Phase II Environmental Site Assessment Report

Mifflin County Industrial Development Corporation
Recreation Site
and
Plaza Site
Granville Township, PA

Corkins Property
Borough of Lewistown, PA

Prepared for:

Mifflin County Planning and Development Department
and
U.S. Environmental Agency, Region III

December 2004

ARM Project 02242

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PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT

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Title and Approval Page

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 Purpose and Scope

On behalf of Mifflin County Planning and Development Department (MCPDD), ARM Group Inc. (ARM) has prepared this Phase II Environmental Site Assessment Report for the United States Environmental Protection Agency's (EPA's) Brownfields Pilot Project in Mifflin County, Pennsylvania. Based on a previous review and evaluation of potential Brownfields sites throughout the County, the following three sites were selected for more detailed evaluation, and are discussed in this report: (1) the Corkins Property (Corkins); (2) the Mifflin County Industrial Development Corporation (MCIDC) Plaza Site; and (3) the MCIDC Recreation Site. The locations of these sites are shown on Figure 1.

The site investigation and characterization activities at the Corkins Site, MCIDC Plaza Site, and the Recreation Site were conducted in accordance with the EPA-approved Phase II Environmental Site Assessment - Site-Specific Sampling and Analysis Plan (dated July 17, 2003). Minor adjustments were made to the field sampling during the course of the project to better address site conditions and logistical constraints, and to provide the a second round of groundwater sampling at the Recreation Site to supplement the site characterization. All changes were discussed with and approved by the EPA Brownfields coordinator prior to implementation.

Where appropriate, this report also addresses applicable provisions of 25 PA Code Chapter 250 (i.e., the Land Recycling and Environmental Remediation Standards Act or Act 2) regarding the characterization and remediation of sites under the Pennsylvania Department of Environmental Protection's (PADEP's) Statewide Health and Site-Specific Cleanup Standards. In accordance with the Act 2 Technical Guidance Manual (PADEP, December 1997) and the Chapter 250 regulations, this report contains information regarding the location and historical use of the sites, the physical setting of the sites, the investigation methods utilized to characterize the constituents of potential concern in soil and groundwater at the sites, a discussion of the analytical results

from these investigation activities, a discussion of an exposure pathway analysis conducted for the sites, and the identification of remedial options for impacted soil and groundwater.

The remainder of Chapter 1.0 contains a discussion of the physical setting, location, and historical use of the sites. The investigation methods utilized to characterize the subsurface conditions of the sites are presented in Chapter 2.0, while Chapter 3.0 contains a detailed description of the investigation results, including the findings of the soil, groundwater and surface water sampling and analyses, the results of the potential sensitive receptor survey, the nature and extent of the site-related constituents of concern, and preliminary remediation recommendations. Chapter 4 presents a more detailed discussion of the recommended remedial alternative and site redevelopment plan for the Recreation Site, which was identified as the most appropriate of the three sites for remediation and redevelopment at this time. References used to support this report are cited in Chapter 5.0. Supporting information is provided in the appendices attached to this report.

1.2 Site Location and History

In 1999, Mifflin County was awarded a $200,000 grant from the Environmental Protection Agency (EPA) to undertake a Brownfield Assessment Demonstration Pilot Program. The initial goal was to integrate the comprehensive planning process and the Brownfield Pilot Program with extensive community involvement. This led to 6 public forums, interviews with 30 key stakeholders in the community, and the identification of 33 potential Brownfield sites in the County. The input from this process was also important in the development of the Mifflin County Comprehensive Plan in December 2000.

To assist in this process, the Mifflin County Commissioners appointed citizens from throughout the County to the Environmental Resources Committee (ERC) to help guide the Brownfield project. From this beginning, Phase I Environmental Site Assessments (ESAs) were undertaken for two (2) potential Brownfield sites, and follow-up contacts were made with many of the 33

identified sites. Some of the site owners that were contacted either were not interested in the program, or had already undergone remediation measures.

In September 2001, Mifflin County re-examined the Brownfield project progress, and a decision was made to focus efforts on three (3) of the potential Brownfield sites based on access permission and cooperation by the property owners.

Between 2000 and 2001, Brownfield funding was used to develop Phase I ESAs at the Corkins and MCIDC Plaza sites. From these assessments a recommendation had been made that Phase II Assessments be undertaken at these sites. Consequently, these sites, as well as the former settling basins and lagoons in Granville Township (i.e., the Recreation Sites, an identified site also owned by MCIDC), were selected for study.

1.2.1 Corkins Property

The site is located at 233 East Third Street (actually includes 221 though 237 East Third Street), in the Borough of Lewistown, Mifflin County, Pennsylvania (Figure 1). The site is a commercial property that is occupied by Mr. Max Corkins and used as an antique automobile restoration shop. The site is situated over approximately 35,000 square feet, spanning three parcels and an alleyway, within a commercial/residential zone in downtown Lewistown.

Two of the three buildings located on the site are mainly block concrete buildings; the third structure is a small wooden carport. The property has been used for residential and light industrial purposes since 1896. Most recently the site has been used to restore and warehouse antique automobiles in various stages of repair.

The findings of the September 2000 Phase I ESA determined that environmental conditions on the site warranted further investigation. The site has been broken into discrete areas of concern based upon the particular findings at the site areas.

The topography of the subject site is relatively flat, with the rear of the property extending into a slope in the north-northwest corner of the property. The land surrounding the site is occupied by a mix of residential and commercial properties to the northeast, south and west, and a cemetery to the northwest.

1.2.2 MCIDC Plaza

The site is located at the MCIDC Plaza, 6395 SR 103 N, Granville Township, Mifflin County, Pennsylvania (Figure 1). The project site is situated in the western portion of the MCIDC Plaza property, and consists of several former industrial buildings encompassing roughly nine (9) acres of the Plaza's 61-acre primary property. The site resides in a commercial/residential area along the south shore of the Juniata River, across from the Borough of Lewistown.

The majority of the buildings are brick or concrete structures that date back to the 1920s. The buildings housed a variety of operations ranging from light industrial to power supply. A detailed building history was included as part of a previous Phase I ESA dated December 2000. The site currently serves as a multi-tenant industrial plaza, with the majority of the buildings being occupied except for the project area.

The findings of the December 2000 Phase I ESA determined that environmental conditions on the site warranted further investigation. The site was then broken down into discrete areas of concern based upon the particular findings and potential concerns in the building areas.

The topography of the subject site is relatively flat, with a slight grade dipping to the north-northwest. The land surrounding the site is occupied by the Grantville Township wastewater treatment plant (Recreations Site), railroad tracks and a residential area to the south, an industrial area to the west, with the Juniata River to the North.

1.2.3 Recreation Site

The subject site consists of approximately five acres of land located east of State Route 103 and immediately south and west of the Juniata River in Granville Township, Mifflin County, Pennsylvania (Figure 1). The municipality of Lewistown, Pennsylvania is located north of the site across the Juniata River.

The site is developed with four inactive wastewater treatment lagoons, four closed masonry settling basins, a small masonry storage building that is used for storage by Granville Township, and associated property. With the exception of the masonry building that is used for storage by Granville Township, located north of the settling basins, the subject site is not being used at the current time. However, during preparation of this report, the former settling basins have been closed, filled and covered with aggregate in conjunction with road construction activities through the area (to provide access to the Township wastewater treatment plant).

The findings of the December 2002 Phase I ESA determined that environmental conditions on the site and previous site activities (i.e., use as wastewater lagoons) warranted further investigation through a Phase II ESA.

The topography of the subject site is relatively flat, with a gentle slope to the northeast. The Juniata River to the north and east, a highway bridge to the south, and the MCIDC Plaza to the west dominate the land surrounding the site.

2.0 CHARACTERIZATION METHODS AND PRODCEDURES

ARM and others have completed several investigations at the three sites. The activities have included, but not been limited to, Phase I ESA at all three sites, a hydrologic investigation at the Recreation Site with additional lagoon sampling (both sediments and water), and associated investigations as outlined in the 2003 Phase II ESA Work Plan. In response to field conditions, some modifications to the Work Plan were made in field to better assess site conditions or eliminate unnecessary sampling (e.g., due to a lack of identified contamination). Any modifications were reviewed with and approved by the EPA prior to implementation. A summary of the investigation activities is presented in this chapter, and supporting information is included as appendices to this document. In general, all sampling locations and analytical parameters were selected based on an understanding of site operations and activities, discussions with EPA representatives, and to satisfy applicable requirements of Act 2 (Section 250.408).

2.1 Corkins Property

2.1.1 Summary of Site Investigation Phases

A Phase I ESA was conducted at the Corkins Property in September 2000. The results of this assessment showed that the site has been used as an antique automobile restoration shop since the early 1980's, and prior use was commercial and residential. Based on the Phase I ESA findings, the property was broken down into two areas of concern: 1) Building 2 area; and 2) the parking lot area. The findings are summarized below:

- Building 2: Three (3) 55-gallon drums of waste oil and antifreeze were identified outside the southwestern corner of the building. An above-ground storage tank (AST) for waste oil was located outside the western edge of the building at the time of the inspection, although no staining was noted.

- Parking Lot: Areas of localized soil staining were identified in the parking lot.

2.1.2 Soil Sampling

Pursuant to the Phase II ES Work Plan, investigation activities at the Corkins site included the collection and analysis of soil samples from two different locations at the site. The goals of this sampling were to characterize the shallow soils near a drum storage area and at oil-stained soil areas in the parking lot. However, during implementation of the Work Plan, the identified soil stains in the parking lot could not be identified at their historical locations. As a result, and as approved by the EPA, the parking lot was re-examined, and soil samples were collected where other oil-stains were identified in the vicinity of the historical stains (see Figure 2 for sample locations).

The soil sample locations were selected based on conditions existing at the time of sampling (visual and PID screening of the soils), and it was determined that the most appropriate sample depth would be surficial (i.e., collected from a depth of 0 to 0.5 feet). The soil samples for VOC analysis were collected as grab (not composite) samples and in a manner to minimize the loss of VOCs. Soil samples for VOC analysis were collected in accordance with SW-846 Method 5035, using EnCore samplers. Aliquots for composite samples were generally collected from similar materials and similar locations so as to reduce potential "dilution" effects.

The soil samples were analyzed for the following:

- Priority Pollutant List (PPL) Metals for soil - USEPA Method 6010B/7471A
- PPL Volatile Organic Compounds (VOCs) for soil - USEPA Method 8260B
- PPL Semi-Volatile Organic Compounds (SVOCs) for soil - USEPA Method 8270C

All samples were initially collected on October 23, 2003, although the samples for VOC analysis were not prepared for analysis within the allowable holding time. As a result, the laboratory was

instructed to not analyze the overdue samples, and two additional samples were collected on October 29, 2003 for analysis of VOCs. These two samples were collected at the same locations and in the same manner as the initial samples. This situation was reviewed with and approved by the EPA prior to collection of the replacement samples.

All chemical data underwent the required data validation process. Results of the soil sampling are summarized in Table 1, and the full analytical results are presented in Appendix A. The data validation report is presented as Appendix E to this report.

2.2 MCIDC Plaza

2.2.1 Summary of Site Investigation Phases

The findings of the December 2000 Phase I ESA determined that environmental conditions on the site warranted further investigation. The assessment determined that a diverse set of operations occurred within the selected buildings, and due to the operational history and the conditions at the time of inspection, a lengthy sampling list was complied. This list was subsequently reduced to include only environmental media, as opposed to waste drums and building materials. Based on the Phase I ESA findings, the site was broken down into several areas of concern that are discussed below:

- Subsidence Basin (near Building 7): Accumulated water and sediment was identified at this location and suspected to potentially contain hazardous contaminants from the water treatment activities.

- Building 33, Building 34, Unpaved Area: Demolition rubble was identified to be covering the ground surface outside of the building, and storage areas for empty drums were also identified.

- Building 4: A concrete transformer pad with obvious staining was identified; soils appeared stained along the draining edge of pad.

2.2.2 Soil/Sediment Sampling

The scope of the Phase II assessment of the Plaza site was based on the results from the Phase I ESA and the approved Phase II Work Plan.

The areas of the site that were investigated included: a wastewater subsidence basin at Building 7; rubble fill materials and soil east of Building 3; stained soil next to a transformer pad at Building 4; and, soil beneath the water tower (see Figure 3 for test pit and soil sample locations). In addition, because of the historic use of significant quantities of hazardous/regulated materials at the site, and the resultant possibility of on-site spills or disposal of such materials, some subsurface investigation of the unpaved Plaza exterior areas was also performed. Potential sample locations in these areas were selected during a pre-investigation site visit, the purpose of which was to familiarize sampling personnel with the site features, including the health and safety issues, and to identify areas most likely to exhibit contamination.

The subsidence basin sediment at Buildings 7 was inspected for obvious signs of leakage or other notable defects, neither of which was observed during the inspection. A 5-part composite sample of the subsidence basin sediment was collected with a bucket auger. Samples from the subsidence basin were analyzed for PPL metals, PPL SVOCs, PCBs, PPL VOCs, pesticides, and cyanide. The sample for VOC analysis was collected as a grab sample (using an Encore sampler) from the location exhibiting the highest PID readings and/or other staining.

The rubble fill and underlying soil east of Building 33 and Building 34, and the unpaved exterior areas selected for investigation, were evaluated by hand excavation using a shovel and bucket auger. One 5-part composite soil sample from beneath the rubble was collected and analyzed for PPL metals, SVOCs, PCBs, and cyanides, and one grab sample was collected for analysis of PPL

VOCs, based on the location demonstrating the highest PID readings or other indications of contamination. Depending on conditions encountered, hand tools and a backhoe were used to evaluate the unpaved exterior areas selected for investigation. A total of four subsurface soil samples were collected from exterior areas and were analyzed for PPL metals, SVOCs, PCBs, VOCs, and cyanides. Final sampling locations and depths were selected in the field based on indications of likely or potential contamination (e.g., visual staining, odors, elevated PID readings, proximity to potential waste sources or migration routes, etc.). Samples for all analyses except VOCs were 5-part composite samples; samples for VOC analysis were grab samples collected from the aliquot locations exhibiting the highest PID readings or other indicators of contamination using EnCore samplers.

The soil samples that were collected from the water tower and Building 4 transformer pad were collected with hand tools. Two surficial samples and two deeper samples from the water tower area were analyzed for total lead. One surficial and one deeper sample from the stained soils next to the transformer pad were analyzed for PCBs. Surficial soil samples were collected from a depth of 0.5 to 1.0 feet, and deeper samples were collected from a depth of 2.5 to 3.0 feet, based on indications of likely or potential contamination (e.g., visual staining, odors, elevated PID readings, proximity to potential waste sources or migration routes, etc.).

The following laboratory methods were used:

- PCBs for soil, and sediment samples - USEPA Method 8082
- PPL Metals for soil - USEPA Methods 6010B/7471A
- PPL SVOCs for soil and sediment - USEPA Method 8270C
- PPL VOCs for soil and sediment - USEPA Method 8260B
- Cyanides for soil and sediment - USEPA Method 335.4/9012A
- PPL Pesticides for soil and sediment - USEPA Method 8081A
- Lead for soil - USEPA Method 7420

All chemical data underwent the required data validation process. Results of the soil sampling are summarized in Table 2, and the analytical data sheets are included in Appendix B. The data validation report is presented in Appendix E.

2.2.3 Water Sampling

At the time of the inspection, the wastewater subsidence basin at Building 7 contained approximately $2^1/_2$ feet of water across the entire volume of the basin. The water surface was inspected for signs of any separate-phase product prior to collecting a water sample from the basin, although no aqueous phase was detected. The settling basin water sample was collected using a dedicated disposable polyethylene bailer that was lowered into the basin. The sample containers were filled in the order as outlined in the SOP and preserved on ice.

The following laboratory methods were used:

- PCBs for water samples - USEPA Method 8082
- PPL Metals for water - USEPA Methods 6010B/7471A
- PPL SVOCs for water - USEPA Method 8270C
- PPL VOCs for water - USEPA Method 8260B
- Cyanides for water - USEPA Method 335.4/9012A
- PPL Pesticides for water - USEPA Method 8081A

All chemical data underwent the required data validation process. Results of the soil sampling are summarized in Table 3, and the analytical data sheets are included in Appendix B. The data validation information is included in Appendix E.

2.3 Recreation Site

2.3.1 Summary of Site Investigation Phases

A Phase I ESA and sampling of solid materials in the former settling basins at the Recreation site had been previously completed by others. Elevated concentrations of several metals and some organics were detected in these materials. Sampling and analyses completed by MCIDC on the sludge existing in the four settling basins confirmed the presence of some elevated metal concentrations in the basin sludge. A sample of sediment from the wastewater lagoon was also previously collected and analyzed, and this information is reflected in this report.

The Phase II ESA at the Recreation site included the inspection of the entire site for the presence or absence of hazardous materials in the vicinity of the basins and lagoons and in the subsurface at the site. A Phase II sampling program was established, with the selected sampling locations presented on Figure 4. The primary components of the investigation work at the Recreation Site included the following:

- Sampling of sludge/sediment within the lagoons;
- Sampling of surface water within the lagoons, where present;
- Installation of three groundwater monitoring wells in the vicinity of settling basins and lagoons; and
- Collection of groundwater samples from three monitoring wells.

2.3.2 Lagoon Soil Sampling

The Phase II work that was conducted at the Recreation Site's former lagoons included the collection of sludge/sediment samples from three of the four lagoons, to supplement the sample previously collected from the fourth lagoon as part of a separate project (the analytical results from all events are summarized on Table 4). From each of the lagoons, one five-part

sludge/sediment sample was collected as a composite sample, except for VOCs, which was collected as a grab sample from the location exhibiting the highest PID reading from field screening; where no elevated PID readings were observed, the sample location for VOC analysis was based on other indicators of contamination such as staining. The sludge/sediment samples in the lagoons were collected with hand-held sampling equipment (hand auger or sediment sampler), selected based on site conditions. All samples were collected into the appropriate containers, and preserved according to the approved plans.

The following laboratory analytical methods were used:

- PCBs for soil/sediment samples - USEPA Method 8082
- PPL Metals for soil/sediment samples - USEPA Methods 6010B/7471A
- PPL SVOCs for soil/sediment samples - USEPA Method 8270C
- PPL VOCs for soil/sediment samples - USEPA Method 8260B
- Cyanides for soil/sediment samples - USEPA Method 335.4/9012A
- PPL Pesticides for soil/sediment samples - USEPA Method 8081A

All chemical data underwent the required data validation process. Results of the sampling activities are summarized in Table 4, and the analytical data sheets are included in Appendix C. The data validation report is included in Appendix E.

2.3.3 Lagoon Water Sampling

The Phase II work that was conducted at the Recreation Site's inactive lagoons included the collection of water samples from three of the four lagoons for full PPL suite analyses. Lagoon 4 (see Figure 4) was dry at the time of sampling and the follow-up field inspection, and therefore a water sample was not collected from this location. The water samples were collected using a low-flow peristaltic pump (intake suspended off the lagoon bottom to avoid sediment), due to the

shallow water in the lagoons making bailers unusable. The tubing in the peristaltic pump was discarded between sampling events.

The following laboratory analytical methods were used for analysis of the water samples from the lagoons:

- PCBs for water samples - USEPA Method 8082
- PPL Metals for water - USEPA Methods 200.7/245.1 or 6010B/7471A
- PPL SVOCs for water - USEPA Method 625 or 8270C
- PPL VOCs for water - USEPA Method 624 or 8260B
- Cyanides for water - USEPA Method 335.4/9012A
- PPL Pesticides for water - USEPA Method 8081A

All chemical data underwent the required data validation process. Results of the lagoon water sampling are summarized in Table 5, and the analytical data sheets are included in Appendix C. The data validation report is included in Appendix E.

2.3.4 Groundwater Monitoring Well Installation

Three groundwater monitoring wells were installed as part of the Phase II investigation at the Recreation site. As presented in the Work Plan for the Recreation Site, the groundwater monitoring well locations were selected so as to assess the upgradient and downgradient groundwater conditions with respect to the lagoons. The upgradient and downgradient locations were estimated based on anticipated site conditions. However, due to field conditions and site access restrictions, the groundwater monitoring well locations needed to be adjusted; Well MW-2 was shifted approximately 300 feet south of the proposed location, and Well MW-3 was shifted approximately 250 feet southwest of the initially proposed location (see Figures 4, 5 and 6). These adjustments were made following EPA approval.

The groundwater monitoring wells were drilled by a truck-mounted CME-75 drill rig, utilizing $4^1/_4$-inch inner diameter hollow-stem augers. The well screened intervals were selected at the time of drilling based on conditions encountered (e.g., soil and rock types, depth to rock, depth to groundwater), to extend at least 10 feet below the groundwater table with five feet (of screen) above the water table to provide for the detection of any floating product. The total depth of the wells ranged between 25 feet to 30 feet below ground surface. The wells were constructed of 2-inch diameter schedule 40 PVC with flush-treaded joints. The well screens are schedule 40, 10-slot PVC, and were packed with #1 sand (clay and silt contents are low) to two feet above the screened interval. The sand pack is sealed with a 1.5-foot thick, hydrated bentonite plug, and the remainder of the annular space is filled with a cement-bentonite grout up the ground surface. The wells have been finished with a protective with a stick-up steel well casing, and padlocked shut.

After installation, the wells were developed to increase the connection with the local groundwater system and to remove fines from the screened interval. After development, the top of the inner-PVC casing was surveyed using an auto-level, tied to an assigned vertical elevation of 100 feet MSL at the ground surface at monitoring well MW-1. Well logs are included in Appendix D.

2.3.5 Groundwater Sampling

On October 23, 2003 ARM personnel collected groundwater samples from monitoring wells MW-1, MW-2, and MW-3. Prior to sampling each well, the depth to groundwater was measured in the monitoring wells and the quantity of water in the well bore, or "well volume," was calculated. A quantity of groundwater equal to three well volumes was purged following American Society for Testing and Materials (ASTM) Method D-4448, or until groundwater parameters adequately stabilized, indicating a representative groundwater sample. The groundwater from the wells was initially purged by pumping at a rate of less than 1 gallon per

minute (gpm). The groundwater samples from the three monitoring wells were then collected using dedicated disposable polyethylene bailers.

The following laboratory methods were used for analysis of the groundwater samples:

- PCBs for water samples - USEPA Method 8082
- PPL Metals for water - USEPA Methods 200.7/245.1 or 6010B/7471A
- PPL SVOCs for water - USEPA Method 625 or 8270C
- PPL VOCs for water - USEPA Method 624 or 8260B
- Cyanides for water - USEPA Method 335.4/9012A
- PPL Pesticides for water - USEPA Method 8081A

Following completion of the initial sampling event, and based on the results obtained, a second sampling event was proposed and approved by the EPA. This sampling event was conducted on September 2, 2004, and was essentially identical to the initial sampling even with regard to purging methods and sample collection; however, based on the initial sampling results, PPL metals were the only parameter tested for from the second sampling event (no other constituents were detected at elevated concentrations during the initial event).

All chemical data underwent the required data validation process. Results of the groundwater sampling are summarized on Table 5 and the analytical data sheets are included in Appendix C. The laboratory data validation packages for both events are included in Appendix E.

3.0 RESULTS OF CHARACTERIZATION

3.1 Introduction

This section presents a discussion of the results of the investigation work that was summarized in the previous section. Specifically, this section presents a discussion of the site geology and the hydrogeology, soil and sediment/sludge, basin and lagoon water, and groundwater sampling results.

3.2 Corkins Property

3.2.1 Site Geology

Based on a review of maps contained in the Pennsylvania Department of Environmental Resources (PADER) *Map 61 - Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania,* dated 1981, the site is located on the Wills Creek Formation (Swc). This formation is described in the PADER document *Engineering Characteristics of the Rocks of Pennsylvania*, dated 1972, as being greenish-gray shale with limestone and sandstone zones that is moderately well bedded and steeply dipping. The formation exhibits seamy to platy joints that are well developed, open, and steeply dipping. Joints are regular spaced, open, and steeply dipping. The formation is slightly resistant to weathering, exhibits low secondary porosity, fair cut slope stability, and is classified as a good quality foundation for heavy structures when excavated to sound material.

3.2.2 Site Hydrogeology

No groundwater wells exist onsite, so no local data is accessible. Based on a review of the Bureau of Topographic and Geologic Survey's (PAGS's), Pennsylvania Groundwater

Information System (PaGWIS) well records, the static depth to groundwater ranges from 18 to 55 feet below ground surface in the vicinity of the site. The Juniata River is the main drainage feature in the area and is located approximately 1,000 feet south of the site; therefore the anticipated groundwater flow direction is approximately south-southwest from the site. It is understood that the site is currently served by public water.

3.2.3 Nature and Extent of Constituents in Soil

Two soil samples were collected from the site on October 23, 2003. The sampling results are summarized on the attached Table 1, and the approximate sampling locations are shown on the attached figure (Figure 2). No staining or other evidence of potential contamination was identified in the vicinity of proposed sampling location C-2, and therefore no sample was collected from this location.

Based on a comparison of the sampling results to the applicable Pennsylvania Department of Environmental Protection (PADEP) Statewide Health Standards (25 PA Code, Chapter 250), the following conclusions can be made:

- No organic compounds (volatile or semi-volatile) were detected at the locations sampled at concentrations that are at or near the applicable PADEP standards. Tetrachloroethene (PCE) and some other solvents were detected at low concentrations in surface soils at location C-1 near the drum storage area, and low concentrations of polyaromatic hydrocarbons (PAHs) were detected at location C-3.

- Inorganic constituents, specifically arsenic and lead, were detected at location C-3 at concentrations that exceed PADEP Statewide Health Cleanup Standards. These exceedances are discussed in more detail below:

- Arsenic: Arsenic was detected at a concentration of 14 mg/kg, as compared to a standard of 12 mg/kg for direct contact exposures at residential sites. It is possible that the arsenic is naturally occurring, as background arsenic concentrations of 10 to 20 mg/kg are not uncommon in parts of Pennsylvania.

- Lead: Lead was detected at a concentration of 810 mg/kg, as compared to the residential direct contact standard of 500 mg/kg, and the soil-to-groundwater standard of 450 mg/kg. Slightly elevated zinc, cadmium, and copper concentrations were also detected at this location.

3.2.4 Potential Exposures to Soil

Inorganic constituents, specifically arsenic and lead, were detected at location C-3 at concentrations that exceed PADEP Statewide Health Cleanup Standards. These exceedances are discussed in more detail below:

- Arsenic: If the site were to be used for residential purposes, additional sampling and/or remedial measures may be appropriate to fully delineate and adequately address the elevated arsenic concentration. If the site were to remain non-residential, no additional investigation or remedial measures would be required to address this issue.

- Lead: The detected lead concentration of 810 mg/kg exceeds the residential direct contact standard, and therefore represents a potentially unacceptable risk if the property were to be used for residential purposes. However, under current and anticipated future non-residential site uses, this concentration does not present a potentially unacceptable direct contact exposure risk (i.e., the concentration is less than the non-residential standard). By exceeding the soil-to-groundwater standard, the lead concentration represents a potential risk of leaching to groundwater and causing an impact that exceeds the groundwater quality standards. However, because groundwater is not used at or near the site, and because the

impact appeared to be small and localized, and because of the anticipated buffer distance between the surface contamination and the groundwater table, this condition is not expected to represent an unacceptable threat to human health or the environment (also see Section 3.4.5).

3.2.5 Groundwater Usage Survey

Based on the September 2000 Phase I ESA, the site and the surrounding area is serviced by the Lewistown Municipal Water Authority. Based on a review of the PAGS's PaGWIS database, and discussions with local officials, there are no active drinking water wells on the site, and the closest drinking water well is located approximately 0.25 miles to the east. As a result, no potentially unacceptable exposures to groundwater are suspected.

3.2.6 Review of Ecological Receptors

Based on site conditions and relevant PADEP Act 2 requirements, a detailed evaluation of ecological receptors is not required at this site because the site is covered with features such as pavement and buildings, is located within an industrialized and commercial area, and no ecological receptors exist at or in the immediate vicinity of the site or within the extent of potential site-related impacts. In addition, the area of potential concern is not large enough to present a potential ecological concern.

3.2.7 Summary

Based on the evaluation conducted, no organic compounds (volatile or semi-volatile) were detected at the locations sampled at concentrations that are at or near the applicable PADEP standards. However, inorganic constituents, specifically arsenic and lead, were detected at location C-3 at concentrations that exceed PADEP Statewide health cleanup standards for residential direct contact exposures and the soil-to-groundwater pathway (lead only). An

exposure assessment indicates that there are no current or future exposures of potential concern to human health or the environment under the current and anticipated future land use.

3.3 MCIDC Plaza

3.3.1 Site Geology

Review of the Pennsylvania Department of Conservation and Natural Resources (DCNR) *Map 13, Physiographic Provinces of Pennsylvania* (2000) indicates that the subject site is located in the Appalachian Mountain Section of the Ridge and Valley Physiographic Province. The Appalachian Mountain Section is characterized by long narrow ridges alternating with valleys, which are often broad and flat. The *Geologic Atlas of Pennsylvania*, (DCNR, 1978) indicates that the site is underlain by undifferentiated limestones of the Keyser and Tonoloway Formations. These Formations are described in the publication entitled *Engineering Characteristics of the Rocks of Pennsylvania* (Pennsylvania Department of Environmental Resources, currently referred to as DCNR, 1982) as follows:

- Keyser Formation - Limestones of the Keyser Formation are described as dark-gray in color, highly fossiliferous, with a crystalline to nodular texture. The formation is generally between 270 and 290 feet thick. It is well bedded with flaggy to thick bedding including massive limestone beds. The joint fractures in this formation develop platy or blocky patterns. They are moderately well developed and described as moderately to highly abundant. The fractures are regularly spaced and are open and steeply dipping. Keyser formation rocks are moderately resistant to weathering. When weathering occurs, small to medium sized, irregularly shaped blocks are produced. Subsurface weathering may result in the formation of pinnacles.

- Tonoloway Formation – Limestones in this formation are described as medium gray and laminated. They contain interbedded zones of medium-dark-gray to light-olive-gray shale

and siltstone. The formation is well bedded with bedding that is flaggy to thick. Joint fractures have a platy or more rarely a blocky pattern. They are moderately well-developed and moderate to highly abundant. The fractures occur at regular, closely spaced intervals. This formation is moderately resistant to weathering; however, when weathering occurs the resulting residuum consists of small to medium-sized, irregularly shaped blocks.

3.3.2 Site Hydrogeology

Based on a review of the PAGS's PaGWIS well records, the static depth to groundwater ranges from 18 to 55 feet below ground surface for the region. The Juniata River is the main drainage feature in the area and is the northern property boundary for the site; therefore the anticipated groundwater flow direction is approximately north from the site. It is understood that the site is currently served by public water.

3.3.3 Nature and Extent of Constituents in Soil/Sediments and Basin Water

One sediment sample and eleven soil samples were collected from the site on October 23 and 29, 2003, along with a grab basin water sample. The sampling results are summarized on the attached Tables 2 and 3, and the approximate sampling locations are shown on the attached Figure 3. The P1 soil sample series covers the transformer pad near Building 4, the P2 (soil and water) samples are the basin samples near Building 7, the P3 soil samples cover debris and fill areas in the vicinity Buildings 33 and 34, and the P4 sample series covers the drip line from the former above-ground water storage tank.

3.3.3.1 Soil

Based on a comparison of the sampling results to the applicable Pennsylvania Department of Environmental Protection (PADEP) Statewide Health Standards (25 PA Code, Chapter 250), the following conclusions can be made regarding the P1, P2, P3, and P4 sampling series:

- The P1 soil samples (Building 4) were collected from the southern side of the transformer pad at a sampling depth of 0.5 to 1 foot, with a deeper sample collected from 2.5 feet to 3.0 feet below ground surface. PCBs were not detected in either sample interval.

- P2 sediment sample (Building 7) was collected from the settling area closest to the inlet from the river intake. The sample was collected from approximately 1 to 2 feet below the top of the sediment. No constituents were detected in excess of the PADEP Statewide health cleanup standards.

- P3 soil samples (Building 33 and 34) were collected from the building debris and fill materials that are in the unpaved space around the buildings. The samples were 5-part composite samples collected from the entire test pit (ranging in depth from 0 to 5 feet bgs). No VOCs or pesticides exceeded the PADEP Statewide Health Cleanup Standards, although the following comments are made with regard to metals and SVOCs:

    - Arsenic: Arsenic was detected at concentrations of 37 mg/kg at P3-TP-5, 58 mg/kg at P3-TP-9 and 21 mg/kg at P3-TP-10. These detections exceed the Act 2 Statewide health direct contact standards for residential exposures. Arsenic detected at P3-TP-9 at 58 mg/kg also exceeds the Non-Residential Surface Soil (0-2 feet) direct contact exposure standard.

    - The SVOCs Benzo(a)pyrene and Dibenz(a,h)anthracene were detected at P3-TP-9 at concentrations above the direct contact standards for residential exposures. The Benzo(a)pyrene detection of 12 mg/kg also exceeds the Non-Residential Surface Soil (0-2 feet) direct contact standard.

- The P4 soil sample (Water Tank) was collected along the drip-line for the water tank. The soil samples were collected from the north and south ends of the tank, the shallow

sample was collected from 0.5 to 1 foot, and the deeper sample was collected from 2.5 feet to 3.0 feet below ground surface. Lead was detected but did not exceed the PADEP Statewide health cleanup standards.

3.3.3.2 Basin Water

Based on a comparison of the sampling results to the applicable PADEP Statewide Health Standards (25 PA Code, Chapter 250), the following conclusions can be made about the water located within the settling basin adjacent to Building 7:

- The water sample collected did not contain any detectable VOCs, pesticides, or PCBs, however lead and several SVOCs were detected. Although this water is not used for drinking water or other potable purposes, concentrations were compared to the drinking water standards to provide an initial point of reference with regard to quality. Constituents detected at concentrations in excess of the drinking water standards are discussed in more detail below:

    - Lead: Lead was detected at 7.9 ug/L, which exceeds the PADEP's Act 2 Statewide health standard for both Residential and Non-Residential Used Aquifers of 5 ug/L.

    - Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i) perylene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, and Indeno (1,2,3-cd)pyrene all exceeded the PADEP's Act 2 Statewide health standards for both Residential and Non-Residential Used Aquifers.

3.3.4 Potential Exposures to Soil

The SVOCs Benzo(a)pyrene and Dibenz(a,h)anthracene were detected at concentrations above the residential direct contact standards. As a result, if the site were to be converted into a residential area, additional sampling and/or remedial measures may be required to fully delineate and adequately address the elevated concentrations. If the area is to remain non-residential, additional soil sampling may be required to further delineate the Benzo(a)pyrene exceedances, and/or a deed notice may be required under Act 2 upon the sale or transfer of the property. The concentrations are below the PADEP soil-to-groundwater Residential Medium-Specific Concentrations (MSCs), indicating that there is no unacceptable threat to groundwater.

Arsenic was detected at locations P3-TP-5, P3-TP-9 and P3-TP-10 at concentrations that exceed PADEP Statewide health cleanup standards. Due to the elevated concentrations of arsenic in the soil, additional sampling and/or remedial measures may be appropriate to fully delineate and adequately address the elevated arsenic concentrations detected. The concentrations are below the PADEP soil-to-groundwater Residential MSC, indicating the lack of a threat to groundwater quality.

3.3.5 Groundwater Usage Survey

Based on the December 2000 Phase I ESA, the site and the surrounding area is serviced by the Lewistown Municipal Water Authority. Based on a review of the PAGS's PaGWIS database, there are no private wells onsite used for drinking water. One production well was previously used by the Former Guardian Industries, although it is understood that this well is no longer active. As a result, there are no exposure pathways of potential concern associated with groundwater.

3.3.6 Review of Ecological Receptors

Based on site conditions and Act 2 requirements (Section 250.311), a detailed evaluation of ecological receptors is not required at this site because the site is covered with features such as pavement and buildings that prevent ecological exposures, is located within an industrialized and commercial area, and no ecological receptors exist at or in the immediate vicinity of the areas of potential concern at site.

3.3.7 Summary

Based on the evaluation conducted, no VOCs, pesticides or PCBs were detected at the locations sampled at concentrations that are at or near the applicable PADEP standards for soil or drinking water.

Of the four areas sampled, only one area (P3 Building 33 and 34) had exceedances of the Non-Residential Surface Soil MSCs, and of the three exceedances, only one exceeded the Non-Residential Subsurface Soil (0-2 foot) MSC (P3-TP-9) for arsenic. None of the sample locations exceeded the soil-to-groundwater MSC. Test Pit P3-TP-9 also had exceedances for two SVOCs, and Benzo(a)pyrene exceeded both the Residential and Non-Residential Surface Soil MSC, but was below the soil-to-groundwater MSC. The soil exceedances may need additional sampling to better delineate the area of exceedances and to determine if remediation (e.g., additional sampling, fencing, capping, removal, etc.) is warranted.

The water sample that was collected from the settling basin next to Building 7 had exceedances of PADEP's Act 2 Statewide Health Standards for both Residential and Non-Residential Used Aquifer's for SVOCs and Metals. The water in the basins are contained and opened only to the atmosphere. Although the basin water is not used for drinking, and the groundwater quality standards do not apply, additional sampling may need to be appropriate to best determine the most efficient disposal option.

Overall, there are no known or suspected ecological or human health exposures of immediate concern.

3.4 Recreation Site

3.4.1 Site Geology

Review of the Pennsylvania Department of Conservation and Natural Resources (DCNR) *Map 13, Physiographic Provinces of Pennsylvania* (2000) indicates that the subject site is located in the Appalachian Mountain Section of the Ridge and Valley Physiographic Province. The Appalachian Mountain Section is characterized by long narrow ridges alternating with valleys, which are often broad and flat. The *Geologic Atlas of Pennsylvania*, (DCNR, 1978) indicates that the site is underlain by undifferentiated limestones of the Keyser and Tonoloway Formations. These Formations are described above in Section 3.3.1 of this Report.

3.4.2 Site Hydrogeology

Based on a review of the PAGS's PaGWIS well records, the static depth to groundwater ranges from 18 to 55 feet below ground surface for the region. The Juniata River is the main drainage feature in the area and is the eastern property boundary for the site. The anticipated groundwater flow direction is to the east-southeast from the site (following the flow direction of the river). It is understood that the site is currently served by public water, although it is largely unimproved except for the wastewater lagoons.

Based on the onsite groundwater elevation from the onsite monitoring well network, the average depth to water ranges from approximately 19.5 feet below top of casing at Wells MW-1 and MW-3 to about 11 feet at Well MW-2. The measured hydraulic gradient is approximately 0.05, with groundwater flowing to the south-southwest. Two rounds of groundwater elevations have

been recorded, and corresponding groundwater contour maps have been created, both indicating the groundwater flow direction to the south (see Figure 5 and 6). The wastewater lagoons may locally effect the groundwater flow direction, acting as ponds and groundwater recharge areas.

3.4.3 Nature and Extent of Constituents in Soil/Sediments and Basin Water

ARM collected sediment samples from the former lagoons on two occasions; Lagoon 4 was initially sampled on April 4, 2003 as part of a separate project, and Lagoons 1 through 3 were sampled on October 23, 2003. Surface water samples were collected from three of the four former lagoons on October 23, 2003 (Lagoon 4 was dry during sampling), with one full round of groundwater sampling from the site wells conducted in October 2003, and a second sampling event with reduced analyses was conducted in September 2004. The results of the sampling are discussed in more detail below.

3.4.3.1 Soil

Based on a comparison of the sampling results to the applicable PADEP Statewide health standards (25 PA Code, Chapter 250), the following conclusions can be made regarding the sampled sediments:

- The Lagoon Samples were collected as five-part composite samples (except for the VOC samples) from various sections of the lagoons. The samples were collected from approximately 0.5 to 1.5 feet below the top of the sediment. VOCs, PCBs, and pesticides were generally either not detected, or were at concentrations well below the PADEP Statewide health cleanup standards. Metals were detected in all of the Lagoons at varying concentrations. Lagoon 1 had exceedances for 4 compounds (arsenic, cadmium, chromium, and lead): arsenic, cadmium, and chromium exceeded the PADEP Residential direct contact MSCs; lead exceeded both the PADEP Residential and Non-Residential direct contact MSCs; and both cadmium and lead

were above the soil-to-groundwater Residential MSCs. Lagoons 2 and 3 had detections for lead that exceeded the PADEP Residential direct contact MSCs, while the zinc concentrations were above the PADEP Residential direct contact MSCs and the soil-to-groundwater Residential MSCs. The arsenic concentration of 18 mg/kg exceeds the PADEP Residential direct contact MSCs in Lagoon 4.

3.4.3.2 Lagoon Water

Lagoon water samples were collected from Lagoon 1, Lagoon 2 and Lagoon 3 on October 23, 2003, using dedicated sampling equipment. The samples were collected from approximately 0.5 to 1.0 feet below the top of the top of water, but above the lagoon sediments to avoid sediment intrusion. Although this water is not used for drinking water, water quality was compared to Act 2 drinking water standards as an initial assessment. As presented in Table 5, no VOCs, SVOCs or PCBs exceeded the PADEP Statewide health cleanup standards in these samples. The three sampled lagoons all had metal detections, and Lagoon 2 water exceeded PADEP Statewide health cleanup standards for pesticides in drinking water.

- Lead was detected between 11 ug/L to 42 ug/L in the lagoons, which exceeds the PADEP's Act 2 Statewide health standard for both residential and non-residential used aquifers of 5 ug/L.

- The pesticide Aldrin was detected at 0.1 ug/L in Lagoon 2; this concentration exceeds PADEP's Act 2 Statewide health standard for both residential and non-residential used aquifers.

3.4.3.3 Groundwater

Based on a comparison of the sampling results to the applicable PADEP Statewide health standards (25 PA Code, Chapter 250), the following conclusions can be made with regard to the groundwater quality at the site:

- The groundwater at monitoring wells MW-1, MW-2 and MW-3 did not exceed PADEP Act 2 Statewide Health MSCs for VOCs, SVOCs, pesticides or PCBs.

- Antimony, cadmium, lean and thallium were detected in groundwater at concentrations that exceed the Act 2 drinking water standards.

3.4.4 Potential Exposures to Soil

Inorganic constituents, specifically arsenic, cadmium, chromium, lead, and zinc were detected in the lagoon soils/sediments at concentrations that exceed PADEP Statewide health cleanup standards. These exceedances are discussed in more detail below:

- Arsenic and Chromium: If the site were to be used for residential purposes, additional sampling and/or remedial measures may be appropriate to fully delineate and adequately address the elevated arsenic concentration. If the site were to remain non-residential, no remedial measures would be required to address these constituents.

- Cadmium and Zinc: Because these constituents exceed the residential direct contact standards and the soil-to-groundwater residential MSCs, the detected concentrations represent potentially unacceptable exposure risks if the property were to be used for residential purposes. By exceeding the soil-to-groundwater standard, the cadmium and zinc concentrations represent a potential risk of

leaching to groundwater and causing an impact that exceeds the groundwater quality standards.

- Lead: Because lead concentrations exceed the residential direct contact standard in Lagoon 2 and Lagoon 3, and the non- residential direct contact standard in Lagoon 1, the lead concentrations represent potentially unacceptable risks if the property were to be used for residential or non-residential purposes, and additional sampling and/or remedial measures may be appropriate to fully delineate and adequately address the elevated lead concentrations. By exceeding the soil-to-groundwater standard, the lead concentrations represent a potential risk of leaching to groundwater and causing an impact that exceeds the groundwater quality standards.

3.4.5 Exposure to Lagoon Water

Inorganic constituents, specifically antimony and lead, and the pesticide Aldrin, were detected in the lagoon surface water at concentrations that exceed PADEP Statewide health standards for residential and non-residential used aquifers. Although this water is not used for drinking water, it represents a potential direct contact exposure risk and contaminant migration risk.

3.4.6 Exposure to Groundwater

Inorganic constituents, specifically antimony, cadmium, lead and thallium, were detected in groundwater at the site at concentrations that exceed the PADEP Statewide health standards for residential and non-residential used aquifers. Since groundwater is not used at the site and there is no future plan to use site related groundwater, there are no current or probable future exposures to impacted groundwater. At a minimum, institutional controls should be implemented to prevent the future use of groundwater at the site.

3.4.7 Groundwater Usage Survey

Based on the March 2003 Phase I ESA, the site and the surrounding area is serviced by the Lewistown Municipal Water Authority, and no groundwater supply wells were observed onsite. Based on a review of the PAGS's PaGWIS, there are no private wells onsite used for drinking water, or in the immediate area.

3.4.8 Review of Ecological Receptors

An extensive review of ecological receptors based Act 2 requirements (Section 250.311) has not been conducted due to the existing site configuration and proposed redevelopment plans. The former industrial wastewater lagoons were built in the 1920's and used until 1972 when Hurricane Agnes forced FMC to discontinue production, therefore rending the lagoons inactive. The water level in the lagoons varies seasonally and has supported various types of vegetation that could be considered a habitat for ecological receptors. Beyond the lagoons, the banks of the Juanita River support a diverse population of trees, shrubs and associated overbank vegetation, and this environment could be considered as a potential receptor. Capping of the lagoons is recommended at the most appropriate measure for eliminating the potential direct contact exposure pathways between ecological receptors and the lagoon surface water and soils/sediments.

3.4.9 Summary

Based on the evaluation conducted, no organic compounds (volatile or semi-volatile), pesticides, and PCBs were detected at the soil/sediment sample locations at concentrations that are at or near the applicable PADEP standards. The metals that were detected in soil (arsenic, cadmium, chromium, lead and zinc) were detected at concentrations that exceed state action levels for direct contact exposures, and lead and cadmium were detected at concentrations above state action levels for potential impacts to groundwater.

Based on the evaluation conducted, no organic compounds (volatile or semi-volatile) or PCBs were detected at the water samples (lagoon water and groundwater) at concentrations that are at or near the applicable PADEP standards. The pesticide Aldrin and the metals antimony, cadmium, lead and thallium were detected at concentrations above drinking water standards. Since there is public water for the site, if remediation were to be done, a note would need to be added to the deed for the purchaser of the property so that they are aware that groundwater at the site could not be used as a source for drinking water.

Remedial measures such as filling the lagoons with clean soil (a.k.a., capping) would restrict potentially unacceptable direct contact exposures to human and ecological receptors.

4.0 REMEDIAL ACTION AND REDEVELOPMENT PLAN FOR RECREATION SITE

Based on a number of factors, the Recreation Site was identified as a favorable candidate for remediation and redevelopment. Of the three sites evaluated, the Recreation Site presents the greatest potential exposure risks, and also a high potential for successful and cost-effective remediation and redevelopment. The remediation and redevelopment plans proposed for the Recreation Site are summarized below, and covered in greater detail in the Grant Application that has been included in Appendix F of this Report. It is anticipated that these plans will be refined through the subsequent completion of an Act 2 Cleanup Plan for the site.

4.1 Introduction

The proposed remediation approach and redevelopment plan is multi-media in nature, and will address the remediation and/or protection of the following media: wastes; soil; groundwater; and surface water. Based on an analysis of the site competed in 1991 and the more recent and thorough analysis completed as part of a Phase II Environmental Assessment, the historic operations at the site have resulted in the presence of residual sludges, contaminated soils and surface water, and contaminated groundwater. Contaminants of concern at the site include organic compounds and heavy metals, with lead being the primary contaminant of concern. Under current conditions, the site presents potentially unacceptable exposure risks associated with the contaminated media. The Recreation Site is a cog in the redevelopment wheel and the beatification of Lewistown, as depicted on Figure 7, the Recreation Site would serve are a stepping stone to the proposed recreation gateway in Lewistown Community.

As discussed in this Section, a conceptual site remediation and redevelopment plan has been developed to concurrently address the issues of potential environmental concern, and to provide for the future beneficial reuse of the site. Benefits and details of the proposed remedial approach

are presented in the remainder of this Section, and a conceptual site redevelopment plan is presented as Figure 8.

4.2 Proposed Remedial Action and Redevelopment Plan for Recreation Site

To address the unacceptable exposure risks, remediation of the site is planned to consist of draining the lagoons and capping the waste residuals and contaminated soil *in situ* with soil. The cap will be graded to match the approximate original grade of the land, and will be sloped to promote surface water runoff. Soils for filling and capping the lagoons will be imported to the site from off-site locations, and will also include the interior soil berms that will be knocked down. Capping the waste and contaminated soils is a cost-effective way to prevent direct contact exposures with the contaminants, and to prevent potential erosion and migration to the River. Capping will also reduce surface water infiltration through the contaminated materials, reducing the leaching of contaminants to groundwater. Public water is available to the site, and the use of on-site groundwater will be restricted to prevent unacceptable exposures. Without remediation, the proposed regional park will not be feasible, and the area will continue to be wasted land.

4.3 Remediation and Redevelopment Benefits

- **Watershed Restoration**

The proposed project will protect the Juniata River by eliminating real and potential contamination from the former lagoons through implementation of the proposedremediation plans. Through these activities, potential contaminant migration to the Juniata River will be reduced, and native species will be planted to generally restore the area to a pre-developed condition. The proposed park will prevent future development of the site and the loss of riverside and floodplain habitat. The park will also preserve flood storage capacity in the floodplain, and prevent future floodplain encroachments. A natural buffer will be maintained along the Riverbanks to support the filtering of pollutants and protection of the River.

- **Reducing Environmental Exposure for Sensitive Populations**

Because the inactive lagoons are currently open, sensitive environmental receptors and human populations can be exposed to potentially unacceptable concentrations of constituents in exposed waste residuals and contaminated soil within the lagoons and surface water that collects within the lagoons. Removal of contaminated standing water and filling and capping of the lagoons as proposed will eliminate the direct contact exposure risks to environmental and human receptors. A geotextile fabric or similar barrier will be used at the base of the cap to prevent borrowing animals from being exposed to contaminated materials. The use of groundwater at the site will also be restricted to prevent potentially unacceptable exposure risks from contaminated groundwater. Capping and grading will also promote surface water runoff, thereby eliminating the lagoons as an attractive location for mosquitoes and potentially sensitive receptors, and reducing the leaching of contaminants into groundwater.

- **Enhancing Environmentally Responsible Development**

The redevelopment plan for the sludge pits site will include low-impact recreational uses such as a boat and canoe launching area, a walking trail, and picnic tables (see Figure 8 for conceptual layout). The site will be restored to contours that will approximate the original contours prior to the site becoming industrialized. Parking areas will generally be gravel-covered, and non-permeable surfaces will be held to a minimum. Responsible sewage disposal, utilizing cost-effective and environmentally friendly methods will be employed. Landscaping will add only native species to the site, and where possible, alien species will be removed. Low-impact recreation such as fishing, picnicking and boat launching will be the focus of the park. As a result of this project this site will become a destination for local residents and visitors to the County. The park is also environmentally responsible because it will preserve the River bank area and prevent future development in the floodplain.

4.4 Closing

It is anticipated that a Cleanup Plan will be finalized and submitted to the PADEP along with the Site Characterization report, with the overall goal of entering the PADEP Act 2 program and obtaining the appropriate release of liability warranted for the site.

5.0 REFERENCES

ARM Group Inc., 2003. "Phase II Environmental Site Assessment Site-Specific, Sampling and Analysis Plan."

ARM Group Inc. 2003. "Phase I Environmental Site Assessment MCIDC Recreation Site, State Route 103, Granville Township, Mifflin County, Pennsylvania."

ARM Group Inc. 2001 "Results of WWTP Sediment Characterization, MCIDC Plaza, Granville Township, Mifflin County, Pennsylvania."

Berg, T.M., Geologic Map of Pennsylvania, 1980.

Bureau of Topographic and Geologic Survey (PAGS), the Pennsylvania Groundwater Information (PaGWIS).

PA Department of Environmental Protection. Act 2 Land Recycling Program Manual. May 2002.

Gannett Fleming Inc., 1973. "Feasibility Study for Acquisition of Industrial Property."

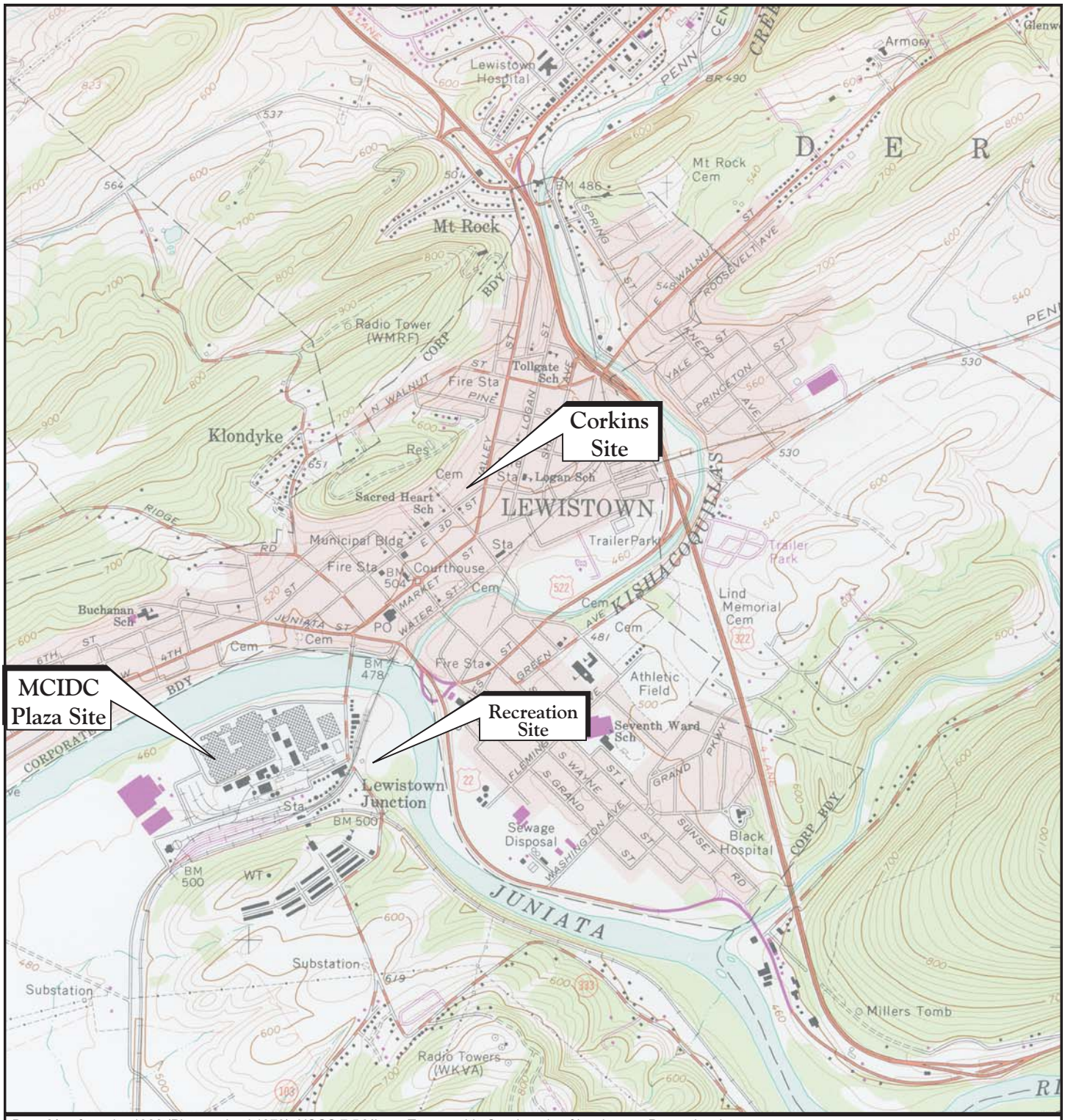
Gannett Fleming Inc., 2000. "Phase I Environmental Site Assessment for Corkins Property, 233 East Third Street, Lewistown, PA."

Gannett Fleming Inc. 2000. "Phase I Environmental Site Assessment for MCIDC Plaza, 6395 SR 103N, Granville Township, Mifflin County, Pennsylvania."

Geyer, A. and Wilshusen, J.P., Engineering Characteristics of the Rocks of Pennsylvania, 1982

REWAI, 1991. "Hydrogeologic Investigation of the MCIDC Former industrial Wastewater Treatment Facility, Lewistown, Pennsylvania."

FIGURES



Base Map from the 1966 (Photorevised 1973) USGS 7.5 Minute Topographic Quadrangle of Lewistown, Pennsylvania

N

500 0 500 1000

SCALE IN FEET

Figure 1

Site Locations Map

Mifflin County Brownfields
Project Proposal
Mifflin County, PA

September 2004

02242

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033

Not To Scale

- Soil Sample Location
- Dropped Soil Sample Location
- C3 Work Plan Table 1 Sample ID

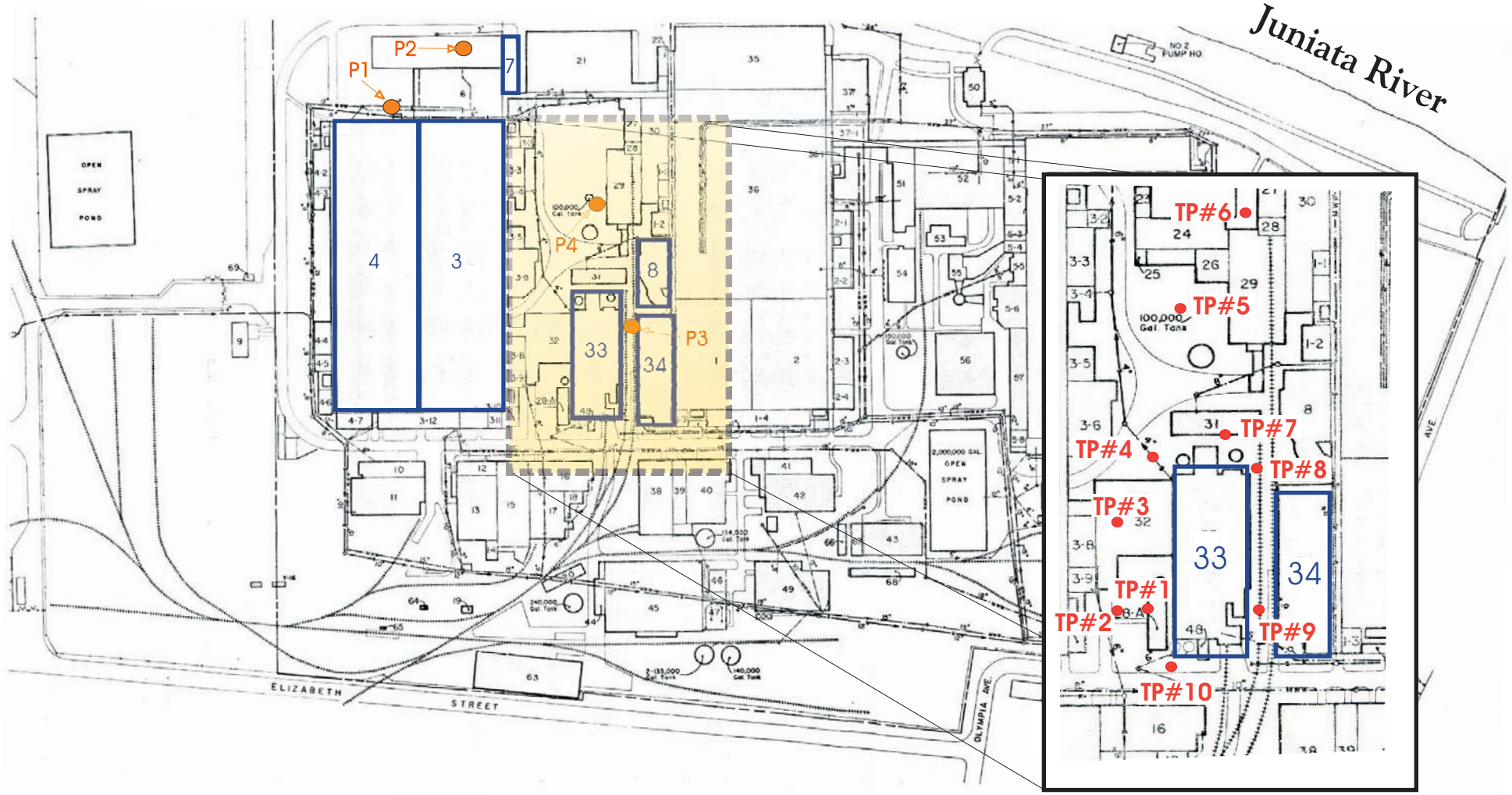
Corkins Site

Lewistown, PA

Figure 2

September 2004	02242

ARM Group Inc.
Earth Resource Engineers and Consultants



Enlargement of P3 Sampling Area

N

50 0 50 100
SCALE IN FEET

Soil Sample Location

C2 Work Plan Table 1 Sample ID

TP#10 Test Pit Investigation Location

Figure 3

MCIDC Plaza Site

September 2004

02242

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Earth Resource Engineers and Consultants
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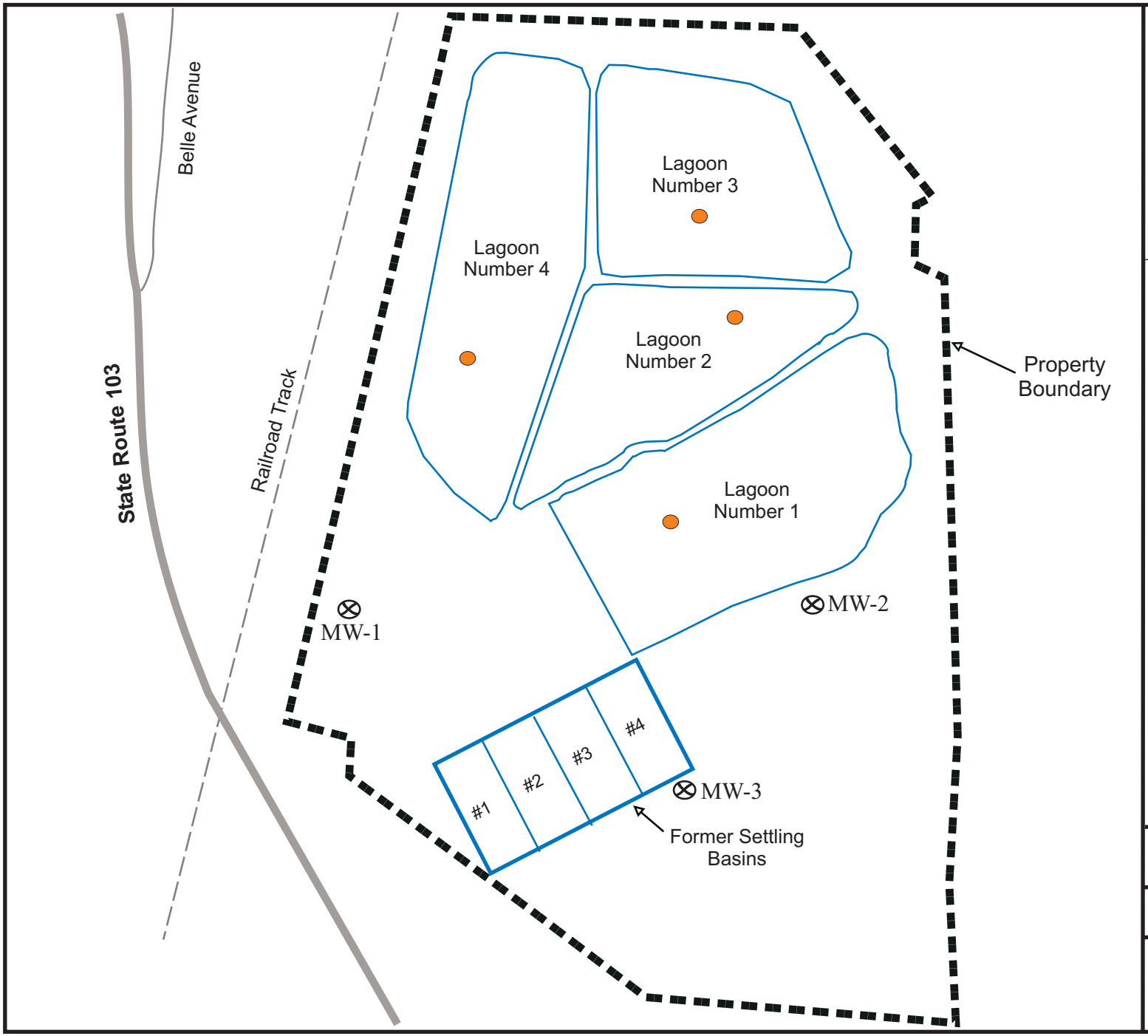


N

Not To Scale

Soil Sample Location

MW-1 Proposed Monitoring Well Location with Identifier

Recreation Site

Mifflin County Industrial Development Corporation
Inactive Wastewater Lagoon Site
Mifflin County, PA

Figure 2

SITE LAYOUT

May 2005	05154

ARM Group Inc.
Earth Resource Engineers and Consultants

Base photo obtained from Mifflin County GIS Department dated April, 2001.

MW-1
83.45
MONITORING WELL LOCATION WITH IDENTIFIER AND APPROX. GROUNDWATER ELEVATION

85
GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

GRAOUNDWATER ELEVATION BASED ON AN ASSUMED VERTICAL DATUM OF 100 FT. MSL AT THE GROUND SURFACE OF MW-1.

N

0 200 400 600
SCALE IN FEET

Groundwater Contour Map September 23, 2003

MCIDC – Recreation Area
Grantville Township
Mifflin County, Pa.

September 2004	Scale: 1" = 200'	02242

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797

Figure 5

I:\02 Projects\02242 Mifflin County\2004 RI REPORT\02242_fig5.dwg

Base photo obtained from Mifflin County GIS Department dated April, 2001.

MW-1
82.20
MONITORING WELL LOCATION WITH IDENTIFIER AND APPROX. GROUNDWATER ELEVATION

85
GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

GRAOUNDWATER ELEVATION BASED ON AN ASSUMED VERTICAL DATUM OF 100 FT. MSL AT THE GROUND SURFACE OF MW-1.

N

0 200 400 600
SCALE IN FEET

Groundwater Contour Map August 16, 2004

MCIDC – Recreation Area
Grantville Township
Mifflin County, Pa.

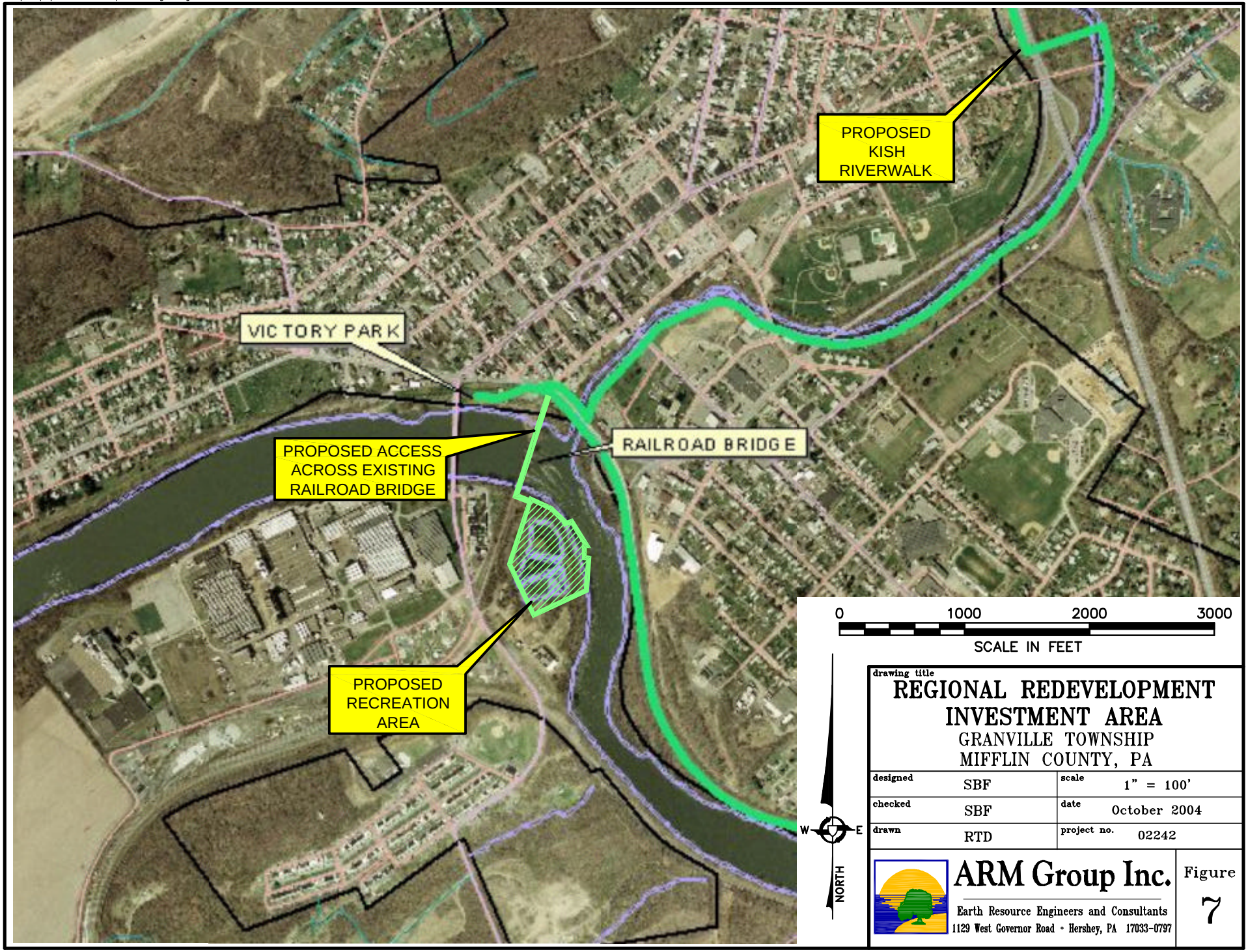
September 2004	Scale: 1" = 200'	02242

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797

Figure 6

I:\02 Projects\02242 Mifflin County\2004 RI REPORT\02242_fig6.dwg

D:\temp\BGPlot_1740\02242_fig7.dwg



drawing title

REGIONAL REDEVELOPMENT INVESTMENT AREA

GRANVILLE TOWNSHIP
MIFFLIN COUNTY, PA

designed	SBF	scale	1" = 100'
checked	SBF	date	October 2004
drawn	RTD	project no.	02242

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797

Figure 7

NORTH

LEGEND

- PROPOSED TREE LINE (APPROXIMATE)
- PROPOSED NATURE TRAIL (HIKING / BIKING)
- PROPERTY LINE (APPROXIMATE)
- PROPOSED RESTROOM FACILITIES

0 100 200 300

SCALE IN FEET

drawing title

CONCEPTUAL SITE REDEVELOPMENT PLAN

GRANVILLE TOWNSHIP
MIFFLIN COUNTY, PA

designed	SBF	scale	1" = 100'
checked	SBF	date	September 2004
drawn	RTD	project no.	02242

ARM Group Inc.
Earth Resource Engineers and Consultants
1129 West Governor Road • Hershey, PA 17033-0797

Figure 8

D:\temp\BGPlot_2736\02242_fig8.dwg

TABLES

Table 1
Summary of Soil Sampling Results
Corkins Property, Granville Township, PA

	Residential MSC for Soil 0-15ft.	Non-Residential MSC for Soil Surface Soil 0-2ft	Non-Residential Subsurface MSC for Soil 2-15ft	Soil to Groundwater MSC for Used Aquifers	C1	C3
VOLATILE ORGANICS (mg/kg)						
Benzene	41	210	240	0.5	0.0029	>0.00082
Styrene	10,000	10,000	10,000	24	0.0096	>0.0016
Tetrachloroethene	340	1,500	3,300	0.5	0.012	>0.00082
TOTAL METALS (mg/kg)						
Antimony	88	1,100	190,000	27	>5	8
Arsenic	12	53	190,000	150	>8	**14**
Beryllium	440	5,600	190,000	320	0.58	0.31
Cadmium	47	210	190,000	38	>1	7.7
Chromium	94	420	190,000	190	14	35
Copper	8,200	100,000	190,000	36,000	20	520
Lead	500	1,000	190,000	450	170	**810**
Mercury	66	840	190,000	10	0.347	0.348
Nickel	4,400	56,000	190,000	650	15	28
Thallium	15	200	190,000	14	0.116	>0.1
Zinc	66,000	190,000	190,000	12,000	170	790
SEMI-VOLATILE ORGANICS (mg/kg)						
Benzo (a) pyrene	2.5	11	190,000	46	>0.5	1
Benzo (b) fluoranthene	25	110	190,000	120	>0.5	2
Benzo (g,h,I) perylene	13,000	170,000	190,000	180	>0.5	1
Bis(2-ethylhexyl)phthalate	1,300	5,700	10,000	130	>1.6	4
Butyl benzyl phthalate	10,000	10,000	10,000	10,000	>0.5	14
Fluoranthene	8,800	110,000	190,000	3,200	>0.5	15
Pyrene	6,600	84,000	190,000	2,200	>0.5	13

Notes:

MSC = Act 2 (25 PA Code 250) Medium-Specific Concentrations for Regulated Substances in Soil; Soil to Groundwater MSC is for used aquifers at residential sites.

Red - Exceedance of Residential MSC 0 - 15 ft.

Brown - Exceedance of Non-Residential Surface Soil 2-15 ft.

Green - Exceedance of Non-Residential Surface Soil MSC 0-2 ft.

Shaded - Exceedance of Soil to Groundwater Residential MSC.

Units reported in mg/kg

Table 2
Summary of Soil Sampling Results
MCIDC Plaza, Granville Township, PA

	Residential MSC for Soil 0-15ft.	Non-Residential MSC for Soil Surface Soil 0-2ft	Non-Residential Subsurface MSC for Soil 2-15ft	Soil to Groundwater MSC for Used Aquifers	Soil Sample Location											
					P1-PAD S	P1-PAD S	P2 BASIN	P3-TP 4	P3-TP 5	P3-TP 8	P3-TP 9	P3-TP 10	P4-NORTH D	P4-NORTH S	P4-SOUTH S	P4-SOUTH D
VOLATILE ORGANICS (mg/kg)																
Chloroform	6	17	19	10	-	-	<0.004	<0.002	<0.0012	<0.002	0.007	<0.00097	-	-	-	-
Carbon disulfide	10,000	10,000	10,000	190	-	-	0.081	<0.002	<0.0012	<0.002	<0.0022	0.0021	-	-	-	-
1,1,1-Trichloroethane	10,000	10,000	10,000	20	-	-	<0.004	0.012	0.0039	<0.002	0.24	0.0028	-	-	-	-
Trichloroethene	190	970	1,100	0.5	-	-	<0.002	<0.001	<0.00061	<0.001	<0.0011	0.0064	-	-	-	-
TOTAL METALS (mg/kg)																
Antimony	88	1,100	190,000	27	-	-	<10	<5	<5	<5	<6.9	6.3	-	-	-	-
Arsenic	12	53	190,000	150	-	-	<16	10	9.8	*37*	**58**	**21**	-	-	-	-
Beryllium	440	5,600	190,000	320	-	-	0.4	0.62	0.64	1.5	2.7	0.7	-	-	-	-
Cadmium	47	210	190,000	38	-	-	<2	<1	<1.0	1.9	2.9	<1	-	-	-	-
Chromium	94	420	190,000	190	-	-	10	13	15	20	28	23	-	-	-	-
Copper	8,200	100,000	190,000	36,000	-	-	31	49	22	5,300	130	95	-	-	-	-
Cyanide (total)	4,400	56,000	190,000	200			<0.504	<0.208	<0.290	0.408	<0.346	0.386				
Lead	500	1,000	190,000	450	-	-	84	97	35	190	88	450	57	110	160	260
Mercury	66	840	190,000	10	-	-	<0.202	0.184	<0.1	0.770	0.257	0.243	-	-	-	-
Nickel	4,400	56,000	190,000	650	-	-	15	15	16	39	110	24	-	-	-	-
Thallium	15	200	190,000	14	-	-	<0.202	0.11	<0.1	0.71	0.52	0.23	-	-	-	-
Zinc	66,000	190,000	190,000	12,000	-	-	130	350	53	750	550	610	-	-	-	-
SEMIVOLATILE ORGANICS (mg/kg)																
Acenaphthylene	13,000	170,000	190,000	2,500	-	-	<1	<0.65	<0.1	<0.66	2.0	<0.5	-	-	-	-
Anthracene	66,000	190,000	190,000	350	-	-	<1	<0.65	<0.1	<0.66	2.6	<0.5	-	-	-	-
Benz (a) anthracene	25	110	190,000	79	-	-	1.9	2.4	<0.1	<0.66	5.7	<0.5	-	-	-	-
Benzo (a) pyrene	2.5	11	190,000	46	-	-	1.3	2.4	<0.1	0.72	**12**	<0.5	-	-	-	-
Benzo (b) fluoranthene	25	110	190,000	120	-	-	2.5	3.2	<0.1	0.96	21	<0.5	-	-	-	-
Benzo (g,h,i) perylene	13,000	170,000	190,000	180	-	-	<1	1.5	<0.1	0.89	9	<0.5	-	-	-	-
Benzo (k) fluoranthene	250	1,100	190,000	610	-	-	1.2	1.2	<0.1	<0.66	7	<0.5	-	-	-	-
Chrysene	2,500	11,000	190,000	230	-	-	1.9	2.5	<0.1	<0.66	13	<0.5	-	-	-	-
Dibenz (a,h) anthracene	2.5	11	190,000	41	-	-	<1	<0.65	<0.1	<0.66	**3.6**	<0.5	-	-	-	-
Fluoranthene	8,800	110,000	190,000	3,200	-	-	4.6	4.4	<0.1	<0.66	4	<0.5	-	-	-	-
Indeno (1,2,3-cd) pyrene	25	110	190,000	7,000	-	-	<1	1.5	<0.1	0.88	10	<0.5	-	-	-	-
Phenanthrene	66,000	190,000	190,000	10,000	-	-	1.6	1.6	<0.1	<0.66	1.4	<0.5	-	-	-	-
Pyrene	6,600	84,000	190,000	2,200	-	-	2.8	3.6	<0.1	<0.66	5.4	<0.5	-	-	-	-
PESTICIDES (mg/kg)																
4,4'-DDD	75	330	190,000	6.8	-	-	0.015						-	-	-	-
PCBS (mg/kg)																
PCB-1254	4.4	44	10,000	75	<0.05	<0.1		0.18	<0.05	<0.05	<0.18	<0.1	-	-	-	-
PCB-1260	30	130	190,000	500	<0.05	<0.1		0.1	<0.05	<0.05	<0.18	<0.1	-	-	-	-

Notes:
MSC = Act 2 (25 PA Code 250) Medium-Specific Concentrations for Regulated Substances in Soil; Soil to Groundwater MSC is for used aquifers at residential sites.
Red - Exceedance of Residential MSC 0 - 15 ft.
Green - Exceedance of Non-Residential Surface Soil MSC 0-2 ft.
Brown - Exceedance of Non-Residential Surface Soil 2-15 ft.
Shaded - Exceedance of Soil to Groundwater Residential MSC.
Units reported in mg/kg

Table 3
Summary of Basin Water Sampling Results
MCIDC Plaza, Granville Township, PA

Constituent	PADEP Act 2 Statewide Health Standard (Used Aquifer; Residential)*	PADEP Act 2 Statewide Health Standard (Used Aquifer; Non-Residential)*	Sample ID P-2 BASIN
VOLATILE ORGANICS (ug/L)			
SEMIVOLATILE ORGANICS (ug/L)			
Benzo (a) anthracene	0.9	3.6	**7.1**
Benzo (a) pyrene	0.2	0.2	**5.7**
Benzo (b) fluoranthene	0.90	1.20	**11**
Benzo (g,h,i) perylene	0.26	0.26	**3.3**
Benzo (k) fluoranthene	0.55	0.55	**4**
Chrysene	1.9	1.9	**8.1**
Dibenz (a,h) anthracene	0.09	0.36	**1.1**
Fluoranthene	260	260	15
Indeno (1,2,3-cd) pyrene	0.9	3.6	**3.6**
Pyrene	130	130	11
TOTAL METALS (ug/L)			
Lead	5	5	**7.9**
PESTICIDES (ug/L)			
PCB (ug/L)			

Notes:
*Only the detected compounds are shown.
Bold - Exceedance of PADEP Act 2 Statewide Health Standard Used Aquifer; Residential and/or Non-Residential
Results in ug/L

Table 4
Summary of Soil/Sediment Sampling Results
Recreation Site, Granville Township, PA

	Residential MSC for Soil 0-15ft.	Non-Residential MSC for Soil Surface Soil 0-2ft	Non-Residential Subsurface MSC for Soil 2-15ft	Soil to Groundwater MSC for Used Aquifers	Sample Location ID				
					Lagoon 1	Lagoon 10	Lagoon 2	Lagoon 3	Lagoon 4
VOLATILE ORGANICS (mg/kg)									
Carbon disulfide	10,000	10,000	10,000	190	0.051	0.0053	0.2	0.014	0.3
Toluene	7,600	10,000	10,000	100	>0.0027	0.0058	0.0065	>0.0018	0.0061
SEMIVOLATILE ORGANICS (mg/kg)									
TOTAL METALS (mg/kg)									
Antimony	88	1,100	190,000	27	25	18	>7.5	>8.7	>6.6
Arsenic	12	53	190,000	150	**40**	**26**	>12	0.14	**18**
Beryllium	440	5,600	190,000	320	0.88	0.96	>.3	0.69	1.3
Cadmium	47	210	190,000	38	**89**	**260**	37	24	2
Chromium	94	420	190,000	190	**130**	**110**	82	88	23
Copper	8,200	100,000	190,000	36,000	490	460	99	82	22
Cyanide (total)	4,400	56,000	190,000	200	0.76	0.98	>0.377	1.56	35.2
Lead	500	1,000	190,000	450	**1,800**	**2,800**	**750**	**640**	82
Mercury	66	840	190,000	10	7.09	7.88	>0.151	3.29	0.718
Nickel	4,400	56,000	190,000	650	13	15	6.80	11	21
Silver	1,100	14,000	190,000	84	>4.4	>5.3	>3.8	>4.3	>3.3
Thallium	15	200	190,000	14	0.443	0.569	>0.151	>0.174	>0.017
Zinc	66,000	190,000	190,000	12,000	2,400	5,000	**20,000**	**30,000**	6,000
PESTICIDES (mg/kg)									
4,4'-DDD	75	330	190,000	6.8	0.0074	>0.013	>0.091	>0.010	>0.010
PCBs (mg/kg)									
PCB-1248	9.9	44	10,000	18	1	0.7	>0.150	>0.087	>0.087

Notes:

MSC = Act 2 (25 PA Code 250) Medium-Specific Concentrations for Regulated Substances in Soil; Soil to Groundwater MSC is for used aquifers at residential sites.

Red - Exceedance of Residential MSC 0 - 15 ft.

Green - Exceedance of Non-Residential Surface Soil MSC 0-2 ft.

Brown - Exceedance of Non-Residential Surface Soil 2-15 ft.

Shaded - Exceedance of Soil to Groundwater Residential MSC.

Units reported in mg/kg

Lagoon 4 Sampling event occurred 4/3/2003 as part of a separate project

Lagoon 10 Sample is the Blind Duplicate Sample For Lagoon 1

Table 5
Summary of Groundwater and Lagoon Water Sampling Results
Recreation Site, Granville Township, PA

Constituent	PADEP Act 2 Statewide Health Standard (Used Aquifer; Residential)*	PADEP Act 2 Statewide Health Standard (Used Aquifer; Non-Residential)*	Sample Location ID											Blind Dupliates	
			Lagoon 1	Lagoon 10	Lagoon 2	Lagoon 3	Lagoon 4	MW-1	MW-1	MW-2	MW-2	MW-3	MW-3	MW-10	MW-20
			10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	9/2/04	10/23/03	9/2/04	10/23/03	9/2/04	9/2/04	10/28/03
VOLATILE ORGANICS (ug/L)															
SEMIVOLATILE ORGANICS (ug/L)															
Benzo(a)anthracene	3.6	3.6	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	0.34	-	>0.2	-	-	-
3,4-Methylphenol	100	100	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	2.9	-	>2.0	-	-	-
Naphthalene	100	100	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	7.6	-	>2.0	-	-	-
Phenanthrene	1,100	1,100	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	2.9	-	>2.0	-	-	-
TOTAL METALS (ug/L)															
Arsenic	50	50	<5	<5	9.85	9.15	-	6.57	<5	16.3	7.4	-	<5	<5	-
Antimony	6	6	<5	**6.01**	**10.9**	<5	-	<5	<2.5	<5	<2.5	**7.94**	<2.5	<2.5	-
Cadmium	5	5	<4	<4	<4	<4	-	**8**	**12**	<4	<5.5	<4	**<5.5**	**10**	-
Copper	1000	1000	<50	<50	<50	<50	-	<50	<3.8	<50	3.9	<50	<3.8	<3.8	-
Lead	5	5	**17**	**12**	**42**	**11**	**-**	**12**	<3.6	**97**	<3.6	**9.9**	<3.6	<3.6	**-**
Nickel	100	100	<50	<50	<50	<50	**-**	<50	12	<50	8.7	<50	23	12	-
Thallium	2	2	**-**	**-**	**-**	**-**	**-**	**-**	**3.4**	**-**	<2.8	-	-	<2.8	-
Zinc	2,000	2,000	180	180	270	180	**-**	1,800	1,500	180	24	130	380	1,400	-
PESTICIDES (ug/L)															
Aldrin	0.0087	0.037	<0.037	<0.037	**0.1**	<0.037	-	<0.037	-	<0.037	-	<0.037	-	-	<0.037
PCB (ug/L)															

Notes:

72 - Results in bold text exceed the PADEP Act 2 Statewide Health Standard.
Only detected constituents are listed
Lagoon 10 Sample is the Blind Duplicate Sample For Lagoon 1
MW-20 Sample is the Blind Duplicate Sample For MW-2.
Lagoon 4 was dry at time of sampling.
- No sample submitted for analysis

Table 6
Summary of Groundwater Elevations in Site Wells
Recreation Site, Granville Township, PA

Well ID	Date	TOC Surveyed Elevation (feet above relative benchmark)	Depth to Water (feet below TOC)	Groundwater Elevation (feet above relative benchmark)
MW-1	10-23-03	103.09	19.64	83.45
	08-16-04		20.89	82.20
MW-2	10-23-03	105.40	10.9	94.50
	08-16-04		11.46	93.94
MW-3	10-23-03	99.18	19.7	79.48
	08-16-04		22.26	76.92

Groundwater elevation is based on an assumed datum of 100 feet msl, set at the ground surface at MW-1.

APPENDIX A

ANALYTICAL RESULTS FOR CORKIN'S PROPERTY

APPENDIX B

ANALYTICAL RESULTS FOR MCIDC PLAZA

APPENDIX C

ANALYTICAL RESULTS FOR RECREATION SITE

APPENDIX D

RECREATION SITE WELL LOGS

APPENDIX E

DATA VALIDATION

APPENDIX F

GRANT APPLICATION DOCUMENTS

MONITORING WELL DATA
OCTOBER 23, 2003

LAGOON 4 SEDIMENT SAMPLING DATA
APRIL 3, 2003

MONITORING WELL DATA
SEPTEMBER 2, 2004