RESPONSE ACTION IMPLEMENTATION CERTIFICATION REPORT WIRE MILL POND U.S. STEEL DULUTH WORKS SITE DULUTH, MINNESOTA

February 1998

Prepared for

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CERTIFICATION

The U.S. Steel, Duluth Works Site, Wire Mill Pond Response Action (RA) implementation project, as required by the approved Response Action Plan (RAP), is complete. The RA activities required by the Minnesota Pollution Control Agency (MPCA) were performed to be consistent with the approved RAP and subsequent MPCA correspondence and discussions, as referenced throughout this document and presented in Appendix A. With the exception of the wetlands establishment to be conducted in the spring of 1998, no deficiencies in the work are believed to exist nor were any documented by the MPCA representatives during site inspections. The certification statement below attests to the truth, accuracy and completeness of the Wire Mill Pond RA implementation as required by the MPCA.

> "I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified portions of this document for which I cannot personally verify their truth and accuracy, I certify as the company official having supervisory responsibility for the person(s) who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.
>
> I hereby certify, that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the state of Minnesota."

James M. Bedessem | 24247 | 3-3-98

James M. Bedessem, P.E. — License No. — Date
ARCADIS Geraghty & Miller, Inc.

RESPONSE ACTION IMPLEMENTATION CERTIFICATION REPORT WIRE MILL POND U.S. STEEL DULUTH WORKS SITE DULUTH, MINNESOTA

1.0 INTRODUCTION

U.S. Steel (USS) has completed construction activities associated with the response action (RA) for the Wire Mill Pond at the Duluth Works Site (Site) in Duluth, Minnesota. Activities were conducted in accordance with the Response Action Plan (RAP), as approved by the Minnesota Pollution Control Agency (MPCA) in correspondence dated November 6, 1996 (see Appendix A). The Wire Mill Pond was a "no action" alternative as defined in the Record of Decision (ROD) in 1989; however, as part of a voluntary agreement, USS prepared and implemented the RAP. USS retained Geraghty & Miller as Project Engineer to provide construction oversight and certify the implementation of the RA. Construction activities commenced on June 12, 1997, and with the exception of wetlands establishment (to be completed in the spring of 1998), USS completed the field activities as required in the RAP on December 6, 1997.

This RA Implementation Certification Report and the accompanying set of Record Drawings summarize the events leading to the completion of the RA field activities, present the "as-built" conditions, and provide certification that the remedy was executed as prescribed in the RAP. Further, this report and accompanying drawings are intended to serve as the RA construction certification report, focusing on site remedial activities, quality assurance/quality control (QA/QC), design modifications, and the achievement of performance standards as established in the RAP. The following major sections are included:

- Certification;
- 1.0 Introduction;

- 2.0 Response Action Requirements;
- 3.0 Construction Implementation;
- 4.0 Construction Modifications;
- 5.0 Construction Quality Assurance/Quality Control;
- 6.0 Response Action Monitoring;
- 7.0 Operation and Maintenance; and,
- 8.0 References.

Each section discusses specific site issues leading to the completion of the RA implementation. Data collected throughout the RA process are summarized in tables or appended for reference as supporting documentation.

1.1 BACKGROUND

The Site was an integrated steel mill consisting of coke production, iron and steel making, casting, primary rolling and roughing, hot and cold finishing and galvanizing. The Site is located in Sections 34 and 35, T49N, R15W, and Sections 2 and 3, T48N, R15W in the southern portion of the City of Duluth, St. Louis County, Minnesota (Drawing No. 1, Appendix B).

In 1907, the Minnesota Steel Company, a USS subsidiary, purchased the Duluth Works Site and built a machine shop and small powerhouse. Additional facilities were constructed several years later. Production began in 1915. Principal products were shell steel, rails, and structural shapes. Operation of the open hearth and blast furnaces ceased in 1975. Operations at the coke plant ceased in 1979.

Most of the buildings including blast furnaces, open hearth furnaces, fuel oil storage tanks, the rolling mill, the material storage area and the coke plant have been demolished. The

wire mill and several shop buildings were being demolished concurrent with RA activities at the Wire Mill Pond.

The Site is bounded by Morgan Park to the north, the St. Louis River to the east, and the Duluth Missabe and Iron Range Railroad to the west and south. Land to the northwest of the Site is steep and hilly.

During operations, the Wire Mill Pond served as a receiving water for stormwater and wastewater from the "cold" side of the integrated steel mill, including the wire mill and the merchant mill. Operations performed in these mills included hot and cold rolling, pickling, and galvanizing. The cold side of the Duluth Works ceased operation in 1973, except for the wire mill which continued to operate under a lease agreement. Tenants used the wire mill and discharged noncontact cooling water to the pond from 1973 until approximately 1986, when the operation of the wire mill was discontinued. The Wire Mill Pond was used as a treatment basin, holding wastewater to allow oil and greases to be removed prior to discharge to the St. Louis River. Additional background for the Wire Mill Pond, including sediments and water quality, is provided in Section 2.0 - Background of the RAP (Barr 1996).

1.2 PROJECT ORGANIZATION

The RA implementation was conducted by various management, inspection, and construction personnel organized to effectively administer, supervise, test, and construct the prescribed remedy in a sound engineering manner and in compliance with the approved RAP. These responsibilities were divided into three categories, each fulfilled through the procurement of outside services by USS, and include RA construction, construction management, and construction QA/QC. Inspections for regulatory compliance were also conducted by MPCA representatives. Each of these roles are defined and specific personnel identified in the subsections below.

1.2.1 Construction Contractor

Waste Abatement Technology, L.P. (WATEC) was the general contractor for the USS, Duluth Works Site Wire Mill Pond RA implementation project. WATEC was responsible for furnishing all labor, methods, services, materials, equipment, and installation of all materials related to the remedy as prescribed in the RAP. WATEC was also responsible for implementing construction quality control (CQC) to ensure that the materials and performance of construction met the intent of the RAP as required in the technical specifications. The construction contractor was comprised of the following personnel; specific responsibilities for construction QA/QC are further defined in Section 5.0 and in the RAP:

- Construction Contractor Superintendent: Steve Kelemencky, WATEC
- CQC Manager: Steve Kelemencky, WATEC
- CQC Testing Laboratories: Northeast Technical Services, Inc.
- Land Surveyor: SALO Engineering, Inc.
- Construction Crew: WATEC
  Earth Burners, Inc.

1.2.2 Construction Management

Geraghty & Miller provided the daily, on-site construction management and oversight for design compliance, scheduling, budget tracking, and overall conformance with the construction drawings and technical specifications. USS and Geraghty & Miller office personnel were also involved on a daily basis in construction and contractual issues, and related changes in the construction drawings and technical specifications.

1.2.3 Construction Quality Assurance

Geraghty & Miller was also retained by USS to perform construction quality assurance (CQA) functions throughout the implementation of the RAP. Geraghty & Miller personnel observed each component of the remedy to determine compliance with the RAP. The CQA protocols presented in Section 5.0 and the RAP were followed for CQA activities. The CQA team was comprised of the following personnel; specific responsibilities for each CQA position are further defined in Section 5.0 and the RAP:

- CQA Officer: James Bedessem, Geraghty & Miller
- Field Engineers:
  - CQA Manager: Darren Quillen, Geraghty & Miller
  - Inspectors: Peter Kero, Geraghty & Miller
    Sean Jeric, Geraghty & Miller
    David Richardson, Geraghty & Miller

1.2.4 Regulatory Agency Inspection

The MPCA oversaw the RA implementation project throughout the construction period. The MPCA had the authority to inspect the construction site, review the design and necessary field revisions, verify that the CQA/CQC practices were being appropriately implemented, obtain verification samples, and verify that the construction was in compliance with the RAP. Representatives from the Duluth and Minneapolis offices of the MPCA conducted inspections; typically, inspections were conducted by the following MPCA personnel:

- John Moeger, MPCA-Minneapolis office
- Eric Dott, MPCA-Minneapolis office
- Steven Schoff, MPCA-Minneapolis office
- Frank Wallner, MPCA-Minneapolis office

- Heidi Kroening, MPCA-Duluth office
- Timothy Musick, MPCA-Duluth office

A community work group that had been established previously continued to meet monthly throughout the construction of the RA. USS and the MPCA informed the work group of construction progress and major design changes at these meetings.

2.0 RESPONSE ACTION REQUIREMENTS

The RA implementation at the Site was conducted under the jurisdiction of the MPCA, and in accordance with the approved RAP entitled, "Response Action Plan, Wire Mill Pond, USS Duluth Works Site, Duluth, Minnesota," prepared by Barr Engineering Co. and dated February 1996. The RAP was developed in response to a USS voluntary agreement with the MPCA regarding the MPCA's concern with the materials that remained in the pond and their potential impact to the water quality in the St. Louis River. Remedial Action Objectives (RAOs) for the Wire Mill Pond were established to protect the water quality of the St. Louis River by improving the water quality of stormwater discharging from the site, through the Wire Mill Pond. To accomplish this objective, USS proposed to implement "best management practices" to minimize stormwater contact with residuals from former manufacturing operations. Specifically, the RAOs include the following:

- Eliminate stormwater contact with residual materials in the existing primary storm sewer drainage (84-inch pipe) for the watershed by limiting flow through the pipe and by cleaning and rehabilitating portions of the pipe which will remain in use.

- Eliminate stormwater contact with contaminated sediments in the Wire Mill Pond by removing the sediments for off-site disposal.

- Fill the pond with clean fill material to a depth which will promote the establishment of a wetland.

The development and implementation of this remedy consisted of the major components presented below and as discussed in the RAP:

- modification of watershed drainage patterns;

- rehabilitation of 84-inch storm sewer;
- temporary diversion of stormwater flows;
- temporary barrier at the Wire Mill Pond outlet;
- gross pond dewatering and temporary water treatment;
- excavation of non-native material from the Wire Mill Pond;
- dewatering of excavated material;
- drying of excavated material;
- transportation of excavated material;
- backfilling Wire Mill Pond; and,
- site restoration via wetlands construction.

The design criteria and the performance standards established in the RAP were used to ensure that the RA accomplished the aforementioned objectives. The performance standards setforth for the implementation of this project include minimum water quality treatment standards for pond water discharge into the St. Louis River (see Table 5-1), removal of non-native material to a depth of 589 feet above mean sea level (amsl) in the center of the pond and disposal in an off-site landfill, and the placement of backfill in the pond to an approximate elevation of 599.5 feet amsl to create the appropriate habitat for the emergence of wetlands.

As a result of the RA, the performance standards have been, or are being met as documented in the laboratory data summary tables and appendices. All verification testing was performed in accordance with the RAP, as noted in the construction QA/QC plan presented in Section 5.0.

3.0 CONSTRUCTION IMPLEMENTATION

WATEC was retained as the RA general construction contractor to supervise and conduct activities associated with the response implemented at the Site. Their selection was the result of a competitive bidding process conducted by USS. WATEC was contracted to provide appropriate and adequate labor, equipment, and materials to execute the construction activities in accordance with the RAP and the technical specifications prepared for the project. During implementation, Geraghty & Miller, as the Project Engineer, provided on-site construction management and QA/QC services on behalf of USS.

3.1 CONSTRUCTION OVERVIEW

WATEC initiated site work on June 12, 1997, and completed the work on December 6, 1997. WATEC implemented the construction activities in accordance with the RAP, prepared by Barr Engineering on behalf of USS, and subsequent correspondence provided in Appendix A. Throughout the construction period, Geraghty & Miller provided oversight on a full-time basis, while the MPCA conducted periodic site inspections.

The RA consisted of general site preparation; gross pond dewatering and treatment; bulkhead construction in the existing 84-inch storm sewer; removal, staging and disposal of non-native materials from the pond; backfilling the pond; and site restoration. Each activity was planned and specified in the RAP and technical specifications to achieve quality control and efficiency. The sequence of activities was a significant factor in completing the remedy within the 1997 construction season and is discussed in the following sections.

Site preparation consisted of items including, but not limited to, furnishing and setting up the field offices and staging areas; establishing erosion and sedimentation control measures, such as silt fence; establishing field controls; clearing and grubbing; construction of the temporary

stormwater diversion ditches; and, construction of the dewatering basin. Gross pond dewatering and treatment commenced during site preparation activities and continued throughout a majority of the project. This component of the RA required the most significant construction modification by implementing in-place flocculation of the pond and geotextile installation to adequately filter the suspended solids and enable dewatering and treatment activities to continue (see Section 4.4). Bulkhead construction of the storm sewer reduced the quantity of site-wide run-off which was discharged into the pond. Sediment excavation, staging, and disposal comprised the primary objective of the RA and was completed via landfill disposal of sediment at a minimum solids content of 70 percent. Soil backfill activities and site restoration completed the construction activities for the 1997 construction season. Wetland species planting and establishment is the only outstanding component and will be completed in the spring of 1998.

With the exception of those components presented in Section 4.0 - Construction Modifications, these activities were conducted in accordance with the RAP and the technical specifications. A photographic documentation of the RA implementation is presented in Appendix C.

3.2 CONSTRUCTION SEQUENCE

RA implementation was planned and conducted in a logical series of activities to efficiently complete the construction within the 1997 season while maintaining control of the site throughout field activities. A brief discussion of the sequence of construction and chronology of events is provided below.

Throughout the majority of the RA implementation, various components were conducted simultaneously to expedite completing of the project. At the commencement of construction, pond dewatering/treatment was performed concurrent with site preparation activities. Pond dewatering/treatment continued throughout the project, with interruptions for maintenance, until mid-November at which time dewatering activities were terminated. Upon realization that the

existing treatment system could not operate with the high suspended solids loading and during the engineering evaluation to remedy this situation, sediment excavation commenced and was completed; staging and disposal operations continued for two months subsequent to the completion of sediment excavation activities. In-place flocculation and geotextile installation was the alternative selected to address the high colloidal content in the water column. Upon completion of the geotextile installation, backfilling operations commenced and required approximately 3 weeks to complete. Site restoration completed RA construction activities, with the exception of wetlands establishment which will be completed in the spring of 1998. A chronology of events throughout RA construction is summarized below:

Date	Activity
June 12, 1997	Mobilization
June 16, 1997	Initiated site preparation
June 23, 1997	Initiated water treatment system installation
June 26, 1997	Initiated gross pond dewatering and treatment
July 2, 1997	Initiated bulkhead construction
August 11, 1997	Initiated sediment excavation and processing
September 16, 1997	Completed sediment excavation
October 15, 1997	Conducted in-place flocculation of pond
October 20, 1997	Initiated pond discharge to Duluth sewer system
November 5, 1997	Initiated geotextile installation activities
November 7, 1997	Initiated backfilling operations
November 13, 1997	Completed processing and disposal of sediment
December 6, 1997	Demobilized from site

4.0 CONSTRUCTION MODIFICATIONS

Prior to, and throughout RA construction activities, construction modifications were implemented as a consequence of varying field conditions and operations to improve the function of the overall remedy. These modifications are consistent with the intent of the approved RA and were conducted either in conjunction with the MPCA or as a direct result of the conditions presented at the time of construction. The construction modifications are discussed below and represent deviations from the prescribed RAP and technical specifications.

4.1 STORM SEWER REHABILITATION

The location of the 84-inch storm sewer bulkhead was modified from that depicted on Drawing No. 3 of the RAP. USS determined that the Wire Mill building would be demolished and stormwater collection via storm sewer along the Wire Mill would no longer be required. Thus bulkhead construction was relocated downstream, away from the building, as depicted on Drawing No. 2 of the Record Drawings. Bulkheads were constructed near the outlets of the 84-inch, 30-inch, and 12-inch diameter pipes and the outfall structure was demolished. The MPCA was notified of this design modification, via a telephone conversation with Mr. Tom Kingston, and the construction drawings, dated January 22, 1997, reflected this modification.

4.2 DEWATERING BASIN DRAINAGE PIPE INSTALLATION

The existing corrugated metal pipe (CMP), located in the north ditch and designed to convey the discharge from the dewatering basin drainage pipe to the pond, was removed at the commencement of RA implementation. The removal of this existing CMP was conducted to further limit the quantity of stormwater runoff entering the pond during construction. The

corrugated polyethylene pipe (CPEP), intended to convey drainage from the dewatering basin to the wire mill pond via the CMP, was extended for direct discharge into the pond. This modification is depicted in Detail No. 2 of Drawing No. 7.

4.3 OUTLET FILTER FOR DEWATERING BASIN

The installation of the outlet filter in the dewatering basin was modified to provide filtration around the entire outlet. A 4-foot long by 4-foot wide box of silt fence was installed for total encasement of the outlet area. Crushed rock was placed within the confines of the silt fence, as designed, to provide added filtration capacity. This modification is depicted in Detail No. 1 of Drawing No. 7.

4.4 TEMPORARY WATER TREATMENT SYSTEM

To dewater the entire pond prior to excavation activities as originally intended by WATEC, an enhanced treatment system was proposed from that designed and operated prior to RA field implementation. As requested by the MPCA, and subsequently approved in correspondence faxed on June 20, 1997, the treatment system consisted of the following components:

- two 2,500-pound granular-activated carbon units;
- two 1,500-pound granular-activated carbon units;
- four 100-micron bag filters; and,
- four 25-micron bag filters.

Figure 4-1 provides a schematic diagram of the treatment system.

At the commencement of RA implementation, the system was operated in parallel with a flow rate capacity of approximately 400 gallons per minute (gpm). As greater filtration

and treatment capacity was required because of increased suspended solids content in the water column due to sediment excavation activities, the system was converted to operation in series. The bag filters were frequently cleaned to maintain filtration capacity and prohibit potential breakthrough. Additionally, two absorbent booms were placed around the discharge area as a precautionary measure requested by the MPCA. As further required by correspondence from the MPCA (see Appendix A), the effluent was tested on a weekly basis to verify that the system met the performance standards presented in the RAP.

4.5 GROSS POND DEWATERING

As previously discussed, an alternative approach to the RA was initiated by WATEC that included the removal of water from the pond prior to, and during, sediment removal activities. The MPCA was informed, and subsequently approved, this approach (see Appendix A). Water removal was initially conducted with the treatment system discussed in Section 4.4. Upon encountering a significant suspended solids content in the water column, the treatment system flow rate was significantly reduced and, consequently, was shut-down. Sediment removal activities commenced through the water column, as prescribed in the RAP, while other gross dewatering alternatives were evaluated. The selected alternative consisted of three components including in-place flocculation of the pond, gross dewatering via the treatment system and the sewer system, and installation of a filter fabric to prevent resuspension of settled solids. This alternative was discussed with the MPCA at various site meetings and telephone conversations. Each component is further discussed in the following subsections.

4.5.1 Flocculation

To remove the suspended solids content from the water column, the pond was flocculated in-place. Four, 6-inch centrifugal pumps were placed equidistant along the perimeter of the pond for circulation. A proprietary coagulant and flocculant were injected

into the circulating stream for approximately 5 hours. The objective of this process was to achieve a total suspended solids (TSS) content of 50 parts per million (ppm). A verification test was conducted the following day that yielded a result of 10 ppm.

4.5.2 Gross Dewatering

Upon completion of flocculation activities, the pond was dewatered to an approximate elevation of 597 amsl. This stage of gross dewatering was accomplished through both the on-site treatment system and direct discharge to the Duluth sewer system. Officials approved the use of the sewer as provided in correspondence from the Western Lake Superior Sanitary District, dated October 9, 1997, and the City of Duluth, dated October 16, 1997. Frequent testing was conducted to verify that the treated water met the RAP standards and that sewer discharge met the city's pretreatment standards (see Section 5.2.2).

The intake for discharge to the sewer was protected by absorbent booms to minimize any discharge of an oily sheen. The pond was pumped at a rate of approximately 300 gpm through approximately 3,200 lineal feet of 6-inch high density polyethlyene (HDPE) pipe and 1,400 lineal feet of existing forcemain pipe located at the main entrance of the USS Duluth Works. The existing forcemain pipe discharged the water into the sewer system at the existing Hilton Road connection. Upon achieving the desired water surface elevation, maintenance dewatering was conducted intermittently via the sewer system and the treatment system.

4.5.3 Geotextile Installation

A dual geotextile filter comprised of a woven and a non-woven fabric pre-sewn in the factory was installed over the pond to provide separation between the settled solids and clean backfill. This separation ensured that the fine-grained solids would not re-suspend during backfilling and potentially compromise the operation of the treatment system. The specific geotextile materials used were provided by TC Marifi and include HP570 (woven) and 1100N

(non-woven). The fabric was delivered to the site in pre-sewn panels 45 feet wide by 150 feet long; these individual panels were then sewn on-site prior to installation to comprise one 2.5-acre panel. The geotextile was pulled across the pond and temporarily anchored on one side while permitting the opposing side to slide into place during backfilling activities. The geotextile floated on the water during installation. A geotextile layout diagram and product specifications are provided in Appendix D.

Clean backfill was placed on the geotextile in 1-foot thick lifts along the south perimeter of the pond, down the center of the pond, and then, along the north perimeter of the pond. Backfilling was conducted in this manner to ensure that settled solids did not "squeeze" from under the geotextile and to minimize stresses on the fabric. The geotextile was then backfilled in a manner to uniformly sink the fabric. After placement of three, 1-foot thick lifts over the entire geotextile, backfilling continued in 1 to 2-foot thick lifts until the design elevation was obtained.

4.6 LANDFILL DISPOSAL FACILITY

The dewatered and dried excavated material was disposed at the following facility:

Timberline Trail Recycling and Disposal Facility
Waste Management of Northern Wisconsin
N4581 Hutchinson Road
Weyerhaeuser, WI 54895

4.7 POND OUTLET

Construction of the Wire Mill Pond outlet was slightly modified to that depicted in the RAP. A geotextile, a one-foot thick sand layer, and a one-foot thick clay layer was placed below the riprap. This modification is depicted in Detail No. 4 on Drawing No. 7.

5.0 CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL

The Quality Assurance and Monitoring Plan presented in the RAP set forth the QA/QC requirements for implementation of the RA at the site. In general, the strategies presented in the RAP were employed. A description of personnel responsibilities, testing procedures, and test results throughout construction are presented below.

5.1 POSITION RESPONSIBILITIES

The construction contractor was responsible for the quality of construction in the finished product and for compliance with the construction documents, drawings and specifications, and regulatory requirements. The Construction Quality Assurance (CQA) personnel had the ultimate responsibility for the oversight of construction and assurance of conformance with the construction drawings, specifications, and CQA requirements. CQA and CQC personnel responsibilities throughout implementation are discussed below; specific personnel assignments to each position are defined in Section 1.0.

5.1.1 CQA Team

Execution of the CQA Program and supervision of CQA personnel was the responsibility of the CQA Officer. The CQA Program was administered on-site by field engineers who reported to the CQA Officer.

5.1.1.1 CQA Officer

The CQA Officer had the responsibility and authority to perform the activities specified in the CQA Program. Specific responsibilities of the CQA Officer included:

- Reviewing and understanding RAP requirements.
- Educating CQA Inspectors on CQA requirements and procedures.
- Scheduling and coordinating CQA inspection and testing activities, including laboratories.
- Directing and supporting the CQA inspection personnel in performing observations and tests.
- Preparing appropriate reports on the inspection results.
- Verifying that the Contractor's procedures are in accordance with the CQA Program.

5.1.1.2 Construction Quality Assurance Field Engineers

Depending on the construction activities, the CQA Officer was supported by one of three field engineers. The number of field engineers at the site at any given time was determined by the CQA Officer, but at a minimum, the CQA Manager, or lead field engineer, was on-site throughout the duration of the project. Field engineers were responsible for:

- Reviewing and understanding RAP Plan requirements.
- Performing observations and tests under the direction of the Engineer.
- Reporting observed deviations from the RAP or CQA Program to the Engineer.
- Assisting the Engineer with the preparation of reports on inspections and tests.

5.1.2 CQC Team

The contractor was responsible for implementing the RA in strict accordance with the RAP, local building requirements, and industry standards. Construction was conducted in a safe and controlled manner. The Contractor was responsible for designating a Construction Quality Control (CQC) Manager who was responsible for ensuring that the Contractor's quality and performance responsibilities were fulfilled. All CQA activities for the project was coordinated between the CQA Manager and the Contractor's CQC Manager.

5.1.2.1 Construction Quality Control Manager

The designated CQC Manager was the construction superintendent and thus had the authority to direct and control the Contractor's crews, subcontractors, and construction activity scheduling. The CQC Manager was on-site throughout the project and was directly responsible for overseeing the quality control testing activities.

5.1.2.2 Construction Crews

To ensure that the RAP was properly and efficiently implemented, the Contractor employed experienced construction labor, and used standard or acceptable construction techniques. All contractor employees were trained for the functions they performed and the equipment they operated.

5.2 CONSTRUCTION QUALITY ASSURANCE MONITORING

QA/QC monitoring and testing was conducted in accordance with the RAP and subsequent correspondence from the MPCA. QA/QC activities are discussed in Section 4.0 of the RAP and selected correspondence provided in Appendix A, and include both observations and testing to ensure that construction met the intent of the RA. Observations

and inspections were performed on a daily basis by on-site CQA personnel for all components of the remedy; testing was performed for specific activities to verify that the work performed met the performance standards setforth in the RAP or subsequent correspondence. The specific components subjected to CQA monitoring as required in the RAP or correspondence are presented below, and further discussed in the following subsections.

- treatment system discharge;
- sewer system discharge;
- pond excavation verification; and,
- dewatering basin monitoring.

5.2.1 Treatment System Discharge

During gross and maintenance dewatering activities, pond water was treated through the treatment system (see Section 4.3) prior to discharge to the St. Louis River. As requested by MPCA in correspondence faxed on June 20, 1997 (see Appendix A), weekly testing was conducted during operation to verify that the discharge met the performance standards setforth by the MPCA and USS (see letter dated May 12, 1997 in Appendix A). The treatment system was operated continuously through June and July; in August, September and October, the system was used intermittently. In the event that a result for a specific constituent exceeded the standard, the treatment system was immediately shut-down until the situation was addressed. The treatment system performance standards and discharge test results are presented in Table 5-1.

5.2.2 Sewer System Discharge

In accordance with the approval from WLSSD, dated October 9, 1997, influent to the sanitary sewer system was sampled and tested once every two days of operation for the following parameters and limits:

GRO/DRO:	100 ppm
Oil and Grease:	100 ppm
Lead:	1 ppm
Mercury:	0.5 ppb
Total Suspended Solids:	for billing purposes

Direct discharge to the sewer began on October 20, 1997 and was operated intermittently until November 17, 1997. Operations were interrupted periodically due to task coordination and construction activities, such as geotextile installation. During operation, the influent test results were in compliance with the above standards. The analytical results for sewer discharge are presented in Table 5-2.

5.2.3 Pond Excavation Verification

In accordance with the RAP and subsequent correspondence from the MPCA, dated November 6, 1996, the pond was professionally surveyed to verify the extent of excavation. On September 15th and 16th, twelve points along the bottom of the pond were surveyed by SALO Engineering, Inc. to demonstrate that the 589-foot datum elevation was reached. The survey method used conventional means with the addition of a flat plate on the bottom of the survey rod to increase resistance upon contact with the pond floor; this method was previously demonstrated to the MPCA on September 11, 1997 for their approval. The pond excavation verification survey is provided on Drawing No. 3.

5.2.4 Dewatering Basin Monitoring

On October 28, 1997, on-site CQA personnel inspected the decommissioned dewatering basin to assess completion and ensure that the excavated non-native material was removed, in its entirety, from the former basin area. Visual monitoring was the method setforth in the RAP to verify completion. Upon inspection on this date, it was determined that the temporary dewatering basin was properly decommissioned.

Similarly, the drying pad was visually inspected to verify that all loose, non-native material was removed from the concrete floor of the wire mill. Upon inspection, CQA personnel determined that the drying pad was properly cleaned of loose, non-native material.

5.3 ADDITIONAL CONSTRUCTION MONITORING

CQA personnel performed daily inspections of construction activities throughout the duration of RA implementation. Although not required by the RAP, these inspections included each of the major components of the RA as discussed in Section 2.0. As part of these inspections, CQA personnel observed that backfilling activities were conducted in a manner that would not compromise the integrity of the geotextile nor permit previously settled sediment to "squeeze" from under the fabric. The methodology used during backfilling is discussed in Section 4.4.3. Additional observations verified that the design elevations for the top of sand, top of clay, and final grade were in accordance with the RAP. The final grading plan of the pond is provided on Drawing No. 4.

6.0 RESPONSE ACTION MONITORING

Post-construction monitoring will be conducted to evaluate the effectiveness of the RA at Wire Mill Pond. Water quality sampling will comprise this evaluation. The Protocol for water quality monitoring and associated reporting requirements were established in the following documents:

- Section 4.3 - Water Quality Monitoring - of the RAP;
- A November 6, 1996 letter from the MPCA;
- The "Monitoring, Maintenance and Contingency Plan, Wire Mill Pond Response Action" prepared by Barr Engineering Company, dated May 1997 (RA Contingency Plan); and,
- The Site Storm Water Pollution Prevention Plan.

Contingency procedures for any detected exceedance of water quality standards, as defined in the RA Contingency Plan, are provided in this same contingency plan.

7.0 OPERATION AND MAINTENANCE

Future activities at the Wire Mill Pond site include the establishment of wetlands, as required in the RAP. WATEC will conduct wetlands establishment activities in the spring of 1998 to complete the RA implementation.

Post-construction operation and maintenance at the site consists of periodic inspections and implementation of contingency actions, if deemed necessary during inspections. The components and frequency of inspections are detailed in correspondence from the MPCA, dated November 6, 1996 (see Appendix A), and the RA Contingency Plan, dated May 1997. Contingency actions are detailed in the RA Contingency Plan.

8.0 REFERENCES

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