liters (13 gallons) of Creek water to mimic the hydraulic dredge dilution. Sediments will be collected adjacent to the Columbus McKinnon RI sediment study area as shown in Plate 1.

The sediments will be collected from a boat using a ponar dredge in accordance with the procedure outlined in Appendix A1. Sediment grab samples from the ponar dredge will be composited in a stainless steel bowl before being containerized in the bulk sample collection container (see Section 3.2.1). To obtain a representative composite of the sediments, a minimum of five (5) grab samples should be obtained across the length of the study area (i.e., one sample each near the upstream and downstream limits of the study area, and three samples in-between). River water may be collected from the side of the boat in the sediment sample collection area using a glass jar or stainless steel pitcher. For safety reasons, the sampling program will not be performed during periods of high river flow or during severe weather.

3.2 SAMPLE HANDLING AND ANALYTICAL METHODOLOGY

3.2.1 Sample Handling

Bulk sediment samples to be collected from Ellicott Creek may be composited into a 2-gallon (10 liter) glass pickle jar fitted with a teflon-lined lid. Creek water also will be composited into 2-gallon glass pickle jars fitted with teflon-lined lids (approximately seven jars will be required). The sediment and water jars will be transported to the analytical laboratory in accordance with the sample handling procedures presented in Appendices A2 and A3.

Upon arrival at the analytical laboratory, the moisture content and PCB concentration of the undiluted sediment will be determined. The results of these analyses will be required prior to initiating the jar test procedure to determine which PCB species should be targeted for analysis in the jar test samples. Approximately nine (9) 10% sediment solutions will be prepared at the analytical laboratory by mixing 1 part sediment and 9 parts creek water by volume in 2-liter beakers. A 1 to 2 ml aliquot will be removed from each of the twelve solutions and the total solids concentrations will be determined. Nine of the prepared samples will be spiked with PCB-1254 in accordance with the procedure presented in Section 3.3. The laboratory will be provided with written instructions as to the desired spike concentration for each sample and the spike concentration labeling procedure to be followed. The spiked samples will be refrigerated when not in use.

Following treatability testing, sediment and supernatant samples to be analyzed for PCBs will be placed in separate, precleaned, amber glass jars with teflon-lined caps and stored at 4°C to await analysis.

Raw sediment to be analyzed for particle size distribution and solids content (i.e., particle size analysis) will be stored at 4°C to await analysis and transported to the testing lab in amber glass jars fitted with teflon-lined lids.

3.2.2 Analytical Methodology/Protocol

Sediment and supernatant samples to be analyzed for PCBs will be tested by a New York State Department of Health (NYSDOH) ELAP-certified laboratory. Table 3-1 identifies the method, method reference, holding time, preservative, and container specifications for PCB analysis of sediment and water samples. As indicated in Table 3-1, PCB analyses will be performed using USEPA SW-846 methodology. Samples submitted for PCB analysis must be extracted within seven (7) days of sample receipt and analyzed within 40 days of extraction. Accordingly, it will be necessary to perform the treatability testing immediately after spiking the samples to ensure that extraction of treated sediment/supernatant can be performed within 7 days of spiking.

Samples for particle size will be analyzed in accordance with procedures outlined in "Annual Book of ASTM Standards, Section 4, 1992."

3.3 SAMPLE SPIKING

A minimum of nine (9) samples will be spiked with PCB-1254 to a total PCB spike concentration in the sample of 10 mg/kg. Since PCBs adhere to sediments (which will represent approximately 1/10 of the total volume of the prepared sample), the PCB concentration in the sediments will be approximately 100 mg/kg. The laboratory's in-house PCB-1254 stock (5,000 ppm) will be used as the spiking solution for QC analyses. Four (4) mls of PCB-1254 spiking solution will be added to the 2-liter beaker containing the prepared sample, and the sample will be placed on the jar test apparatus and mixed at low speed for 18 hours to ensure true PCB contact with all fractions of the sample matrix. The sample spiking will be performed by the same NYSDOH ELAP-certified laboratory selected to perform the chemical analysis of the treated sediment and supernatant samples.

One spiked sample will be analyzed for PCB content immediately upon termination of the mixing procedure to ensure that adequate transfer of PCB-1254 to the solid phase has occurred. Same-say turnaround of the analysis of this sample will be required. Additional

TABLE 3-1

COLUMBUS McKINNON SITE
SEDIMENT DISPOSITION TREATABILITY STUDY
ANALYTICAL METHODS & PROTOCOLS FOR

SEDIMENT AND SUPERNATANT TESTING

Parameter	Method	Method Ref.	Maximum Detect Limit	Holding Time	Preservation	Container
PCBs - Aqueous	8080	1	1 ug/L	Note 2	Cool to 4°C	1-liter amber glass jar with teflon-lined lid
PCBs - Sediment	8080	1	Note 1	Note 2	Cool to 4°C	1-liter amber glass jar with teflon-lined lid
Particle Size Dist.	ASTM 422	2				1-liter amber glass jar with teflon-lined lid

NOTES:

(1) Detection Limit is calculated from the minimum detectable GC response being equal to 5 times the GC background noise, assuming a 10-ml final volume of a one liter liquid extract, and assuming a GC injection of 5-ml. The laboratory shall document the detection limit achieved as well as all sample cleanups and provisions taken to achieve the minimum detection limit.

(2) Samples submitted for PCB analysis shall be extracted within seven (7) days of sample receipt and analyzed within 40 days of extraction.

METHOD REFERENCES:

1) USEPA SW-846, Third Edition

2) Annual Book of ASTM Standards, Section 4, 1992.

mixing of the samples will be required prior to initiating the jar test procedure if adequate transference has not occurred.

3.4 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

In order to provide information on the integrity and validity of the analytical data obtained from the laboratory, the following QA/QC samples will be analyzed with each group and matrix (i.e., sediment and water) of samples sent to the laboratory for PCB analysis:

- method blank;
- surrogate spike; and
- matrix spike blank

Matrix spikes and matrix spike duplicates will not be performed due to the limited quantity of sample which will be available for analysis following the treatability test. A matrix spike blank will be analyzed in lieu of these QC samples.

In addition to reporting analytical results for these QC samples, the laboratory shall also report the following information for each sample:

- date collected;
- date extracted or digested;
- date analyzed;
- method for sample preparation;
- analytical methodology
- method for sample cleanup (if used);
- method detection limits;
- instrument detection limits;
- sample dilution factor; and
- a case narrative including a discussion of all QC problems and corrective action taken.

The laboratory selected to perform the PCB spiking and analysis will be an NYSDOH ELAP-approved laboratory certified for the analysis of PCBs.

Appendix A: Item 1 - PROCEDURE FOR COLLECTION OF BOTTOM SEDIMENT SAMPLES IN DEEP WATER

Applicability: GENERAL Revision No.: 1 Date: 11/9/89

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 11/9/89

1.0 INTRODUCTION

This guideline presents a procedure for collecting sediment samples from a river bottom. Often, the sampling of bottom sediments is complicated by the structural properties of the material and the fact that sampling takes place below a water surface. It is thus necessary to select appropriate sampling materials and apply proper sampling techniques in order to collect a representative sample.

The procedure described herein is for the collection of sediment samples from the side of a boat using a Ponar Grab Dredge. The Ponar Grab Dredge is a clamshell-like device which allows for collection of a sediment sample at a discreet location. The Ponar Grab Dredge jaws close automatically upon striking bottom. This device is constructed primarily of stainless steel, which makes it suitable for use in obtaining environmental samples.

2.0 HEALTH AND SAFETY REQUIREMENTS

In addition to compliance with the Project Health and Safety Plan, the following safety guidelines will be followed during sediment sampling from a boat:

1. A minimum of two and a maximum of three persons shall be in the boat at all times.
2. All personnel shall wear U.S. Coast Guard - approved personal flotation devices (PFDs) while in the boat.

3. The boat used during sediment sampling will be a large (approximately 16-foot length), flat-bottomed type to provide stability and ample work area.

4. The boat shall be equipped with an anchor, anchor rope, two oars and small outboard motor.

5. The boat operator will be familiar with U.S. Coast Guard safety procedures for operating a boat.

6. Sampling will be conducted when weather conditions allow for safe operation of the boat and the potential of capsize due to strong current is minimized.

3.0 METHODOLOGY

The sediment sampling procedure is described below:

1. Ensure appropriate safety procedures for boat operation are followed.

2. Anchor boat from bow over sample location.

3. With the Ponar Grab Dredge jaws in the open position, lower the device from the stern of the boat until it strikes bottom, noting the depth from the water to the water/sediment interface.

4. Gently lift the dredge off the river bottom, and slowly raise it through the water until it breaks the water surface.

5. Bring the dredge near (not inside) the boat. While one individual holds the stainless steel bowl under the dredge, the other person can open the jaws and empty the sediment into the bowl.

6. Record field measurements, such as weather conditions, depth to sediment, sample location, sample appearance/odor, types of sediment present, and other pertinent information in the Project Field Book.

7. Gently mix the retrieved sediment with the stainless steel scoop to provide a homogeneous sample. Fill the appropriate sample containers, and follow appropriate sample handling procedures.
8. Decontaminate the sampling equipment between sampling locations.

4.0 EQUIPMENT REQUIREMENTS

- personal protective garment and gear (if applicable)
- Ponar Grab Dredge
- nylon rope (20', flagged at 5' intervals)
- stainless steel bowl
- stainless steel scoop
- boat with motor, anchor, oars
- Project Field Book

Appendix R: Item 2 - SAMPLE SHIPPING

Applicability: GENERAL Revision No.: 2 Date: 02/21/89

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 10/10/89

1.0 INTRODUCTION

This guideline presents a method for chain-of-custody procedures to track sample shipments, to minimize loss or misidentification of samples, and to ensure that unauthorized persons do not tamper with collected samples.

2.0 METHODOLOGY

1. Fill out the chain-of-custody form completely (see attached example) with all relevant information (the white original goes with the samples and should be placed in a "ziploc" plastic bag and taped inside the sample cooler lid; the yellow copy should be retained by the sampler).
2. Mark liquid volume and solids levels on sample bottles with grease pencil.
3. Place about 3 inches of inert cushioning material such as styrofoam peanuts or bubble pack in bottom of cooler. Place bottles in cooler with VOA vials (in a "ziploc" bag) in the center of the cooler.
4. Cover pack bottles, especially VOA vials, with ice in plastic bags. Pack cooler with blue ice in "ziploc" plastic bags and additional cushioning material.
5. Tape drain shut and wrap cooler completely with strapping tape to secure lid.
6. Place lab address on top of cooler. To protect the shipping coolers against tampering during shipment, the cooler lid will be taped to the cooler body. A chain-of-custody seal will be placed over the tape. A broken seal will indicate that the contents may have been tampered with.

MALCOLM PIRNIE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.:

SITE NAME:

SAMPLERS (SIGNATURE):

STATION NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS

RELINQUISHED BY (SIGNATURE):	**DATE/TIME:**	**RECEIVED BY (SIGNATURE):**	**RELINQUISHED BY (SIGNATURE):**	**DATE/TIME:**	**RECEIVED BY (SIGNATURE):**
RELINQUISHED BY (SIGNATURE):	**DATE/TIME:**	**RECEIVED BY (SIGNATURE):**	**RELINQUISHED BY (SIGNATURE):**	**DATE/TIME:**	**RECEIVED BY (SIGNATURE):**
RELINQUISHED BY (SIGNATURE):	**DATE/TIME:**	**RECEIVED FOR LABORATORY BY (SIGNATURE):**	**DATE/TIME:**	**REMARKS:**	

Distribution: Original accompanies shipment, copy to coordinator field files

7. For out-of-town laboratory shipments, specify that the contents are "Fragile" and place "This Side Up" labels on all four sides of the cooler. "This Side Up" labels are yellow labels with a black arrow with the arrow head pointing toward the cooler lid. "This Side Up" labels should not be affixed to the cooler lid or the cooler bottom.

Appendix A: Item 3 - SAMPLE LABELLING

Applicability: HAZARDOUS WASTE Revision No.: 1 Date: 11/9/89

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 10/10/89

1.0 GENERAL

This guideline presents a method for sample labelling in order to property identify environmental samples collected during the field investigation.

2.0 METHODOLOGY

1. Each sample of each matrix will be assigned a unique identification alpha-numeric code. An example of this code and a description of its components is presented on the attached sheet.

2. Affix a non-removable (when wet) label to each sample container. The following information should be written on the label with permanent marker:

   - Site name
   - Sample identification
   - Project number
   - Date/time
   - Sampler's initials
   - Sample preservation
   - Analysis required

3. Wrap the label with 2-inch cellophane tape such that the label is completely covered and the tape wraps around the entire perimeter of the bottle.

Appendix A: Item 3 - SAMPLE LABELLING

Applicability: HAZARDOUS WASTE Revision No.: 1 Date: 11/9/89

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 10/10/89

Example of Sample ID: CM-MW1D

CM
(Site Code)
Columbus McKinnon

MW1
(Sample Location)

D
(Monitor/Sample Type)

(S) Shallow

(I) Intermediate

(D) Deep

MW = Ground Water Installation (Well Location No. 1)

SP = Sampling Point

SW = Surface Water

SB = Soil Boring (depth designation follows alpha code)

SS = Stream Sediment (water depth designation follows alpha code).

TB = Trip Blank

RB = Field (Rinse) Blank

THF1108B.SOP

Appendix A : Item 4 - ANALYSIS FOR TOTAL SUSPENDED SOLIDS (TSS)

Applicability: TREATABILITY STUDY Revision No.: ____ Date: ________

Prepared By: BJH Date: 5/22/90 Approved By: MMY Date: 5/31/90

1.0 INTRODUCTION

This guideline presents a method for determination of Total Suspended Solids (TSS) in mg/L.

2.0 EQUIPMENT

- muffle furnace
- desiccator
- analytical balance
- Whatman grade 934-AH, 0.45 um glass fiber filter disks
- filtration apparatus
- suction flask
- aluminum drying trays
- vacuum pump

3.0 PROCEDURE

1. Weigh the Whatman filter, record the value on TSS laboratory worksheet (Attachment No. 1).
2. Assemble filtration apparatus, Whatman filter disk and source of suction.
3. Filter small amount (5-10 ml) distilled water to seat filter disk.
4. Thoroughly stir sample prior to pouring into a 100 ml measuring cylinder.
5. Filter the well mixed sample (approximately 100 mls). (Record actual volume on TSS laboratory worksheet.)

6. Rinse measuring cylinder with a small volume of distilled water and filter rinsate. Continue suction for (1) one additional minute.

7. Carefully remove the filter from the filtration apparatus and transfer it to the aluminum drying tray, in accordance with an appropriate sample numbering system.

8. Dry for one (1) hour at 103-105°C in the muffler furnace.

9. Cool in the desiccator for one half hour.

10. Weigh the filter and dry residue, record the weight on the TSS laboratory worksheet (Attachment No. 1).

11. Perform the TSS calculations as indicated on the TSS Laboratory Worksheet and in Section 4.0 Data Interpretation.

4.0 DATA INTERPRETATION

$$\text{mg total suspended solids/L} = \frac{(A-B) \times 100}{\text{sample volume (L)}}$$

where: A = weight of filter + dried residue, mg.
B = weight of filter, mg.

The precision of the TSS test is estimated to be approximately plus or minus 20%.

5.0 ATTACHMENTS

Attachment 1 - Laboratory Worksheet

ATTACHMENT 1

LABORATORY WORKSHEET FOR SUSPENDED SOLIDS

DATE ____________________
TESTED BY ____________________
PROJECT ____________________

____________		Sample Location	____________	
____________		Sample Number	____________	
____________	ml	Sample Volume	____________	ml
____________	gms	Weight of Filter Paper & Dry Residue	____________	gms
____________	gms	Weight of Filter Paper	____________	gms
____________	gms	Weight of Dry Residue	____________	gms
____________	Total mg/l	Suspended Solids(1)	____________	mg/l

____________		Sample Location	____________	
____________		Sample Number	____________	
____________	ml	Sample Volume	____________	ml
____________	gms	Weight of Filter Paper & Dry Residue	____________	gms
____________	gms	Weight of Filter Paper	____________	gms
____________	gms	Weight of Dry Residue	____________	gms
____________	mg/l	Total Suspended Solids(1)	____________	mg/l

____________		Sample Location	____________	
____________		Sample Number	____________	
____________	ml	Sample Volume	____________	ml
____________	gms	Weight of Filter Paper & Dry Residue	____________	gms
____________	gms	Weight of Filter Paper	____________	gms
____________	gms	Weight of Dry Residue	____________	gms
____________	mg/l	Total Suspended Solids(1)	____________	mg/l

____________		Sample Location	____________	
____________		Sample Number	____________	
____________	ml	Sample Volume	____________	ml
____________	gms	Weight of Filter Paper & Dry Residue	____________	gms
____________	gms	Weight of Filter Paper	____________	gms
____________	gms	Weight of Dry Residue	____________	gms
____________	mg/l	Total Suspended Solids(1)	____________	mg/l

---

NOTE:

(1) Total Suspended Solids (mg/l) =

$$\frac{\text{Weight of Dry Residue (gms)}}{\text{Volume of Sample (ml)}} \times 1000\ \text{mg/g} \times 1000\ \text{ml/l}$$

APPENDIX B

BENCH-SCALE SETTLING TEST ANALYTICAL RESULTS

MALCOLM
PIRNIE

Malcolm Pirnie Laboratory
707 Old Saw Mill River Road
Tarrytown, NY 10591
Phone: (914) 345-8230
Fax: (914) 345-8741

TECHNICAL REPORT

COLUMBUS MCKINNON

Approved by:

Project Number : 1332-012-623

Date : 03-03-1993

MALCOLM PIRNIE ENVIRONMENTAL LABORATORY

CERTIFICATIONS

- New York State Department of Health:
  ELAP # 10202 Water, Wastewater, Solid and Hazardous Waste
- New Jersey Department of Environmental Protection:
  LAB ID# 73171
  Water, Wastewater (including solid and hazardous waste)
- Connecticut Department of Health Services:
  LAB ID# PH-0536 Water and Wastewater
- US ARMY CORPS OF ENGINEERS - Missouri River Division - HTRW Validation

ANALYTICAL REFERENCES

The Malcolm Pirnie Environmental Laboratory utilizes a variety of methods and procedures based on the analytical references listed below.

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, 3/83 Revision.

Test Methods for Evaluating Solids Waste-Physical/Chemical Methods, SW-846, 3rd Edition. Office of Solid Waste and Emergency repairs, USEPA, Washington, D.C., 1986.

USEPA Contract Laboratory Program, Statement of Work for Organics Analysis, USEPA, OLM01.5.

USEPA Contract Laboratory Program, Statement of Work for Inorganics Analysis, USEPA, ILM01.0.

Standard Methods for the Examination of Water and Wastewater, 16 Edition, APHA, Washington D.C., 1985.

Annual Book of ASTM Standards, Part 31 - Water. American Society for Testing and Materials, Philadelphia, PA, 1981.

Methods for Organic Chemisal Analysis of Municipal and Industrial Wastewater, Appendix A, CFR Part 136, Federal Register, Vol. 49, No. 209, 1984.

SAMPLE SUMMARY SORTED BY LAB ID

12:51:52 03 MAR 1993

CLIENT IDENTIFICATION	LAB ID	DATE SAMPLED
#1 SUPERNATANT	93-00210-N	01/28/93
#1 SEDIMENT	93-00211-N	01/28/93
#2 SUPERNATANT	93-00212-N	01/28/93
#2 SEDIMENT	93-00213-N	01/28/93
#3 SUPERNATANT	93-00214-N	01/28/93
#3 SEDIMENT	93-00215-N	01/28/93
#4 SUPERNATANT	93-00216-N	01/28/93
#4 SEDIMENT	93-00217-N	01/28/93
#5 SUPERNATANT	93-00218-N	01/28/93
#5 SEDIMENT	93-00219-N	01/28/93
#6 SUPERNATANT	93-00220-N	01/28/93
#6 SEDIMENT	93-00221-N	01/28/93
#7 SUPERNATANT	93-00222-N	01/28/93
#7 SEDIMENT	93-00223-N	01/28/93
#8 SUPERNATANT	93-00224-N	01/29/93
#8 SEDIMENT	93-00225-N	01/29/93

CLIENT RESULTS SUMMARY REPORT
Revision Notes: COMPLETE REPORT

COLUMBUS MCKINNON

716-828-1300
Contact: KATHY MCCUE, BUF
MPI Project Manager:

Group: ORGANICS

Project #	Lab Id	Client Id	Date Sampled	Date Analyzed	By	Analysis	Parameter	Result	Units
1332-012-623	93-00210-N	#1 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(S)	Arochlor-1016 (SOLUBLE)	<.96	ug/L
				02/02/93	SUB		Arochlor-1221 (SOLUBLE)	<.96	ug/L
				02/02/93	SUB		Arochlor-1232 (SOLUBLE)	<.96	ug/L
				02/02/93	SUB		Arochlor-1242 (SOLUBLE)	<.96	ug/L
				02/02/93	SUB		Arochlor-1248 (SOLUBLE)	<.96	ug/L
				02/02/93	SUB		Arochlor-1254 (SOLUBLE)	11.7	ug/L
				02/02/93	SUB		Arochlor-1260 (SOLUBLE)	<1.9	ug/L
1332-012-623	93-00210-N	#1 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(I)	Arochlor-1016 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1221 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1232 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1242 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1248 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1254 (INSOLUBLE)	1540	ug/L
				02/02/93	SUB		Arochlor-1260 (INSOLUBLE)	<33	ug/L

1332-012-623	93-00211-N	#1 SEDIMENT	01/28/93	02/01/93	SUB	PCB-S	Arochlor-1016	<15	ug/kg
				02/01/93	SUB		Arochlor-1221	<15	ug/kg
				02/01/93	SUB		Arochlor-1232	<15	ug/kg
				02/01/93	SUB		Arochlor-1242	<15	ug/kg
				02/01/93	SUB		Arochlor-1248	<15	ug/kg
				02/01/93	SUB		Arochlor-1254	2950	ug/kg
				02/01/93	SUB		Arochlor-1260	<30	ug/kg

CLIENT RESULTS SUMMARY REPORT
Revision Notes: COMPLETE REPORT

COLUMBUS MCKINNON

716-828-1300
Contact: KATHY MCCUE, BUF
MPI Project Manager:

Group: ORGANICS

Project #	Lab Id	Client Id	Date Sampled	Date Analyzed	By	Analysis	Parameter	Result	Units
1332-012-623	93-00212-N	#2 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(S)	Arochlor-1016 (SOLUBLE)	<.61	ug/L
				02/02/93	SUB		Arochlor-1221 (SOLUBLE)	<.61	ug/L
				02/02/93	SUB		Arochlor-1232 (SOLUBLE)	<.61	ug/L
				02/02/93	SUB		Arochlor-1242 (SOLUBLE)	<.61	ug/L
				02/02/93	SUB		Arochlor-1248 (SOLUBLE)	<.61	ug/L
				02/02/93	SUB		Arochlor-1254 (SOLUBLE)	13.0	ug/L
				02/02/93	SUB		Arochlor-1260 (SOLUBLE)	<1.2	ug/L
1332-012-623	93-00212-N	#2 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(I)	Arochlor-1016 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1221 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1232 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1242 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1248 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1254 (INSOLUBLE)	1720	ug/L
				02/02/93	SUB		Arochlor-1260 (INSOLUBLE)	<33	ug/L

1332-012-623	93-00213-N	#2 SEDIMENT	01/28/93	02/01/93	SUB	PCB-S	Arochlor-1016	<16	ug/kg
				02/01/93	SUB		Arochlor-1221	<16	ug/kg
				02/01/93	SUB		Arochlor-1232	<16	ug/kg
				02/01/93	SUB		Arochlor-1242	<16	ug/kg
				02/01/93	SUB		Arochlor-1248	<16	ug/kg
				02/01/93	SUB		Arochlor-1254	8950	ug/kg
				02/01/93	SUB		Arochlor-1260	<31	ug/kg

CLIENT RESULTS SUMMARY REPORT
Revision Notes: COMPLETE REPORT

COLUMBUS MCKINNON

716-828-1300
Contact: KATHY MCCUE, BUF
MPI Project Manager:

Group: ORGANICS

Project #	Lab Id	Client Id	Date Sampled	Date Analyzed	By	Analysis	Parameter	Result	Units
1332-012-623	93-00214-N	#3 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(S)	Arochlor-1016 (SOLUBLE)	<.60	ug/L
				02/02/93	SUB		Arochlor-1221 (SOLUBLE)	<.60	ug/L
				02/02/93	SUB		Arochlor-1232 (SOLUBLE)	<.60	ug/L
				02/02/93	SUB		Arochlor-1242 (SOLUBLE)	<.60	ug/L
				02/02/93	SUB		Arochlor-1248 (SOLUBLE)	<.60	ug/L
				02/02/93	SUB		Arochlor-1254 (SOLUBLE)	8.50	ug/L
				02/02/93	SUB		Arochlor-1260 (SOLUBLE)	<1.2	ug/L
1332-012-623	93-00214-N	#3 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(I)	Arochlor-1016 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1221 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1232 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1242 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1248 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1254 (INSOLUBLE)	3600	ug/L
				02/02/93	SUB		Arochlor-1260 (INSOLUBLE)	<33	ug/L

1332-012-623	93-00215-N	#3 SEDIMENT	01/28/93	02/01/93	SUB	PCB-S	Arochlor-1016	<17	ug/kg
				02/01/93	SUB		Arochlor-1221	<17	ug/kg
				02/01/93	SUB		Arochlor-1232	<17	ug/kg
				02/01/93	SUB		Arochlor-1242	<17	ug/kg
				02/01/93	SUB		Arochlor-1248	<17	ug/kg
				02/01/93	SUB		Arochlor-1254	5510	ug/kg
				02/01/93	SUB		Arochlor-1260	<33	ug/kg

CLIENT RESULTS SUMMARY REPORT
Revision Notes: COMPLETE REPORT

COLUMBUS MCKINNON

716-828-1300
Contact: KATHY MCCUE, BUF
MPI Project Manager:

Group: ORGANICS

Project #	Lab Id	Client Id	Date Sampled	Date Analyzed	By	Analysis	Parameter	Result	Units
1332-012-623	93-00216-N	#4 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(S)	Arochlor-1016 (SOLUBLE)	<.56	ug/L
				02/02/93	SUB		Arochlor-1221 (SOLUBLE)	<.56	ug/L
				02/02/93	SUB		Arochlor-1232 (SOLUBLE)	<.56	ug/L
				02/02/93	SUB		Arochlor-1242 (SOLUBLE)	<.56	ug/L
				02/02/93	SUB		Arochlor-1248 (SOLUBLE)	<.56	ug/L
				02/02/93	SUB		Arochlor-1254 (SOLUBLE)	5.54	ug/L
				02/02/93	SUB		Arochlor-1260 (SOLUBLE)	<1.1	ug/L
1332-012-623	93-00216-N	#4 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(I)	Arochlor-1016 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1221 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1232 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1242 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1248 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1254 (INSOLUBLE)	2950	ug/L
				02/02/93	SUB		Arochlor-1260 (INSOLUBLE)	<33	ug/L

1332-012-623	93-00217-N	#4 SEDIMENT	01/28/93	02/01/93	SUB	PCB-S	Arochlor-1016	<16	ug/kg
				02/01/93	SUB		Arochlor-1221	<16	ug/kg
				02/01/93	SUB		Arochlor-1232	<16	ug/kg
				02/01/93	SUB		Arochlor-1242	<16	ug/kg
				02/01/93	SUB		Arochlor-1248	<16	ug/kg
				02/01/93	SUB		Arochlor-1254	6600	ug/kg
				02/01/93	SUB		Arochlor-1260	<33	ug/kg

CLIENT RESULTS SUMMARY REPORT
Revision Notes: COMPLETE REPORT

COLUMBUS MCKINNON

716-828-1300
Contact: KATHY MCCUE, BUF
MPI Project Manager:

Group: ORGANICS

Project #	Lab Id	Client Id	Date Sampled	Date Analyzed	By	Analysis	Parameter	Result	Units
1332-012-623	93-00218-N	#5 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(S)	Arochlor-1016 (SOLUBLE)	<.59	ug/L
				02/02/93	SUB		Arochlor-1221 (SOLUBLE)	<.59	ug/L
				02/02/93	SUB		Arochlor-1232 (SOLUBLE)	<.59	ug/L
				02/02/93	SUB		Arochlor-1242 (SOLUBLE)	<.59	ug/L
				02/02/93	SUB		Arochlor-1248 (SOLUBLE)	<.59	ug/L
				02/02/93	SUB		Arochlor-1254 (SOLUBLE)	9.01	ug/L
				02/02/93	SUB		Arochlor-1260 (SOLUBLE)	<1.2	ug/L
1332-012-623	93-00218-N	#5 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(I)	Arochlor-1016 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1221 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1232 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1242 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1248 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1254 (INSOLUBLE)	2290	ug/L
				02/02/93	SUB		Arochlor-1260 (INSOLUBLE)	<33	ug/L

1332-012-623	93-00219-N	#5 SEDIMENT	01/28/93	02/01/93	SUB	PCB-S	Arochlor-1016	<16	ug/kg
				02/01/93	SUB		Arochlor-1221	<16	ug/kg
				02/01/93	SUB		Arochlor-1232	<16	ug/kg
				02/01/93	SUB		Arochlor-1242	<16	ug/kg
				02/01/93	SUB		Arochlor-1248	<16	ug/kg
				02/01/93	SUB		Arochlor-1254	7870	ug/kg
				02/01/93	SUB		Arochlor-1260	<32	ug/kg

CLIENT RESULTS SUMMARY REPORT
Revision Notes: COMPLETE REPORT

COLUMBUS MCKINNON

716-828-1300
Contact: KATHY MCCUE, BUF
MPI Project Manager:

Group: ORGANICS

Project #	Lab Id	Client Id	Date Sampled	Date Analyzed	By	Analysis	Parameter	Result	Units
1332-012-623	93-00220-N	#6 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(S)	Arochlor-1016 (SOLUBLE)	<.52	ug/L
				02/02/93	SUB		Arochlor-1221 (SOLUBLE)	<.52	ug/L
				02/02/93	SUB		Arochlor-1232 (SOLUBLE)	<.52	ug/L
				02/02/93	SUB		Arochlor-1242 (SOLUBLE)	<.52	ug/L
				02/02/93	SUB		Arochlor-1248 (SOLUBLE)	<.52	ug/L
				02/02/93	SUB		Arochlor-1254 (SOLUBLE)	17.0	ug/L
				02/02/93	SUB		Arochlor-1260 (SOLUBLE)	<1.0	ug/L
1332-012-623	93-00220-N	#6 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(I)	Arochlor-1016 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1221 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1232 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1242 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1248 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1254 (INSOLUBLE)	6630	ug/L
				02/02/93	SUB		Arochlor-1260 (INSOLUBLE)	<33	ug/L

1332-012-623	93-00221-N	#6 SEDIMENT	01/28/93	02/01/93	SUB	PCB-S	Arochlor-1016	<16	ug/kg
				02/01/93	SUB		Arochlor-1221	<16	ug/kg
				02/01/93	SUB		Arochlor-1232	<16	ug/kg
				02/01/93	SUB		Arochlor-1242	<16	ug/kg
				02/01/93	SUB		Arochlor-1248	<16	ug/kg
				02/01/93	SUB		Arochlor-1254	7470	ug/kg
				02/01/93	SUB		Arochlor-1260	<31	ug/kg

CLIENT RESULTS SUMMARY REPORT
Revision Notes: COMPLETE REPORT

COLUMBUS MCKINNON

716-828-1300
Contact: KATHY MCCUE, BUF
MPI Project Manager:

Group: ORGANICS

Project #	Lab Id	Client Id	Date Sampled	Date Analyzed	By	Analysis	Parameter	Result	Units
1332-012-623	93-00222-N	#7 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(S)	Arochlor-1016 (SOLUBLE)	<.52	ug/L
				02/02/93	SUB		Arochlor-1221 (SOLUBLE)	<.52	ug/L
				02/02/93	SUB		Arochlor-1232 (SOLUBLE)	<.52	ug/L
				02/02/93	SUB		Arochlor-1242 (SOLUBLE)	<.52	ug/L
				02/02/93	SUB		Arochlor-1248 (SOLUBLE)	<.52	ug/L
				02/02/93	SUB		Arochlor-1254 (SOLUBLE)	25.4	ug/L
				02/02/93	SUB		Arochlor-1260 (SOLUBLE)	<1.0	ug/L
1332-012-623	93-00222-N	#7 SUPERNATANT	01/28/93	02/02/93	SUB	PCB(I)	Arochlor-1016 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1221 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1232 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1242 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1248 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1254 (INSOLUBLE)	13600	ug/L
				02/02/93	SUB		Arochlor-1260 (INSOLUBLE)	<33	ug/L

1332-012-623	93-00223-N	#7 SEDIMENT	01/28/93	02/01/93	SUB	PCB-S	Arochlor-1016	<17	ug/kg
				02/01/93	SUB		Arochlor-1221	<17	ug/kg
				02/01/93	SUB		Arochlor-1232	<17	ug/kg
				02/01/93	SUB		Arochlor-1242	<17	ug/kg
				02/01/93	SUB		Arochlor-1248	<17	ug/kg
				02/01/93	SUB		Arochlor-1254	5080	ug/kg
				02/01/93	SUB		Arochlor-1260	<33	ug/kg

CLIENT RESULTS SUMMARY REPORT
Revision Notes: COMPLETE REPORT

COLUMBUS MCKINNON

716-828-1300
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MPI Project Manager:

Group: ORGANICS

Project #	Lab Id	Client Id	Date Sampled	Date Analyzed	By	Analysis	Parameter	Result	Units
1332-012-623	93-00224-N	#8 SUPERNATANT	01/29/93	02/02/93	SUB	PCB(S)	Arochlor-1016 (SOLUBLE)	<.51	ug/L
				02/02/93	SUB		Arochlor-1221 (SOLUBLE)	<.51	ug/L
				02/02/93	SUB		Arochlor-1232 (SOLUBLE)	<.51	ug/L
				02/02/93	SUB		Arochlor-1242 (SOLUBLE)	<.51	ug/L
				02/02/93	SUB		Arochlor-1248 (SOLUBLE)	<.51	ug/L
				02/02/93	SUB		Arochlor-1254 (SOLUBLE)	9.70	ug/L
				02/02/93	SUB		Arochlor-1260 (SOLUBLE)	<1.0	ug/L
1332-012-623	93-00224-N	#8 SUPERNATANT	01/29/93	02/02/93	SUB	PCB(I)	Arochlor-1016 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1221 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1232 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1242 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1248 (INSOLUBLE)	<17	ug/L
				02/02/93	SUB		Arochlor-1254 (INSOLUBLE)	3800	ug/L
				02/02/93	SUB		Arochlor-1260 (INSOLUBLE)	<33	ug/L

1332-012-623	93-00225-N	#8 SEDIMENT	01/29/93	02/01/93	SUB	PCB-S	Arochlor-1016	<16	ug/kg
				02/01/93	SUB		Arochlor-1221	<16	ug/kg
				02/01/93	SUB		Arochlor-1232	<16	ug/kg
				02/01/93	SUB		Arochlor-1242	<16	ug/kg
				02/01/93	SUB		Arochlor-1248	<16	ug/kg
				02/01/93	SUB		Arochlor-1254	8100	ug/kg
				02/01/93	SUB		Arochlor-1260	<33	ug/kg

CLIENT RESULTS SUMMARY REPORT
Revision Notes: COMPLETE REPORT

COLUMBUS MCKINNON

716-828-1300
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MPI Project Manager:

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Project #	Lab Id	Client Id	Date Sampled	Date Analyzed	By	Analysis	Parameter	Result	Units
1332-012-623	93-00210-N	#1 SUPERNATANT	01/28/93	01/29/93	ND	TSS	Total Suspended Solids	4145	mg/L
1332-012-623	93-00211-N	#1 SEDIMENT	01/28/93	02/01/93	ND	TS-%	Percent TS	25.2	%
1332-012-623	93-00212-N	#2 SUPERNATANT	01/28/93	01/29/93	ND	TSS	Total Suspended Solids	1983	mg/L
1332-012-623	93-00213-N	#2 SEDIMENT	01/28/93	02/01/93	ND	TS-%	Percent TS	29.1	%
1332-012-623	93-00214-N	#3 SUPERNATANT	01/28/93	01/29/93	ND	TSS	Total Suspended Solids	997	mg/L
1332-012-623	93-00215-N	#3 SEDIMENT	01/28/93	02/01/93	ND	TS-%	Percent TS	28.5	%
1332-012-623	93-00216-N	#4 SUPERNATANT	01/28/93	01/29/93	ND	TSS	Total Suspended Solids	610	mg/L
1332-012-623	93-00217-N	#4 SEDIMENT	01/28/93	02/01/93	ND	TS-%	Percent TS	28.7	%
1332-012-623	93-00218-N	#5 SUPERNATANT	01/28/93	01/29/93	ND	TSS	Total Suspended Solids	348	mg/L

CLIENT RESULTS SUMMARY REPORT
Revision Notes: COMPLETE REPORT

COLUMBUS MCKINNON

716-828-1300
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MPI Project Manager:

Group: INORGANICS

Project #	Lab Id	Client Id	Date Sampled	Date Analyzed	By	Analysis	Parameter	Result	Units
1332-012-623	---------								
1332-012-623	93-00219-N	#5 SEDIMENT	01/28/93	02/01/93	ND	TS-%	Percent TS	28.0	%
1332-012-623	93-00220-N	#6 SUPERNATANT	01/28/93	01/29/93	ND	TSS	Total Suspended Solids	252	mg/L
1332-012-623	93-00221-N	#6 SEDIMENT	01/28/93	02/01/93	ND	TS-%	Percent TS	28.7	%
1332-012-623	93-00222-N	#7 SUPERNATANT	01/28/93	01/29/93	ND	TSS	Total Suspended Solids	88.0	mg/L
1332-012-623	93-00223-N	#7 SEDIMENT	01/28/93	02/01/93	ND	TS-%	Percent TS	32.4	%
1332-012-623	93-00224-N	#8 SUPERNATANT	01/29/93	01/29/93	ND	TSS	Total Suspended Solids	84.0	mg/L
1332-012-623	93-00225-N	#8 SEDIMENT	01/29/93	02/01/93	ND	TS-%	Percent TS	31.4	%

FEB 11, 1993

TABLE 1: QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA

AROCLORS - GC ANALYSIS DATA (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1969	MALCOLM PIRNIE	MALPRNPCB	X BLANK	01-28-93	
ETC Sample No.	*Company*	*Facility*	*Sample Point*	*Date*	*Time*

QG32601

		Results		*QC Replicate*		*QC Blank and Spiked Blank*			*QC Matrix Spike*		
NPDES Number	*Compound*	*Sample Concen. ug/kg*	*MDL ug/kg*	*First ug/kg*	*Second ug/kg*	*Blank Data ug/kg*	*Concen. Added ug/kg*	*% Recov*	*Unspiked Sample ug/kg*	*Concen. Added ug/kg*	*% Reco*
300A	Aroclor 1242	ND	16	-	-	-	-	-	-	-	-
300B	Aroclor 1254	ND	33	-	-	-	-	-	-	-	-
300C	Aroclor 1260	ND	33	-	-	-	-	-	-	-	-
300D	Aroclor 1248	ND	16	-	-	-	-	-	-	-	-
300E	Aroclor 1232	ND	16	-	-	-	-	-	-	-	-
300F	Aroclor 1221	ND	16	-	-	-	-	-	-	-	-
300G	Aroclor 1016	ND	16	-	-	-	-	-	-	-	-

All zero and variable recoveries have been manually verified.

TABLE 1: QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA

AROCLORS - GC ANALYSIS DATA (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time
GF1978	MALCOLM PIRNIE	MALPRNPCB	X BLANK	02-01-93	

QG3260

		Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
NPDES Number	Compound	Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Re
300A	Aroclor 1242	ND	17	-	-	-	-	-	-	-	
300B	Aroclor 1254	ND	33	-	-	-	-	-	-	-	
300C	Aroclor 1260	ND	33	-	-	-	-	-	-	-	
300D	Aroclor 1248	ND	17	-	-	-	-	-	-	-	
300E	Aroclor 1232	ND	17	-	-	-	-	-	-	-	
300F	Aroclor 1221	ND	17	-	-	-	-	-	-	-	
300G	Aroclor 1016	ND	17	-	-	-	-	-	-	-	

All zero and variable recoveries have been manually verified.

TABLE 1: QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA

AROCLORS - GC ANALYSIS DATA (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1987	MALCOLM PIRNIE	MALPRNPCB	X BLANK	02-02-93	
ETC Sample No.	*Company*	*Facility*	*Sample Point*	*Date*	*Time*

QG32602

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
300A	Aroclor 1242	ND	16	-	-	-	-	-	-	-	-
300B	Aroclor 1254	ND	33	-	-	-	-	-	-	-	-
300C	Aroclor 1260	ND	33	-	-	-	-	-	-	-	-
300D	Aroclor 1248	ND	16	-	-	-	-	-	-	-	-
300E	Aroclor 1232	ND	16	-	-	-	-	-	-	-	-
300F	Aroclor 1221	ND	16	-	-	-	-	-	-	-	-
300G	Aroclor 1016	ND	16	-	-	-	-	-	-	-	-

All zero and variable recoveries have been manually verified.

TABLE 1: QUANTITATIVE RESULTS AND QUALITY ASSURANCE DATA

AROCLORS - GC ANALYSIS DATA (QR14)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1996	MALCOLM PIRNIE	MALPRNPCB	X BLANK	02-02-93		QG32603
ETC Sample No.	*Company*	*Facility*	*Sample Point*	*Date*	*Time*	

		Results		*QC Replicate*		*QC Blank and Spiked Blank*			*QC Matrix Spike*		
NPDES Number	*Compound*	*Sample Concen. ug/l*	*MDL ug/l*	*First ug/l*	*Second ug/l*	*Blank Data ug/l*	*Concen. Added ug/l*	*% Recov*	*Unspiked Sample ug/l*	*Concen. Added ug/l*	*% Recov*
300A	Aroclor 1242	ND	.50	-	-	-	-	-	-	-	-
300B	Aroclor 1254	ND	1.0	-	-	-	-	-	-	-	-
300C	Aroclor 1260	ND	1.0	-	-	-	-	-	-	-	-
300D	Aroclor 1248	ND	.50	-	-	-	-	-	-	-	-
300E	Aroclor 1232	ND	.50	-	-	-	-	-	-	-	-
300F	Aroclor 1221	ND	.50	-	-	-	-	-	-	-	-
300G	Aroclor 1016	ND	.50	-	-	-	-	-	-	-	-

All zero and variable recoveries have been manually verified.

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TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
GF1969	MALCOLM PIRNIE	MALPRNPCB	XBLANK	930128		0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	64	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1970	MALCOLM PIRNIE	MALPRNPCB	X93-0211	930201		0
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	40	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified

** Advisory Limits Only

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours
GF1971	MALCOLM PIRNIE	MALPRNPCB	X93-0213	930201	0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	38	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

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TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours
GF1972	MALCOLM PIRNIE	MALPRNPCB	X93-0215	930201	0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	44	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

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TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1973	MALCOLM PIRNIE	MALPRNPCB	X93-0217	930201	0
ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	40	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1974	MALCOLM PIRNIE	MALPRNPCB	X93-0219	930201		0
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	42	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
GF1975	MALCOLM PIRNIE	MALPRNPCB	X93-0221	930201		0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	42	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No	Company	Facility	Sample Point	Date	Elapsed Time Hours
GF1976	MALCOLM PIRNIE	MALPRNPCB	X93-0223	930201	0

<table>
<tr><th rowspan="2">Compound</th><th rowspan="2">Amount added</th><th rowspan="2">%Recovery</th><th colspan="2">Control Limits</th></tr>
<tr><th>Lower</th><th>Upper</th></tr>
<tr><td>VOLATILE FRACTION (GC/MS)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Toluene-D8</td><td>-</td><td>-</td><td>81</td><td>117</td></tr>
<tr><td>p-Bromofluorobenzene</td><td>-</td><td>-</td><td>74</td><td>121</td></tr>
<tr><td>1,2-Dichloroethane-D4</td><td>-</td><td>-</td><td>70</td><td>121</td></tr>
<tr><td>ACID FRACTION (GC/MS)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Phenol-D5</td><td>-</td><td>-</td><td>24</td><td>113</td></tr>
<tr><td>2-Fluorophenol</td><td>-</td><td>-</td><td>25</td><td>121</td></tr>
<tr><td>2,4,6-Tribromophenol</td><td>-</td><td>-</td><td>19</td><td>122</td></tr>
<tr><td>BASE/NEUTRAL FRACTION (GC/MS)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Nitrobenzene-D5</td><td>-</td><td>-</td><td>23</td><td>120</td></tr>
<tr><td>2-Fluorobiphenyl</td><td>-</td><td>-</td><td>30</td><td>115</td></tr>
<tr><td>Terphenyl-D14</td><td>-</td><td>-</td><td>18</td><td>137</td></tr>
<tr><td>PESTICIDE/PCB FRACTION (GC)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Dibutylchlorendate</td><td>1.0</td><td>0 *</td><td>20 **</td><td>150 **</td></tr>
<tr><td>2,4,5,6-Tetrachloro-m-xylene</td><td>.20</td><td>44</td><td>34</td><td>160</td></tr>
<tr><td>EPN</td><td>-</td><td>-</td><td>20 **</td><td>150 **</td></tr>
<tr><td>METHOD 601</td><td></td><td></td><td></td><td></td></tr>
<tr><td>1,4-Dichlorobutane</td><td>-</td><td>-</td><td>70</td><td>130</td></tr>
<tr><td>METHOD 602</td><td></td><td></td><td></td><td></td></tr>
<tr><td>a,a,a-Trifluorotoluene</td><td>-</td><td>-</td><td>80</td><td>120</td></tr>
<tr><td>HERBICIDE (GC)</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Dicamba</td><td>-</td><td>-</td><td>3</td><td>143</td></tr>
</table>

* Recovery Manually Verified

** Advisory Limits Only

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TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
GF1977	MALCOLM PIRNIE	MALPRNPCB	X93-0225	930201		0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	22 *	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

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TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1978	MALCOLM PIRNIE	MALPRNPCB	XBLANK	930201	0
ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	56	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

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TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1979	MALCOLM PIRNIE	MALPRNPCB	X93-0210	930202	0
ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	38	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified

** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
GF1980	MALCOLM PIRNIE	MALPRNPCB	X93-0212	930202		0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	36	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No	Company	Facility	Sample Point	Date	Time	Elapsed Hours
GF1982	MALCOLM PIRNIE	MALPRNPCB	X93-0214	930202		0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	44	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
GF1981	MALCOLM PIRNIE	MALPRNPCB	X93-0216	930202		0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	37	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours
GF1983	MALCOLM PIRNIE	MALPRNPCB	X93-0218	930202	0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	36	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1984	MALCOLM PIRNIE	MALPRNPCB	X93-0220	930202	0
ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	36	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
GF1985	MALCOLM PIRNIE	MALPRNPCB	X93-0222	930202		0

Compound	Amount added	%Recovery	Control Limits Lower	Control Limits Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	30 *	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1986	MALCOLM PIRNIE	MALPRNPCB	X93-0224	930202	0
ETC Sample No	Company	Facility	Sample Point	Date	Elapsed Time Hours

Compound	Amount added	%Recovery	Control Limits Lower	Control Limits Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	47	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours
GF1987	MALCOLM PIRNIE	MALPRNPCB	XBLANK	930202	0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	67	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified

** Advisory Limits Only

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - WATER(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No	Company	Facility	Sample Point	Date	Elapsed Time Hours
GF1988	MALCOLM PIRNIE	MALPRNPCB	X93-0210	930202	0

Compound	Amount added	%Recovery	Control Limits Lower	Control Limits Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	88	110
p-Bromofluorobenzene	-	-	86	115
1,2-Dichloroethane-D4	-	-	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	10	94
2-Fluorophenol	-	-	21	100
2,4,6-Tribromophenol	-	-	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	35	114
2-Fluorobiphenyl	-	-	43	116
Terphenyl-D14	-	-	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	24 **	154 **
2,4,5,6-Tetrachloro-m-xylene	.20	59	46	185
EPN	-	-	24 **	154 **
METHOD 601				
1,4-Dichlorobutane	-	-	82	120
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - SOIL(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours
GF1989	MALCOLM PIRNIE	MALPRNPCB	X93-0212	930202	0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	81	117
p-Bromofluorobenzene	-	-	74	121
1,2-Dichloroethane-D4	-	-	70	121
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	24	113
2-Fluorophenol	-	-	25	121
2,4,6-Tribromophenol	-	-	19	122
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	23	120
2-Fluorobiphenyl	-	-	30	115
Terphenyl-D14	-	-	18	137
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	8 *	20 **	150 **
2,4,5,6-Tetrachloro-m-xylene	.20	58	34	160
EPN	-	-	20 **	150 **
METHOD 601				
1,4-Dichlorobutane	-	-	70	130
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - WATER(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1990	MALCOLM PIRNIE	MALPRNPCB	X93-0214	930202		0
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	88	110
p-Bromofluorobenzene	-	-	86	115
1,2-Dichloroethane-D4	-	-	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	10	94
2-Fluorophenol	-	-	21	100
2,4,6-Tribromophenol	-	-	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	35	114
2-Fluorobiphenyl	-	-	43	116
Terphenyl-D14	-	-	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	24 **	154 **
2,4,5,6-Tetrachloro-m-xylene	.20	48	46	185
EPN	-	-	24 **	154 **
METHOD 601				
1,4-Dichlorobutane	-	-	82	120
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually V[illegible]fied
** Advisory Limits On

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - WATER(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1991	MALCOLM PIRNIE	MALPRNPCB	X93-0216	930202	0
ETC Sample No.	Company	Facility	Sample Point	Date	Time Elapsed Hours

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	88	110
p-Bromofluorobenzene	-	-	86	115
1,2-Dichloroethane-D4	-	-	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	10	94
2-Fluorophenol	-	-	21	100
2,4,6-Tribromophenol	-	-	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	35	114
2-Fluorobiphenyl	-	-	43	116
Terphenyl-D14	-	-	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	24 **	154 **
2,4,5,6-Tetrachloro-m-xylene	.20	59	46	185
EPN	-	-	24 **	154 **
METHOD 601				
1,4-Dichlorobutane	-	-	82	120
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - WATER(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No	Company	Facility	Sample Point	Date	Elapsed Time Hours
GF1992	MALCOLM PIRNIE	MALPRNPCB	X93-0218	930202	0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	88	110
p-Bromofluorobenzene	-	-	86	115
1,2-Dichloroethane-D4	-	-	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	10	94
2-Fluorophenol	-	-	21	100
2,4,6-Tribromophenol	-	-	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	35	114
2-Fluorobiphenyl	-	-	43	116
Terphenyl-D14	-	-	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	24 **	154 **
2,4,5,6-Tetrachloro-m-xylene	.20	46	46	185
EPN	-	-	24 **	154 **
METHOD 601				
1,4-Dichlorobutane	-	-	82	120
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - WATER(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
GF1993	MALCOLM PIRNIE	MALPRNPCB	X93-0220	930202		0

Compound	Amount added	%Recovery	Control Limits Lower	Control Limits Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	88	110
p-Bromofluorobenzene	-	-	86	115
1,2-Dichloroethane-D4	-	-	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	10	94
2-Fluorophenol	-	-	21	100
2,4,6-Tribromophenol	-	-	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	35	114
2-Fluorobiphenyl	-	-	43	116
Terphenyl-D14	-	-	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	24 **	154 **
2,4,5,6-Tetrachloro-m-xylene	.20	51	46	185
EPN	-	-	24 **	154 **
METHOD 601				
1,4-Dichlorobutane	-	-	82	120
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified

** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - WATER(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours
GF1994	MALCOLM PIRNIE	MALPRNPCB	X93-0222	930202	0

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	88	110
p-Bromofluorobenzene	-	-	86	115
1,2-Dichloroethane-D4	-	-	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	10	94
2-Fluorophenol	-	-	21	100
2,4,6-Tribromophenol	-	-	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	35	114
2-Fluorobiphenyl	-	-	43	116
Terphenyl-D14	-	-	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	24 **	154 **
2,4,5,6-Tetrachloro-m-xylene	.20	47	46	185
EPN	-	-	24 **	154 **
METHOD 601				
1,4-Dichlorobutane	-	-	82	120
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - WATER(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1995	MALCOLM PIRNIE	MALPRNPCB	X93-0224	930202		0
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	88	110
p-Bromofluorobenzene	-	-	86	115
1,2-Dichloroethane-D4	-	-	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	10	94
2-Fluorophenol	-	-	21	100
2,4,6-Tribromophenol	-	-	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	35	114
2-Fluorobiphenyl	-	-	43	116
Terphenyl-D14	-	-	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	24 **	154 **
2,4,5,6-Tetrachloro-m-xylene	.20	48	46	185
EPN	-	-	24 **	154 **
METHOD 601				
1,4-Dichlorobutane	-	-	82	120
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

FEB 12, 1993

TABLE 2: METHOD PERFORMANCE DATA

SURROGATE RECOVERY - WATER(QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

GF1996	MALCOLM PIRNIE	MALPRNPCB	XBLANK	930202	0
ETC Sample No.	Company	Facility	Sample Point	Date	Elapsed Time Hours

Compound	Amount added	%Recovery	Control Limits	
			Lower	Upper
VOLATILE FRACTION (GC/MS)				
Toluene-D8	-	-	88	110
p-Bromofluorobenzene	-	-	86	115
1,2-Dichloroethane-D4	-	-	76	114
ACID FRACTION (GC/MS)				
Phenol-D5	-	-	10	94
2-Fluorophenol	-	-	21	100
2,4,6-Tribromophenol	-	-	10	123
BASE/NEUTRAL FRACTION (GC/MS)				
Nitrobenzene-D5	-	-	35	114
2-Fluorobiphenyl	-	-	43	116
Terphenyl-D14	-	-	33	141
PESTICIDE/PCB FRACTION (GC)				
Dibutylchlorendate	1.0	0 *	24 **	154 **
2,4,5,6-Tetrachloro-m-xylene	.20	62	46	185
EPN	-	-	24 **	154 **
METHOD 601				
1,4-Dichlorobutane	-	-	82	120
METHOD 602				
a,a,a-Trifluorotoluene	-	-	80	120
HERBICIDE (GC)				
Dicamba	-	-	3	143

* Recovery Manually Verified
** Advisory Limits Only

KEY TO REPORT

LAB ID -D = MATRIX DUPLICATE OF ORIGINAL SAMPLE
-N = ORIGINAL SAMPLE
-S = MATRIX SPIKE OF ORIGINAL SAMPLE

B--THIS FLAG IS USED WHEN THE ANALYTE IS FOUND IN THE BLANK AS WELL AS THE SAMPLE. IT INDICATES POSSIBLE/PROBABLE CONTAMINATION, AND WARNS THE USER TO TAKE APPROPRIATE ACTION.

BR--BROKEN UPON RECEIPT

J--INDICATES AN ESTIMATED VALUE. THE RESULT IS LESS THAN THE SAMPLE QUANTITATION LIMIT BUT GREATER THAN ZERO.

LE--LABORATORY ERROR.

NA--NOT APPLICABLE.

ND--NOT DETECTED

NES--NOT ENOUGH SAMPLE.

U--INDICATES COMPOUND WAS ANALYZED FOR BUT NOT DETECTED

MALCOLM PIRNIE, INC.
ENVIRONMENTAL LABORATORY
707 OLD SAW MILL RIVER ROAD
TARRYTOWN, NY 10591
TEL. 914-345-8230
FAX. 914-345-8741

CHAIN OF CUSTODY RECORD

PAGE 2 OF 2

NAME OF CLIENT
PROJECT NUMBER
ADDRESS
CITY STATE ZIPCODE
CONTACT NAME TEL#

FOR LAB USE ONLY
CCR #
QUOTE #
REPORT #

SAMPLE RECEIVE ☐
SAMPLE LOGGING ☐
SAMPLE DISTRIB. ☐

PROJECT DESCRIPTION:

SAMPLER SIGNATURE: DATE:

IF SAMPLE(S) REQUIRE SPECIAL QA/QC, CHECK HERE ☐ AND DESCRIBE:

PRESERVATIVE TYPE CHECK(S)
1. HNO3 ☐
2. H2SO4 ☐
3. H3PO4 ☐
4. HCl ☐
5. NaOH ☐
6. Na2SO3 ☐
7. None ☐
8. Other(s) ☐

SAMPLE I.D	DESCRIPTION	DATE	TIME	MATRIX	PRESERVATION	NO. OF CONTAINERS Volatiles Organic Compounds	Acid Extractable Compounds	Base/Neutral Extractable Compounds	Pesticides	PCB's	Herbicides	Cyanide	EP. Toxicity-Organics	EP. Toxicity-Inorganics	Phenols	Metals	Others: T55	REMARKS
#7 SEDIMENT	3 hr	1/28		Sediment	0003					1								Dry Wt. PCBs
#8 SUPERNATANT	10 HR	1/29		AQUEOUS	0004					1							1	*
#8 SEDIMENT	10 HR	1/29		SEDIMENT	0005					1								DRY WT PCB'S

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time
	1/28/92	18:50		1/30/92	9 AM						

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time

REMARKS
* SUPERNATANT SAMPLES: ANALYZE SOLUBLE AND INSOLUBLE PCB'S.

FORMHMRL # 002 1/90

MALCOLM PIRNIE, INC.
ENVIRONMENTAL LABORATORY
707 OLD SAW MILL RIVER ROAD
TARRYTOWN, NY 10591
TEL. 914-345-8230
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CHAIN OF CUSTODY RECORD

PAGE 1 OF 2

NAME OF CLIENT Columbus McKinnon
PROJECT NUMBER 1332-012
ADDRESS
CITY STATE ZIPCODE
CONTACT NAME TEL#

FOR LAB USE ONLY
CCR #
QUOTE #
REPORT #
SAMPLE RECEIVE ☐
SAMPLE LOGGING ☐
SAMPLE DISTRIB ☐

PROJECT DESCRIPTION: Bench Scale Settling Test

SAMPLER SIGNATURE: Cackey McKee DATE: 1/28/93

IF SAMPLE(S) REQUIRE SPECIAL QA/QC, CHECK HERE ☐ AND DESCRIBE:

PRESERVATIVE TYPE CHECK(S)
1. HNO3 ☐
2. H2SO4 ☐
3. H3PO4 ☐
4. HCl ☐
5. NaOH ☐
6. Na2SO3 ☐
7. None ☐
8. Other(s) ☐

						NO. OF CONTAINERS												
SAMPLE I.D	DESCRIPTION	DATE	TIME	MATRIX	PRESERVATION	Volatiles Organic Compounds	Acid Extractable Compounds	Base/Neutral Extractable Compounds	Pesticides	PCB's	Herbicides	Cyanide	EP. Toxicity-Organics	EP. Toxicity-Inorganics	Phenols	Metals	Others: TSS	REMARKS
#1 SUPERNATANT	1.5 min	1/28		Aqueous	92-0210					1							1	*
#1 SEDIMENT	1.5 min	1/28		Sediment	0211					1								Dry wt PCBs
#2 SUPERNATANT	3 min	1/28		Aqueous	0212					1							1	*
#2 SEDIMENT	3 min	1/28		Sediment	0213					1								Dry wt. PCBs
#3 SUPERNATANT	5 min	1/28		Aqueous	0214					1							1	*
#3 SEDIMENT	5 min	1/28		Sediment	0215					1								Dry wt PCBs
#4 SUPERNATANT	10 min	1/28		Aqueous	0216					1							1	*
#4 SEDIMENT	10 min	1/28		Sediment	0217					1								Dry wt. PCBs
#5 SUPERNATANT	21 min	1/28		Aqueous	0218					1							1	*
#5 SEDIMENT	21 min	1/28		Sediment	D219					1								Dry wt. PCBs
#6 SUPERNATANT	1 hr	1/28		Aqueous	0220					1							1	*
#6 SEDIMENT	1 hr	1/28		Sediment	0221					1								Dry wt. PCBs
#7 SUPERNATANT	2 hr	1/28		Aqueous	0222					1							1	*

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time
Cackey McKee	1/28/93	8:50	K Johnson	1/30/93	9AM						
Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	**REMARKS**					
						* ~~Aqueous~~ Supernatant samples Analyze soluble and insoluble PCBs. call for explanation!					

FORMHMPL # 002 1/90

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
BY KAM DATE 2/5/93 SHEET NO. 1 OF 1
CHKD. BY .... DATE .... JOB NO. ....
SUBJECT Columbus McKinnon Treatability Test

RAW SEDIMENT

TOTAL SOLIDS

BEFORE MAKING SOL'NS	328,020 mg/L
AFTER MAKING SOL'NS	416,840 mg/L

AVERAGE TOTAL SOLIDS = 372,430 mg/L

PCB CONCENTRATION – ONLY PCB-1254 WAS DETECTED

ASSUME SOL'N DENSITY = 1 kg/L

$$\text{WET WEIGHT} = 0.149 \frac{\text{mg PCBs}}{\text{kg total}}$$

$$\text{DRY WEIGHT} = 0.149 \frac{\text{mg PCB}}{\text{kg total}} * \frac{\text{L total}}{372{,}430 \text{ mg solids}} * \frac{1 \text{ kg}}{\text{L}} * \frac{10^6 \text{ mg}}{\text{kg}}$$

$$\boxed{\text{DRY WEIGHT} = 0.4 \frac{\text{mg PCB-1254}}{\text{kg solids}}}$$

USING MEASURED SOLUTION DENSITIES AND SURROGATE RECOVERY:

- RAW SEDIMENT DENSITY WAS NOT MEASURED, HOWEVER, SETTLED SEDIMENT FROM BEAKER #8 HAD TS = 38.0%, VERY CLOSE TO THE AVG. TS OF RAW SEDIMENT. THUS, THE DENSITY OF SETTLED SEDIMENT #8 WAS USED – 1.3 kg/L
- SURROGATE RECOVERY = 130%

$$\text{DRY WEIGHT} = \frac{0.149 \frac{\text{mg PCB}}{\cancel{\text{kg total}}}}{1.3 \text{ surr. recov.}} * \frac{\cancel{\text{L total}}}{372{,}430 \text{ mg solids}} * \frac{1.3 \cancel{\text{kg total}}}{\cancel{\text{L total}}} * \frac{10^6 \text{ mg solids}}{\text{kg solids}}$$

$$\boxed{\text{DRY WEIGHT} = 0.40 \frac{\text{mg PCB-1254}}{\text{kg dry solids}}}$$

COLUMBUS MCKINNON CORP.
BENCH SCALE TREATABILITY TESTING
SEDIMENT SOLUTION PREPARATION*

Sample No.	Sediment Volume, mL	Water Volume, mL	Volume Removed for Tot. Solids Analysis, mL	Total ① Solids, mg/L	Conc. of Spike Sol.	Volume Spike Sol. ml	Observations
1	200 ml	1800 ml	10 ml	20,080	21.331 mg/ml	1	
2	200 ml	1800 ml	10 ml	19,720	21.331 mg/ml	1	
3	200 ml	1800 ml	10 ml	21,340	21.331	1	
4	200 ml	1800 ml	10 ml	21,520	21.331	1	
5	200 ml	1800 ml	10 ml	23,480	21.331	1	
6	200 ml	1800 ml	10 ml	19,630	21.331	1	
7	200 ml	1800 ml	10 ml	25,230	21.331	1	
10 8	200 ml	1800 ml	10 ml	31,980	21,331	1	
9	200 ml	1800 ml	10 ml	33,210	21,331	1	Solids Interface @ 1 HR = [illegible] mls
10	200 ml	1800 ml	10 ml	38,910	[illegible] 56 ~~34,540~~	0	
11	200 ml	1800 ml	10 ml	34,540		0	
12	200 ml	1800 ml	10 ml	45,460		0	

* Preparation of 2-liter volumes of 10% by volume sediment/creek water solutions.

Spike Solution: 21,331 PPM in Toluene

① Aliquot Removed after 1 HR Mixing @ 150 RPM

ANALYSIS WORKSHEET / QC DATA

Analysis Date: 1-27-93

Analyst: ND

Supervisor: JM

Parameter: TS

Method Reference:

# of Samples:

RAW SEDIMENT TOTAL SOLIDS

BLANK RESULT:

DETECTION LIMIT:

WAVELENGTH: nm

CONCENTRATION OF STANDARDS	RESULTS OF STANDARDS	CALCULATIONS
%RPD = 23.8%		

CLIENT NAME (JCB #)	SAMPLE ID	SAMPLE MATRIX	TARE	DRY		ABS STRAINS	RESULTS	
							[illegible]	[illegible]
SED. 22	SEDIMENT	10 ml	58.5919	62.7603			416840	
DCP 27	↓	✓	52.2853	55.5655			328020	

COMMENTS:

☐ CHECKED BY: DATE:

☐ LOGGED BY: DATE:

Q.C. Batch 012 QC32601

M.P. ID	ETC ID		Approx Conc of PCB
PCB # 1	GF1966	#9 Sediment	3862.84 mg/kg of 1254
matrix Interference → PCB # 2	GF1967	Raw Sediment	149.35 mg/kg of 1254
PCB # 3	GF1968	#9 Filter Paper	14385.80 mg/kg of 1254
BLK	GF1969		0.0 mg/kg

Q.C. Batch 012 QC32603

M.P. ID	ETC ID	Approx Conc of PCB
210	GF1988	11.69 mg/L of 1254
212	GF1989	13.00 mg/L of 1254
214	GF1990	8.50 mg/L of 1254
216	GF1991	5.54 mg/L of 1254
218	GF1992	9.01 mg/L of 1254
220	GF1993	16.98 mg/L of 1254
222	GF1994	25.35 mg/L of 1254
224	GF1995	9.69 mg/L of 1254
BLK	GF1996	0.0 mg/kg

RDK 2/5/93

0

1/28/93

COLUMBUS MCKINNON
BENCH SCALE TREATABILITY STUDY

2000mL 2000mL 1950mL 1975mL 1950 2000 1950 2000 ← Initial Volume (mL)

Time	Height, mL							
	1	2	3	4	5	6	7	8
30 sec	1950	1950	1900	1900	1900	1950	1950	1950
1 min	1900	1900	1850	1850	1900	1950	1850	1900
1.5 min	1850	1850	1800	1800	---	---	---	---
2 min		1800	1800	1800	1850	1900	1900	1900
3 min		475	500	550	600	425	510	850
5 min			400	430	480	375	410	675
10 min				350	390	300	350	525
20 min					See attached sheets			
30 min						210	250	390
1 hr						200	210	330
1.5 hr							200	310
2 hr							200	300
Tot. Ht.*	1100	600	560	450	—	225		
Interface	None Discernable	400	400	325	—	200		

* Volume of sediment remaining after decanting supernatant.

Time	Height, mL							
	1	2	3	4	5	6	7	8
2.5 hr							200	300
3 hr							200	300
3.5 hr								300
4 hr								300
4.5 hr								
5 hr								
5.5 hr								
6 hr								
6.5 hr								
7 hr								290 10:15
7.5 hr								290 10:45
8 hr								290 11:15
8.5 hr								290 11:45
9 hr								290 12:15
9.5 hr								285 12:45
10 hr								285 1:15
Tot. Ht.							250	325
Interface							200	285

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APPENDIX C

BENCH-SCALE DATA CALCULATIONS

APPENDIX C

C.1 AROCLOR 1254 RESULTS

An anlytical data review was conducted to verify the PCB result of the sample collected by Malcolm Pirnie, Inc. personnel from the Columbus McKinnon site on January 25, 1993 and extracted by the Malcolm Pirnie Environmental Laboratory on January 28, 1993. The sample was subsequently analyzed by ETC on February 4, 1993 utilizing SW-846, method 8080.

A review of the holding times indicates that the sample was both extracted and analyzed within established holding time criteria.

A review of the method blank data indicated that no contaminants were detected in the blanks and that the sample value was not biased by laboratory, glassware, or instrument contamination.

The surrogate spike recovery for 2,4,5,6-tetrachloro-m-xylene (128%) was within established control limits (34%-160%) indicating successful sample extraction and acceptable analytical system efficiency.

According to the protocol, sample analysis was conducted utilizing dual column confirmation. Aroclor 1254 was detected in sample GF1967 on each of the columns. The quantification of the analytical result is provided as attached.

C.2 PCB CONCENTRATIONS

The PCB-1254 concentrations in the sediment and supernatant (insoluble and soluble) fractions of the samples are presented in Table C-2. The PCB concentrations in each fraction have been corrected for extraction procedure inefficiencies using surrogate spike recovery data as reported by the analytical laboratory for each sample. Surrogate recoveries are presented in Table C-1. The analytical results, as reported by the lab, were divided by the surrogate spike recovery percentage to reflect the more probable concentration. The PCB concentration in the sediment was measured on a wet weight basis and converted to dry weight basis by dividing by the total solids content of the settled sediment.

COLUMBUS McKINNON CORP.
REMEDIAL DESIGN REPORT

TABLE C-1

SURROGATE RECOVERIES

	Surrogate Recovery (percent)[1]		
Time (min.)	**Sediment**	**Insoluble**	**Soluble**
1.5	40	38	59
3	38	36	58
5	44	44	48
10	40	37	69
20	42	36	46
60	42	36	51
180	44	35	47
600	22	47	48

Note:
(1) Surrogate compound used to simulate PCB behavior was 2,4,5,6-Tetrachlor-m-Xylene (TMX).

COLUMBUS McKINNON CORP.
REMEDIAL DESIGN REPORT

TABLE C-2

PCB CONCENTRATION AND MASS

Settling Time (min.)	Sediment			Supernatant						
				Insoluble			Soluble			Total
	PCB Conc.(1)(3) mg/kg (dry)	PCB Mass(2) (mg)	% of Total Mass	PCB Conc.(1)(3)(4) mg/kg	PCB Mass(2) (mg)	% of Total Mass	PCB Conc(1) mg/l	PCB Mass(2) (mg)	% of Total Mass	PCB Mass (mg)
1.5	33.931	1.236	97.4	4.064	0.015	1.2	0.020	0.018	1.4	1.269
3	69.942	2.564	98.3	4.790	0.013	0.5	0.022	0.031	1.2	2.608
5	35.374	1.421	97.4	8.187	0.012	0.8	0.018	0.026	1.8	1.459
10	47.500	1.975	99.0	7.976	0.007	0.4	0.008	0.012	0.6	1.994
20	55.470	2.512	98.8	6.352	0.003	0.1	0.020	0.028	1.1	2.543
60	60.844	2.362	97.3	18.420	0.008	0.3	0.033	0.059	2.4	2.429
180	33.695	1.653	94.4	38.844	0.006	0.3	0.054	0.092	5.3	1.751
600	96.842	6.180	99.4	8.052	0.001	0.02	0.020	0.034	0.5	6.215

NOTES:
(1) Corrected using surrogate recoveries (see Appendix C).
(2) See Appendix C for calculation procedure.
(3) Concentration was measured on wet-weight basis and converted to dry weight basis by dividing by sediment total solids content.
(4) Dry weight basis.

As evidenced by the results in Table C-2, there is little PCB mass in the jar test supernatant in comparison to the mass in the settled solids. This condition occurs even in the jar having the shortest settling duration (i.e., 1.5 minutes), indicating that a substantial portion of the spiked PCB mass adhered to or settled with the fast sinking particles. Although the mass of insoluble PCBs appears to decrease slightly with time, 97% or more of the total PCB mass for each sample jar is associated with the settled sediment fraction, in all but one of the samples.

C.3 PCB MASS BALANCE

A PCB mass balance was performed for each of the eight jar test samples to determine the mass distribution of recovered PCBs among the sediment, insoluble and soluble fractions of the test solutions, and to determine if this distribution changed as a function of settling time. This information will be used to predict the anticipated distribution of PCBs between the sediment and supernatant in the dredge spoils impoundment.

This section presents the calculations used to determine the mass of PCBs in each fraction.

C.3.1 Calculations

The total recovered mass of PCBs in each sample is the sum of the soluble PCBs, insoluble PCBs and sediment PCBs:

$$\text{Mass Total Recovered PCBs} = \text{Mass Soluble PCBs} + \text{Mass Insoluble PCBs} + \text{Mass Sediment PCBs} \quad (1)$$

The mass of soluble PCBs in the supernatant of each sample was calculated by multiplying the supernatant aqueous PCB concentration (corrected for surrogate recovery) by the total volume of supernatant, as shown below in equation (2):

$$\text{Mass Soluble PCBs} = \text{Soluble PCB Concentration}\left(\frac{mg\ PCB}{L}\right) x\ \text{Supernatant Volume}\ (L) \quad (2)$$

The mass of insoluble PCBs in the supernatant was calculated by multiplying the supernatant insoluble PCB concentration (corrected for surrogate recovery) by the TSS of the supernatant and the total volume of the supernatant, as shown in equation (3):

$$\text{Mass Insoluble PCBs} = \text{Insoluble PCB concentration} \left(\frac{\text{mg PCB}}{\text{kg dry TSS}}\right) \times \text{TSS} \left(\frac{\text{mg}}{L}\right) \times \text{supernatant Vol. } (L) \qquad (3)$$

The mass of PCBs in the sediment was calculated by multiplying the sediment PCB concentration (dry weight basis, corrected for surrogate recovery) by the mass of total solids in the sediment fraction. The mass of total solids in the sediment fraction was calculated as the difference between the initial mass of total solids in each solution and the mass of total suspended solids in the supernatant fraction. Thus, the mass of PCBs in the sediment was calculated according to equation (4):

$$\text{Mass Sediment PCBs} = \text{Sediment PCB Concentration} \left(\frac{\text{mg PCB}}{\text{kg dry sediment}}\right) \times \left[\left(\text{Initial Total Solids} \left(\frac{\text{mg}}{L}\right) \times \text{Initial Volume } (L) \right) - \left(\text{TSS} \left(\frac{\text{mg}}{L}\right) \times \text{Supernatant Volume } (L) \right)\right] \qquad (4)$$

APPENDIX D

GRAIN SIZE DISTRIBUTION

GZA
GeoEnvironmental
of New York

*Engineers and
Scientists*

February 15, 1993
File: 6032

GZA

364 Nagel Drive
Buffalo, New York
14225
716-685-2300
FAX 716-685-3629

Ms. Jeanne Asquith
Malcolm Pirnie, Inc.
S-3515 Abbott Road, Box 1938
Buffalo, New York 14219

Re: Laboratory Test Results
MPI Job No. 1332

Dear Ms. Asquith:

GZA GeoEnvironmental of New York (GZA) has completed laboratory testing of a sample delivered to GZA by Malcolm Pirnie, Inc. (MPI). The sample was tested for particle size distribution using the sieve and hydrometer methods, ASTM D422. Data were collected in the hydrometer portion of the test at the frequency specified in ASTM D422 and at the frequency specified by MPI. The data were reduced using the data from both sets of hydrometer readings and grain size curves were plotted for both data sets. The sample designated as 01253-1 is plotted with the ASTM specified hydrometer readings and the sample designated as 01253-1A is plotted with the MPI specified hydrometer readings. The test data and test procedures are attached.

Please call me if there are any questions regarding these data. GZA appreciates the opportunity to provide these services to MPI.

Very truly yours,

GZA GEOENVIRONMENTAL OF NEW YORK

Donald R. McMahon

Donald R. McMahon, P.E.
Associate Principal

Attachments

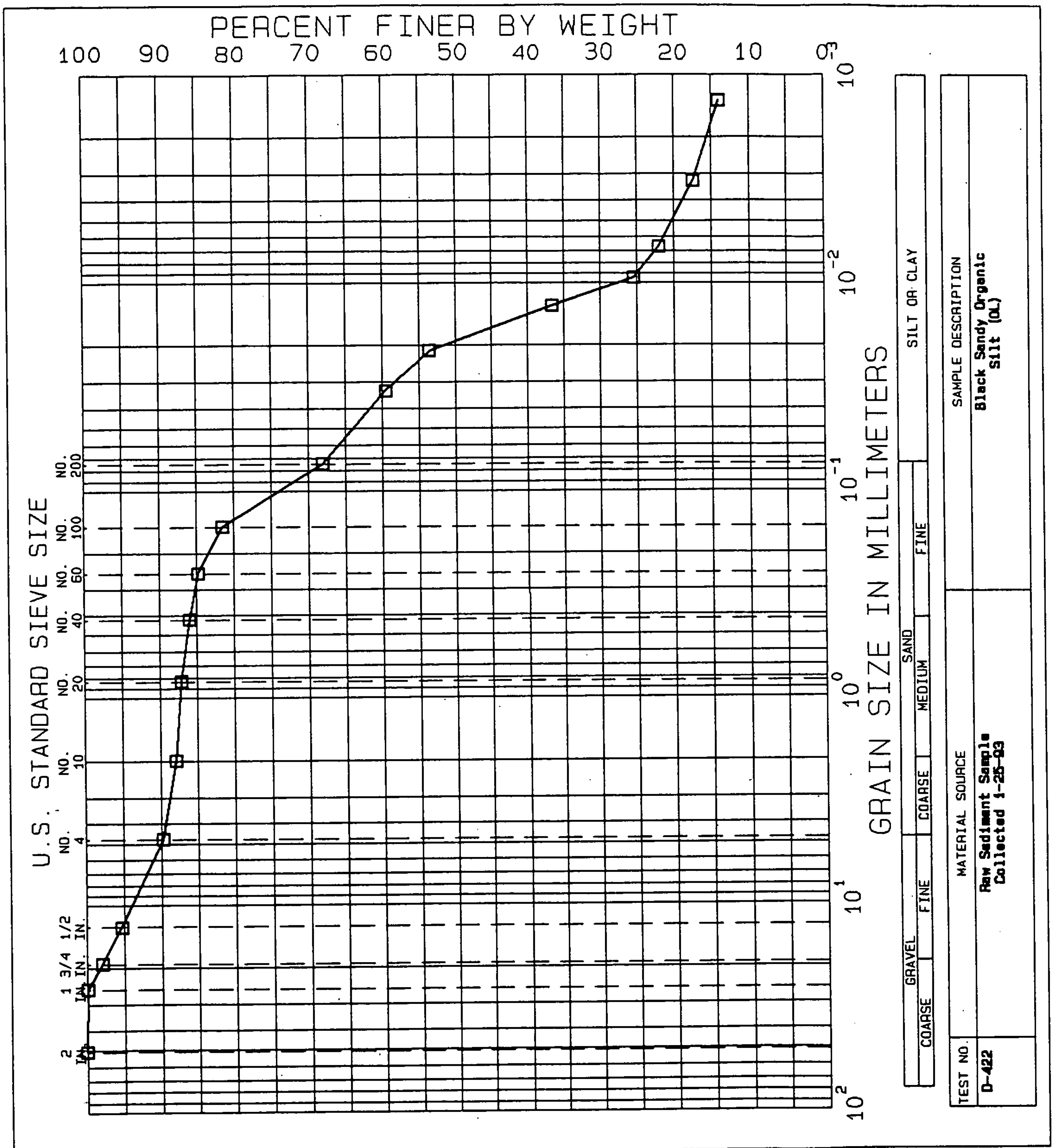
GEOTECHNICAL LABORATORY TESTING DATA SUMMARY

PROJECT NAME: MALCOLM PIRNIE JOB NO. 1332-01-2
PROJECT NO. 6032.00 PROJECT ENGINEER: D.R. McMAHON

MATERIAL SOURCE: PROJECT SITE
DATE ASSIGNED: 2-10-93 WORK ORDER NO. 1824

IDENTIFICATION			WATER CONTENT	ATTERBERG LIMITS			GRAIN SIZE ANALYSIS		MOISTURE-DENSITY RELATIONSHIP (Modified)		PERMEABILITY TEST					LABORATORY LOG AND SOIL DESCRIPTION
SAMPLE TYPE	SAMPLE NUMBER	DEPTH ft.	%	LL %	PL %	PI	SIEVE -200 %	HYD. -2μ %	MAX. DRY DENSITY pcf	OPT. WATER CONTENT %	PERME-ABILITY cm/sec.	TYPE OF TEST	$\bar{\sigma}_c$ psf	DRY UNIT WT pcf	WATER CONTENT %	
	01253-1						68	15								Black Sandy Organic Silt (OL)
	01253-1A						68									Black Sandy Organic Silt (OL)

GZA GeoEnvironmental of New York
Engineers and Scientists



SAMPLE DESCRIPTION: Black Sandy Organic Silt (OL)

MATERIAL SOURCE: Raw Sediment Sample Collected 1-25-93

TEST NO.: D-422

MALCOLM PIRNIE
JOB NO. 1332-01-2
GRADATION TESTS

EXPLOR. NO.
SAMPLE NO. 01253-1
DEPTH
TECH. JB
REVIEWER WSL

WORK ORDER NO. 1824
DATE 2-12-93
FILE 8032.00

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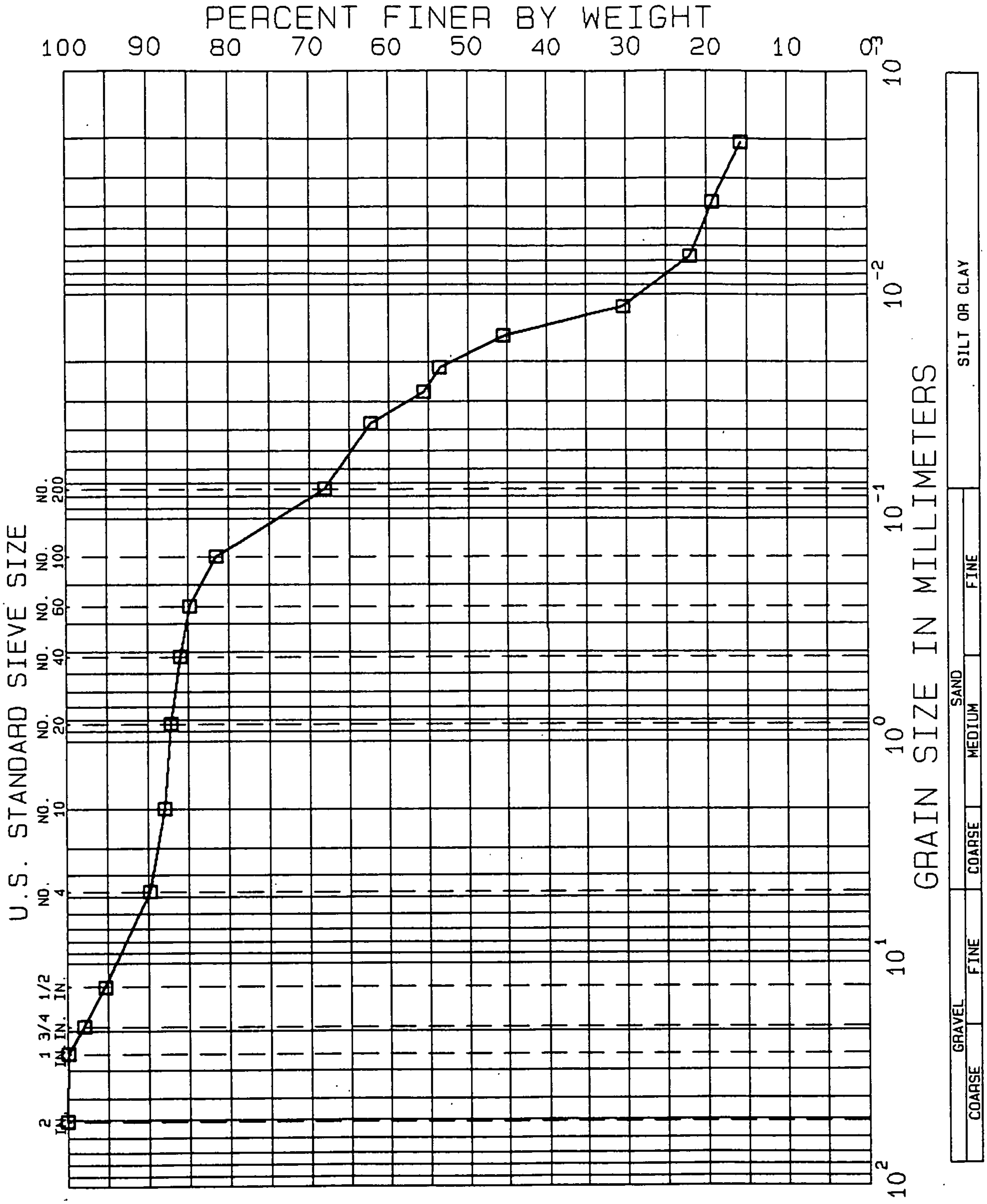

TEST NO.	MATERIAL SOURCE	SAMPLE DESCRIPTION
D-422	**Raw Sediment Sample Collected 1-26-93**	**Black Sandy Organic Silt (OL)**

MALCOLM PIRNIE
JOB NO. 1332-01-2
GRADATION TESTS

EXPLOR. NO.
SAMPLE NO. **01253-1A**
DEPTH
TECH. **JB**
REVIEWER **WGL**

WORK ORDER
NO. **1824**
DATE **2-12-93**

FILE **8032.00**

GZA GeoEnvironmental of New York
Engineers and Scientists

LEGEND FOR GEOTECHNICAL LABORATORY DATA SUMMARY SHEET

WATER CONTENT (ASTM D 2216)

% = WATER CONTENT IN PERCENT

ATTERBERG LIMITS (ASTM D 4318)

LL % = LIQUID LIMIT IN PERCENT

PL % = PLASTIC LIMIT IN PERCENT

PI = PLASTICITY INDEX

GRAIN SIZE ANALYSIS (ASTM D 422)

SIEVE -200 % = PERCENT FINES, MATERIAL FINER THAN NO. 200 SIEVE (0.074 MM)

HYD. -2μ % = PERCENT FINER THAN 2 MICRONS

MOISTURE-DENSITY RELATIONSHIP (Modified) (ASTM D 1557)

MAX. DRY DENSITY pcf = MAXIMUM DRY DENSITY IN POUNDS PER CUBIC FOOT

OPT. WATER CONTENT % = OPTIMUM WATER CONTENT IN PERCENT

PERMEABILITY TEST (ASTM D 5084)

PERMEABILITY cm/sec. = PERMEABILITY MEASURED IN CENTIMETERS PER SECOND

TYPE OF TEST Kr = RECONSTITUTED (REMOLDED) SAMPLE
K = UNDISTURBED SAMPLE

$\bar{\sigma}_c$ psf = EFFECTIVE CONFINING PRESSURE DURING PERMEABILITY TEST IN POUNDS PER SQUARE FOOT

DRY UNIT WT. pcf = DRY DENSITY OF TEST SAMPLE IN POUNDS PER CUBIC FOOT

WATER CONTENT % = WATER CONTENT OF TEST SAMPLE IN PERCENT

GZA GeoEnvironmental of New York
Engineers and Scientists

APPENDIX E

~~Appendix E1 - Field Composting Procedures~~
Appendix E1 - Hand Auger Sample Collection Procedure
Appendix E2 - Sample Labelling Procedure
Appendix E3 - Sample Shipping Procedure
Appendix E4 - Ponar Dredge Sampling

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APPENDIX E1

HAND AUGER SAMPLE COLLECTION PROCEDURE

Appendix E : Item 1 - HAND AUGERING

Applicability: GENERAL Revision No.: ____ Date: ________

Prepared By: KRM Date: 12/6/89 Approved By: KLB Date: 12/6/89

1.0 INTRODUCTION

This guideline presents a method for hand augering which enables the recovery of representative subsurface samples for identification and testing (ASTM D1452-80).

2.0 METHODOLOGY

1. Review project objectives and the Project Health and Safety Plan (HASP).
2. Select augering locations which provide necessary information for achieving objectives. Check locations with owner/operator to ensure augering operations will not interfere with site operations, and select appropriate access routes.
3. Stake locations in field and measure distance from locations to nearest landmarks. Survey location, if required.
4. Obtain clearances from appropriate utilities and, if buried waste/metallic objects are suspected, screen location with appropriate geophysical methods.
5. Establish a central staging area for storage of augering supplies and for equipment decontamination (include plastic-covered work bench/table as necessary). Locate a secure storage area for augered samples.
6. Assemble auger and decontaminate in accordance with approved procedure (see appropriate guideline).
7. Cover the area to be sampled with plastic sheeting.
8. Make the auger boring through the plastic sheeting by rotating and advancing the auger the desired distance into the soil.

9. Withdraw the auger from the hole and remove soil for examination and on-site testing.

10. Document all properties and sample locations in the Project Field Book as described below.

11. Place sample in appropriate container(s), label and store for future reference or ship to laboratory for analysis in accordance with approved procedures (see appropriate guideline).

12. Decontaminate auger in accordance with approved procedures (see appropriate guideline).

13. Advance auger to next sample interval and repeat steps 7 through 12.

14. Backfill auger holes in accordance with approved procedures (see appropriate guideline).

3.0 DOCUMENTATION

A "Project Field Book" should be established upon initiation of any site activities to document the field investigation process. The Field Book represents a critical, legally defensible QA component of the project. The Field Book must be bound and should have numbered (can be numbered in field), water resistant pages. Various data forms can be inserted into the book as appropriate, prior to binding. All notations should be in black ink which will not smudge when wet. Notations in the Field Book should follow a log book format, specifying time and date of

Appendix E: Item 1 - HAND AUGERING

Applicability: GENERAL Revision No.: ____ Date: ________

Prepared By: KRM Date: 12/6/89 Approved By: KLB Date: 12/6/89

- plastic sheeting
- stainless steel trowel
- workbench/table
- stainless steel sampling knife
- approved cleaned sample container(s)
- auger(s) per ASTM D1452-80
- waterproof marker
- measuring tape
- engineer's rule/tape
- Project Field Book

APPENDIX E2

SAMPLE LABELLING PROCEDURE

Appendix E: Item 2 - SAMPLE LABELLING FOR OFF-SITE ANALYSIS

Applicability: GENERAL Revision No.: 3 Date: 5/10/90 MMY

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 10/10/89

1.0 INTRODUCTION

This guideline presents a method for sample labelling in order to properly identify samples collected during the pilot plant program.

2.0 METHODOLOGY

1. Assign each sample of each matrix a unique identification alphanumeric code. An example of this code and a description of its components is presented on the following page.
2. Affix a non-removable (when wet) label to each sample container. The following information should be written on the label with permanent marker:
   - Site name
   - Sample identification
   - Project number
   - Date/time of sample collection (month, day, year)
   - Sampler's initials
   - Sample preservation
   - Analysis required
3. Wrap the label with 2-inch cellophane tape such that the label is completely covered and the tape wraps around the entire perimeter of the bottle.

<u>Example of Sample ID: HRD-BTE1</u>

HRD (Site Code) Harrison Radiator	BTE1 (Sample Location)

BTE = Biotower Effluent
1 = Sample No. 1
TB = Trip Blank
RB = Field (Rinse) Blank

055.3

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APPENDIX E3

SAMPLE SHIPPING PROCEDURE

Appendix E: Item 3 - SAMPLE SHIPPING

Applicability: GENERAL Revision No.: 3 Date: 5/10/90 MMY

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 10/10/89

1.0 INTRODUCTION

This guideline presents a method for chain-of-custody procedures to track sample shipments, to minimize loss or misidentification of samples, and to ensure that unauthorized persons do not tamper with collected samples.

2.0 METHODOLOGY

1. Fill out the chain-of-custody form completely (see attached example) with all relevant information (the white original goes with the samples and should be placed in a "ziploc" plastic bag and taped inside the sample cooler lid; the yellow copy should be retained by the sampler).
2. Mark liquid volume levels on sample bottles with grease pencil.
3. Place about 3 inches of inert cushioning material such as styrofoam peanuts or bubble pack in bottom of cooler. Place bottles in cooler with VOA vials (in a "ziploc" bag) in the center of the cooler.
4. Cover pack bottles, especially VOA vials, with ice in plastic bags. Pack cooler with blue ice in "ziploc" plastic bags and additional cushioning material.
5. Tape drain shut and wrap cooler completely with strapping tape to secure lid.
6. Place lab address on top of cooler. To protect the shipping coolers against tampering during shipment, the cooler lid will be taped to the cooler body. A chain-of-custody seal will be placed over the tape. A broken seal will indicate that the contents may have been tampered with.

Appendix E: Item 3 - SAMPLE SHIPPING

Applicability: GENERAL Revision No.: 3 Date: 5/10/90 MMY

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 10/10/89

7. For out-of-town laboratory shipments, specify that the contents are "Fragile" and place "This Side Up" labels on all four sides of the cooler. "This Side Up" labels are yellow labels with a black arrow with the arrow head pointing toward the cooler lid. "This Side Up" labels should not be affixed to the cooler lid or the cooler bottom.

APPENDIX E4

PONAR DREDGE SAMPLING

Appendix E : Item 4 - PROCEDURE FOR COLLECTION OF BOTTOM SEDIMENT SAMPLES IN DEEP WATER

Applicability: GENERAL Revision No.: 1 Date: 11/9/89

Prepared By: THF Date: 11/9/89 Approved By: KLB Date: 11/9/89

1.0 INTRODUCTION

This guideline presents a procedure for collecting sediment samples from a river bottom. Often, the sampling of bottom sediments is complicated by the structural properties of the material and the fact that sampling takes place below a water surface. It is thus necessary to select appropriate sampling materials and apply proper sampling techniques in order to collect a representative sample.

The procedure described herein is for the collection of sediment samples from the side of a boat using a Ponar Grab Dredge. The Ponar Grab Dredge is a clamshell-like device which allows for collection of a sediment sample at a discreet location. The Ponar Grab Dredge jaws close automatically upon striking bottom. This device is constructed primarily of stainless steel, which makes it suitable for use in obtaining environmental samples.

2.0 HEALTH AND SAFETY REQUIREMENTS

In addition to compliance with the Project Health and Safety Plan, the following safety guidelines will be followed during sediment sampling from a boat:

1. A minimum of two and a maximum of three persons shall be in the boat at all times.
2. All personnel shall wear U.S. Coast Guard - approved personal flotation devices (PFDs) while in the boat.

3. The boat used during sediment sampling will be a large (approximately 16-foot length), flat-bottomed type to provide stability and ample work area.

4. The boat shall be equipped with an anchor, anchor rope, two oars and small outboard motor.

5. The boat operator will be familiar with U.S. Coast Guard safety procedures for operating a boat.

6. Sampling will be conducted when weather conditions allow for safe operation of the boat and the potential of capsize due to strong current is minimized.

3.0 METHODOLOGY

The sediment sampling procedure is described below:

1. Ensure appropriate safety procedures for boat operation are followed.

2. Anchor boat from bow over sample location.

3. With the Ponar Grab Dredge jaws in the open position, lower the device from the stern of the boat until it strikes bottom, noting the depth from the water to the water/sediment interface.

4. Gently lift the dredge off the river bottom, and slowly raise it through the water until it breaks the water surface.

5. Bring the dredge near (not inside) the boat. While one individual holds the stainless steel bowl under the dredge, the other person can open the jaws and empty the sediment into the bowl.

6. Record field measurements, such as weather conditions, depth to sediment, sample location, sample appearance/odor, types of sediment present, and other pertinent information in the Project Field Book.

Appendix E: Item 4 - PROCEDURE FOR COLLECTION OF BOTTOM SEDIMENT SAMPLES IN DEEP WATER

Applicability: GENERAL Revision No.: 1 Date: 11/9/89

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7. Gently mix the retrieved sediment with the stainless steel scoop to provide a homogeneous sample. Fill the appropriate sample containers, and follow appropriate sample handling procedures.
8. Decontaminate the sampling equipment between sampling locations.

4.0 EQUIPMENT REQUIREMENTS

- personal protective garment and gear (if applicable)
- Ponar Grab Dredge
- nylon rope (20', flagged at 5' intervals)
- stainless steel bowl
- stainless steel scoop
- boat with motor, anchor, oars
- Project Field Book