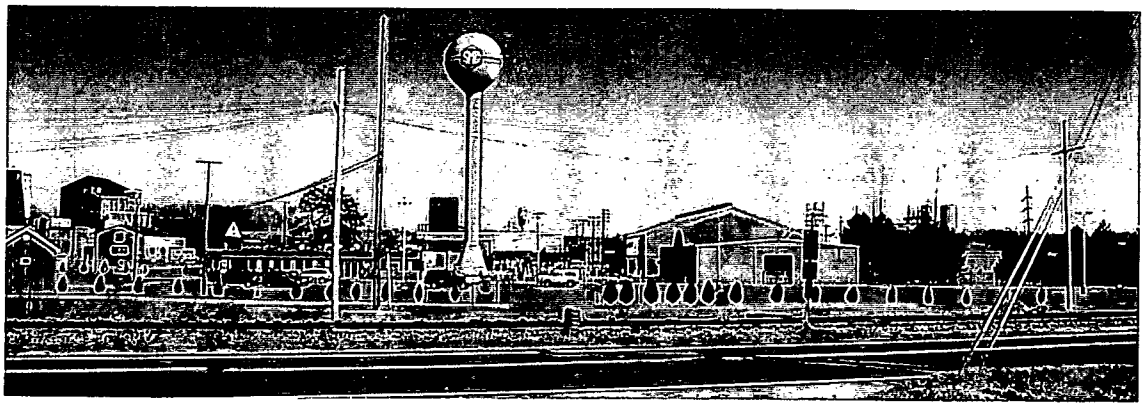

DECOMMISSIONING PLAN

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

Volume I
Text, Tables and Figures

Volume II
Appendices 19.1 through 19.8

Volume III
Appendix 19.9 Environmental Report

Prepared by

Integrated Environmental Management, Inc.

and

TRC Environmental Corporation

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Appendix 19.9 - Environmental Report

Environmental Report for the Newfield Facility

Submitted by:

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TABLE OF CONTENTS

SECTION PAGE

1.0 INTRODUCTION 1-1
1.1 The Proposed Action 1-1
1.2 The Purpose and Need for the Proposed Action 1-2
1.3 Background 1-4
1.3.1 Site Location 1-4
1.3.2 Site Use and History 1-5
1.4 Source Characterization 1-11
1.5 Apphcable Regulatory Requirements, Permits and Required Consultations 1-13
1.6 Scope 1-13
2.0 DETAILED DESCRIPTION OF ALTERNATIVES 2-1
2.1 License Continuation (LC) 2-1
2.2 On Site Stabilization and Long-Term Control (LTC) Alternative (Proposed Action) 2-1
2.3 Off-Site Disposal with License Termination (LT) Alternative 2-3
2.4 Alternatives Considered but Eliminated 2-3
2.5 Cumulative Effects 2-4
2.6 Comparison of the Predicted Environmental Impacts 2-4
2.7 Regulatory Compliance 2-4
3.0 AFFECTED ENVIRONMENT 3-1
3.1 Land Use 3-1
3.2 Transportation 3-4
3.2.1 Roads and Highways 3-4
3.2.2 Public Transportation (Bus Service) 3-6
3.2.3 Rail Service 3-6
3.2.4 Air Transportation 3-7
3.3 Geology and Soils 3-8
3.3.1 Regional Geology 3-8
3.3.1.1 Bedrock Geology 3-8
3.3.1.2 Overburden Geology 3-9
3.3.1.3 Potential for Geologic Hazards 3-12
3.3.2 Site Geology 3-14
3.3.3 Soil Quality 3-15
3.4 Water Resources 3-15
3.4.1 Surface Water Hydrology 3-15
3.4.1.1 Regional Hydrology 3-15
3.4.1.2 Local Hydrology 3-16

TABLE OF CONTENTS
(Continued)

3.4.1.3 Water Flow Data 3-19
3.4.1.4 Wetlands 3-22
3.4.1.5 100-Year Floodplain 3-22
3.4.1.6 Surface Water Quality – Maurice River Basin 3-22
3.4.1.7 Surface Water Quality - Hudson Branch and Burnt Mill Pond 3-23
3.4.1.8 Potential Pollutant Sources in the Hudson Branch Watershed 3-24
3.4.1.9 Surface Water Use 3-26
3.4.1.10 Water Control Stmctures 3-27
3.4.2 Ground Water Hydrogeology 3-27
3.4.2.1 Ground Water Aquifers 3-27
3.4.2.2 Ground Water Use 3-27
3.4.2.3 Site-Specific Hydrogeologic Characteristics 3-29
3.4.2.4 Regional Ground Water Quality 3-31
3.4.2.5 Local Ground Water Quality 3-32
3.4.2.6 Potential Ground Water Pollutant Sources 3-35
3.5 Ecological Resources 3-36
3.5.1 Habitats 3-37
3.5.1.1 Aquatic Habitats 3-38
3.5.1.2 Upland Habitats 3-40
3.5.1.3 Wetland Habitats 3-41
3.5.2 Potential Receptor Species Profile 3-43
3.5.2.1 Aquatic Receptor Species 3-44
3.5.2.2 Terrestrial Upland/Wetland Receptor Species 3-45
3.5.2.3 Rare and Endangered Species 3-46
3.5.3 Ecological Risk 3-48
3.6 Meteorology, Climatology and Air Quality 3-50
3.6.1 General Climate and Climate Normals, Means and Extremes 3-51
3.6.2 Severe Weather Phenomena 3-53
3.6.3 Air Quality 3-54
3.7 Noise 3-55
3.7.1 Applicable Noise Standards 3-56
3.7.2 Characterization of Existing Noise 3-57
3.7.3 Noise Monitoring Results 3-58
3.8 Historic and Cultural Resources 3-59
3.9 Visual/Scenic Resources 3-63
3.9.1 Character and Visual Quahty of the Existing Landscape 3-63
3.9.2 Viewshed Map/Analysis 3-63
3.9.3 Visual Resource Analysis 3-64
3.9.4 Section of Viewpoints for Further Analysis 3-65

TABLE OF CONTENTS
(Continued)

3.9.5 Description of Existing Views 3-65
3.10 Socioeconomic Considerations 3-66
3.10.1 Population 3-67
3.10.2 Employment 3-69
3.10.3 Poverty 3-69
3.10.4 General Socioeconomic Indicators 3-70
3.10.5 Housing 3-70
3.10.6 Schools 3-71
3.10.7 Health Services 3-72
3.10.8 Tax Structure 3-72
3.11 Public and Occupational Health 3-73
3.11.1 Radiologic Issues 3-73
3.11.1.1 Background Conditions 3-73
3.11.1.2 Current Radiologic Sources and Exposure Levels 3-74
3.11.2 Chemical Contaminants of Concern 3-76
3.11.2.1 Comparison to State and Federal Guidance Levels 3-76
3.11.2.2 Human Health Risk Assessment 3-77
3.11.2.3 Proposed Remedial Actions 3-78
3.12 Waste Management 3-79

4.0 ENVIRONMENTAL IMPACTS 4-1

4.1 Land Use Impacts 4-1
4.1.1 LTC Alternative 4-1
4.1.2 LT Alternative 4-3
4.1.3 LC Alternative 4-4
4.2 Transportation Impacts 4-4
4.2.1 LTC Alternative 4-4
4.2.2 LT Alternative 4-5
4.2.3 LC Alternative 4-7
4.3 Geology and Soil Impacts 4-7
4.3.1 LTC Alternative 4-7
4.3.2 LT Alternative 4-8
4.3.3 LC Alternative 4-8
4.4 Water Resources Impacts 4-8
4.4.1 LTC Alternative 4-9
4.4.2 LT Alternative 4-10
4.4.3 LC Alternative 4-11
4.5 Ecological Resources Impacts 4-12
4.5.1 LTC Alternative 4-12

TABLE OF CONTENTS
(Continued)

4.5.2 LT Alternative 4-13
4.5.3 LC Alternative 4-14
4.6 Air Quality Impacts 4-14
4.6.1 Overview 4-14
4.6.2 LTC Alternative 4-17
4.6.3 LT Alternative 4-20
4.6.4 LC Alternative 4-22
4.6.5 Visibility Impacts 4-23
4.6.6 Summary 4-23
4.7 Noise Impacts 4-24
4.7.1 LTC Alternative 4-24
4.7.2 LT Alternative 4-27
4.7.3 LC Alternative 4-29
4.8 Historic and Cultural Resources Impacts 4-29
4.8.1 LTC Alternative 4-30
4.8.2 LT Alternative 4-31
4.8.3 LC Alternative 4-32
4.9 Visual/Scenic Resources Impacts 4-32
4.9.1 LTC Alternative 4-32
4.9.2 LT Alternative 4-36
4.9.3 LC Alternative 4-37
4.10 Socioeconomic Impacts 4-37
4.10.1 LTC Alternative 4-37
4.10.2 LT Alternative 4-38
4.10.3 LC Alternative 4-39
4.11 Environmental Justice 4-39
4.12 Public and Occupational Health Effects Impacts 4-41
4.12.1 LTC Alternative 4-42
4.12.2 LT Alternative 4-44
4.12.3 LC Alternative 4-47
4.13 Waste Management Impacts 4-47
4.13.1 LTC Alternative 4-47
4.13.2 LT Alternative 4-48
4.13.3 LC Alternative 4-48

5.0 MITIGATION MEASURES 5-1

5.1 LTC Alternative 5-1
5.2 LT Alternative 5-2
5.3 LC Alternative 5-3

TABLE OF CONTENTS
(Continued)

6.0 ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS 6-1
6.1 Radiological Monitoring 6-1
6.1.1 LTC Altemative 6-3
6.1.2 LT Altemative 6-3
6.1.3 LC Altemative 6-3
6.2 Physicochemical Monitoring 6-3
6.3 Ecological Monitoring 6-4
7.0 COST-BENEFIT ANALYSIS 7-1
7.1 LTC Altemative 7-1
7.2 LT Altemative 7-1
7.3 LC Altemative 7-2
8.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES 8-1
8.1 LTC Altemative 8-1
8.2 LT Altemative 8-2
8.3 LC Altemative 8-3
9.0 REFERENCES 9-1
10.0 LIST OF PREPARERS 10-1

TABLES

1-1 Stored Material Volume Estimates
1-2 Potentially Applicable Regulatory Requirements and Consultations
1-3 Existing Permits

2-1 Summary of Predicted Environmental Impacts

3-1 Sedimentary Sequence of Unconsolidated Sediments, Gloucester County
3-2 Summary of Historic Earthquakes Occurring or Felt in New Jersey
3-3 Summary of Freshwater Use, Cumberland and Gloucester Counties
3-4 Monitoring/Extraction Well Constmction Details
3-5 Climate Data – Normals, Means and Extremes, Philadelphia, PA
3-6 Precipitation Frequency Estimates (inches) in the Newfield Area
3-7 Monitored Air Quality in the Newfield Area
3-8 Visual Resources and Potential Viewpoints within One Mile of the Storage Yard Area

TABLE OF CONTENTS
(Continued)

TABLES (continued)

3-9 Population Data Summary for Area Surrounding SMC Facility Based on Year 2000 Census
3-10 Total Population by Quadrant for Area Surrounding SMC Facility Based on Year 2000 Census Data
3-11 Poverty Data Summary for Area Surrounding SMC Facility Based on Year 2000 Census
3-12 Housing Data Summary for Area Surrounding SMC Facility Based on Year 2000 Census
3-13 Background Soil Radionuclide Concentrations

4-1 Air Pollutant Emission Rates – LTC Alternative
4-2 Predicted Project Air Pollutant Concentrations – LTC Alternative
4-3 Predicted Cumulative Air Pollutant Concentrations for Events during which the Project Is a Significant Contributor – LTC Alternative
4-4 Predicted Project Radionuchde Concentrations – LT and LTC Alternatives
4-5 Air Pollutant Emission Rates - LT Alternative
4-6 Predicted Project Air Pollutant Concentrations – LT Alternative
4-7 Predicted Cumulative Air Pollutant Concentrations for Events during which the Project Is a Significant Contributor - LT Alternative
4-8 Noise Levels of Major Construction Equipment
4-9 Maximum Projected Constmction Noise Levels at Receptor Locations – LTC Alternative
4-10 Maximum Projected Constmction Noise Levels at Receptor Locations – LT Alternative

7-1 Cost Estimate – On-Site Stabilization and Long-Term Control Alternative
7-2 Cost Estimate – Off-Site Disposal with License Termination Alternative
7-3 Cost Estimate – License Continuation Alternative

FIGURES

1-1 Site Location Map
1-2 Site Plan
1-3 Aerial Photograph (2000)
1-4 Aerial Photograph (2005)
1-5 Restricted and Former Restricted Areas
1-6 Storage Yard Plan (2005 Aerial Photo)

TABLE OF CONTENTS
(Continued)

FIGURES (continued)

2-1 Proposed Action Capped Pile Site Plan
2-2 Off-Site Disposal with License Termination Alternative Features

3-1 Land Use within 1 Mile of SMC
3-2 State Planning Areas within 1 Mile of SMC
3-3 Prime and Other Important Farmlands within 1 Mile of SMC
3-4 Proximity of Pinelands Habitat to SMC Facility
3-5 Main Transportation Routes in the Vicinity of SMC Facility
3-6 Geologic Cross Section, Gloucester County
3-7 Surficial Geology Map, Gloucester County
3-8 Site Geologic Cross-Section
3-9 Limits of Cohansey-Maurice Watershed
3-10 Local Surface Water Features
3-11 Delineated Wetlands and Habitat Cover Types (1996)
3-12 Delineated Flood Hazard Areas near SMC Facility
3-13 Water Use Summary – Maurice, Salein and Cohansey Watershed Management Area
3-14 Monitoring Well Location Plan
3-15 Meteorological (Met) and Air Quality (AQ) Monitoring Site Locations
3-16 Annual Windrose for Millville Municipal Airport
3-17 Monthly Windroses for Millville Municipal Airport
3-18 Noise Monitoring Locations
3-19 Projected Storage Yard Viewshed – Existing Conditions
3-20 Viewpoint Locations
3-21 Points of Storage Yard Visibility – Viewpoints 1 and 2
3-22 Points of Storage Yard Visibility – Viewpoints 3 and 5
3-23 2000 Census Tract and Block Group Locations

4-1 Map Showing Geometry of Potential Emission Sources for the Proposed Decommissioning Alternatives
4-2 Isopleth Map of Predicted Maximum Annual NO_2 Concentrations – LTC Alternative
4-3 Isopleth Map of Predicted Average Annual PM_{10} Concentrations – LTC Alternative
4-4 Isopleth Map of Predicted 6th-High 24-Hour Average PM_{10} Concentrations – LTC Alternative
4-5 Isopleth Map of Predicted Maximum Annual NO_2 Concentrations – LT Alternative
4-6 Isopleth Map of Predicted Average Annual PM_{10} Concentrations – LT Alternative
4-7 Isopleth Map of Predicted 6th-High 24-Hour Average PM_{10} Concentrations – LT Alternative

TABLE OF CONTENTS
(Continued)

4-8 Location of Stabilized Storage Pile Relative to Potential Cultural Resource Areas
4-9 Locations of LT Alternative Features Relative to Potential Cultural Resource Areas
4-10 Viewshed Map – Proposed Action
4-11 Viewpoint Location 1 – LTC Alternative
4-12 Viewpoint Location 2 – LTC Alternative
4-13 Viewpoint Location 4 – LTC Alternative
4-14 Viewpoint Location 5 – LTC Alternative
4-15 Viewpoint Location 23 – LTC Alternative (Ghosted Image)
4-16 Viewpoint Location 18 – LTC Alternative (Ghosted Image)
4-17 Viewpoint Location 1 – LT Alternative
4-18 Viewpoint Location 2 – LT Alternative
4-19 Location of LTC Alternative Features Relative to Off-Site Sensitive Receptors

PLATES

A Topographic Map, SMC Facility
B Outfalls and Drainage Areas at the SMC Facility

APPENDICES

A Select Land Use Information
B Selected Geologic/Soil Data
C Hydrologic Data for the Maurice River Basin
D Surface Water Sampling Results
E Regional Hydrogeologic Information
F Local Hydrogeologic Data
G Ecological Data
H Cultural Resource Information
I Visual Resource Survey Information
J Select Socioeconomic Data
K Air Modeling Information

1.0 INTRODUCTION

1.1 The Proposed Action

The National Environmental Policy Act (NEPA) of 1969 (42 USC 4321 et seq.) requires Federal agencies, as part of their decision-making process, to consider the environmental inipacts of actions under their jurisdiction. The U.S. Nuclear Regulatory Commission (USNRC) has developed a guidance document, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Final Report (NUREG-1748), to guide the preparation of Environmental Reports under the environmental review process. This document has been prepared to address the NUREG-1748 guidance for proposed decommissioning activities at the Shieldalloy Metallurgical Corporation (SMC) facility in Newfield, New Jersey.

The SMC facihty holds a USNRC radioactive materials license (USNRC License No. SMB-743) that authorizes the possession of up to 303,050 kilograms of thorium in any chemical/physical form, and up to 45,000 kilograms of uranium in any chenical or physical form. As of October 17, 2005, SMC was at 96.8% of the thorium limit and 87.6% of the uranium limit. The majority of the hcensed radioactive material inventory at the facihty consists of slag from the former D-111 production department and dust from the former D-111 baghouses. The remainder is soil and surface-contaminated concrete from on-site remediation activities.

The proposed action to be implemented under the Decommissioning Plan consists of on-site stabilization of the residual radioactivity, followed by long-term control. Under this action, all residual radioactive materials at the SMC facihty will be consolidated in the existing Storage Yard in the eastem part of the facility, where the majority of the materials are currently located. The materials will be graded, covered with an engineered barrier, and subject to long-term maintenance. Following the completion of the engineered barrier, land use restrictions and institutional controls, via the issuance of a "possession only" radioactive materials hcense by the USNRC, hereinafter referred to as a "Long Term Control" or LTC license, will ensure long-term protection of the public and the environment.

1.2 The Purpose and Need for the Proposed Action

Under the Atomic Energy Act, the USNRC has the statutory authority for protection of public health and safety and the environment related to the use of source, byproduct, and special nuclear material. One portion of the responsibility is to ensure safe and timely decommissioning of the nuclear facilities that it licenses. Once licensed activities have ceased, licensees are required by USNRC regulations to decommission their facilities so that their licenses can be terminated.

The criteria for allowing the release of sites for unrestricted use are hsted in the USNRC's License Termination Rule (LTR), codified in Subpart E of 10 CFR 20. In Section 20.1402, it states, in part, that a site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a total effective dose equivalent (TEDE) to an average member of the critical group that is less than 25 mrem (0.25 mSv) per year, including the dose from ground water sources of drinking water, and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). These criteria, in essence, require that radioactivity in buildings, equipment, soil, ground water, and surface water resulting from the licensed operation be reduced to acceptably low levels. Licensees must then demonstrate by a site radiological survey that: (1) residual contamination in all facilities and environmental media has been properly reduced or eliminated; and that (2), except for any residual radiological contamination found to be acceptable by USNRC to remain at the site, radioactive material has been transferred to authorized recipients. Confirmatory surveys may be conducted by USNRC, where appropriate, to verify that sites meet the LTR's dose criteria for hcense termination.

Altemately, the LTR allows USNRC to approve on-site stabilization of the radioactive material under conditions of restricted release, as codified in 10 CFR 20.1403. Such an approach requires the establishment of long-term, legally-enforceable institutional controls. In SECY-03-0069, the USNRC staff reconmended the possession-only license for long-term control (LTC hcense) as one option for resolving LTR institutional control issues at sites where restricted use would be used. To address the institutional controls issue, the USNRC developed options,

including: 1) a risk-informed, graded approach for selecting institutional controls; 2) an USNRC possession-only license for long-term controls and 3) USNRC monitoring of institutional controls after license termination using a legal agreement and deed restriction. Under the risk-informed graded approach for selecting institutional controls, a general risk framework is defined by the hazard level and likelihood of hazard occurrence. Specific grading of institutional controls is determined by evaluating and balancing numerous site-specific factors, such as the following:

- physical characteristics of the site that limit future land use;
- land uses that would be adverse to performance/compliance and therefore should be prohibited;
- land uses that are acceptable and could result in productive reuse of the site;
- dose assessinent results;
- engineered barriers and maintenance;
- monitoring controls and maintenance;
- jurisdictional limitations on enforceability and long-term effectiveness of institutional controls; and
- advice from affected parties, such as local govemments and the public.

If a licensee cannot establish acceptable durable institutional controls, a USNRC LTC license is offered as a possibility after completion of remediation. The LTC hcense option involves amending the existing license to a possession-only license after remediation is complete and after demonstrating that the LTR dose criteria are met. For such sites, the USNRC itself would serve as the durable institutional control in order to maintain the restrictions necessary to meet the LTR criteria. The USNRC would ensure monitoring, inspection and enforcement are performed under its licensing authority. More information is provided in the USNRC's site-specific interim guidance for a LTC hcense at the SMC facility (USNRC, 2004).

A detailed hcense history is provided in Section 2 of the Decommissioning Plan. In August of 2001, SMC notified USNRC that production activities using source material as authorized under License No. SMB-743 had ceased and that they intended to terminate the hcense. Subsequently, Report No. 94005/G-2827, "Decommissioning Plan for the Newfield Facility" (Rev 0) was prepared and submitted to the USNRC for approval. During regulatory

review of that document, SMC learned that new guidance on license termination under restricted release conditions was forthcoming. Therefore, on November 25, 2002, SMC submitted an application to defer further review of Rev. 0 of the Decommissioning Plan until the new guidance was released. Prior to USNRC action on that request, SMC was notified that Rev. 0 did not pass acceptance review due to deficiencies in the proposed institutional controls, the lack of sufficient stakeholder input on the proposed decommissioning methodology, and questions regarding the sufficiency of financial assurance. However, License No. SMB-743, the term of which had been previously extended under timely renewal notice, was modified to permit only on-going and previously-authorized decommissioning operations to proceed. Once SMC received the new USNRC guidance on restricted release (USNRC, 2004), an interest was expressed in pursuing this option and, at the recommendation of the USNRC, a phased approach to the preparation of Rev. 1 of the Decommissioning Plan began. The basis for the revised plan would be to amend License No. SMB-743 to a LTC license once all scheduled remedial actions (i.e., on-site stabilization of residual radioactivity) and the final status survey are complete, when SMC is able to demonstrate the dose criteria of the LTR have been met and when SMC's provision for a long-term control plan is in place.

1.3 Background

1.3.1 Site Location

The SMC facility is located at 35 South West Boulevard, primarily in the Borough of Newfield, Gloucester County, New Jersey. A small portion of the southwest corner of the site is located in the City of Vineland, Cumberland County, New Jersey. Franklin Township surrounds the Newfield Borough boundary in Gloucester County. A site location map is provided in Figure 1-1. The manufacturing portion of the facility and associated support areas cover approximately 27.4 hectares (67.7 acres). The approximate center of the facility is located at latitude 39°32'27.6"N, longitude 75°01'06.7"W. SMC also owns an additional 8 hectares (19.8 acres) of farmland, located approximately 610 meters (2,000 feet) southwest of the main facility in Vineland, Cumberland County, New Jersey. Since SMC has never used this property for

manufacturing or related activities, this report focuses on the main 27.4-hectare (67.7-acre) facility area, referred to herein as the SMC facility.

The SMC facility is bounded to the north by a former rail spur and to the west by Conrail rail lines and by West Boulevard. Woods, residences and small businesses are present to the east of the site. The southem property line is bounded by the Hudson Branch, its associated wetlands/headwaters, and an unnamed pond. Residences are located along Weymouth Road, south of the Hudson Branch.

The majority of the site is surrounded by secure steel-wire fencing, except for a small portion of the property along the westem property boundary, where the facihty parking lot is located. A detailed plan depicting the boundaries and physical features of the facility is provided as Figure 1-2. In Figure 1-3, this plan is shown overlaying an aerial photo of the facility taken in October 2000. A current aerial photo of the facility (January 2005) is provided in Figure 1-4. A current topographical map (January 2005) of the SMC facility is provided as Plate A.

1.3.2 Site Use and History

The SMC facility manufactures or has manufactured specialty steel and super alloy additives, primary aluminum master alloys, metal carbides, powdered metals and optical surfacing products. Raw materials used at the facility included ores which contain oxides of columbium (niobium), vanadium, aluminum metal, titanium metal, strontium metal, zirconium metal, and fluoride (titanium and boron) salts. During the manufacturing process, slag, dross and baghouse dust were generated.

One of the materials received, used and stored by SMC contained radioactive material which is classified as "source material" pursuant to 10 CFR Part 40. This material is called pyrochlore, a concentrated ore containing columbium (niobium) and greater than 0.05% of natural uranium and natural thorium. It is therefore licensable by the USNRC.

The majority of the hcensed radioactive material inventory at the facility consists of slag from the former D-111 production department and dust from the former D-111 baghouses. After processing of consumable pyrochlore ore and other feed materials for ferrocolumbium and other

metallurgical operations, greater than 99% of the radioactive species remained in the slag and, to a much lesser extent, in the baghouse dust.

The facility is comprised of three primary areas: 1) the Manufacturing Area; 2) undeveloped plant property, including the former lagoon area; and 3) the Storage Yard. Each of these areas is described in more detail below:

- Manufacturing Area - This area is characterized by the presence of plant operations, offices, loading docks, and other facilities associated with former and present production operations (refer to Figure 1-2). The majority of this area is covered by buildings, other structures, asphalt or concrete.

  The majority of the Manufacturing Area has either never been impacted by licensed operations, or has already been free-hcensed. Areas not impacted by licensed operations include the visitor center and administrative offices, Departments 101, 107, 115, 116/118, 203 and 204. Stmctures or facilities which were at one time impacted by hcensed operations include the AAF Baghouse, Building D203G, Building D203A, the Flex-Kleen Baghouse and Buildings D-111, D-102 and D-112. The status of each of these is described below.

  The AAF Baghouse was one of two emission control units associated with Building D-111, where ferrocolumbium production was performed. It was comprised of an American Air Filter baghouse, hence it was referred to as the "AAF Baghouse." Because of improvements made to the air handling system and to a baghouse that operated in tandem with the AAF Baghouse, in early 1999 SMC determined that it was no longer necessary to operate two emission control systems. Therefore, the decision was made to decommission the AAF Baghouse.

  During the remedial action, which occurred between May 17 and June 17, 1999, the AAF Baghouse was disassembled. Stmctural components and materials that were generated during the demolition were surveyed to detemine whether they could be released for unrestricted use (i.e., without regard for radiological constituents). Those items that did not meet the applicable release criteria were decontaminated and re-surveyed, or controlled as hcensed material. A final status survey report was prepared, and the area, with the exception of the concrete pad, was released for unrestricted use in a license amendment. During the project to decontaminate and dismantle Buildings D-111 and D-102/D-112 (discussed below), the AAF concrete pad was removed and placed in the Storage Yard.

  Building D203(G), also known as "G-Warehouse," was used for temporarily storing source material pending shipment or use. When SMC no longer needed G-

Warehouse to perform the primary activities authorized under License No. SMB-743, it was decommissioned. Routine radiological surveillance of this area demonstrated that it was relatively free of residual radioactivity. Therefore, no remedial actions were necessary. In October of 2000, a final status survey of G-Warehouse was performed and documented and the building was subsequently released for unrestricted use in a hcense amendment.

Building D203(A), also known as "A-Warehouse," was another area where source material was received and temporarily stored pending shipment or use. When SMC no longer needed A-Warehouse to perform the primary activities aithorized under License No. SMB-743, it was decommissioned. The necessary remedial actions were performed, and a final status survey was conducted and documented. The building was subsequently released for unrestricted use in a license amendment.

SMC began the decominissioning of the D-111 Production Department, the Flex-Kleen Baghouse and the D-102/D-112 Production Department in Jiiiy of 2002. Department 111 was used for ferrocolumbium operations, Department 102 was used foi the fomer aluminothermic reduction operation, and Department 112 was the site of cmshing operations. All three buildings were decontaminated and dismantied. Those surfaces that could not be readily decontanunated (i.e., surface-contaminated concrete and soils) were placed in the vicinity of Storage Yard. The decontamination and dismanthng work was documented in accordance with SMC's Radiation Protection Program procedure. A final status survey of the area will be conducted as part of the overall decommissioning effort.

While not designated as restricted areas, final status surveys were conducted in 2002 at three additional buildings/areas of the Manufactiiring Area that had the potential for impact by licensed operations. These include the D-117 (Cave), D-202 (laboratory) and D-Warehouse. Based on the findings of this special siirvey effort, it was determined that D-117 and D-Warehouse may be released for unrestricted use (i.e., without regard for radiological constituents). However, because of the presence of numerous sources of non-hcensed radioactivity in the laboratory, the final radiological status of this area will be addressed during the site-wide decommissioning effort.

Much of the Manufacturing Area has also been evaluated with respect to other potential non-radiological environmental concems, including areas referred to as the former Manpro-Vibra Degreasing Unit; the Railroad Siding Area; the Department 102 Area; several areas associated with former underground storage tanks; and the Building 101(B) Glass Stack Area. Operations within the Manufacturing Area have been curtailed, with only linnted manufacturing operations presently being performed on-site. Portions of the Manufacturing Area will be subject to non-radiological

remediation to address identified environmental impacts. In addition, this area also contains the Wastewater Treatment Facihty, housed in Building 216 in the southwestem comer of the site, which was installed to treat ground water contaminated with hexavalent chromium and volatile organic compounds (VOCs). Treated ground water is discharged to the adjacent Hudson Branch at Outfall DSN-004A (see Figure 1-2), subject to the requirements of a NJPDES Discharge to Surface Water Permit.

- Undeveloped Property - This area consists of several undeveloped strips of property, the majority of which extends along the southem portion of the property, and includes areas east and west of the Manufacturing Area. No buildings or other significant stmctures are present in this area. The extent of this area is depicted in Figure 1-2.

The undeveloped property includes some additional areas that had the potential for impact by licensed operations. These include the Haul Road and the east end of the Storage Yard area, as described below.

The Haul Road was, at one time, a county right-of-way that ran through SMC's Newfield plant. It is visible in the southem portion of the site on Figure 1-5. Over the years, the southem portion of the Haul Road was surfaced with cmshed slag from SMC operations. Site characterization surveys in 1988 and in 1991 showed that the contact exposure rates in and near the Haul Road were only slightly discemible from background, and that the slag used to form the road bed was not characteristic of licensed material (i.e., ferrocolumbium slag). Nonetheless, the readily detectable radioactive materials identified within the Haul Road were subsequently excavated and relocated to the Storage Yard. A final status survey was performed and documented in the fourth quarter of 1998.

The east end of the Storage Yard was used, at one time, to store ferrovanadium slag. However, placement of those materials often resulted in mixing with ferrocolumbium slag. Eventually, the two slag types were segregated, and the ferrovanadium slag pile was sold for beneficial re-use. The footprint of the pile was then excavated to remove any remaining ferrocolumbium slag, and was placed into a single pile of soil/slag within the Storage Yard. Soil sampling and walkover gamma surveys of the excavated area were performed and documented in 1999. The soil sampling results were negative for residual radioactivity above the applicable release criteria, and the USNRC released the area for re-forestation under a natural resource restoration settlement (as discussed in more detail later in this section).

Other areas of potential environmental (but non-radiological) concem that have been evaluated in the undeveloped portion of the site include the Former Material Storage

Area, the Dmm Storage Area, the Former Chromium Button Storage Area, and the Tank T12 Chromium Wastewater Spill Area (site of a 1990 wastewater spill).

- Former Lagoon Area - This area occupied the central portion of the site and was characterized by the presence of wastewater treatment lagoons. An unlined lagoon used to hold untreated process wastewater during the 1960s was subsequently replaced with nine smaller lined lagoons in which wastewater was treated prior to discharge. Over time, the wastewater treatment process was modified, and the use of the lagoons was gradually phased out. Final characterization, remediation, and closure of these lagoons were performed in the 1990s, as described in more detail later in this section.

- Storage Yard - This area, which comprises about 2.8 hectares (7 acres) of the eastem portion of the site, has historically been used to store materials generated as a result of former manufacturing processes. A defined portion of this area has been designated a restricted area in License No. SMB-743. Currentiy, the Storage Yard contains a number of segregated piles, the layout of which is shown in Figure 1-6. A breakdown of the volumes of the various stockpiled material types is provided in Table 1-1.. These volumes were estimated based on the 2005 topographic survey conducted at the site and, therefore, may vary somewhat from previously estimated volimes.

Non-USNRC-related environmental investigations of the facility have been on-going since 1972, when the first hydrologic investigation was conducted to evaluate the source of hexavalent chromium, which had been detected in a nearby municipal water supply well. In addition, a series of subsequent ground water and surface water studies were conducted to evaluate potential environmental impacts associated with SMC facility operations. Under an October 1988 Administrative Consent Order (ACO) with NJDEP, SMC contracted the design and installation of a 400-gallon-per-minute ground water pump-and-treat system to control off-site migration of hexavalent chromium. As a result of the October 1988 ACO and further discussions with the NJDEP, SMC commenced with the removal of all of the materials from the Storage Yard that were not regulated by the USNRC. The only materials that are in the Storage Yard today are those that are under the USNRC's jurisdiction.

A remedial investigation/feasibihty study (RI/FS) was also initiated under the ACO to fully characterize and evaluate potential non-USNRC environmental impacts associated with the site. The 1988 ACO had noted NJDEP's and SMC's disagreement regarding the hazardous waste

status of chromium slag piles and solid waste status of other slags, dross and baghouse dusts stored at the facility. The ACO stated that the chromium slag pile area and general slag area had not been fully investigated and required that investigation and remediation of soil and ground water contamination at and emanating from these areas be performed during the RI/FS. The 1988 ACO also acknowledged that the site was regulated by the USNRC and, therefore, certain activities conducted pursuant to the ACO could require the approval of the USNRC in addition to the approval of the NJDEP.

The RI report was completed in 1992, and several focused feasibility studies and supplemental investigations have been completed since then. A Record of Decision (ROD) for the ground water operable unit was signed on September 24, 1996. A Draft Final Feasibility Study Report was issued in 1996 (TRC, 1996a) that evaluated remedial altematives for addressing non-USNRC environmental impacts associated with soil and the surface water and sediment of the Hudson Branch. Based on NJDEP comments on this report, the associated remedial actions are expected to consist primarily of containment of the contaminated soil/sediment through capping in place (soils) or excavation, consolidation and capping (sediment), in combination with the implementation of institutional controls to limit future development of the site to non-residential uses. The institutional controls would include the establishment of a Declaration of Environmental Restrictions (DER) under NJSA 58:10B-13 and NJAC 7:26E-8. A DER includes the establishment of a deed notice, with subsequent inspections and biennial certifications required to confirm the continued effectiveness of the DER. As part of a natural resource restoration settlement at the facility, SMC also must develop an upland forest area on certain portions of the facility (see tree-planting areas indicated in Figure 1-2). The continued maintenance of these planting areas as forested areas also requires the establishment of site use restrictions, most likely within the DER mechanism described above.

In 1995, six of the former wastewater treatment lagoons described previously (designated as B-1, B-2, B-3, B-5, B-11 and B-12) were remediated and closed. The contents of the lagoons consisted of water and settled sludge containing metals (primarily chromium), generated from

treatment, storage and settling/polishing stages of the treatment process. Remediation of these lagoons entailed the following primary activities:

- Characterization of the sludge in each lagoon;
- Removal, treatment and discharge of standing water from each of the units;
- Demolition of associated pump houses, valve pits and piping with disposal of all generated wastes;
- Solidification, excavation and off-site disposal of the accumulated sludge, lagoon liner, and impacted underlying bedding material and soils;
- Collection and chemical analysis of confirmatory soil samples from each lagoon;
- Supplemental excavation and disposal of impacted soils located beneath portions of the lagoons; and
- Backfilling and restoration of final grade.

In 1994, a lagoon characterization investigation was conducted for three additional former wastewater treatment lagoons (B6, B7 and B8). The objectives of the investigation were to characterize the lagoons' contents, with respect to quantity and composition. Closure involved the treatment and removal of lagoon surface water, excavation and disposal of sludge, removal and off-site disposal of lagoon liners and contaminated soils, and backfilhng and grading of the lagoon excavations. Approximately 9,464 cubic meters (2.5 million gallons) of chromium hydroxide sludge were removed, dewatered and disposed of as part of this remedial action, the details of which were captured in a 1999 report. Sampling of the sludges for radionuclide content confirmed that no residual radioactivity above the site-specific release criteria were present prior to disposal.

1.4 Source Characterization

The remaining restricted area, the Storage Yard, at the SMC facility has been characterized through previous studies and monitoring. In addition, the presence of numerous small and discrete sources of non-licensed radioactivity in the D-202 laboratory, while not a restricted area, will be addressed as part of the decommissioning process. No contaminated systems or equipment remain to be addressed elsewhere on the property.

Areas where residual radioactivity has been identified in surface soil include the Storage Yard and the Hudson Branch watershed. The radionuclides of concem have been identified as radium, thorium and uranium plus progeny in the Hudson Branch watershed.

Radioactive materials are confirmed to be present in the Storage Yard. Slag materials, referred to as standard slag, high-ratio slag, and Canal® slag, consist of solid, non-combustible material with the consistency of vitrified rock. All three slag types were maintained separately from the others at their respective points of generation and were transported in trucks from D-111 and D-102 to the Storage Yard. Approximately 25,000 cubic meters (33,000 cubic yards) of high ratio and standard slag are present in the Storage Yard, along with approximately 2,300 cubic meters (3,000 cubic yards) of Canal® slag.

In addition, baghouse dust was transported by truck to the Storage Yard. There are approximately 10,000 cubic meters (13,000 cubic yards) of baghouse dust currently in the Storage Yard.

There are approximately 23 curies each of uranium and thorium in the form of slag and baghouse dust in the Storage Yard. The concentration of each in the slag is approximately 400 pCi/gram. In the baghouse dust, the concentrations are typically an order of magnitude lower.

The residual radioactivity in the slag and baghouse dust is not readily transportable in the environment. The physical form of the slag in the Storage Yard (glass-like rock) results in negligible leaching of the radioactive elements into the regional water supply or local wetlands. As presented in Section 4.4.1 of the Decommissioning Plan, leachability and distribution coeffecient studies performed on samples of the slag support this conclusion. Because the slag and baghouse dust contained within the Storage Yard were placed directly upon the ground surface and the leaching rate of radionuclides from these materials is negligible, subsurface activity beyond a nominal depth of 30 cm (1 foot) (attributable mainly to incidental surficial slag burial) is unlikely. The surface of the baghouse dust pile forms a "crust" when it encounters moisture, which serves to deter fugitive dust emissions. The radiation exposure rates in this area range from background to 0.2 milliR per hour on contact with the slag, with the maximum

measured ambient exposure rate being due north of the Storage Yard, approximately 30 feet from the slag piles.

The Storage Yard also contains less than 6,500 cubic meters (8,5000 cubic yards) of soil and slag excavated during removal activities associated with the Haul Road. As described in Section 1.3.2, characterization efforts conducted in 1988 and 1991 showed that the contact exposure rates in and near the Haul Road prior to remediation were only slightly discemible from background. While the contaminants therein were natural uranium and natural thorium, the isotopic ratios were not characteristic of licensed material (i.e., slag). Nonetheless, in September of 1998, soil with some residual slag was scraped from the road and transferred to the Storage Yard. This soil contains approximately 0.2 curies of uranium, and thorium.

1.5 Applicable Regulatory Requirements, Permits and Required Consultations

Potential regulatory requirements, permits and consultations that are considered herein are summarized in Tables 1-2 and 1-3. Consultation with the U.S. Fish and Wildlife Service and with the State Historic Preservation Officer is documented herein (see Sections 3.5.2.3 and 3.8, respectively).

1.6 Scope

Under NEPA, environmental impacts of decommissioning actions must be considered as part of the federal decision-making process. This Environmental Report analyzes the environmental impacts of the proposed action and alternatives to the proposed action, including the no action alternative, in accordance with the guidelines of NUREG-1748. Both radiological and non-radiological impacts are considered. Issues addressed include the following:

- land use implications;
- social, economic and cultural resource impacts, including environmental justice considerations;
- geologic stability and potential impacts to surface water and ground water;
- air quality impacts;
- human health impacts; and

- ecological impacts.

The report considers cumulative impacts as well. In addition, monitoring, mitigation measures, unavoidable adverse impacts, and other factors are considered.

2.0 DETAILED DESCRIPTION OF ALTERNATIVES

The proposed action consists of on-site stabilization and long-term control of the residual radioactivity at the site. Other alternatives considered in the Decommissioning Plan include an off-site disposal with license termination alternative and a license continuation (no action) alternative. All alternatives are evaluated within this Environmental Report, in accordance with the NUREG-1748 guidance. These alternatives are described in detail in the Decommissioning Plan and are summarized briefly below.

2.1 License Continuation (LC)

The LC alternative would retain the site in its current configuration, without any additional processing or stabilization of residual radioactivity. This alternative may not meet the interests of the public, the State of New Jersey or SMC. However, consideration of a no action alternative is required by the regulations implementing NEPA in order to provide a baseline for comparison with other alternatives.

Under this alternative, the existing on-site materials would be monitored and undefined corrective actions would be taken only if problems should occur. The materials in the Storage Yard would remain in their current amounts and distributions, and SMC's license for possession of source material would not be terminated.

2.2 On Site Stabilization and Long-Term Control (LTC) Alternative (Proposed Action)

Under the proposed action, radioactive materials would be consolidated into a single pile within the Storage Yard (see Figure 2-1) and covered with an engineered barrier. USNRC-regulated materials to be consolidated within the pile include those currently stored in the southeastern part of the Storage Yard; concrete demolition materials that are currently stored just outside of the Storage Yard would also be consolidated within the pile. The large pieces of slag currently in the Storage Yard will form the main body of the consolidation area. It is anticipated that finer-grained slag, soils and baghouse dust will be used to prepare the subgrade of the barrier system by filling the larger void spaces among the slag matrix. Sampling and radiological

analyses of surface soils surrounding the engineered barrier area will be conducted and additional regulated soils will be excavated and included in the consolidated area, if necessary, based on the sampling results. The engineered barrier will then be constructed upon these consolidated materials. The multi-layer barrier system will include a geomembrane for water diversion and multiple layers of soil for shielding, protection of the geomembrane, protection against frost, and vegetative support. Dust suppression methods would be used to minimize windblown dust during consolidation and construction activities as necessary. Surface drainage features will be constructed to minimize the potential for erosion of the completed engineered barrier. Once the barrier is installed, a final status survey of the plant in its entirety will be performed and documented as evidence that the site meets the established dose criteria for restricted release.

The estimated duration of the construction of the engineered barrier is 7 months. After the completion of the engineered barrier, institutional controls, including access restrictions, maintenance and monitoring of the engineered barrier and security systems, and legal restrictions against future residential, agricultural or industrial activities in the restricted area would be implemented. Maintenance activities would include repairing any observed damage (e.g., soil cracking) to the engineered barrier or site security fencing, mowing grass and maintenance of drainage controls. SMC's license for decommissioning would then be amended to a LTC license.

Impacts associated with the proposed action would be fairly minimal. Consolidation of materials and construction of the engineered barrier would result in some minor impacts on air quality and noise. Air impacts could be minimized through the use of wetting or other dust-suppression methods to minimize the emissions of particulates. Ecological and visual impacts would be beneficial, resulting in a more attractive Storage Yard area that also provides a greater ecological habitat value.

2.3 Off-Site Disposal with License Termination (LT) Alternative

The LT alternative was considered within the Decommissioning Plan but is not the preferred alternative on the basis of the cost/benefit analysis. Under this alternative, radiologically-contaminated materials would be removed from the site and disposed of at the Envirocare of Utah, Inc. facility near Clive, Utah. On-site radioactive contamination would be reduced to levels considered acceptable for release for unrestricted use. The licensed materials would be transported from the site via railcar. Rehabilitation/expansion of an existing railroad spur would likely be needed to accommodate the temporary storage and loading of railroad cars. Construction of additional roadways to support truck traffic between the Storage Yard and the railroad staging area would also be required.

Material would be removed from the Storage Yard in four phases that would, to some degree, occur concurrently. These phases include 1) moving the radiologically-impacted materials from the Storage Yard to the staging area; 2) crushing the slag to meet the size requirements of the off-site disposal facility; 3) loading the slag from the staging area into the railcars: and 4) transporting and disposing of the slag to the off-site facility. Figure 2-2 illustrates the features of this alternative. The estimated time required to complete these activities is 5 months/year for 2 years.

This alternative would result in increased noise and air emissions levels during the construction period. Air emissions would exceed National Ambient Air Quality Standards (NAAQS) during the transfer and crushing of the radioactive materials. Because use of the Storage Yard would be unrestricted following removal of the radiologically-impacted materials, the area could be redeveloped for additional industrial use. The presence of enhanced rail access would increase the potential desirability of the area for future industrial use. Therefore, the long-term ecological value and aesthetic value of the area are difficult to define.

2.4 Alternatives Considered but Eliminated

There were no alternatives that were considered but eliminated from further study. The sale of the slag in the Storage Yard for beneficial reuse (e.g., as a conditioner in the production

of steel) was considered by SMC, but it does not look to be a promising alternative and therefore is not evaluated in any detail herein. Implementation of this alternative would be highly dependent upon the identification of an ultimate customer for the material.

2.5 Cumulative Effects

As discussed previously in Section 1.3, under CERCLA activities at the SMC facility, it is likely that long-term site use restrictions will be assigned to many of the areas surrounding the Storage Yard, due mainly to the presence of inorganics in the site soils. These restrictions are likely to prohibit future residential development of the property, regardless of its radiological status. In addition, as part of a natural resource damages settlement, portions of the facility are designated as natural resource restoration tree planting areas (see Figure 1-2). Therefore, future development in these areas will also be restricted regardless of radiological conditions. With these additional site use restrictions in-place, the ultimate impacts of future use restrictions associated with the Storage Yard under the proposed action could have a limited effect on future use of the property as a whole (as opposed to a scenario where the remainder of the facility had no non-radiological site use restrictions associated with its future use).

2.6 Comparison of the Predicted Environmental Impacts

A comparison of the predicted environmental impacts for the alternatives is presented in Table 2-1.

2.7 Regulatory Compliance

Actions undertaken as part of the proposed decommissioning effort would comply with the federal statutes and regulations summarized in Table 1-2.

Consultation with the U.S. Fish and Wildlife Service has been completed, as required by Section 7 of the Endangered Species Act (see Section 3.5.2.3 for more information). Consultation with the State Historic Preservation Officer, as required by Section 106 of the Historic Preservation Act, has also been completed (see Section 3.8 for more information).

3.0 AFFECTED ENVIRONMENT

This section of the report describes the baseline environmental conditions at and surrounding the SMC facility. In Section 4, the various decommissioning alternatives described in Section 2 are evaluated with respect to their potential impacts on the environment, based on the baseline conditions defined here.

3.1 Land Use

Current land use in the general vicinity of the site was defined through a review of various information sources. The area encompassed within a 1.6-kilometer (1-mile) radius of the SMC facility includes areas of several municipal entities: the Borough of Newfield, the City of Vineland, and the Township of Franklin. The site itself is zoned for heavy industry. Figure 3-1 depicts specific land uses within a 1.6 kilometer radius, based on the following sources:

- Borough of Newfield Master Land Use Plan, February 1979;
- City of Vineland Master Plan, January 1992;
- City of Vineland Zone Map, January 1996; and
- Township of Franklin Zoning Map, May 2003.

The figure indicates the relative distribution of residential, business (i.e., commercial and industrial), and cultivation (i.e., agricultural/woodland) uses in the area surrounding the SMC facility. As can be seen from this figure, much of the region to the east of the site is zoned for residential use while much of that to the west/southwest is agricultural and/or undeveloped.

Future land use is guided by state and local planning documents. In accordance with NJSA 52:18A-200(f), the State of New Jersey has developed the New Jersey State Development and Redevelopment Plan (New Jersey State Planning Commission, 2001), which is intended to coordinate planning activities and establish statewide planning objectives in many areas, including land use, transportation, agriculture and farmland retention, and other development-related areas. The plan defines "planning areas" based on growth and conservation objectives and is intended to serve as the underlying land-use planning and management framework that directs funding, infrastructure improvements and preservation for programs throughout New

Jersey. The planning areas within one mile of the SMC facility are indicated in Figure 3-2. The area directiy to the southwest of the facility in Cumberland County is defined as a Suburban Planning Area, which is defined as an area for growth. The remaining areas surrounding the SMC facility, including the area encompassed by the facility itself, consist of Rural and Environmentally Sensitive Planning Areas. These areas are defined as areas for limited growth or conservation. In general, the areas delineated in Figure 3-2 are fairly consistent with the existing land use areas indicated in Figure 3-1.

In response to recent "Smart Growth" concepts and calls for limitations on sprawl, Franklin Township has drafted a new master plan (Franklin Township Master Plan Advisory Committee, 2004) based upon principles of Smart Growth. This draft document recommends the elimination of current zoning districts, with all residentially zoned land to be zoned R-A, Residential-Agriculture. This classification would be consistent with the "rural/environmentally sensitive planning area" designation assigned to the portions of Franklin Township within 1 mile of the SMC facility. No other specific future planned land use changes were identified.

Regionally, approximately 22,409 hectares (55,374 acres) of land in Gloucester County are used for agricultural purposes (Delaware Valley Regional Planning Commission or DVRPC, 2005). As of 1990, in the Borough of Newfield, approximately 101 of 439 total hectares (250 of 1,086 acres) were used for agricultural purposes while in Franklin Township, approximately 3,766 of 14,731 total hectares (9,305 of 36,400 acres) are used for agricultural purposes (Gloucester County, 2005a). In Cumberland County, about 9,308 of the 22,258 hectares (23,000 of the 55,000 acres) designated as prime farmland are utilized for fresh market and processing vegetable production, while use of farmland for container production, field nursery stock production (including perennial plants), and turf production is also rapidly expanding (Cumberiand County, 2005a).

Prime and unique farmlands in the vicinity of the SMC facility, defined on the basis of soil type in accordance with 7 CFR 657.5, were identified based on information provided on the Natural Resources Conservation Service website (Natural Resources Conservation Service, 2005). The areas within 1.6 kilometers (1 mile) of the SMC facihty that are mapped as

containing soil types defined as prime farmland, farmland of statewide importance and farmland of unique importance are indicated in Figure 3-3. Lists of the soils defined as Prime and Other Important Farmlands within Gloucester and Cumberland Counties are included in Appendix A.

As can be seen in Figure 3-3, the majority of the area surrounding the SMC facility is classified as prime farmland, farmland of statewide importance or farmland of unique importance (as defined at 7 CFR 657.5). The only exceptions are the areas encompassed by the facility itself and by the developed section of Newfield Borough, which are characterized by either DouB (Downer-Urban land complex, 0 to 5 percent slope) or AvuB (Aura-Urban land complex, 0 to 5 percent slopes) soils.

With respect to land uses related to natural resources, there are no known mineral, fuel, hydrocarbon or other natural resources in the area surrounding the facility, with the possible exception of sand and gravel (NJGS, 2002).

On a regional basis, other special land-use classifications in the general area of the SMC facility include the New Jersey Pinelands habitat complex. This complex covers more than ¼ of New Jersey's land area, with its boundaries approximated in large part by the boundaries established for the Pinelands National Reserve and the state Pinelands area. The boundary of the area defined by the U.S. Fish and Wildlife Service as "significant land habitat complex" under the New Jersey Pinelands is located approximately 2.4 kilometers (1.5 miles) northeast of the SMC facility, as indicated in Figure 3-4.

The nearest state park is Parvin State Park, located approximately 11 kilometers (7 miles) west-southwest of the SMC facility. The park, known both for its environmental and historical attributes, is characterized by pine forests, a swamp, hardwood forest, two lakes and a stream. Historically, the park was used by American Indians, served as a home for the Civilian Conservation Corps, was a summer camp for the children of displaced Japanese Americans, was a POW camp for German prisoners and provided temporary housing for the Kamycks who fled their homelands in Eastern Europe in 1952. No National Parks are located in the vicinity of the SMC facility.

Besides the presence of prime agricultural lands, no other special land-use classifications (i.e., American Indian or military reservations, wild and scenic rivers, state and national parks, national forests, designated coastal areas, wildlife refuges, wilderness areas) were identified within a 1.6-kilometer (1 mile) radius of the SMC facility. Similarly, no commercial fishing or other unusual land uses were identified within the immediate vicinity of the facility.

3.2 Transportation

Transportation facilities and services in the immediate vicinity of the SMC facility include state and local roads/highways, airports, New Jersey Transit bus service, and freight rail service.

3.2.1 Roads and Highways

Roads and highways in the immediate vicinity of the SMC facility include county, state and federal roads and highways. These are described in more detail below. Their locations are indicated in Figure 3-5.

West/East Boulevard (also known as Gloucester County 615), which borders the SMC facility to the west, is the main north-south thoroughfare through the Borough of Newfield. It is a 2-lane road with uncontrolled access. The State of New Jersey classifies this road as an urban minor arterial roadway (New Jersey Department of Transportation, 2004). Weymouth Boulevard, the closest east-west roadway to the south of the SMC facility, is also known as Gloucester County 690. It is a 2-lane road with uncontrolled access. This road is classified as an urban collector (ibid.).

The nearest major State highways are Highways 47, 55 and 555, while the nearest Federal highway is U.S. Highway 40. U.S. Highway 40 runs from northwest to southeast to the north and east of the SMC facility. It is a 2-lane road with uncontrolled access that links the area to Atlantic City to the southeast and to the Wilmington, Delaware area and the 1-95 corridor to the northwest. It is classified by the State as an urban principal arterial and is part of the designated intrastate access travel routes in New Jersey (NJ Access Network). Roads within the

NJ Access Network support use by 2.6-meter-wide standard trucks and double-trailer truck combinations with origin or destination in New Jersey, providing access to businesses, terminals, pick-ups and deliveries (NJAC 16:32-1.5). Highway 40 can be accessed from the SMC facility by traveling north on West/East Boulevard or by driving east on Gloucester County 690.

NJ Highway 47 runs north-south just over 1.6 kilometers (1 mile) west of the SMC facihty. It is a 2-lane road with uncontrolled access that links the Philadelphia area to the southem tip of New Jersey. It is classified by the State as an urban minor arterial roadway and is part of the NJ Access Network, although the portion of Highway 47 west of the SMC facility is not eligible for 2.6-meter/16-meter (102-inch/53-foot) or double-bottom trucks.

NJ Highway 55 rinns somewhat parallel to West/East Boulevard and Highway 47, approximately 3.2 kilometers (2 miles) to the west of the SMC facility. Highway 55 is a 4-lane, divided road with controlled access that links the Newfield area to the Philadelphia area and 1-95 and 1-76 corridors to the north, and to Millville and southem New Jersey to the south. It is classified by the state as an urban freeway/expressway aud it is part of the NJ Access Network for large trucks. Highway 55 can be accessed from the SMC facility by traveling north on West/East Boulevard, and then northwest on U.S. Highway 40 or by traveling south on West/East Boulevard and then west on Cumberland County 674.

NJ Highway 555 runs north-south just over 1.2 kilometers (0.75 miles) east of the SMC facility. Highway 555 is a 2-lane road with uncontrolled access that joins Highway 42 (to the north) to the southem part of New Jersey, south of Millville. In the vicinity of the SMC facility, it is classified by the state as an urban collector and it is part of the NJ Access Network for large trucks.

The Delaware Valley Regional Planning Commission (DVRPC) is the designated Metropolitan Planning Organization (MPO) for an area that includes Gloucester County. Its Year 2025 Land Use and Transportation Plan (DVRPC, 2002) was developed to guide regional planning in a manner that supports future growth and development. The only transportation plan project identified within the Plan in the immediate vicinity of the SMC facility is the

reconfiguration of the interchange at US Highway 40 and NJ Highway 47. No transportation plan studies were identified for the immediate vicinity of the SMC facility.

The South Jersey Transportation Planning Organization (SJTPO) is the designated MPO for four southern New Jersey counties, including Cumberland County. The SJTPO 2025 Regional Transportation Plan (Parsons Brinckerhoff, 2004) was developed to guide transportation decision-making for a 25-year horizon. Included in the plan is the evaluation of two regional transportation corridors located in the immediate vicinity of the SMC facility: the Route 40 corridor (referred to as Corridor 6), and the Route 55 corridor (referred to as Corridor 8). The plan also includes the results of the development of a SJTPO Congestion Management System (SJ CMS) to identify potential future needs for corridor studies. Based on identified transportation deficiencies, the study identified County Road 615 (West/East Boulevard) in Cumberland County as a high priority potential SJTPO corridor study area.

3.2.2 Public Transportation (Bus Service)

New Jersey Transit offers bus service to the Newfield area via Bus Line 408. This bus line provides service from Millville to the south and to the Camden and Philadelphia area to the north. In Newfield, the bus stops at Northwest Boulevard and Catawba Street. The bus runs daily, with reduced schedules on Saturdays and Sundays (New Jersey Transit, 2005).

3.2.3 Rail Service

A railroad line operated by Conrail borders the SMC facility immediately to the west, between the facility and West/East Boulevard. According to information provided in the South Jersey Regional Rail Study (Gannett Fleming, 2002), Conrail operates 2 to 3 trains per day at an average speed of 48 kilometers per hour (30 miles per hour) on this line that runs from Glassboro in the north to Millville to the south.

An abandoned rail spur borders the facility to the north. This spur originally connected to the main line that borders the facility to the west, but sections of the spur have been removed and those sections that remain are overgrown with dense brush and small trees.

The South Jersey Regional Rail Study evaluated four existing rail corridors in South Jersey with respect to the possibility of reactivating passenger rail service. The study found that reactivation of passenger service along Corridor 4, Glassboro to Vineland-Millville (including the rail line immediately adjacent to the SMC facility), would have the least environmental impacts, including wetland impacts, of the corridors studied. Of the corridors studied, this corridor has the most freight activity, the best general track condition, and the highest number of noise sensitive areas, but is the only corridor that would not connect with passenger rail service operating today. Implementation of the Camden/Glassboro passenger line would be required for the reactivation of the Glassboro to Vineland-Millville corridor to make sense. The DVRPC long-range plan (DVRPC, 2002) identifies the Camden/Glassboro light rail system as one of its conceptual transportation plan projects, with construction proposed for the 2006-2013 time frame. The South Jersey Regional Rail Study recommends the development of single-track passenger service along the Glassboro to Vineland-Millville corridor, with five stations, including one in Newfield Borough near Catawba Avenue and East Boulevard.

3.2.4 Air Transportation

Several small privately-owned airports are located near the SMC facility. Their locations are visible on Figure 3-5.

Kroelinger Airport is located approximately 2.4 kilometers (1.5 miles) southwest of the SMC facility. The facility is open to the public. The two runways have turf surfaces. It is reported that the airport is used, on average, 29 times per week, with 67% of the use attributable to local general aviation and 33% of the use attributable to transient general aviation (AirNav, 2005a).

Rudy's Airport is located approximately 4 kilometers (2.5 miles) northwest of the SMC facility. The facility is open to the public. Two runways have turf surfaces. It is reported that the airport is seldom used (20 times per year), with 100% of the use attributable to transient general aviation (AirNav, 2005b).

Vineland-Downstown Airport is located approximately 4 kilometers (2.5 miles) east-northeast of the SMC facihty. The facihty is open to the pubhc and features four turf runways. Two of the runways are restricted to agricultural and firefighting aircraft only. It is reported that the airport is used, on average, 38 times per day, with 95% of the use attributable to local general aviation and 5% of the use attributable to transient general aviation. Heavy agricultural use is reported from April through October. Twenty-two aircraft are reportedly based at the field, including 20 single-engine planes and 2 multi-engine planes (AirNav, 2005c).

3.3 Geology and Soils

This subsection presents a summary of available information characterizing the geology and soils of the SMC facility and vicinity.

3.3.1 Regional Geology

The SMC facility area is characterized by a thick sequence of unconsolidated materials which unconformably overlie bedrock, present at a depth of over 610 meters (2,000 feet) below grade. The unconsolidated materials underlie the entire county and dip and thicken to the southeast. Table 3-1 depicts the sedimentary sequence of unconsolidated sediments in Gloucester County, New Jersey. Regional geologic information was taken from "Special Report 30: Water Resources and Geology of Gloucester County, New Jersey", NJDCED, Hardt, W.F. and Hilton, G.S., 1969 and "Generalized Structural Contour Maps of the New Jersey Coastal Plain", Report 4, NJGS, Richards, H.G., Olmsted, F.H., and Ruhle, J.L., undated.

3.3.1.1 Bedrock Geology

The SMC facility is located in the Atlantic Coastal Plain physiographic province, which extends from the Delaware Bay in the southwest to the Raritan Bay in the northeast, and from the Fall Line in the west to the Atiantic Ocean in the east. Bedrock below the site consists of a banded, micaceous schist or gneiss of the Wissahickon Formation of Precambrian age. The formation primarily contains mica, quartz, feldspar, and chlorite, and the formation has

numerous fractures and joints and folding of individual layers. This formation outcrops northwest of and outside of Gloucester County; based upon average dip, the top of the formation is projected to be at a depth of over 610 meters (2,000 feet) below grade in the Newfield area. Relative to the overlying unconsolidated materials, the bedrock is not expected to be a significant water supply resource in the area, both due to depth and comparatively low yield.

To the north and west of the SMC facility lies the Newark Basin, which was an active post-Devonian age rift zone. The Ramapo fault and the associated fault zone he at the approximate westem edge of the rift zone, approximately 130 kilometers (80 miles) north of the site area. The Newark Basin is filled with sedimentary and igneous rock of Triassic and Jurassic ages, including sandstone, siltstone, shale, conglomerates, basalts and diabases. Thrust faults to the north of Philadelphia (possibly a Precambrian suture zone) separate the Newark Basin sediments from the Precambrian bedrock which underlies the site.

3.3.1.2 Overburden Geology

The Coastal Plain is a seaward-dipping wedge of unconsolidated sediments that range in age from Cretaceous to Holocene. The dominant subsurface geologic characteristic is the large sequence of unconsolidated materials which underlie the site. This dominant feature influences landform, drainage, and water supply availability. The unconsolidated materials that underiie much of southem New Jersey dip and thicken to the southeast. A geologic cross section of Gloucester County is presented in Figure 3-6. Overburden formations in the vicinity of the SMC facility are expected to have similar characteristics. The Middle to Lower Cretaceous sediments are primarily continental deposits consisting of altemating layers of clay, silt, sand and gravel. The Upper Cretaceous and most Tertiary sediments were deposited in beach and shelf environments, and tend to be finer grained than the continental deposits. Very fine-grained sediments are recognized as transgressive marine deposits that formed during major incursions of the sea. Coarsening-upward deposits that overlie the fine-grained units are recognized as marine regressions, deposited in inner-shelf, near-shore or beach environments as the ocean was retreating. The formations typically outcrop in sequential bands striking northeast-southwest,

with the earliest deposits outcropping further to the west, near the Delaware River. The various formations are described from deepest to shallowest below.

- The deepest among the sequence of unconsolidated deposits are the Upper Cretaceous Raritan and Magothy Formations. Beneath the SMC facility, the combined formation thickness is expected to be 152 meters (500 feet) or more. The Raritan Formation is composed of quartzose sand, clay, and some gravel; the Magothy Formation consists of beds of dark-gray to black clays altemating with micaceous fine sand. These formations represent a significant aquifer system in parts of Gloucester County, particularly to the northwest, closer to the outcrop area, but the water may be brackish beneath the area of the SMC facility.

- The Raritan and Magothy Formations are overlain unconformably by Upper Cretaceous sediments of the Merchantville Formation. The Merchantville Formation is described as a glauconitic, micaceous silt and clay or quartzose or glauconitic sandy clay (the composition varies within the county), with thickness ranging from 14 to 21 meters (45 to 70 feet). This formation is a minor aquifer within Gloucester County and, together with the overlying Woodbury Clay, acts as an aquaclude.

- The Woodbury Clay is described as a dark blue to black, blocky clay. In some areas, this formation consists of a micaceous silty clay or fine sand. Fossil assemblages suggest both continental and marine origins. The Woodbury Clay thickness in Gloucester County ranges up to 24 meters (80 feet).

- The Woodbury Clay is overlain unconformably by the Englishtown Formation, a micaceous, slightly glauconitic white and yellow sand, which is a minor aquifer in Gloucester County.

- The Marshalltown Formation consists of a dark-green to black clay, sandy clay, and silt, with mica and glauconite in some areas. Marine fossils have been found in the formation. The formation acts as a confining layer for the underlying Enghshtown Formation. The top of the Marshalltown Formation is expected to be at an elevation of approximately 244 meters (800 feet) below mean sea level in the Newfield area, or approximately 274 meters (900 feet) below grade.

- The Wenonah Formation conformably overlies the Marshalltown Formation. The Wenonah Formation and the Mount Laurel Sand are similar

in composition and are mapped as a single unit in Gloucester County, although the Mount Laurel Sand is the predominant formation. The unit is composed of medium-to-coarse-grained quartz sands with varying percentages of glauconite.

- The Navesink Formation conformably overlies the irregular surface of the Mount Laurel Sand and the Wenonah Formation. The formation consists of glauconitic sand and clay mixed with quartz sands, and can be clayey at the surface and pebbly at the base. The Navesink Formation and the overlying Homerstown Sand function as confining layers.

- The Navesink Formation is overlain unconformably by the Tertiary age Homerstown Sand. The Homerstown Sand is composed of clay and sand and can have significant percentages of glauconite. As noted above, this formation, along with the Navesink Formation, functions as a confining layer. The top of the Hornerstown Sand is at an approximate elevation of 183 meters (600 feet) below mean sea level in the Newfield area or approximately 213 meters (700 feet) below grade.

- The Vincentown Formation can occur as a quartz sand with glauconite or a limey sandstone with shell fossils. It ranges up to 17 meters (55 feet) in thickness in Gloucester County.

- The Manasquan Formation is similar in composition to the Vincentown Formation and, therefore is difficult to distinguish. The Manasquan Formation can contain a high percentage of glauconite, and can act as a confining layer for the Vincentown Formation.

- The Kirkwood Formation consists of clay, silt, and very-fine-to-coarse quartzose micaceous sand and represents only a minor aquifer in the county. The Kirkwood Formation ranges in thickness from 15 to 49 meters (50 to 160 feet).

- The Cohansey Sand is composed of fine-to-coarse quartz sand, lenses of clay, and lenses of gravel. It dips southeast about 2 meters per kilometer (11 feet per mile) and is approximately 40 meters (130 feet) thick in the Newfield area. Grain size varies both vertically and laterally, which is consistent with deposition within a coastal environment. The Cohansey Sand is a productive aquifer. Beneath the site, the Cohansey Sand is composed of coarse sands and little to trace silt in the upper 12 meters (40 feet), and generally finer sand and some silt, with some clay and silt stringers in the lower 18 to 24 meters (60 to 80 feet). Discontinuous silt and

clay lenses, up to 1.8 meters (6 feet) in thickness, have also been encountered within this formation.

- The Pleistocene Bridgeton Formation unconformably overlies the Cohansey Sand and is overlain by other sediments of Pleistocene age, including the Pensauken and Cape May Formations. The Pensauken and Cape May Formations, although present in parts of Gloucester County, are not expected to be present in the site area of the SMC facility.

- The Bridgeton Formation is composed of fine-to-very-coarse quartz sand and gravel, possibly of glacial or interglacial origins. The Bridgeton Formation has been exhibited at the SMC facility as a brown sand. In the area of the SMC facility, the Bridgeton Formation is expected to be hydraulically connected to the underlying Cohansey Sand. Ground water is expected to be under water table conditions.

Erosion, deposition, cutting, and filling have altered the landscape in and around the area of the SMC facility. Such actions may expose the Cohansey Sand at the surface where the Bridgeton Formation has been removed. Reworked sediments of the Bridgeton Formation and the Cohansey Sand may be present in stream valleys and floodplains. A surficial geologic map of Gloucester County is presented in Figure 3-7.

3.3.1.3 Potential for Geologic Hazards

Metamorphic and igneous bedrock is present at considerable depth below the area in which the SMC facility is located. Subsidence, either due to collapse of karst terrain or fault movement related to underlying bedrock, is not believed to be a significant concem in the area.

Published descriptions of the Precambrian Wissahickon Formation, which underlies the Newfield site at a depth of over 610 meters (2,000 feet), indicate that the formation contains fractures, joints, crumphng, and folding to the northwest, nearer the outcrop area. Future deformation of bedrock or the unconsolidated sequence above bedrock at this site is not a significant concem due to the low anticipated seismic potential and the considerable sequence of unconsolidated materials underlying the site above the bedrock surface.

Table 3-2 presents a summary of historic earthquakes felt in New Jersey with a magnitude of 3 or greater on the Richter scale or Mercalli intensity of IV or greater centered within 325 kilometers (200 miles) of the site. According to NJGS Report 31 (Dombroski, 1992), "New Jersey is not especially prone to earthquakes and has had no major earthquakes within the last several hundred years." New Jersey is 3,200 kilometers (2,000 miles) from the Mid-Atlantic Ridge, the nearest tectonic plate boundary. Historical earthquakes felt in New Jersey are caused by fault movements within the North American tectonic plate (not at the plate boundary). The reference cites three general areas of seismic activity that can be felt by seismographs in New Jersey; these include:

- Several northeast-trending faults in north-central New Jersey and New York, of which, the Ramapo fault is the most active. The Ramapo fault is located approximately 130 kilometers (80 miles) north of the SMC facility.

- In the Delaware Valley, between Trenton and Wilmington and in the Wilmington area. Trenton and Wilmington are 80 kilometers (50 miles) north and 48 kilometers (30 miles) west of the SMC facility, respectively, and the valley trends northeast-southwest, approximately 40 kilometers northwest of the facihty.

- Subsidence in the Raritan Bay, which has caused tremors in that area. The Raritan Bay is located approximately 130 kilometers (80 miles) to the northeast of the SMC facility.

In summary, the seismic potential of the area is considered to be low. The nearest mapped fault of seismic significance is the Ramapo fault, located approximately 130 kilometers (80 miles) to the north of the SMC facility. The locations of faults mapped in bedrock to the north and west of the site are documented.

The overburden materials in the vicinity of the site consist of sands, silts, and gravels (Bridgeton Formation and Cohansey Sand). Relief on the site and in the immediate vicinity of the site is slight, as indicated on Plate A and Figure 1-1, respectively. Excluding the existing slag piles, rehef is on the order of 4.6 meters (15 feet) or less across the entire site. As indicated in Figure 1-1, local land surface highs in the area surrounding the SMC facility are 40 meters

(130 feet) NGVD 1929 (915 meters or 3,000 feet north of the site) and 43 meters (140 feet) NGVD 1929 (915 meters or 3,000 feet east-southeast of the site). Because of the low relief and low seismic potential in the area, landslides are not believed to be a significant concem in the area of the SMC facihty.

The SMC facility is located near the source of the Hudson Branch, the small stream which crosses the southeastem comer of the property. The sandy surficial materials and low relief would be conducive to the infiltration of precipitation in undeveloped areas surrounding the site; consequently, the potential for stormwater flows to cause erosion of surficial materials appears to be slight.

3.3.2 Site Geology

A number of geologic borings have been eompleted at the SMC facility as part of previous environmental investigations, including the RI. Drilling activities have involved the collection of soil samples using a variety of drilling methods; the maximum on-site boring depth was 43.3 meters (142 feet) below ground surface (bgs). Figure 3-8 presents a geologic cross-section based upon boring logs developed as part of the RI. The boring logs used to create this figure, as well as the log for an additional deep boring (SC-12D) located near the Storage Yard, are presented in Appendix B.

Surficial materials at the site are characterized by brown sand that is representative of the Bridgeton Formation. The thickness of the sand ranges from 0 meters (off-site well SC-17D) to 8.5 meters (28 feet) (well SC-12D). The Cohansey Sand is the major geologic formation identified during subsurface investigations at the SMC facility. The Cohansey Sand is composed of coarse sands and little to trace silt in the upper 12 meters (40 feet), and generally finer sand and some silt, with some clay and silt stringers in the lower 18 to 24 meters (60 to 80 feet). Discontinuous silt and clay lenses up to 1.8 meters (6 feet) thick were encountered. The Kirkwood Formation, described as a gray silt and clay layer, has been encountered on-site at depths ranging from 37 meters (121 feet) below grade (on-site well SC-22D) to 46.6 meters (153 feet) bgs (off-site well SC-17D).

Based on soil data available on-line at the USDA's Natural Resources Conservation Service Soil Data Mart website (Natural Resources Conservation Service, 2005), the predominant soil mapping unit on-site is Downer – Urban land complex, 0-5% slopes (DouB, see Figure 3-3). The area immediately adjacent to the Hudson Branch is mapped as Manahawkin muck, 0-2% slopes, frequently flooded (MakAt). Other surrounding soil mapping units include Woodstown-Glassboro complex, 0-2% slopes (WokA), Aura sandy loam, 0-2% slopes (AugB), Downer loamy sand, 0-5% slopes (DocB) and Sassafras sandy loam, 2-5% slopes (SacB).

3.3.3 Soil Quality

Soil and sediment quahty at the SMC facility has been defined through extensive remedial investigations. The main contaminants of concem include inorganics, which are present at levels exceeding New Jersey direct contact soil cleanup criteria. Chromium levels in soils beneath the former glass stack at the facility have the potential to impact ground water. Radionuclide levels in soils and sediments were defined in a 1992 site characterization report (IT Corporation, 1992), as indicated in figures included in Appendix B.

3.4 Water Resources

This section characterizes regional and site-specific surface water hydrology and ground water hydrogeologic resources.

3.4.1 Surface Water Hydrology

The surface water hydrology of the area in which the SMC facility is located, as well as site-specific hydrologic characteristics are described below.

3.4.1.1 Regional Hydrology

The SMC facility is situated within the Cohansey-Maurice regional watershed, which comprises a portion of the Lower Delaware sub-region, the Delaware basin and the Mid-Atlantic watershed (USGS, 2005). The 56.8 kilometers (35.3 miles) of the Maurice River system (which

includes Menanatico and Muskee Creeks and the Manumuskin River) travels through five municipalities in Gloucester and Cumberland counties on its way to the Delaware Bay. The watershed boundaries are depicted in Figure 3-9. The Maurice River and its tributaries drain the southwest portion of the Pinelands National Reserve, are a critical stop for migratory birds, and support many animal species that the state has recognized as endangered. A lower portion of the river, from the south side of the Millville sewage treatment plant to the Route 670 Bridge at Mauricetown, is designated as a Wild and Scenic River. The closest portion of this section of the Maurice River is located over 14.5 kilometers (9 miles) to the south-southwest of the SMC facility. Approximately 5.6 kilometers (3.5 miles) of the Maurice River are designated as fishing areas.

3.4.1.2 Local Hydrology

The SMC facility is located within the Upper Maurice River portion of the Maurice River watershed. This portion of the watershed contains approximately 80 kilometers (50 miles) of streams and drains 1000 square kilometers (386 square miles) of land (FGCW, 2005).

Local surface water features at and downstream of the SMC facility are highlighted on Figure 3-10. The topographic map of the area (see Figure 1-1) indicates the presence of a drainage divide north of the center of Newfield, so that drainage to the north would be directed to the Burnt Mill Branch, while drainage to the south (including the SMC facility) would be toward the Hudson Branch.

The Hudson Branch is a tributary to Bumt Mill Branch, and originates just to the east of the SMC facility. The upstream drainage area of the Hudson Branch (upstream of a point adjacent to the Storage Yard) is estimated at 4.8 square kilometers (1.85 square miles), most of which is only sparsely developed. Ground water discharge appears to be the primary source of water to the Hudson Branch in times of no or low precipitation. During periods of increased precipitation, the Hudson Branch originates as far as 92 meters (300 feet) east of the facility, and water ponds within the marshy area at the southwest comer of the site, approximately 300 meters (1,000 feet) downstream of the Storage Yard.

From its point of origin, the Hudson Branch flows westward through portions of the SMC facility and along the facility's southern property boundary. A small ponded area (referred to herein as the unnamed pond), approximately 0.6 hectares (1.4 acres) in size, is located within this reach of the Hudson Branch, immediately south of SMC's former thermal coohng pond (see Figure 3-10). The channel of the Hudson Branch along the southern boundary of the facility varies in size and ranges from 3 to 6 meters (10 to 20 feet) wide and from 0.3 to 0.9 meters (1 to 3 feet) deep. During typical flow conditions, the northem edge of the Hudson Branch channel is located approximately 92 meters (300 feet) from the Storage Yard. Downstream of the SMC facility, the Hudson Branch flows through a combination of undeveloped areas, residential areas and soine agricultural areas.

The Hudson Branch joins the Burnt Mill Branch approximately 1,980 meters (6,500 feet) southwest of the site. A 6-hectare (15-acre) pond (Bumt Mill Pond) exists at the confluence of the Hudson Branch and Bumt Mill Branch (Manaway Branch), impounded by an eight-foot-high dam. The watershed area for Bumt Mill Pond is reported to be 1,669 hectares (4,123 acres). The pond is shallow, with a mean depth of 0.73 meters (2.4 feet) (F.X. Browne Associates, Inc., 1993). The Bumt Mill Branch (Manaway Branch) continues from Burnt Mill Pond, joining the Maurice River approximately 2,743 meters (9,000 feet) southwest of Bumt Mill Pond.

Non-consumptive water uses for the Hudson Branch and Bumt Mill Pond, such as recreation, are not significant. The Hudson Branch primarily flows through private property, with no publicly-accessible areas. Bumt Mill Pond is primarily surrounded by residences. Although recreational activities, such as fishing, most likely occur within the pond, it is not listed by the NJDEP as a publicly-accessible fishing area (NJDEP, 2005a).

The SMC facility and the adjoining Borough of Newfield to the east and north of the facility comprise an urban area, partially surfaced with impermeable materials (i.e., buildings and pavement), which would result in increased runoff as compared to undeveloped land. Other man-made changes which may impact surface water flow in the area include: roadway runoff during storm events, culverts below roadways which may restrict flow during significant flood

events, and non-stormwater discharges (such as the treated ground water discharges from the SMC site) into the Hudson Branch, which add to the base flow of the stream.

Within the SMC facility itself, drainage from developed portions of the facihty is managed via a storm drain system and through overland flow. Most of the drainage from the developed portion of the site is directed to the on-site drainage basin (pond) located in the southwestern portion of the facility. The drainage from the far westem employee parking lot area is discharged into a ditch near the westem boundary of the facility. Stormwater drainage in the eastem undeveloped area of the facility is generally via sheet flow. Drainage within the Storage Yard is generally contained by perimeter berms, although there are some low points in the existing berm system where drainage could potentially escape the Storage Yard. Any drainage that escaped the confines of the Storage Yard would either flow via sheet flow across the undeveloped area towards the Hudson Branch or would infiltrate into the sandy soils. Plate B illustrates drainage features at the SMC facility.

Historically, the SMC facility had three permitted discharge outfalls to the Hudson Branch. Following the closure of on-site lagoon features, the outfalls were revised to reflect current discharge conditions at the facility, as reflected within a NJDPES permit (Permit No. NJ0004103) issued in October 2002. Currently permitted outfalls include outfalls DSN003A and DSN004A. DSN003A is located in the westem portion of the SMC facility and is used for stormwater discharges from the employee parking lot and other westem portions of the SMC facility. Discharges from this outfall are regulated under stormwater discharge general permit NJ0088315. DSN004A is located at the southwest comer of the drainage basin in the southwest portion of the SMC facility. DSN004A receives a combination of facility stormwater and treated water from the on-site ground water treatment system. When on-site operations were more extensive, non-contact cooling water was also discharged at this location. The treated ground water discharge is monitored separately from the discharge from DSN004A, at an intemal monitoring point for the treatment system referred to within the NJPDES permit as DSN001B. Flows from DSN004A are recorded at an H-flume located at the outfall. According to the NJPDES permit application documents for the SMC facihty, the monthly average daily flow

from outfall DSN004A is approximately 2,006 cubic meters per day (0.53 million gallons per day or MGD). Historically, before the closure of the on-site lagoon features, only stormwater and non-contact cooling water were discharged at this location, which was previously referred to as DSN002.

In addition to SMC's two permitted outfalls, a third outfall is located just west of the former thermal coohng pond. This outfall discharges stormwater from a portion of the Borough of Newfield located north of the SMC facility. A 0.9-meter (36-inch) diameter stormwater pipe enters the SMC facility at the northern property line, crosses the SMC facility and discharges into the Hudson Branch at this location (see Plate B). Historically, this discharge location was permitted as outfall DSN001 and was the point at which treated ground water and stormwater were discharged, along with non-contact cooling water. Currently only stormwater from the Borough of Newfield is discharged at this location.

3.4.1.3 Water Flow Data

There are no stream gauging stations on the Hudson Branch or the Burnt Mill Branch downstream of the site. The closest downstream gauging station is located on the Maurice River at Norma, New Jersey, approximately 2,740 meters (9,000 feet) downstream of the confluence of the Burnt Mill Branch and the Maurice River (i.e., approximately 6.4 kilometers or 4 miles southwest of the site). Appendix C presents a summary of the average discharges by month at this gauging station between January 2003 and December 2004. The discharges are also compared to the 7-day once-in-10-year low flow values. A table depicting the average monthly streamflows in cubic feet per second between 1932 and 2003 is also presented. Mean monthly streamflows for this period of record range from 189 cubic meters per minute or m^3/min (49,817 gallons per minute or gpm) in October to 391 m^3/min (103,324 gpm) in March.

Although there is no stream flow gauging station on the Hudson Branch, flow rates in the Hudson Branch have been characterized by a number of studies conducted over the years. There are a number of limitations and apparent inconsistencies in the available data, however, owing in part to seasonal variations in recharge/discharge relationships and precipitation. Also, the flow

data were collected over a period when the ground water extraction and treatment system at the SMC facility was being implemented. Because average ground water extraction rates varied over this period, from 0 m^3/min (1974) to 0.30 m^3/min (80 gpm) in 1988/1989 to 0.76 m^3/min (200 gpm) in 1991/1992 to 1.51 m^3/min (400 gpm) in 1993/1995, the rate of discharge of treated ground water to the Hudson Branch also varied over this period. Other contributions to the total outfall discharges also varied over the study period. The location of the treated ground water discharge outfall has also changed (from historic Outfall DSN001 to existing Outfall DSN004A), with associated impacts to the Hudson Branch flow rates. The various studies also indicate a complicated relationship between ground water discharge/surface water recharge areas along the Hudson Branch, with areas that exhibit surface water gain during some times of the year exhibiting surface water loss during other times of the year. Therefore, this discussion focuses on the most recent flow characterizations, conducted in 1993 and 1995.

The 1993/1995 study, conducted by Environmental Resources Management, Inc. (ERM, 1995) included the collection of flow measurements at nine locations on the Hudson Branch, Burnt Mill Branch and Maurice River during a low-flow period (October 15 – November 10, 1993) and a high-flow period (April 19 – June 30, 1995). The study was conducted prior to the closure of on-site lagoon features and associated relocation of the treated ground water discharge from historic outfall DSN001 to existing outfall DSN004A. Flow measurements were collected by measuring flow depth and velocity. The flow rate was then determined by multiplying the velocity by the estimated cross section. The ground water treatment rate and discharge during the study period approximated 1.51 m^3/min (400 gpm).

During the autumn 1993 low-flow portion of the study, no flow was measured at the uppermost stream sampling location, located at the ponded headwaters of the Hudson Branch. Flow measurements in the Hudson Branch generally decreased from highs of 1.53 to 2.23 m^3/min (404 to 588 gpm) at a culvert approximately 15.25 meters (50 feet) downstream of historic outfall DSN001, to the confluence of the Hudson Branch with Burnt Mill Pond, where no flow was measured during any of the monitoring events at a location immediately upstream of Burnt Mill Pond.

Flow within the Bumt Mill Branch during the autumn 1993 study ranged from 1.50 to 1.89 m^3/min (397 to 491 gpm) just downstream of Burnt Mill Pond to 3.55 to 10.27 m^3/min (937 to 2,714 gpm) just upstream of the Maurice River. Flows in the Maurice River just upstream of its confluence with Bumt Mill Branch ranged from 89.37 to 97.08 m^3/min (23,608 to 25,465 gpm) over this period.

During the spring 1995 study, the uppermost Hudson Branch sampling location continued to exhibit no measurable flow. Variable flow rates were measured at other Hudson Branch locations, however. Periods of relatively constant flow with distance downstream, periods of steady flow decreases and one period of steady flow increases were observed over the study period (April 19 – June 30, 1995). For the portion of the stream between historic outfall DSN001 and Weymouth Road, reductions in flow rate were observed during every monitoring event but one. Flows measured just downstream of historic Outfall DSN001 ranged from 0.05 m^3/min (13 gpm) to 1.67 m^3/min (440 gpm) over the study period. For the portion of the stream between Weymouth Road and samphng station 8 (located near SMC's farm parcel), flow reductions were measured during four events, flow increases were measured during three events, and relatively constant flows (i.e., within a range of plus or minus 10 gpm) were measured during three events. In the area immediately upstream of Bumt Mill Pond, measurable rates of flow were present during the first half of the spring 1995 portion of the study (April 19 – May 19) but flow was generally not measurable or negative (i.e., upstream flow was measured) during the second half of the study period.

Flow within the Burnt Mill Branch during the spring 1995 study ranged from 2.56 to 10.27 m^3/min (675 to 2,712 gpm) just downstream of Burnt Mill Pond to 8.75 to 17.32 m^3/min (2,312 to 4,576 gpm) just upstream of the Maurice River. Flows in the Maurice River just upstream of its confluence with Bumt Mill Branch ranged from 54.95 to 168 m^3/min (14,516 to 44,382 gpm) over this period.

3.4.1.4 Wetlands

A wetlands delineation was conducted along the Hudson Branch in the vicinity of the SMC facility in 1994 and a wetland cover survey was subsequently conducted by TRC in 1996 (TRC, 1996a). Identified wetland habitats present adjacent to the Hudson Branch included the following palustrine wetland types: emergent marsh, broad-leaved deciduous forest, scrub-shrub (i.e., woody vegetation less than 6 meters (20 feet) in height), and open water. The width of the wetlands ranges from approximately 1.5 meters (5 feet) (upgradient of the on-site pond) to over 122 meters (400 feet). The wetland limits and associated wetland cover types are depicted in Figure 3-11. More detail on the specific habitats within the wetland areas is provided in Section 3.5.1.

3.4.1.5 100-Year Floodplain

The delineated flood hazard areas near the SMC facility, as indicated on Federal Emergency Management Agency (FEMA) publications (FEMA, 1982; FEMA, 1991), are provided in Figure 3-12. The majority of the SMC facility is mapped as "zone X," areas determined to be outside the 500-year floodplain. A small zone along the Hudson Branch is mapped as a special flood hazard area, inundated by the 100-year flood, with no base flood elevations determined.

3.4.1.6 Surface Water Quality – Maurice River Basin

Water quality data for the Maurice River basin for the year 2003 (USGS, 2003) are presented in Appendix C. The data include results for four water quality stations along the Maurice River, including the Maurice River at Norma, New Jersey, the closest gauging station downstream of the SMC facility. The USEPA maintains data regarding documented impairments to water quality by watershed. For the Cohansey-Maurice watershed, the most commonly reported impairment is to biology (moderate impairment), followed by fecal coliforms, severe impairments to biology, and nutrients (USEPA, 2005a). At the Norma monitoring station, pH and fecal coliforms were noted impairments.

3.4.1.7 Surface Water Quality - Hudson Branch and Burnt Mill Pond

Surface water quality in the Hudson Branch and Burnt Mill Pond has been characterized by several studies, including studies conducted in support of RI/FS activities or NJPDES permitting at the SMC facility. The most comprehensive characterization activities within the Hudson Branch were conducted in 1990 and 1995, as part of the RI/FS.

Five surface water samples were collected within the Hudson Branch during the RI in October 1990 and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs) and inorganics. Seven surface water samples were collected during a supplemental sampling effort in 1995 at locations along the Hudson Branch, Bumt Mill Branch and within Bumt Mill Pond. These samples were analyzed for inorganics only. Surface water sample locations and a summary of field measurements and analytical results are presented in Appendix D.

In general, the majority of the VOCs and SVOCs detected in the RI surface water samples were limited to common laboratory contaminants and were not considered to be attributable to the SMC facility. Chlorinated VOCs were detected at estimated concentrations at one samphng station located near the toe of the VOC-impacted ground water plume. The inorganic analyses of the RI samples indicated the presence of several inorganics, with concentrations generally decreasing with distance downstream of the SMC facility. In the seven surface water samples collected in 1995 (analyzed for inorganics only), the highest levels of inorganics were primarily detected in two of the samples, SW-8 and SW-25. Surface water sample SW-8 was collected in the same area as RI sample SW01, near the headwaters of the Hudson Branch, while surface water sample SW-25 was collected within Bumt Mill Pond.

Surface water radiological sampling was conducted in 1991 as part of a larger site study (IT Corporation, 1992). Samples of stormwater runoff and surface water from the Hudson Branch and from background locations along Bumt Mill Branch were collected and analyzed for a variable list of parameters, including U-238, Th-232, Ra-226, Ra-228, Pb-214, Bi-214, gross alpha and gross beta. The maximum measured thorium and uranium concentrations (48.4 pCi/liter and 17.4 pCi/liter, respectively) were noted in filtered stormwater runoff samples

collected within the fenced portion of the SMC facility, directly south of the Storage Yard. The maximum radium concentration, 33.1 pCi/liter, was found in a filtered Hudson Branch surface water sample collected directiy south of the SMC facility. The study report states that concentrations of radium, uranium and thorium in the filtered surface water samples did not differ significantiy from background, with gross alpha and gross beta concentrations being less than 15 pCi/liter and 50 pCi/liter, respectively.

3.4.1.8 Potential Pollutant Sources in the Hudson Branch Watershed

As previously described in Section 3.4.1.2, SMC historically maintained three permitted outfalls at its facility to manage the discharge of stormwater, treated ground water and stormwater, and non-contact cooling water. These discharges were govemed by the discharge parameters established in the NJDPES permit under which they were regulated. Current discharges of treated ground water and stormwater from DSN004A continue to be regulated by the limitations specified in the facility's current NJDPES permit. Other potential pollutant sources associated with the SMC facility that may have impacted discharges to the Hudson Branch in the past include historic on-site waste management activities, periodic spills, or discharges associated with equipment malfunctions.

To identify other potential pollutant sources in the Hudson Branch watershed near the SMC facility, TRC subcontracted FirstSearch Technology Corporation of Massachusetts to conduct an environmental record database search, which includes USEPA and State database records. As a result of the database search, several properties were identified in the vicinity of the SMC facihty, which may have or could potentially discharge pollutants to the Hudson Branch, as described below.

- Bondy Oil, located directiy northwest df the SMC facility is listed as a State Spills site and a Leaking Underground Storage Tank site, with confirmed soil and ground water contamination related to petroleum products. A 550-gallon gasoline leaking underground storage tank was removed from the site in June 1990. A *No Further Action – Area of Concern* status was given to the site in August 1995, and a Classification Exception Area has been designated for ground water downgradient of this site.

- Research Glass of New Jersey, located at 3770 Northwest Boulevard, is listed as a State Hazardous Waste site and a Leaking Underground Storage Tank site. Soil and ground water contamination have been confirmed at the site. A 300-gallon leaking gasoline tank was removed from the site in February 1997. A *No Further Action – Area of Concern* status was given to the site in January 2001. This property is situated within 0.4 kilometers (0.25 miles) southwest of the SMC facility.

- Andrews Glass Go. Inc., located at 3740 Northwest Boulevard, is listed as a RCRA Small Quantity Generator and a State Hazardous Waste site. According to the record, the site is listed as a *Site With On-Site Source(s) of Contamination* with an active status as of April 1994. This property is also situated within 0.4 kilometers (0.25 miles) southwest of the SMC facility.

- Gelsi Mustang World, located at 3576 Northwest Boulevard, is hsted as a Leaking Underground Storage Tank site. Accotding to the record, a 12,000-gallon diesel leaking underground storage tank was removed from the site in June 1991. A *No Further Action – Area of Concern* status was given to the site in March 1992. The property is situated within 0.8 kilometers (0.5 miles) southwest of the SMC facility.

- The North Vineland Car Wash, located at 130 West Weymouth Road, is listed as a State Hazardous Waste site. According to the record, the property is listed as a *Site With On-Site Source(s) of Contamination* with a pendmg status as of Fehmsry 1998. No further information regarding the site was hsted. The property is situated within 0.8 kilometers (0.5 miles) southwest of the SMC facility.

- Galena Lead Crystal, located at 158 West Weymouth Road, is listed as a State Hazardous Waste site. The site is listed as a *Site With On-Site Source(s) of Contamination* with an active status as of September 1992. This property is situated within 0.8 kilometers (0.5 miles) southwest of the SMC facility.

- The Newfield Borough Sanitary Landfill and Ralph Rambone Landfill, both located on Catawba Avenue, are listed as State Hazardous Waste Sites. According to the records, both sites are listed as *Sites With On-Site Source(s) of Contamination* with pending status as of June 1993 and July 1993, respectively. Both sites are located within 0.8 kilometers (0.5 miles) northeast of the SMC facility.

3.4.1.9 Surface Water Use

For the purposes of surface water classification, the Hudson Branch and Burnt Mill Branch are not "listed streams" within NJAC 7:9B-1.15, Table 2 (Delaware River Drainage Basin). Therefore, in accordance with NJAC 7:9B-1.15(b)3(iii), they take on the classification of the water body into which they flow (i.e., the Maurice River). The section of the Maurice River into which the Burnt Mill Branch discharges is classified as FW2-NT (non-trout). Designated uses of FW2-NT surface waters include the following:

- Maintenance, migration and propagation of the natural and established biota;
- Primary and secondary contact recreation;
- Industrial and agricultural water supply;
- Public potable water supply after conventional filtration treatment and disinfection; and
- Any other reasonable uses.

The New Jersey Geological Survey has published information regarding water withdrawals and uses in the state based on Watershed Management Areas (WMAs) for the years 1990 – 1999 (Domber and Hoffman, 2004). Figure 3-13 provides water use information for the Maurice, Salem and Cohansey WMA (WMA 17), which covers most of the southwest comer of the state, including the Newfield area. Within WMA 17, surface water withdrawals averaged 23,555 million gallons per year for the 1990 – 1999 period. This amounts to nearly half of the average total freshwater withdrawals (surface water and ground water combined) in the WMA. The predominant use of freshwater within the WMA is mining, followed by potable supply, industrial use, and agricultural use. Commercial and irrigation uses of freshwater were reported to be minimal. Similar data for Cumberland and Gloucester Counties is provided in Table 3-3. The major local potable water providers, the Newfield Water Department and Vineland Water and Sewer Utility, obtain their potable water strictly from ground water sources (see Section 3.4.2.2).

3.4.1.10 Water Control Structures

There are no known or planned surface water diversions in the Hudson Branch or the Burnt Mill Branch downstream of the site, or upstream of the convergence with the Maurice River. The presence of a 2.4-meter (8-foot) high dam creates Burnt Mill Pond at the confluence of the Hudson Branch and Burnt Mill Branch.

3.4.2 Ground Water Hydrogeology

The hydrogeology of the area in which the SMC facility is located, as well as site-specific hydrogeologic characteristics, are described below.

3.4.2.1 Ground Water Aquifers

The SMC facility is situated within the New Jersey Coastal Plain Aquifer, a USEPA designated sole-source aquifer (Federal Register, Vol., 53, No. 122, page 23791, June 24, 1988) which covers approximately 10,880 square kilometers (4,200 square miles). More than half of the land area is below an altitude of 15 meters (50 feet) above sea level (NGVD 1929). The area is surrounded by the Delaware River on the west, Delaware Bay on the south, the Atlantic Ocean on the east, and Raritan Bay on the north. There are five major aquifers within the New Jersey Coastal Plain Aquifer. These include the Potomac-Raritan-Magothy aquifer system, Englishtown aquifer, Wenonah-Mount Laurel aquifer, lower "244-meter" ("800-foot") sand aquifer of the Kirkwood Formation and the Kirkwood-Cohansey Aquifer. The Kirkwood-Cohansey Aquifer is located directly above the basal clay of the Kirkwood Formation, which acts as a confining unit. Appendix E presents a qualitative description of the New Jersey Coastal Plain Aquifer System. Additional regional geologic descriptions were previously provided in Section 3.3.1.

3.4.2.2 Ground Water Use

Ground water in the vicinity of the SMC facihty is classified as Class II-A, per NJAC 7:9-6.5. The primary designated use for Class II-A ground water is potable water and conversion

to potable water through conventional water supply treatment, mixing or other similar technique. Secondary uses include agricultural water and industrial water.

As indicated in Figure 3-13, within the Maurice, Salem and Cohansey WMA, an average of 92.4 million cubic meters of ground water were extracted annually for the period of 1990 – 1999, just over 50% of the total freshwater withdrawal for the WMA. The predominant use of freshwater within the WMA is mining, followed by potable supply, industrial use, and agricultural use. Commercial and irrigation uses of freshwater were reported to be minimal.

Ground water is the primary source of domestic, agricultural, community, and municipal water supplies in the general area of the SMC facihty. Depths of public wells are in the range of 45.7 to 61 meters (150 to 200 feet) deep, typically installed within the Kirkwood-Cohansey Formation; the depths of private wells vary in the area. In general, ground water in the area provides good quality water and a reliable quantity of water at an economical depth. Freshwater uses within Cumberland and Gloucester Counties are provided in Table 3-3.

Potable water is provided locally by the Newfield Water Department and the Vineland Water and Sewer Utility. Each utility relies solely on ground water sources for its potable water. The Newfield Water Department serves approximately 1,900 individuals in Newfield Borough and Franklin Township from two wells, one located at Catawba and Hazel (Well 3) and one located at Catawba and Woodlawn (Well 5). These wells are located to the north and northeast of the SMC facility, respectively. The Newfield Water Department also purchases ground water to supplement that produced by the two Newfield wells (NJDEP, 2004a; USEPA, 2005b).

The Vineland Water and Sewer Utility serves approximately 31,000 individuals in the City of Vineland from 13 wells. The nearest well to the SMC facility is referred to as Well 10, located along Delsea Drive, just north of Bumt Mill Pond.

Additional information on local ground water use is provided in Appendix F, including information on local large-capacity wells, defined as wells with permitted daily withdrawals of 378.5 cubic meters (100,000 gallons) or more, within 1.6 kilometers (1 mile) of the SMC facility. The locations of these wells relative to the SMC facility are also provided in Appendix F (Figure F-1), based on a well survey conducted by TRC in 2001. Ground water beneath and

downgradient of the SMC facility is withdrawn via five extraction wells at a combined rate of approximately 1.51 m^3/min (400 gpm) as part of a CERCLA remedial action for the treatment of chromium and chlorinated organics. The well survey identified the two Borough of Newfield potable wells described above, along with six wells associated with agricultural use. Since 2001, four additional high-capacity irrigation wells have been installed within 1.6 kilometers (1 mile) of the SMC facility. Two of the wells are located approximately 168 meters (550 feet) to the north, off of Madison Avenue (wells 3106890 and 3163314, also indicated on Figure F-1).

Due to the presence of chromium and trichloroethene in ground water beneath and downgradient of the SMC facility, the City of Vineland has designated an area of the city downgradient from the SMC facility as a well restriction area, requiring mandatory connection with public water systems. A figure depicting the well restriction area (Figure F-2), and a copy of the legal description of the well restriction area (as provided by the City of Vineland Water-Sewer Utility) are presented in Appendix F.

3.4.2.3 Site-Specific Hydrogeologic Characteristics

A tabular summary of the SMC monitoring wells located at and surrounding the site is provided in Table 3-4. Figure 3-14 depicts the ground water monitoring well locations that are present in the immediate vicinity of the SMC facility. Additional monitoring and extraction wells are located downgradient and upgradient of the site, as indicated in Figures F-3 and F-4 in Appendix F.

As described in Section 3.3.2, the Cohansey Sand below the site is composed of coarse sands and little to trace silt in the upper 12 meters (40 feet), and generally finer sand and some silt, with some clay and silt stringers in the lower 18 to 24 meters (60 to 80 feet). Based on pump test analyses, the shallow and deep transmissivities vary for the upper and lower Cohansey Sand beneath the SMC facility, with lower transmissivity and specific yield values for the lower Cohansey Sand (due to the smaller grain size sand and increased percentage of silt and clay) than for the upper Cohansey Sand. Based on these differences, historically the ground water data for

the shallow wells (screened above 15 meters or 50 feet) have been evaluated separately from the data for the deeper wells (screened below 15 meters).

The ground water flow directions in both the upper and lower Cohansey Sand closely correiate to the general topography of the site, which slopes gentiy to the southwest. Ground water contours for the upper and lower Cohansey Sand for the July 2005 ground water monitoring event are presented in Figures F-3 and F-4 in Appendix F. The extraction of ground water as part of SMC's ground water treatment system impacts the contours, especially in the lower Cohansey Sand.

Typically, depths to ground water range from 0 feet at the Hudson Branch to approximately 5.2 meters (17 feet) below grade in the northwest portion of the site. The depth to ground water ranges between approximately 2.4 to 3.0 meters (8 to 10 feet) below grade in the vicinity of the Storage Yard. The average linear shallow ground water flow velocity on-site has been calculated at approximately 0.3 to 0.9 meters per day (1 to 3 feet per day) (DRAI, 1990). A downward hydraulic gradient has been observed at most of the well clusters on-site, consistent with the ground water pumping conditions at and downgradient of the site.

Water table elevations tend to fluctuate on a seasonal basis. Based on historic water table elevation data, seasonal fluctuations generally range from approximately 0.15 to 0.61 meters (0.5 to 2.0 feet) in the on-site wells. The highest water levels occur in either April or July (depending on the well) and the lowest levels occur in October. Ground water elevations in the on-site wells have not changed considerably in the last ten years of monitoring.

Based on aquifer testing, separate transmissivities and specific yield values for both the shallow (water table) and deeper (lower Cohansey Sand) aquifers have been determined. According to the aquifer tests, the transmissivity of the shallow aquifer is about 130,000 gallons per day per foot (gpd/ft) and the storage coefficient is on the order of 0.03. The transmissivity and storage coefficient of the lower portion of the aquifer are less, on the order of 74,000 gpd/ft and 0.002, respectively. These values were averaged from four aquifer tests performed for SMC, as well as from two tests conducted during development of a historic Newfield supply well, located adjacent to the site (to the northwest). Vertical hydraulic conductivities of 0.006 to 3

gpd/square foot were calculated at locations across the site (DRAI, 1988). Based on the aquifer testing, ground water modeling has been conducted on several occasions to support the evaluation of ground water remedial altematives, including the determination of the locations, depths and pumping rates of the ground water extraction wells that make up the ground water remediation system.

3.4.2.4 Regional Ground Water Quality

According to the USEPA (USEPA, 2005c), ground water in the New Jersey Coastal Plain is low in dissolved sohds (generally less than 150 milhgrams per hter (mg/L). Calcium and bicarbonate are usually the dominant ions in solution, with smaller amounts of sodium, potassium, magnesium sulfate and chloride. Locally, concentrations of iron and manganese present a problem near the water table because the ground water tends to have a low pH. These waters are treated to make them palatable. Historically, no significant quantities of heavy metals, pesticides, organics or cohform bacteria have been found in the artesian aquifers. Except for specific parameters (e.g. iron) and contamination incidents, water quality in the artesian ground water system meets or exceed Federal and State drinking water standards. Appendix E presents a summary of several ground water quality parameters for two regional USGS wells located in Camden and Vineland, New Jersey.

The Newfield Water Department treats extracted ground water for disinfection, corrosion control, and iron removal prior to public distribution. The Vineland Water and Sewer Utility provides routine treatment of extracted ground water for taste/odor control, disinfection, and corrosion control. Three Vineland water treatment plants also provide inorganics and/or iron removal, two provide dechlorination or organics removal and one provides removal of radionuclides. Water extracted from Well 10, the well closest to the SMC facility, is treated for corrosion control, disinfection, inorganics and iron removal, and dechlorination. [NJDEP, 2004a]

3.4.2.5 Local Ground Water Quality

Ground water quality investigations and regular quarterly monitoring of ground water quality in wells located at and downgradient of the SMC facility have provided a good definition of local ground water quality. While these studies have included a wide range of analytes, the results have indicated that the major ground water quality concerns in the immediate vicinity of the facility are the presence of chromium and VOCs (mainly trichloroethene or TCE) contaminant plumes extending to the southwest of the facility, in the downgradient direction. As a result of these studies, ground water extraction wells have been located both on and to the southwest of the SMC facility. These recovery wells have been located to hydrauhically control further migration of the chromium plume. The ground water recovered from these wells is treated at an on-site treatment facility prior to discharge into the Hudson Branch.

Tables depicting the results of the July 2005 quarterly ground water sampling event are provided in Appendix F (Tables F-2 and F-3). Ground water contaminant isopleth maps generated for chromium, hexavalent chromium and TCE in April 2005 (the last date such maps were generated) are also provided in Appendix F. Based on the results of quarterly ground water monitoring conducted since 1990, the following trends have been observed:

- The overall footprint of the shallow TCE plume (i.e., 1 ppb contour line) has remained virtually unchanged over the last several years.

- TCE concentrations in wells near the toe of the deep TCE plume have exhibited a fairly substantial decrease over the last nine years. On-site deep well A has also exhibited a general downward trend in the levels of TCE.

- The overall footprint of the shallow total chromium plume (i.e., 100 ppb contour line) has remained virtually unchanged over the last several years. Similarly, concentrations of total chromium within the center of the shallow plume have remained fairly constant over the same time period.

- The overall footprint of the deep total chromium plume (i.e., 100 ppb contour line) has remained virtually unchanged over the last several years. Concentrations of total chromium beneath the southwest comer of the SMC facility (i.e., wells A, IWC5 and SC22D), historically within the center of the deep plume, have exhibited somewhat varied results since April 2001. Similarly, in the lobe of the deep total

chromium plume that extends to the southwest of the facility, well IW2 has exhibited substantial reductions in total chromium levels, but other wells (e.g., SC2D(R)) have exhibited more varied results.

The CERCLA ROD for the ground water operable unit at the SMC facility included a requirement that a Classification Exception Area (CEA) be established for the area of ground water impacted above the applicable New Jersey ground water quality standards. The CEA will remain in effect until such time as compliance with the ground water quahty standards is achieved. Per the requirements of NJAC 7:9-6.6(d), designated ground water uses are suspended during the life of the CEA, including potable use of the ground water. SMC filed the infonnation necessary to establish a CEA beneath and downgradient of the SMC facihty in April 2001 (TRC, 2001).

In addition to traditional chemical characterization of the ground water quality, several rounds of radiological ground water sampling events were conducted from the late 1980s through 1990, and again in 2004 and 2005. Drinking water standards and screening levels have been estabhshed for gross alpha (15 picocuries per liter or pCi/l screening level), beta/photon emitters (4 mrem/yr; with 50 pCi/l used as a screening level), combined radium 226/228 (5 pCi/l standard) and uranium (30 ug/L standard). The ACO stipulated the use of 5 pCi/l gross alpha as a trigger for conducting isotope-specific analyses.

On-site monitoring of radiologic parameters included wells such as well W3 (representative of background conditions), wells W2, SCII, SC12, and SC13 (representative of conditions in the vicinity of the Storage Yard), and well A (generally downgradient of the Storage Yard and near the downgradient property line). The purpose of these analyses was to determine if licensed radioactivity impacted site ground water. As thorium and uranium decay naturally, energy is released in the form of alpha and beta emissions, measured in pCi/l. Both filtered and unfiltered ground water samples were analyzed to detennine the influence of suspended versus dissolved solids on ground water quahty.

For the ground water samples collected in the late 1980s through 1990, the highest radiological results were detected in sampling conducted in 1988 and 1989 by Dan Raviv

Associates (Dan Raviv, 1990). During that period, the highest detected level of gross alpha activity was 10 pCi/l in a filtered sample from well SC13 in the vicinity of the slag piles, while the highest detected level of gross beta was 130 pCi/l in an unfiltered sample collected at well SC12. Exceedances of the gross beta screening level of 50 pCi/l were also detected in samples collected from well SCII. Wells W2, W3, and A, however, were consistently below the screening levels for both gross alpha and beta. In subsequent sampling rounds conducted in 1990, gross alpha and beta levels were generally below screening levels or less than method detection limits. Where isotopic analyses were conducted, all results were less than 5 pCi/l.

The annual ground water sampling event conducted in April 2004 included the collection of additional sample volumes to undergo radiochemical analysis (TRC, 2004). At the request of the NJDEP, select well locations surrounding the slag pile were analyzed for gross alpha, gross beta, radium-226 (Ra-226), radium-228 (Ra-228) and uranium-238 (U-238). Monitoring wells A, SC12S (including a duphcate sample labeled SC32S), SC13S, and SC14S (upgradient or side-gradient well) were selected based on the 1988 ACO. Shallow monitoring wells SC11S(R) and W2(R) were also selected for sampling to replace wells originally listed for sampling in the ACO that no longer exist onsite. In addition, samples from USGS observation well OBS-2A (considered a true upgradient well) were submitted for radiochemical analysis. Samples were collected for both filtered and unfiltered analyses. For the filtered samples, the sediment removed by the filter was also analyzed for U-238. A table summarizing the analytical results is included in Appendix F (Table F-4).

One of the monitoring wells (SC12S) exhibited gross beta levels (in the unfiltered sample) that exceeded the 50 pCi/l screening level. The unfiltered sample from monitoring well SC12S exhibited 128 pCi/l gross beta, which was confirmed by the duphcate sample (SC32S at 115 pCi/l). None of the wells, including USGS observation well OBS-2A, exhibited gross alpha, Ra-226, Ra-228 or U-238 concentrations in excess of applicable drinking water standards even when laboratory-determined error factors are considered.

Another set of samples was collected from SMC wells SC25S, SC11S, SC12S and SC13S on April 13, 2005. A Borough of Newfield well was also sampled to represent

background conditions. The samples (both filtered and unfiltered fractions) were analyzed for gross alpha/beta, isotopio thorium, isotopic uranium, and isotopic radium. The results of this sampling round are described in a June 9, 2005 letter report from IEM to SMC (presented in Appendix F). As indicated there, the non-radium isotopes meet the USEPA's drinking water standard for non-radium nuclides. The combined Ra-226 and Ra-228 results, however, for one on-site well (SC-1IS) and for the background Borough welf are slightiy higher than 5 pCi/l, the combined MCL for Ra-226 and Ra-228. Because compliance with the drinking water standards for public water supplies is based on annual average radionuclide concentrations (i.e., multiple analyses per year of one analysis of a composite sample collected over a period of a year), however, the results of the single sample collected from the Borough well do not indicate non-compliance with the drinking water standard. Also, as discussed in more detail in the following subsection, a NJDEP analysis of the susceptibility of public water systems indicates that both Newfield wells are highly susceptible to gross-alpha and radium contamination from non-point source urban and agricultural land use factors. (NJDEP, 2004a).

3.4.2.6 Potential Ground Water Pollutant Sources

As part of its Source Water Assessment Program, NJDEP has evaluated each public water system's susceptibility to contamination, specifically pathogens, nutrients, pesticides, VOCs, inorganics, radionuclides, radon and disinfection byproduct precursors (DBPs). Since both Newfield and Vineland obtain their potable water supplies from ground water only, the associated evaluations focused on the potential susceptibility of the production wells to be adversely impacted by contamination. NJDEP's analyses are based on sensitivity factors and intensity of use factors. Sensitivity factors include the confinement status of the potable wells, depth to the top of the open interval of the well and percent organic soil matter. Intensity of use factors include factors related to urban land use and agricultural land use for non-point sources. Point sources, including sites on NJDEP's Known Contaminated Site List, were found to be significant only in models for VOCs, inorganics and disinfection byproduct precursors; point sources are not significant in models for radionuclide susceptibility. The analyses provide

susceptibility ratings (high, medium or low) for each contaminant category for each well and intake. The ground water source assessment areas are based on three periods of time travel: Tier 1 is based on a 2-year time of travel (TOT), Tier 2 is based on a 5-year TOT and Tier 3 is based on a 12-year TOT. For Newfield, both Wells 3 and 5 have a high susceptibihty rating for nutrients and radionuclides, while only Well 3 has a high susceptibility rating for VOCs. For Vineland Well 10, the Vineland production well located nearest the SMC facility, a high susceptibility to nutrients, VOCs, radionuclides and DBPs is identified. (NJDEP, 2004a, 2004b).

The SMC facility is not located within any of the Tier 1-3 TOT areas established for either the Newfield Water Department or Vineland Water and Sewer Utility potable wells. Also, given that the analysis of potential radionuclide susceptibility considers only non-point source urban, agricultural and wetlands land use factors and not potential point sources, the presence of the SMC facility does not impact the radionuclide susceptibility eyaluation for the Newfield or Vineland wells. (ibid.)

As described in Section 3.4.2.5, a CEA will be estabhshed for the SMC facihty in accordance with the ground water ROD. Other potential sources of pollutants to ground water in the immediate vicinity of the SMC facility include the sites previously discussed in Section 3.4.1.8. The Bondy Oil site, located adjacent to the entrance to the SMC facihty, along West Boulevard, also has a CEA established in association with a former leaking underground storage tank.

3.5 Ecological Resources

This section characterizes the on-site and off-site ecological resources that could potentially be affected by the proposed action or alternatives. The information presented in this section is derived from an ecological risk assessment (ERA) conducted at the facility (TRC, 1997a), as well as from the responses to informational requests submitted to appropriate state and federal agencies.

As described previously in Section 3.1, the SMC facility is located near the New Jersey Pinelands habitat complex. The Pinelands is distinctive for the widespread occurrence of dry pine, oak, and heath communities in a humid, temperate, deciduous forest climate. These low-

nutrient and fire-adapted species have been successful in establishing and maintaining themselves competitively over the last several thousand years on the sandy, well-drained, nutrient-poor soils. The upland and lowland plant cominunities of the Pinelands are distinct from each other, due primarily to soil moisture differences. The ecological significance of the Pinelands is attributable to its status as the largest area of contiguous, undeveloped forest and wetland on the Atlantic Coastal Plain of the Mid-Atlantic region, and as the largest pine barrens complex in the world, with a mosaic of globally rare upland and wetland communities and species of national significance. (USFWS, 2005).

The SMC facility itself is characterized by sandy unconsohdated soils, flat to gently sloping terrain, and vegetative and wetiand types that are similar to the New Jersey Pine Barrens. The Hudson Branch flows along the southem portion of the site, with its headwaters located to the east of the facility. The headwaters of the Hudson Branch are characterized by an extensive wetland that develops into a ponded area, from which the Hudson Branch flows along a stream course along the southem border of the site. The Hudson Branch is a tributary to Bumt Mill Pond, from which the Bumt Mill Branch flows to the Maurice River. More information on the various habitats and associated plant and animal species either observed or potentially present at the facility is presented below.

3.5.1 Habitats

Several aquatic, wetland and terrestrial habitats are present at the SMC facility or in association with the Hudson Branch. These habitats consist of perennial stream (Hudson Branch), ponds (ponded portions of the Hudson Branch), palustrine emergent marsh, palustrine scrub-shrub wetlands, palustrine forested wetiands, forested uplands and maintained grassland areas. In addition, disturbed areas that are devoid of vegetation are present throughout the developed portions of the SMC facility. These disturbed areas do not provide suitable habitat for ecological receptors. The various habitats are described in more detail below, based on observations made during studies conducted in support of the preparation of the ERA (ibid).

3.5.1.1 Aquatic Habitats

Aquatic habitats are associated with the Hudson Branch, a small perennial stream that is located along the southern boundary of the SMC facility (Figure 3-10). The Hudson Branch generally flows to the southwest for approximately 2.1 kilometers (1.3 miles), where it flows into Burnt Mill Pond, an impounded area of the Burnt Mill Branch.

The Hudson Branch is fairly typical of a low gradient stream in that riffle-run habitats are not present and the stream substrate consists of fine particle-sized material (i.e., fine sands, silt, and clay) with considerable organic matter present. Total organic carbon contents in sediment samples have ranged from 1.2 percent to 64.8 percent. The pH of the Hudson Branch sediments is generally neutral. Two ponded areas of the Hudson Branch have been identified (see Figure 3-10). One pond, approximately 0.57 hectares (1.4 acres) in size, is present on SMC property within the headwaters of the Hudson Branch (referred to as the unnamed pond), while a small impoundment, approximately 1,214 square meters (0.3 acres) in size, is present approximately 0.9 kilometers (3,000 feet) downstream of the SMC facility. This smaller pond is located in a residential area.

The upstream portion of the Hudson Branch above the unnamed pond consists of a shallow gully that contains surface water flows only on an intermittent basis. The unnamed pond is approximately 0.6 to 1.8 meters (2 to 6 feet) in depth. The substrate is soft with a variable total organic carbon content that ranges from 6.6 percent to 19 percent. Vegetation consists primarily of common reed (*Phragmites australis*) and water willow (*Decodon verticillatus*). Water flows from the pond through a culvert (under the former Haul Road) to form the Hudson Branch.

The portion of the Hudson Branch located immediately downgradient of the unnamed pond is a poorly defined channel. Surface water flows generally meander through a broad area of common reed for approximately 230 meters (750 feet) before the Hudson Branch becomes a more defined channel. Based on aerial photographs (ENSR, 1989), the portion of the Hudson Branch immediately downgradient of the unnamed pond appears to have been channelized within a straight ditch through former cultivated fields. This alteration occurred between 1940

and 1951, and this portion of the Hudson Branch remained channelized until sometime around 1974 to 1977, when the stream appeared to follow a more meandering route.

Approximately 152 meters (500 feet) upgradient of West Boulevard, the Hudson Branch separates into two distinct channels. These two channels diverge for approximately 107 meters (350 feet) before rejoining 46 meters (150 feet) upgradient of West Boulevard. The northemmost channel receives discharges from SMC Outfall DSN-004A, including treated ground water that is discharged to the on-site drainage basin before being discharged through the outfall. Downgradient of West Boulevard, the Hudson Branch enters a more defined single channel that remains well-defined until it flows into Burnt Mill Pond.

Water depths within the identified stream channel portions of the Hudson Branch (generally present throughout the Hudson Branch downgradient of the area of common reed discussed above) range from several centimeters to approximately 0.6 meters (2 feet) within pooled areas of the stream. Low flow velocities are present throughout the entire reach of the Hudson Branch. Aquatic plants (macrophytes) and submerged logs are also present within the channelized portions of the Hudson Branch.

As described in Section 3.4.1.3, portions of the Hudson Branch have been observed to gain surface water (areas of ground water release) during portions of the year while other areas appear to lose surface water (ground water recharge areas). However, surface water release and recharge is variable within reaches of the Hudson Branch and reflects temporal changes due to seasonality and in response to precipitation events.

A macroinvertebrate habitat assessment (MACS, 1993) was conducted along selected locations of the Hudson Branch and associated reference areas. This type of assessment is a qualitative evaluation of a stream location's ability to provide macroinvertebrate habitat. The assessment considers such habitat parameters as channel modification, in-stream habitat features (i.e., aquatic vegetation, logs), presence of pools, bank vegetation and stabihty, shading, and riparian zone width. Each of these parameters was assessed at each sampling location to obtain a total habitat score. Habitat scores may range from 0 to 140, with higher values indicating better

potential habitat for macroinvertebrates. Water quality parameters (i.e., dissolved oxygen, conductivity, pH, and temperature) were also measured as part of the habitat assessment.

Two sampling locations within the unnamed pond scored 63 and 64, respectively, while a selected reference pond sampling location in Burnt Mill Pond scored similarly, but slightly lower at 60. Water quality parameters between the three pond sampling locations did not vary substantially, with the exception of observed lower conductivity at the reference pond sample location.

The habitat quality within a selected reference stream sample located in Bumt Mill Branch scored high at 97. Habitat quality within the Hudson Branch at a sample location just upstream of SMC's farm parcel was also fairly high, with a score of 94. Therefore, these two samphng locations appear similar in providing high quality habitat for macroinvertebrates. However, three additional Hudson Branch sampling locations, located both upstream and downstream of the farm parcel location, scored lower. These lower scores indicate that portions of the Hudson Branch provide lower quality habitat for macroinvertebrates. The locations that exhibited these lower scores were associated with conditions such as the absence of year-round surface water flow, and dense stands of common reed, a non-native plant that may lower the habitat quality for macroinvertebrates. Water quality parameters for a reference stream sample collected from the Bumt Mill Branch generally had lower pH, dissolved oxygen, and conductivity levels than did the stream samples collected from the Hudson Branch locations. Water quality parameter values were generally comparable among Hudson Branch sample locations.

3.5.1.2 Upland Habitats

Forested and grass cover types are present within undeveloped portions of the SMC facility. The locations of these habitats at the time the ERA was conducted are depicted in Figure 3-11. At that time, two areas of grass habitat were present within the southwest comer (referred to as Grassland Area #1) and near the southeast comer (for the purposes of the ERA, referred to as Grassland Area #2; referred to elsewhere as the "pansy field") of the site.

Grassland Area #1 was approximately 2.27 hectares (5.6 acres) in size while Grassland Area #2 consisted of approximately 1.13 hectares (2.8 acres).

Approximately 6.9 hectares (17 acres) of forested uplands, containing a predominately red and white oak (*Quercus spp.*) overstory with sporadic pitch pine (*Pinus rigida*), are present along the southem boundary of the site. These forested habitats typically contain dense understory vegetation consisting of sweet pepperbush (*Clethra alnifolia*), laurel (*Rhododendron maxinium*), green-hrier (*Smilax sp.*) and poison ivy (*Toxicodendron radicans*). A partial hst of plant species noted within this area is presented in Appendix G, Table G-1. The extent of the forested habitat is limited by adjacent areas of human activities (i.e., SMC property, roadways, residential and other buildings, and agriculmre). A chain link fence separates both of the grass areas from the adjacent forested habitat.

Since the preparation of the ERA, there have been several changes at the SMC facility that have impacted habitat types. The former wastewater lagoons have been closed and the area planted with grass. Also a new drainage basin was constructed in a former grassland area located just southwest of the former lagoon areas. SMC has also conducted planting of upland tree species within the two grassland areas and in other undeveloped portions of the SMC facility, in accordance with the Natural Resources Restoration Plan, Upland Areas (TRC, 1997b) developed for the site. Species planted include the following:

- 50% pitch pine (*Pinus rigida*)
- 20% chestnut oak (*Quercus prinus*)
- 20% red oak (*Quercus rubra*)
- 10% persimmon (*Diospyros birginiana*)

The lagoon closure area, drainage basin location and the areas in which tree planting have been conducted are indicated in Figure 1-2.

3.5.1.3 Wetiand Habitats

A wetiands delineation was performed along the Hudson Branch at and downstream of the facihty in 1994 (Schoor, DePalma & Ganger, 1994). A wetiand characterization study was

subsequently conducted in February 1996 as part of RI/FS activities at the site (TRC, 1996a). Transects were established perpendicular to the Hudson Branch every 100 meters (250 feet) from the headwaters to a point downstream of N. West Avenue. The transects identified the center line of the Hudson Branch (or shoreline, if within a ponded area) and the limits of each wetland cover type, until the upland/wetland boundary was encountered. These locations were flagged and subsequently field-located by surveyors. Identified wetland habitats present adjacent to the Hudson Branch include the following palustrine wetland types: emergent marsh, broad-leaved deciduous forest, scrub-shrub, and open water. The width of the wetlands was reported to range from approximately 1.5 meters (5 feet) upgradient of the unnamed pond to over 122 meters (400 feet). The extent of the wetlands and associated habitat types are indicated in Figure 3-11.

Above the unnamed pond, narrow bands of palustrine scrub-shrub and emergent marsh wetlands are located adjacent to the intermittent surface flow areas of the Hudson Branch. Plants noted within these areas include common reed, highbush blueberry (*Vaccinium corymbosum*), and willow (*Salix sp.*). A broad band of wetlands is present at the confluence of the Hudson Branch with the unnamed pond. Although the northern shore of the pond is bordered by a steep bank, the eastern and southern shorelines contain a wide band of emergent herbaceous marsh vegetation (primarily common reed), with a forested overstory consisting of young red maple (*Acer rubrum*).

Downgradient of the unnamed pond, the wetland vegetation consists primarily of common reed immediately adjacent to the Hudson Branch. Wide bands of forested wetlands consisting of red maple and tupelo (*Nyssa sylvatica*) in the overstory are present to the north and south, upgradient of the areas of common reed. These forested areas contain a well-stocked and dense stand of intermediate-sized trees, with a dense understory of sweet pepperbush, highbush blueberry, laurel, green-brier, and cinnamon fern (*Osmunda cinamomea*). A sparse forest overstory of red maple is present within the area located within the divided portion of the Hudson Branch (upgradient of West Boulevard).

The broad area of wetlands located between West Boulevard and Weymouth Road consists of a sparse forest overstory (comprised of large mature trees), with a herbaceous

understory comprised of various grasses, sedges, and rushes. South of Weymouth Road, the wetlands bordering the Hudson Branch remain fairly extensive with little topographical relief present. This area of wetlands is a well-interspersed area of scrub-shrub and emergent herbaceous wetlands containing common elder (*Sambucus canadensis*), multiflora rose (*Rosa multiflora*), and arrow-wood (*Viburnum recognitum*) in the shrub layer, with various grasses, cat-tail (*Typha latifolia*), water willow, and sensitive fern (*Onoclea sensibilis*) also present. This wetland gradually grades into a palustrine emergent marsh consisting of water willow, pickerel weed (*Pontederia cordata*), and other herbaceous vegetation. A broad area of mature red maple forested wetlands is present downgradient of this marsh. This forested wetlands extends to West Arbor Avenue. South of West Arbor Avenue is a disturbed area that presentiy contains a small man-made pond that was formed by impounding the Hudson Branch. This disturbed area extends for several hundred feet (to North West Avenue), where mature red maple forested wetiands are present until the Hudson Branch reaches Bumt Mill Pond.

3.5.2 Potential Receptor Species Profile

Ecological data collected during various investigations conducted at the site and along the Hudson Branch as well as a review of the available hterature were used to identify potential receptor species (i.e., amphibians, birds, mammals, and reptiles). Plant species provide an important component of the habitats identified on the SMC site (and adjacent to the Hudson Branch) and have been briefly discussed in the previous sections. As indicated, Appendix G, Table G-1 provides the plant species receptor hst. Wildhfe species that may potentially inhabit the upland grasslands, forested wetlands/uplands, and the Hudson Branch are listed in Appendix G, Table G-2. This list includes amphibians, birds, mammals, and reptiles that may inhabit these cover types during the breeding season (e.g., spring to early fall). A macroinvertebrate survey was conducted during the habitat assessment previously described (Section 3.5.1.1, Aquatic Habitats). Results of the qualitative macroinvertebrate collection from selected sampling locations of the Hudson Branch are also provided in Appendix G, Table G-3 and discussed below.

3.5.2.1 Aquatic Receptor Species

A variety of amphibians and reptiles may potentially inhabit the aquatic habitats provided by the stream and ponded areas of the Hudson Branch. Some species, such as the green frog (*Rana clamitans*) and eastem painted turtle (*Chrysemys picta*), may inhabit these aquatic habitats throughout the year while other species, such as the gray treefrog (*Hyla versicolor*), may only utilize these aquatic habitats for breeding in the spring. During the remainder of the year, species such as the gray treefrog would forage within the adjacent forested wetland/upland cover types. A variety of snake species may forage for prey such as frogs along the banks of the Hudson Branch. Several snake species identified as potential receptors prefer aquatic habitats as foraging areas. Such species include the eastem ribbon snake (*Thamnophis sauritus*) and northem water snake (*Nerodia sipedon*).

Birds that may be present along the Hudson Branch include waterfowl species such as the mallard (*Anas platyrhynchos*) and wading birds including the green-backed heron (*Butorides striatus*). These species may potentially forage for food in and immediately adjacent to the Hudson Branch. Piscivorous (fish eating) species such as the belted kingfisher (*Ceryle alcyon*) may also potentially use the Hudson Branch as a foraging area. Riparian (along the stream bank) gleaners such as the spotted sandpiper (*Actitis macularia*) and red-winged blackbird (*Agelaius phoeniceus*) may forage on invertebrates or seeds along the banks of the Hudson Branch, while aerial screeners such as the tree swallow (*Tachycineata bicolor*) or eastem phoebe (*Sayornis phoebe*) may forage on insects above the aquatic habitats provided by the Hudson Branch. Other avian species including various sparrows may utilize the dense vegetation along the banks as nesting habitat.

Mammalian use of the Hudson Branch is expected to include several bat species that would forage for insects above the more open areas of aquatic habitat (i.e., ponds, herbaceous emergent marsh). Aquatic habitats are generally productive sites for invertebrates including emerging insects that provide an important food resource for bats. Mammalian predators such as the opossum (*Didelphis virginiana*) and raccoon (*Procyon lotor*) may forage within the emergent marshes and along the banks of the stream and pond habitat. The raccoon and opossum are

omnivorous feeders that may consume a wide variety of items (e.g., amphibians, invertebrates) found within the aquatic habitats provided by the Hudson Branch.

A macroinvertebrate habitat assessment and survey was conducted at various locations of the Hudson Branch using a methodology developed for low-gradient, non-tidal streams (MACS, 1993). The macroinvertebrate sampling method involved sweeping a D-net along productive habitats (i.e., aquatic vegetation, submerged logs) located within the Hudson Branch. This method provides a qualitative insight into the macroinvertebrate cominunity present within the Hudson Branch, as well as a qualitative evaluation of the aquatic habitat's ability to provide macroinvertebrate habitat (see Section 3.5.1.1, Aquatic Habitats, for results of the habitat assessment). Results of the macroinvertebrate survey are summarized in Appendix G (Table G-3). In general, macroinvertebrates present within the unnamed pond were comprised primarily of midges (*Chironomidae*), dragonflies/damselflies (*Odonates*), and mayflies (*Ephemeropterans*). Dominant macroinvertebrates noted within the samples collected from the stream portions of the Hudson Branch were similar, with the addition of mollusks.

3.5.2.2 Terrestrial Upland/Wetiand Receptor Species

A diverse assemblage of amphibians and reptiles may potentially inhabit the upland and wetiand habitats present on the SMC facility site (see Table G-2). Several amphibian species, such as the spring peeper (*Pseudacris crucifer*) and redback salamander (*Plethodon cinereus*), may use the wetiand and upland forest cover types while Fowler's toad (*Bufo woodhousei*) may utilize both the forested and grass habitats available on the SMC property. A variety of snakes are likely to use the wetiand and upland cover types found on the site. Snake species are generally camivorous and are found both within wetland and upland habitats where prey (i.e., small mammals) are present.

A diverse avian community consisting primarily of ground gleaners may use the grass habitats for feeding on seeds and invertebrates. These species include granivores such as the mouming dove (*Zenaida macroura*) and insectivores such as the killdeer (*Charadrius vociferous*) and northem flicker (*Colaptes auratus*). Omnivorous birds such as the American

robin (*Turdus migratorius*) are also expected to use the grass cover type, feeding on macroinvertebrates (i.e., earthworms, insects) as well as seeds. A greater diversity of bird species may inhabit the forested cover types present at the SMC facility, due to the greater vertical structural diversity provided by the overstory and understory vegetation. Insectivores such as the tufted titmouse (*Parus bicolor*) and downy woodpecker (*Picoides pubescens*) may use the forested habitats, while various flycatchers, thrushes and warblers may also use the forested areas for nesting and/or foraging. Raptors such as various hawks and owls may also forage on small birds and mammals present in both grass and forested cover types.

Mammalian herbivores such as white-tailed deer (*Odocoileus virginianus*) and eastern cottontail (*Sylvilagus floridanus*) may forage within the forested and/or grass cover types present on the SMC property. Small mammal species including moles, mice, shrews, and voles are likely to inhabit either the grass or forested habitats. Mammalian predators, such as the red fox (*Vulpes vulpes*), may also forage for small mammals within both of these cover types.

3.5.2.3 Rare and Endangered Species

The New Jersey Natural Heritage Program was contacted regarding the potential presence of endangered, threatened, or rare species on or near the SMC facility. Based on the request, the Natural Heritage Database and the Landscape Project were searched for occurrences of any rare wildlife specifies, plant species, wildlife habitat or natural communities on the referenced site. The search identified the eastern box turtle, *Terrapene carolina*, a State species of special concern at the site. The search also encompassed areas within 0.4 kilometers (0.25 miles) of the site. No records of any additional rare wildlife species, wildlife habitat, rare plants or natural communities were identified within 0.4 kilometers of the site. The written response from the Natural Heritage Program, including lists of rare species and natural communities in Gloucester and Cumberland Counties, is provided in Appendix G.

The U.S. Fish and Wildlife Service was also contacted regarding the potential presence of endangered or threatened species on or near the SMC facihty. Their response letter is provided in Appendix G. Except for an occasional transient bald eagle (*Haliaeetus leucocephalus*), no other federally-listed or proposed endangered or threatened fauna under U.S. Fish and Wildlife Service jurisdiction are known to occur within the vicinity of the SMC facility.

A survey for selected endangered and threatened plant species was performed by Amy S. Greene Environmental Consultants, Inc. in June 1994 (Amy S. Greene, Inc., 1994); the resultant letter reported is included herein in Appendix G. A meander survey was conducted over the SMC Newfield facihty and within the wetlands located adjacent to the Hudson Branch (extending approximately 396 meters (0.25 miles) downstream of Weymouth Road). The survey focused on a determination of the presence/absence of Barratt's sedge (*Carex barrattii*), pink tickseed (*Coreopsis rosea*), Pine Barren boneset (*Eupatorium resinosum*), and swamp pink (*Helonias bullata*) (see figure in Appendix G). During the survey, special attention was given to locations with suitable habitat for these species. While no specimens of Barratt's sedge, pink tickseed, Pine Barren boneset, and swamp pink were identified during the survey, the thermal pond area (located southwest of the USNRC controlled area, as indicated in Figure 1-3, and referred to as the on-site wastewater detention basin area in Greene's study) contained emergent wetland species and ponding, and was identified as a potentially suitable habitat for pink tickseed.

3.5.3 Ecological Risk

As mentioned previously, an ERA was performed to evaluate potential risks to ecological receptors based on non-radiological chemicals of concem (COCs) detected during remedial investigation/feasibihty study activities at the SMC facility. The objective of the ERA was to evaluate potential effects of COCs on ecological receptors present at the facility or on the adjacent and downgradient Hudson Branch stream/wetland habitat. The ERA characterized the presence and distribution of COCs in media of ecological concem, and evaluated potential impacts on identified receptors (as described in Section 3.5.2).

Risks to ecological receptors were assessed by several predictive modeling, laboratory, and field studies including:

- comparison of surface water COC concentrations with applicable criteria or effect levels;
- comparison of sediment COC concentrations with applicable sediment quality criteria/guidelines;
- sediment toxicity testing in the laboratory with two selected macroinvertebrate species;
- an *in-situ* macroinvertebrate community bioassessment;
- comparison of surface soil COC concentrations with apphcable phytotoxicity benchmarks;
- a threatened and endangered plant survey and a stressed vegetation survey; and
- comparison of modeled exposure doses for five selected wildlife indicator species (representing several different food chain pathways) to toxicological benchmark doses.

Surface water chemical analyses identified the presence of seven inorganic compounds at concentrations above respective acute and/or chronic criteria that were applicable at the time the ERA was conducted. Two of these seven inorganic compounds were also detected above criteria in reference surface water samples collected in 1995. A comparison of 1990 and 1995 surface water data illustrated a reduction in the number of COCs that exceeded the acute and/or chronic criteria or effects levels, from 12 in 1990 to 7 in 1995. Also, inorganic concentrations were generally less in 1995 than 1990, giving an overall indication of improved water quality. The surface water exceedances of criteria were qualified, as these concentrations represent total

recoverable metal concentrations and not dissolved concentrations, which more accurately represent the bioavailable component to ecological receptors.

Sediment chemistry and laboratory toxicity testing results indicated that portions of the Hudson Branch stream sediments may cause mortality to sensitive macroinvertebrate species. However, the results of the macroinvertebrate community bioassessment indicated that the on-site ponded portion of the Hudson Branch contains a similar macroinvertebrate community when compared to a reference macroinvertebrate community. Habitat quality differences appear to account for observed differences in macroinvertebrate communities collected from a reference stream and from stream habitats of the Hudson Branch, although the upper portion of the Hudson Branch (upgradient of West Boulevard) and an isolated area downgradient of Weymouth Road may be affected by either habitat differences or inorganic contamination. However, the presence of macroinvertebrates generally considered to be intolerant of elevated levels of inorganic compounds at each of these two locations indicates that sediment characteristics are binding the inorganic compounds to the sediment, resulting in low bioavailability.

Fifteen inorganic compounds were detected in surface soil samples at concentrations exceeding their respective phytotoxic benchmarks. However, the threatened/endangered plant survey did not identify any federal- or state-listed rare species on the SMC facility or within downgradient areas adjacent to the Hudson Branch. In addition, stressed vegetation was not observed within the Hudson Branch and associated wetlands, or within the ecological areas of interest present on the SMC facility.

Food chain analyses (aquatic and terrestrial) were conducted based on modeling and did not reflect actual field data. This approach was strictly an exercise used to evaluate potential ecological impacts at or near the SMC facility. Aluminum, chromium, cobalt, selenium, and vanadium mean concentrations in the Hudson Branch presented a potential for ecological impacts in the food chain analysis for fish-eating birds. The remaining constituents detected in the Hudson Branch are unlikely to present a risk to ecological receptors feeding within the Hudson Branch.

A potential for ecological impacts was predicted in the food chain analysis for several inorganic compounds that may impact avian and/or mammalian insectivores within the forested area located along the southem boundary of the SMC facility. A potential for ecological impacts was also predicted for avian and/or mammalian insectivores from aluminum, iron, titanium, and vanadium within the grassland area located in the southwestem comer of the SMC facility. Potential impacts to ecological receptors foraging within the grassland habitat located in the southeastem portion of the SMC facility were anticipated for aluminum and selenium. Impacts to upper trophic level species (e.g., hawks) foraging throughout terrestrial portions of fhe SMC facility were not anticipated.

Conclusions drawn from these results include:

- detected concentrations of inorganic constituents in surface water samples represent total recoverable metal concentrations and not dissolved concentrations, which are more closely associated with bioavailability;
- the on-site macroinvertebrate pond community is similar to the reference macroinvertebrate pond community;
- differences in Hudson Branch stream and reference stream macroinvertebrate communities appear to be primarily habitat-related;
- ecological impacts predicted from food chain exposures are unlikely due to data considerations including background concentrations of inorganic compounds; possible exceptions include the potential for mean aluminum, chromium, cobalt, selenium, and vanadium concentrations in aquatic media to impact the kingfisher; the potential for mean concentrations of aluminum, iron, titanium, and vanadium to impact avian and/or insectivorous mammals within Grassland Area #1; the potential for mean concentrations of aluminum and selenium to impact insectivores mammals and/or avian receptors within Grassland Area #2; and the potential for mean concentrations of aluminum, copper, iron, titanium, vanadium, and zinc to impact avian and/or mammalian insectivores within the Forested Area; and
- constituents of potential concem with respect to phytotoxic effects were identified, although field evidence suggests no impact on existing plants.

3.6 Meteorology, Climatology and Air Quality

To evaluate meteorology and climatology in the vicinity of the SMC facility, the Philadelphia Intemational Airport (approximately 40 kilometers (25 miles) north-northwest of the site) was chosen as a climatologically representative site; Philadelphia, hke the Newfield site,

is inland while other major airports in the region are coastal and show coastal influences (e.g. sea breezes) that do not frequently affect the Newfield area. The Philadelphia weather station is a National Weather Service "first order station" for which long-term climate data are routinely summarized; therefore, it was selected for the analyses of climate normals and extremes. In addition, regional climate data are available from the New Jersey State Climatologist's office at Rutgers University (http://climate.rutgers.edu/stateclim/) and hourly weather observations are available for the Millville Municipal Airport in Millville, NJ (approximately 19 kilometers (12 miles) south of the site) from the National Climatic Data Center (NCDC). Figure 3-15 is a topographic map showing the location of the SMC facility, the regional terrain and the meteorological (Met) and air quality (AQ) monitoring sites referenced in this section. Figure 1-1 shows the local terrain, which is quite flat, and therefore has no significant influence on air flows and other climate variables.

3.6.1 General Climate and Climate Normals, Means and Extremes

In the 2003 Local Climatological Data-Annual Summary with Comparative Data (LCD) for Philadelphia, the National Oceanic and Atmospheric Administration (NOAA) describes the chmate of the region as being moderate:

> *"The Appalachian Mountains to the west and the Atlantic Ocean to the east have a moderating effect on climate. Periods of very high or very low temperatures seldom last for more than three or four days. Temperatures below zero or above 100 degrees are a rarity. On occasion, the area becomes engulfed with maritime air during the summer months, and high humidity adds to the discomfort of seasonable warm temperatures.*
>
> *Precipitation is fairly evenly distributed throughout the year with maximum amounts during the late summer months.... Single storms of 10 inches or more occur about every five years."*

The chmate "normals" reported by NCDC are based on data from 1971-2000. The normal temperature reported is 12.9 degrees Celsius (55.3 degrees Fahrenheit). The normal annual precipitation is 106.8 centimeters (42.05 inches), with the normal amount of snowfall

being 49 centimeters (19.3 inches). The mid-day (1 PM) normal relative humidity (a measure of atmospheric water vapor content) is 55 percent.

The site is located in the prevaihng westerly wind belt and experiences transitory high and low pressure systems with associated fronts. The LCD describes the local air flow pattems as:

> *"The prevailing wind direction for the summer months is from the southwest, while northwesterly winds prevail during the winter. The annual prevailing direction is from the west-southwest. Destructive velocities are comparatively rare and occur mostly in gustiness during summer thunderstorms. High winds occurring in the winter months, as a rule, come with the advance of cold air after the passage of a deep low pressure system. Only rarely have hurricanes in the vicinity caused widespread damage, primarily because of flooding."*

During the summer, southem New Jersey is frequently under the influence of moist, maritime air masses as winds arrive from the south: During the winter, with more westerly winds, the area is frequently under the influence of continental air masses.

NOAA reports the mean annual wind speed is 15.4 kilometers per hour (9.6 miles per hour) and the prevailing wind direction is 230 degrees (southwest). Tight pressure gradients either from deep low pressure systems or from hurricanes can result in high winds during either the winter or summer seasons. The maximum 2-minute wind speed of 82 km/hour (51 mi/hour) at 300 degrees (west-northwest) occurred in June 1998. The maximum 5-second wind speed of 114 km/hour (71 miles/hour) also occurred in June 1998, from the west-northwest. Figures 3-16 and 3-17 present the annual and monthly windroses for the Millville Municipal Airport for the period 2000 to 2004. Annually, winds from west-southwest to northwest predominate, with northwest winds more frequent in the winter months and southwest winds predominant in the summer months. Table 3-5 presents monthly and annual normals covering the 30 year period of record (POR) from 1971 to 2000. Table 3-5 also presents means and extremes (covering various PORs, as noted in the table) for temperature, humidity, wind vectors and precipitation.

3.6.2 Severe Weather Phenomena

Newfield lies in Gloucester County, near the borders of Cumberland, Salem and Atlantic Counties; therefore, NCDC Storm Data (http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms) for the available POR (1950-2004) were analyzed for these counties. A total of 175 thunderstorm or lightning events were reported, as well as 31 reports of tomadoes or funnel clouds, for a frequency of somewhat more than one per year in the surrounding counties. Thunderstorm and tomado/funnel cloud events occur primarily from spring through summer seasons. Hail greater than ½ inch diameter was reported 45 times during the POR, or about twice per year in the surrounding counties. Waterspouts in the area are rare. Since 1874, there have been 30 hurricanes that have passed within 60 miles of Cape May, NJ, yielding a return frequency of once every 4½ years (http://www.hurricanecity.com/city/capemay.htm). Hurricanes can occur from summer through autumn.

Table 3-6 presents the duration and intensity of precipitation events expected in the Newfield area as reported by the National Weather Service Hydrometeorological Design Center (http://hdsc.nws.noaa.gov/hdsc/pfds/). As an example, this table shows that 3.13 inches of precipitation could be expected in a 60-minute duration event each 100 years.

The area is well ventilated and persistent (longer than 5 days) severe atmospheric stagnation events are very rare (Holzworth, G.C., Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States, Office of Air Programs, USEPA, RTP, NC, 1972). Holzworth indicates that only 2 to 4 days per year in southern New Jersey have "high meteorological potential for air pollution" (for comparison, portions of California have more than 12 days per year with high meteorological potential for air pollution). The table below summarizes Holzworth's annual and seasonal mean mixing height analysis. Note that the mixing heights tend to be large, which contributes to the good ventilation the area enjoys.

Mixing Height Summary for Southern New Jersey
(Mixing Heights in Meters)

	Spring	Summer	Autumn	Winter	Annual
Mean Morning	750	650	750	850	750
Mean Afternoon	1600	1700	1200	1000	1300

3.6.3 Air Quality

The National Ambient Air Quality Standards (NAAQS) set regulatory limits for the concentrations of air pollutants acceptable in ambient air. NAAQS have been promulgated for carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, particulate matter less than 10 micrometers diameter (PM_{10}), particulate matter less than 2.5 micrometers diameter ($PM_{2.5}$) and lead. Gloucester, Cumberland, Salem and Atlantic Counties are NAAQS nonattainment areas for ozone, and Gloucester County is also designed as nonattainment for particulate matter less than $PM_{2.5}$; however the area is in attainment for all other NAAQS. The nearest Prevention of Significant Deterioration (PSD) Class I area is the Brigantine National Wildlife Refuge, located approximately 50 kilometers (31 miles) to the east of the SMC facility. The rest of the state is considered a PSD Class II area.

Table 3-7 presents the background air quality observations at the nearest monitoring stations to Newfield that record each pollutant's concentration, together with the approximate distance and direction to the monitoring station from the SMC facility, the period of record on which the observations were based (generally the latest three-years reporting complete data), the concentration averaging period and the NAAQS. Note that ozone concentrations exceed the NAAQS; however, concentrations for all other pollutants are less than NAAQS for these sites and time periods. The emission inventory of other air pollution sources in the area is discussed in Section 4.6.

3.7 Noise

This section describes existing noise conditions and noise standards in the vicinity of the SMC facility. Noise is defined as unwanted sound resulting from vibrations in the air. Excessive noise can cause annoyance and adverse health effects. Annoyance can include sleep disturbance and speech interference. It can also distract attention and make activities more difficuh to perform (USEPA, 1978).

The range of pressures that cause the vibrations that create noise is large. Noise is therefore measured on a logarithmic scale, expressed in decibels (dB). The frequency of a sound is the "pitch" (high or low). The unit for frequency is hertz (Hz). Most sounds are composed of a composite of frequencies. The normal human ear can usually distinguish frequencies from 20 Hz (low frequency) to about 20,000 Hz (high frequency), although people are most sensitive to frequencies between 500 and 4,000 Hz. The individual frequency bands can be combined into one overall dB level.

Noise is typically measured on the A-weighted scale (dBA). The A-weighted scale was developed and has been shown to provide a good correlation with the human response to sound and is the most widely used descriptor for community noise assessments (Harris, 1991). The faintest sound that can be heard by a young, healthy ear is about 0 dBA, while an uncomfortably loud sound is about 120 dBA. Provided below are some common sound levels in order to provide a frame of reference.

- Pile Driver at 100 feet — 90 to 100 dBA
- Chainsaw at 30 feet — 90 dBA
- Truck at 100 feet — 85 dBA
- Noisy Urban Environment — 75 dBA
- Average Speech — 60 dBA
- Lawn Mower at 100 feet — 65 dBA
- Typical Suburban Daytime — 50 dBA
- Quiet Office — 40 dBA
- Quiet Suburban nighttime — 35 dBA
- Soft Whisper at 15 feet — 30 dBA

Common terms used in this noise analysis are defined below.

L_{eq}— The equivalent noise level over a specified period of time (i.e., 1-hour). It is a single value of sound that includes all of the varying sound energy in a given duration.

Statistical Sound Levels—The A-weighted sound level exceeded a certain percentage of the time. The L_{90} is the sound level exceeded 90 percent of the time and is often considered the background or residual noise level. The L_{10} is the sound level exceeded 10 percent of the time and is a measurement of intrusive sounds, such as aircraft overflights.

3.7.1 Applicable Noise Standards

The Borough of Newfield has a noise ordinance under Section 131-1 of the zoning code. The ordinance is a "nuisance" type ordinance that basically prohibits loud and unnecessary noises. There are no numerical limits on any noise sources, nor are there any restrictions in the ordinance limiting hours of construction. There is a requirement, however, that any exhausts must discharge into a muffler to prevent loud noises.

The State of New Jersey Noise Control Code (N.J.A.C. 7:29-1) limits noise generated by any industrial facility, when measured at the property line of any residence, to the following levels:

Between the hours of 7:00 A.M. and 10:00 P.M.

- Continuous airbome sound level may not exceed 65 dBA.

Between the hours of 10:00 P.M. and 7:00 A.M.

- Continuous airbome sound level may not exceed 50 dBA.

The standard is applicable to continuous noise sources (e.g., fans, stacks) and does not address construction activities, such as those associated with the implementation of the proposed action and altematives.

3.7.2 Characterization of Existing Noise

The land uses bordering the site consist of a combination of residential, commercial and industrial and agricultural uses. The areas to the north and south are mainly residential with some schools and churches. A mix of commercial/industrial and residential uses are located to the east and west of the site. The topography in the area is essentially flat, with no intervening terrain between the SMC facility and the noise analysis locations.

An ambient noise monitoring program was conducted on February 1, 2005 in the vicinity of the SMC facility for the purposes of quantifying existing ambient noise levels, identifying the sources of noise that contribute to the noise environment, and for identifying and cataloguing noise-sensitive land uses, defined as including but not limited to residences, churches, schools and libraries. Provided below is a list of identified noise-sensitive uses and their locations, not including residences, which were identified in the study area:

- Edgarton School - Catawba Avenue and Madison Avenue
- Newfield Public Library – Catawba Avenue
- Saint Rose of Lima Church – Catawba Avenue
- First Baptist Church – Catawba Avenue
- Grace Orthodox Church – Weymouth Road near Northwest Boulevard

Noise monitoring was conducted during the daytime hours. A RION NA-27 precision integrating sound level meter and octave band analyzer with an integral data logger was utilized for this program. The meter meets ANSI S1.4-1983 requirements for precision Type 1 sound level meters. The nieter was calibrated before and after the survey period using a Bruel & Kjaer Model 4231 sound level calibrator. The microphone was fitted with a windscreen to reduce wind-generated noise and mounted on a tripod at a height of approximately 1.5 meters (5 feet) above ground level. The meter was programmed to measure the existing sound levels for a continuous period of approximately 15 minutes at each location. The statistical parameters of L_{eq}, L_{90} and L_{10} were calculated by the meter.

In addition to noise level measurements, the contributing noise sources were identified and recorded, along with the prevailing meteorological conditions. Wind speed and direction

were obtained via a Dwyer hand-held wind meter and a compass and/or by examining a topographic map of the area, respectively. Sky conditions were observed and recorded at each location.

The noise analysis was conducted within an approximate 610-meter (2,000-foot) radius of the SMC facility. Noise levels were measured at six noise-sensitive locations. These locations, along with their approximate distance from the center of the SMC facility where construction will take place are presented below and are depicted on Figure 3-18.

1 – Edgarton School – North, 2,300 feet
2 – 333 Catawba Avenue – North, 2,100 feet
3 – 18 Gorgo Lane – Northeast, 1,300 feet
4 – Weymouth Road/Prospect Avenue – South, 1,100 feet
5 – Grace Orthodox Church – Southwest, 1,500 feet
6 – Madison Avenue – North, 1,600 feet

3.7.3 Noise Monitoring Results

During the monitoring period, meteorological conditions consisted of sunny skies, with light northerly winds of less than 8 kilometers (5 miles) per hour and temperatures ranging from about 1.7° C to 4.4° C (35° F to 40° F). The existing noise environment is affected by vehicular traffic (cars and trucks), natural sounds (birds and barking dogs) and some aircraft overflights. In general, the area is fairly quiet in the absence of the aforementioned intrusive sounds. Sources at the SMC facility are faintly audible at times at some locations. The locations along Weymouth Road are most affected by vehicular traffic noise. There are no significant line (e.g., highway) or stationary sources that affected the noise environment during the noise monitoring program. West Boulevard is the most significant roadway as pertains to vehicular traffic noise. A rail line is also present adjacent to West Boulevard, although no train traffic was noted during the monitoring program.

A summary of the measured ambient noise levels from the monitoring program is presented in the table below.

MEASURED AMBIENT NOISE LEVELS

Receptor	L_{max}	L_{eq}	L_{90}
Edgarton School	60	46	38
333 Catawba Avenue	72	56	36
18 Gorgo Lane	71	52	35
Weymouth/Prospect	74	59	37
Grace Church	80	58	44
Madison Avenue	67	47	32

A review of the data above reveals that existing L_{90} levels are lower than L_{eq} levels, indicative of a relatively quiet noise environment in the absence of intmsive vehicular traffic noise. The highest residual (L_{90}) level was measured at the Grace Church location, due to a more continuous flow of traffic on West Boulevard and Weymouth Road. The ambient sound levels presented herein are likely the lowest that occur during the year, due to the winter time conditions with no insect noise and minimal outdoor activity.

3.8 Historic and Cultural Resources

As part of other environmental studies conducted at the SMC facility, a Phase la (reconnaissance-level) cultural resource investigation of the facility was conducted by the Cultural Resource Consulting Group (CRCG) in 1993 (CRCG, 1994). The resultant report provides information on the area's cultural setting.

The SMC facility is located in an area historically used for farming. Industries began mostiy as mills but, following the Revolutionary War, several glassworks were estabhshed in the area. The Glassboro and Millville Railroad opened in 1860 and encouraged the settiement of Vineland and other areas along the railroad corridor, including Newfield. Newfield grew at a relatively slow rate, with several small industries present in the late 19th century.

Information on other historically or archaeologieally significant properties in the vicinity of the SMC facility was investigated. Cumberland County maintains a Register of Historic Stractures and Sites for Vineland on its web page (Cumberland County, 2005b). Of the properties listed there, the closest property to the SMC facility is the New Jersey Memorial

Home, located at 524 North West Boulevard, approximately 5.6 kilometers (3.5 miles) south of the SMC facility. This property is also the only property in Vineland or Newfield listed in the Library of Congress' Historic American Buildings Survey and Historic American Engineering Record Collection (American Memory Collection) (Library of Congress, 2005). An online search of the National Historic Landmarks program database (National Park Service, 2005a) identified no such properties in Newfield or Vineland. A search of the National Register Information System for the National Register of Historic Places (National Park Service, 2005b) identified properties in Gloucester and Cumberland Counties, with none in Newfield and two in Vineland (both located on Landis Avenue, over 6.4 kilometers (4 miles) from the SMC facility). The New Jersey Historic Preservation Office website (NJDEP, 2005b) includes a list of New Jersey and National Registers of Historic Places by county and by city/township/borough within each county. There are no sites listed for Newfield Borough in Gloucester County. A number of sites are listed for Vineland, but many of those are listed only with an identification number; no address is provided. For those listings where an address is provided, the closest property to the SMC facihty is the New Jersey Memorial Home, referenced above. Based on the information gathered during this investigation, no cultural resources were identified within the immediate vicinity of the SMC facility.

With respect to the SMC facility itself, the Phase la survey covered the entire SMC manufacturing facility, as well as the undeveloped farmland property to the southwest of the main facility. The study was designed to investigate the potential for either Euro-American or Native American cultural resources in the area of potential effect. The project area was viewed as potentially sensitive because of its associations with fresh water and moderately well-drained soils. Field procedures were limited to surface reconnaissance. Background research was conducted at local repositories, including The Alexander Library of Rutgers University (Department of Special Collections and Archives), the Historic Preservation Office of the New Jersey Department of Environmental Protection (NJDEP) and the Archaeology/Ethnology Bureau of the New Jersey State Museum.

Based on documentary research, no previously documented prehistoric sites were identified in the study area or immediate vicinity. With respect to the historic period, the primary use of the main facility was farming, until the site became a glassworks operation in the early- to mid-20th century. The facility was determined to have a low to moderate potential for archaeological resources, due to the intensive development of most of the tract. Only one location, referred to as the "Pansy Field" (see Figure 1-3 for location), was identified as being relatively undisturbed and therefore suitable for archaeological testing. The survey also noted the glass stack that remains at the facility (see Figure 1-2), a remnant of the historic glassworks operations at the site, should be preserved if possible. The survey also recommended the performance of a Phase Ib survey of the Hudson Branch if ground-disturbing activity would occur along it.

The Phase la survey was reviewed by the NJDEP Historic Preservation Office under Section 106 of the National Historic Preservation Act. Due to the potential need for environmental remediation of chromium-impacted soils beneath the glass stack, a Phase II Cultural Resource Study was subsequently conducted by CRCG (CRCG, 1995), focusing on the glass stack feature. The Phase II study evaluated the stmcmre in terms of National Register eligibility and assessed the effects of proposed environmental remediation activities on this resource.

The Phase II cultural resource investigations provided additional information on the historic use of the SMC facility site as a glassmaking facility. This site was used by various glasswork companies over time, including the Specialty Glass Corporation. These historic operations utilized several structures, one of which was a stack located at the fumace that stood roughly 61 feet tall. In 1945, a devastating fire destroyed the main buildings and the business appears to have closed until SMC purchased the facility in 1952. The Specialty Glass Corporation's stack and a second structure that may have been Specialty Glass' office were incorporated into SMC's facility. The glass stack was reused by SMC for metal smelting operations, with only minor modifications made to the structure.

The 1995 CRCG report determined that the glass stack is a potentially eligible structure for the National Register, based on the following: its association with the historic production of glass in New Jersey and the fact that it may be the last surviving tum-of-the-century glass stack in southem New Jersey; its association with Victor Durand, an innovative glass manufacturer in the early 20th century; and its preservation as an example of a particular type of specialized industrial structure. The soils beneath the glass stack were identified as a potential source of chromium ground water contamination, however, raising the possibility that the stack could require demolition to achieve environmental remediation goals.

The NJDEP State Historic Preservation Office documented their initial comments on the 1995 CRCG report in a memo (see Appendix H). In the memo, the Deputy State Historic Preservation Officer (SHPO) agrees with the conclusion that the glass stack is eligible for the National Register and agrees that, while demolition of the structure would have an adverse effect, the deteriorating condition of the stack, the high cost of stabilization and the environmental problems associated with the glass stack area result in no feasible altemative to demolition. The memo requires that the Advisory Council on Historic Preservation be notified of the adverse effect and sent required documentation. A draft Memorandum of Agreement (MOA) was also provided, which would require documentation of the stack to HABS/HAER Standards, which would be determined by the National Park Service. Subsequent to the receipt of this memo, USEPA's cultural resource representative verbally questioned the need for stack demolition based on environmental concems. The USEPA subsequently issued comments on the Feasibility Study for the site (TRC, 1996a) that required additional samples be collected from beneath the stack to show that a remedial action was necessary. The level of HABS/HAER documentation would not be determined until the need for remediation was demonstrated. This USEPA comment was documented in NJDEP's written comments on the FS dated July 24, 1996 (see Appendix H). As of the date of this Environmental Report, no subsequent action has been taken with respect to the characterization of the soils beneath the glass stack; this issue will ultimately be resolved under the facihty's CERCLA program.

3.9 Visual/Scenic Resources

An assessment of existing visual/scenic resources was conducted for the SMC facility in early 2005. Potential viewpoints were identified and viewshed analyses were conducted for representative viewpoints within a L6-kilometer (1-niile) radius from the project site, as described in more detail below.

3.9.1 Character and Visual Quality of the Existing Landscape

As described previously, the SMC facility is located in the Borough of Newfield, Gloucester County, with a small portion of the facility located in the City of Vineland, Cumberland County (see Figure 1-1). The surrounding regional landscape character can generally be described as a niixed suburban and agricultural/rural environment. Some of the surrounding area remains wooded and undeveloped or in agricultural use, with pockets of new development broadening into commercial and residential uses. Further descriptions of local land use are presented in Section 3.1.

As indicated in Figure 1-1, the general elevation of the SMC facility is approximately 30 meters (100 feet) above mean sea level (MSL) (NGVD 1929), and topography in the surrounding study area ranges from approximately 24 to 42 meters (80 to 140 feet) above MSL, with lower topography generally to the southwest. The minimal topographic relief, combined with the widespread presence of roadside vegetation, generally does not afford long distance vistas at most locations. Visual characteristics of the region are also influenced by man-made features and development, including highway development, water towers, and overhead electric transmission lines.

3.9.2 Viewshed Map/Analysis

In order to assess the potential visual impacts associated with existing conditions, a viewshed analysis was conducted for the study area. Computerized methods were used to identify areas from which the existing Storage Yard might be visible. This was done by creating a digital elevation model of the area using site topographic data and information available from

the State of New Jersey. Vegetation coverage of the area was processed as an impediment layer, with forested areas assigned a conservative height (10.7 meters or 35 feet) based on field observations. The resultant digital elevation model accounts for both terrain and vegetation and indicates the areas from which an existing feature (e.g., the Storage Yard slag pile) is projected to be visible under existing conditions. A viewshed map for existing Storage Yard conditions (Figure 3-19) projects the potential visibility of the Storage Yard from a 1.6-kilometer (1-mile) radius area onto an aerial photo of the area. Additional information on the methodology used to create this map is provided in Appendix I.

3.9.3 Visual Resource Analysis

The visual resource analysis included the evaluation of potential visual resources within 1.6 kilometers (1 mile) of the Storage Yard, including scenic easements, public parks and recreation areas, scenic overlooks, sensitive community resources and open space areas. In the absence of such scenic and recreational resources within this radius, other potentially sensitive local community locations were considered, including educational facilities, churches, major intersections, commercial centers, and residential areas. Candidate areas identified in this analysis included the following:

- Residential area/new housing development along Strawberry Avenue
- Roadway views along West Boulevard, providing potential southeastern and northeastern views toward the Storage Yard
- Residential area along Arbor Avenue
- Residential area along Weymouth Road
- Residential area south of Catawba Avenue
- Edgarton School on Catawba Avenue
- Residential area along Rosemont Avenue
- Residential area along Woodlawn Avenue
- Undeveloped area along Gorgo Lane, south of Newfield water tower
- Grace Orthodox Church, East Weymouth Road
- Columbia Avenue, near County Bridge
- Christ Community Church, Salem Avenue
- Notre Dame School, Church Street

- Commercial development along West Boulevard
- Residential area along Sandy Drive and West Boulevard.

3.9.4 Section of Viewpoints for Further Analysis

A field visit was conducted bn March 14, 2005 to assist in the determination of potential project visibility for the identified visual resources. The lack of vegetation (i.e., leaf-off conditions) at the time of the visit provided for a worst-case analysis.

Specific locations were selected for further evaluation based on the Viewshed Map and the field observations, with priority given to locations in the existing viewshed of the Storage Yard (as well as locations in the potential viewshed of the proposed action, as discussed further in Section 4.9). Locations selected for further consideration within a 1.6-kilometer (1-mile) radius of the Storage Yard are listed in Table 3-8 and indicated on Figure 3-20. Locations on the SMC facility itself were included in the scope of the analysis. Locations with anticipated potential views of the existing Storage Yard based on the Viewshed Map included these on-site locations, as well as off-site locations #19 and #21 (refer to Table 3-8 for location descriptions). Specific locations within residential areas surrounding the SMC facility were selected for further analysis based on their potential visibility of the Storage Yard, and are therefore considered to be representative of worst-case conditions for all residential areas surrounding the facility. At each viewshed location, photographs were taken to document existing conditions, as well as for potential use in the analysis of alternatives in Section 4. A detailed photo log and the associated photographs are provided in Appendix I.

3.9.5 Description of Existing Views

For each of the viewpoint locations analyzed by field observations, the visibility of the existing Storage Yard is indicated in Table 3-8. As presented there, the Storage Yard was visible only from viewpoint locations within the SMC property boundaries. The Storage Yard was not visible from the areas immediately surrounding the SMC site, including residential areas. Views from locations along West Boulevard, which borders the site to the west, were generally limited to the westemmost buildings in the SMC manufacturing area, the parking lot, the administrative

building and the SMC water tower. Views of the SMC facility from locations along Weymouth Road, which runs east-west less than 1000 feet to the south, were generally blocked by the dense vegetation that grows along the Hudson Branch.

For other more distant viewpoints, the physical features of the landscape also limit the visibility of the Storage Yard. These features include the mature (9- to 12-meter or 30 to 40-foot tall) vegetation along the perimeter of the SMC facility and along the edges of most surrounding roadways, the lack of significant variation in the topography, and the effects of increasing distance from the site. At the two viewpoint locations (locations 19 and 21) which were identified based on the viewshed mapping as having views that could potentially be impacted by the Storage Yard at the SMC facility, no visibihty was observed in the field. The lack of visibility of the Storage Yard from residential viewpoints listed in Table 3-8 was also confirmed by the field observations. Views from Gorgo Lane (viewpoint location 18), located approximately 0.4 kilometers (1,300 feet) to the east-northeast of the Storage Yard, are representative of roadway views to the east which, as indicated by the Viewshed Map, are not subject to project visibility. Additionally the two educational facilities, Edgarton School and Notre Dame School (viewpoint locations 14, 15 and 22), and two church locations, Grace Orthodox Church and Christ Community Church (viewpoint locations 19 and 21), do not have views of the Storage Yard.

Those locations within the SMC facility where visibility of the Storage Yard was confirmed during the March 14th visit are depicted in photographs 1, 2, 4, and 5 (see Figures 3-21 and 3-22). Photos of viewpoints without existing visibility of the Storage Yard are presented in Appendix I.

3.10 Socioeconomic Considerations

Socioeconomic analyses include evaluations of population, racial makeup, employment and poverty in the area surrounding the SMC facility. These analyses are described below. Other features considered in the socioeconomic analysis include the availability of education,

housing and medical services, tax structure, and other general means of measuring socioeconomic conditions that are used in the area.

3.10.1 Population

As described previously in Section 1.3.1, the SMC manufacturing facility encompasses 67.7 acres (i.e., 0.11 square miles) in the Borough of Newfield in Gloucester County, with a small portion of the facility area located in the City of Vineland in Cumberland County (see Figure 1-1). Based on the facility's location within a city/borough area and based on the size of the facility, a radius of approximately 0.6 miles (1 square mile) was considered in the evaluation of demographic data, per NUREG 1748 environmental justice evaluation guidelines. Demographic data were obtained for the census block groups within this 0.6-mile (0.965-kilometer) radius of the facility, as well as for Newfield Borough, the City of Vineland, Cumberland and Gloucester Counties, and the State of New Jersey.

U.S. Census demographic data for the 2000 census are available for the census tracts and census block groups covering and surrounding the SMC facility location. The locations of the census tracts and associated block groups located within a 0.6-mile radius of the facility are indicated in Figure 3-23 and the population data are summarized in Table 3-9. The actual census data sheets are included in Appendix J. The targeted census tracts and block groups include the following:

Gloucester County
Census Tract 5017.03, Block Group 1
Census Tract 5018, Block Groups 1 and 2

Cumberland County
Census Tract 409.02, Block Groups 1 and 2

The total population within the block groups identified above is 5,425. In comparison, the population of Newfield Borough is 1,616 and the population of the City of Vineland is 56,271.

To support analyses conducted within the Decommissioning Plan, additional population data for the area within one square-mile (0.6-mile radius) of the site was gathered on the basis of census blocks, the smallest area by which census data is collected. The total population numbers for all blocks even partially included in the 0.6-mile radius were collected and then sorted by compass direction into four quadrants, as follows:

- The northern quadrant (extending from NE to NW);
- The western quadrant (extending from NW to SW);
- The southern quadrant (extending from SW to SE); and
- The eastern quadrant (extending from SE to NE).

The four quadrants are indicated graphically in Figure 3-23. For those blocks that occupy more than one quadrant, the USGS map (Figure 1-1) was referenced to determine which quadrant contained the greatest number of residences for that block. The population data for that block was then assigned to that quadrant. The block-based population data and assigned quadrants are presented in Table 3-10. As indicated there, the greatest population is located to the north (i.e., in the NE to NW quadrant) of the facility, in the direction of the Borough of Newfield. This quadrant has a population of 869, more than twice as great as any other quadrant. The remaining quadrants have population values ranging from 351 (southern quadrant) to 270 (eastern quadrant). The US Census data tables containing the individual block populations are presented in Appendix J.

In the Newfield and Vineland areas in general, population growth has been slow, growing by 1.5% for the Borough of Newfield and by 2.7% for the City of Vineland over the 1990 to 2000 period. In contrast, Gloucester and Cumberland Counties as a whole grew at faster rates of 10.7% and 6.1%, respectively, over the same period. Population projections for the area continue to be low, with only a 3.1% increase in population projected through 2025 for the Borough of Newfield (Gloucester County, 2005b). While Newfield is expected to grow at a slow rate, the State Division of Labor Market and Demographic Research projects a steady increase in the Gloucester County population of 40.3% for the 2000 through 2025 period, which exceeds the predicted State average of 21.8% for the same period (New Jersey Department of Labor, 2005). The City of Vineland estimates that population growth from 2000 to 2009 will be

approximately 7.6% (City of Vineland Department of Economic Development, 2005). At 9.7%, the projected population increase for Cumberland County for the 2000 to 2025 period is much slower than that estimated for Gloucester County for the same period (New Jersey Department of Labor, 2005).

As indicated in Table 3-9, for the census tracts within a 0.6-mile radius of the SMC facility, the majority of the residents (78%) are non-Hispanic white residents. This percentage is higher than the percentage of non-Hispanic white residents for Cumberland County and the State of New Jersey as a whole, but less than the percentage of non-Hispanic white residents for Gloucester County. The Hispanic population (of any race) in the census block groups located within a 0.6-mile radius of the facility is 9.7%, while the black or African American population (not Hispanic or Latino) is 10.2%. These percentages are less than the comparable Cumberland County and State of New Jersey percentages, but greater than the comparable percentages for Gloucester County. Asians, native Hawaiians or other Pacific Islanders and other races all comprise less than 1% of the population of the surrounding census block groups. The population that classifies itself as a mix of two or more races comprises 1.3% of the population of the surrounding census block groups. Detailed census data for the area are presented in Appendix J.

3.10.2 Employment

For Gloucester County, unemployment rates from 1996 to 2001 ranged from a high of 6.2% in 1996 to 3.2% in 2000 (Gloucester County, 2005c). Unemployment rates are typically higher in Cumberland County, ranging from near 10% in 1996 to a low of 7.1% in 2000. In 2002, Cumberland County had the second highest unemployment rate in the state. (New Jersey Department of Human Services, 2005).

3.10.3 Poverty

As indicated in Table 3-11, the percentages of low-income families in the census tract block groups in the immediate vicinity of the SMC facility are comparable to the percentages for Gloucester and Cumberland Counties and for the State of New Jersey. The percentages of low-

income families in the census tracts range from 2.6% to 12.2%. In general, Cumberland County is one of the most economically depressed counties in New Jersey. The county-wide percentage of families on welfare and public assistance is one of the highest in the state. On average, families in Vineland fare somewhat better than the county overall (ibid.).

3.10.4 General Socioeconomic Indicators

In 1991, 1993 and 1996, the State of New Jersey ranked municipalities based on the Municipal Distress Index (MDI). This factor was to be considered in determining priority in Statewide Policies for Public Investment Priorities as well as for municipal strategic revitalization planning. The MDI was developed as an index of socioeconomic distress, not of quality of life. The MDI rankings were based on factors such as population change, children on assistance, per capita income, unemployment rate, local tax rate, valuation per capita, percent of housing built before 1940 and percent of substandard housing.

Over the period from 1993 to 1996, Newfield fell in the distress rankings from 93.5 in 1993 to 108.5 in 1996 (a ".5" designation indicates a tie with another municipality for that ranking). Over the period from 1991 to 1996, however, Vineland rose in the distress rankings from 52 in 1991 to 41 in 1996. These results indicated that Newfield was moving toward less distress, while Vineland was moving toward more distress. Neither Newfield nor Vineland were defined as communities showing "big" movements toward more or less stress. [New Jersey State Office of Planning, 1997] The current New Jersey State Development and Redevelopment Plan builds upon the idea of minimizing distress in municipalities and incorporates additional factors to guide future development in the State of New Jersey.

3.10.5 Housing

Housing data for the census tracts surrounding the SMC facility is summarized in Table 3-12. As of the 2000 census, there were 56 vacant housing units in the census tracts immediately surrounding the SMC facility. The vacancy rates in these census tracts were comparable to or less than the vacancy rates for Cumberland and Gloucester counties and for the State of New

Jersey as a whole. The median house value in only one of the census tract block groups (Census Tract 5018, Block Group 1) was less than 90% of the county median value. In two of the census tract block groups, the median values exceeded the county median values. Rent values were generally comparable to or greater than the county median values. In general, Gloucester County and Cumberland County exhibit lower median values and lower median rents than in the State of New Jersey as a whole.

3.10.6 Schools

Schools in the general vicinity of the SMC facility include public schools that are part of the Buena Regional School District, the Franklin Township School District and the Vineland Public School system, as well as private schools. Four schools are located in Newfield, including the following:

- Edgarton Memorial Elementary School (Grades Kindergarten – 5), 212 Catawba and Madison Avenues (Buena Regional School District)
- Main Road School, (Grades 3 – 6), 1452 Main Road (Franklin Township School District)
- Notre Dame Regional School (Grades Kindergarten – 8), Church Street
- Our Lady of Mercy Academy (Grades 9 – 12), 1001 Main Road

These four schools combined have a total enrollment of 1,079 (NCES, 2005).

Students from Newfield attending public schools attend Buena Regional District schools: Buena Regional District is comprised of 6 schools, including one high school, one middle school and four elementary schools, with a total enrollment of 2,569 (ibid.). The Franklin Township school district includes 3 schools, all elementary schools, with a total enrollment of 1,421 (ibid.). The Vineland City school district is comprised of 20 schools, including 2 high schools, 4 middle schools, 11 elementary schools/kindergarten centers and 2 pre-schools, with a total emollment of 10,583 (Vineland Pubhc Schools, 2005).

3.10.7 Health Services

The closest emergency-care medical facility to the SMC facility is the South Jersey Healthcare Regional Medical Center located at 1505 W. Sherman Avenue in Vineland. The facility offers 262 beds and emergency care, as well as a full suite of medical inpatient and outpatient services. A total of 533 doctors and healthcare professionals are on the medial staff (South Jersey Healthcare, 2005).

3.10.8 Tax Structure

New Jersey depends heavily on property tax in funding the local tax burden. Property taxes are based on "true" value (or market value), with all real property assessed according to the same standard of value, except for qualified agricultural or horticultural land. Each county has a board of taxation that is responsible for assessing real property at some percentage of true value. New Jersey has an equalization program to ensure that each taxing district, as a whole, is treated equitably. County, municipal and school budget costs determine the amount of property tax to be paid. A town's general tax rate is calculated by dividing the total dollar amount it needs to raise to meet local budget expenses by the total assessed value of all its taxable property. The effective tax rate is a statistical study that enables the comparison of one district to another district (based on the assumption that all districts are at 100% valuation). The effective tax rate is not used to calculate the tax bill.

In 2003, the effective tax rate in Newfield Borough was 3.170, while the effective tax rate for Vineland City was 2.499. The Newfield Borough effective tax rate rose steadily from 2.177 in 1997 to 3.170 in 2003. The Vineland City effective tax rate varied over the same period, with a low value of 2.420 in 1998 and a high value of 2.514 in both 1997 and 2002. (New Jersey Department of the Treasury, 2005).

When the 2003 effective tax rates for Newfield Borough are compared to the effective tax rates of the other 23 municipalities in Gloucester County, 14 of the 23 have lower effective tax rates. When the 2003 effective tax rates for Vineland City are compared to the effective tax rates

of the 13 other municipalities in Cumberland County, only 3 of the 13 have lower effective tax rates. (ibid.)

3.11 Public and Occupational Health

Potential public and occupational health concerns associated with the SMC facility include concerns related to both chemical and radioactive contaminants.

3.11.1 Radiologic Issues

3.11.1.1 Background Conditions

Background radiation is attributed, primarily, to cosmic sources, naturally-occurring radioactive material, including radon (except as a decay product of source or special nuclear material). Background radiation does not include radiation from source, byproduct, or special nuclear materials regulated by the cognizant Federal or State agency.

Background radiation levels at the SMC facility have been defined through the performance of a number of different surveys at the facility. The results of these studies are described in more detail below.

Ambient background gamma exposure rates were performed as part of a number of different surveillance operations (e.g., final status surveys of A-Warehouse, G-Warehouse etc.), including compliance surveys that are performed and documented each quarter. In general, these range from 7 to 8 microrem per hour.

With respect to surface contamination, alpha backgrounds ranging from 0 to 2 counts per minute were obtained using hand-held instruments. Background alpha activities using large area floor monitors ranged from 8 to 13 counts per minute. Background beta results for the large area floor monitors ranged from 900 to 1,080 counts per minute.

With respect to background surface soil and subsurface soil contamination, surveys of ambient gamma exposure rates in background locations were performed as part of a number of different surveillance operations (e.g., final status surveys of Haul Road, ferrovanadium slag sorting area, etc.), including the cofnpliance surveys performed and documented each quarter.

The values recorded are instrument- and geometry-dependent; however they generally range from 8 to 15 microrem per hour in outdoor areas.

Background soil samples have been collected and analyzed by a variety of organizations and methodologies over the years. Table 3-13 is a compendium of background soil concentrations of uranium and thorium isotopes acquired during three measurement campaigns.

In surface water, background conditions were assessed in a study conducted in 1991 (IT, 1992), with the resultant report concluding that the concentrations of radium, uranium and thorium in the filtrate of site-specific surface water samples did not differ significantly from background, with gross alpha and gross beta concentrations less than 15 pCi/l and 50 pCi/l, respectively.

In April 2004, wells that were sampled and analyzed for radiologic parameters included a USGS observation well, OBS-2A, located approximately 1,400 feet northeast of the SMC northeast property line. Although it was reported in the USGS literature (USGS, 2002) that the water level in this observation well is affected by nearby pumping (possibly a nearby irrigation well), the water level during the April 2004 sampling event was approximately 7 feet higher than the water levels measured in SMC's upgradient monitoring wells. Also, active irrigation was observed in an adjacent field when the water level measurement was collected from OBS-2A. Therefore, the radiologic data for well OBS-2A can be considered background data to the SMC facility. Gross alpha and gross beta concentrations were both below 5 pCi/l and radium-226 and radium-228 concentrations were both below 2 pCi/l. These values are less than those recently reported by the City of Vineland Water Utility (City of Vineland Water Utility, 2002, 2004). For the years 2001 and 2003, alpha emitters were measured in the city's drinking water sources at levels ranging from 6.4 to 16 pCi/l.

3.11.1.2 Current Radiologic Sources and Exposure Levels

The remaining restricted area, the Storage Yard, at the SMC facility has been characterized through previous studies and monitoring. No contaminated systems or equipment will be addressed by the decommissioning activities.

Radionuclide concentrations in the Hudson's Branch sediments were summarized in a 1992 site characterization report (IT Corporation, 1992). The report concluded that the presence of uranium and thorium plus progeny in the sediment samples do not contribute significantly to the ambient background exposure rate in the area. A scale drawing and map showing the Hudson's Branch watershed, with ambient exposure rates, is included in Appendix B. Appendix B also includes a figure showing the location of soil samples and a summary of analytical results.

Radioactive materials are confirmed to be present in the Storage Yard. Slag materials, referred to as standard slag, high-ratio slag, and Canal® slag, consist of solid, non-combustible material with the consistency of vitrified rock. In addition, baghouse dust is stored in the Storage Yard. There are approximately 23 curies each of uranium and thorium in the form of slag and baghouse dust in the Storage Yard. The concentration of each in the slag is approximately 400 pCi/gram. In the baghouse dust, the concentrations are typically an order of magnitude lower.

The residual radioactivity in the slag and baghouse dust is not readily transportable in the environment. The physical form of the slag in the Storage Yard (glass-like rock) results in negligible leaching of the radioactive elements into the regional water supply or local wetlands. As described in Section 4.4.1 of the Decommissioning Plan, leachability and distribution coefficient studies performed on samples of the slag support this conclusion. Because the slag, baghouse dust contained within the Storage Yard have been placed directly upon the ground surface and the leach rate of radionuclides from these materials is negligible, subsurface activity beyond a nominal depth of 30 cm (1 foot) (attributable mainly to incidental surficial slag burial) is unlikely. The surface of the baghouse dust pile forms a "crust" when it encounters moisture, which serves to deter fugitive dust emissions. The radiation exposure rates in this area range from background to less than 0.2 milliR per hour, with the maximum measured ambient exposure rate being due north of the Storage Yard, approximately 30 feet from the slag piles.

The Storage Yard also contains less than 6,500 m^3 (8,500 cubic yards) of soil and slag excavated during a previous remedial action along the facility's haul road (see Section 1.4 for further discussion).

As noted in Section 3.11.1.1, a study conducted by IT (IT, 1992) concluded that the concentrations of radium, uranium and thorium in the filtrate of surface water samples collected at the site or in the adjacent Hudson Branch in 1991 did not differ significantiy from background, with gross alpha and gross beta concentrations less than 15 pCi/l and 50 pCi/l, respectively. Similarly, as discussed in Section 3.4.2.5, elevated levels of radionuclides have not been identified in ground water samples collected from the vicinity of the SMC facility.

3.11.2 Chemical Contaminants of Concem

Chemical COCs at the SMC facility were identified through the performance of remedial investigations and risk assessments. Impacts have been detected in site soils and ground water and in the sediments and surface water of the adjacent Hudson Branch. Inorganics are the main COCs detected in soils, sediments and surface water. Chromium and TCE are the main COCs detected in ground water. More discussion is presented in the following section.

3.11.2.1 Comparison to State and Federal Guidance Levels

When the Feasibility Study was prepared that evaluated the potential remediation of soils at the SMC facility (TRC, 1996a), benzo(a)pyrene, 4,4-DDT and PCBs were the only organic constituents detected at levels exceeding state and federal guidance levels applicable at the time. Benzo(a)pyrene and PCBs were each detected at elevated levels in a single surface soil sample; similarly 4,4-DDT was detected at an elevated level in a single subsurface soil sample. Therefore, the presence of these constituents in soils at elevated levels is very limited and, as a result, they are not considered to be significant soil COCs at the SMC facility.

The detection of inorganics at elevated levels in soil samples was much more pervasive across the facility. Beryllium was most commonly detected above the New Jersey direct contact soil cleanup criterion of 1 part per million (ppm), which was applicable at the time of the study. Subsequent evaluations of the potential risks posed by beryllium have resulted in an increase in the accepted "protective" level of beryllium in soils. The beryllium direct contact soil standard currently proposed for promulgation by NJDEP is 230 ppm, based on non-residential site use.

The maximum level of beryllium detected in soils at the SMC facility is 60.1 ppm, well below this proposed value. Other inorganics identified in site soils at levels exceeding New Jersey soil cleanup criteria include arsenic, chromium, hexavalent chromium, copper, lead, nickel and vanadium.

As with the soils, inorganics were the major COCs detected in the surface water and sediments at levels exceeding apphcable guidehnes at the time the analysis was conducted. In data collected in 1995, seven inorganic constituents exceeded acute and/or chronic surface water quality criteria, a drop from 1990 when twelve inorganic constituents were detected at elevated levels. Sediments contained elevated inorganic levels but the potential for human exposures to impacted sediments is minimal.

3.11.2.2 Human Health Risk Assessment

A human health risk assessment conducted for the facility (TRC, 1995) evaluated potential risks associated with the chemical COCs for the following potential scenarios:

- Site Trespasser (exposure of children trespassing onto site to soils and surface water)
- Commercial/Industrial Use (exposure of adult employees to soils and dust based on current site use)
- Residential Use (exposure of residents to ground water through off-site residential use of ground water)
- Future Construction (exposure of future construction workers to subsurface soils and dust, assuming future development of site)
- Future Residential Use (exposure of children and adults to on-site soils and dust, assuming future residential use of site)

The only estimated risks that exceeded acceptable levels ranges defined by the National Contingency Plan (NCP) for CERCLA sites (i.e., greater than 10^{-4} to 10^{-6} for carcinogens, and greater than a hazard index of 1 for noncarcinogens) were those associated with off-site residential use of ground water (based on potential carcinogenic and noncarcinogenic risks) and future residential use of the site and associated exposure to site soils and dusts (based on noncarcinogenic risks). The elevated carcinogenic risk associated with off-site residential

ground water use was mainly attributable to the presence of arsenic, beryllium and trichloroethene while the elevated noncarcinogenic risk was mainly attributable to hexavalent chromium and vanadium. The elevated noncarcinogenic risk associated with future residential use of the site and associated exposures to soils and dust was mainly attributable to vanadium.

3.11.2.3 Proposed Remedial Actions

The FS developed for soils at the SMC facility under CERCLA includes a recommended remedial action that NJDEP has reviewed and generally concurred with through comments issued on the FS document. The currentiy proposed method for addressing the exceedances of soil cleanup criteria for chemical COCs and potential risks associated with on-site residential exposures to chemical COCs in site soils and dusts is on-site capping combined with site fencing, a deed restriction, and a limited subsurface soil removal action in an area where hexavalent chromium was detected at an elevated level.

Under the CERCLA FS process for the SMC facility, an ecological risk-based approach was used to develop remedial goals and remedial altematives for chemical COCs detected in the surface water and sediments of the Hudson Branch. The remedial objectives included restoration of surface water and sediment quality to a degree sufficient to support existing and designated uses of the Hudson Branch, utilization of pollution prevention measures, source controls, and natural processes to diminish risks associated with impacted sediments, minimization of the potential transport of impacted sediments to downstream locations and the minimization of environmental harm that could result from the implementation of a remedial action. The proposed method for addressing chemically-impacted sediments and surface water includes impacted sediment removal from select sections of the Hudson Branch, with subsequent consolidation and capping on site and post-construction monitoring.

The implementation of these actions will also require the implementation of institutional controls to limit future development of the site to non-residential uses. The institutional controls would include the establishment of a Declaration of Environmental Restrictions (DER) under NJSA 58:10B-13 and NJAC 7:26E-8. A DER includes the estabhshment of a deed notice, with

subsequent inspections and biennial certifications required to confirm the continued effectiveness of the DER. As part of a natural resource restoration settlement at the facility, SMC also must develop an upland forest area on certain portions of the facility (see tree-planting areas indicated in Figure 1-2). The continued maintenance of these areas as forested areas also requires the establishment of site use restrictions, which would most likely be incorporated within the DER described above.

3.12 Waste Management

Because no licensed operations are bn-going at the Newfield site, there are no radiological waste streams associated with current operations. However, there are several non-radiological waste streams that result from current operations. These wastestreams include:

- Wastewater treatment filter cake;
- Metallic dust/floor sweepings (swarf);
- Trash;
- Cardboard;
- Light steel; and
- Wooden pallets.

Wastewater treatment filter cake is generated as a byproduct of the on-site ground water treatment system, as a result of the operation of a filter-press. The filter cake waste stream is characterized as a non-hazardous waste that contains approximately 20% solids, consisting primarily of metal hydroxide (iron and chromium) produced from the treatment of extracted ground water. SMC generates approximately 12 tons of ground water treatment filter cake on a monthly basis. This material is disposed of off-site at the Gloucester County Solid Waste Complex (GCSWC) landfill located in Swedesboro, New Jersey.

Metal dust and particulate matter produced from grinding operations, referred to as swarf, is collected continuously and transferred into super sack containers. The super sacks of waste metal powders and floor sweepings are shipped off site in dump trailers for disposal. SMC

generates approximately two to three dump trailers of this material per year. This material is shipped to various permitted out-of-state sohd waste landfills for disposal.

Trash, cardboard, light steel, and wood pallet wastes are generated on an on-going basis, with volumes generated varying based on current site activities. SMC manages cardboard and light steel separate from the trash waste stream, with separate collection receptacles so that these wastes can be recycled off site. Wooden pallets are crushed and hauled off-site to a wood-chipping facility in Atiantic County, New Jersey for recychng. Trash is accumulated in dumpsters and disposed of at the GCSWC. Cardboard and light steel are accumulated in 30- and 40-cubic-yard containers and recycled by Cifaloglio, Inc. and Cumberland Recycling Company, respectively. Universal wastes are generated at a very slow rate and, as a result, are disposed of very infrequently, in accordance with applicable rules and regulations.

SMC currently does not generate any hazardous waste. USEPA Identification number NJD002365930 was assigned to SMC when the facility was generating hazardous waste.

4.0 ENVIRONMENTAL IMPACTS

For each of the alternatives described in Section 2, the potential impacts on the resources described in Section 3 are evaluated. Such impacts include direct, indirect and cumulative impacts. Where applicable, recommendations are provided for minimizing potential impacts. The first alternative evaluated in each subsection below (the LTC alternative) represents the proposed action. As described previously in Section 2.1, the LC alternative represents a no action alternative.

4.1 Land Use Impacts

Potential land use impacts that can result from decommissioning activities include changes of land use from one use to another or impacts on neighboring land use. Consistency with local land use plans is a consideration in the evaluation of land use impacts. Both long- and short-term land use impacts are considered.

4.1.1 LTC Alternative

Construction activities associated with the stabilization of the licensed materials at the SMC facility within a single pile in the Storage Yard area and the subsequent construction of an vegetated engineered barrier over the materials will be limited to on-site actions. Therefore, no adverse impacts on neighboring land use, including residential or agricultural land uses, would be expected. Dust and noise impacts associated with this alternative are not expected to significantly impact off-site land use, as discussed in Sections 4.6.1 and 4.7.1. On-site land use impacts during decommissioning would be minimal, as current industrial site activities in the Storage Yard are limited. Because the remediation work crew would be small, no indirect off-site land use impacts associated with the construction activities would be expected.

Off-site activities associated with decommissioning would include the identification of a suitable source of cover soil materials and the transport of those soils to the site. It is expected that a commercial source of soil borrow material would be identified, whereby the soil materials would likely be sold to another buyer if not used for the decommissioning activities. Therefore,

off-site land use impacts associated with the removal and transport of soil from the soil source area would likely be minimal.

The only land use definitely impacted by the decommissioning activities under the proposed action would be the future use of the Storage Yard within the SMC facihty. Institutional controls would be required to prevent the future disruption of the area in which the engineered barrier is constructed.

Long-term land use impacts are difficult to predict, as future land use needs are dependent upon many factors. The majority of the area in which the SMC facility is located is identified by the State of New Jersey as a rural and environmentally sensitive planning area, designated for limited growth or conservation (see Figure 3-2). Stabilizing the licensed radioactive materials in place provides a greater degree of environmental protection than the existing conditions at the site and therefore is in keeping with the protection of environmentally sensitive areas. The institutional controls that would limit future use of the stabilized area would be in keeping with a limited growth/conservation goal. Similarly, no adverse indirect off-site land use impacts would be expected following completion of decommissioning activities.

With respect to cumulative impacts, the implementation of future use restrictions in the Storage Yard would be consistent with other land use restrictions at the facility required in association with soil chemical contamination or the establishment of natural resource restoration areas. Therefore, the implementation of future use restrictions in the Storage Yard would not significantly impact future development of currently undeveloped areas of the facility, as much of the area surrounding the Storage Yard is already designated as a natural resource restorations area for the re-establishment of an upland forest area. Under USNRC guidance on the implementation of an LTC license at the SMC facility, the unrestricted portion of the property may not be sold to anyone other than the licensee. This restriction would prevent the subdivision of the restricted portions of the property from the unrestricted portions of the property. If conformance with this guidance were maintained, it could impact the potential future use of the industrial unrestricted portions of the property.

4.1.2 LT Alternative

During decommissioning, a greater area of the SMC facility would be impacted under the LT alternative than under the proposed action. Reconstruction and expansion of a railroad spur could be required, as well as construction of a temporary storage area for materials prior to their loading onto the railcars. A material crushing area would also have to be constructed. The construction impacts would be limited to the SMC facility (with the possible exception of a short section of the railroad spur) and would not impact off-site residential or agricultural land use. Dust and noise impacts associated with this alternative, while shghtiy greater than the proposed action, are not expected to significantly impact off-site land use, as discussed in Sections 4.6.2 and 4.7.2. Potential impacts at the receiving site, Envirocare, Inc. of Utah, would be minimal, as this disposal site is hcensed to receive these types of material. This alternative would also have minimal indirect land use impacts, as the associated work force would be small.

Once decommissioning is complete, institutional controls would no longer be required for the site to comply with USNRC regulations for license termination. This lack of future land use restrictions, combined with the rehabilitation of the adjacent railroad hne, could enhance the value of the Storage Yard for future industrial development. However, future industrial development would not necessarily be in keeping with the rural and environmentally sensitive land use planning area in which the facihty is located. No adverse indirect off-site land use impacts would be expected following completion of decommissioning activities, although the impact of any potential future development of the Storage Yard is difficult to predict.

With respect to cumulative impacts, the resolution of soil chemical contamination issues under CERCLA at the facility will likely require the implementation of institutional controls, as described previously in Section 1.3. At a minimum, future development of much of the facility surrounding the Storage Yard will be prevented by the presence of NJDEP-required natural resource restoration areas (also described in Section 1.3 and indicated by green shading in Figure 1-2). Some of these areas are located immediately adjacent to the Storage Yard. Therefore, while this alternative would not require land use restrictions, other features at the SMC facihty

will require long-term land use controls, which could ultimately impact future land use options within the Storage Yard.

4.1.3 LC Altemative

Under the LC altemative, there would be no land use impacts (direct or indirect) other than those that exist under the current baseline conditions (see Section 3.1). Therefore, the LC altemative would be compatible with existing surrounding land use, although it is not in keeping with the rural and environmentally sensitive land use planning area in which the facility is located, or with the USNRC's requirements for timely decommissioning of licensed sites.

4.2 Transportation Impacts

This section includes an analysis of the potential impacts of the various altematives on the surrounding transportation system.

4.2.1 LTC Altemative

The proposed action would involve minimal on-site transportation impacts. Licensed materials would be consolidated within the Storage Yard, with only minimal movement of other materials (i.e., D-111 and D-102/D-112 demolition concrete) from outside storage areas into the Storage Yard. Materials used to construct the engineered barrier would be transported to the site from off-site sources. An on-site roadway system to the Storage Yard currently exists that could support the on-site truck traffic. The maximum likely radiation dose to the general pubhc associated with this option (i.e., less than 25 millirem TEDE) would not differ from the measured radiation dose associated with routine site operations.

To bring soil cover materials on-site, it is estimated that approximately 1,200 dump truck loads of soil material (based on standard-sized 20-cubic yard trucks) will be transported to the site, with a total 7-month construction period. Assuming that soil is transported to the site over 4 of the 7 months, the average round trip traffic to/from the site would be approximately 19 trucks per day, spaced out over the day. If clean soils are placed over the area where materials are

removed for consolidation into the main pile, an additional 200 trucks will bring those soils to the site. The source of the soils will not be identified until the project is ready to be constructed; however, given the SMC facility's general proximity to State Highway 55, the major transportation corridor through the area, the impacts on local transportation routes should be minimal.

Dust and noise impacts associated with the transportation of materials under the proposed action are evaluated within Sections 4.6.1 and 4.7.1. No off-site transportation of radioactive materials would be included in the proposed action.

No cumulative transportation impacts were identified in association with this alternative.

4.2.2 LT Alternative

Under the LT alternative, licensed materials would be transported from the site via railcar to the off-site disposal facility, Envirocare of Utah, Inc., located approximately 130 kilometers (80 miles) west of Salt Lake City and over 3,500 kilometers (approximately 2,250 miles) from the SMC facility. This would be accomplished in several stages, requiring the on-site transport of the materials to a staging area, the crushing of some of the material to meet the size requirements of the disposal facility, loading the slag into railcars, and then off-site transportation of the materials to the Envirocare facility.

The existing railroad spur along the northern boundary of the site would have to rehabilitated and extended to accommodate the temporary storage and loading of railcars and, as a result, an extension of the existing road system (approximately 500 feet long) may be required to support the loading area. These improvements, if maintained in the future, would enhance the potential future use of the manufacturing portion of the facility by restoring railroad access to the site.

The estimated total amount of material that would be disposed of off-site is approximately 120,000 metric tons (133,000 tons). At an assumed 80 metric tons (90 tons) capacity per railcar, approximately 1,500 covered railcars would be required to transport the materials to the Envirocare facility. As described previously, the estimated distance from the

SMC facility to the Envirocare facility is approximately 3,500 kilometers (2,200 miles). Based on an estimated 10-month construction project, approximately 7 railcars/day would be transferred to the Envirocare facility. Other decommissioning activities (removal, transport and crushing of slag and placement of clean soil cover over the Storage Yard following material removal) would also occur during this 10-month period, estimated to span 2 years at 5 months/year. With only 2 to 3 trains per day currently using the Conrail tracks adjacent to the SMC facility (see Section 3.2.3), the additional train traffic resulting from this alternative would not be expected to have a significant adverse impact locally. The great distance over which the materials will be hauled results in minor but increased transportation impacts over a much larger geographic area than the proposed action. Long-range rail service planning in the area does not indicate any significant change in rail use over the next few years. Radiation dose rates at a distance of 1 meter from a loaded railcar (90-ton capacity) would be approximately 0.2 mR/hr. This results in a trivial dose potential of 0.22 mR above background under an extreme scenario of continuous occupancy at that distance for the passage of 1,500 material-bearing cars at a nominal speed of 10 miles per hour.

Following the removal of the radioactive materials for off-site disposal, excavation areas would have to be covered with clean topsoil. It is estimated that approximately 11,500 cubic yards of material would have to be brought in from an off-site source and placed on site. It is estimated that approximately 575 dump truck loads of soil material would be transported to the site over the second 5-month construction period. Therefore, the average round-trip traffic associated with clean soil import to the site would be approximately 5 trucks per day, spaced out over the day. Even if the soil were delivered over a shorter time frame (say over 1½ months), the average round-trip traffic associated with clean soil import would be approximately 13 trucks per day, spaced out over the day. The source of the soils would not be identified until the project is ready to be constructed; however, given the SMC facility's general proximity to State Highway 55, the major transportation corridor through the area, the impacts on local transportation routes should be minimal.

Dust and noise impacts associated with the transportation and handling of materials under this altemative are evaluated within Sections 4.6.2 and 4.7.2.

No cumulative transportation impacts were identified in association with this altemative.

4.2.3 LC Alternative

Under the LC altemative, no short-term or long-term transportation impacts would result. No transportation of licensed material would be required.

4.3 Geology and Soil Impacts

Potential geologic impacts include both the potential impacts of the altematives on the geologic and soil features (i.e., soil erosion, disruption of natural drainage pattems, etc.), as well as the impacts that the existing geological resources may pose on the proposed action and ahematives considered.

4.3.1 LTC Altemative

Under this altemative, licensed materials would be consolidated within the area in which they are currentiy stored, with a small volume of additional materials (D-111 and D-102/D-112 concrete debris) added from nearby areas of the facility. Therefore, the impacts of the altemative on existing geologic and soil features would be minimal. The greatest potential impact would be the reduction in the surficial erosion of the stored materials, as they would be covered with a vegetated engineered barrier. Under existing conditions, heavy rain has the potential to erode the uncovered materials, although the perimeter berm system minimizes migration of any eroded materials. The engineered cap has been demonstrated to be stable even under extreme precipitation conditions (see Appendix 19.2 in the Decommissioning Plan). Other baseline geologic and soil features (underlying soil compaction, disruption of natural drainage pattems, etc.) are not expected to be significantiy impacted, due to the presence of the existing piles. Also, the existing piles have demonstrated long-term stabihty with relatively steep side slopes (i.e., 2 horizontal to 1 vertical or 2H:1V). The consolidated pile will have shallower slopes

(3H:1V) that will exhibit even greater stability. The maximum slopes of the final pile are consistent with the design standard in the waste disposal industry (as demonstrated by maximum sanitary landfill side slope requirements established at NJAC 7:26-2A.7(i)5(iii)) and have been demonstrated to be protective against slope failures for highly variable waste materials. Therefore, the potential for slope failures of the final pile are not a major concem. Since the site is not located in an active geologic area, potential seismic or volcanic hazards are also minimal.

4.3.2 LT Altemative

Under this altemative, licensed materials would be removed from the SMC facility. The site surface would be retumed to near its natural conditions and original drainage pattems would be restored. This alternative would have no adverse impacts on geology and soils at the SMC facility and, conversely, the geology of the area would not adversely impact the implementation or long-term effectiveness of the altemative. The disposal site that would receive the decommissioning wastes was required to go through a rigorous geologic evaluation during the permitting process. Therefore, it can be concluded that the disposal facility permit was issued based on demonstrated protectiveness of geology and soil conditions.

4.3.3 LC Altemative

Under this altemative, existing conditions would remain. The uncovered storage piles would continue to act as a potential erosion source with existing perimeter berms minimizing migration of any eroded materials. There would be no significant change from the baseline geologic and soil conditions previously described in Section 3.3.

4.4 Water Resources Impacts

Potential water resources impacts include impacts on surface water and ground water use and quality. There are several common components to each of the alternatives that are described here and are not repeated for each individual altemative below.

Implementation of each of the alternatives will not require the use of water (other than potentially for dust control purposes), so there will be no significant project-related withdrawals of surface water or ground water. Similarly, no direct discharges to surface water or ground water will be associated with the implementation of the alternatives. The only potential indirect discharges would be discharges to surface water via stormwater flow, and infiltration of precipitation, with subsequent discharge to the ground water. All construction activities will comply with stormwater discharge requirements applicable to construction projects. Run-on and run-off controls will be used in construction areas to minimize the impact of construction activities on stormwater quality.

There are no stormwater collection systems in the immediate vicinity of the Storage Yard, so should any stormwater discharges escape the area during or after construction, the discharges would be via overland flow. The presence of vegetation in the areas between the Storage Yard and the Hudson Branch inhibits the transport of materials directly into the Hudson Branch; instead, the overland flow would tend to soak into the ground and subsequently be lost via evapotranspiration or discharge into the ground water.

As existing impacts to ground water associated with the presence of the stockpiled materials are not significant, none of the alternatives are expected to have significant impacts on ground water quality.

The Storage Yard is located near the headwaters of the Hudson Branch and, based on available floodplain mapping, the presence or absence of the stockpiled materials is not expected to significantly impact the flood handling capabihty of the associated floodplain.

4.4.1 LTC Alternative

This alternative will require the consolidation of the licensed materials within the Storage Yard and the import and placement of the engineered barrier materials over the resultant pile.

During construction, modifications to the existing stormwater containment system around the Storage Yard will be required to support the transport of construction materials and equipment into the area while maintaining control of stormwater discharges. Any temporary

stockpiles of incoming materials will be managed so as to minimize impacts to stormwater quality. While not expected to be required, if more sophisticated construction drainage systems are determined to be necessary during design, stormwater discharges from the construction area could be directed to the on-site pond, which would provide detention of the stormwater prior to its discharge to the Hudson Branch. Any changes in the discharge from the on-site pond would have to comply with NJDPES requirements.

Once the engineered barrier is constructed and the surficial topsoil seeded, direct contact between the radioactive materials and stormwater will no longer occur and any associated potential stormwater impacts will cease. While existing data indicate that infiltration of precipitation through the stockpiled materials would not be expected to impact ground water quality, the presence of a geomembrane layer in the engineered barrier will block the future infiltration of precipitation. Surface drainage features, including open drainage swales and down chute channels will be utihzed as necessary to minimize erosion. The presence of a thick vegetative cover combined with regular inspections and maintenance will also minimize the impacts of erosion.

4.4.2 LT Altemative

This altematiye will require the removal and off-site disposal of the licensed materials currently within the Storage Yard, and the import and placement of clean soil over the former Storage Yard. Ancillary activities will include the construction of a railroad spur and a staging/crushing area near the railroad spur.

During construction, modifications to the existing stormwater containment system around the Storage Yard will be required to support the transport of materials from the area while maintaining control of stormwater discharges. New stormwater control measures will have to be constructed along the railroad spur and in the adjacent staging/crushing area. Any temporary stockpiles of materials will be managed so as to minimize impacts to stormwater quality. The area of the proposed railroad spur and associated staging area are located just north and east of an area where existing catch basins collect stormwater and direct it to the on-site pond prior to

discharge to the Hudson Branch. This collection system could be extended to provide drainage from the proposed staging area and possibly from the railcar loading area, if determined to be necessary during design. If implemented, stormwater discharges from the temporary storage area would be directed to the on-site pond, which would provide temporary detention of the stormwater prior to its discharge to the Hudson Branch. All discharges from the on-site pond would have to comply with NJDPES requirements.

Transport of the inaterials via railcar to the disposal facility would occur in covered railcars, so potential impacts on surface and ground water quality during the transport process would be minimal, unless an unexpected accident were to occur. The containment features of the ultimate disposal facility were constructed in accordance with applicable regulations and would be expected to be protective of surface and ground water quality.

Once the stockpiled materials are removed from the site, the Storage Yard will be covered with clean soil and seeded. Direct contact between the licensed materials and stormwater will no longer occur and any associated potential stormwater impacts will cease. Similarly, there will be no infiltration of stormwater through the materials and into the ground water. Once the existing materials are removed, the surface of the Storage Yard will be retumed to its original, gently sloping condition. Therefore, erosion is not expected to present a significant problem, especially once vegetation is estabhshed over the area.

4.4.3 LC Altemative

Under the LC altemative, the Storage Yard would remain as it exists today. Precipitation would continue to fall directly onto the stockpiled materials, with runoff contained by the existing berm system and a portion of the precipitation infiltrating through the stockpiled materials, into the ground water. Continued infiltration of precipitation through the stockpiled materials would not be expected to adversely impact ground water quality, as no significant adverse impacts have been detected to date. Impacts to surface water quality would also be expected to be minimal, unless runoff containment systems are compromised.

4.5 Ecological Resources Impacts

Potential ecological resource impacts include impacts that could result from on-site construction activities, including land clearing, roadway maintenance, and other land disturbance activities. Over the long-term, ecological resources could be impacted by a change in the long-term habitat value of the areas affected by the ahematives. For each of the altematives except the LC altemative, construction activities within the Storage Yard will occur in an area that is already relatively barren of existing vegetation; therefore, Storage Yard activities will not adversely impact existing valuable habitat or require the use of herbicides or mechanical clearing equipment.

4.5.1 LTC Altemative

This altemative would convert existing unvegetated piles of materials into a single consolidated pile covered with vegetation. This would reduce the footprint of the existing piles, thereby further reducing the pbtential ecological impacts of the stockpiled materials.

Construction impacts on ecological resources would be minimal, as the 2.8-hectare (7-acre) Storage Yard in which the majority of the work will be conducted is unvegetated and fenced. The two small areas located outside of the Storage Yard from which concrete building demolition materials (D-111 and D-102/D-112) will be removed are also in relatively unvegetated areas and therefore offer little habitat value under current conditions. Therefore, no adverse impacts to existing potentially valuable habitats would occur as a result of material consolidation. As described in Section 4.4, stormwater management measures would be taken to minimize potential impacts to the adjacent Hudson Branch during construction.

The preferred habitat of the eastem box turtle (*Terrapene carolina*), a species of special concem identified by the New Jersey Natural Heritage Database for the subject site, consists of moist, forested areas with plenty of underbrush. This type of habitat, available along the edges of the Hudson Branch, would not be impacted by the proposed action. Similariy, the proposed action would not impact the preferred habitat (i.e., large bodies of open water with plentiful fish

and tall trees for nesting/roosting) of the bald eagle (*Haliaeetus leucocephalus*), identified by the USFWS as an occasional transient threatened species in the area of the SMC facility.

The topsoil layer of the engineered barrier will be planted with a grass seed mixture suitable for providing long-term stabilization of the engineered barrier and minimizing future maintenance. The seed mix selected for the area may include grass and legume species, including rye grass (*Lolium* spp.), birdsfoot trefoil (*Lotus corniculatus*), red clover (*Trifolium pratense*), and vetch (*Vicia* spp.), which also provide some wildlife value. The final planting scheme would be designed in close cooperation with the final engineering barrier design to ensure that the integrity of the barrier system would not be compromised by the selected plant species.

A cumulative impact of designing a vegetated engineered barrier system that would also provide habitat value is that such an approach would complement the development of adjacent areas as upland wooded communities under SMC's natural resource restoration activities.

4.5.2 LT Alternative

Under the LT alternative, the existing unvegetated piles of materials would be removed from the Storage Yard, and the area would be covered with a layer of clean topsoil that would support the revegetation of the area, at least for the short term.

Construction impacts on ecology would be somewhat greater than the LTC alternative, because of the added requirements of rehabilitating and extending the existing rail spur to the Storage Yard area. While an existing railroad spur borders the northern edge of the SMC facility, the spur has not been used for some time. In some areas, the track is missing, while existing sections of track have become overgrown with dense vegetation (as indicated on the topographic map, Plate A). Therefore, while material removal activities will impact the 2.8-hectare (7-acre) unvegetated Stbrage Yard, construction activities will also impact approximately 1.1 additional hectares (2.7 acres). The material/crushing area will cover approximately 0.3 hectares (0.8 acres) in a relatively unvegetated area that offers littie habitat value under current conditions. However, the rehabilitation/extension of the existing railroad spur will impact

approximately 0.8 hectares (1.9 acres) of dense vegetation. Mechanical clearing of this vegetation will be required to initiate construction activities. As described in Section 4.4.2, stormwater management measures would be taken to minimize potential impacts to the surface water during construction.

The preferred habitat of the eastem box turtle and bald eagle would not be impacted by this altemative.

This altemative does not include long-term maintenance of the former Storage Yard after the radioactive materials are removed. Therefore, the long-term maintenance of vegetation in this area is not addressed, and the long-term ecological value of the area cannot be defined. Redevelopment of the area could adversely impact the ecological value of adjacent natural resource restoration areas.

The off-site transport and disposal of the radioactive materials would not be expected to have any associated significant ecological impacts, unless an accidental release of materials occurred during the transport/disposal process. The potential ecological impacts of the disposal facility were previously considered during the process under which the facility received its disposal permit.

4.5.3 LC Altemative

Under the LC altemative, the Storage Yard would remain as it currently exists and the ecological impacts would remain as described in Section 3.5. There would be no construction-related impacts to existing habitat areas under this altemative, and no future enhancement of the ecological value of the Storage Yard.

4.6 Air Quality Impacts

4.6.1 Overview

The types and amounts of pollutants emitted from under the three decommissioning altematives were evaluated based upon the construction and transportation equipment (e.g., trucks, front-end loaders) needed to implement each altemative and the proposed material

handling activities (e.g., consolidation of materials and crushing activities) associated with each altemative. The air pollutant emissions from each operation were estimated using USEPA or other recognized emission factors. A "preferred" USEPA air quality dispersion model was used to predict ambient concentrations arising from project emissions and the emissions of other nearby pollutant sources. The predicted concentrations were added to monitored regional background concentrations to determine the likely total predicted air pollutant concentrations from each decommissioning altemative. The concentrations described below are predicted to occur during the active remediation phase of each decommissioning altemative and are compared to National Ambient Air Quahty Standards (NAAQS).

Air quality dispersion modeling was performed using USEPA's Industrial Source Complex Model (ISC3), Version 02035. EPA lists ISC3 as a refined air quality model preferred for regulatory apphcations in the "Guideline on Air Models" (FR, Vol. 68, No. 72, April 15, 2003, pages 18440-18482). ISC3 is a straight-line, Gaussian dispersion model capable of predicting ambient air pollutant concentrations for averaging periods ranging from hourly to multi-year. ISC3 is suitable for predicting concentrations caused by industrial source complexes located in flat to gently rolling terrain with a large variety of emission source types including point, area and volume emission sources. The model requires source parameter, (e.g., type, location, emission rate, release characteristics), reception location and hourly meteorological data in order to predict ambient concentrations.

Meteorological data used by ISC3 were collected during 2000-2004 at Millville Municipal Airport. This airport is the closest routine meteorological observing station (located approximately 12 miles south of the site) and is representative of meteorological conditions at the site. Concurrent Sterling, VA upper air data (the closest, non-coastal upper air observing site) were used to determine mixing heights. All meteorological data used for modeling were converted to model input format using EPA's Meteorological Processor for Regulatory Models.

Figure 4-1 shows the emission source locations as modeled using ISC3 for the decommissioning altematives. The locations are shown as areas in which equipment will operate and from which the emissions are modeled to occur. The emissions sources are:

- Area 1: The location of the existing Storage Yard, modeled as an eight-sided polygon. All emissions are assumed to be at five feet above grade to simulate the midpoint height (from ground to the top) of trucks and construction equipment. The emissions have an initial vertical spread of ten feet to simulate mixing in the wake zone downwind of the trucks and construction equipment.

- Area 2: The location of two smaller storage areas (temporary D111 and D102/D112 demolition material storage areas) that will be removed under the LTC and LT alternatives. Because these areas are small, not near the property boundary and contain limited amounts of material, they have been combined into a single four-sided polygon for modeling purposes, with equivalent area and emissions of the two individual areas. The emission height variables are as described above for Area 1.

- Area 3: The location of materials crushing and train loading activities (Staging Area). Emissions from this area occur only for the LT Altemative. This area is modeled as a three-sided polygon with emission height variables as described above for Area 1.

- Area 4: The area containing paved and unpaved road ways that will be used to transport materials under the LTC and LT altematives, modeled as a series of seven square "sub-areas" to comply with ISC3 guidance on area source geometry, and emission height variables as described above for Area 1. The roadway in the three western squares is paved, while the roadway in the four eastem squares is unpaved.

Modeled emissions for these areas vary by the time of the day and the month of the year, depending upon whether the project is active (equipment is in use) or inactive.

Concentrations from these sources were predicted for a nested Cartesian array of 4,109 receptor points from the site boundary to a distance 20 km from the site in all directions, far enough to encompass the modeling significant impact area, i.e., the distance where the predicted concentrations from the decommissioning project fall below USEPA's modeling significant impact levels (SILs) (New Source Review Workshop Manual, Draft, USEPA Office of Air Quality Planning and Standards, October 1990). The array spacing ranged from 50 m along the facility property line to 1 km at longer distances.

In addition, cumulative air quality impacts were modeled for sources to at least 10 km beyond the significant impact area (i.e., all sources identified within a radius equal to the modehng SIL distance plus 10 km). Based on modeling results, the significant impact areas

included locations within 79.1 m of the property for annual average concentrations of particulate matter less than or equal to 10 micrometers in diameter (PM_{10}), 7.0 km of the property for twenty-four hour average concentrations of PM_{10} and 875 m of the property for annual average concentrations of nitrogen dioxide (NO_2). The NJDEP provided emissions data from the New Jersey Environmental Management System (NJEMS) and Operating Permit data for sources within the area described above. The highest reported short-term (hourly to daily) and annual emission rates for each emission unit and operating scenario were modeled for the cumulative impact analyses. Because NJEMS does not contain information needed to assign each process emission unit to an individual stack at the facilities, all process emissions from each facility were merged into the worst-case "representative" stack as determined by the method presented in USEPA's Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019). Tank vents and landfill gas vents were excluded from the merged stack calculation. Likewise, fugitive (non-process) emissions were not modeled for the NJEMS sources, since fugitive emissions cause local impacts near the individual sources and are inconsequential for regional air quality impact analyses. Cumulative air quality concentrations are reported for events to which the project's contribution exceeds USEPA's modeling SILs, i.e., events for which the project's emissions are significant contributors to the modeled cumulative concentrations.

The emissions and predicted concentrations arising from each decommissioning alternative are discussed below.

4.6.2 LTC Alternative

Description of Emissions

This alternative involves consolidating the radioactive materials within a single pile in the Storage Yard area and covering the consolidated materials with an engineered barrier consisting of geomembrane and soil cover layers. The evaluation of this alternative also assumes that the remainder of the Storage Yard area will be covered with a layer of clean soil. For the purposes of this analysis, the equipment used to excavate, transport and cover the radioactive material has been assumed to include:

- Tri-axle dump trucks;
- Loader;
- Dozer; and
- Excavator.

Potential emissions sources have been assumed to include:

- Paved and unpaved roadways;
- Materials handling (storage piles, heavy equipment operation, drop emissions); and
- Wind erosion of exposed materials surfaces.

These sources would primarily emit nitrogen oxides (NO_x) from engine operation, particles from engine operation, materials handling, roadways, etc., and other USEPA criteria air pollutants in insignificant amounts that will not impact air quality (e.g. less than 10 lbs/yr of sulfur oxides, SO_x). Therefore, USEPA (AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, January 1995) and other emissions factors (Factor Information Retrieval System (FIRE), http://www.epa.gov/ttnchie1/faq/firefaq.html, and Air Pollution Engineering Manual, AWMA, 1992) were used to calculate the emissions of NO_x and PM_{10} from these sources. The modeling of this altemative also assumes the use commercial palliatives to control and mitigate dust emissions from the unpaved roadways.

The emission rates and modeling variables for short-term and annual average modeling of the LTC altemative are summarized in Table 4-1. Emissions from decommissioning activities are expected to occur eight hours per day, five days per week for seven months. Potential wind erosion at the site is assumed to occur twenty-four hours per day. The emissions presented are worst-case hourly rates for active and inactive periods and annual rates. The area in square meters (m^2) is listed for each of the area sources as described above and the emissions are shown as pounds per hour (lb/hr) for the short-term emissions and pounds per seven months (lb/yr) for the long-term emissions. Emissions are also given as grams per square meter per second ($g/m^2/s$), as ISC3 requires for model input. Detailed emissions calculations for all sources are described in Appendix K. The emissions in each of the three emission source location areas

applicable to this alternative (as described in Section 4.6.1) have been summed and are treated as the specified area or polygon sources using the ISC3 dispersion model.

Air Quality Impacts

Table 4-2 presents a comparison of predicted NO_2 and PM_{10} concentrations attributable to the project to monitored concentrations in the region. Note that the predicted concentrations of NO_2 and PM_{10} on an annual average basis are less than the current background concentrations. The predicted average twenty-four hour PM_{10} concentration is greater than the current background concentration. The total predicted concentrations (project-attributable concentrations plus background) are all less than the NAAQS.

Figures 4-2 through 4-4 present isopleths of predicted pollutant concentrations from the LTC alternative. As expected for the area source fugitive emissions from this type of source, the highest concentrations are along the property boundary and decrease rapidly with distance. The highest concentrations for this alternative generally occur northeast of the facility.

Table 4-3 presents the predicted cumulative air pollutant impacts of the LTC alternative, other nearby emissions sources and the monitored background concentrations. This table shows predicated concentrations for events for which the project's concentration contribution exceeds USEPA's modeling SILs (1 pg/m^3 for annual average impacts, 5 pg/m^3 for the twenty-four hour average PM_{10} impact). Note that this alternative does not significantly contribute to any violations of the NAAQS. Maximum annual potential radionuclide concentrations associated with this alternative are presented in Table 4-4. The highest predicted annual PM_{10} concentrations are shown in this table, as well as the thorium and uranium concentrations in micro-curies per milliliter based on the concentrations of these elements in the on-site material. These concentrations were subsequently used in the evaluation of potential risks within the Decommissioning Plan.

4.6.3 LT Alternative

Description of Emissions

This alternative involves removing the radioactive materials from the site Storage Yard area, crushing the larger materials and loading the materials onto rail cars for off-site disposal. The evaluation of this alternative also includes covering the Storage Yard area with a layer of clean soil after the radioactive materials have been removed. For the purposes of this analysis, the equipment used to excavate, transport and prepare the waste material for shipping has been assumed to include:

- Tri-axle dump trucks;
- Loaders;
- Dozer;
- Rock crusher; and
- Train engine.

Potential emissions sources have been assumed to include:

- Paved and unpaved roadways;
- Materials handling (storage piles, heavy equipment operation, material crushing, drop emissions); and
- Wind erosion of exposed materials surfaces.

As was the case for the LTC alternative, these sources would primarily emit NO_x from engine operation, particles from engine operation, materials handling, roadways, etc. and other USEPA criteria air pollutants in insignificant amounts that will not impact air quality. Therefore, USEPA (AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, January 1995) and other emissions factors (Factor Information Retrieval System (FIRE), http://www.epa.gov/ttnchie1/faq/firefaq.html, and Air Pollution Engineering Manual, AWMA, 1992) were used to calculate the emissions of NO_x and PM_{10} from these sources. The modeling of this alternative assumes the use of commercial palliatives to control and mitigate dust emissions from the unpaved roadways and water sprays to control and mitigate emissions from the rock crusher.

The emission rates and modeling variables for the LT alternative are summarized in Table 4-5. Emissions from decommissioning activities are expected to occur eight hours per day, five days per week for five months per year over two years. Potential wind erosion at the site is assumed to occur twenty-four hours per day. The emissions presented are worst-case hourly rates for active and inactive periods and annual rates. Detailed emissions calculations for all sources are described in Appendix K. The emissions in each of the four emission source location areas described in Section 4.6.1 have been summed and are treated as the specified area or polygon sources using the ISC3 dispersion model.

Air Quality Impacts

ISC3 was used to model active decommissioning periods with equipment operating on the site and inactive periods such as nights and weekends to determine 24-hour average predicted concentrations. Annual emission rates were used to predict annual average concentrations.

Table 4-6 presents a comparison of predicted NO_2 and PM_{10} concentrations to monitored concentrations in the region. Note that the model-predicted concentrations are greater than the observed background concentrations for the NO_2 annual average and the PM_{10} twenty-four hour average. The predicted PM_{10} annual average concentration is less than the observed concentration. The total predicted concentrations (observed background concentrations plus predicted model concentrations) exceed the NAAQS for both the NO_2 annual and twenty-four hour PM_{10} averaging periods. The high predicted concentrations are attributable to emissions from Area 3, the Staging Area, despite the use of water spray emission controls on the rock crusher.

Figures 4-6 through 4-7 present isopleths of predicted pollutant concentrations from the LT alternative. The maximum concentrations generally occur along the northern and eastern property boundaries and decrease rapidly with distance from the facility.

Table 4-7 presents the predicted cumulative air pollutant impacts of the LT alternative, other nearby emissions sources and the monitored background concentrations. This table shows concentrations for events for which the project's concentration contribution exceeds USEPA's

modeling SILs. The LT alternative produces concentrations predicted to exceed the NAAQS for all regulatory averaging periods for NO_2 and PM_{10}.

Maximum annual potential radionuclide concentrations associated with this alternative are presented in Table 4-4. The highest predicted annual PM_{10} concentrations are shown in this table, as well as the thorium and uranium concentrations in micro-curies per milliliter based on the concentrations of these elements in the on-site material. These concentrations were subsequently used in the evaluation of potential risks within the Decommissioning Plan.

4.6.4 LC Alternative

Description of Emissions

The LC alternative involves leaving the existing piles of radioactive materials in-place. Under this alternative, the Storage Yard area would likely become largely namrally vegetated over the long term. Areas that do not support vegetation, such as areas containing large pieces of slag, have been exposed to the wind for some time and wind-erodible particles have been removed. USEPA notes that erodible materials are removed from an undisturbed surface in a matter of minutes by wind, and as long as the surface remains undisturbed, it is no longer a source of particle emissions (USEPA, AP-42, Compilation of Air Pollution Emission Factors, Section 13.2.5). Piles containing finer material will tend to form a natural crust, with the erodible materials from the crusted surface having already been removed. There would be no vehicles or construction equipment used under this scenario.

There will be no emissions of NO_x attributable to this alternative, since there will be no combustion sources or engines employed. Airbome particle emissions under the LC alternative will be negligible. USEPA does not consider inactive exposed areas and storage piles within industrial facilities to be sources of particle emissions.

Air Quality Impacts

Under the LC alternative, the site would have inconsequential impacts on air quality, since there would be virtually no emissions. Under this scenario, the air quality concentrations would be equal to the background concentrations.

4.6.5 Visibility Impacts

The worst-case emission scenario (LT alternative) was modeled using USEPA's visibility screening model, VISCREEN, to determine whether the project would have any significant visibility impact on the nearest Prevention of Significant Deterioration (PSD) Class I area, the Brigantine National Wildlife Refuge. Modeling was performed in accordance with the Federal Land Manager's Air Quality Related Values Working Group (FLAG) Phase I Report (U.S. Forest Service, December 2000). The output of the VISCREEN model is presented in Appendix K and shows that the screening criteria for the maximum visual impacts are not exceeded either inside or outside the Class I area. Thus, since the other alternatives have lower emission rates, all of the alternatives will comply with the visibility screening criteria.

4.6.6 Summary

Project air emissions for the three decommissioning alternatives were quantified using USEPA and other standard emission factors. The air quality impacts of these emissions were modeled using standard USEPA dispersion models. The results were:

- The LTC alternative is predicted to comply with the NAAQS.
- The LT alternative is predicted to not comply with the NAAQS.
- The LC alternative would not alter the existing air quality and would comply with the NAAQS.
- Modeling the worst-case emission alternative, the LT alternative, shows that all of the alternatives will comply with visibility guidelines.

4.7 Noise Impacts

Potential noise impacts evaluated for the proposed action and alternatives include predicted noise levels associated with construction and post-decommissioning conditions. Potential impacts to sensitive receptors were also evaluated.

4.7.1 LTC Alternative

The major potential noise impacts associated with the proposed action would be short-term impacts associated with construction activities. Short-term impacts due to construction were evaluated by estimating project construction noise levels, comparing them to measured daytime baseline noise levels in the area (as described in Section 3.7), and then evaluating them against USEPA guidelines.

The proposed action will consist mainly of soil and material handling activities. No new permanent line or stationary sources of noise will be associated with the proposed action. Material would be consolidated within a single pile in the Storage Yard and covered with a multi-layer engineered barrier. Constmction will occur over an approximate seven-month period.

Noise during construction will be generated primarily from the diesel engines which power the equipment. Exhaust noise usually is the predominant source of diesel engine noise; therefore, maintaining functional mufflers on all equipment will be a requirement of the project.

Noise levels of equipment likely to be used during construction were obtained from references which have documented construction equipment noise levels for many types of projects. The sources used to represent equipment covered by the proposed action include Bolt, Beranek and Newman's *Noise from Construction Equipment and Operations, Building Equipment and Home Appliances*, prepared for the USEPA (BBN, 1971) and a construction noise survey conducted by the New York State Department of Environmental Conservation (NYSDEC, 1974). These construction equipment noise levels are summarized in Table 4-8. The sound levels are for reference distances of 15 meters (50 feet).

The Storage Yard covers a fairly large area within the SMC facility. The actual sound levels that will be experienced by existing off-site residential uses surrounding the facility will be a function of distance. As such, no one existing residential use will be exposed to the same sound levels over an extended period of time, as construction equipment operates through the site.

In order to arrive at a quantitative average construction noise level at each residential receptor, the center of the site was used to calculate distance from construction. Typical construction noise levels were calculated by considering possible combinations of construction equipment likely to be used. These calculated levels are compared to the existing daytime L_{eq} and L_{90} noise levels in Table 4-9.

It is important to note that the levels calculated are for full-engine-load conditions on each source. Typically, however, construction equipment will idle or run at reduced engine loads, with lower sound levels, much of the time. The calculated levels in Table 4-9 were arrived at by considering the reduction in noise with distance (e.g., 6 dBA reduction with doubling of distance) and absorption of sound by the atmosphere. The noise levels do not account for any intervening buildings which exist, particularly between the SMC facility and the Edgarton School/Newfield Library area. They also do not account for absorption of sound that will occur at all locations due to the existing ground cover (grass, vegetation). Therefore, actual construction noise levels at all locations are expected to be lower than those presented in Table 4-9.

The calculated construction noise levels for all scenarios are above the existing residual (L_{90}) noise levels at all locations, indicating that construction noise would be audible during periods of time when the loudest equipment is in operation and during times when intrusive sounds, such as vehicular traffic, are not present. Backup beepers would also likely be audible at most locations. Calculated construction noise levels are similar to the existing L_{eq} levels, however, at most locations. None of the calculated construction noise levels exceed the measured L_{max} (maximum level measured) at any location.

It is important to note that the construction equipment is not generally operated continuously, nor is all of the equipment always operated simultaneously. There will, therefore, be times when no equipment is operating and noise will be at ambient levels. Construction activities are also scheduled to occur during daytime hours, when many people are at work and away from home.

The construction noise levels presented in Table 4-9 are also representative of the noise that would be experienced by outdoor receptors (i.e., people outdoors). A building (house) will provide significant attenuation for those who are indoors. Sound levels can be expected to be up to 27 dBA lower indoors with the windows closed. Even in homes with the windows open, indoor sound levels can be reduced by up to 17 dBA (USEPA, 1978). Construction noise will also be temporary in nature.

The calculated construction noise levels were noted to be below the maximum levels measured during the baseline noise monitoring program described in Section 3.7. As such, construction noise would not be in excess of sounds that currently occur in the area. The USEPA (1978) recommends that a continuous exposure over a person's hfetime to noise levels lower than 70 dBA is adequate to prevent hearing damage. The calculated construction noise levels presented herein are well below 70 dBA at all noise sensitive locations. Also, construction noise is only anticipated to last for approximately seven months. Lastly, there will be times when equipment is idling and lower noise levels will be generated.

The USEPA also recommends that in areas such as school yards and playgrounds, 24-hour outdoor noise levels should be maintained at or below 55 dBA. The analysis shows that at the Edgarton School, even if three equipment pieces operated at full load 24 hours per day, noise levels at the school would remain below the recommended 55 dBA level. Accordingly, no severe or permanent impacts would occur with the proposed action.

Following completion of the proposed action, no noise-generating activities would occur, with the possible exception of routine grass cutting.

4.7.2 LT Ahemative

The LT altemative would involve material movement from the Storage Yard to a staging area near the Storage Yard. Crushing of the material would be conducted (assumed herein to occur continuously over a work shift each day) to obtain proper sizing and the material would then be loaded into railcars for offsite disposal. Rehabihtation/expansion of a small rail spur may also be required. The LT altemative construction period is anticipated to cover five months per year for two years.

As with the proposed action discussed in the previous section, most noise would be generated primarily from diesel engines which power the equipment. Payloaders, a bulldozer and dump trucks are the primary construction equipment anticipated to be required. Additionally with this altemative, noise would be generated by a rock crusher and a small locomotive that would be used to move railcars (estimated at 15 per day) as they are loaded.

The same methodology used to calculate noise levels for the proposed action was used for this alternative. Noise levels for construction equipment, including noise levels associated with a crusher and a locomotive, were provided in Table 4-8. As with the proposed action, typical construction noise levels were calculated by considering combinations of construction equipment. Noise for the rock crusher was added for this altemative. These calculated levels are compared to the existing daytime L_{eq} and L_{90} noise levels in Table 4-10.

A review of the data in the Table 4-10 reveals that, as with the proposed action, construction noise levels will be above the existing L_{90} noise levels at all locations and therefore audible during periods when the loudest equipment are in operation at full loads and during times when vehicular traffic is not present. The above levels (with the rock crusher) are only one dBA greater than the proposed action.

The sound levels calculated above do not include locomotive noise. A locomotive under full load would add an additional 5 dBA to the above-calculated levels. However, the locomotive would likely be under full load only once per day, when the loaded railcars leave the site. The remainder of the time, the locomotive would be idling or off, as the railcars are loaded.

Similar to the proposed action, mitigating factors exist which will tend to lessen any short-term impacts. These include the fact that indoor sound levels would be significantly lower, and that construction is scheduled to only occur during daytime hours, when many people are away from home. Also, the calculated levels reflect full-load operation, when, in fact, equipment are often operated at partial load or are idling.

The calculated levels, even adding 5 dBA for very short duration locomotive noise, are shown to be below the existing measured maximum levels in the area. As such, construction noise would not be in excess of sounds that currently occur in the area. The USEPA recommends that a continuous exposure over a person's lifetime to noise levels lower than 70 dBA is adequate to prevent hearing damage. The calculated construction noise levels presented herein are well below 70 dBA at all noise sensitive locations. Also, construction noise is only anticipated to last for a total of approximately ten months spread, over two years. Lastly, there will be times when equipment are idling and lower noise levels will be generated.

The USEPA also recommends that outdoor noise levels in areas such as school yards and playgrounds, 24-hour noise levels should be maintained at or below 55 dBA. The analysis shows that noise levels at Edgarton School would remain below the recommended 55-dBA level, even if three equipment pieces and the rock crusher operated at full load, 24-hours-per-day. Accordingly, no severe or permanent impacts would occur with the LT alternative. However, slightly higher sound levels would be generated with this alternative than with the proposed action.

Initially following completion of this alternative, no noise generating activities would occur, with the possible exception of routine grass cutting. However, should the Storage Yard be redeveloped in the future (as there are no future use restrictions associated with this alternative), new noise-generating activities could be associated with its future use.

4.7.3 LC Altemative

Under the LC altemative, the site would remain essentially unchanged, and no construction noise would be generated. Noise levels would remain at the baseline levels described in Section 3.7.

4.8 Historic and Cultural Resources Impacts

An evaluation of potential historic and cultural resources impacts includes a consideration of the potential for adverse effects on the integrity of a cultural resource's location, design, setting, materials, workmanship, feeling or association. Such adverse effects can include, but are not limited to, the following:

- Physical destmction, damage, or alteration of all or part of the property;
- Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification of the *National Register*;
- Introduction of visual, audible or atmospheric elements that are out of character with the property or alter its setting;
- Neglect of a property resulting in its deterioration or destruction; and
- Transfer, lease or sale of the property.

As described previously in Section 3.8, previous cultural resource survey activities at the SMC facility identified the "pansy field" area, the glass stack and the Hudson Branch as areas with potential historic or cultural resource value. It was recommended that archaeological testing be conducted in the "pansy field" area, located east of the former thermal pond (see Figure 1-3), and that a Phase Ib survey be conducted of the Hudson Branch if ground-disturbing activity would occur along it. The glass stack was identified as a potentially eligible structure for the National Register and, therefore, requires special consideration.

SMC has received SHPO input on the potential impact on cultural resources of remedial activities associated with CERCLA responses at the site. These activities have the potential for direct impacts on the areas identified by the cultural resource survey, as soil remediation beneath the glass stack area could potentially require the dismanthng of the glass stack. Since SHPO

already has provided input on the relative value of these potential resources with respect to the CERCLA remedial activities, consultation with SHPO regarding the less intrusive proposed action and alternatives evaluated herein was not conducted.

The potential for adverse impacts on these areas of potential historic or cultural resource value are evaluated in association with the proposed action and other alternatives below.

4.8.1 LTC Alternative

Under the LTC alternative, waste excavation and consolidation activities would not be conducted in identified areas of potential historic or cultural value. The construction areas associated with the engineered barrier and the areas of potential historic or cultural resource value are indicated in Figure 4-10. While the Storage Yard is located adjacent to the "pansy field" area, the facility's perimeter fence separates the two areas and will effectively ensure that construction activities do not extend into the "pansy field" area. Potential indirect impacts and cumulative impacts on the on-site areas of potential historic or cultural resource value during and after decommissioning are also expected to be minimal. By maintaining control of drainage, erosion and airborne emissions during decommissioning, there should be no resultant adverse impacts on these areas.

After construction, the LTC alternative will generally improve the setting of the potential cultural and historic resources by aesthetically improving the Storage Yard area. A single vegetation-covered pile will be more pleasing to the eye than the bare piles of materials that currently exist. There will be no adverse audible or atmospheric elements associated with the closed pile. With the required long-term monitoring of the area following construction activities, future neglect of the property is not likely to occur.

No off-site impacts to potential historic or cultural resources are expected under this alternative.

4.8.2 LT Alternative

Under the LT alternative, waste excavation, crushing and loading activities would not be conducted in identified areas of potential historic or cultural value. The material staging/loading areas and the areas of potential historic or cultural resource value are indicated in Figure 4-11. As with the proposed action, the facility's perimeter fence that separates the Storage Yard from the adjacent "pansy field" area will effectively ensure that Storage Yard construction activities do not extend into the "pansy field" area. Potential indirect impacts and cumulative impacts on the areas of potential historic or cultural resource value during decommissioning are also expected to be minimal, although the proposed reuse of the rail spur along the northern property boundary could potentially cause the vibration of the glass stack. By maintaining control of drainage, erosion and airborne emissions during decommissioning, there should be no resultant adverse impacts on these areas.

After construction, the LT alternative will visually improve the setting of the potential cultural and historic resources, as the existing material piles will no longer be in place. Since access to the former Storage Yard will no longer be restricted, there would be a greater potential for redevelopment of the site. However, any redevelopment would have to comply with ultimate remedial decisions regarding CERCLA-regulated soils and sediments at the facility, as well as development restrictions in areas designated as planting areas under the Natural Resources Restoration Plan. There will be no adverse audible or atmospheric elements associated with the area after decommissioning is complete, unless the Storage Yard is redeveloped.

Off-site cultural or historic resources located between the SMC facility and the disposal facility could potentially be adversely impacted, should a serious train accident occur. The existing risk of such an event would only be slightly increased under this alternative, because the existing use of the transportation corridor will only increase slightly under this alternative. Therefore, off-site impacts on historic and cultural resources are unhkely to occur under the LT alternative.

4.8.3 LC Alternative

Under the LC alternative, potential impacts on identified on-site areas of potential historic or cultural value would be identical to the baseline conditions described in Section 3.8. Under existing conditions, there is a potential for drainage or airborne emissions from the pile to migrate to these potential areas, although historically, such migration has not been a significant concern. No off-site impacts on historic or cultural resources would be expected under this alternative.

4.9 Visual/Scenic Resources Impacts

To evaluate the potential visual/scenic resource impacts associated with the alternatives, the visual analyses of existing site conditions previously described in Section 3.9 was modified to reflect future site conditions under each of the alternatives.

4.9.1 LTC Alternative

To evaluate visual/scenic resource impacts under the LTC, a viewshed analysis procedure similar to that described in Section 3.9 for the existing site conditions was conducted. Computerized methods were used to identify areas from which the stabilized pile might be visible, based on the estimated final elevation of the pile, the combined digital-elevation terrain and vegetation model of the surrounding area that was created to evaluate existing conditions (see Section 3.9.2), and an assumed vegetation height of 35 feet in defined treed areas.

The Viewshed Map for the proposed action, Figure 4-12, projects the potential visibility of the proposed action using a 1.6-kilometer (1-mile) radius area on an aerial photograph of the area. The viewshed for the proposed action is larger than the viewshed for existing conditions (Figure 3-19), extending mainly to the northwest and to the south. The viewpoint locations selected to the north and west of the facility for the existing conditions analysis also represent viewshed conditions under the proposed action. Because the viewshed analysis focuses on residential areas, educational facilities, churches, commercial areas and other areas previously identified in Section 3.9.3, limited additional viewpoint locations were selected in the mainly

agricultural areas located south of the facility. The Grace Orthodox Church, located south of the facility near the intersection of Weymouth Road and West Boulevard, is within the projected viewshed under both existing conditions and the proposed action, and was therefore considered to be a "worst-case" representation of sensitive viewpoint locations to the south. Other locations along Weymouth Road south of the facility were screened in the field and not included for analysis based on the combination of roadside, yard and Hudson Branch area vegetation. Viewpoint location 6 was selected as an additional viewshed location to the south of the site based on its presence within the projected proposed action viewshed; however, field observations indicated that tree growth between the facility and observation point would block any views of the proposed action.

Concurrent with the field verification of existing conditions on March 14, 2005, photographs were collected at each of the selected viewshed points (as listed in Table 3-8 and presented in Appendix I). Some of these photographs, as appropriate, were subsequently used to develop photographic simulations of the proposed action. All renderings used in the analysis were based on a computerized engineering model of the stabilized pile, which represents both proposed elevation changes and changes in the extent/shape of the pile (as presented in Figure 2-1). The renderings are intended to show not only the form and scale of the proposed action, but also the texture of the grass planted on the stabihzed pile.

In general, computerized perspective views rely on three-dimensional engineering models of proposed structures in a geo-referenced real-world environment. The model positions the viewer at the approximate receptor point, and specifies a field of view equal to that of the lens used to capture the actual photograph. The computerized perspective views are then superimposed on the photographs to present a visual depiction of the proposed changes at the site.

The height and form of the proposed structure (in this case, the stabilized pile) relative to the receptor's view are calculated in photo simulations by determining the angle created between the horizontal plane at the photo location and the proposed elevation of the structure. In addition to the model existing in a geo-referenced projection system, the photo location coordinates were

registered using a sub-meter global positioning system (GPS) at the time the photo was taken. The compass angle of the camera at each photo location was also documented, as well as the general Storage Yard location. Photographs were taken at both 35 mm and 50 mm focal lengths to represent both wide-angle views and views seen by a human eye. The method of simulating views that reflect the proposed action at viewpoint locations employed Computer Aided Drafting (CAD) and Geographical Information System (GIS) methodologies, along with traditional empirical tools. More details on the specific methods used are provided in Appendix I.

The only locations at which the stabilized pile would actually be visible are located on the SMC facility; therefore, viewpoint simulations were conducted for viewpoint locations 1, 2, 4, and 5 (see Figure 3-20 for viewpoint locations). Photos revised to indicate the view of the stabilized pile are provided as Figures 4-13 through 4-16. There are no anticipated adverse impacts for visual resources outside the SMC boundaries, due to the well vegetated nature of the area surrounding the SMC site and limited off-site neighborhood visibility, as described in Section 3.9.6. To illustrate this point, two additional photos taken from viewpoint location 23 (immediately to the west of SMC) and viewpoint location 18 (to the northeast of SMC) were rendered to show ghosted images of the stabilized pile relative to existing structures/vegetation that currently block the view of the storage pile. These photos are presented in Figures 4-17 and 4-18.

Given the surrounding SMC vegetated perimeter, on-site views of the stabilized pile would blend with the existing surrounding mixed tall grasses, intermittent shrubbery and bordering tree line. Long-term visual impacts of the proposed action will include an improvement of the overall visual appearance of the existing Storage Yard.

Figure 4-13 presents existing and proposed views from the northeast comer of the manufacturing area (west-northwest of the Storage Yard). This location is at the point where the manufacturing area ends and the open, undeveloped portion of the facility begins. The existing slag pile is visible as a dark mass in front of the tree line in the existing view. This view is one of the most direct and unobstructed on the entire SMC site; therefore this area would be relatively impacted by the vegetated, stabilized pile. From this perspective, the rendering shows

the northwestem portion of the stabilized slag pile. In front of the existing pile is a storage shed. The stabilized pile is rendered for the leaf-off season and the dry conditions of the surrounding grasses and ground vegetation. As shown, the stabihzed pile will appear as a raised vegetative feature, not out of character with the surrounding environment of moderately low-growing ground vegetation and perimeter tree hne. The stabilized slag pile will obscure portions of the perimeter tree line directly behind to the east.

Figure 4-14 presents existing and proposed views to the east-northeast from a location along the unpaved SMC service road, southwest of the Storage Yard. This vantage point would also provide a relatively direct and unobstructed view of the stabilized pile. Visible along the horizon above the northem SMC perimeter vegetation is the Newfield water tower. The rendering exhibits the stabilized pile in front of the perimeter tree line, with the Newfield water tower visible along the horizon in the background. Comparable to the character of viewpoint location 1 (Figure 4-13), the stabilized pile will appear as a raised vegetative feature, not out of character with the existing surrounding view of moderately low-growing ground vegetation and the surrounding perimeter tree line.

Figure 4-15 exhibits a somewhat similar perspective as that presented in Figure 4-14, but from a greater distance. This view of the Storage Yard was taken from the service road near the existing pond, just south of the southemmost facihty buildings (visible in the left portion of the photo). Along the perimeter tree line, the Newfield water tower and electric transmission poles and hnes are visible. The stabilized pile in the rendering extends from the center of the photograph to the left, just below the water tower (seen behind the bare tree). The tones and color shading of the rendering are suited toward leaf-off winter conditions, wherein the existing low-growing vegetation appears in sandy, brown shades, with the stabilized area shown as blending in with the existing vegetation conditions. The stabilized pile will obscure portions of the perimeter tree line directly behind to the northeast.

Figure 4-16 exhibits a westem view toward the Storage Yard from the paved area north of the Administration Building. The view consists mainly of the facility's manufacturing buildings, with the Storage Yard in the distance, between the buildings. The stabilized pile is

visible in the rendering between and beyond the manufacturing buildings, at the end of the roadway. The top of the western perimeter tree line is visible behind the stabilized pile, while several overhead utility poles are visible in front of the pile.

The stabilized pile would not be visible from viewpoint location 23, located immediately west of the SMC facility. To illustrate this point, Figure 4-17 depicts the stabilized pile as a ghosted image. As indicated in the photo, existing structures at the SMC facility block the view of the pile.

Similarly, the stabilized pile would not be visible from viewpoint location 18, located northwest of the facility, along Gorgo Lane. Figure 4-18 depicts the stabilized pile as a ghosted image. Existing topography and vegetation would effectively block the view of the pile from that location.

Based on these renderings of the LTC alternative, the alternative will not negatively impact the overall visual quality on- or off-site.

4.9.2 LT Alternative

For this alternative, the Storage Yard materials would be removed and disposed of off-site. The material would be transported from the site via railcar, requiring the construction of a railroad spur and a temporary storage area for materials prior to their loading onto the railcars. A material crushing area would also be constructed. Because this area would be constructed near the existing Storage Yard and would not consist of any raised structures, off-site visual impacts associated with these construction and operation activities would be minimal. This is supported by the minimal visual impacts of the existing Storage Yard, as documented in Section 3.9.

Once the LT alternative is complete, the existing slag pile would no longer occupy the Storage Yard. The Storage Yard would initially exist as open space, with no adverse direct or indirect off-site visual impacts to the surrounding community. Figures 4-19 and 4-20 provide renderings of viewpoint locations 1 and 2 under the LT alternative conditions, showing the area as open space. The process used in developing these renderings is identical to that described in

Section 4.9.1. It is possible that the Storage Yard could be redeveloped for future use, but that scenario could not be visually analyzed without a specific use identified.

4.9.3 LC Alternative

Under the LC alternative, the site would remain unchanged, and no action would be taken to alter the existing slag pile at the Storage Yard. With the LC alternative, there would be no aesthetic/visual impacts (direct or indirect) to the SMC facility and surrounding community, other than those that exist under the current conditions. Existing conditions were previously described in Section 3.9.

4.10 Socioeconomic Impacts

Socioeconomic impacts that can result from decommissioning projects include impacts to housing or schools due to an influx of additional workforce, or other impacts on the area's tax structure and distribution.

4.10.1 LTC Alternative

The workforce required to implement the LTC alternative would be limited in size (it is estimated that approximately 6 to 12 workers at any given time would be needed to consolidate the radioactive materials and construct the engineered barrier). The duration of the project is estimated to be 7 months. Some of the work will require special qualifications (e.g., knowledge of USNRC requirements) and may therefore require the import of qualified workers from other areas. Workers that do not require special qualifications should be readily available locally. Overall, the potential individual and cumulative impacts on local population, housing, and health, social, and educational services are expected to be minimal. The presence of the construction workers will result in slight increases in the amount of income taxes collected; however, since New Jersey depends heavily on property tax for funding the local tax burden, the slight increase in income taxes will have minimal, if any, local impact. Purchase of materials of

construction (e.g., soil) could provide a positive local economic benefit during the construction period.

The presence of the engineered barrier and associated institutional controls would prevent future development of the Storage Yard for commercial or industrial purposes. However, it is likely that land use across the facility will be limited to non-residential uses under CERCLA, based on the presence of chemical soil contaminants. Development of other portions of the site will also be limited by the presence of protected natural resource areas, under SMC's natural resource restoration agreement with NJDEP. Therefore, restrictions on future development of the Storage Yard will have a limited impact on the potential development of the rest of the facihty, since other restrictions to development already existing in adjacent undeveloped areas. Under USNRC guidance on the implementation of an LTC license at the SMC facility, the unrestricted portion of the property may not be sold to anyone other than the licensee. This restriction would prevent the subdivision of the restricted portions of the property from the unrestricted portions of the property, and could impact the potential future use of the industrial unrestricted portions of the property. While SMC has no plans to discontinue operations at the site, this could have socioeconomic impacts on the Borough of Newfield if it would cause the industrially-developed portions of the property to be vacant at some point in the distant future.

4.10.2 LT Altemative

The socioeconomic impacts associated with this altemative would be comparable to the LTC altemative. The workforce required to implement the LT altemative would also be limited in size (approximately 8 to 10 workers at any one time) but would be on-site for a slightly longer period of time, estimated to be two 5-month intervals spread over a period of 2 years. Some of the work will require special qualifications (e.g., knowledge of USNRC requirements) and may therefore require the import of qualified workers from other areas. Workers that do not require special qualifications should be readily available locally. The potential individual and cumulative impacts on local population, housing, and health, social, and educational services are

expected to be minimal. As with the LTC altemative, the additional construction workers will have minimal, if any, impact on local tax revenues.

By removing the radioactive materials from the SMC facility, the restrictions associated with the Storage Yard area would be lifted. However, other future site use restrictions will remain, namely a likely limitation of future use of portions of the facility for non-residential use only, due to the presence of chemical soil contamination, and prohibition of the potential development of other currently undeveloped portions of the site under SMC's natural resource restoration agreement with NJDEP. Therefore, the removal of restrictions associated with fumre development of the Storage Yard will not have a significant impact on the potential development of the currently undeveloped portions of the facility, since other limitations to development already exist over much of this area. The lack of restrictions (other than residential site use restrictions) could encourage redevelopment of the industrial portion of the facility, however, in the event that SMC would ever discontinue operations on that portion of the property.

4.10.3 LC Altemative

Under the LC altemative, the socioeconomic impacts would remain as they currently exist and the Storage Yard would remain as a restricted area. Current active operations at the SMC facihty are relatively small in scale when compared to historic facility operations; therefore, the facility does not provide significant contributions to or demands on local socioeconomic conditions. The greatest current contribution of the facility to the local economy is in the property taxes that the facility pays.

4.11 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was developed to ensure that the activities of Federal agencies "do not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination" because of their race, ethnicity, or income. The order directs each Federal agency to identify and address "disproportionately high and

adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations."

Interim environmental justice evaluation procedures to be used in the environmental review process are defined in Appendix C of NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with NMSS Programs*, as supplemented by the *Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions* (69 FR 52040, August 24, 2004). In accordance with these procedures, demographic data are reviewed to determine if minority or low-income communities live in proximity to the site, where they could be disproportionately impacted by activities at the site. For the purpose of this procedure, minorities are defined as individuals who are members of the following populations groups: Hispanic or Latino (of any race), African American (not of Hispanic or Latino origin), American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; some other race or of two or more races. "Low income" is defined as being below the poverty level as defined by the U.S. Census Bureau. The poverty level is adjusted according to family size; for example, the 1999 poverty threshold for a two-person family is $10,869 and for a four-person family it is $17,029. The U.S. Census Bureau develops statistics on persons and families below the poverty level based on the census data and those statistics were used in this evaluation.

In determining whether environmental justice issues are of concern at a given site, the USNRC uses a minority or low-income population of greater than 50% in surrounding block groups as a trigger point at which environmental justice must be considered in greater detail. The USNRC may also consider differences greater than 20 percentage points between the surrounding block groups and comparable state or county values to be significant (NUREG-1748). These guidelines are utilized herein in the evaluation of minority and low-income populations in the area surrounding the SMC facility. As described in Section 3.10.1, a 0.6-mile radius (i.e., 1 square mile) around the SMC facility has been used in the evaluation of demographic data, as specified by NUREG-1748 for facilities within city limits (the majority of the SMC facility is located in the Borough of Newfield, with the remainder of the facility located within the City of Vineland).

As indicated in Table 3-9, the combined data for the five census tract block groups (as previously identified in Section 3.10.1) within 0.6 miles of the SMC facility indicate that the "white-alone" portion of the population is 78.2% of the total population. This is greater than the "white-alone" portion of the population in Cumberland County and in the State of New Jersey. It is less than the 85.7% "white-alone" population in Gloucester County, but is not more than 20 percentage points less than the "white-alone" population of Gloucester County. Since the minority population within 0.6 miles of the SMC facility does not exceed 50% nor is it more than 20 percentage points greater than the comparable county or state levels, environmental justice is not considered to be an issue with respect to the minority populations within the census tract block groups that surround the SMC facility. Detailed data are provided in Appendix J.

With respect to low-income populations, as indicated in Table 3-11, fewer low-income persons and low-income families reside in the census tract block groups in the immediate vicinity of the SMC facility than in Gloucester or Cumberland Counties or the State of New Jersey. Only 5.7% of the persons and only 2.8% of the families residing in the census tract block groups in the immediate vicinity of the SMC facility have incomes below the poverty level. The percentages of persons in the surrounding counties and state with incomes below the poverty level are higher, ranging from 6.2% to 15%; similarly, the percentages of families with incomes below the poverty levels in the surrounding counties and state are higher, ranging from 4.3% to 11.3%. Therefore, environmental justice is not considered to be an issue with respect to low-income populations in the census tracts surrounding the SMC facility. Detailed data are provided in Appendix J.

4.12 Public and Occupational Health Effects Impacts

Public and occupational health impacts from both non-radiological and radiological sources are evaluated below for the various alternatives.

4.12.1 LTC Alternative

The area of the facility in which materials would be consolidated and the engineered barrier constructed is indicated on Figure 2-1. The nearest site boundary to the activities is the property line immediately to the north of the Storage Yard. The nearest full-time resident is located approximately 200 meters (650 feet) to the south of the Storage Yard. Figure 4-23 indicates the nearest drinking water intake, Newfield Borough well #5, located approximately 0.7 kilometers (2,200 feet) to the north of the Storage Yard. The nearest sensitive receptor (i.e., the Edgarton School) is located approximately 0.8 kilometers (0.5 miles) to the north-northwest of the Storage Yard. As described in Section 3.10.7, the nearest hospital is located at 1505 W. Sherman Avenue in Vineland, approximately 13.7 kilometers (8.5 miles) south-southwest of the SMC facility. The nearest State park to the facility (Parvin State Park) is approximately 11 kilometers (7 miles) west-southwest of the facility.

No liquid non-radioactive discharges are expected to be associated with this alternative. Application of a road stabilization material may be required to minimize dust generation on the unpaved haul roads. Such a material would be applied sparingly and would be absorbed by the road materials after application; therefore, it would not generate runoff to the Hudson Branch. The use of runoff control measures such as silt fencing, berms, etc., would prevent construction-related stormwater runoff during the implementation period.

The LTC alternative would not alter existing non-radiological soil, sediment or ground water impacts that have been defined by CERCLA site investigations, as described previously in Section 3.11.2.1. No significant non-radiological airborne impacts have been identified for existing site conditions. The existing non-radiological environmental impacts and their associated potential risks to human health (described in Section 3.11.2.2) are being addressed separately through CERCLA-based remedial actions (as described in Section 3.11.2.3).

Releases to the air associated with the construction of the LTC alternative would consist of the generation of NO_2 and particulate emissions during excavation, hauling and consolidation of the radioactive materials as well as during construction of the engineered barrier. These emissions would be as previously described in Section 4.6.2. The emissions would not result in

exceedances of NAAQS. The highest concentrations of pollutants generally would occur to the northeast of the facility. As indicated in Section 3.10.1, of the quadrants surrounding the SMC facility, the area with the smallest current population is the quadrant stretching from the southeast to the northeast of the SMC facility although, as indicated in Figures 4-2 through 4-4, emissions concentrations decrease rapidly with distance from the property line. While moderate population increases can be expected for the Newfield area in the coming years, no significant changes to the existing population are expected during or after completion of construction.

It is estimated that approximately 6 workers would be required to implement this alternative at any given time, with up to 12 required during the liner installation period (a more labor-intensive operation), and the decommissioning activities would occur over a 7-month period. Exposures to on-site workers during that period would mainly consist of exposures to fugitive dust and direct radiation associated with the excavation, transport and radioactive material consolidation activities. A detailed evaluation of potential radiological risks to on-site workers associated with such exposures is presented in Section 7.2.1.1 of the Decommissioning Plan. Cumulatively, on-site workers would be subject to the combined impacts of air emissions, direct radiation and noise. These impacts could be mitigated through the use of appropriate personal protection equipment and dust suppression materials. Potential accidents associated with construction activities are described in Section 7.2.2 of the Decommissioning Plan.

Off-site cumulative impacts would mainly consist of air emissions and noise. These impacts would be short-term impacts incurred during the 7-month construction period. Potential risks associated with off-site transportation activities are described in Section 7.2.3 of the Decommissioning Plan. Risks associated with transportation activities are limited to the risks associated with the shipment of cover materials to the site. Monitoring programs to be implemented in conjunction with this alternative are described in Section 11 of the Decommissioning Plan. A detailed evaluation of potential radiological risks to members of the public associated with the implementation of the LTC alternative is presented in Section 7.2.1.2 of the Decommissioning Plan. Due to the lack of projected impacts of the LTC alternative on

ground water quality, potable water use and use of ground water for irrigation purposes would not be impacted by this altemative.

Upon completion of the engineered barrier, implementation of the institutional controls and amendment of the existing license to an LTC license, the dose potential for on-site workers would be as shown for the Industrial Worker scenario in Section 5 of the Decommissioning Plan. The dose potential for members of the pubhc would have a maximum value of 25 milhrem TEDE.

4.12.2 LT Altemative

The areas of the facility from which existing materials would be removed and the temporary stockpiling/crushing areas were previously indicated on Figure 2-2. The proximity of these activities to the nearest site boundary, nearest full time resident, nearest public drinking water well and nearest sensitive receptors is identical to that described in Section 4.12.1 for the proposed action. Under this altemative, however, more extensive activities would be conducted in a staging area along the northem property line, since all of the on-site materials would be removed from the Storage Yard, some would be crushed, and all would be loaded onto railcars in this portion of the site.

Once the material is loaded onto railcars, it is likely it would be transported north on the Conrail tracks. Locally, the tracks pass much closer to residences, the nearest drinking water well and nearest school than the on-site activities. Also, as the train makes its way to Utah, it will pass by many other potential sensitive receptors. This would be of potential concem only in the event of an accident that would cause a release of the materials from the railcars.

As with the proposed action, no liquid non-radioactive discharges are expected to be associated with this altemative. Application of a road stabilization material may be required to minimize dust generation on the unpaved haul roads. Such a material would be applied sparingly and would be absorbed by the road materials after application; therefore, it would not generate runoff to the Hudson Branch. Under this alternative, wet suppression systems could also be required for the crusher operations, to minimize dusts generated during crushing. The use of

runoff control measures such as silt fencing, berms, etc. would prevent construction-related stormwater runoff during the implementation period.

The LT alternative would not alter existing non-radiological soil, sediment or ground water impacts that have been defined by CERCLA site investigations, as described previously in Section 3.11.2.1. No significant non-radiological airborne inipacts have been identified for existing site conditions. The existing non-radiological environmental impacts and their associated potential risks to human health (described in Section 3.11.2.2) are being addressed separately through CERCLA-based remedial actions (as described in Section 3.11.2.3).

Releases to the air would consist of the generation of particulate emissions during excavation, hauling, crushing and loading of materials onto railcars, as well as during the placement of clean soil over the Storage Yard once all radioactive materials are removed. These emissions would be as previously described in Section 4.6.3. The emissions would be expected to result in exceedances of NAAQS for both the annual NO_2 and the twenty-four hour PM_{10} averaging periods. The highest predicted concentrations are attributable to emissions from the staging area, where rock crushing and rail car loading will occur, despite the assumed use of water spray emission controls on the rock crusher. When cumulative air impacts of the LT alternative are considered along with nearby emissions sources and background concentration, the predicted concentrations exceed the NAAQS for all regulatory averaging periods for NO_2 and PM_{10}. With this alternative, the greatest concentrations would generally occur along the northern and eastern property lines. As indicated in Section 7 of the Decommissioning Plan, of the quadrants surrounding the SMC facility, the area with the largest current population is to the north of the SMC facility, while the area with the smallest current population is to the east of the SMC facility. As indicated in Figures 4-6 through 4-7, concentrations decrease rapidly with distance from the property line. While moderate population increases can be expected for the Newfield area in the coming years, no significant changes to the existing population are expected during or after completion of construction.

It is estimated that approximately 8 to 10 workers would be required to implement this alternative, and the decommissioning activities would bccur over 5 months over each of two

years. Exposures to on-site workers during that period would mainly consist of exposures to fugitive dust and direct radiation associated with the excavation, transport, crushing and loading of the radioactive material onto railcars. A detailed evaluation of potential risks to on-site workers associated with such exposures is presented in Section 7.2.1.1 of the Decommissioning Plan. Cumulatively, on-site workers would be subject to the combined impacts of air emissions, direct radiation and noise, each of which would be greater under the LT alternative than under the proposed action. These impacts could be mitigated through the use of appropriate personal protection equipment. Potential accidents associated with construction activities are described in Section 7.2.2 of the Decommissioning Plan.

Off-site cumulative impacts would mainly consist of air emissions and noise. These impacts would be short-term impacts incurred during the 5-month construction period over each of two years. Potential risks associated with off-site transportation activities are described in Section 7.2.3 of the Decommissioning Plan. Risks associated with transportation activities would include the risks associated with the rail shipment of the radioactive materials to the disposal facility in Utah as well as the shipment of soil cover materials to the site. Monitoring programs to be implemented in conjunction with this alternative would be similar to those described in Section 11 of the Decommissioning Plan. A detailed evaluation of potential radiological risks to members of the public associated with the implementation of the LT alternative is presented in Section 7.2.1.2 of the Decommissioning Plan. Due to the lack of projected impacts of the LT alternative on ground water quality, potable water use and use of ground water for irrigation purposes would not be impacted by this alternative.

Under this alternative, future use of the Storage Yard would be unrestricted from a radiological standpoint. However, site use restrictions associated with the resolution of CERCLA issues as well as natural resource damage issues at the facility would limit the potential feasibility of developing currently undeveloped portions of the facility.

4.12.3 LC Alternative

The LC alternative would not result in any changes from existing site conditions. The proximity of the radioactive materials to the nearest site boundary, nearest full time resident, nearest public drinking water well and nearest sensitive receptors would be essentially identical to that described in Section 4.12.1 for the proposed action. The only difference would be that the materials would remain spread over a larger area and would not be contained, as they are under the proposed action.

The LT alternative would not alter existing non-radiological soil, sediment or ground water impacts that have been defined by CERCLA site investigations, as described previously in Section 3.11.2.1. No significant non-radiological airborne impacts have been identified for existing site conditions. The existing non-radiological environmental impacts and their associated potential risks to human health (described in Section 3.11.2.2) are being addressed separately through CERCLA-based remedial actions (as described in Section 3.11.2.3).

This alternative would not be associated with any changes in terms of liquid discharges to water or new discharges to air. Radiological risks to on-site workers and members of the public associated with the LC alternative are discussed in detail in Sections 7.2.1.1 and 7.2.1.2 of the Decommissioning Plan, respectively.

4.13 Waste Management Impacts

This section includes an evaluation of the potential impacts of the proposed action and alternatives on waste generation and management.

4.13.1 LTC Alternative

The LTC alternative is not expected to result in the generation of significant amounts of waste requiring off-site management. By consolidating the radioactive materials beneath an engineered barrier on-site, there will be minimal, if any, impact on off-site waste management systems. Additional waste materials potentially generated under this alternative include personal protection equipment wastes (e.g., disposable protective clothing), which would be minimal.

4.13.2 LT Altemative

Under the LT alternative, the radioactive materials will be transported to Envirocare, Inc., in Utah for final disposal. The Envirocare facility is a licensed waste disposal facility with sufficient capacity to receive the described waste materials. However, use of the facility's capacity to accept these materials will ultimately reduce its ability to receive wastes from other waste sources. Additional waste materials potentially generated under this altemative include personal protection equipment wastes (e.g., disposable protective clothing), which would be minimal.

4.13.3 LC Altemative

Under the LC altemative, waste disposal activities would remain the same as they currently are, as previously described in Section 3.12.

5.0 MITIGATION MEASURES

Mitigation measures are those measures taken to minimize adverse impacts, such as the impacts of construction activities or potential post-closure actions. Mitigation measures associated with each of the altematives are outlined below

5.1 LTC Altemative

- The development and implementation of effective health and safety measures to maintain a safe environment during constmction (see Section 10 of the Decommissioning Plan).

- The development and implementation of a Quality Assurance program to assure that decommissioning activities are performed in a manner consistent with the Decommissioning Plan, regulatory requirements and license conditions (see Section 13 of the Decommissioning Plan).

- The development and implementation of an environmental monitoring and control program to reduce exposures to radioactive materials and direct radiation (see Section 11 of the Decommissioning Plan). Such a program will include the following:

  - Sediment control measures, including run-on and run-off control measures utilizing perimeter drainage swales, silt fences, hay bales and other stormwater and erosion control features, as necessary.

  - Dust suppression measures, such as water spray, calcium chloride, or other dust suppression materials, to minimize the release of airbome materials from licensed material excavation, transport and consolidation activities

  - Air monitoring to monitor dust generation in the work area and at the perimeter of the Storage Yard;

- The development and implementation of a long-term maintenance, monitoring and institutional control program that will ensure the engineered barrier is adequately maintained following construction and to ensure that institutional controls limiting future site use are enforced (see Section 16.4 of the Decommissioning Plan). Such a program will include the following:

  - Radiation monitoring program;

- Inspection program to ensure the integrity of the vegetative cover, engineered barrier, associated surface water management systems and site security;

- Maintenance of the vegetative cover, engineered barrier integrity and surface water management systems) and site security measures;

- Implementation of deed restrictions and maintenance of associated land use restrictions; and

- Maintenance of the LTC license.

5.2 LT Altemative

- The development and implementation of effective health and safety measures to maintain a safe environment during construction.

- The development and implementation of a Quality Assurance program to assure that decommissioning activities are performed in a manner consistent with the Decommissioning Plan, regulatory requirements and license conditions.

- The development and implementation of an environmental monitoring and control program to reduce exposures to radioactive materials and direct radiation during decommissioning. Such a program would include the following:

  - Sediment control measures, including run-on and run-off control measures utilizing perimeter drainage swales, silt fences, hay bales and other stormwater and erosion control features, as necessary.

  - Dust suppression measures, such as water spray, calcium chloride, or other dust suppression materials, to minimize the release of airbome materials from licensed material excavation, transport and material management (crushing, railcar loading) activities

  - Air monitoring to monitor dust generation in the work area and at the perimeter of the Storage Yard;

- The development and implementation of a transportation and contingency program, to ensure that the waste hauler (i.e., rail carrier) is knowledgeable of the hcensed materials being carried, the associated health and safety/spill prevention and control issues and actions to be taken in the event of a transportation accident

during shipment of the radioactive materials to the off-site disposal facihty in Utah.

5.3 LC Altemative

No mitigation measures would be associated with the LC alternative.

6.0 ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

This section presents environmental measurement and monitoring programs that would be associated with each alternative relative to baseline, operation and decommissioning conditions for each of the alternatives.

6.1 Radiological Monitoring

General descriptions of the radiological monitoring to be conducted under each alternative except the LC alternative are presented below. A detailed description of radiological monitoring for the LTC alternative is provided in Section 11 of the Decommissioning Plan. A program similar in scope would be implemented for the LT alternative, with the exception that the monitoring program would cover activities conducted in both the Storage Yard area and the staging area. The subsections that follow this general discussion are specific to the individual alternatives.

The purposes of radiological monitoring would be to:

- protect the health and safety of workers;
- protect the health and safety of the general public; and
- demonstrate comphance with applicable license, federal and state requirements, as well as decommissioning plan commitments.

The primary effluent discharges during the decommissioning process are assumed to be airborne in nature and associated with excavation, dumping, shaping, crushing and other licensed material management activities. Therefore, the main potential exposure pathways under each of the alternatives would include the following:

- direct radiation exposure;
- particulate inhalation; and
- direct ingestion.

Under each of the alternatives except the LC alternative, air surveys would be conducted during decommissioning. Radiation safety personnel would be assigned to the project to conduct

the surveys in a manner suitable for the nature and range of anticipated hazards. Routine surveys would be conducted at a specified frequency to ensure that contamination and radiation levels in unrestricted areas do not exceed license, federal, state or site limits. Surveys would also be conducted whenever work activities create a potential change in radiological conditions. Based upon knowledge of the radiological constituents present at the site and existing exposure rates, it is expected that maximum individual personnel exposures will not exceed 500 millirem total effective dose equivalent (TEDE) during decommissioning activities in any single year for the proposed action and for the LT altemative. As required in 10 CFR 20.1502, the need for individual monitoring for intemal and extemal exposures would be determined and documented prior to the start of work based on existing data. Even if individual monitoring were not required, it may nonetheless be implemented at the discretion of the Site Health and Safety Officer (HSO) or tine SMC Radiation Safety Officer (RSO).

An air sampling program would be conducted, generally consisting of collecting samples at locations representative of actual effluent releases, with the wind direction taken into consideration in air sampler positioning. Air sampling equipment is described in Section 10 of the Decommissioning Plan. Sampling frequencies and changes will be determined based on the radiological and physical condition of the work location, worker stay tinies and type of air sampling performed. Sampling frequencies and locations are described in more detail in Section 11.2 of the Decommissioning Plan.

Sampling will define basehne values and operational conditions. Sampling durations will be determined prior to the start of sample collection based on how routinely or non-routinely the area is occupied, the likelihood of exceeding a predetermined percentage of a derived air concentration (DAC) or DAC-hour exposure, the length of time required by the operating activity and any other conditions, as warranted. The minimum detectable concentration (MDC) will also be a determining factor for sampling duration and will be evaluated prior to sample collection. MDC will be based on 10% of the specified DAC. Other details on the air sampling program are provided in Section 10 of the Decommissioning Plan. Quahty assurance issues are addressed in Section 13 of the Decommissioning Plan.

6.1.1 LTC Alternative

For the proposed action, the majority of the construction activities will be conducted in the Storage Yard (see Figure 2-1). Therefore, the Storage Yard area would be the main focus of radiological monitoring activities. Details on the air monitoring program are provided in the Decommissioning Plan, including air sampling equipment (Section 10), frequencies and locations (Section 11), and quality assurance measures (Section 13).

6.1.2 LT Alternative

Under the LT alternative, constmction activities would occur in both the Storage Yard and in the temporary staging/crushing and railcar loading area, as indicated Figure 2-2. These areas would be the focus of radiological monitoring activities. Monitoring activities would be comparable to those described in the Decommissioning Plan for the LTC alternative (see Section 6.1.1 above) except that they would be expanded to monitor both the Storage Yard area and the staging area.

6.1.3 LC Alternative

Existing radiological monitoring programs would continue under the LC altemative.

6.2 Physicochemical Monitoring

As described in Section 6.1, effluents associated with the proposed action and other altematives are expected to be limited to airborne discharges associated with excavation, dumping, shaping, crushing and other licensed material management activities. Therefore, physicochemical monitoring will be linuted to potential air monitoring conducted in association with the licensed material management activities. The air monitoring program described in Section 6.1 above will incorporate both radiological and physicochemical monitoring. Therefore, refer to Section 6.1 for the details of the monitoring program.

6.3 Ecological Monitoring

As described in the discussion of the ecological impacts of the proposed action and other alternatives presented in Section 4.5, none of the alternatives are expected to result in any significant impacts to ecological resources. Therefore, no ecological monitoring is proposed in association with any of the alternatives evaluated.

7.0 COST-BENEFIT ANALYSIS

This section presents an analysis of the costs and benefits associated with the proposed action and each alternative. Both quantitative economic costs and benefits and qualitative environmental costs and benefits are considered.

7.1 LTC Alternative

The estimated present worth economic cost associated with the LTC alternative is presented in Table 7-1. The total cost includes both the capital costs of construction, estimated to be approximately $3,300,000, and the long-term maintenance and monitoring costs associated with the stabilized pile. Based on a discount rate of 3%, the total estimated present worth cost is approximately $5,200,000. As discussed in Section 4.10.1, economic benefits associated with this alternative are not expected to be significant. There may be a local economic benefit associated with the purchase of the materials needed to construct the engineered barrier.

Qualitative environmental costs and benefits associated with the proposed action were previously summarized in Table 2-1. A cost-benefit analysis of the LTC alternative is also presented in Section 7.4 of the Decommissioning Plan.

7.2 LT Alternative

The estimated present worth economic cost associated with the LT alternative is presented in Table 7-2. No long-term maintenance and monitoring costs are associated with this alternative, as there would be no use restrictions associated with the Storage Yard following the removal of the licensed materials. The total estimated present worth cost is approximately $58,000,000. As discussed in Section 4.10.2, economic benefits associated with this alternative are not expected to be significant.

Qualitative environmental costs and benefits associated with the LT alternative were previously summarized in Table 2-1. A cost-benefit analysis of the LT alternative is also presented in Section 7.4 of the Decommissioning Plan.

7.3 LC Alternative

The costs associated with the LC alternative are limited to the costs associated with USNRC fees and continued monitoring activities, as required under the current license. Based on a discount rate of 3%, the total estimated present worth cost is approximately $2,700,000. The environmental costs and benefits associated with the LC alternative were previously summarized in Table 2-1.

8.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

This section summarizes the following, as applicable, for each of the alternatives:

- Unavoidable adverse environmental impacts;
- Irreversible and irretrievable commitments of resources used in project construction, operation and decommissioning;
- Short-term and long-term impacts; and
- Short-term uses of the environment and the maintenance and enhancement of long-term productivity.

8.1 LTC Alternative

This alternative would result in the long-term presence of licensed materials at the SMC facility, but under the protective conditions offered by the engineered barrier to be placed over the materials and under the terms of the legally enforceable and durable institutional controls. No unavoidable adverse environmental impacts were identified, as the stabilization of the piles will improve on-site environmental conditions, with minimal adverse impacts during construction. Commitments of resources associated with this alternative include the commitment of approximately 19,000 cubic meters (25,000 cubic yards) of soil material for the engineered barrier system, along with approximately 1.85 hectares (4.5 acres) of geomembrane material, as well as the energy costs of consolidating materials within the Storage Yard and constmcting the cover system. Short-term impacts include slight increases in noise, traffic levels and air emissions during construction. No exceedances of NAAQS are predicted. Long-term impacts include potential improvements to stormwater quality, since the licensed materials will no longer be directly exposed to precipitation, long-term improvements to the ecological value of the Storage Yard and the improved aesthetics of the Storage Yard from those on-site locations where it is yisible. After construction is complete, long-term land-use controls will be required to prevent future development, which will be in keeping with other CERCLA-related and natural resource restoration-related land use controls required for other areas of the facility. Long-term restrictions on the use of the Storage Yard would also be in keeping with long-term hmited growth/conservation land use goals for the area. Since the majority of the decommissioning activities will occur in the Storage Yard, there will be minimal changes in short-term uses of the

environment from those that are existing. Limitations on the future use of the Storage Yard will ensure that the area continues to provide an ecological habitat value in the future. Under USNRC guidance on the implementation of an LTC license at the SMC facility, the unrestricted portion of the property may not be sold to anyone other than the licensee. This restriction would prevent the subdivision of the restricted portions of the property from the unrestricted portions of the property, and could impact the potential future use of the industrial unrestricted portions of the property. While SMC has no plans to discontinue operations at the site, this could have socioeconomic impacts on the Borough of Newfield if it would cause the industrially-developed portions of the property to be vacant at some point in the distant future.

8.2 LT Alternative

For the LT alternative, the licensed materials would be contained in an off-site disposal facility where the engineered containment features of the facility will limit any unavoidable adverse impacts. To implement this alternative, existing vegetation along the northern property line of the facility would have to be removed to rehabilitate and extend the existing railroad spur and support the transport of the licensed materials off-site by railcar. Irreversible commitments of resources would include the energy required to transfer the licensed materials to railcars, crush oversize materials, transport the materials to Utah for disposal and ultimately construct a cover system over the Utah disposal area. Short-term impacts include slight increases in noise and rail traffic and increases in air emissions levels during construction. Even with the implementation of dust suppression measures, exceedances of NAAQS are expected under this alternative, due to the added crushing and rail car loading activities, as well as the required removal of all the radioactive materials from the Storage Yard. Long-term positive impacts include potential improvements to stormwater quality, since the licensed materials will no longer be exposed to precipitation, while adverse impacts would include adverse ecological impacts associated with the destruction of existing vegetation along the northern boundary of the facility to support the rehabilitation/extension of the existing rail spur. Long-term impacts on the ecological value and aesthetics of the Storage Yard after removal of the licensed materials are hard to predict, as

future land use restrictions would be removed and the area could be redeveloped for industrial purposes. With the required improvement to the rail line along the northern border of the site and the potential added redevelopment value it would provide to both the SMC manufacturing area and the decommissioned Storage Yard, it is possible that the short-term impacts to the environment along the rail spur and in the temporary staging/crushing area could become long-term changes to the environment. As mentioned previously, following decommissioning, the Storage Yard could be redeveloped for future industrial use.

8.3 LC Alternative

Under the LC alternative, the Storage Yard materials would remain as-is indefinitely. While there are minimal unavoidable adverse environmental impacts and commitments of resources associated with the LC alternative, without assured long-term maintenance of the stormwater and access controls, there is a potential for future adverse impacts to public health and the environment.

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10.0 LIST OF PREPARERS

The list of preparers is provided at the end of this document.

TABLE 1-1
STORED MATERIAL VOLUME ESTIMATES
Shieldalloy Metallurgical Corporation

Area	Parcel	Volume (cy)	Volume (m^3)
1	Excavated soil mixed with slag	15,000	11,000
2	Excavated soil from D111	1,000	800
3	Canal slag (in and out of Supersacs)	3,000	2,300
4	Slag	30,000	23,000
5	Slag & demolition concrete	5,000	3,800
6	Hi-Ratio Slag	2,000	1,500
7	Hi Ratio Slag & D111 Flex Kleen Bags & D116 Polishing Compound Contaminated Equipment & Cleaning	1,000	800
8	Baghouse Dust	13,000	10,000
9	Baghouse dust mixed with slag	4,000	3,100
10	D111/D112 concrete	500	400
12	D111/D112 concrete	1,500	1,100
	Total Estimated Volume:	76,000	57,800

See Figure 1-6 for locations of stored material areas
Estimated volumes based on 2005 topography and assumed natural soil topography beneath the piles.

TABLE 1-2
POTENTIALLY APPLICABLE REGULATORY REQUIREMENTS AND CONSULTATIONS
SHIELDALLOY METALLURGICAL CORPORATION

FEDERAL STATUTE OR REQUIREMENT	REGULATION OR GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Clean Air Act	Emissions Standards for New Source Performance Standards (NSPS) (40 CFR 60)	Requires Best Available Control Technology (BACT) for new sources, and sets emissions limitations.	No source or industry categories applicable to the proposed action.
Clean Air Act	Emissions Standards for Hazardous Air Pollutants (NESHAPS) (40 CFR 61)	Establishes emissions limitations for hazardous air pollutants.	No source or industry categories applicable to the proposed action.
Clean Water Act	Ambient Water Quality Criteria (AWQC) (40 CFR 131.36(b)(1))	Non-enforceable guidelines established for the protection of human health and/or aquatic organisms.	While AWQC would be applicable to discharges to surface water, no discharges expected to be associated with proposed action
Clean Water Act	Effluent Discharge Limitatipns (40 CFR 401.15)	Regulates the discharge of contaminants from an industrial point source.	No surface water discharges covered by these regulations are expected to be associated with the proposed action.
Resource Conservation and Recovery Act (RCRA)	Hazardous Waste Determination - Toxicity Characteristic (40 CFR 261.24)	Establishes maximum concentrations of contaminants for the toxicity characteristic using the test method described in 40 CFR 261 Appendix II.	Applicable to the determination of whether soils, if excavated, require handling as a hazardous waste.
Resource Conservation and Recovery Act (RCRA)	Land Disposal Restrictions (40 CFR 268)	Establishes maximum concentrations of contaminants on the basis of which hazardous wastes are restricted from land disposal.	This regulation will be applicable to any off-site disposal of soil determined to be a hazardous waste.

TABLE 1-2
POTENTIALLY APPLICABLE REGULATORY REQUIREMENTS AND CONSULTATIONS
SHIELDALLOY METALLURGICAL CORPORATION

FEDERAL STATUTE OR REQUIREMENT	REGULATION OR GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Wetlands --			
Executive Order 11990	Protection of Wetlands	Regulates activities conducted in a wetland area to minimize the destruction, loss or degradation of the wetlands.	While wetlands are located along the southern edge of the SMC facility, the proposed action is not expected to impact the wetland areas.
Wetlands	Wetlands Construction and Management Procedures (40 CFR 6, Appendix A)	Sets forth EPA policy for carrying out the provisions of Executive Order 11900 (see above).	While wetlands are located along the southern edge of the SMC facility, the proposed action is not expected to impact the wetland areas.
Clean Water Act	Section 404 - Prohibition of Wetland Filling (40 CFR 230, 33 CFR 320-330)	Prohibits the discharge of dredged or fill material to a wetland without a permit issued by the Corps of Engineers	While wetlands are located along the southern edge of the SMC facility, the proposed action is not expected to impact the wetland areas.
Floodplains --			
Executive Order 11988	Protection of Floodplains	Regulates activities conducted in a floodplain to minimize adverse effects to the floodplain and ensures that flood hazards have been considered.	The 500-year floodplain associated with the Hudson Branch is not expected to be impacted by the proposed action.
Flood Disaster Protection Act of 1973	Disaster Prevention	Regulates development in flood prone areas under FEMA.	The 500-year floodplain associated with the Hudson Branch is not expected to be impacted by the proposed action.
Wildlife --			
Fish and Wildlife Coordination Act (16 USC 661)	Protection of Wildlife Habitats	Prevents the modification of a stream or a river that affects fish or wildlife.	While the Hudson Branch is located along the southern edge of the SMC facility, the proposed action is not expected to impact the stream.

TABLE 1-2
POTENTIALLY APPLICABLE REGULATORY REQUIREMENTS AND CONSULTATIONS
SHIELDALLOY METALLURGICAL CORPORATION

FEDERAL STATUTE OR REQUIREMENT	REGULATION OR GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Historic Places-- National Historic Preservation Act of 1966, as Amended (16 USC 470, et seq.)	Protection of Historic Places	Requires actions to take into account effects on properties included in or eligible for the National Register of Historic Places and minimizes harm to National Historic Landmarks.	The glass stack on the SMC facility has been identified as a potentially significant cultural resource through consultatipn with the State Historic Preservation Office. The proposed action is not expected to impact the glass stack or any other areas of the facility with a potential for historic or prehistoric significance.
Archaeological and Historic Preservation Act (16 USC 469a-1)	Protection of Historic and Archaeological Data	Provides for preservation of historic or archaeological data that might be lost due to alterations of the terrain in connection with any Federally-approved project.	No known historic or archaeological sites or data will be impacted by the proposed action.
Farmlands-- Farmland Protection Policy Act (7 USC 4201 et seq.)	Protection of Significant/ Important Agricultural Lands	Requires evaluation of direct and indirect effects of actions on remaining farms and farm support sources.	While areas designated as Prime Farmiands are located in the vicinity of the SMC facility, the proposed action is not expected to impact these lands.
Indian Tribes -- Executive Order 13175	Coordination with Indian Tribal Officials	Requires coordination and consultation with tribal officials for activities that have tribal implications	Proposed action will not involve actions with tribal implications.
Minority and Low Income Populations -- Executive Order 12898	Identify and mitigate environmental impacts on minority and low income populations	Identify and mitigate significant and adverse impacts on minority and low income populations	Minority populations in the vicinity of the SMC facility are considered herein; based on analysis, no disproportionate impacts on minority/low income populations identified.

TABLE 1-2
POTENTIALLY APPLICABLE REGULATORY REQUIREMENTS AND CONSULTATIONS
SHIELDALLOY METALLURGICAL CORPORATION

FEDERAL STATUTE OR REQUIREMENT	REGULATION OR GUIDANCE	SYNOPSIS	ARPLICABILITY TO SITE CONDITIONS
Endangered Species Act of 1973, as Amended (16 USC 1531)	Section 7 of the Endangered Species Act	Identification and protection of threatened or endangered species	Consultation with the NJDEP Natural Heritage Database and US Fish and Wildlife Service identified the potential presence of the eastern box turtle, a New Jersey state species of special concern at the SMC facilify.
Sole Source Aquifer -- Safe Drinking Water Act (40 CFR 149)	Protection of Ground Water Used for a Potable Water Supply	Provides protection of designated aquifers from actions by federally-funded programs	The SMC facility is located within the New Jersey Coastal Plan Aquifer, an EPA designated sole-source aquifer; proposed action not expected to adversely impact aquifer use.
Rivers and Harbors Act of 1899	Section 10 of the Rivers and Harbors Act	Requires a permit from the Army Corps of Engineers for work within navigable waters	Proposed action does not include work within navigable waters.
Hazardous Materials Transportation Act	Rules for Transportation of Hazardous Materials (49 CFR 170 - 178)	Procedures for packaging, labeling, manifesting, and off-site transport of hazardous materials.	These regulations are applicable to off-site shipments of hazardous materials, including radioactive material.
Occupational Safety and Health Act	Various sections, including - Recordkeeping, Reporting and Related Regulations (29 CFR 1904) - General Industry Standards (29 CFR 1910) - Safety and Health Standards (29 CFR 1926)	Outlines recordkeeping and reporting requirements. Establishes requirement for 40-hour training and medical surveillance of hazardbus waste workers. Regulations specify the type of safety equipment and procedures for site remediation/excavation.	OSHA regulations are generally applicable to all non-radioactive occupational hazards. For decommissioning activities at the SMC facility, the sections of OSHA most likely to be applicable are those related to potential chemical hazards presented by non-radioactive materials (e.g., potential exposures to soils which contain inorganic contaminants but which do not pose a radioactive threat).

TABLE 1-3
EXISTING PERMITS
SHIELDALLOY METALLURGICAL CORPORATION

REGULATORY AGENCY/DEPT.	PERMIT TYPE	TYPE OF DISCHARGE	ISSUANCE/ AMENDMENT DATE	LICENSE/PERMIT NUMBER	NOTES
NJDEP Air Quality Permitting Program	Minor Facilities and Pre-Construction Permit	Department 101 Gyrocrusher	March 2002	PCP020001	
NJDEP-Division of Water Quality	NJPDES/DSW	Treated ground water and stormwater	12/10/2002	NJ0004103	Includes discharge of untreated stormwater, which is regulated under stormwater discharge general permit NJ0088315
US Nuclear Regulatory Commission	Radioactive Materials License	NA	11/4/2002	SMB-743	

TABLE 2-1
SUMMARY OF PREDICTED ENVIRONMENTAL IMPACTS

	PROPOSED ACTION (LTC ALTERNATIVE)		OFF-SITE DISPOSAL WITH LICENSE TERMINATION (LT) ALTERNATIVE		LICENSE CONTINUATION (LC) ALTERNATIVE (NO ACTION)	
	BENEFITS	ADVERSE IMPACTS	BENEFITS	ADVERSE IMPACTS	BENEFITS	ADVERSE IMPACTS
Land Use	• Maintenance of area covered by engineered barrier as an undeveloped green area would be in keeping with limited growth/conservation land use planning goals established for the area • With respect to cumulative impacts, land use restrictions would be in keeping with natural resource restoration restrictions applicable to adjacent areas of the facility	• The Decommissioning Plan indicates that, if conditions warrant, the unrestricted portion of the site may be sold. Under USNRC guidance, the unrestricted portion of the property may not be sold to anyone other than the licensee. Conforming with this guidance would prevent the subdivision of the restricted portions of the property from the unrestricted portions of the property and could impact the potential future use of the industrial unrestricted portions of the property, should they ever be vacated.	• None identified	• Requires additional industrial development (e.g., construction of railroad spur) which, in combination with a lack of future land use restrictions in Storage Yard area, could result in additional industrial development of the site, such development would not be in keeping with limited growth/conservation land use goals for area or restrictions on future site use in adjacent natural resource restoration areas	• None identified	• Does not support limited growth/conservation land use planning goals for area
Transportation	• No off-site transport of licensed materials required	• Minimal local short-term off-site transportation impacts (only those associated with transport of materials for the engineered barrier to the site)	• None identified	• Requires long-distance rail transport of licensed materials to disposal facility in Utah; therefore, transportation impacts a much larger area than the proposed action • Minimal impacts to local rail service would result • Minimal local short-term off-site transportation impacts would be associated with the transport of clean soil cover materials to the site	• Involves no short-term impacts to local transportation systems	• None identified
Geology and Soil	• None identified	• None identified	• Licensed materials are removed from the facility, thereby permanently removing them from being the source of any potential geologic or soil impacts	• None identified	• None identified	• Uncovered piles remain a potential erosion source
Water Resources	• Potential reduction in future impacts to water quality associated with stormwater runoff from existing uncovered Storage Yard materials	• None identified	• Potential reduction in future impacts to water quality associated with stormwater runoff from existing uncovered Storage Yard materials	• None identified	• None identified	• Potential for impacts to surface water quality due to stormwater runoff from uncovered piles remains

TABLE 2-1
SUMMARY OF PREDICTED ENVIRONMENTAL IMPACTS

	PROPOSED ACTION (LTC ALTERNATIVE)		OFF-SITE DISPOSAL WITH LICENSE TERMINATION (LT) ALTERNATIVE		LICENSE CONTINUATION (LC) ALTERNATIVE (NO ACTION)	
	BENEFITS	ADVERSE IMPACTS	BENEFITS	ADVERSE IMPACTS	BENEFITS	ADVERSE IMPACTS
Ecological Resources	• Barten area with minimal ecological resource value transformed into a vegetated area with greater habitat value • Due to long-term maintenance requirements, stabilized material area will retain its ecological value for years to come • Habitat value of stabilized pile will complement surrounding natural resource restoration areas where upland forested habitat is being provided	• None identified	• Barren area with minimal ecological resource value transformed into a vegetated area with greater habitat value; however, lack of future use restrictions does not guarantee long-term ecological value of area	• Construction/rehabilitation of railroad spur will require removal of existing dense vegetation along former rail line	• Involves no construction-related adverse impacts to existing habitat	• Existing stored materials continue to offer poor ecological habitat value
Air Quality	• Placement of engineered barrier over currentiy uncovered licensed materials will eliminate potential future emissions from the surface of the materials	• Reshaping of materials prior to placement of the engineered barrier and the placement of the soil materials associated with the engineered barrier will result in some increased air emissions, although National Ambient Air Quality Standards (NAAQS) will not be exceeded	• Removal of currently uncovered licensed materials will eliminate potential future emissions from the surface of the materials	• All licensed materials will require excavation, transport to railcar loading area, and, in some cases, crushing of oversize materials, thereby resulting in increased emissions over the short-term; Emissions would be greater than those that would occur under the proposed action and would exceed the NAAQS	• No short-term increases in emissions associated with the LC alternative	• Potential for future emissions associated with exposed materials in Storage Yard would remain
Noise	• During construction, USEPA recommended maximum noise level for school yards and playgrounds would not be exceeded • No noise impacts would be associated with the stabilized area over the long-term	• Increased noise levels would occur temporarily during the 7-month construction period, although leyels will be below maximum levels measured during baseline monitoring	• During construction, USEPA recommended maximum noise level for school yards and playgrounds would not be exceeded • No noise impacts would be associated with this alternative immediately following material removal • Long-term noise impacts would depend on future use of the former Storage Area, once it is no longer a restricted area	• Increased noise levels would occur temporarily during the two 5-month construction periods spread over 2-years, although levels will be below maximum levels measured during baseline monitoring • Use of additional equipment (e.g., crusher, locomotives) results in slightly higher noise levels when compared to proposed action	• No short-term or long-term increases in noise levels associated with the LC alternative	• None identified

TABLE 2-1
SUMMARY OF PREDICTED ENVIRONMENTAL IMPACTS

	PROPOSED ACTION (LTC ALTERNATIVE)		OFF-SITE DISPOSAL WITH LICENSE TERMINATION (LT) ALTERNATIVE		LICENSE CONTINUATION (LC) ALTERNATIVE (NO ACTION)	
	BENEFITS	ADVERSE IMPACTS	BENEFITS	ADVERSE IMPACTS	BENEFITS	ADVERSE IMPACTS
Historic and Cultural Resources	• Aesthetics of facility would be slightly improved, but the surrounding facility would still remain a very industrial setting, in keeping with the nature of the glass stack, an industrial feature of the facility that is eligible for the National Register • Long-term maintenance and monitoring requirements associated with the stabilized area would ensure that future neglect of the area would not occur	• None identified	• Lack of future site use restrictions in former Storage Yard area could result in redevelopment; potential impacts of future redevelopment on cultural resources cannot be defined	• Lack of future site use restrictions in former Storage Yard area could result in redevelopment; potential impact of future redevelopment on cultural resources cannot be defined • Off-site accident during transport of licensed materials to Utah or reuse facility could potentially adversely impact historic or cultural resources	• Lack of construction activities results in no short-term adverse impacts on cultural resources	• Potential for future emissions associated with exposed materials in Storage Yard area would continue
Visual/Scenic Resources	• Vegetated stabilized area would be more aesthetically pleasing than existing barren Storage Yard area • Visibility of stabilized pile is limited to on-site site locations	• None identified	• Once licensed materials are removed, the Storage Yard area would be more aesthetically pleasing than existing barren piles • Visibility of the Storage Yard area is limited fo on-site site locations • Visual resource costs/benefits associated with potential future development of Storage Yard area cannot be evaluated without a specific future use defined	• Visual resource costs/benefits associated with potential future development of Storage Yard area cannot be evaluated without a specific future use defined	• None identified	• Existing barren piles remain in Storage Yard area, but visibility is limited to locations on the SMC facility
Socioeconomic Impacts	• Minimal economic benefits to surrounding community due to limited construction work force and limited construction period (7 months) • Some local economic benefits could result from the purchase of materials for the construction of the engineered barrier	• Future use restrictions in Storage Yard area would prevent future development of the area for more economically productive purposes; however, other development restrictions already exist in adjacent areas of the facility, so cumulative impact may not be significant • The Decommissioning Plan indicates that, if conditions warrant, the unrestricted portion of the site may be sold. Under USNRC guidance, the unrestricted portion of the property may not be sold to anyone other than the licensee. Conforming with this guidance would prevent the subdivision of the restricted portions of the property from the unrestricted portions of the property and could impact the potential future use of the industrial unrestricted portions of the property, should they ever be vacated.	• Minimal economic benefits to surrounding community during implementation, due to limited construction work force and limited construction period (two 5-month periods spread over 2 years) • Lack of future restrictions in Storage Yard area enhance potential future economic development of the area; other development restrictions associated with CERCLA and natural resource restoration issues would limit the overall areal extent of development in this area, however	• There will be no or limited local economic benefits associated with the transport and off-site disposal of the licensed materials	• None identified	• Storage Yard area would remain as a restricted area

TABLE 2-1
SUMMARY OF PREDICTED ENVIRONMENTAL IMPACTS

	PROPOSED ACTION (LTC ALTERNATIVE)		OFF-SITE DISPOSAL WITH LICENSE TERMINATION (LT) ALTERNATIVE		LICENSE CONTINUATION (LC) ALTERNATIVE (NO ACTION)	
	BENEFITS	ADVERSE IMPACTS	BENEFITS	ADVERSE IMPACTS	BENEFITS	ADVERSE IMPACTS
Public Health and Safety	• Minimal off-site impacts to public health and safety	• None identified	• Minimal off-site impacts to public health and safety expected	• Greater potential for off-site impacts to public health and safety due to off-site transport of licensed materials to Utah for disposal and potential for accidents during transport	• Involves no short-term off-site impacts associated with construction	• No reduction in potential future emissions from the Storage Yard area would be achieved
Waste Management	• Does not consume available radioactive waste disposal capacity	• None identified	• None identified	• Consumes available radioactive waste disposal capacity	• Does not consume available radioactive waste disposal capacity	• None identified

TABLE 3-1
SEDIMENTARY SEQUENCE OF UNCONSOLIDATED SEDIMENTS
GLOUCESTER COUNTY, NEW JERSEY

SERIES	FORMATION	LITHOLOGY	THICKNESS (feet)
Pleistocene	Bridgeton Formation	Sand and Gravel	0-28
Tertiary	Cohansey Sand	Sand, Clay and Gravel	0-130
	Kirkwood Formation	Sand, Clay, Some Gravel	50-160
	Mansaquan Formation	Sand and Clay, Glauconitic	0-25
	Vincentown Formation	Limy Sand and Limestone	0-55
	Homerstown Sand	Clay and Sand, Glauconitic	8-30
Upper Cretaceous	Navensink Formation	Clay and Sand, Glauconitic	0-40
	Mount Laurel Sand	Sand, Medium to Coarse, Glauconitic	65-95
	Wenonah Formation	Sand, Fine to Mediurn, Micaceous	
	Marshalltown Formation	Clay, Sandy in Places, Glauconitic	10-40
	Englishtown Formation	Sand, White and Yellow, Micaceous, Slightly Glauconitic	0-50
	Woodbury Clay	Clay, Black, Micaceous	50-80
	Merchantville Formation	Clay, Glauconitic, Some Sandy Zones	45-70
	Magothy Formation	Clay, Dark Colored and Sand, Light Colored (Alternating)	150-500
	Raritan Formation	Clay and Sand, Variegated (Alternating)	

Source: Special Report 30, Water Resources and Geology of Gloucester County, New Jersey, USGS, 1969 (Handt and Hultin, 1969)

TABLE 3-2
HISTORICAL EARTHQUAKES OCCURRING OR FELT IN NEW JERSEY[1]

Date	Time	Latitude/ Longitude (°/°)	Location	Magni-tude	Max. Intensity	Area felt (sq. mi.)	Depth (km)	Dist. From SMC site (mi)
12/18/1737	23:00	40 48/ 74 00	Near NY City		VII			102
11/29/1783	22:50	41 00/ 74 30	W of NY City		VI			104
09/02/1847		Felt from RI to Philadelphia, PA			V			
09/29/1847		40 30/ 74 00 Near NY City - Felt from RI to Philadelphia, PA			V			85
09/09/1848	22:00	Near NY City – Felt from RI to Philadelphia, PA			V			
10/09/1871	09:40	39 42/ 75 30	Wilmington, DE		VII			28
07/11/1872	05:25	40 54/ 73 48	New Rochelle, NY		V	100		114
12/10/1874	22:25	40 54/ 73 48	Westchester County, NY		VI	5,000		114
09/10/1877	09:59	40 06/ 74 54	Near Burlington, NJ		V	300		40
03/25/1879	19:30	39 12/ 75 30	Delaware River		V	600		35
08/10/1884	14:07	40 36/ 74 00	Near NY City	5.0	VII	70,000		91
03/09/1893	12:30	40 36/ 74 00	NY City		V			91
09/01/1895	06:09	40 42/ 74 48	Near High Bridge, NJ		VI	35,000		81
04/23/1910			NJ Coast		IV	2,000		76
01/26/1921	18:40	40 00/ 75 00	Near Riverton, NJ		V	150		33
06/01/1927	07:20	40 18/ 74 00	NJ Coast		VII	3,000		76
01/24/1933	21:00	40 12/ 74 42	Near Trenton, NJ		V	600		49
08/22/1938	22:36	40 06/ 74 30	Central NJ		V	5,000		48
11/14/1939	21:54	39 36/ 75 12	Salem County, NJ		V	6,000		11
1943	p.m.	41 06/ 74 12	Mahwah, NJ & Suffern, NY		V	5		116
09/03/1951	20:26	41 12/ 74 06	Rockland County, NY	4.4	V	5,500		125

[1] Only earthquakes of magnitude 3 or greater or of a modified Mercalli intensity scale of IV or greater within 320 kilometers (200 miles) of the Shieldalloy Metallurgical Corporation site location in Newfield, New Jersey are listed. Distance to site was determined based on listed latitude/longitude.

Source: "Catalog of New Jersey Earthquakes Through 1990," Ceological Survey Report 31; New Jersey Ceological Survey

Figure 1, a map showing earthquake epicenters in and near New Jersey, illustrates the approximate locations.

TABLE 3-2 (continued)
HISTORICAL EARTHQUAKES OCCURRING OR FELT IN NEW JERSEY[1]

Date	Time	Latitude/ Longitude (°/°)	Location	Magni-tude	Max. Intensity	Area felt (sq. mi.)	Depth (km)	Dist. From SMC site (mi)
08/16/1953	23:22	40 18/ 74 00	Bergen County, NJ		IV			76
03/31/1954	16:25	40 18/ 74 00	Monmouth County shoreline, NJ		IV			76
03/23/1957	14:03	40 48/ 74 00	West-central NJ		VI			88
12/27/1961	12:06	40 12/ 74 48	PA-NJ border		V	150		48
12/10/1968	04:13	40 06/ 75 00	Near Riverton, NJ	2.9	V			38
10/06/1969		41 00/ 74 36	Lake Hopatcong, NJ	1.3	IV	13		39
02/28/1973	03:21	39 43/ 75 26	Northem Salem Gounty, NJ	3.8	VI	3,000		25
04/28/1974	10:19	39 42/ 75 42	Wilmington, DE	2.5	IV	5		38
06/09/1974	16:45		Atlantic City to Wildwood, NJ		V	100		
06/17/1974	14:30		Atlantic City to Wildwood, NJ		IV	50		
03/11/1976	16:07	41 01/ 74 23	Riverdale, NJ	2.8	V	100		107
04/13/1976	10:39	40 48/ 74 02	Ridgefield, NJ	3.1	V	250	3.1	55
02/10/1977	14:14	39 46/ 75 32	Wilmington, DE	2.0	V	3		107
03/10/1977	11:22	41 11/ 74 09	Suffern, NY	2.2	IV	100	6	122
06/30/1978	15:13	41 05/ 74 12	Mahwah-Oakland, NJ	2.9	V	100	5	115
01/30/1979	11:30	40 19/ 74 16	Cheesequake, NJ	3.5	V	3,600	5	67
02/23/1979	05:23	40 48/ 74 49	Chester, NJ		IV		13	87
03/09/1979	23:49	40 43/ 74 30	Bernardsville, NJ	3.1	V	250	3	85
03/05/1980	12:06	40 10/ 75 04	Abington, PA	3.5	IV	300	7.9	43
03/11/1980	01:00	40 09/ 75 05	Abington, PA	3.7	V	600	5	42

[1] Only earthquakes of magnitude 3 or greater or of a modified Mercalli intensity scale of IV or greater within 320 kilometers (200 miles) of the Shieldalloy Metallurgical Gorporation site location in Newfield, New Jersey are listed. Distance to site was determined based on listed latitude/longitude.

Source: "Catalog of New Jersey Earthquakes Through 1990," Geological Survey Report 31: New Jersey Geological Survey

Figure 1, a map showing earthquake epicenters in and near New Jersey, illustrates the approximate locations.

TABLE 3-2 (continued)
HISTORICAL EARTHQUAKES OCCURRING OR FELT IN NEW JERSEY[1]

Date	Time	Latitude/ Longitude (°'/°')	Location	Magni-tude	Max. Intensity	Area felt (sq. mi.)	Depth (km)	Dist. From SMC site (mi)
08/02/1980	12:21	40 26/ 74 09	Keyport, NJ	3.1			7.6	77
08/30/1980	04:19	39 50/ 74 52	Medford, NJ	3.0			2.2	22
10/21/1981	11:49	41 08/ 72 34	Long Island Sound, NY	3.5	V	6,500	6.4	170
04/12/1982	17:14	40 03/ 74 48	Near Mount Holly, NJ	2.4	V		7.4	37
02/19/1983	00:45	40 38/ 74 46	Oldwick, NJ	2.7	IV		6.1	79
11/17/1983	14:55	39 44/ 75 35	Wilmington, DE	2.2	V		4.8	33
01/19/1984	18:03	39 43/ 75 32	Wilmington, DE	2.4	IV	50	4.0	30
04/22/1984	20:36	39 55/ 76 21	Near Lancaster, PA	4.4	VI	22,000	5	75
10/19/1985	05:07	40 59/ 73 50	Ardsley, NY	4.0	VI	12,000	6	118
10/21/1985	05:37	40 59/ 73 50	Ardsley, NY	3.3	V	2,000	5	118
10/22/1990	20:34	39 31/ 75 30	Hancock's Bridge, NJ; Felt in NJ, DE and PA	3.2	V	1,000	10	26

[1] Only earthquakes of magnitude 3 or greater or of a modified Mercalli intensity scale of IV or greater within 320 kilometers (200 miles) of the Shieldalloy Metallurgical Gorporation site location in Newfield, New Jersey are listed. Distance to site was determined based on listed latitude/longitude.
Source: "Catalog of New Jersey Earthquakes Through 1990," Geological Survey Report 31; New Jersey Geological Survey

TABLE 3-3
SUMMARY OF FRESHWATER USE
CUMBERLAND AND GLOUCESTER COUNTIES

Category	Units	County	
		Cumberland	Gloucester
Total population	Thousands	146.44	254.67
Public supply, total population served	Thousands	93.71	206.51
Public supply, ground water withdrawls	Mgal/d	17.68	21.00
Public supply, surface water withdrawls	Mgal/d	0.00	0.00
Public supply, toati withdrawls	Mgal/d	17.68	21.00
Domestic, self-supplied population	Thousands	52.73	48.16
Domestic ground water withdrawals	Mgal/d	4.22	3.85
Domestic surface water withdrawals	Mgal/d	0.00	0.00
Domestic, total self supplied withdrawals	Mgal/d	4.22	3.85
Industrial ground water withdrawals	Mgal/d	13.80	7.56
Industrial surface water withdrawals	Mgal/d	0.00	18.51
Industrial, total self-supplied withdrawals	Mgal/d	13.80	26.07
Irrigation, acres irrigated, sprinkler	Thousands	20.25	11.77
Irrigation, acres irrigated, microirrigation	Thousands	3.30	4.00
Irrigation, acres irrigated, surface (flood)	Thousands	0.00	0.00
Irrigation, acres irrigated, total	Thousands	23.55	15.77
Irrigation, ground water withdrawals	Mgal/d	5.40	1.87
Irrigation, surface water withdrawals	Mgal/d	0.41	2.75
Irrigation, total withdrawals	Mgal/d	5.81	4.62
Livestock, ground water withdrawals	Mgal/d	0.07	0.10
Livestock, surface water withdrawals	Mgal/d	0.00	0.00
Livestock, total withdrawals	Mgal/d	0.07	0.10
Mining, ground water withdrawals	Mgal/d	4.64	0.11
Mining, surface water withdrawals	Mgal/d	65.13	3.32
Mining, total withdawals	Mgal/d	69.77	3.43
Thermoelectric total withdrawals	Mgal/d	0.00	0.00
Total ground water withdrawals	Mgal/d	45.81	34.49
Total surface water withdrawals	Mgal/d	65.54	24.58
Total withdrawals	Mgal/d	111.35	59.07

Source: USGS Estimated Use of Water in the United States, 2000

TABLE 3-4
MONITORING/EXTRACTION WELL CONSTRUCTION DETAILS
SHIELDALLOY METALLURGICAL CORPORATION

WELL #	PERMIT #	INSTALLATION DATE	CASING TYPE DIAMETER	GROUND ELEVATION (msl) (2)	TOP OF INNER CASING ELEVATION (msl) (2)	TOTAL WELL DEPTH (ft) (3)	SCREENED INTERVAL (m) (3)	SCREENED INTERVAL ELEVATION (msl) (1) (2)
A	51-142	1970	8TEEL/2"	-	94.82	124	114 to 124	-21.18 to -31.18
IWC3	51-222	1/74	STEEL/2"	-	97.83	60	55 to 60	40.83 to 35.83
IWC4	51-223	1/74	STEEL/2"	-	98.61	80	75 to 80	21.61 to 16.61
1WC5	51-224	1/74	STEEL/2"	-	98.03	100	95 to 100	1.03 to -3.97
W3D	31-25759	12/5/86	PVC/4"	-	108.37	108	88 to 108	18.37 to -1.63
W-4	51-219	5/8/74	PVC/4"	-	104.58	75	55 to 75	47.58 to 27.58
SC-12D	31-35226-0	11/28/90	PVC/4"	102.16	103.19	140	126 to 136	-23.84 to -33.84
SC-13D	31-35227-8	11/29/90	PVC/4"	99.67	101.99	140.5	127 to 137	-27.33 to -37.33
SC-20D	31-38187	1/10/92	PVC/4"	101.55	104.53	139	129 to 139	-27.45 to -37.45
SC-22D	31-35222-7	11/21/90	PVC/4"	96.18	98.72	125	111 to 121	-14.82 to -24.82
SC-1D	31-21619-6	5/30/84	PVC/2"	88.00	90.90	115	85-95/100-115	3 to -7 / -12 to -27
SC-2D(r)	31-38194	1/3/92	PVC/4"	90.62	92.70	-	106 to 116	-15.38 to -25.38
SC-3D(r)	31-38195	1/7/92	PVC/4"	88.75	91.06	-	102 to 112	-13.25 to -23.25
SC-4D	31-21690-1	6/8/84	PVC/2"	-	92.64	120	110 to 120	-19.36 to -29.36
SC-5D	31-21876-8	6/12/84	PVC/2"	-	97.00	120	90 to 120	5.00 to -25.00
SC-6D	31-21878-4	6/26/84	PVC/2"	-	94.38	125	110 to 120	-17.62 to -27.62
SC-10D	31-23370	11/12/85	PVC/4"	-	95.72	125	105 to 125	-11.28 to -31.28
SC-17D	31-35223-5	11/27/90	PVC/4"	106.48	108.07	153	143 to 153	-36.52 to -46.52
SC-18D	31-35228-6	11/20/90	PVC/4"	93.56	96.01	130	119 to 129	-25.44 to -35.44
SC-19D	31-35221-9	11/26/90	PVC/4"	89.65	92.03	133	120 to 130	-30.35 to -40.35
SC-21D	31-35220-1	11/27/90	PVC/4"	90.44	91.65	140	125 to 135	-34.56 to -44.56
SC-24D	3142083	8/24/93	PVC/4"	-	93.52	115	105 to 115	-13.48 to -23.48
SC-26D	31-39500	7/9/1992	PVC/4"	100.68	100.45	143	127 to 137	-26.32 to -36.32
IW-2	-	11/12/85	PVC/6"	-	91.05	70	40 to 70	49.05 to 19.05
SC-28D	31-47408	8/16/95	PVC/4"	107.41	106.87	153	133 to 153	-25.59 to -45.59
SC-29D	31-47409	2/20/97	PVC/4"	106.50	106.23	148	128 to 148	-21.50 to -41.50
SC-30D	31-63686	6/14/02	PVC/2"	114.59	115.58	157	147 to 157	-32.41 to -42.41
SC-31D	31-66758	6/25/02	PVC/2"	99.78	102.61	130	120 to 130	-20.22 to -30.22
OBS-2A*	31-06092	-	-	-	122.80	154	129 to 149	-8.20 to -28.20
B	51-143	1970	STEEL/2"	-	94.33	46	36 to 46	56.33 to 46.33
K	51-152	1971	STEEL/2"	-	99.18	46	36 to 46	61.18 to 51.18
L	51-153	1971	STEEL/2"	-	103.51	52	42 to 52	59.51 to 49.51
IWC1	51-220	1/74	STEEL/2"	-	98.13	20	15 to 20	81.13 to 76.13
IWC2	51-221	1/74	STEEL/2"	-	98.51	40	35 to 40	61.51 to 56.51
W2(r)	31-38189	12/20/91	PVC/4"	95.88	97.96	17	2 to 17	93.88 to 78.88
SC-9S	31-23368-6	8/1/85	PVC/4"	-	96.23	30	15 to 30	79.23 to 64.23
SC-11S(r)	31-39512	7/1/92	PVC/4"	106.91	108.12	24	9 to 24	97.91 to 82.91
SC-12S	31-29140-6	9/2/88	PVC/2"	-	104.76	25	15 to 25	87.76 to 77.76
SC-138	31-29570-3	9/9/88	PVC/2"	-	101.41	24.7	14.7 to 24.7	84.71 to 74.71
SC-14S	31-35215-4	11/15/90	PVC/4"	105.83	108.38	27	12 to 27	93.83 to 78.83
SC-15S	31-35216-2	11/13/90	PVC/4"	106.06	108.32	27.5	12.5 to 27.5	93.56 to 78.56
SC-163	31-35217-5	11/14/90	PVC/4"	105.32	108.05	27	12 to 27	93.32 to 78.32
SC-20S	31-35218-3	11/13/90	PVC/4"	101.74	104.45	22	7 to 22	94.74 to 79.74
SC-22S	31-35219-7	11/14/90	PVC/4"	96.17	99.65	18	3 to 18	93.17 to 78.17
SC-23S	31-35437-8	11/16/90	PVC/4"	102.83	102.21	24	9 to 24	93.83 to 78.83
SC-25S	31-38188	12/23/91	PVC/4"	-	102.27	21	6 to 21	94.27 to 79.27
SC-27S	31-41031	12/15/92	PVC/4"	-	100.54	22	7 to 22	91.54 to 76.54
SC-1S	31-28825-1	6/22/88	PVC/4"	-	87.26	55	35 to 55	50.26 to 30.26
SC-3S	31-28914-2	6/8/88	PVC/4"	-	90.32	55	35 to 55	53.32 to 33.32
SC-4S	31-21689-7	6/7/84	PVC/2"	-	93.65	45	35 to 45	56.65 to 46.65
SC-5S	31-35434-1	11/28/90	PVC/4"	94.18	96.55	20	5 to 20	89.18 to 74.18
SC-BS	31-21691-5	6/21/84	PVC/2"	-	94.62	75	45 to 75	47.62 to 17.62
SC-10S	31-23369	11/11/85	PVC/4"	-	95.38	55	35 to 55	58.38 to 38.38
SC-178	31-35229-4	11/19/90	PVC/4"	106.53	109.26	28	13 to 28	93.53 to 78.53
SC-18S	31-35230-8	11/15/90	PVC/4"	93.43	95.72	19	4 to 19	89.43 to 74.43
SC-198	31-35224-3	11/15/90	PVC/4"	90.14	92.98	17	2 to 17	88.14 to 73.14
8O-218	31-35225-1	11/15/90	PVC/4"	90.57	92.64	18	3 to 18	87.57 to 72.57
SC-24S	31-35435-1	11/28/90	PVC/4"	91.57	93.57	20	5 to 20	86.57 to 71.57
IW-1	-	4/5/83	PVC/6"	89.06	90.33	62	32 to 62	57.06 to 27.06

Note:

(1) - Screened interval elevations for well locations without surveyed ground elevations calculated assuming a ground elevation of 2 feet below the surveyed well elevation (i.e., top of inner casing elevation).

(2) - All elevations based on vertical datum NGVD 1929

(3) - Feet Below Grade

* - USGS observation well (NJ-WRD Well Number 15-0372) land surface is 120 feet above NGVD 1929, with the measuring point 2.80 ft above the land surface The total well depth is 154 feet, with a screened interval of 129-149 feet below grade. (USGS Water Resources Data, New Jersey Water Year 2002 Vol. 2: Water Data Report NJ-02-2)

msl - Feet Above Mean Sea Level

ft - Feet

TABLE 3-5
CLIMATE DATA -

NORMALS, MEANS, AND EXTREMES

PHILADELPHIA, PA (PHL)

LATITUDE: 39° 52' 06" N LONGITUDE: 75° 13' 52" W BLSVATION (FT): GRND: 59 BARO: 62 TIME ZONE: EASTERN (UTC + 5) WBAN: 13739

	ELEMENT	POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	39.0	42.1	51.3	62.0	72.1	80.6	85.5	84.0	76.7	65.7	54.8	44.2	63.2
	MEAN DAILY MAXIMHM	56	39.6	42.5	51.4	63.4	73.2	82.2	86.5	84.9	77.6	66.7	55.3	43.9	63.9
	HIGHEST DAILY MAXIMUM	62	74	74	87	95	97	100	104	101	100	96	81	73	104
	YEAR OF OCCURRENCE		1950	1997	1945	2002	1991	1994	1966	2001	1953	1941	1993	1998	JUL 1966
	MEAN OF BXTREME MAXS.	56	59.9	61.8	73.0	82.9	88.5	93.6	96.0	94.0	90.2	81.8	72.6	63.1	79.8
	NORMAL DAILY MINIMDM	30	25.5	27.5	35.1	44.2	54.8	64.0	69.7	68.5	60.9	48.7	39.5	30.6	47.4
	MEAN DAILY MINIMUM	56	24.6	26.5	33.4	43.0	52.9	62.2	67.8	66.7	59.1	47.4	37.9	28.9	45.9
	LOWEST DAILY MIMTMDM	62	-7	-4	7	19	28	44	51	44	35	25	IS	1	-7
	YEAR OF OCCURRSNCE		1984	1961	1984	1982	1966	1984	1966	1986	1963	1969	1976	1983	JAN 1984
	MEAN OF EXTREME MINS.	56	8.9	10.7	18.7	30.0	40.7	50.3	57.7	55.7	44.5	33.4	23.9	14.1	32.4
	NORMAL DRY BULB	30	32.3	34.8	43.2	53.1	63.5	72.3	77.6	76.3	68.8	57.2	47.1	37.4	55.3
	MEAN DRY BULB	56	32.1	34.5	42.4	53.1	63.0	72.2	77.1	75.8	68.3	57.0	46.7	36.4	54.9
	MEAN WET BULB	20	30.3	32.0	38.3	47.2	56.7	65.4	69.9	68.9	62.5	52.2	43.1	34.0	50.0
	MEAN OEW POINT	20	23.3	24.3	30.2	39.9	50.6	60.4	65.5	64.6	58.0	47.0	36.8	26.7	43.9
	NORMAL NO. DAYS WITH:														
	MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.4	1.3	4.6	10.S	7.3	1.6	0.0	0.0	0.0	25.7
	MAXIMUM ≤ 32°	30	8.0	5.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.6	17.7
	MINIMUM ≤ 32°	30	24.8	20.8	12.6	2.0	0.0	0.0	0.0	0.0	0.0	0.7	7.3	19.2	87.4
	MINIMUM ≤ 0°	30	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.S
H/C	NORMAL HEATING DEG. DAYS	30	1020	858	681	362	113	12	1	2	39	269	545	857	4759
	NORMAL COOLING DEG. DAYS	30	0	0	2	10	70	234	395	351	152	19	2	0	1235
RH	NORMAL (PERCENT)	30	67	64	62	61	66	68	69	70	72	71	68	68	67
	HOUR 01 LST	30	71	69	70	70	77	80	80	82	82	82	75	72	76
	HOUR 07 LST	30	74	73	73	71	7S	77	78	81	83	83	78	75	77
	HOUR 13 LST	30	60	65	52	50	53	54	54	55	56	55	56	58	55
	HOUR 19 LST	30	65	61	58	55	59	61	62	65	68	69	66	66	63
S	PERCENT POSSIBLE SUNSHINE	59	49	53	55	55	56	62	61	62	59	59	52	49	56
	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY≤1/4 MI)	64	2.5	2.3	1.7	1.2	1.3	1.0	0.8	1.0	1.5	3.0	2.3	2.5	21.2
	THUNDERSTORMS	64	0.3	0.3	1.0	2.0	4.1	S.1	5.4	4.9	2.5	0.8	0.6	0.2	27.2
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	1			6.4			5.6							
	MIDNIGHT-MIDNIGHT (OKTAS)	1			5.6										
	MEAN NO. DAYS WITH:														
	CLEAR	1	3.0	2.0	8.0		8.0	11.0							
	PARTLY CLOUDY	1		1.0	4.0		5.0	3.0							
	CLOUDY	1	3.0	6.0	8.0		7.0	9.0							
PR	MEAN STATION PRESSURE(IN)	31	30.05	30.05	30.00	29.95	29.95	29.95	29.97	30.01	30.05	30.07	30.06	30.06	30.01
	MEAN SEA-LEVEL PRES. (IN)	20	30.10	30.09	30.0S	29.99	29.98	29.97	29.99	30.03	30.06	30.10	30.10	30.10	30.05
WINDS	MEAN SPEED (MPH)	63	10.4	10.9	11.4	10.9	9.6	8.8	8.2	7.9	8.4	8.9	9.7	10.1	9.6
	PREVAIL.DIR(TENS OF DEGS)	40	29	30	29	23	23	23	23	23	23	23	23	29	23
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	8	44	43	40	37	43	51	41	41	39	45	46	45	51
	DIR. (TENS OF DEGS)		28	29	27	33	28	30	33	25	32	24	27	27	30
	YEAR OF OCCURRENCE		1999	1996	1996	2002	2002	1998	1999	1997	1998	2003	2003	2000	JUN 1998
	MAXIMUM 5-SECOND:														
	SPEED (MPH)	8	57	52	52	51	59	71	46	52	49	55	58	53	71
	DIR. (TENS OF DEGS)		18	31	26	28	23	30	32	24	13	20	28	28	30
	YEAR OF OCCURRENCE		1996	1996	1996	2000	2002	1998	1999	1997	2003	2003	2003	2000	JUN 1998
PRECIPITATION	NORMAL (IN)	30	3.52	2.74	3.81	3.49	3.89	3.29	4.39	3.82	3.88	2.75	3.16	3.31	42.05
	MAXIMUM MONTHLY (IN)	61	8.86	6.44	7.01	8.12	7.41	8.08	10.42	9.70	13.07	5.99	9.06	8.47	13.07
	YEAR OF OCCURRENCE		1978	1979	1980	1983	1948	2003	1994	1955	1999	1995	1972	1996	SEP 1999
	MINIMUM MONTHLY (IN)	61	0.45	0.55	0.68	0.52	0.47	0.11	0.64	0.49	0.44	0.09	0.32	0.25	0.09
	YEAR OF OCCURRENCE		1955	2002	1966	1985	1964	1949	1957	1964	1968	1963	1976	1955	OCT 1963
	MAXIMUM IN 24 HOURS (IN)	57	2.70	2.06	3.08	2.76	3.18	4.62	4.49	5.68	6.77	3.85	3.99	3.03	6.77
	YEAR OF OCCURRENCE		1979	2003	2000	1970	1984	1973	1989	1971	1999	1980	1977	1992	SEP 1999
	NORMAL NO. DAYS WITH:														
	PRECIPITATION ≥ 0.01	30	10.9	9.7	10.5	10.9	11.7	10.0	9.4	8.4	9.1	8.0	9.4	10.6	118.6
	PRECIPITATION ≥ 1.00	30	0.9	0.6	1.0	0.8	0.8	0.8	1.3	1.2	1.1	0.7	0.6	0.8	10.6
SNOW	NORMAL (IN)	30	6.4	6.6	3.2	0.6	0.0	0.0	0.0	0.0	0.0	0.1	0.4	2.0	19.3
	MAXIMUM MONTHLY (IN)	60	23.4	29.6	13.4	4.3	T	T	0.0	0.0	0.0	2.1	8.8	18.8	29.6
	YEAR OF OCCURRENCE		1978	2003	1958	1971	1963	1993				1979	1953	1966	FEB 2003
	MAXIMUM IN 24 HOURS (IN)	60	13.2	21.3	12.0	4.3	T	T	0.0	0.0	0.0	2.1	8.7	14.6	21.3
	YEAR OF OCCUHRBNGE		1961	1983	1993	1971	1963	1993				1979	1953	1960	FEB 1983
	MAXIMUM SNOW DEPTH (IN)	55	12	23	12	3	0	0	0	0	0	0	8	12	23
	YEAR OP OCCURRENCE		1961	2003	1993	1997							1953	1966	FEB 2003
	NORMAL NO. DAYS WITH:														
	SNOWFALL ≥ 1.0	30	1.9	1.5	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	5.1

TABLE 3-6

PRECIPITATION FREQUENCY ESTIMATES (INCHES) IN THE NEWFIELD AREA

Average Recurrence (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
2	0.42	0.67	0.84	1.16	1.46	1.77	1.92	2.37	2.86	3.28	3.78	4.16	4.8	5.37	7.19	8.88	11.25	13.43
5	0.5	0.8	1.01	1.44	1.84	2.24	2.44	3	3.64	4.26	4.9	5.36	6.08	6.69	8.7	10.58	13.18	15.54
10	0.56	0.89	1.13	1.63	2.13	2.6	2.85	3.52	4.3	5.1	5.87	6.38	7.17	7.78	9.92	11.93	14.66	17.12
25	0.63	1.01	1.27	1.89	2.52	3.1	3.42	4.26	5.3	6.39	7.32	7.89	8.77	9.36	11.62	13.78	16.6	19.11
50	0.69	1.09	1.38	2.08	2.82	3.5	3.89	4.89	6.17	7.52	8.59	9.2	10.14	10.68	12.99	15.24	18.07	20.6
100	0.74	1.17	1.48	2.27	3.13	3.92	4.38	5.56	7.12	8.8	9.99	10.66	11.65	12.1	14.42	16.71	19.52	22
200	0.79	1.25	1.58	2.46	3.45	4.34	4.89	6.28	8.19	10.23	11.58	12.27	13.3	13.62	15.9	18.22	20.93	23.33
500	0.85	1.35	1.7	2.71	3.88	4.93	5.6	7.33	9.78	12.42	14	14.68	15.75	16	17.96	20.25	22.75	25.01
1000	0.9	1.42	1.79	2.89	4.22	5.4	6.18	8.2	11.15	14.33	16.1	16.75	17.83	18.03	19.6	21.84	24.11	26.2

Source: National Weather Service Hydometeorological Design Center (http://hdsc.nws.noaa.gov/hdsc/pfds/)

TABLE 3-7
MONITORED AIR QUALITY IN THE NEWFIELD AREA

Pollutant	Monitoring Site	Distance (km)	Direction From Project	Period of Record	Pollutant Averaging Period	Observed Concentration	NAAQS
Carbon monoxide	Ancora	21	NE	2001-03	1-hr	1.5 ppm[a]	35 ppm[a]
					8-hr	1.1 ppm[a]	9 ppm[a]
Nitrogen dioxide	Camden	43	N	2001-03	Annual	0.021 ppm[b]	0.053 ppm[b]
Ozone	Millville	13	S	2001-03	1-hr	0.129 ppm[a]	0.12 ppm[a]
					8-hr	0.108 ppm[a]	0.08 ppm[a]
Sulfur dioxide	Millville	13	S	2001-03	3-hr	0.033 ppm[a]	0.5 ppm[a]
					24-hr	0.021 ppm[a]	0.14 ppm[a]
					Annual	0.004 ppm[b]	0.03 ppm[b]
$PM_{2.5}$[c]	Gibbstown	39	NW	2001-03	24-hr	37.3 µg/m^3,[b]	60 µg/m^3,[d]
					Annual	13.8 pg/m^3,[e]	15 µg/m^3,[e]
PM_{10}[f]	Camden	43	N	2001-03	24-hr	61 pg/m^3,[g]	150 µg/m^3,[g]
					Annual	27 µg/m^3,[b]	50 µg/m^3,[b]
Lead	Pennsauken	48	N	2000-01	Quarter	0.02 pg/m^3,[b]	1.5 µg/m^3,[b]

[a] Highest second-high concentration, consistent with the form of the NAAQS.
[b] Highest concentration, consistent with the form of the NAAQS.
[c] Particulate matter less than 2.5 micrometers in diameter.
[d] Average of the yearly 98[tb] percentile 24-hour average observations over three years.
[a] Average of the highest annual observations over three years.
[f] Particulate matter less than 10 micrometers in diameter.
[g] Fourth highest 24-hour average concentration over three years of observations.

TABLE 3-8

VISUAL RESOURCES AND POTENTIAL VIEWPOINTS WITHIN ONE MILE OF THE STORAGE YARD AREA

Shieldalloy Metallurgical Corporation

View-point Location[1]	Description of Viewpoint	Viewpoint Distance from Storage Yard Area	Land Use	Storage Yard Visible under Existing Conditions?
1	Shieldalloy - on-site; directly west of the Storage Yard	~600 feet west	Industrial	Yes
2	Shieldalloy - on-site-	~650 feet southwest	Industrial	Yes
3,4	Shieldailoy - on-site; near Water Treatment Bldg	~1,320 feet west	Industrial	Yes
5	Shieldalloy - on-site; Entrance roadway	~1,450 feet west	Industrial	Yes
6	Strawberry Ave-development site for Genco Homes	~2,950 feet south	Residential	No
7	West Blvd, north of power line	~4,650 feet southwest	Highway-residential	No
8	West Blvd, Near Arbor Avenue	~2,400 feet southwest	Residential	No
9	Arbor Avenue and North West Avenue	~4,800 feet southwest	Residential	No
10	North West Avenue, north of Arbor Avenue intersection	~4,600 feet southwest	Residential	No
11	Weymouth Road at Salem Avenue	~5,100 feet west	Residential	No
12	Catawba Avenue and West Blvd.	~3,100 feet north west	Commercial	No
13	Church Street, south of Catawba Avenue	~5,100 feet north	Residential	No
14	Edgarton School at Madison/Catawba Ave	~1,900 feet north	Institutional	No
15	Edgarton School - parking lot on Catawba Avenue	~2,100 feet north	Institutional	No
16	Rosemont Avenue and Fawn Drive	~5,200 feet north	Residential	No
17	Woodlawn Avenue at Covey Lane	~3,700 feet northeast	Residential	No

[1] Viewpoint location also corresponds to photo number in Figure 3-20

TABLE 3-8 (continued)

VISUAL RESOURCES AND POTENTIAL VIEWPOINTS WITHIN 1 MILE OF THE STORAGE YARD AREA

Shieldalloy Metallurgical Corporation

View-point Location[1]	Description of Viewpoint	Viewpoint Distance from Storage Yard Area	Land Use	Storage Yard Visible under Existing Conditions?
18	Gorgo Lane, south of Newfield water tower	~1,300 feet northeast	Residential/ Undeveloped	No
19	Grace Orthodox Church ~ Weymouth Road near West Blvd	~1,600 feet southwest	Mixed Residential	No
20	Columbia Avenue at County Bridge	~5,280 feet northwest	Residential	No
21	Christ Community Church parking lot - Salem Avenue, west of North West Blvd.	~3,300 feet northwest	Residential	No
22	Notre Dame School on Church Street, south of Conwell	~3,300 feet north-northwest	Institutional/ residential	No
23	46 West Blvd, Cabinet Source Store	~1,980 feet west	Mixed Residential	No
24	West Blvd and Sandy Drive	~5,280 feet northwest	Residential	No
25	Strawberry Avenue, east of City Line Avenue	~3,900 feet southeast	Residential	No

[1] Viewpoint location also corresponds to photo number in Figure 3-20

TABLE 3-9
POPULATION DATA SUMMARY FOR AREA SURROUNDING SMC FACILITY
BASED ON YEAR 2000 CENSUS

		Hispanic or Latino		Not Hispanic or Latino													
		Of any race		White Alone		Black or African American alone		American Indian and Alaska Native alone		Asian alone		Native Hawaiian and Other Pacific Islander alone		Some other race alone		Two or more races	
Geography	Total popul.	Total popul.	% of total popul.	Total popul.	% of total popul.	Total popul.	% of total popul.	Total popul.	% of total popul.	Total popul.	% of total popul.	Total popul.	% of total popul.	Total popul.	% of total popul.	Total popul.	% of total popul.
New Jersey	8,414,350	1,117,191	13.3%	5,557,209	66.0%	1,096,171	13.0%	11,338	0.1%	477,012	5.7%	2,175	0.0%	19,565	0.2%	133,689	1.6%
Gloucester County, New Jersey	254,673	6,583	2.6%	218,262	85.7%	22,562	8.9%	426	0.2%	3,763	1.5%	60	0.0%	221	0.1%	2,796	1.1%
Cumberland County, New Jersey	146,438	27,823	19.0%	85,510	58.4%	28,134	19.2%	1,077	0.7%	1,338	0.9%	39	0.0%	136	0.1%	2,381	1.6%
Combined Data for Census Tract Block Groups Surrounding SMC Facility[1]	5,425	525	9.7%	4,241	78.2%	554	10.2%	7	0.1%	19	0.4%	1	0.0%	6	0.1%	71	1.3%

[1] Census Tract Block Groups within 0.6 miles of the SMC facility include the following:
Block Group 1, Census Tract 5017.03, Gloucester County, New Jersey
Block Group 1, Census Tract 5018, Gloucester County, New Jersey
Block Group 2, Census Tract 5018, Gloucester County, New Jersey
Block Group 1, Census Tract 409.02, Cumberland County, New Jersey
Block Group 2, Census Tract 409.02, Cumberland County, New Jersey

Source: U.S. Census Bureau; Census 2000

TABLE 3-10
TOTAL POPULATION BY QUADRANT FOR AREA SURROUNDING SMC FACILITY
BASED ON YEAR 2000 CENSUS DATA

P1. TOTAL POPULATION [1] - Universe: Total population Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data		
Quadrant	Block ID	Total Population
NE to NW	Block 1006, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	92
NE to NW	Block 1007, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	62
NE to NW	Block 1008, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	35
NE to NW	Block 1012, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	15
NE to NW	Block 1013, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	13
NE to NW	Block 1014, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	64
NE to NW	Block 1015, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	0
NE to NW	Block 1016, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	0
NE to NW	Block 1017, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	51
NE to NW	Block 1018, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	61
NE to NW	Block 1019, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	25
NE to NW	Block 1020, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	21
NE to NW	Block 1021, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	25
NE to NW	Block 1022, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	22
NE to NW	Block 1023, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	0
NE to NW	Block 2000, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	289
NE to NW	Block 2004, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	51
NE to NW	Block 2005, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	35
NE to NW	Block 2009, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	8
	Total Population - NE to NW:	869
NW to SW	Block 1000, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	6
NW to SW	Block 1001, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	0
NW to SW	Block 1002, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	78
NW to SW	Block 1003, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	45
NW to SW	Block 1017, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	0
NW to SW	Block 1018, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	2
NW to SW	Block 2006, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	0
NW to SW	Block 2007, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	0
NW to SW	Block 2008, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	0
NW to SW	Block 2012, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	16
NW to SW	Block 2014, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	17
NW to SW	Block 2015, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	32
NW to SW	Block 2016, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	39
NW to SW	Block 2017, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	25
NW to SW	Block 2018, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	66
	Total Population - NW to SW:	326
SW to SE	Block 1007, Block Group 1, Census Tract 5017.03, Gloucester County, New Jersey	0
SW to SE	Block 2007, Block Grbup 2, Census Tract 409.02, Cumberland County, New Jersey	50
SW to SE	Block 2008, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	32
SW to SE	Block 2009, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	0
SW to SE	Block 2010, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	0
SW to SE	Block 2011, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	38
SW to SE	Block 2019, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	56
SW to SE	Block 2020, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	0
SW to SE	Block 2021, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	0
SW to SE	Block 2022, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	31
SW to SE	Block 2023, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	32
SW to SE	Block 2024, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	112
	Total Population - SW to SE:	351
SE to NE	Block 1006, Block Group 1, Census Tract 5017.03, Gloucester County, New Jersey	202
SE to NE	Block 2003, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	68
	Total Population - SE to NE:	270

See Figure 3-23 for quadrant locations

TABLE 3-11
POVERTY DATA SUMMARY FOR AREA SURROUNDING SMC FACILITY
BASED ON YEAR 2000 CENSUS

Location	Total Number of Persons	Number of Persons Below the Poverty Level in 1999	Percentage of Persons Below the Poverty Level in 1999	Total Number of Families	Percentage of Families Below the Poverty Level in 1999	Percentage of Families Below Poverty Level in 1999
New Jersey	8,232,588	699,668	8.5%	2,167,577	135,549	6.3%
Gloucester County, New Jersey	249,843	15,395	6.2%	67,528	2,873	4.3%
Cumberland County, New Jersey	135,350	20,367	15.0%	35,373	4,004	11.3%
Combined Data for Census Tract Block Groups Surrounding SMC Facility[1]	4,859	279	5.7%	1,379	38	2.8%

[1] Census Tract Block Groups within 0.6 miles of the SMC facility include the following:
Block Group 1, Census Tract 5017.03, Gloucester County, New Jersey
Block Group 1, Census Tract 5018, Gloucester County, New Jersey
Block Group 2, Census Tract 5018, Gloucester County, New Jersey
Block Group 1, Census Tract 409.02, Cumberland County, New Jersey
Block Group 2, Census Tract 409.02, Cumberland County, New Jersey

Source: U.S. Census Bureau; Census 2000

TABLE 3-12
HOUSING DATA SUMMARY FOR AREA SURROUNDING SMC FACILITY
BASED ON YEAR 2000 CENSUS

Location	Total Units	Vacant Units	Vacant Units (%)	Vacant Units for Sale (%)	Vacant Units for Rent (%)	Median Value ($)	Median Contract Rent ($)
New Jersey	3,310,275	245,630	7.4%	12.2%	21.7%	170,800	672
Gloucester County, New Jersey	95,054	4,337	4.6%	26.9%	30.2%	120,100	557
Block Group 1, Census Tract 5017.03, Gloucester County, New Jersey	366	13	3.6% (1)	0.0%	0.0%	119,200	669
Block Group 1, Census Tract 5018, Gloucester County, New Jersey	288	16	5.6%	25.0%	43.8%	99,900	555
Block Group 2, Census Tract 5018, Gloucester County, New Jersey	332	8	2.4%	100.0%	0.0%	160,000	543
Cumberland County, New Jersey	52,863	3,720	7.0%	25.1%	24.3%	91,200	518
Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	277	0	0.0%	0.0%	0.0%	87,600	661
Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	630	19	3.0%	100.0%	0.0%	118,400	535

(1) All vacant units in Block Group 1, Census Tract 5017.03 were reported as seasonal, recreational, or occasional use units

Source: U.S. Census Bureau; Census 2000

TABLE 3-13
BACKGROUND SOIL RADIONUCLIDE CONCENTRATIONS
Shieldalloy Metallurgical Corporation

Sample ID	Campaign Identifier	Radionuclide Concentration (pCi/g)				
		Th-228	Th-232	Th-230	U-234	U-238
980715-15	IEM	0.9	0.9	0.5	0.5	0.5
980715-16	IEM	0.3	1.1	0.2	0.2	0.2
091898-01	IEM	1.8	1.8	1.7	1.7	1.7
091898-02	IEM	1.4	1.4	1	1	1
091898-03	IEM	0.9	0.9	0.8	0.8	0.8
091898-04	IEM	1.4	1.4	0.6	0.6	0.6
091898-05	IEM	0.6	0.6	0.6	0.6	0.6
091898-06	IEM	0.6	0.6	0.5	0.5	0.5
091898-07	IEM	1.2	1.2	0.5	0.5	0.5
091898-08	IEM	0.6	0.6	0.9	0.9	0.9
S7	USNRC	0.29	0.33	0.9	0.9	0.9
ORAU-1	ORAU	0.3	0.3	1.3	1.3	1.3
ORAU-2	ORAU	0.5	0.5	0.4	0.4	0.4
ORAU-3	ORAU	0.1	0.1	0.3	0.3	0.3
ORAU-4	ORAU	0.1	0.1	0.3	0.3	0.3
ORAU-5	ORAU	0.4	0.4	0.4	0.4	0.4
ORAU-6	ORAU	0.5	0.5	0.4	0.4	0.4
ORAU-7	ORAU	0.6	0.6	0.8	0.8	0.8
ENSR-1	ENSR	1.48	1.48	0.83	0.83	0.83
ENSR-2	ENSR	0.28	0.28	1.38	1.38	1.38
ENSR-3	ENSR	1.91	1.91	1.37	1.37	1.37
ENSR-4	ENSR	1.68	1.68	0.92	0.92	0.92
ENSR-5	ENSR	1.19	1.19	1.04	1.04	1.04
ENSR-6	ENSR	1.35	1.35	0.42	0.42	0.42
Mean		0.85	0.88	0.75	0.75	0.75
Standard Deviation		0.56	0.55	0.40	0.40	0.40

TABLE 4-1
AIR POLLUTANT EMISSION RATES – LTC ALTERNATIVE

Emissions for PM_{10} Short-Term Modeling:				
Source	Hours Per Day	Area (m^2)	PM_{10} (lb/hr)	PM_{10} ($g/m^2/s$)
AREA1 Active Pile (Active Portion)	8	22449	34.2	2.40E-05
AREA1 Active Pile (Inactive Portion)	16	22449	1.02	3.58E-07
AREA1 Inactive Piles	24	22449	7.3	1.70E-06
AREA4 Paved Section 1	8	24843	36.8	2.33E-05
AREA4 Paved Section 2	8	24843	36.8	2.33E-05
AREA4 Paved Section 3	8	24843	36.8	2.33E-05
AREA4 Unpaved Section 1	8	33124	11.3	5.37E-06
AREA4 Unpaved Section 2	8	33124	11.3	5.37E-06
AREA4 Unpaved Section 3	8	33124	11.3	5.37E-06
AREA4 Unpaved Section 4	8	33124	11.3	5.37E-06
AREA4 On-Road Engines	8	63040	0.0095	2.37E-09
Emissions for PM_{10} Long-Term Modeling:				
Source	Operating Hours	Area (m^2)	PM_{10} (lb/yr)*	PM_{10} ($g/m^2/s$)
AREA1	5136	22449	5467.5	5.97E-06
AREA2	5136	1323	92.5	1.71E-06
AREA4 Paved Section 1	5136	24843	1229	1.21E-06
AREA4 Paved Section 2	5136	24843	1229	1.21E-06
AREA4 Paved Section 3	5136	24843	1229	1.21E-06
AREA4 Unpaved Section 1	5136	33124	206	1.52E-07
AREA4 Unpaved Section 2	5136	33124	206	1.52E-07
AREA4 Unpaved Section 3	5136	33124	206	1.52E-07
AREA4 Unpaved Section 4	5136	33124	206	1.52E-07
AREA4 On-Road Engines	5136	63040	0.734	2.86E-10
Emissions for NO_x Long-Term Modeling:				
Source	Operating Hours	Area (m^2)	NO_x (lb/yr)*	NO_x ($g/m^2/s$)
AREA1	5136	22449	3204.9	3.50E-06
AREA2	5136	1323	91.6	1.70E-06
AREA4 On-Road Engines	5136	63040	22.9	8.91E-09

* Long term emission rates are based on seven month project duration.

TABLE 4-2
PREDICTED PROJECT AIR POLLUTANT CONCENTRATIONS – LTC ALTERNATIVE

Pollutant	Pollutant Averaging Period	Observed Concentration ($\mu g/m^3$)	Predicted Project Concentration ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	39.6[e]	4.7[a]	44.3[a]	100[a]
PM_{10}[d]	24-hr	61[e]	86.4[d]	147.4[d]	150[d]
	Annual	27[e]	10.2[e]	37.2[e]	50[a]

[a] Highest concentration, consistent with the form of the NAAQS. Includes EPA Tier 2 NO_2 screening analysis per the Guideline on Air Quality Models (FR, Vol. 68, No. 72, pg 18457).
[b] Particulate matter less than or equal to 10 micrometers in diameter.
[c] Fourth highest 24-hour average concentration over three years of observations.
[d] Sixth highest 24-hour average concentration over five years of predicted concentrations.
[e] Highest of average annual concentrations over the period (three years of observed monitoring and five years of model-predicted), consistent with form of NAAQS.

TABLE 4-3
PREDICTED CUMULATIVE AIR POLLUTANT CONCENTRATIONS FOR EVENTS DURING WHICH THE PROJECT IS A SIGNIFICANT CONTRIBUTOR – LTC ALTERNATIVE

Pollutant	Pollutant Averaging Period	Observed Concentration ($\mu g/m^3$)	Predicted Cumulative Concentration ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	39.6[e]	45.5[e]	85.1[e]	100[e]
RM_{10}[b]	24-hr	61[c]	87.9[d]	148.9[d]	150[d]
	Annual	27[e]	10.9[e]	37.9[e]	50[e]

a. Highest concentration, consistent with the form of the NAAQS. Includes EPA Tier 2 NO2 screening analysis per the Guideline on Air Quality Models (FR, Vol. 68, No. 72, pg 18457).
b Particulate matter less than or equal to 10 micrometers in diameter.
c Fourth highest 24-hour average concentration over three years of observations.
d Sixth highest 24-hour average concentration over five years of predicted concentrations.
e Highest of average annual concentrations over the period (three years of observed monitoring and five years of model-predicted), consistent with form of NAAQS.

TABLE 4-4
PREDICTED PROJECT RADIONUCLIDE CONCENTRATIONS – LTC AND LT ALTERNATIVES

Alternative	Predicted Cumulative Concentration ($\mu g/m^3$)	Thorium Concentration ($\mu Ci/ml$)	Uranium Concentration ($\mu Ci/ml$)
LTC	11.0	2e-15	2e-15
LT	22.8	4e-15	4e-15

TABLE 4-5
AIR POLLUTANT EMISSION RATES – LT ALTERNATIVE

Emissions for PM_{10} Short-Term Modeling:				
Source	Hours Per Day	Area (m^2)	PM_{10} (lb/hr)	PM_{10} ($g/m^2/s$)
AREA1 Active Pile (Active Portion)	8	22449	25.6	1.80E-05
AREA1 Active Pile (Inactive Portion)	16	22449	1.18	4.13E-07
AREA1 Inactive Piles	24	22449	1.6	3.70E-07
AREA1 Inactive Piles: Area Erosion	24	22449	6.8	1.60E-06
AREA3 Active Pile (Active Portion)	8	1640	23.1	2.22E-04
AREA3 Active Pile (Inactive Portion)	16	1640	0.1	5.44E-07
AREA3 Inactive Piles	24	1640	0.2	5.44E-07
AREA3 Inactive Piles: Area Erosion	24	1640	0.1	3.07E-07
AREA4 Paved Section 1	8	24843	4.52	2.87E-06
AREA4 Paved Section 2	8	24843	4.52	2.87E-06
AREA4 Paved Section 3	8	24843	4.52	2.87E-06
AREA4 Unpaved Section 1	8	33124	3.3	1.55E-06
AREA4 Unpaved Section 2	8	33124	3.3	1.55E-06
AREA4 Unpaved Section 3	8	33124	3.3	1.55E-06
AREA4 Unpaved Section 4	8	33124	3.3	1.55E-06
AREA4 On-Road Engines	8	63040	0.004	9.05E-10
Emissions for PM_{10} Long-Term Modeling:				
Source	Operating Hours	Area (m^2)	PM_{10} (lb/yr)*	PM_{10} ($g/m^2/s$)
AREA1	3672	22449	4094.4	6.26E-06
AREA1: Area Erosion	6552	22449	1872.3	1.60E-06
AREA2	3672	1323	159	4.11E-06
AREA3	3672	1640	2195.4	4.59E-05
AREA3: Area Erosion	6552	1640	26	3.08E-07
AREA4 Paved Section 1	3672	24843	490	6.77E-07
AREA4 Paved Section 2	3672	24843	490	6.77E-07
AREA4 Paved Section 3	3672	24843	490	6.77E-07
AREA4 Unpaved Section 1	3672	33124	332	3.44E-07
AREA4 Unpaved Section 2	3672	33124	332	3.44E-07
AREA4 Unpaved Section 3	3672	33124	332	3.44E-07
AREA4 Unpaved Section 4	3672	33124	332	3.44E-07
AREA4 On-Road Engines	3672	63040	0.38	2.05E-10
Emissions for NO_x Long-Term Modeling:				
Source	Operating Hours	Area (m^2)	NO_x (lb/yr)*	NO_x ($g/m^2/s$)
AREA1	3672	22449	1438	2.20E-06
AREA2	3672	1323	59.8	1.55E-06
AREA3	3672	1640	9232	1.93E-04
AREA4 On-Road Engines	3672	63040	12.3	6.67E-09

* Long term emission rates are based on five month per year project duration.

TABLE 4-6
PREDICTED PROJECT AIR POLLUTANT CONCENTRATIONS – LT ALTERNATIVE

Pollutant	Pollutant Averaging Period	Observed Concentration ($\mu g/m^3$)	Predicted Project Concentration ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	39.6[a]	62.0[a]	101.6[a]	100[a]
PM_{10}[d]	24-hr	61[c]	244.5[d]	305.5[d]	150[d]
	Annual	27[a]	21.1[a]	48.1[a]	50[a]

a Highest concentration, consistent with the form of the NAAQS. Includes EPA Tier 2 NO2 screening analysis per the Guideline on Air Quality Models (FR, Vol. 68, No. 72, pg 18457).
b Particulate matter less than or equal to 10 micrometers in diameter.
c Fourth highest 24-hour average concentration over three years of observations.
d Sixth highest 24-hour average concentration over five years of predicted concentrations.
e Highest of average annual concentrations over the period (three years of observed monitoring and five years of model-predicted), consistent with form of NAAQS.

TABLE 4-7
PREDICTED CUMULATIVE AIR POLLUTANT CONCENTRATIONS FOR EVENTS DURING WHICH THE PROJECT IS A SIGNIFICANT CONTRIBUTOR – LT ALTERNATIVE

Pollutant	Pollutant Averaging Period	Observed Concentration ($\mu g/m^3$)	Predicted Cumulative Concentration ($\mu g/m^3$)	Total Predicted Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	39.6[e]	63.3[e]	102.9[e]	100[e]
PM_{10}[d]	24-hr	61[e]	207.7[d]	268.7[d]	150[d]
	Annual	27[e]	28.6[e]	55.6[e]	50[e]

a Highest concentration, consistent with the form of the NAAQS. Includes EPA Tier 2 NO2 screening analysis per the Guideline on Air Quality Models (FR, Vol. 68, No. 72, pg 18457).
b Particulate matter less than 10 micrometers in diameter.
c Fourth highest 24-hour average concentration over three years of observations.
d Sixth highest 24-hour average concentration over five years of predicted concentrations.
e Highest of average annual concentrations over the period (three years of observed monitoring and five years of model predicted), consistent with form of NAAQS.

TABLE 4-8
NOISE LEVELS OF MAJOR CONSTRUCTION EQUIPMENT
Shieldalloy Metallurgicai Corporation

Equipment Type	Noise Level at 50 Feet (dBA)
Front End Loaders/Payloaders	85
Excavator	85
Bulldozer	80
Dust Control Truck	80
Dump Trucks	85
Rock Crusher	81
Locomotive	92

Sources: BBN, 1971; NYSDEC, 1974, TRC, 1996b, FTA, 1995

TABLE 4-9

MAXIMUM PROJECTED CONSTRUCTION NOISE LEVELS AT RECEPTOR LOCATIONS – LTC ALTERNATIVE

Shieldalloy Metallurgical Corporation

	Existing Measured Daytime L_{eq}	Existing Measured Daytime L_{90}	Measured L_{max}	Distance to Receptor (feet)	Scenario 1 One Source(1)	Scenario 2 Two Sources(2)	Scenario 3 Three Sources(3)
Edgarton School	46	38	60	2300	48	51	53
333 Catawba Avenue	56	36	72	2100	49	52	54
18 Gorgo Lane	52	35	71	1300	55	58	60
Weymouth/Prospect	59	37	74	1100	56	59	61
Grace Church	58	44	80	1500	52	55	57
Madison Avenue	47	32	67	1600	52	55	57

(1) Assumes one 85 dBA source (e.g., one excavator) operating at full engine load.

(2) Assumes two 85 dBA sources (e.g., one excavator and one dump truck) operating at full engine load.

(3) Assumes three 85 dBA sources (e.g., one excavator and two dump trucks) operating at full engine load. Note that this is an unlikely scenario since when the excavator is at full load, the dump trucks would likely be idling.

TABLE 4-10
MAXIMUM PROJECTED CONSTRUCTION NOISE LEVELS AT RECEPTOR LOCATIONS – LT ALTERNATIVE
Shieldalloy Metallurgical Corporation

	Existing Measured Daytime L_{eq}	Existing Measured Daytime L_{90}	Measured L_{max}	Distance to Receptor (feet)	Scenario 1 One Source(1)	Scenario 2 Two Sources(2)	Scenario 3 Three Sources(3)
Edgarton School	46	38	60	2300	49	52	54
333 Catawba Avenue	56	36	72	2100	50	53	55
18 Gorgo Lane	52	35	71	1300	56	59	61
Weymouth/Prospect	59	37	74	1100	57	60	62
Grace Church	58	44	80	1500	54	56	58
Madison Avenue	47	32	67	1600	54	56	58

(1) Assumes one 85 dBA source (e.g., one payloader) and rock crusher operating at full engine load.

(2) Assumes two 85 dBA sources (e.g., one payloader and one dump truck) and rock crusher operating at full engine load.

(3) Assumes three 85 dBA sources (e.g., two payloaders and one dump truck) and rock crusher operating at full engine load. Note that this is an unlikely scenario since when a payloader is at full load, the dump truck would likely be idling.

TABLE 7-1
COST ESTIMATE - ON-SITE STABILIZATION AND LONG-TERM CONTROL (LTC) ALTERNATIVE
SHIELDALLOY METALLURGICAL CORPORATION
OCTOBER 2005

Item	Quantity	Units	2005 Unit Cost	Total 2005 Cost	Present Value
CAPITAL COSTS					
SITE PREPARATION					
Mobilization	1	LS	$25,000.00	$25,000	
Construction Surveying	7.1	ACRES	$5,000.00	$35,500	
Sediment and Erosion Controls	1	LS	$15,000.00	$15,000	
SUBTOTAL					$75,500
CAP CONSTRUCTION					
Dust Suppressant (Haul Roads)	28,000	SY	$3.60	$100,694	
Radiological and Air Monitoring	1	LS	$64,140.00	$64,140	
Consolidation of Slag Piles into Cap Footprint	30,000	CY	$9.48	$284,455	
Rough Grading of Coarse Slag	22,000	SY	$6.74	$148,233	
Grading of Subgrade Cap Materials	22,000	SY	$0.26	$5,700	
Adjacent Soil Characterization	1	LS	$25,000.00	$25,000	
Sand Cushion Layer (9 inches thick)	6,000	CY	$17.83	$106,957	
Anchor Trench	2,080	LF	$1.65	$3,437	
HDPE Geomembrane (40 mil)	200,000	SF	$2.80	$559,394	
Liner Testing and QA/QC	1	LS	$20,000.00	$20,000	
Drainage Geonet	200,000	SF	$0.73	$146,061	
Soil Isolation/ Frost Protection Layer (2 feet thick)	15,000	CY	$21.23	$318,426	
Topsoil (6 inches thick)	8,000	CY	$40.81	$326,485	
Fine Grade, Seed and Mulch	35,000	SY	$2.72	$95,200	
Drainage Improvements	1	LS	$25,000.00	$25,000	
Establish Vegetative Cover (first-year maintenance)	1	LS	$15,000.00	$15,000	
SUBTOTAL					$2,244,181
FINAL STATUS SURVEY	1	LS	$92,345.00	$92,345	$92,345
DEMOBILIZATION/ DECONTAMINATION/ SITE CLEANUP	1	LS	$20,000.00	$20,000	$20,000
CONSTRUCTION SUBTOTAL					$2,432,026
IMPLEMENTATION COSTS					
Administrative Costs (5%)				$121,601	
Project Management During Construction (10%)				$243,203	
Permits and Legal Documentation (10%)				$243,203	
Engineering Design Costs (10%)				$243,203	
IMPLEMENTATION TOTAL					$851,209
CAPITAL COST GRAND TOTAL					$3,283,235

TABLE 7-1
COST ESTIMATE - ON-SITE STABILIZATION AND LONG-TERM CONTROL (LTC) ALTERNATIVE
SHIELDALLOY METALLURGICAL CORPORATION
OCTOBER 2005

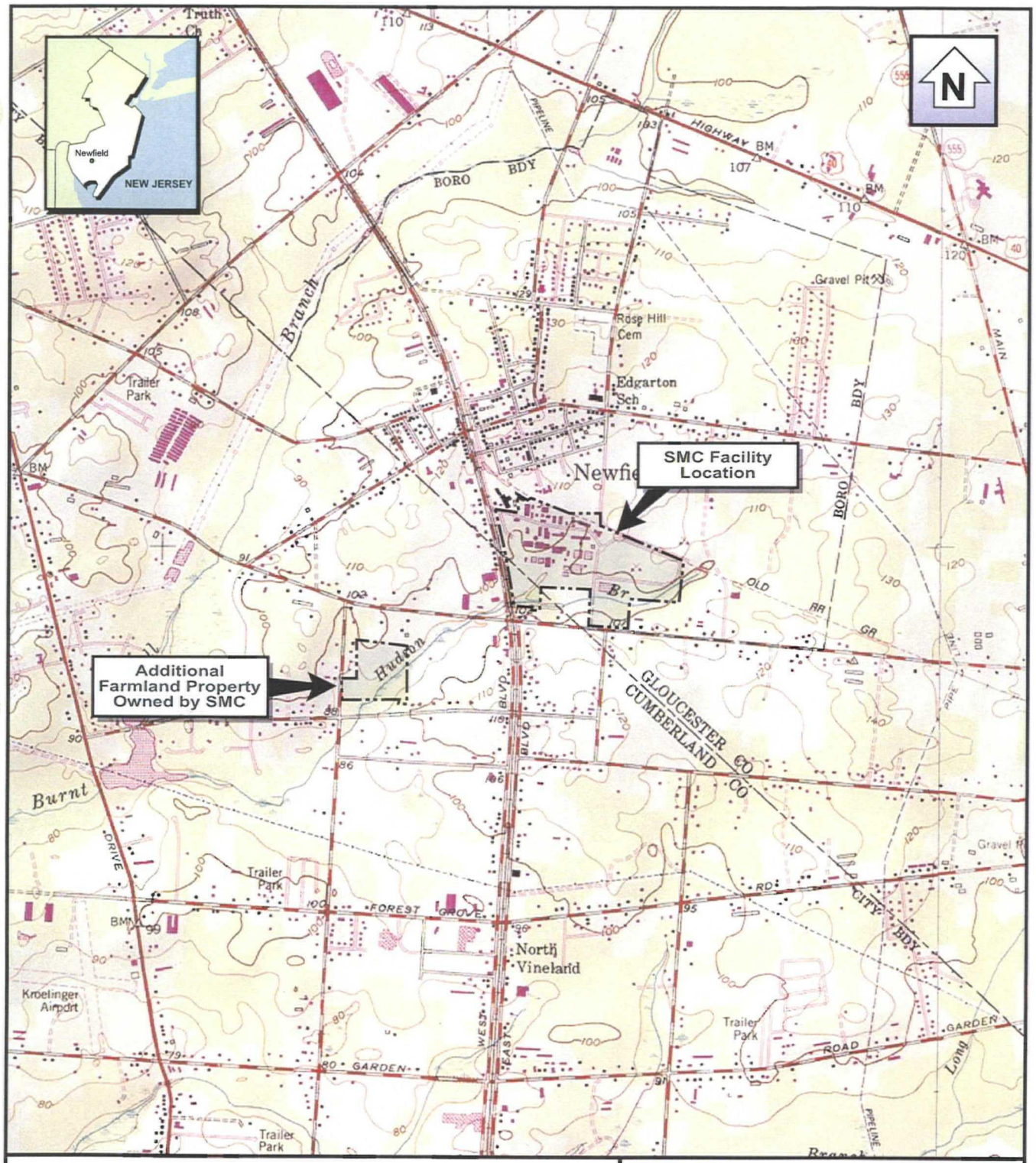
Item	Quantity	Units	2005 Unit Cost	Total 2005 Cost	Present Value
1000-YEAR SURVEILLANCE & MONITORING COSTS					
PRESENT WORTH - 1000-YEARS OF ANNUAL SURVEILLANCE & MONITORING COSTS (3% DISCOUNT RATE)					
Visual and Ambient Gamma Radiation Surveys	1	LS	$1,200.00	$1,200	$40,000
Site Security Maintenance	7.1	ACRES	$165.00	$1,172	$39,050
Cap Maintenance	7.1	ACRES	$495.00	$3,515	$117,150
NRC Fees					
Annual Report Review/Inspection	1	LS	$10,000.00	$10,000	$333,333
Additional Cost Every 5 Years for License Renewal, Expande Inspection and Report Review (converted to an annual cost)	1	LS	$20,000.00	$4,367	$145,570
Trust Fund Fees & Expenses	1	LS	$5,390.00	$5,390	$179,667
					$854,770
SUBTOTAL: CAPITAL AND 1,000-YEAR SURVEILLANCE & MONITORING COSTS					$4,138,005
CONTINGENGY (25%)					$1,034,501
GRAND TOTAL CAPITAL AND 1,000-YEAR SURVEILLANCE & MONITORING COSTS					$5,172,507

TABLE 7-2
COST ESTIMATE - OFF-SITE DISPOSAL WITH LICENSE TERMINATION (LT) ALTERNATIVE
SHIELDALLOY METALLURGICAL CORPORATION
OCTOBER 2005

Item	Quantity	Units	2005 Unit Cost	Total 2005 Cost	Present Value
CAPITAL COSTS					
SITE PREPARATION					
Mobilization	1	LS	$62,000.00	$62,000	
Sediment and Erosion Controls	1	LS	$15,000.00	$15,000	
Clear and Grub Dense Brush Including Stumps	2.7	AC	$6,250.00	$16,875	
Gravel Roadway	3,700	SY	$12.52	$46,327	
SUBTOTAL					$140,202
RAILROAD IMPROVEMENTS					
Remove Old Railroad Ties and/or Track	3,000	LF	$9.55	$28,650	
New Crossties with Tie Plates and Spikes	3,000	EA	$102.03	$306,084	
New Track	2,400	LF	$18.41	$44,188	
Car Bumper	1	EA	$3,807.51	$3,808	
Wheetstops	1	PAIR	$778.85	$779	
Railcar Switcher	294	DAYS	$2,500.00	$735,000	
SUBTOTAL					$1,118,508
ONSITE SLAG PROCESSING					
Dust Suppressant	76,667	SY	$3.60	$275,710	
Radiological and Air Monitoring	1	LS	$104,516.00	$104,516	
Relocation of Coarse Slag to Staging Area	43,000	CY	$8.72	$375,101	
Relocation of Baghouse Dust, Finer Slag and Soils to Staging Area	33,000	CY	$6.93	$228,850	
Crush Slag Larger Than Disposal Facility Cutoff	81,000	TONS	$53.95	$4,370,021	
Load Slag Materials into Railcars	76,000	CY	$6.93	$527,048	
Adjacent Soil Characterization	1	LS	$50,000.00	$50,000	
SUBTOTAL					$5,931,246
OFFSITE SLAG DISPOSAL					
Haul Slag to Envirocare Facility in Utah	2,052,000	CF	$7.06	$14,485,122	
Slag Disposal at Envirocare in Utah	2,052,000	CF	$10.50	$21,539,215	
SUBTOTAL					$36,024,336
FINAL STATUS SURVEY	1	LS	$92,345.00	$92,345	$92,345
SITE RESTORATION					
Grading	35,000	SY	$0.36	$12,478	
Topsoil (assume 1 foot of clean soil)	11,500	CY	$32.45	$373,210	
Fine Grade and Seed	35,000	SY	$2.21	$77,280	
Drainage Improvements	1	LS	$15,000.00	$15,000	
SUBTOTAL					$477,967
DEMOBILIZATION/ DECONTAMINATION/ SITE CLEANUP	1	LS	$50,000.00	$50,000	$50,000
CONSTRUCTION TOTAL					$43,834,605
IMPLEMENTATION COSTS					
Administrative Costs (1%)				$438,346	
Project Management During Construction (2%)				$876,692	
Permits and Legal Documentation (1%)				$438,346	
Engineering Design Costs (2%)				$876,692	
IMPLEMENTATION TOTAL					$2,630,076
CAPITAL COST TOTAL					$46,464,681
CONTINGENCY (25%)					$11,616,170
GRAND TOTAL CAPITAL COST					$58,080,851

TABLE 7-3
COST ESTIMATE - LICENSE CONTINUATION (LC) ALTERNATIVE
SHIELDALLOY METALLURGICAL CORPORATION
OCTOBER 2005

Item	Quantity	Units	2005 Unit Cost	Total 2005 Cost	Present Value
1000-YEAR SURVEILLANCE AND MONITORING COSTS					
PRESENT WORTH - 1000-YEARS OF ANNUAL SURVEILLANCE & MONITORING COSTS (3% DISCOUNT RATE)					
USNRC Fees	1	LS	$62,400.00	$62,400	$2,080,000
On-Site Monitoring	1	LS	$2,400.00	$2,400	$80,000
					$2,160,000
SUBTOTAL: CAPITAL AND 1,000-YEAR SURVEILLANCE & MONITORING COSTS					$2,160,000
CONTINGENGY (25%)					$540,000
GRAND TOTAL CAPITAL AND 1,000-YEAR SURVEILLANCE & MONITORING COSTS					$2,700,000



0 2000
SCALE FEET

0 1
SCALE MILE

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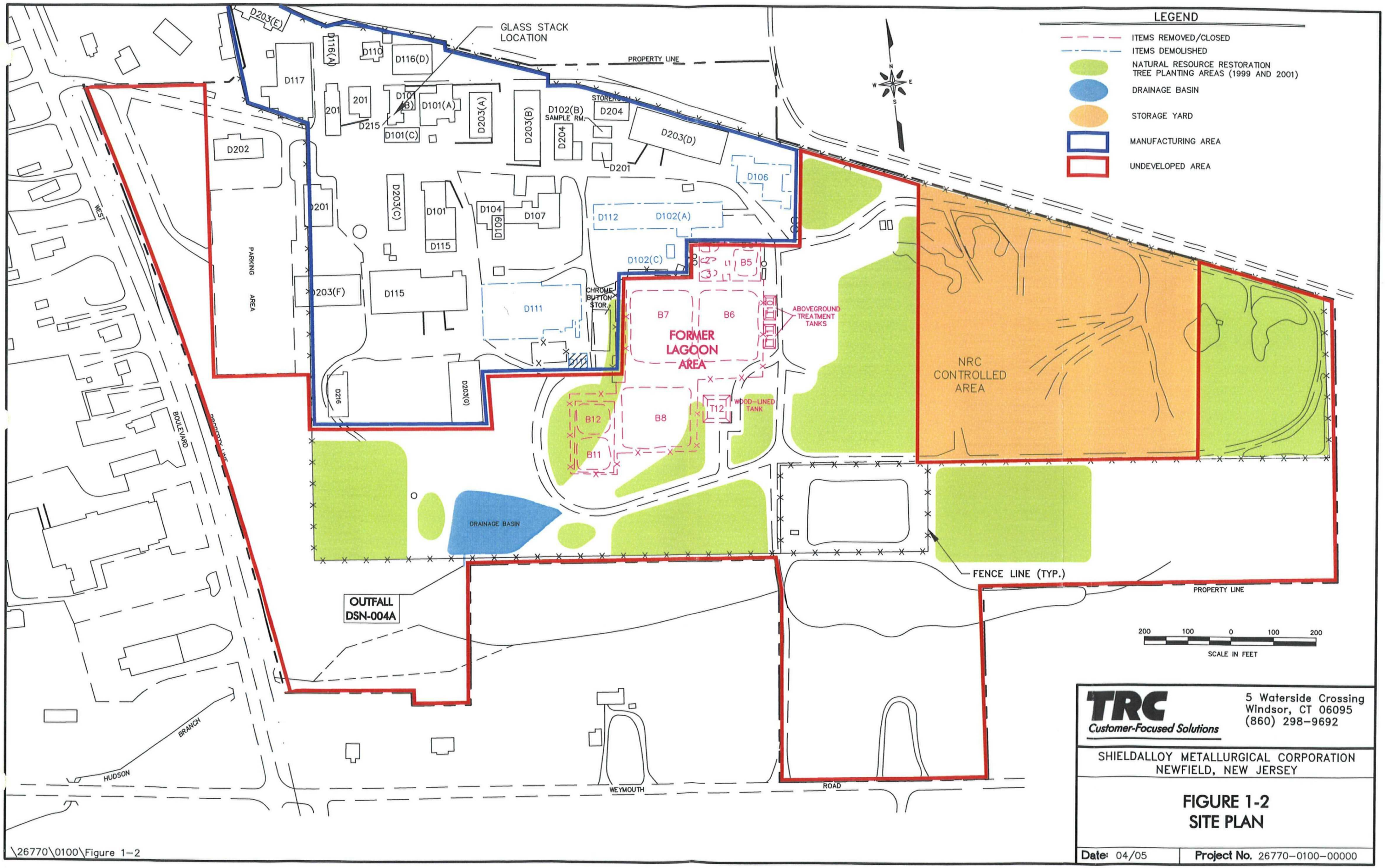
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE 1-1
SITE LOCATION MAP

Date: 04/05 | **Project No.** 26770-0100-00000



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SHIELDALLOY METALLURGICAL CORPORATION
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FIGURE 1-2
SITE PLAN

Date: 04/05 | Project No. 26770-0100-00000

\26770\0100\Figure 1-2

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SHIELDALLOY METALLURGICAL CORPORATION
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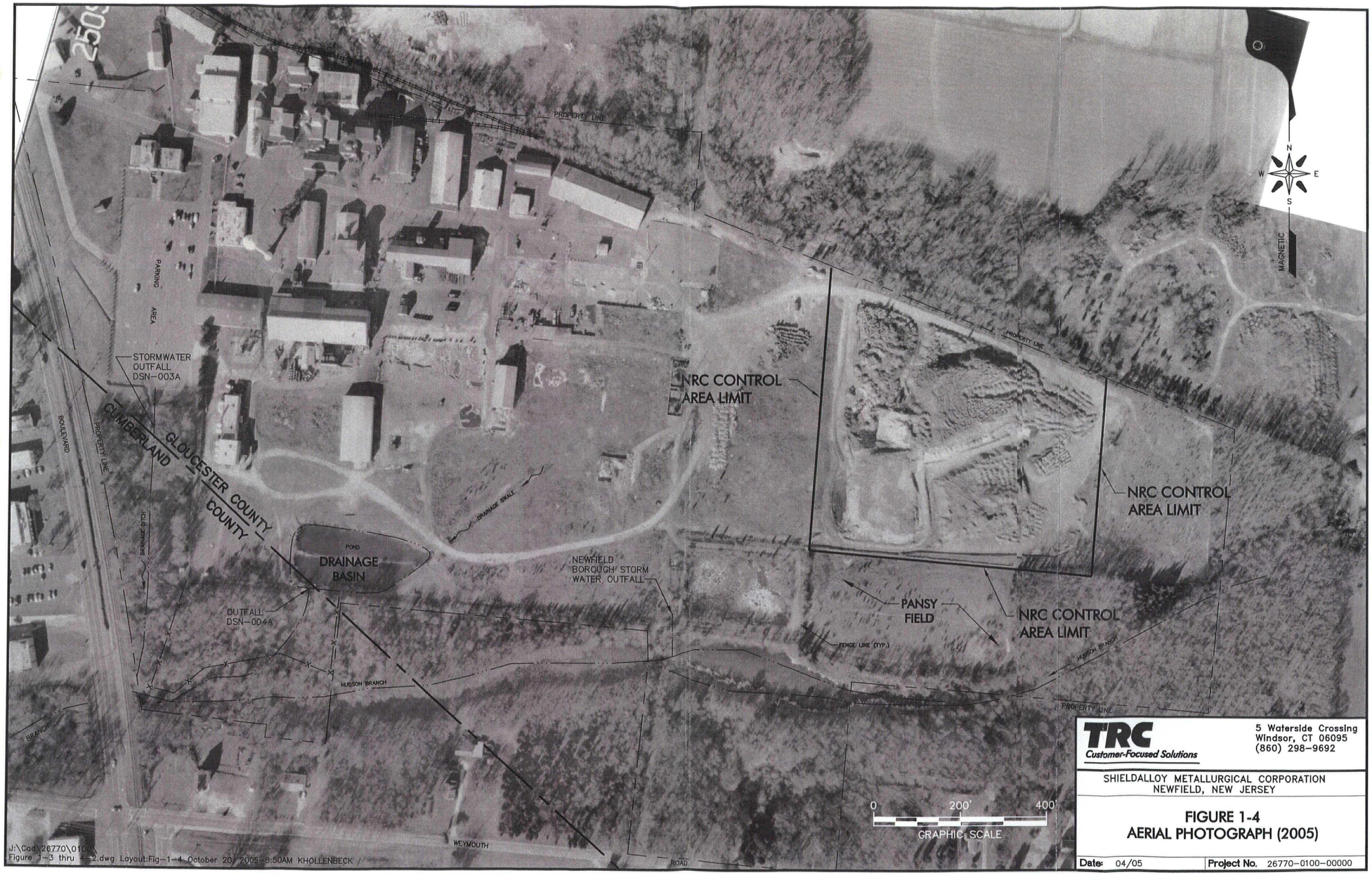
FIGURE 1-3
AERIAL PHOTOGRAPH (2000)

Date: 04/05 | Project No. 26770-0100-00000

J:\Cad\26770\0100\Fig 1-3 thru 4-2.dwg, Fig-1-3, 10/18/2005 11:07:15 AM



J:\Cad\26770\0100\Figure 1-3 thru 4-2.dwg Layout:Fig-1-4 October 20, 2005-8:50AM KHOLLENBECK

J:\Cad\26770\0100\Figure 1-3 thru 4-2.dwg, Fig-1-4, 10/20/2005 8:50:53 AM

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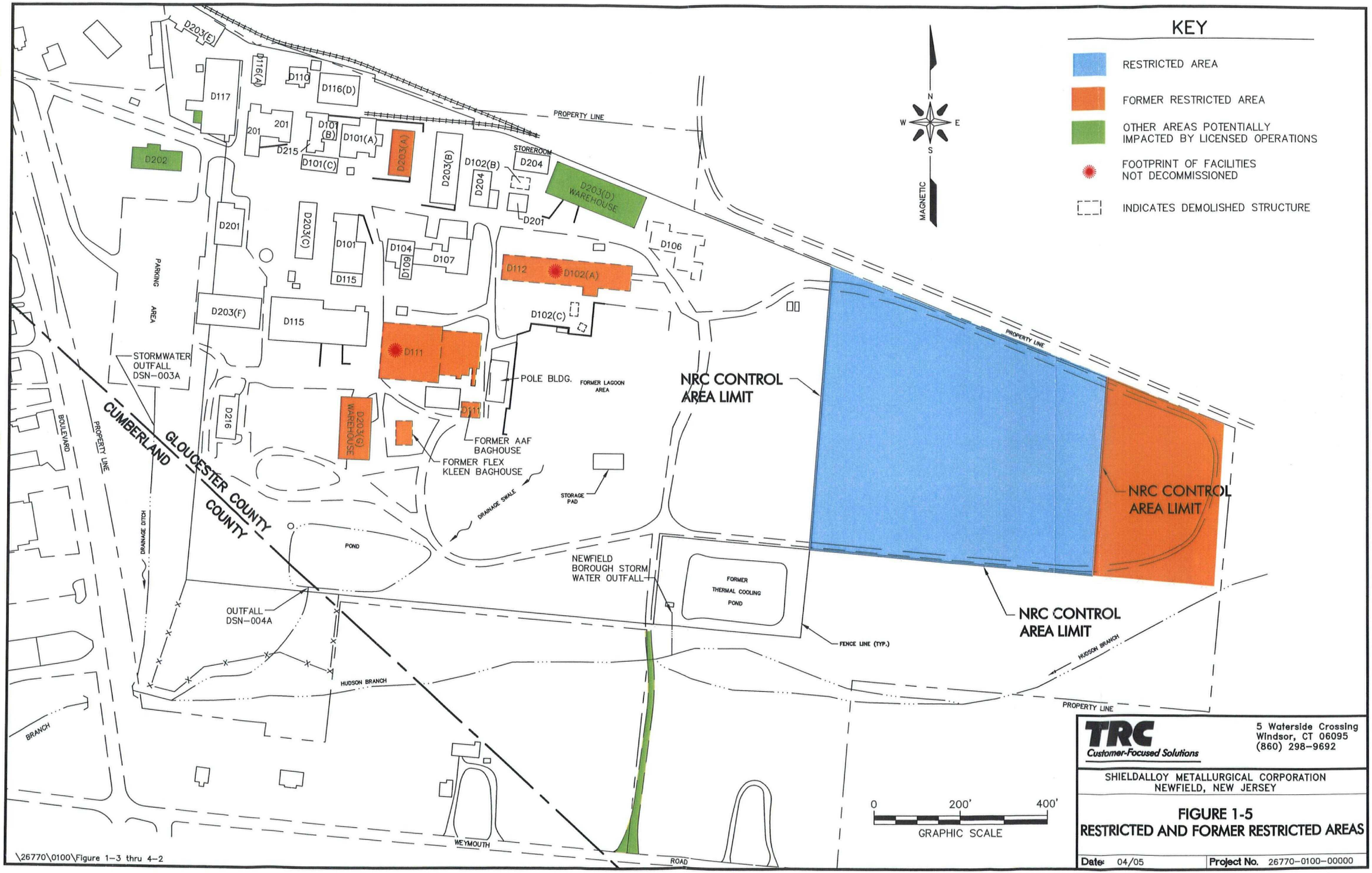
FIGURE 1-4
AERIAL PHOTOGRAPH (2005)

Date: 04/05	Project No. 26770-0100-00000



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NEWFIELD, NEW JERSEY

FIGURE 1-5
RESTRICTED AND FORMER RESTRICTED AREAS

Date: 04/05 | Project No. 26770-0100-00000

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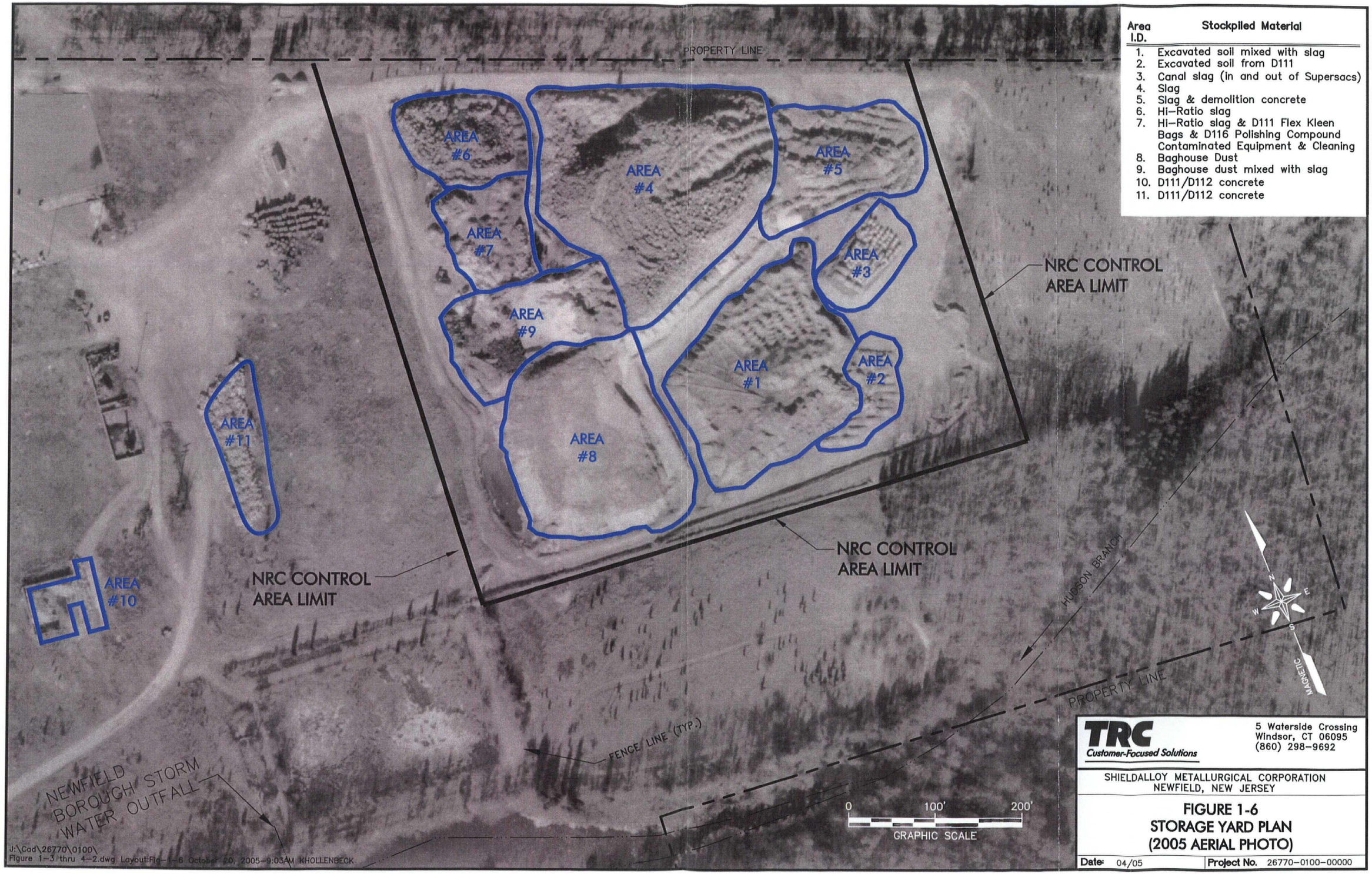

Area I.D.	Stockpiled Material
1.	Excavated soil mixed with slag
2.	Excavated soil from D111
3.	Canal slag (in and out of Supersacs)
4.	Slag
5.	Slag & demolition concrete
6.	Hi–Ratio slag
7.	Hi–Ratio slag & D111 Flex Kleen Bags & D116 Polishing Compound Contaminated Equipment & Cleaning
8.	Baghouse Dust
9.	Baghouse dust mixed with slag
10.	D111/D112 concrete
11.	D111/D112 concrete

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FIGURE 1-6
STORAGE YARD PLAN
(2005 AERIAL PHOTO)

Date: 04/05 | Project No. 26770–0100–00000

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Figure 1–3 thru 4–2.dwg Layout:Fig–1–6 October 20, 2005–9:03AM KHOLLENBECK

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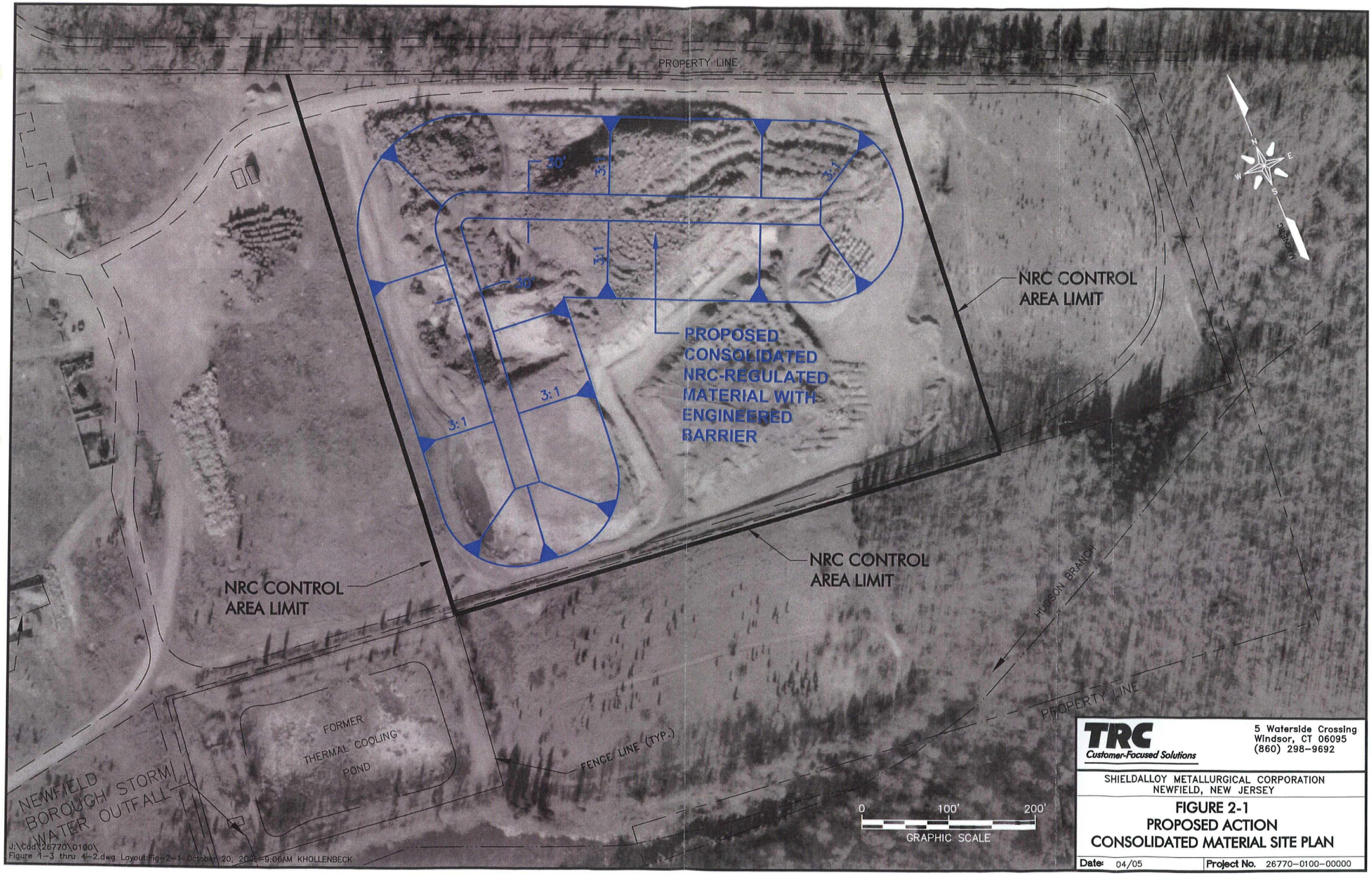

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FIGURE 2-1
PROPOSED ACTION
CONSOLIDATED MATERIAL SITE PLAN

Date: 04/05 | Project No. 26770-0100-00000

J:\Cad\26770\0100\Figure 1-3 thru 4-2.dwg, Fig-2-1, 10/20/2005 9:06:44 AM

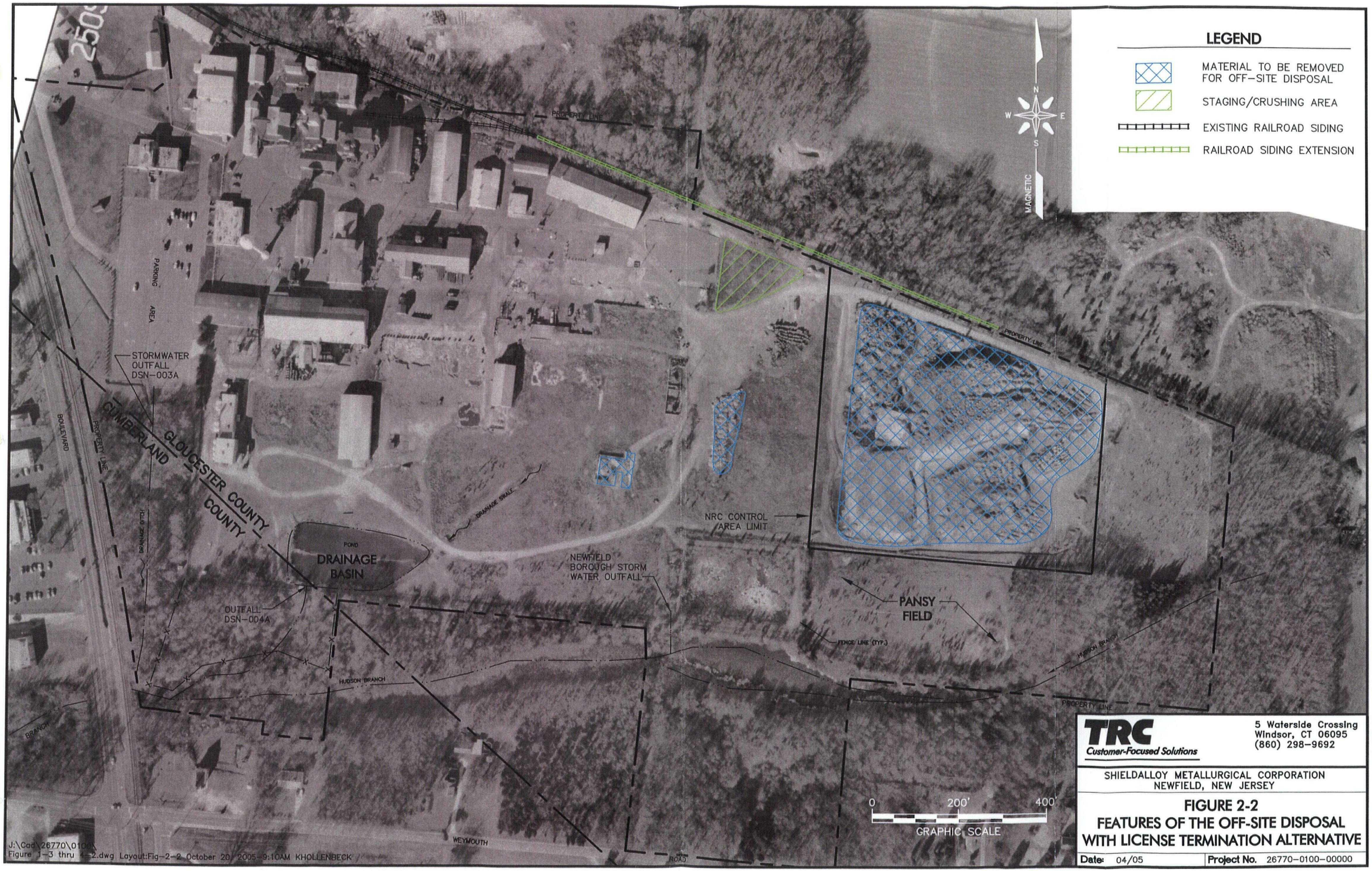

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FIGURE 2-2
FEATURES OF THE OFF-SITE DISPOSAL WITH LICENSE TERMINATION ALTERNATIVE

Date: 04/05	Project No. 26770-0100-00000

J:\Cad\26770\0100\Figure 1-3 thru 4-2.dwg Layout:Fig-2-2 October 20, 2005-9:10AM KHOLLENBECK

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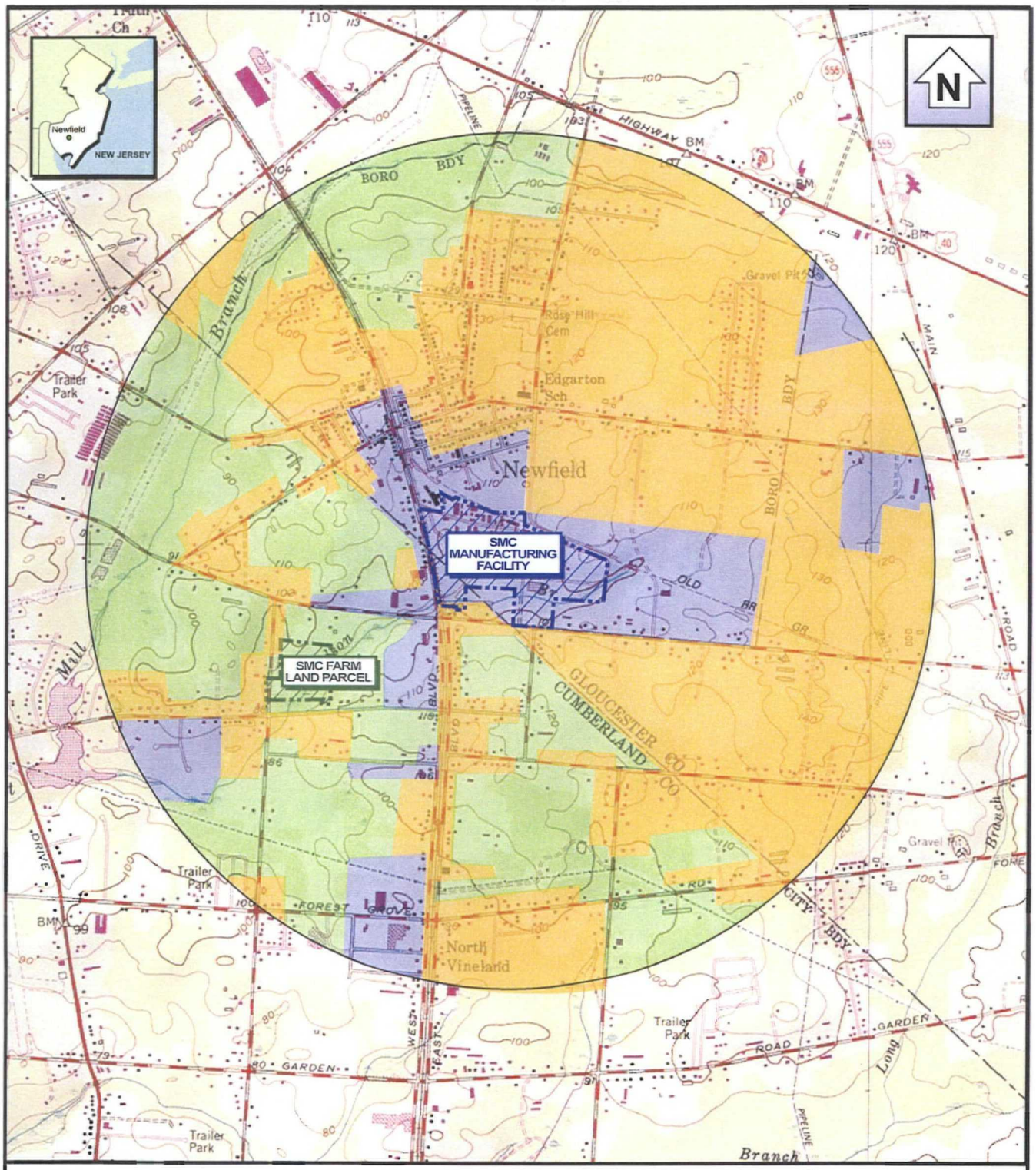

KEY

- Residential
- Business, including commercial & industrial
- Cultivation & woodlands

0 2000
SCALE FEET

0 1
SCALE MILE
1:24000

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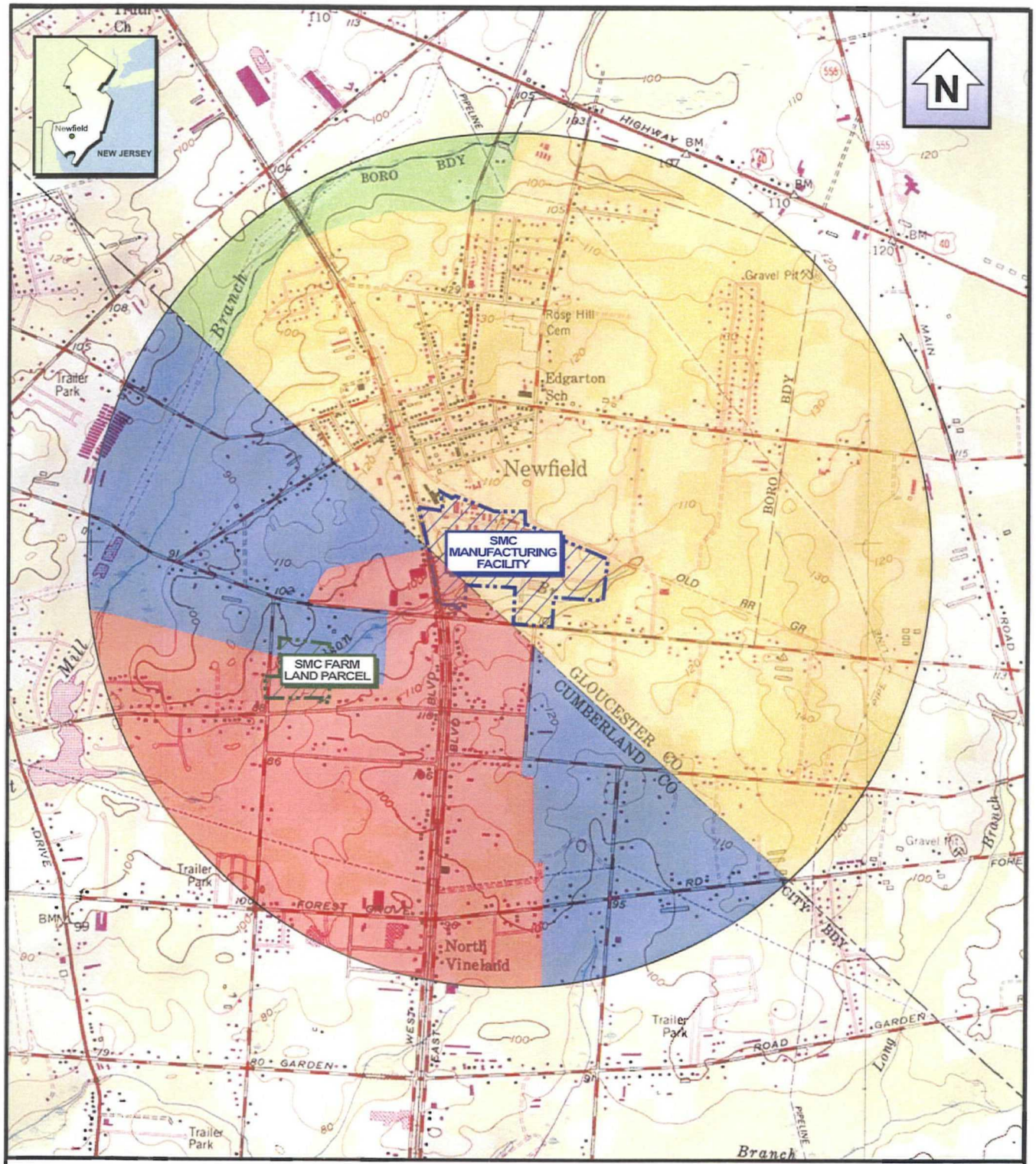
FIGURE 3-1
LAND USE WITHIN 1 MILE OF SMC

Date: 04/05 | **Project No.** 26770-0100-00000



KEY

- Rural/Environmental Sensitive Planning Area
- Suburban Planning Area
- Environmental Sensitive Planning Area
- Rural Planning Area

0 2000 SCALE FEET

0 1 SCALE 1:24000 MILE

SOURCES: Policy Maps of the New Jersey State Development and Redevelopment Plan for Cumberland and Cloucester Counties (8/15/2003 and 7/30/2003, respectively).

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FIGURE 3-2
STATE PLANNING AREAS WITHIN 1 MILE OF SMC

Date: 04/05 | **Project No.** 26770-0100-00000

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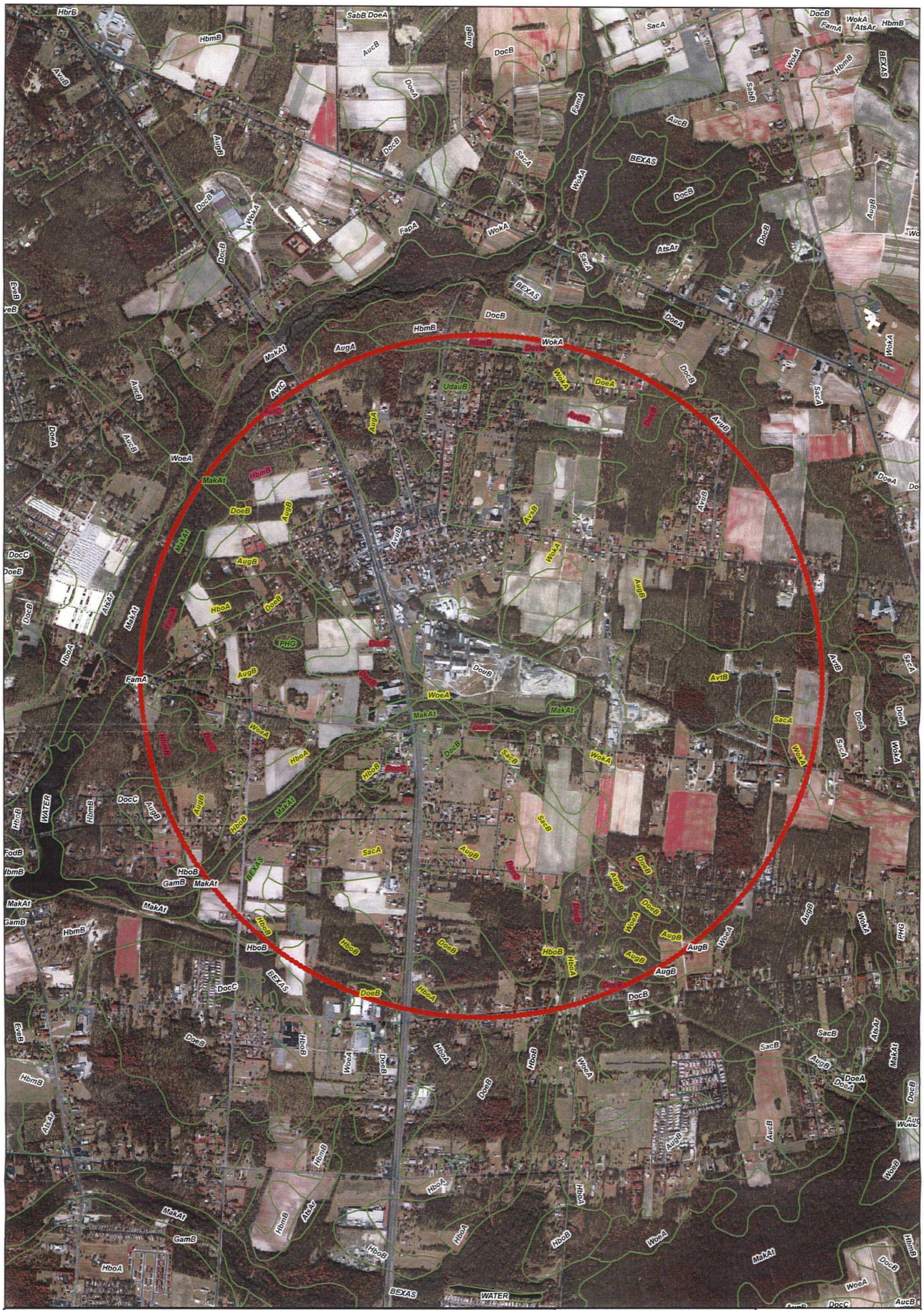

New Jersey 2002 High Resolution
February-April, 2002.
The ortho-rectification process achieved
a +/-4.0 ft. horizontal accuracy at a
95% confidence level
Publication_Date: 20030731

See Appendix A for definition of specific soil types

0 0.125 0.25 0.5 Miles

Prime Farmland

Farmland of Statewide Importance

Farmland of Unique Importance

1- MILE RADIUS

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

Soil Classification
Prime and other Important Farmlands
Within 1 Mile of SMC

FIGURE 3-3

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Boott Mills South
Foot of John Street
Lowell, MA 01852
(978)970-5600

PROJ.26770-0100

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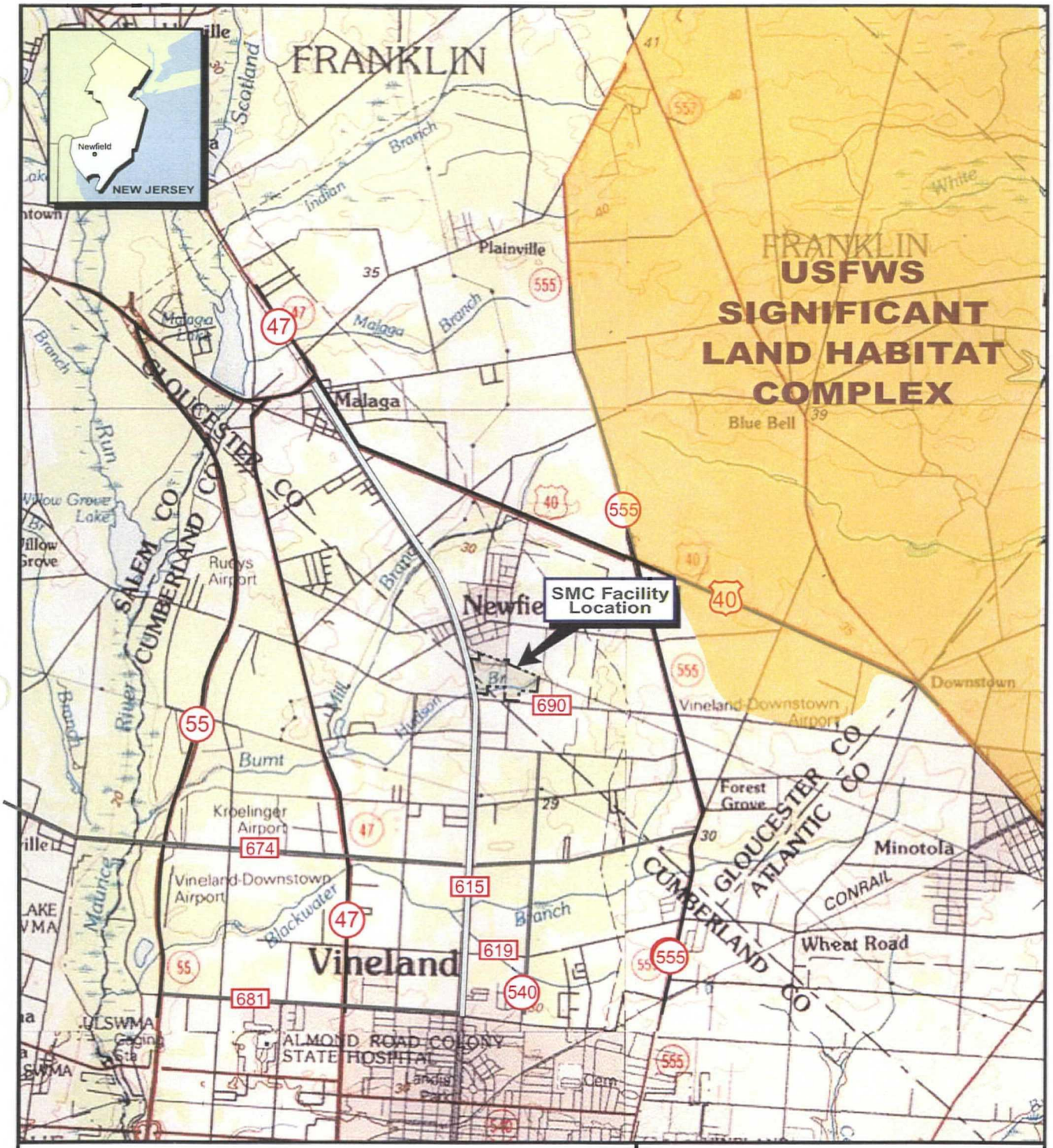

KEY

- 40 U.S. Highways
- 47 State Highways
- 615 County Roads

0 4000 SCALE FT

0 2 SCALE MILE

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SOURCE: USFWS, Significant Habitats and Habitat Complexes of the New York Bight Watershed, New jersey Pinelands, Complex #2 Maps.

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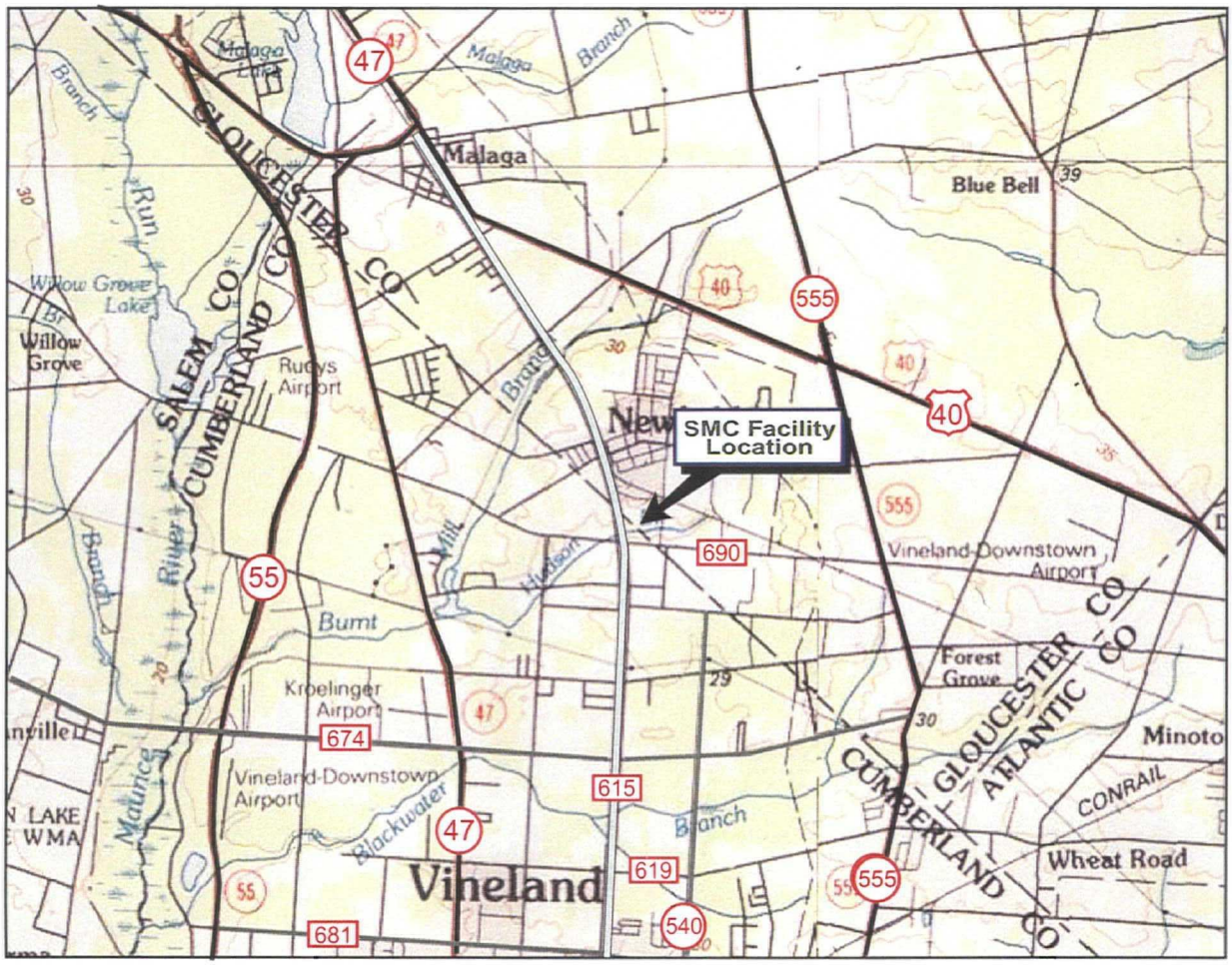
FIGURE 3-4
PROXIMITY OF PINELANDS HABITAT TO SMC FACILITY

Date: 04/05 | **Project No.** 26770-0100-00000



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7.5' USGS TOPOGRAPHIC MAP

KEY

40 U.S. Highways

47 State Highways

615 County Roads

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SHIELDALLOY METALLURGICAL CORPORATION
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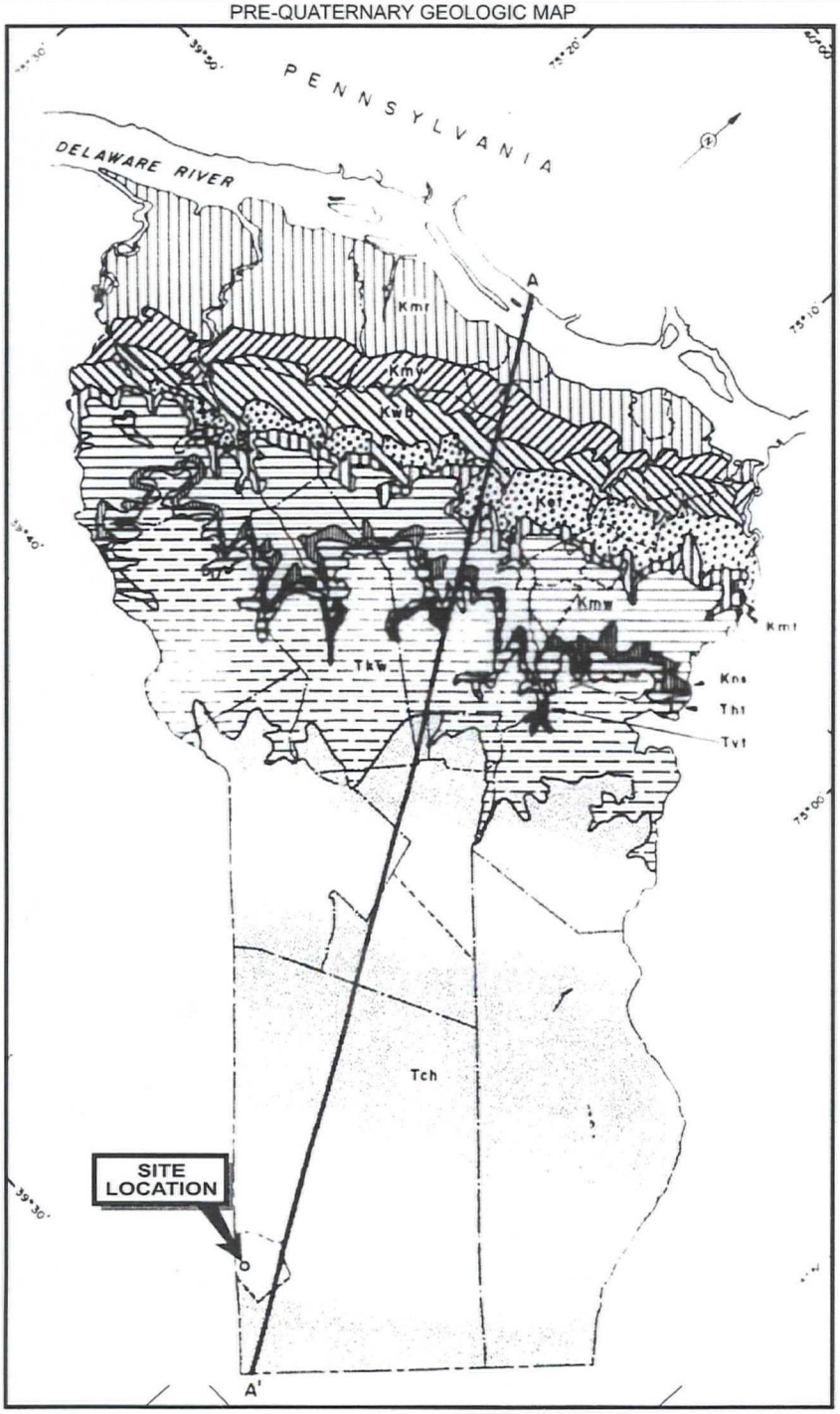
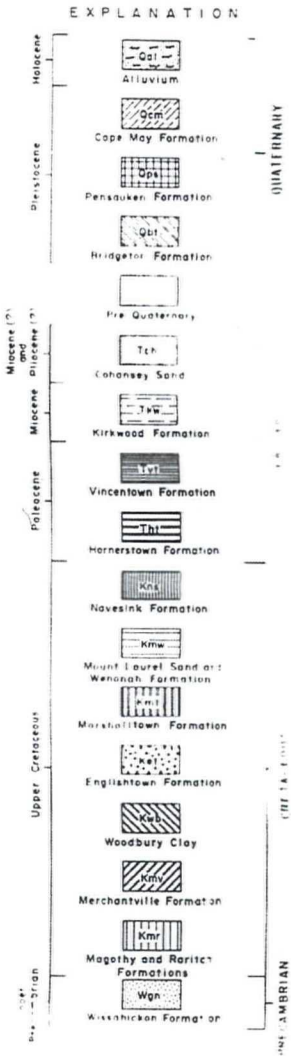
FIGURE 3-5
MAIN TRANSPORTATION ROUTES IN THE VICINITY OF SMC FACILITY

Date: 04/05 | **Project No.** 26770-0100-00000

PRE-QUATERNARY GEOLOGIC MAP





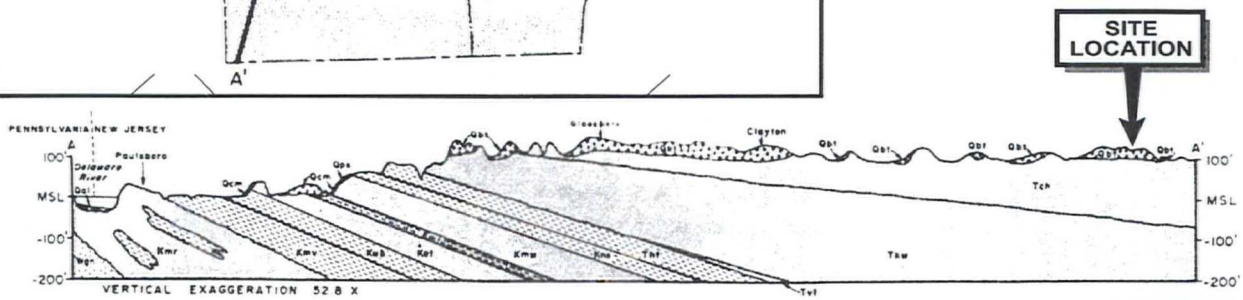


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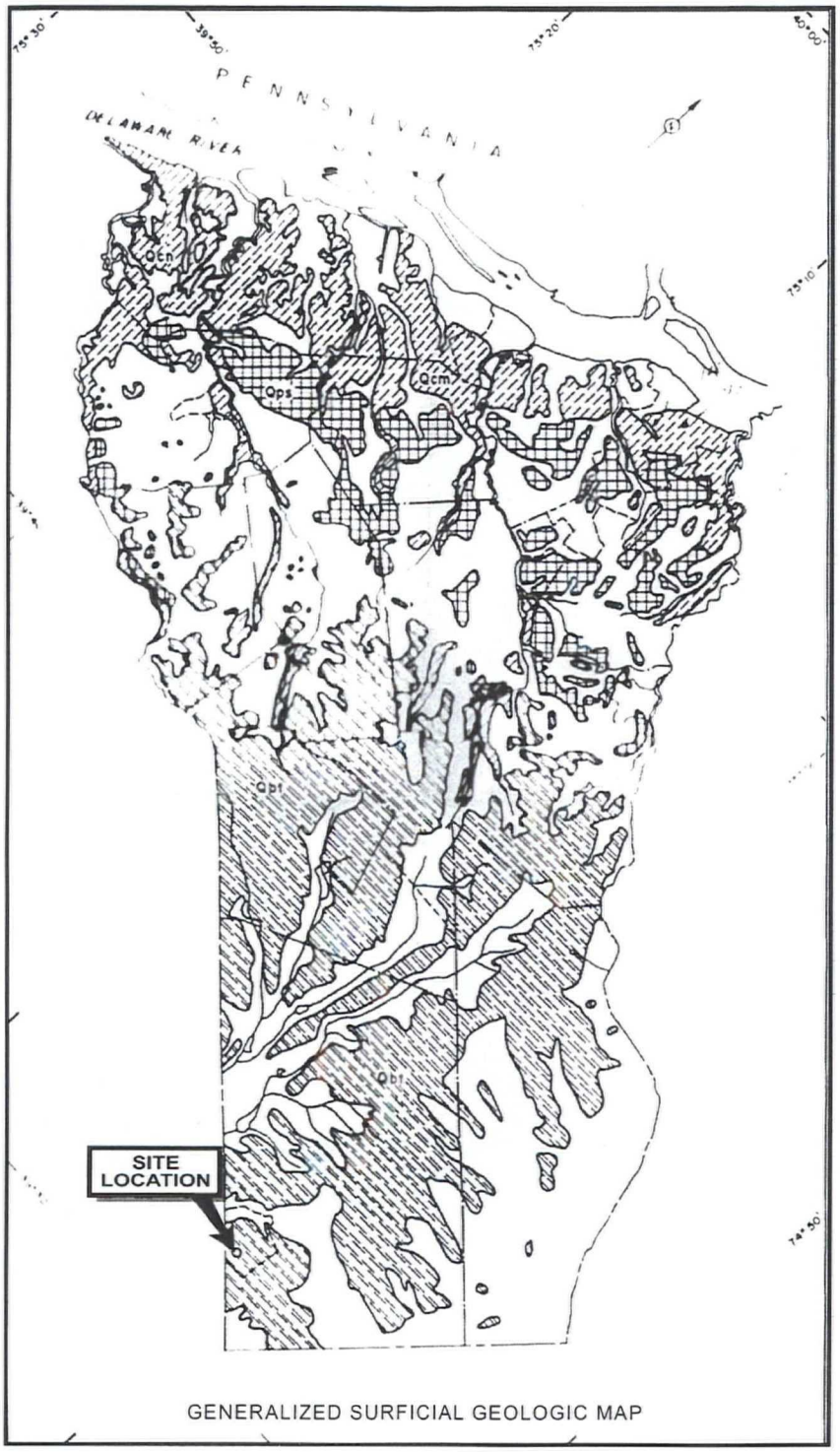
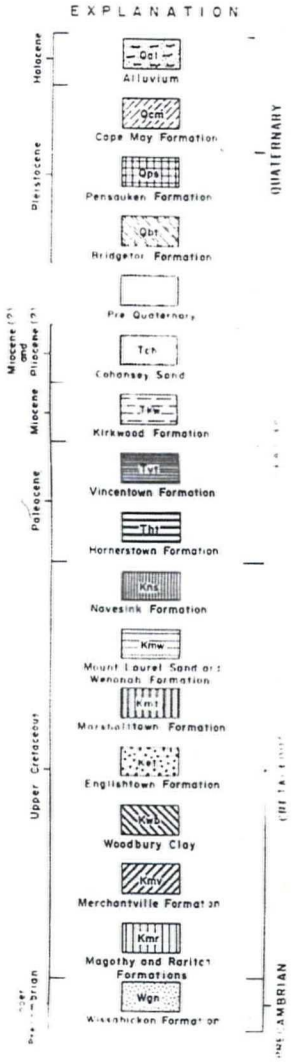
FIGURE 3-6
GEOLOGIC CROSS SECTION
GLOUCESTER COUNTY

Date: 03/05 | **Project No.** 26770-0100-00000





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SHIELDALLOY METALLURGICAL CORP.
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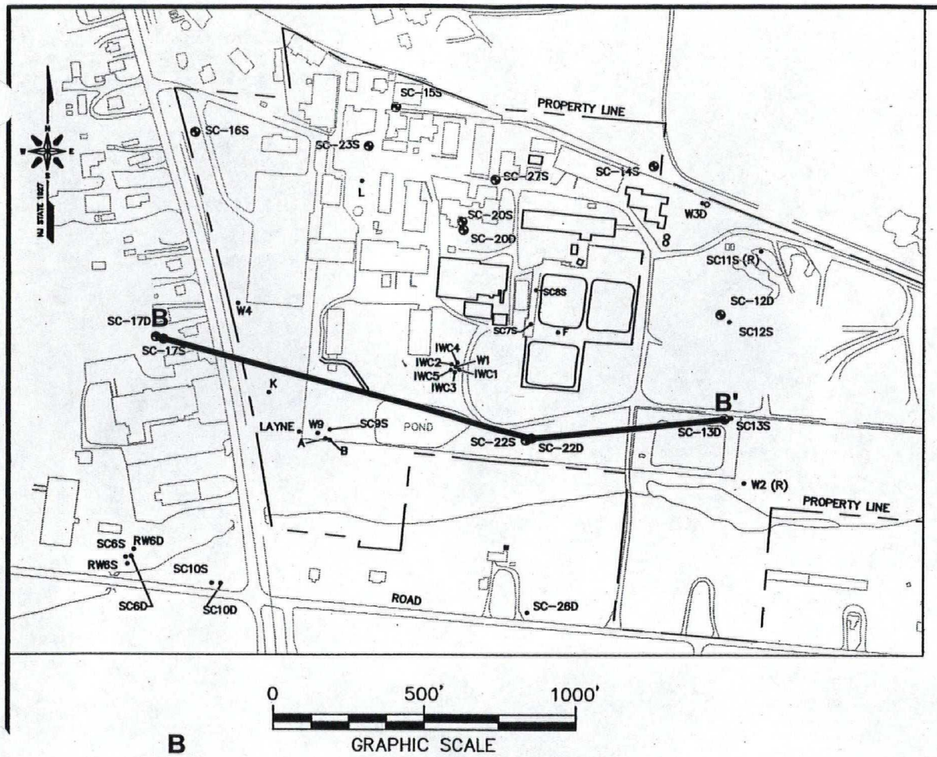
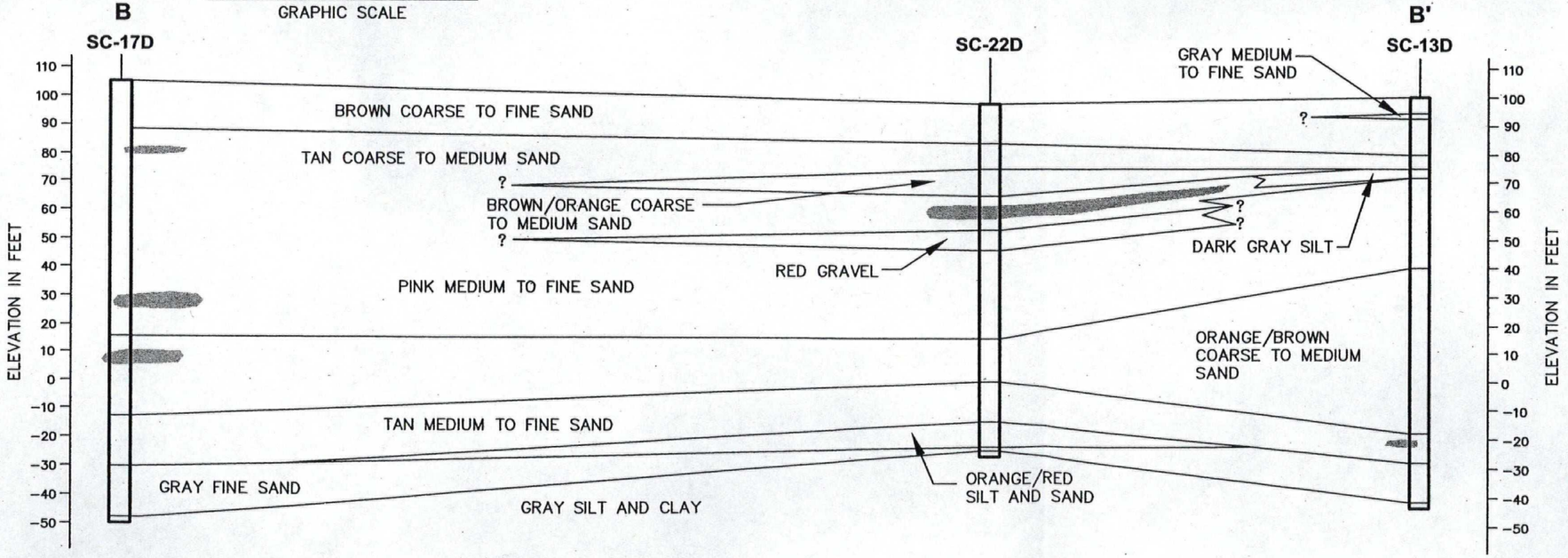
FIGURE 3-7
SURFICIAL GEOLOGY MAP
GLOUCESTER COUNTY

Date: 03/05 | **Project No.** 26770-0100-00000





LEGEND

SILT AND CLAY STRINGER

0' 200' 400'
Scale Horizontal Feet

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Figure 3-8.dwg Layout:FIG 3-8 October 20, 2005-9:54AM KHOLLENBECK

J:\C2d\26770\0100\Figure 3-8.dwg, FIG 3-8, 10/20/2005 9:54:05 AM

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SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE 3-8
SITE GEOLOGIC CROSS-SECTION

Date: 04/05 | Project No. 26770-0100-00000

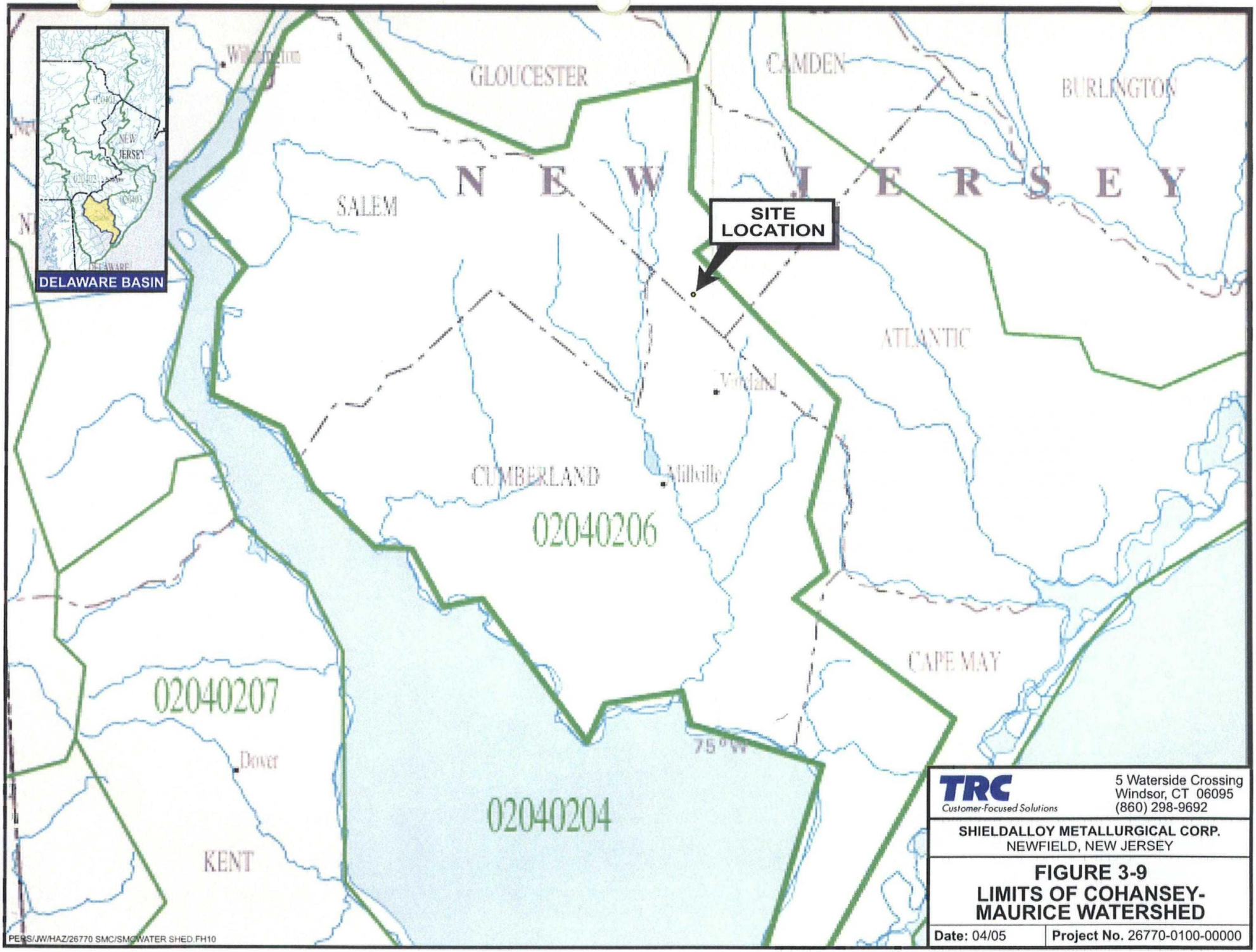
DELAWARE BASIN
NEW JERSEY
GLOUCESTER
CAMDEN
BURLINGTON
SALEM
N E W J E R S E Y
SITE LOCATION
ATLANTIC
Vineland
CUMBERLAND
Millville
02040206
CAPE MAY
02040207
Dover
75°W
02040204
KENT
TRC
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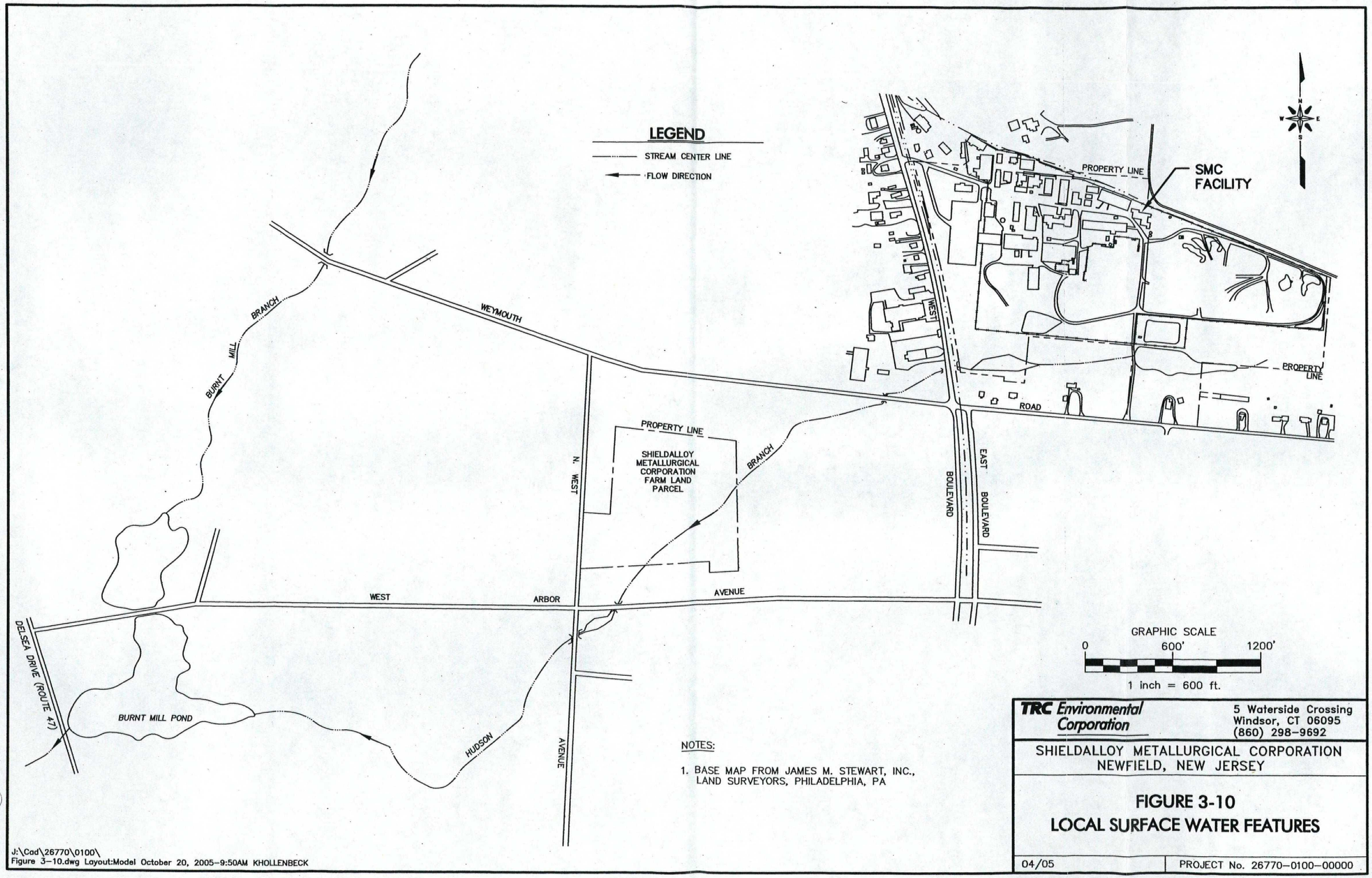
FIGURE 3-9
LIMITS OF COHANSEY-MAURICE WATERSHED
Date: 04/05
Project No. 26770-0100-00000
PERS/JW/HAZ/26770 SMC/SMCWATER SHED.FH10



NOTES:

1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA

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Figure 3-10.dwg Layout:Model October 20, 2005-9:50AM KHOLLENBECK

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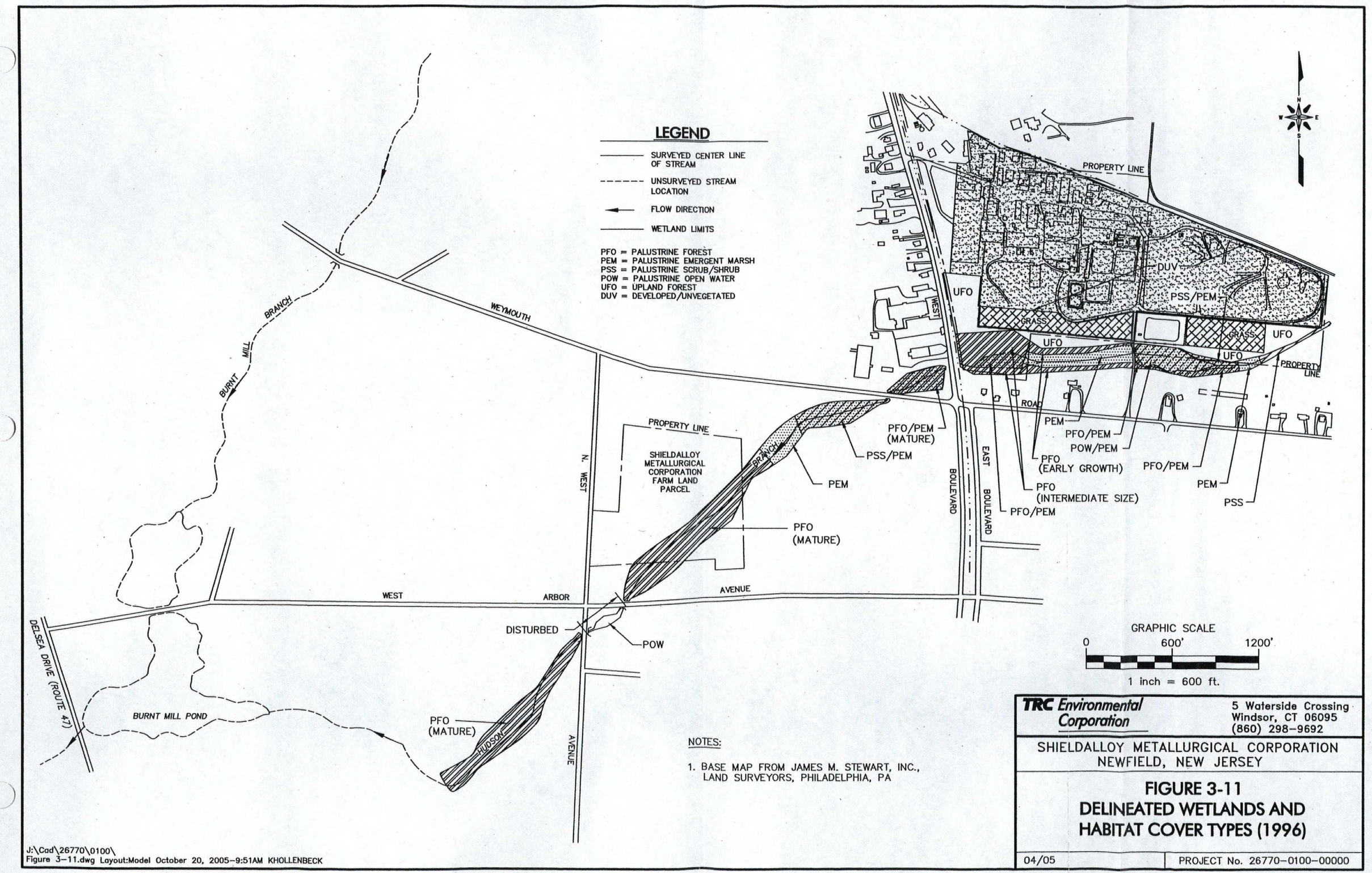
FIGURE 3-10
LOCAL SURFACE WATER FEATURES

04/05

PROJECT No. 26770-0100-00000



NOTES:

1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA

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Figure 3-11.dwg Layout:Model October 20, 2005-9:51AM KHOLLENBECK

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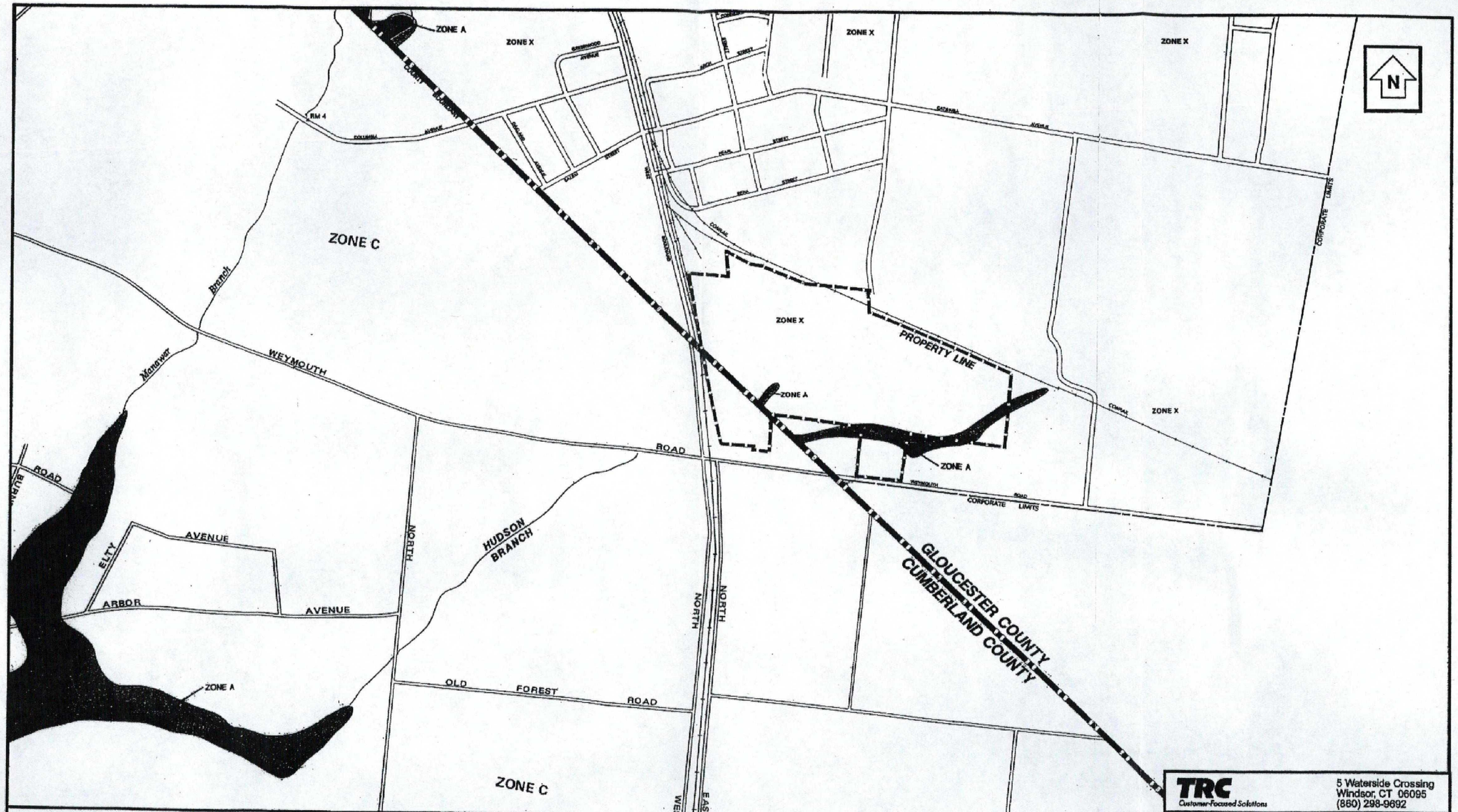
NEWFIELD, NEW JERSEY

FIGURE 3-11
DELINEATED WETLANDS AND HABITAT COVER TYPES (1996)

04/05 | PROJECT No. 26770-0100-00000



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD
Zone A - No Base Flood Elevations Determined

OTHER AREAS
Zone X - Areas Determined to be Outside 500-year Flood Plain
Zone C - Areas of Minimal Flooding

0 800
SCALE FEET

FROM:

FEDERAL EMERGENCY MANAGEMENT AGENCY, FLOOD INSURANCE RATE MAP & STREET INDEX, BOROUGH OF NEWFIELD, NJ, GLOUCESTER COUNTY, 340549 0001 B, 6/17/91 AND CITY OF VINELAND, NEW JERSEY CUMBERLAND COUNTY, 340176 0005 B 7/5/82

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FIGURE 3-12
DELINEATED FLOOD HAZARD AREAS NEAR SMC FACILITY

Date: 04/05 | Project No. 26770-0100-00000

NEW JERSEY WATER WITHDRAWALS, USES, TRANSFERS & DISCHARGES - Watershed Management Area Summary

V 2.5

Subject to revision.

WMA: *Maurice, Salem, and Cohansey*

17

Click on the box to the left and use the pull down menu to select a WMA.

Subject to Revision

See the 'User's Guide' worksheet for more information.

Table 12. Freshwater Withdrawals, Imports & Exports in WMA 17 (millions of gallons)

Withdrawals (Q)	Year 1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
surface water	14,930	23,621	30,836	24,864	27,509	27,527	20,316	27,217	21,133	17,594	23,555
ground water	21,601	22,563	20,524	23,024	25,629	26,828	23,631	27,238	26,653	26,427	24,412
total Q	36,531	46,184	51,359	47,887	53,138	54,356	43,947	54,455	47,787	44,021	47,966
imports	433	457	434	448	373	404	355	374	385	367	403
exports	16	167	177	495	983	1,130	1,105	1,322	1,444	1,296	814
net	418	290	257	(47)	(609)	(726)	(750)	(947)	(1,059)	(929)	(410)

Table 13. Freshwater imports to WMA 17 in 1999

Source WMA	MG received	% of all water withdrawn in source WMA in 1999	% of all potable water used in WMA 17 in 1999
15	303	1.2%	2.5%
16	0	0.0%	0.0%
18	64	0.1%	0.5%
sum:	367		3.0%

Table 14. Freshwater Exports from WMA 17 in 1999

Destination WMA	MG sent	% of all water withdrawn in WMA 17 in 1999	% of all potable water used in destination WMA in 1999
15	136	0.3%	0.9%
18	1,161	2.6%	3.8%
sum:	1,296	2.9%	

Table 15. Use of Fresh Water in WMA 17 (millions of gallons) (includes imports, excludes exports)

Use Group	Year 1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
agricultural	3,912	6,021	4,538	6,583	5,844	6,769	4,511	6,992	7,814	6,668	5,965
commercial	26	55	57	83	44	41	45	17	16	14	40
industrial	8,217	9,154	7,944	8,752	10,040	9,657	9,631	8,420	7,978	7,304	8,710
irrigation	97	87	103	166	139	116	74	120	122	112	113
mining	13,895	19,433	27,742	20,388	24,380	25,098	18,161	25,780	18,856	17,029	21,076
potable supply	10,833	11,752	11,231	11,872	12,081	11,951	10,832	12,424	12,065	12,089	11,713
power generation	0	0	0	0	0	0	0	0	0	0	0
total volume	36,979	46,502	51,615	47,843	52,529	53,630	43,254	53,753	46,851	43,216	47,617
consumed volume	7,370	10,145	9,616	10,836	10,754	11,614	8,537	11,801	11,660	10,326	10,266
consumed percent	20%	22%	19%	23%	20%	22%	20%	22%	25%	24%	22%

Table 16. Sewage Transfers & Reclaimed-Water Discharges in WMA 17 (millions of gallons)

Sewage/Reclaimed Water	Year 1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
imported to WMA	0	0	0	0	0	0	0	0	0	0	0
exported from WMA	1,117	1,202	1,400	988	1,510	1,389	1,590	1,671	1,552	1,527	1,395
generated in WMA	3,996	4,563	4,753	4,472	5,122	4,566	5,315	5,048	4,924	5,019	4,778
discharged in WMA	2,879	3,361	3,353	3,484	3,612	3,177	3,725	3,376	3,372	3,491	3,383

Table 17. Destination of Reclaimed-Water Discharges in WMA 17 (millions of gallons)

Destination	Year 1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
fresh water	1,341	1,508	1,561	1,697	1,730	1,587	1,817	1,669	1,692	1,802	1,640
brackish water	1,538	1,853	1,792	1,787	1,882	1,590	1,909	1,708	1,680	1,689	1,743
salt water	0	0	0	0	0	0	0	0	0	0	0

Table 18. Nonconsumptive Water Returns to WMA 17 (millions of gallons)

Water Use	Year 1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
potable purveyors	7,200	7,983	7,520	8,020	8,181	8,026	7,056	8,425	8,051	8,057	7,852
domestic wells	2,370	2,385	2,412	2,439	2,469	2,496	2,518	2,539	2,563	2,587	2,478
ind + comm + mining	19,639	25,378	31,603	25,873	30,526	30,807	24,685	30,277	23,784	21,567	26,414
ag + irrig	401	611	464	675	598	688	459	711	794	678	608
power generation	0	0	0	0	0	0	0	0	0	0	0
sum:	29,609	36,357	41,999	37,008	41,774	42,017	34,717	41,952	35,191	32,890	37,351

notes:
- Volumes include an estimate of domestic-well withdrawals and their consumptive use.
- Consumed refers to water evaporated in the watershed, it does not include exports.
- This does not account for water released from onstream reservoirs for downstream intakes.
- No accounting for intakes or use of salt-water.
- The allocated volume is based on users with allocation permits.
- Sewage and reclaimed-water transfers and discharges based on sewer service areas and NJPDES discharge volumes.
- Withdrawals for offstream reservoirs in WMAs 03, 08, and 12 are problematic and complicate Figure 1.
- See the 'User's Guide' worksheet for more information.
- Subject to revision.

Figure 12. Freshwater Withdrawals, Use, Imports & Exports

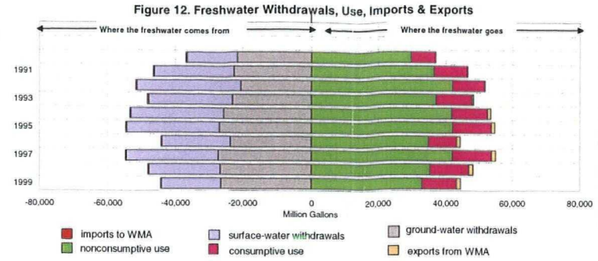


Figure 13. 1999 Freshwater Import & Export Details

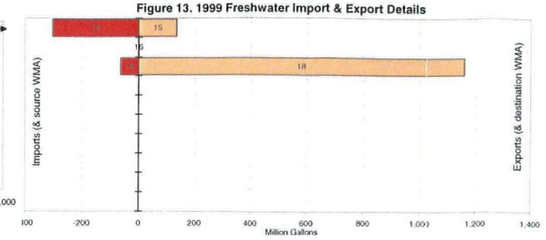


Table 19. Water Allocations in WMA 17 by Water Source

Water Source	Million Gallons/Year
surface water	24,082
ground water	105,998
total	130,080

Figure 14. Use of Fresh Water in WMA

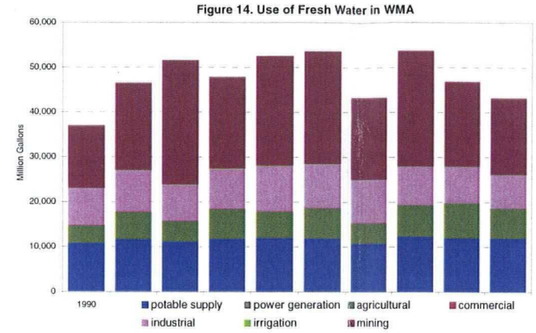


Figure 15. Monthly Consumptive & Nonconsumptive Water Use in WMA

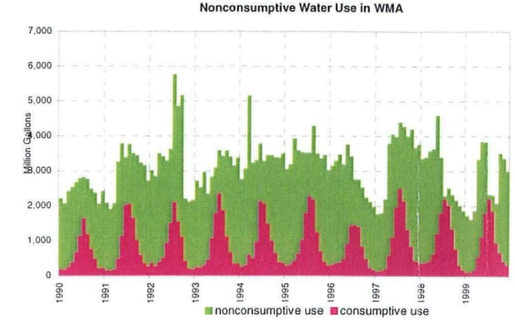


Table 20. Water Allocations in WMA 17 by Water Use Group

Use Group	Million Gallons/Year
agricultural	50,541
commercial	298
industrial	14,941
irrigation	663
mining	50,159
potable supply	13,479
power generation	0
sum	130,080

Table 21. Descriptive Statistics for WMA 17

--- Area:	1,233.3	sq mi.
--- Population:		
year	population	change
1940	123,835	--
1950	150,151	21.3%
1960	184,557	22.9%
1970	206,443	11.9%
1980	233,065	12.9%
1990	245,154	5.2%
2000	255,187	4.1%
--- Withdrawals per square mile (average):		
surface	19.1	mg/sq mi
ground	19.8	mg/sq mi
--- Land Use:		
type	Year 1986	1995
ag.	28.1%	27.1%
barren	0.9%	0.9%
forest	26.1%	25.7%
water	5.2%	5.5%
urban	10.9%	12.3%
wetlands	28.9%	28.5%
--- % of WMA in:		
	Pinelands:	5.8%
	Highlands:	0.0%

Figure 16. Sewage Generation, Transfers and Reclaimed-Water Discharges

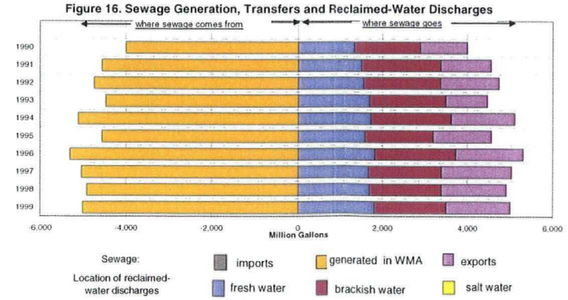


Figure 17. 1999 Sewage Import & Export Details

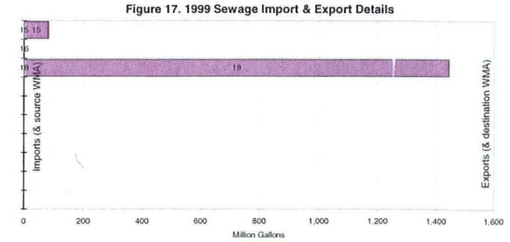
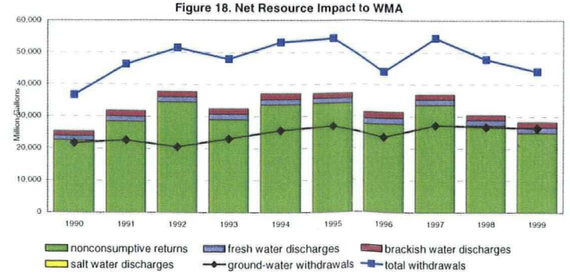


Figure 18. Net Resource Impact to WMA



See the 'Metadata' worksheet for more information.

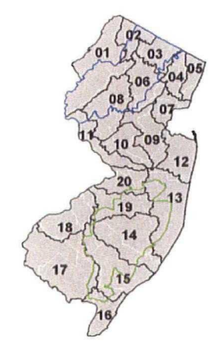


Figure 11. Watershed Management Areas & Countiss in New Jersey

WMA boundaries and numbers in black.
County boundaries in white.
Pinelands outer border in green
Highlands outer border in blue.

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FIGURE 3-13

WATER USE SUMMARY MAURICE, SALEM & COHANSEY WATERSHED MANAGEMENT AREA

Date: 04/05 | Project No. 26770-0100-00000

October 20, 2005

New Jersey Water Supply Plan

NJ Department of Environmental Protection - Land Use Management - New Jersey Geological Survey

G:\Jwaleszczyk\HAZ\26770 SMC\[wmatransfers25.xls]WMA Details

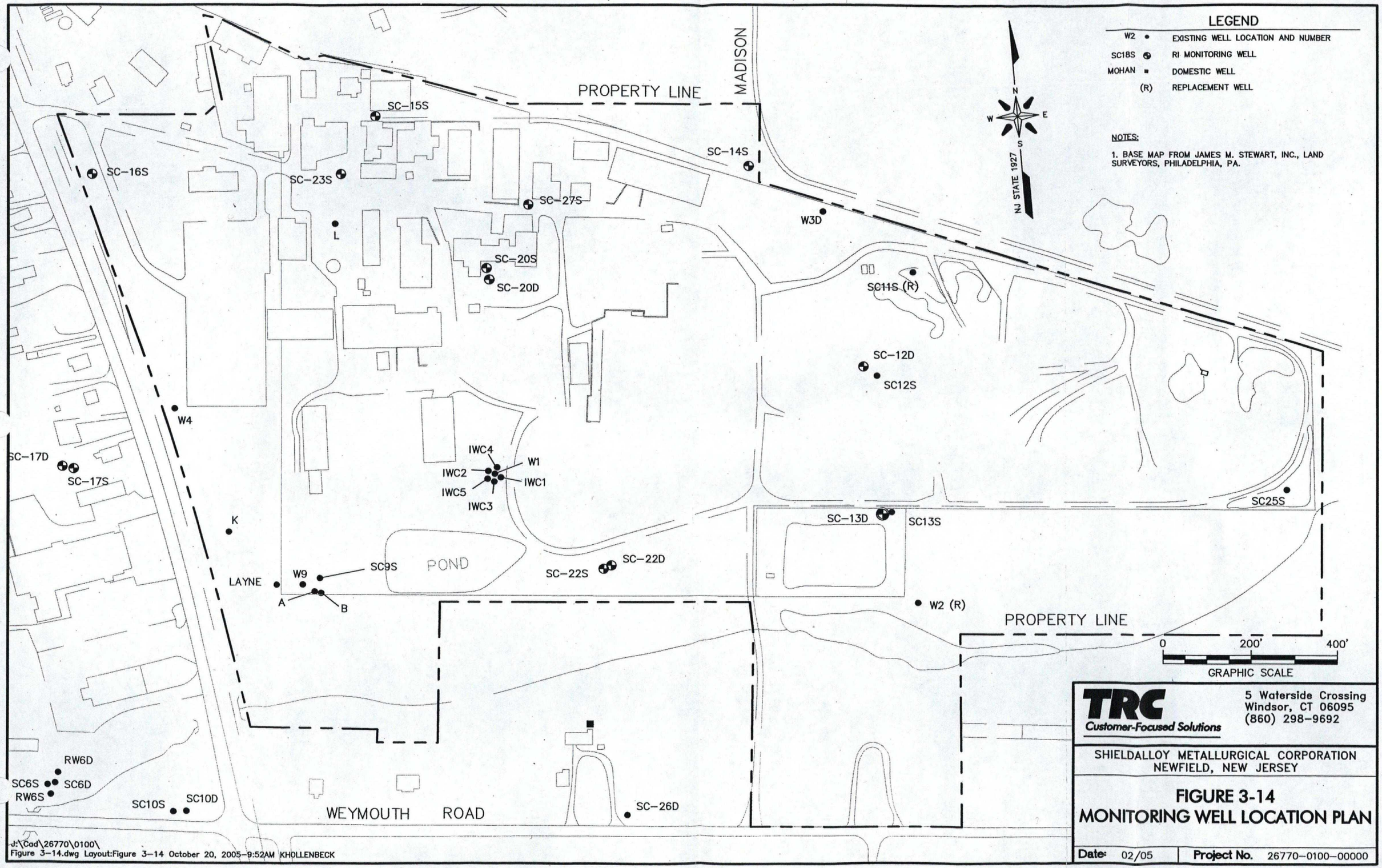

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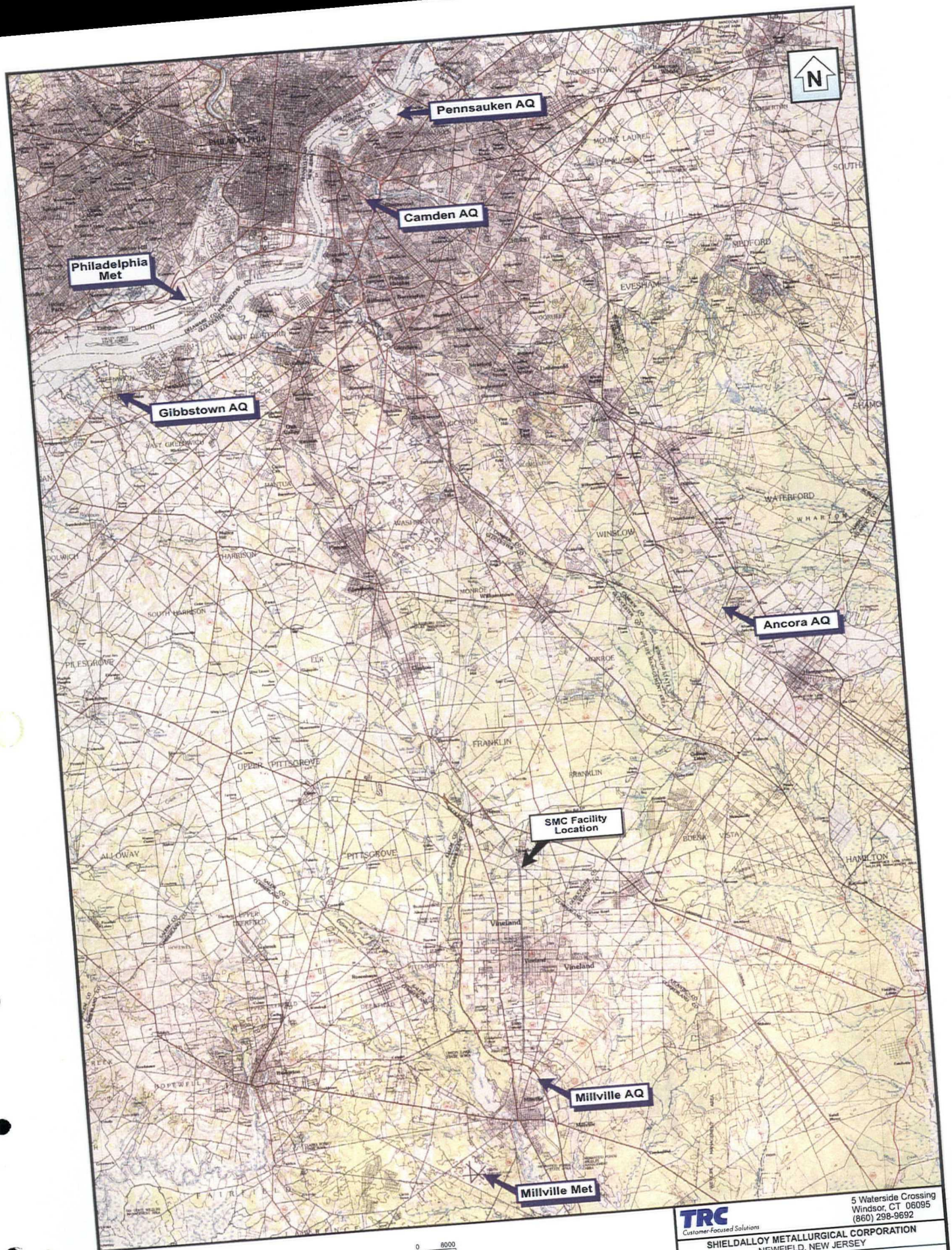
FIGURE 3-14
MONITORING WELL LOCATION PLAN

Date: 02/05 | Project No. 26770-0100-00000

J:\Cad\26770\0100\Figure 3-14.dwg, Figure 3-14, 10/20/2005 9:52:13 AM



0 8000
SCALE FT

0 4
SCALE MILES

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7.5' USGS TOPOGRAPHIC MAP

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FIGURE 3-15
METEOROLOGICAL (MET) AND AIR QUALITY (AQ) MONITORING SITE LOCATIONS

Date: 04/05

Project No. 26770-0000-00000

PERS/JWALESZCZYK/AIR/SMC 26770.FH10

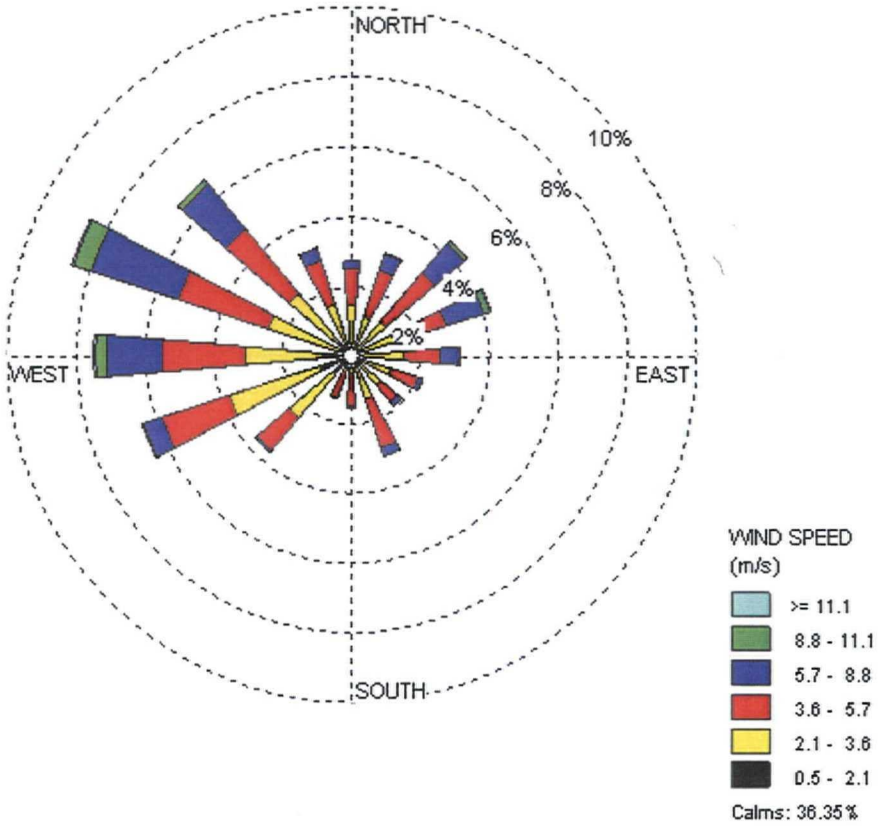

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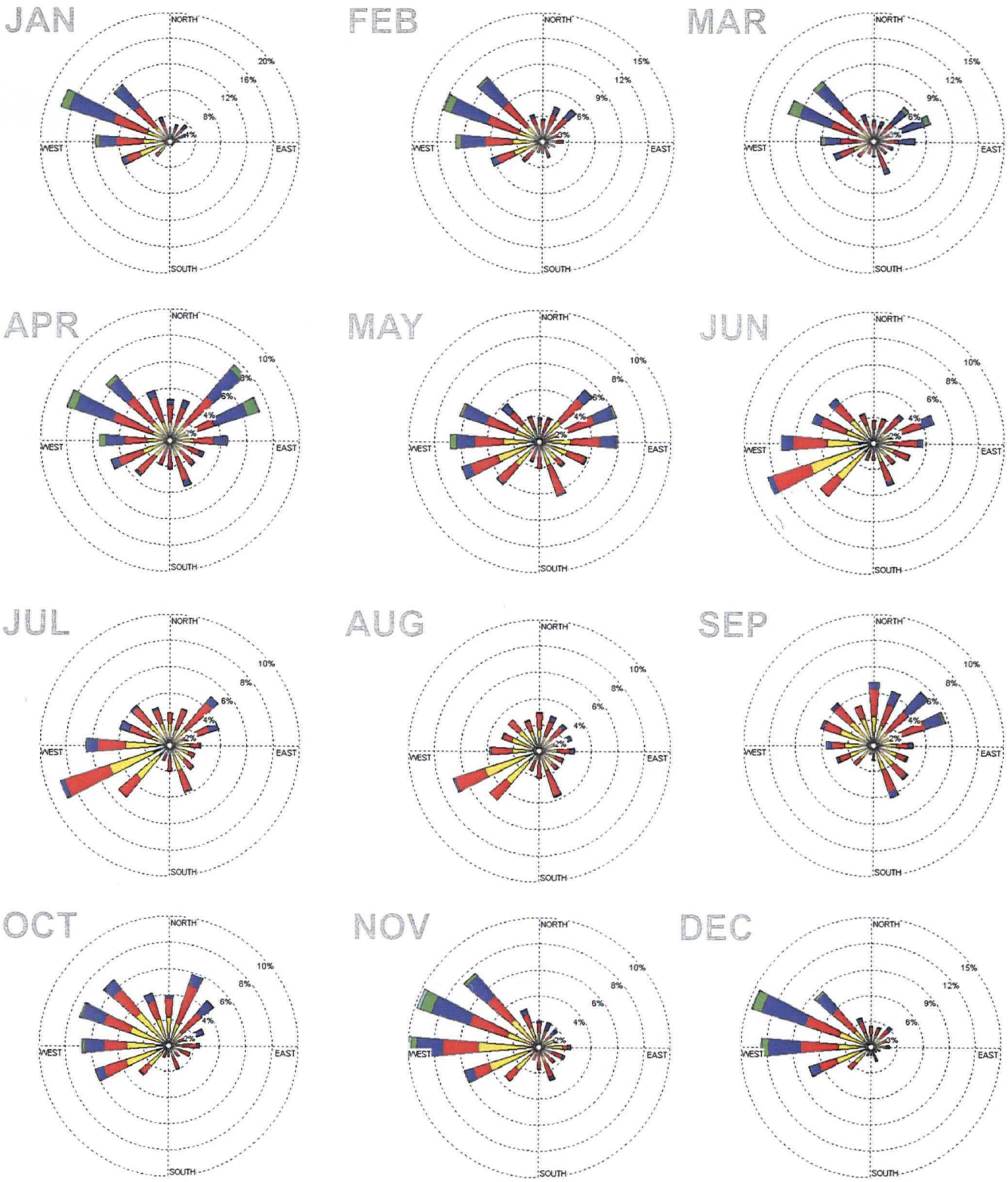
FIGURE 3-16
ANNUAL WINDROSE FOR MILLVILLE MUNICIPAL AIRPORT

Date: 04/05 | **Project No.** 26770-0000-00000

PERS/JWALESZCZYK/AIR/SMC 26770.FH10



WIND SPEED (m/s)

>= 11.1	5.7 - 8.8	2.1 - 3.6
8.8 - 11.1	3.6 - 5.7	0.5 - 2.1

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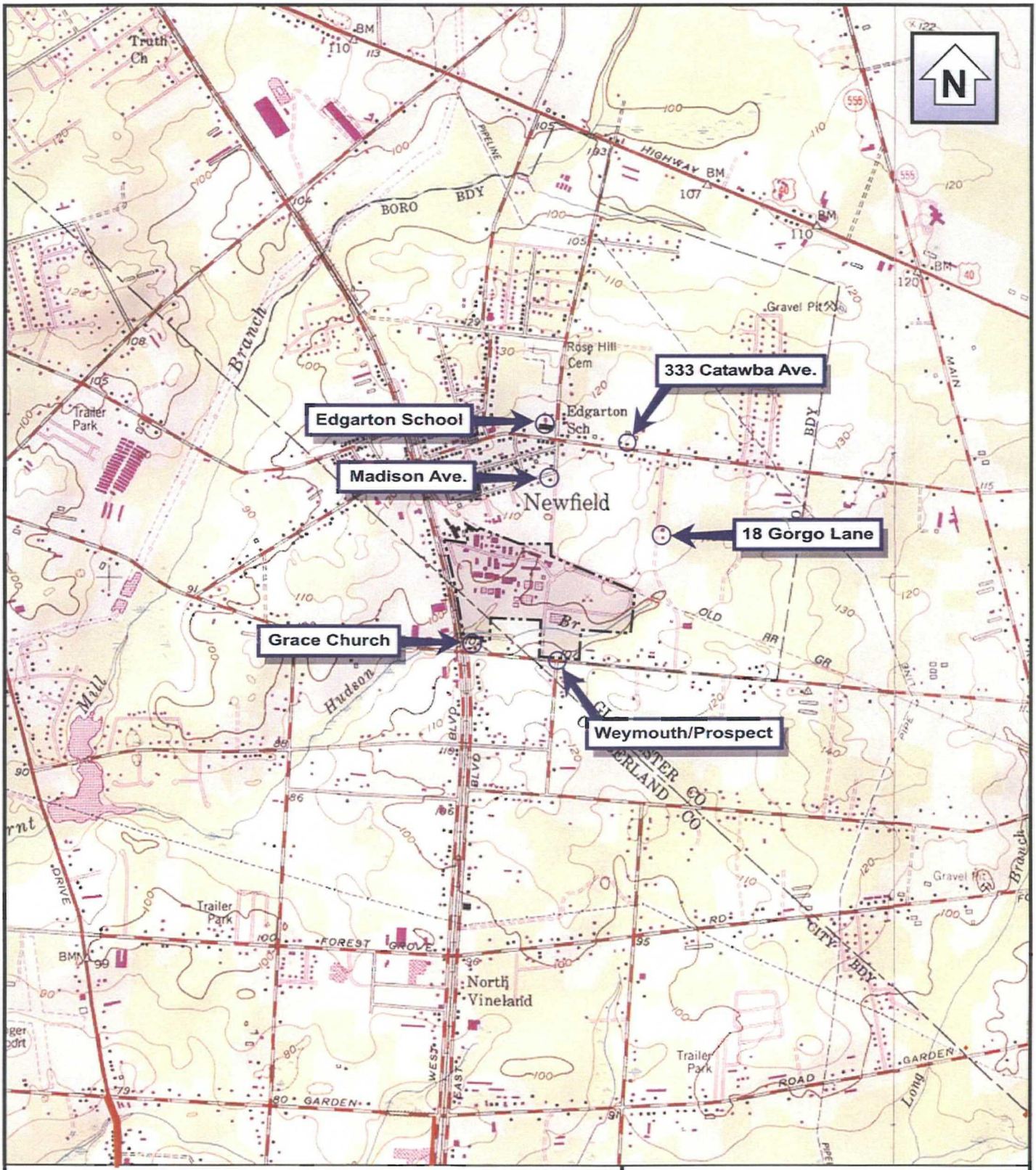
FIGURE 3-17
MONTHLY WINDROSES FOR MILLVILLE MUNICIPAL AIRPORT

Date: 04/05 | **Project No.** 26770-0000-00000

PERS/JWALESZCZYK/AIR/SMC 26770.FH10



0 2000
SCALE FEET

0 1
SCALE MILE
1:24000

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FIGURE 3-18
NOISE MONITORING LOCATIONS

Date: 03/05 | **Project No.** 26770-0100-00000

HAZ/26770 SMC/26770 SMC NML.fh9

New Jersey 2002 High Resolution
February-April, 2002.
The ortho-rectification process achieved
a +/-4.0 ft. horizontal accuracy at a
95% confidence level
Publication_Date: 20030731

0 0.125 0.25 0.5 Miles

Existing viewshed of current site elevation obtained from site aerial survey . maximum elevation of existing pile 129.1 feet

1- MILE RADIUS

Abstract:

Visibility Analysis was produced using a bare earth Digital Elevation Model (DEM) with New Jersey Land Cover Data Set added to compensate for areas with vegetation. Site specific survey information for the proposed and existing footprints was utilized to adjust for elevation differences in this vicinity.

DEM Information: (10- by 10-m data spacing, elevations in decimeters) Elevation_resolution_ is 1 decimeter (0.1 meter). Elevation accuracy is 24,000 contour data, i.e. plus/minus half the contour interval.

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PROJECTED STORAGE YARD VIEWSHED
EXISTING CONDITIONS

FIGURE 3-19

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
(978)970-5600

PROJ.26770-0100

New Jersey 2002 High Resolution
February-April, 2002.
The ortho-rectification process achieved
a +/-4.0 ft. horizontal accuracy at a
95% confidence level
Publication_Date: 20030731

0 0.125 0.25 0.5 Miles

VIEWPOINT LOCATION

1 - MILE RADIUS

Abstract:

Visibility Analysis was produced using a bare earth Digital Elevation Model (DEM) with New Jersey Land Cover Data Set added to compensate for areas with vegetation. Site specific survey information for the proposed and existing footprints was utilized to adjust for elevation differences in this vicinity.

DEM Information: (10- by 10-m data spacing, elevations in decimeters) Elevation_resolution_ is 1 decimeter (0.1 meter). Elevation accuracy is 24,000 contour data, i.e. plus/minus half the contour interval.

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VIEWPOINT LOCATIONS

FIGURE 3-20

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Boott Mills South
Foot of John Street
Lowell, MA 01852
(978)970-5600

PROJ.26770-0100

Photo 1. View of northern portion of storage yard taken just west of the storage yard.

Photo 2. View of southern portion of storage yard taken from the unpaved SMC access road.

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FIGURE 3-21

POINTS OF STORAGE YARD VISIBILITY-VIEWPOINTS 1 AND 2

Date: 03/05 | **Project No.** 26770-0100-00000

pers/jw/haz/26770 smc/photos.fh10

Photo 3. View toward storage yard, taken near the SMC pond

Photo 4. View toward storage yard, from near the SMC administration building.

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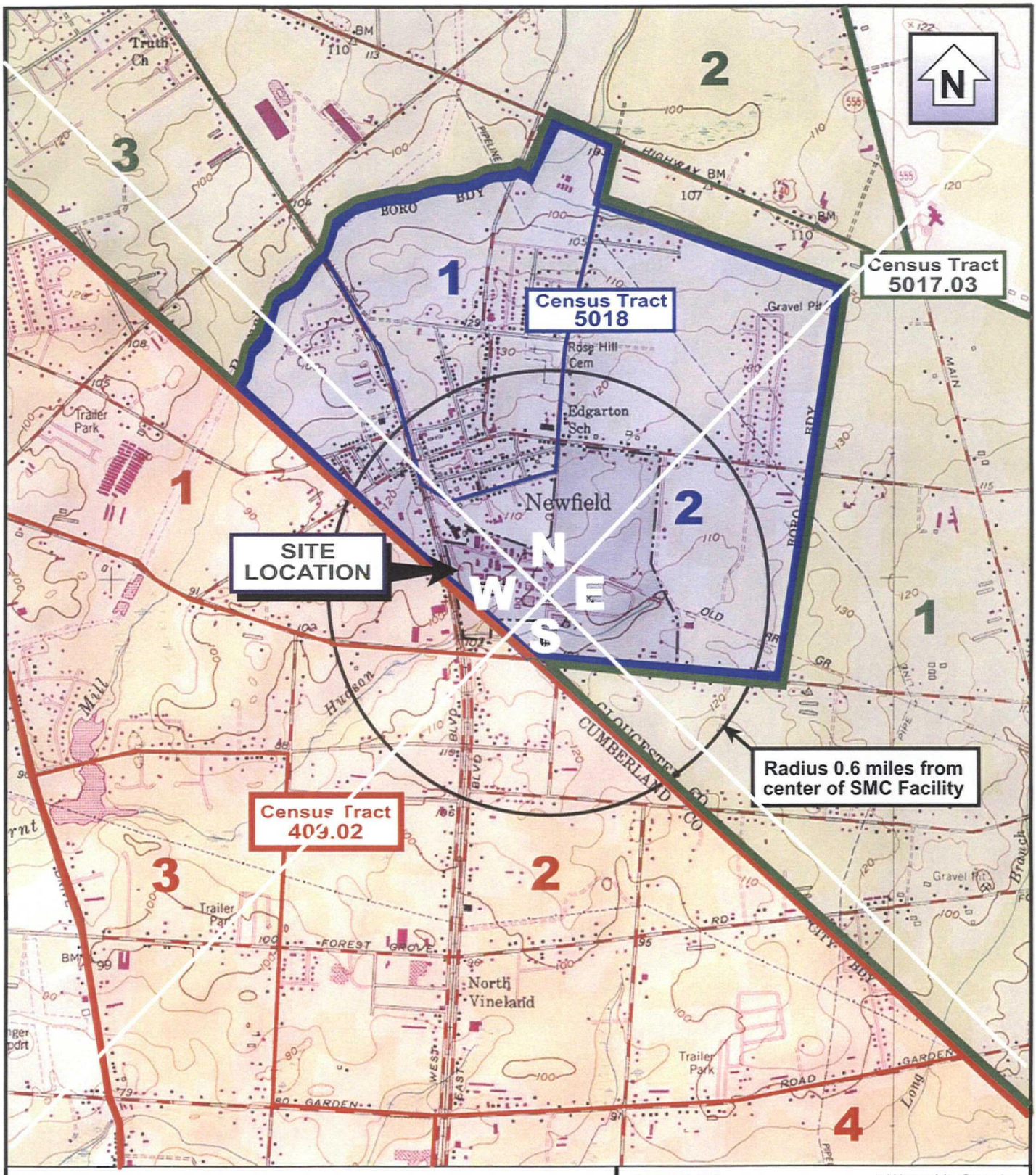
SHIELDALLOY METALLURGICAL CORP. NEWFIELD, NEW JERSEY	
FIGURE 3-22 **POINTS OF STORAGE YARD VISIBILITY-VIEWPOINTS 4 AND 5**	
Date: 03/05	**Project No.** 26770-0100-00000

pers/jw/haz/26770 smc/photos.fh10



0 2000
SCALE FEET

0 1
SCALE MILE
1:24000

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2 Block Group Number

Defines Census Tract Boundary

N Northern Quadrant

S Southern Quadrant

W Western Quadrant

E Eastern Quadrant

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FIGURE 3-23

2000 CENSUS TRACT AND BLOCK GROUP LOCATIONS WITH POPULATION DISTRIBUTION QUADRANTS

Date: 04/05 | **Project No.** 26770-0100-00000

HAZ/26770 SMC CENSUS.fh9

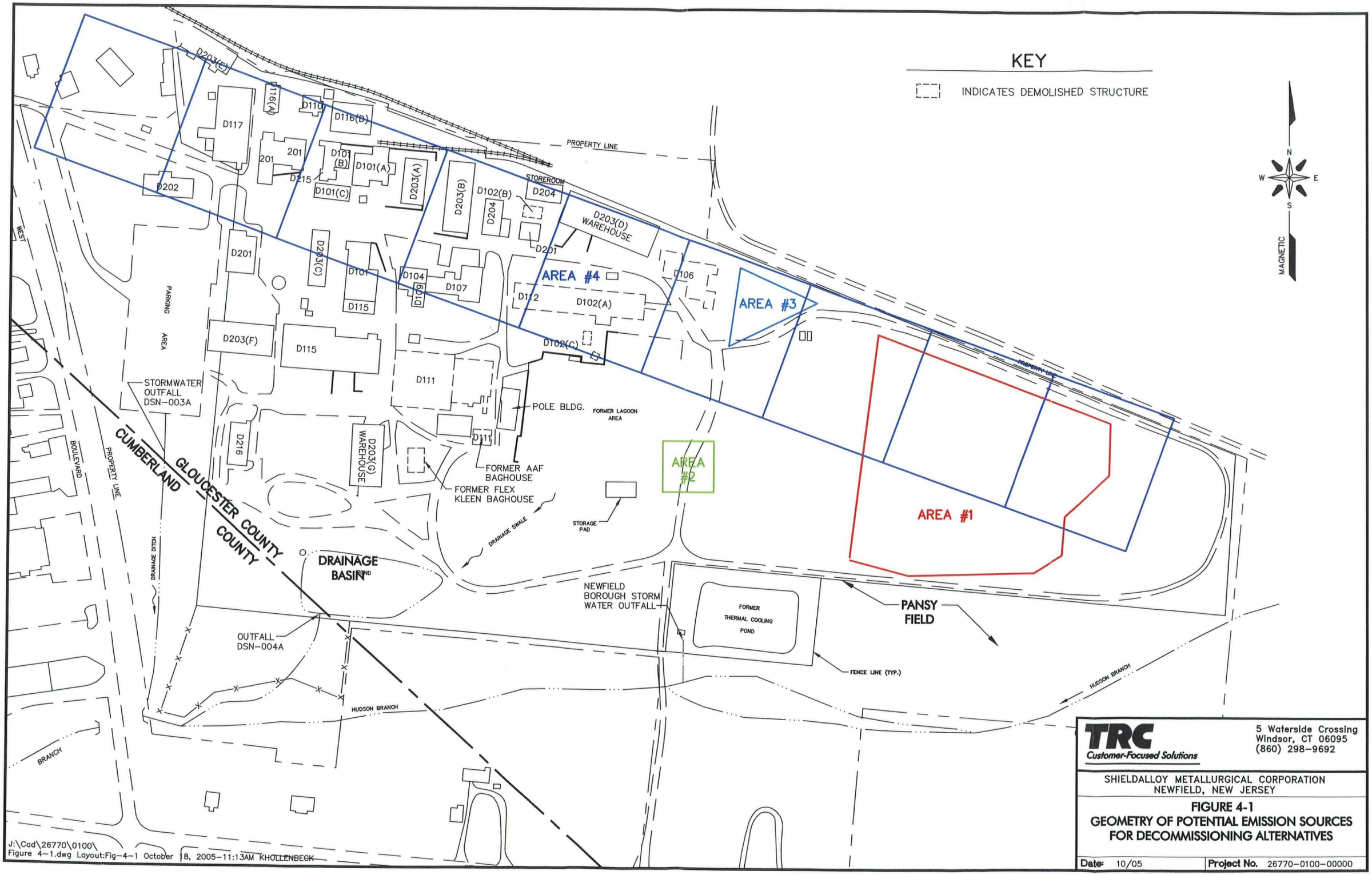

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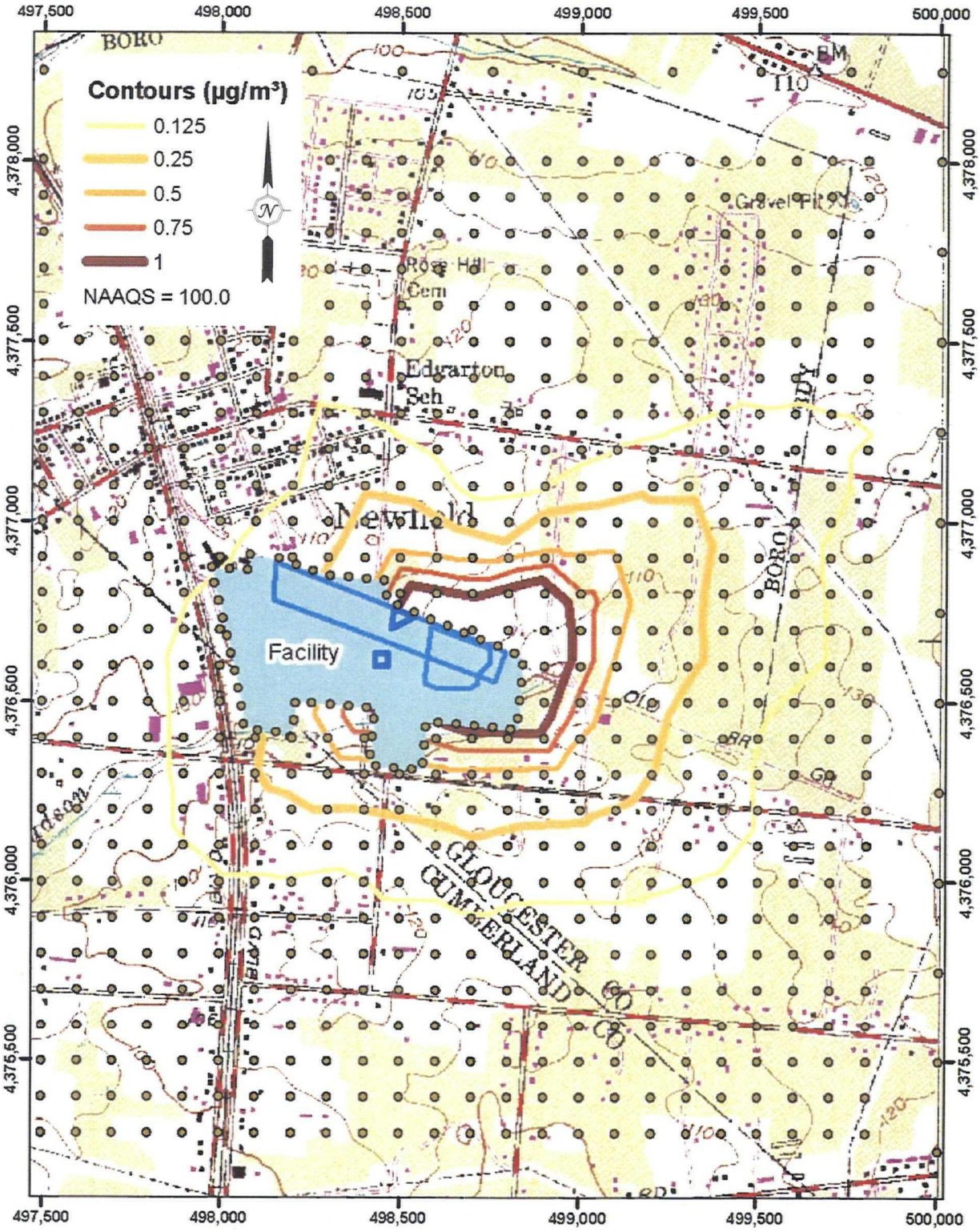
FIGURE 4-1
GEOMETRY OF POTENTIAL EMISSION SOURCES FOR DECOMMISSIONING ALTERNATIVES

Date: 10/05 | Project No. 26770-0100-00000



0 345 690

SCALE METERS

NAD_1927_UTM_ZONE_18N

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FIGURE 4-2

ISOPLETH MAP OF PREDICTED MAXIMUM ANNUAL NO_2 CONCENTRATIONS - LTC ALTERNATIVE

Date: 09/05 | **Project No.** 26770-0000-00000

pers/jw/haz/26770 smc/ER Doc.fh10

0 365 730
SCALE METERS
NAD_1927_UTM_ZONE_18N

TRC
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FIGURE 4-3

ISOPLETH MAP OF PREDICTED AVERAGE ANNUAL PM_{10} CONCENTRATIONS - LTC ALTERNATIVE

Date: 09/05 | **Project No.** 26770-0000-00000

pers/jw/haz/26770 smc/ER Doc.fh10

0 362.5 725

SCALE METERS

NAD_1927_UTM_ZONE_18N

TRC
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SHIELDALLOY METALLURGICAL CORPORATION
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FIGURE 4-4

ISOPLETH MAP OF PREDICTED 6TH-HIGH 24-HOUR AVERAGE PM_{10} CONCENTRATIONS - LTC ALTERNATIVE

Date: 09/05 | **Project No.** 26770-0000-00000

pers/jw/haz/26770 smc/ER Doc.fh10

0 350 700

SCALE METERS

NAD_1927_UTM_ZONE_18N

TRC
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FIGURE 4-5

ISOPLETH MAP OF PREDICTED MAXIMUM ANNUAL NO_2 CONCENTRATIONS - LT ALTERNATIVE

Date: 09/05 | **Project No.** 26770-0000-00000

pers/jw/haz/26770 smc/ER Doc.fh10

0 362.5 725

SCALE METERS

NAD_1927_UTM_ZONE_18N

TRC
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SHIELDALLOY METALLURGICAL CORPORATION
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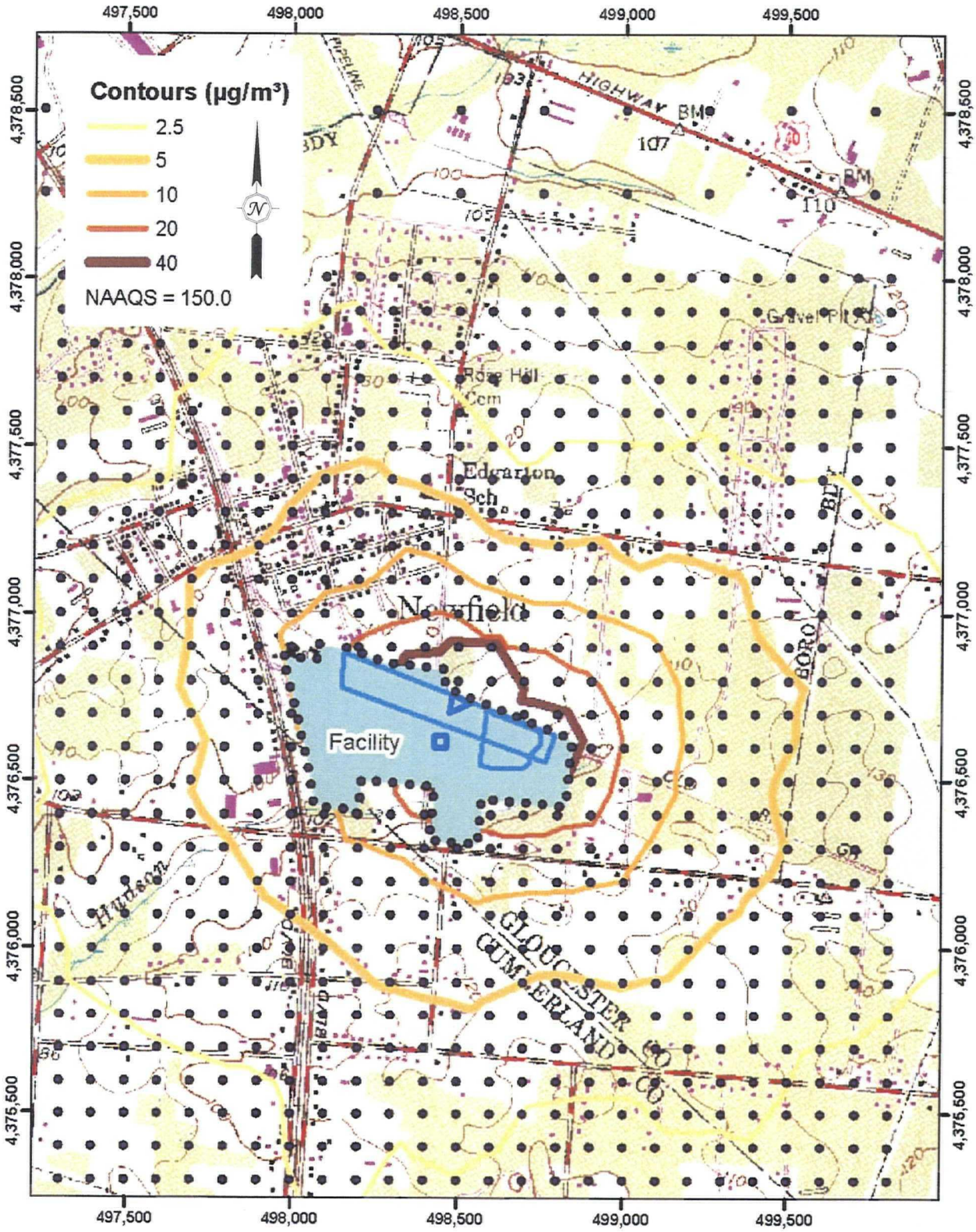
FIGURE 4-6

ISOPLETH MAP OF PREDICTED AVERAGE ANNUAL PM_{10} CONCENTRATIONS - LT ALTERNATIVE

Date: 09/05 | **Project No.** 26770-0000-00000

pers/jw/haz/26770 smc/ER Doc.fh10



0 360 720
SCALE METERS
NAD_1927_UTM_ZONE_18N

TRC
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SHIELDALLOY METALLURGICAL CORPORATION
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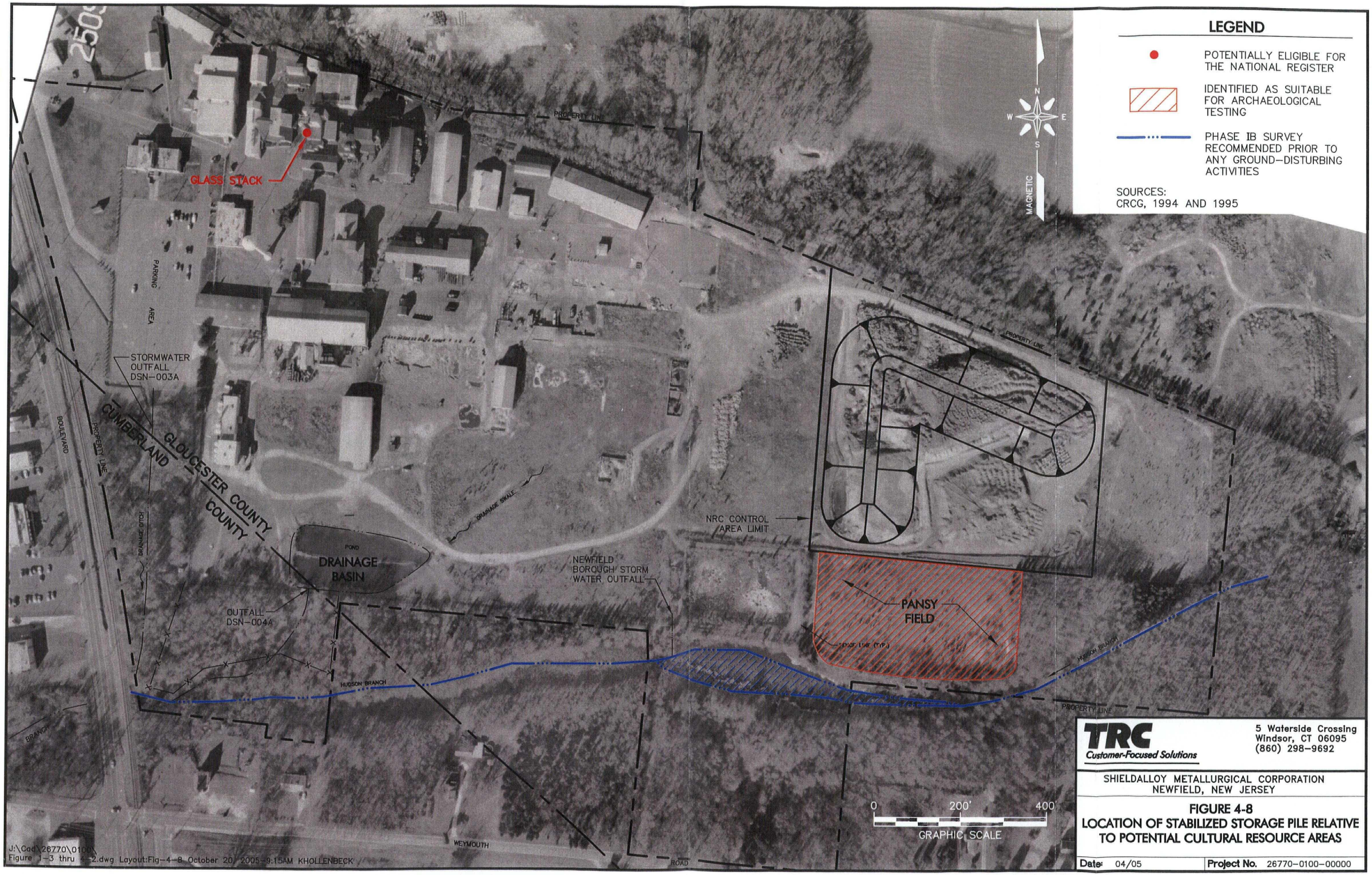
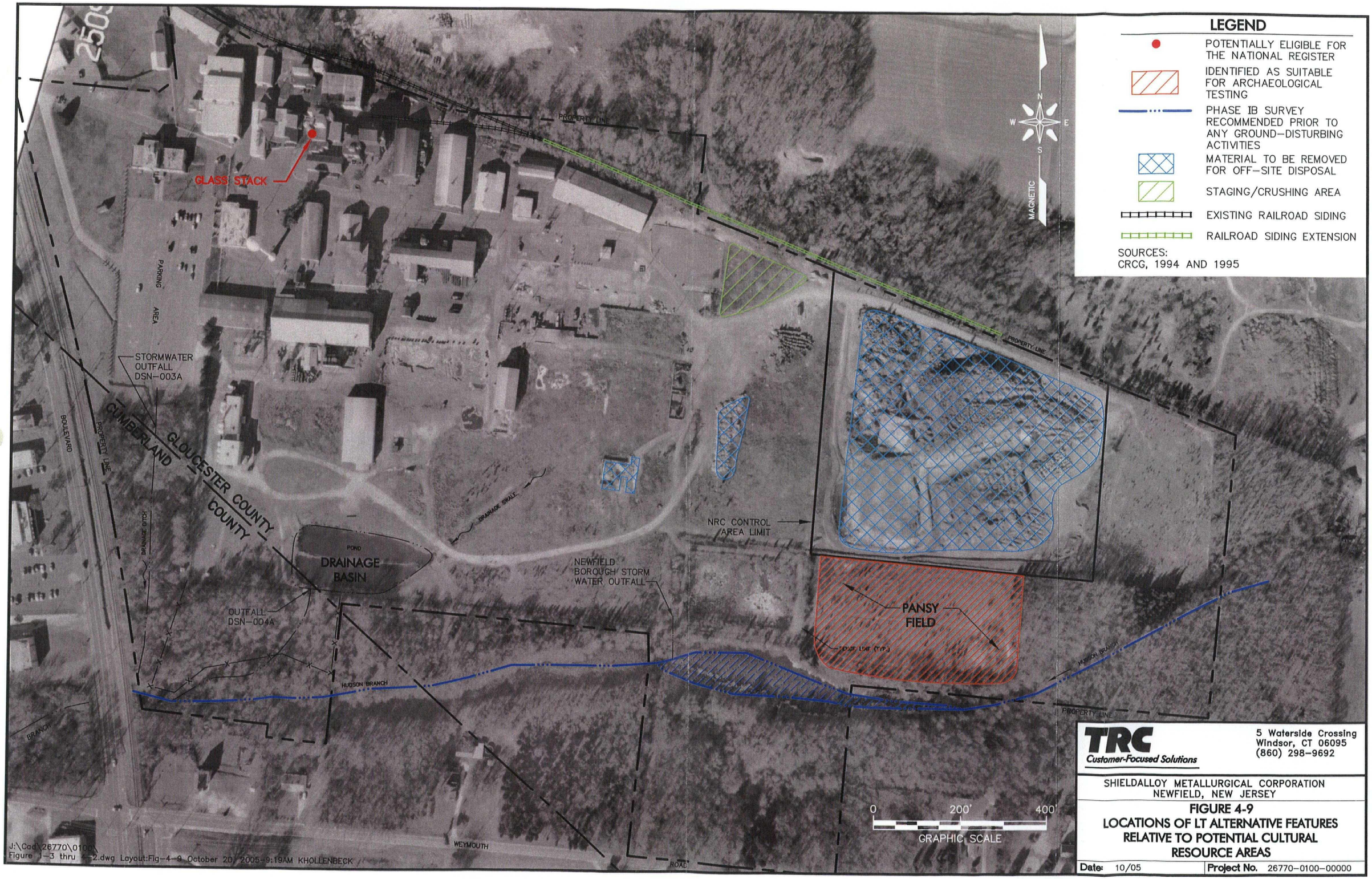
FIGURE 4-7

ISOPLETH MAP OF PREDICTED 6TH-HIGH 24-HOUR AVERAGE PM_{10} CONCENTRATIONS - LT ALTERNATIVE

Date: 09/05 | **Project No.** 26770-0000-00000

pers/jw/haz/26770 smc/ER Doc.fh10


LEGEND
POTENTIALLY ELIGIBLE FOR THE NATIONAL REGISTER
IDENTIFIED AS SUITABLE FOR ARCHAEOLOGICAL TESTING
PHASE IB SURVEY RECOMMENDED PRIOR TO ANY GROUND-DISTURBING ACTIVITIES
SOURCES:
CRCG, 1994 AND 1995
N
W
E
S
MAGNETIC
PROPERTY LINE
GLASS STACK
PARKING AREA
STORMWATER OUTFALL DSN-003A
CUMBERLAND BOULEVARD
GLOUCESTER COUNTY
COUNTY
DRAINAGE DITCH
POND
DRAINAGE BASIN
OUTFALL DSN-004A
DRAINAGE SWALE
NEWFIELD BOROUGH STORM WATER OUTFALL
NRC CONTROL AREA LIMIT
PANSY FIELD
HUDSON BRANCH
BRANCH
WEYMOUTH
ROAD
0
200'
400'
GRAPHIC SCALE
TRC
Customer-Focused Solutions
5 Waterside Crossing
Windsor, CT 06095
(860) 298-9692
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
FIGURE 4-8
LOCATION OF STABILIZED STORAGE PILE RELATIVE TO POTENTIAL CULTURAL RESOURCE AREAS
Date: 04/05
Project No. 26770-0100-00000
J:\Cad\26770\0100\
Figure 1-3 thru 4-2.dwg Layout:Fig-4-8 October 20, 2005-9:15AM KHOLLENBECK


LEGEND
POTENTIALLY ELIGIBLE FOR THE NATIONAL REGISTER
IDENTIFIED AS SUITABLE FOR ARCHAEOLOGICAL TESTING
PHASE IB SURVEY RECOMMENDED PRIOR TO ANY GROUND-DISTURBING ACTIVITIES
MATERIAL TO BE REMOVED FOR OFF-SITE DISPOSAL
STAGING/CRUSHING AREA
EXISTING RAILROAD SIDING
RAILROAD SIDING EXTENSION
SOURCES:
CRCG, 1994 AND 1995
N
W
E
S
MAGNETIC
GLASS STACK
PROPERTY LINE
PARKING AREA
STORMWATER OUTFALL DSN-003A
BOULEVARD
CUMBERLAND
GLOUCESTER COUNTY
COUNTY
DRAINAGE DITCH
DRAINAGE SWALE
POND
DRAINAGE BASIN
OUTFALL DSN-004A
HUDSON BRANCH
NEWFIELD BOROUGH STORM WATER OUTFALL
NRC CONTROL AREA LIMIT
PANSY FIELD
EDGE LINE (TYP.)
WEYMOUTH
ROAD
0
200'
400'
GRAPHIC SCALE
TRC
Customer-Focused Solutions
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Windsor, CT 06095
(860) 298-9692
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
FIGURE 4-9
LOCATIONS OF LT ALTERNATIVE FEATURES RELATIVE TO POTENTIAL CULTURAL RESOURCE AREAS
Date: 10/05
Project No. 26770-0100-00000
J:\Cad\26770\0100\
Figure 4-3 thru 4-12.dwg Layout:Fig-4-9 October 20, 2005-9:19AM KHOLLENBECK

New Jersey 2002 High Resolution
February-April, 2002.
The ortho-rectification process achieved
a +/-4.0 ft. horizontal accuracy at a
95% confidence level
Publication_Date: 20030731

POTENTIAL INCREMENTAL CAPPED PILE VIEWSHED POSITION AND ELEVATION ACQUIRED FROM FIGURE 1-1 ANALYSIS ASSUMED A CAPPED PILE HEIGHT OF 30'

1- MILE RADIUS

Miles
0 0.125 0.25 0.5

Abstract:

Visibility Analysis was produced using a bare earth Digital Elevation Model (DEM) with New Jersey Land Cover Data Set added to compensate for areas with vegetation. Site specific survey information for the proposed and existing footprints was utilized to adjust for elevation differences in this vicinity.

DEM Information: (10- by 10-m data spacing, elevations in decimeters) Elevation_resolution_ is 1 decimeter (0.1 meter). Elevation accuracy is 24,000 contour data, i.e. plus/minus half the contour interval.

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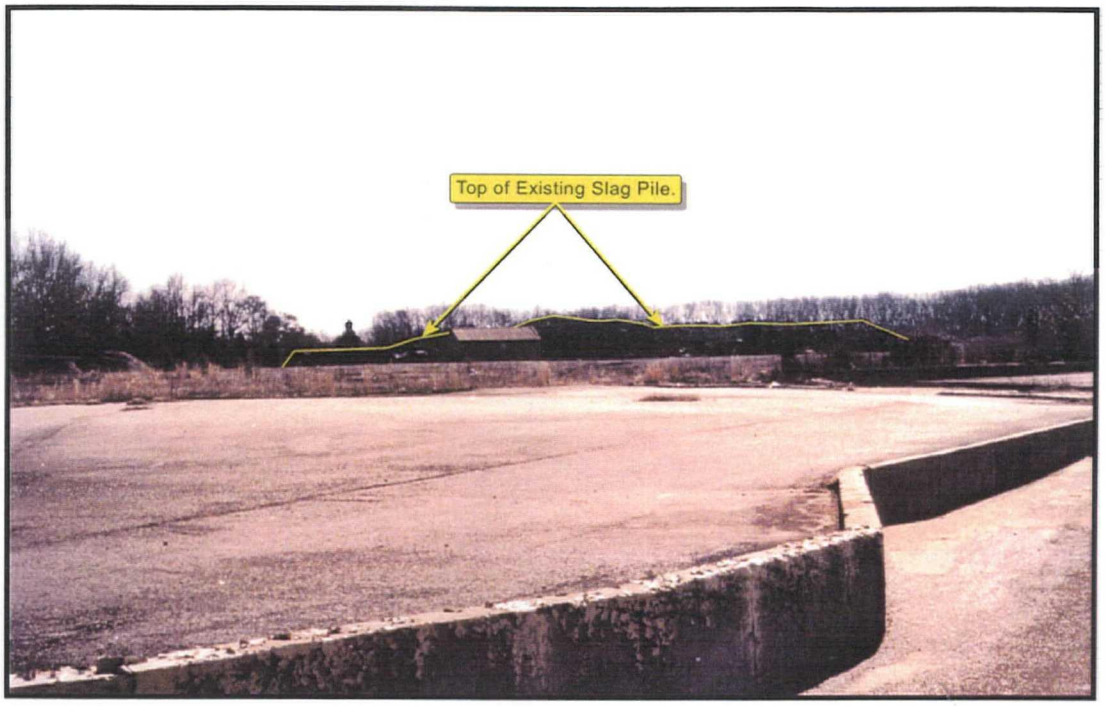
VIEWSHED MAP
PROPOSED ACTION

FIGURE 4-10

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
(978)970-5600

PROJ.26770-0100



Existing View - Storage Yard.

Viewpoint Simulation - LTC Alternative.

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FIGURE 4-11
VIEWPOINT LOCATION 1 - LTC ALTERNATIVE

Date: 10/05 | **Project No.** 26770-0100-00000

Existing View - Storage Yard.

Viewpoint Simulation - LTC Alternative.

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SHIELDALLOY METALLURGICAL CORP. NEWFIELD, NEW JERSEY	
FIGURE 4-12 **VIEWPOINT LOCATION 2 - LTC ALTERNATIVE**	
Date: 10/05	**Project No.** 26770-0100-00000

Existing View - Storage Yard.

Viewpoint Simulation - LTC Alternative.

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FIGURE 4-13
VIEWPOINT LOCATION 4 - LTC ALTERNATIVE

Date: 10/05 | **Project No.** 26770-0100-00000

Existing View.

Viewpoint Simulation - LTC Alternative.

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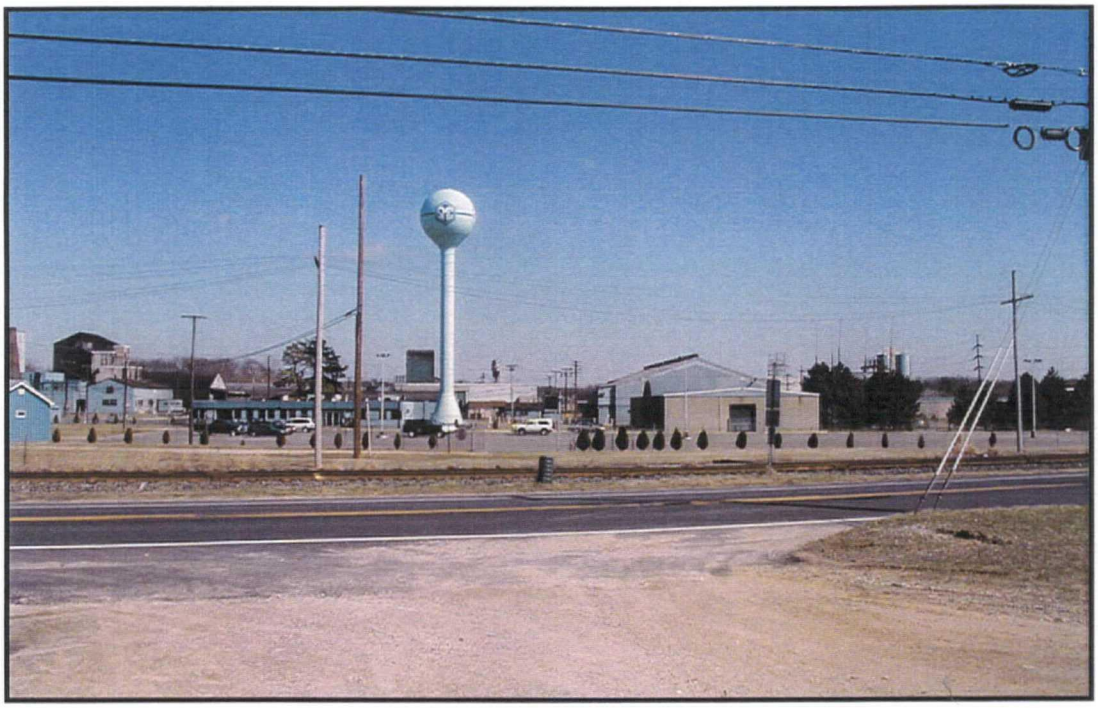
FIGURE 4-14 **VIEWPOINT LOCATION 5 - LTC ALTERNATIVE**	
Date: 10/05	**Project No.** 26770-0100-00000



Existing View.

Viewpoint Simulation with Ghosted Image
(not visible from this location).

TRC Customer-Focused Solutions	5 Waterside Crossing Windsor, CT 06095 (860) 298-9692
SHIELDALLOY METALLURGICAL CORP. NEWFIELD, NEW JERSEY	
FIGURE 4-15 **VIEWPOINT LOCATION 23 -** **LTC ALTERNATIVE (Ghosted Image)**	
Date: 10/05	**Project No.** 26770-0100-00000

Existing View.

Viewpoint Simulation with Ghosted Image
(not visible from this location).

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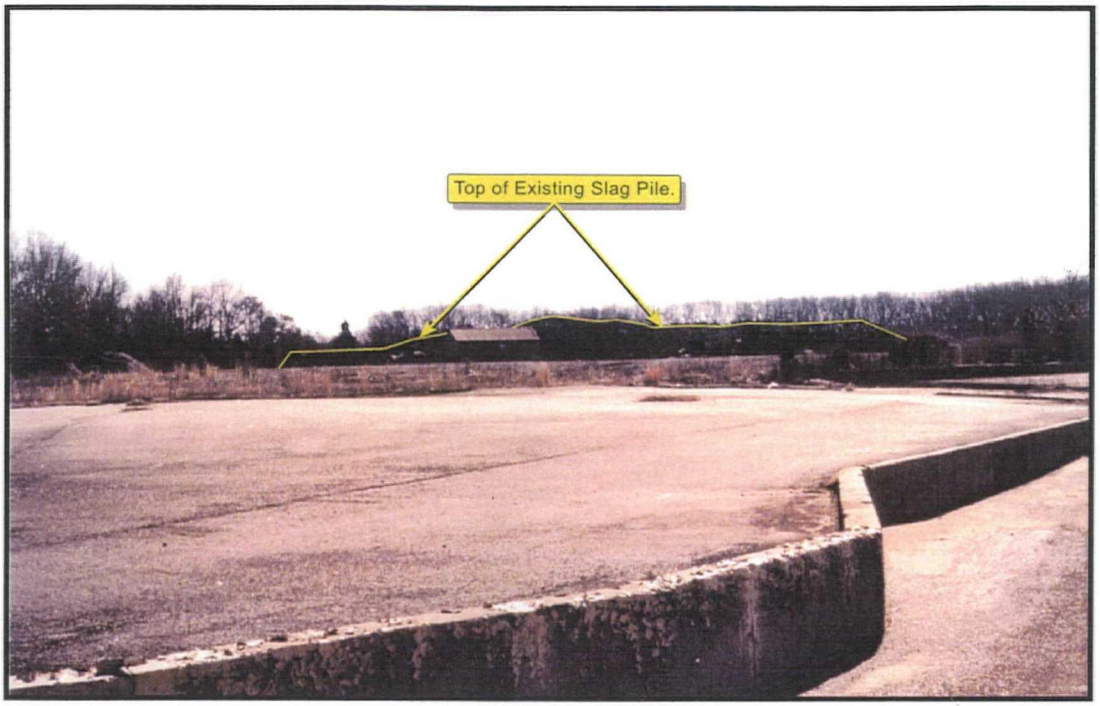
FIGURE 4-16
VIEWPOINT LOCATION 18 -
LTC ALTERNATIVE (Ghosted Image)

Date: 10/05 | **Project No.** 26770-0100-00000



Existing View - Storage Yard.

Viewpoint Simulation - LT Alternative.

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FIGURE 4-17
VIEWPOINT LOCATION 1 - LT ALTERNATIVE

Date: 10/05 | **Project No.** 26770-0100-00000

Existing View - Storage Yard.

Viewpoint Simulation - LT Alternative.

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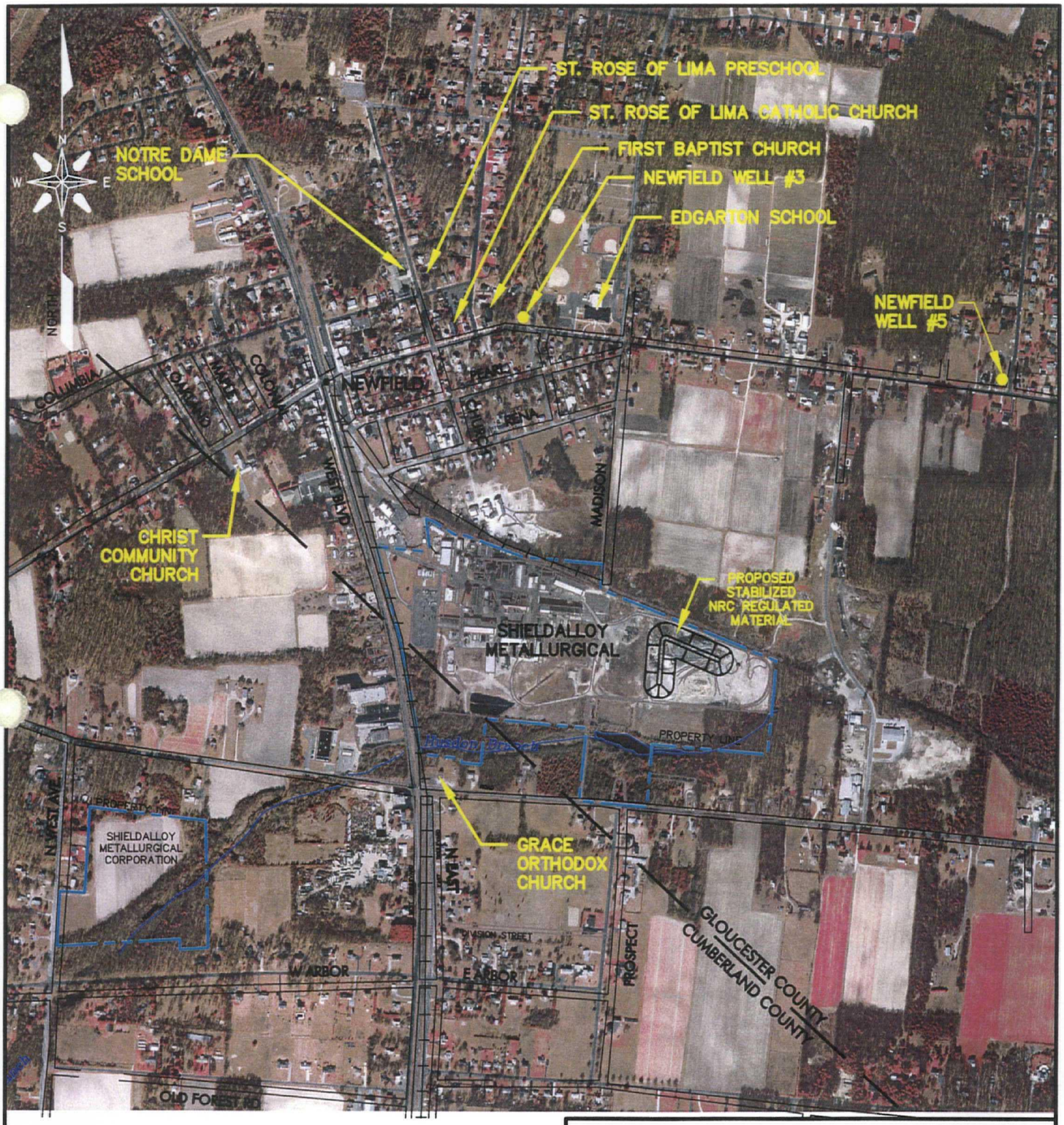
FIGURE 4-18
VIEWPOINT LOCATION 2 - LT ALTERNATIVE

Date: 10/05 | **Project No.** 26770-0100-00000



Orthophoto Source Information:
Originator: BAE SYSTEMS ADR
Publication Date: 07/31/2003
Title: New Jersey 2002 High Resolution Orthophotography
Geospatial Data Presentation Form: remote-sensing image
Publication Information:
Publication Place: Trenton, New Jersey
Publisher: State of New Jersey, Office of Information Technology
Abstract: Digital color infrared (CIR) orthophotography of New Jersey in State Plane NAD83 Coordinates, U.S. Survey Feet. The digital orthophotography was produced at a scale of 1:2400 (1"=200').

0 1000' 2000'
GRAPHIC SCALE

26770\0100\Figure 4-19

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NEWFIELD, NEW JERSEY

FIGURE 4-19
LOCATION OF LTC ALTERNATIVE FEATURES RELATIVE TO OFF-SITE SENSITIVE RECEPTORS

Date: 04/05 | **Project No.** 26770-0100-00000

APPENDIX A - SELECT LAND USE INFORMATION

APPENDIX A - SELECT LAND USE INFORMATION

Soils Defined as Prime and Other Important Farmlands
Gloucester County
Cumberland County

Prime and pther Important Farmlands

Gloucester County, New Jersey

Map symbol	Map unit name	Farmland classification
AucB	Aura loamy sand, 0 to 5 percent slopes	All areas are prime farmlarid
AugA	Aura sandy loam, 0 to 2 percent slopes	All areas are prime farmland
AugB	Aura saridy loam, 2 to 5 percent slopes	All areas are prime farrriland
AupB	Aura loam, 2 to 5 percent slopes	All areas are prime farmland
AysB	Aura-Sassafras loamy sands, 0 to 5 percent slopes	All areas are prime farmland
AvtB	Aura-Sassafras sandy loams, 2 to 5 percent slopes	All areas are prime farmland
BumA	Buddtown-Deptford complex, 0 to 2 percent slopes	All areas are prime farmland
CogB	Collington loamy sand, 0 to 5 percent slopes	All areas are prime farmland
CokA	Collington sandy loam, 0 to 2 percent slopes	All areas are prime farmland
CokB	Collington sandy loam, 2 to 5 percent slopes	All areas are prime farmland
CosB	Colts Neck sandy loam, 2 to 5 percent slopes	All areas are prime farmland
DoeA	Downer sandy loam, 0 to 2 percent slopes	All areas are prime farmland
DoeB	Downer sandy ldam, 2 to 5 percent slopes	All areas are prime farmland
FrfB	Freehold loamy sand, 0 to 5 percent slopes	All areas are prime farmland
FrkA	Freehold sandy loam, 0 to 2 percent slopes	All areas are prime farmland
FrkB	Freehold sandy loam, 2 to 5 percent slopes	All areas are prime farmland
KemB	Keyport sandy loam, 2 to 5 percent slopes	All areas are prime farmland
KeoA	Keyport loam, 0 to 2 percent slopes	All areas are prime farmland
MaoB	Maritoh sandy loam, 2 to 5 percent slopes	All areas are prime farmland
SacA	Sassafras sandy loam, 0 to 2 percent slopes	All areas are prime farmland
SacB	Sassafras sandy loam, 2 to 5 percent slopes	All areas are prime farmland
WeeB	Westphalia fine sandy loam, 2 to 5 percent slopes	All areas are prime farmland
WoeA	Woodstpwn sandy loam, 0 to 2 percent slopes	All areas are prime farmland
WoeB	Woodstown sandy loam, 2 to 5 percent slopes	All areas are prime farmland
WokA	Woodstown-Glassboro complex, 0 to 2 percent slopes	All areas are prime farmland
AugC	Aura sandy loam, 5 fo 10 percent slopes	Farmland of statewide importance
AvsC	Aura-Sassafras loamy sands, 5 to 10 percent slopes	Farmland of statewide importance
AvtC	Aura-Sassafras sandy loams, 5 to 10 percent slopes	Farmland of statewide importance
CogC	Collington loamy sand, 5 to 10 percent slopes	Farmland of statewide importance
CokC	Collington sandy loam, 5 to 10 percent slopes	Farmland of statewide importance
CosC	Colts Neck sandy loam, 5 to 10 percent slopes	Farmland of statewide importance
DocB	Downer loamy sand, 0 to 5 percent slopes	Farmland of statewide importance
DocC	Downer loamy sand, 5 to 10 percent slopes	Farmland of statewide importance
FamA	Fallsington sandy loam, 0 to 2 percent slopes	Farmland of statewide importance
FapA	Fallsington loam, 0 to 2 percent slopes	Farmland of statewide importance
FrfC	Freehold loamy sand, 5 to 10 percent slopes	Farmland bf statewide importance
FrkC	Freehold sandy loam, 5 to 10 percent slopes	Farmland of statewide importance
HbmB	Hammonton loamy sand, 0 to 5 percent slopes	Farmland of statewide importance
JdrA	Jade Run fine sandy loam, 0 to 2 percent slopes	Farmland of statewide importance
KreA	Kresson fine sandy loam, 0 to 2 percent slopes	Farmland of statewide importance
LenA	Lenni loam, 0 to 2 percent slopes	Farmland of statewide importance
MaoC	Marlton sandy loam, 5 to 10 percent slopes	Farmland of statewide importance
MaoC2	Marlton sandy loam, 5 to 10 percent slopes, eroded	Farmland of statewide importance
MumA	Mullica sandy loam, 0 to 2 percent slopes	Farmland of statewide importance
OTKA	Othello and Fallsington soils, 0 to 2 percent slopes	Farmland of statewide importance
SabB	Sassafras loamy sand, 0 to 5 percent slopes	Farmland of statewide importance
SabC	Sassafras loamy sand, 5 to 10 percent slopes	Farmland of statewide importance
SacC	Sassafras sandy loam, 5 to 10 percent slopes	Farmland of statewide importance
TB	Tinton sand, 0 to 5 percent slopes	Farmland of statewide importance

Prime and other Important Farmlands

Gloucester County, New Jersey

Map symbol	Map unit name	Farmland classification
WeeC	Westphalia fine sandy loam, 5 to 10 percent slopes	Farmland of statewide importance
AtsA	Atsion sand, 0 to 2 percent slopes	Farmland of unique importance
AtsAr	Atsion sand, 0 to 2 percent slopes, rarely flooded	Farmland of unique importance
BerAr	Berryland sand, 0 to 2 percent slopes, rarely flooded	Farmland of unique importance
BEXAS	Berryland and Mullica soils, 0 to 2 percent slopes, occasionally flooded	Farmland of unique importance
MakAt	Manahawkin muck, 0 to 2 percent slopes, frequently flooded	Farmland of unique importance
MamnAv	Mannington-Nanticoke complex, 0 to 1 percent slopes, very frequently flooded	Farmland of unique importance
MarnuAv	Mannington-Nahticoke-Udorthents complex, 0 to 1 percent slopes, very frequently flooded	Farmland of unique importance

Prime and other Important Farmlands

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested ederal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

nportant farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable fanning methods are applied. In general, prime farmland has an adequate and dependable supply of moisture frdm precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria fpr prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in spme areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in this table ("Important Fannlands"). This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has beeri overcome by corrective measures. The extent of each listed map unit is shown in table entitled "Acreage and Proportionate Extent of the Soils." The location is shown on the detailed soil maps.

Unique fannland is land other than prime fannland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of spil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these special crops when property managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Because it is not based ori national criteria, unique farmland can differ from one area to another. Unique farmland commonly is in areas where there is a special microclimate, such as the wine country in Califomia.

some areas land that does not meet the criteria for prime or unique farmland is considered to be farmland of statewide importance for the production bod, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be farmland of local importance fpr the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Fannland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Prime and other Important Farmlands

Cumberland County, New Jersey

Map symbol	Map unit name	Farmland classification
AucB	Aura loamy sand, 0 to 5 percent slopes	All areas are prime farmland
AugA	Aura sandy loam, 0 to 2 percent slopes	All areas are prime farmland
AugB	Aura sandy loam, 2 to 5 percent slopes	All areas are prime farmland
AuhB	Aura gravelly sandy loam, 2 to 5 percent slopes	All areas are prime farmland
ChtA	Chillum silt loam, 0 to 2 percent slopes	All areas are prime farmland
ChtB	Chillum silt loam, 2 to 5 percent slopes	All areas are prime farmland
DoeA	Downer sandy loam, 0 to 2 percent slopes	All areas are prime farmland
DoeB	Downer sandy loam, 2 to 5 percent slopes	All areas are prime farmland
HboA	Hammonton sandy loam, 0 to 2 percent slopes	All areas are prime farmland
HboB	Hammonton sandy loam, 2 to 5 percent slopes	All areas are prime farmland
MbrA	Matapeake silt loam, 0 to 2 percent slopes	All areas are prime farmland
MbrB	Matapeake silt loam, 2 to 5 percent slopes	All areas are prime farmland
MbuA	Mattapex silt loam, 0 to 2 percent slopes	All areas are prime farmland
MbuB	Mattapex silt loam, 2 to 5 percent slopes	All areas are prime farmland
SacA	Sassafras sandy loam, 0 to 2 percent slopes	All areas are prime farmland
SacB	Sassafras sandy loam, 2 to 5 percent slopes	All areas are prime farmland
SadA	Sassafras gravelly sandy loam, 0 to 2 percent slopes	All areas are prime farmland
SadB	Sassafras gravelly sandy loam, 2 to 5 percent slopes	All areas are prime farmland
WoeA	Woodstown sandy loam, 0 to 2 percent slopes	All areas are prime farmland
WoeB	Woodstown sandy loam, 2 to 5 percent slopes	All areas are prime farmland
DocB	Downer loamy sand, 0 to 5 percent slopes	Farmland of statewide importance
DocC	Downer loamy sand, 5 to 10 percent slopes	Farmland of statewide importance
[illegible]mA	Fallsington sandy loam, 0 to 2 percent slopes	Farmland of statewide importance
FodB	Fort Mott loamy sand, 0 to 5 percent slopes	Farmland of statewide importance
GamB	Galloway loamy sand, 0 to 5 percent slopes	Farmland of statewide importance
HbmB	Hammonton loamy sand, 0 to 5 percent slopes	Farmland of statewide importance
MbrC	Matapeake silt loam, 5 to 10 percent slopes	Farmland of statewide importance
OthA	Othello silt loam, 0 to 2 percent slopes	Farmland of statewide importance
OTKA	Othello and Fallsington soils, 0 to 2 percent slopes	Farmland of statewide importance
OTMA	Othello, Fallsington, and Trussum soils, 0 to 2 percent slopes	Farmland of statewide importance
SacC	Sassafras sandy loam, 5 to 10 percent slopes	Farmland of statewide importance
SadC	Sassafras gravelly sandy loam, 5 to 10 percent slopes	Farmland of statewide importance
AptAv	Appoquinimink-Transquaking-Mispillion complex, 0 to 1 percent slopes, very frequently flooded	Farmland of unique importance
AtsAr	Atsion sand, 0 to 2 percent slopes, rarely flooded	Farmland of unique importance
BEXAS	Berryland and Mullica soils, 0 to 2 percent slopes, occassionally flooded	Farmland of unique importance
BrvAv	Broadkill silt loam, 0 to 1 percent slopes, very frequently flooded	Farmland of unique importance
MakAt	Manahawkin muck, 0 to 2 percent slopes, frequently flooded	Farmland of unique importance
MmtAv	Mispillion-Transquaking-Appoquinimink complex, 0 to 1 percent slopes, very frequently flooded	Farmland of unique importance
PdwAv	Pawcatuck-Transquaking complex, 0 to 1 percent slopes, very frequently flooded	Farmland of unique importance
TrkAv	Transquaking mucky peat, 0 to 1 percent slopes, very frequently flooded	Farmland of unique importance

Prime and other Important Farmlands

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent, More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in this table ("Important Farmlands"). This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table entitled "Acreage and Proportionate Extent of the Soils." The location is shown on the detailed soil maps.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these special crops when properly managed. The water supply is dependable and pf adequate quality. Nearness to markets is an additional consideration. Because it is not based on national criteria, unique farmland can differ from one area to another. Unique farmland commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas land that does not meet the criteria for prime or unique farmland is considered to be farmland of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be farmland of local importance for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

APPENDIX B - SELECTED GEOLOGIC/SOIL DATA

APPENDIX B - SELECTED GEOLOGIC/SOIL DATA

Select SMC Soil Borings
Hudson's Branch Exposure Rates (uR/hour)
Uranium-238 Concentrations in Soil, Sediment and Water Samples
Thorium-232 Concentrations in Soil and Water Samples
Radium-226 Concentrations in Soil, Sediment and Water Samples

BORING NO.:	SC-12D	CONTRACTOR:	EMPIRE SOILS	DATE STARTED:	11/18/90
PROJECT NO.:	7650-N51	DRILLERS:	KENNEY, EDWARDS	DATE COMPLETED:	11/19/90
PROJECT:	SHIELD ALLOY	TRC INSPECTOR:	MCMORROW	WATER TABLE LEVEL:	9.0 FT
CLIENT:	SMC	DRILLING METHOD:	MUD ROTARY	LOCATION:	N 25800B.4S
LOCATION:	NEWFIELD, NJ	GROUND ELEVATION:	102.16		E 1901049.53
BORING DEPTH:	142 FT	INNER CASING ELEVATION:	103.19	NJDEP PERMIT NUMBER:	313S226-0

DEPTH (FT)	BLOWS	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION
0 - 2	9 11	DARK BROWN, FINE TO MEDIUM SAND, TRACE SILT, MOIST	0.0	0.0 LOCKING COVER
	5 7	RECOVERY = 22"		
2 - 4	7 6	BROWN FINE TO MEDIUM SAND, MOIST		CEMENT/BENTONITE GROUT
	6 6	RECOVERY = 18"		
4 - 6	5 6	BROWN/ORANGE FINE TO COARSE SAND, TRACE GRAVEL, MOIST		
	9 8	RECOVERY = 22"		
6 - 8	6 5	0-12" BROWN FINE SAND, LITTLE SILT, TRACE CLAY, MOIST		8" STEEL CASING
	10 15	12-20" BROWN/ORANGE FINE TO MEDIUM SAND, MOIST		
8 - 10	13 11	BROWN/ORANGE FINE TO COARSE SAND, TRACE SILT, WET		
	6 8	RECOVERY = 24"		
				4" SCHEDULE 40 PVC RISER
15 - 17	4 5	BROWN FINE TO COARSE SAND, TRACE GRAVEL, WET		
	4 6	RECOVERY = 8"		
20 - 22	8 7	BROWN/ORANGE FINE TO COARSE SAND		
	7 6	RECOVERY = 10"		
				BENTONITE SLURRY
25 - 27	10 9	BROWN/ORANGE FINE TO COARSE SAND, LITTLE GRAVEL		
	8 11	RECOVERY = 6"		
30 - 32	6 1	0-3" SAME AS ABOVE		
	1 3	3-10" DARK GRAY CLAY, VERY STIFF		
35 - 37	3 4	0-12" LT. GRAY CLAY, LITTLE SILT	35.0	BOTTOM OF STEEL CASING
	6 8	12-18" BROWN SILT, SOME FINE SAND, TRACE CLAY, MOIST		
40 - 42	2 3	BROWN FINE TO COARSE SAND		
	3 5	RECOVERY = 8"		
		CONTINUED ON NEXT PAGE	CONTINUED	CONTINUED

DEPTH (FT)	BLOWS	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION
45 - 47	2 8 9 13	BROWN FINE TO COARSE SAND RECOVERY - 12"		
50 - 52	3 5 30 30	LT. BROWN FINE TO MEDIUM SAND, TRACE SILT RECOVERY - 4"		
55 - 57	5 11 15 20	SAME AS ABOVE WITH THIN WHITE LAYERS OF SILT THROUGHOUT RECOVERY - 14"		
60 - 62	10 15 20 20	LT. BROWN TO WHITE FINE TO MEDIUM SAND RECOVERY - 14"	60.0	4" SCHEDULE 40 PVC RISER
65 - 67	9 15 21 21	LT. BROWN FINE TO MEDIUM SAND RECOVERY - 12"	65.0	
70 - 72	10 15 33 37	SAME AS ABOVE RECOVERY - 8"		
75 - 77	22 24 28 32	SAME AS ABOVE RECOVERY - 12"		BENTONITE SLURRY
80 - 82	20 19 17 16	BROWN FINE SAND, TRACE SILT RECOVERY - 2"		
85 - 87	10 12 11 20	LT. BROWN FINE SAND, TRACE SILT RECOVERY - 22"		
90 - 92	15 29 16 18	LT. BROWN FINE TO COARSE SAND RECOVERY - 12"		

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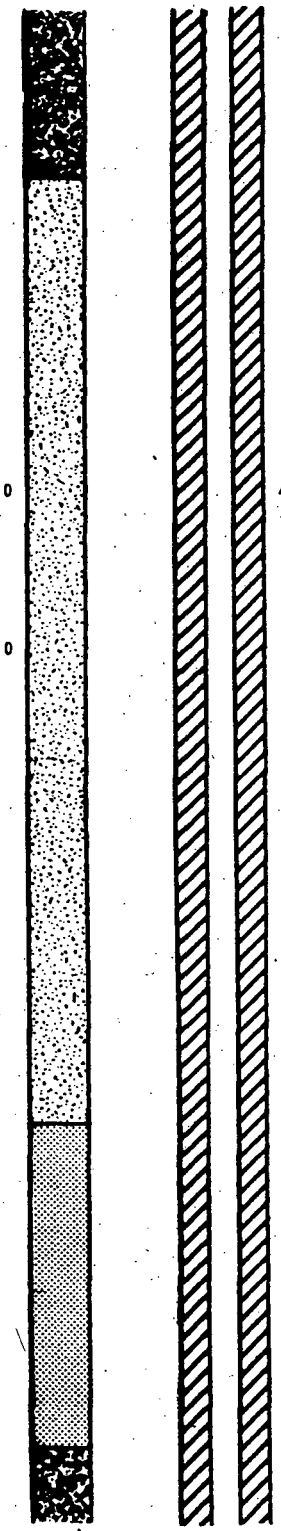

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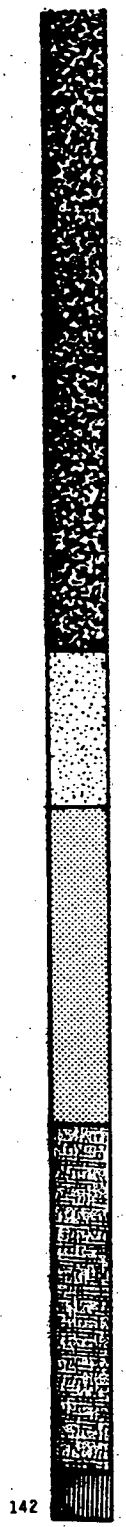
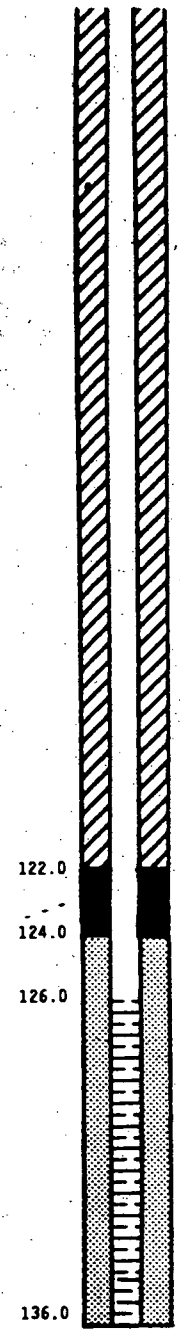
DEPTH (FT)	BLOWS	SOIL DESCRIPTION
95 - 97	19 21 32 29	LT. BROWN FINE TO COARSE SAND RECOVERY - 12"
100 - 102	35 42 67 65	BROWN/ORANGE FINE TO COARSE SAND, TRACE SILT RECOVERY - 8"
105 - 107	25 52 67 100	SAME AS ABOVE RECOVERY - 14"
110 - 112	34 100/5"	SAME AS ABOVE RECOVERY - 8"
115 - 117	100/6"	BROWN/RED FINE TO MEDIUM SAND, TRACE SILT RECOVERY - 3"
120 - 122	12 11 19 28	BROWN FINE SAND, LITTLE SILT RECOVERY - 10"
125 - 127	12 22 20 18	LT. BROWN FINE SAND, LITTLE SILT RECOVERY - 12"
130 - 132	6 6 9 9	DARK GRAY FINE SAND AND SILT RECOVERY - 14"
135 - 137	5 6 5 8	SAME AS ABOVE RECOVERY - 20"
140 - 142	3 5 12 16	0-18" SAME AS ABOVE 18-24" DARK GRAY SILT, SOME CLAY END OF BORING - 142 FT

LITHOLOGY



WELL CONSTRUCTION



BORING NO.:	SC-13D	CONTRACTOR:	EMPIRE SOILS	DATE STARTED:	11/20/90
PROJECT NO.:	7650-N51	DRILLERS:	KENNEY, EDUARDS	DATE COMPLETED:	11/21/90
PROJECT:	SMIELD ALLOY	TRC INSPECTOR:	MCMORROU	WATER TABLE LEVEL:	5.5 FT
CLIENT:	SMC	DRILLING METHOD:	MUD ROTARY	LOCATION: N	257662.57
LOCATION:	NEUFIELD, NJ	GROUND ELEVATION:	99.67	E	1901067.62
BORING DEPTH:	142 FT	INNER CASING ELEVATION:	101.99	NJDEP PERMIT NUMBER:	3135227-6

DEPTH (FT)	BLOWS	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION
0 - 2	2 3	BROWN/ORANGE FINE TO COARSE SAND, TRACE GRAVEL, MOIST	0.0	0.0 LOCKING COVER
	3 3	RECOVERY - 18"		
2 - 4	4 1	0-8" SAME AS ABOVE		CEMENT/BENTONITE GROUT
	2 3	8-12" DARK BROWN FINE TO MEDIUM SAND, TRACE SILT		
4 - 6	4 2	0-12" SAME AS 8-12" ABOVE		
	2 2	12-24" GRAY FINE TO MEDIUM SAND, TRACE SILT, WET		8" STEEL CASING
10 - 12	10 6	BROWN FINE TO MEDIUM SAND, TRACE SILT, TRACE GRAVEL		
	15 12	RECOVERY - 8"		4" SCHEDULE 40 PVC RISER
15 - 17	4 4	BROWN/ORANGE FINE TO COARSE SAND, TRACE GRAVEL		
	4 4	RECOVERY - 6"		
20 - 22	3 4	LT. BROWN FINE TO COARSE SAND, TRACE SILT		
	4 6	RECOVERY - 8"		
				BENTONITE SLURRY
26 - 27	1 1	0-4" BLACK FINE TO MEDIUM SAND, TRACE SILT		
	1 2	4-8" DARK GRAY SILT AND FINE SAND		
30 - 32	3 7	0-12" GRAY SILT, LITTLE FINE SAND, LITTLE CLAY	30.0	BOTTOM OF STEEL CASING
	12 15	12-24" BROWN FINE TO COARSE SAND, TRACE SILT		
35 - 37	7 6	LT. BROWN FINE TO COARSE SAND, TRACE SILT		
	13 16	RECOVERY - 12"		
40 - 42	7 13	LT. BROWN FINE TO COARSE SAND		
	11 12	RECOVERY - 8"		
		CONTINUED ON NEXT PAGE	CONTINUED	CONTINUED

DEPTH (FT)	BLOWS	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION
45 - 47	10 14 17 25	LT. BROWN FINE TO COARSE SAND RECOVERY - 8"		
50 - 52	8 19 21 24	LT. BROWN FINE TO COARSE SAND, TRACE SILT RECOVERY - 10"		
55 - 57	6 14 21 25	SAME AS ABOVE RECOVERY - 10"		
60 - 62	5 15 18 19	SAME AS ABOVE, COLORS RANGE FROM REDDISH BROWN, TO WHITE, TO LT. BROWN 60.0 BACK TO REDDISH BROWN. RECOVERY - 8"		4" SCHEDULE 40 PVC RISER
66 - 67	16 20 30 30	REDDISH BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE SILT 65.0 RECOVERY - 12"		
70 - 72	21 44 64 62	SAME AS ABOVE RECOVERY - 18"		
75 - 77	23 36 34 39	SAME AS ABOVE RECOVERY - 14"		BENTONITE SLURRY
80 - 82	23 30 50/6"	SAME AS ABOVE RECOVERY - 14"		
85 - 87	20 30 33 37	SAME AS ABOVE RECOVERY - 12"		
90 - 92	17 35 32 30	RED FINE TO MEDIUM SAND, TRACE SILT RECOVERY - 12"		

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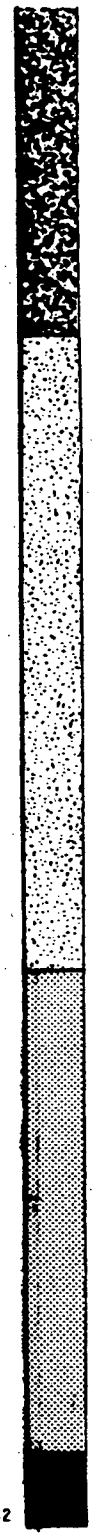
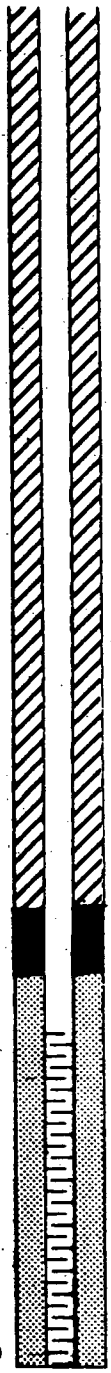
DEPTH (FT)	BLOWS	SOIL DESCRIPTION
95 - 97	22 30	0-12" RED/BROWN FINE TO COARSE SAND, TRACE SILT
	16 30	12-18" RED/BROWN FINE SAND, LITTLE SILT, TRACE CLAY
100 - 102	13 20	RED/BROWN FINE TO COARSE SAND, TRACE SILT
	24 36	RECOVERY - 14"
105 - 107	21 63	BROWN/ORANGE FINE TO MEDIUM SAND, TRACE SILT
	53 69	RECOVERY - 16"
110 - 112	15 29	SAME AS ABOVE
	46 50/1"	RECOVERY - 18"
115 - 117	17 60	BROWN/ORANGE FINE TO MEDIUM SAND, TRACE SILT
	100/5"	RECOVERY - 12"
120 - 122	8 20	LT. BROWN FINE TO MEDIUM SAND WITH STRINGS OF GRAY CLAY AT 2"
	22 22	RECOVERY - 8"
125 - 127	13 23	LT. BROWN FINE SAND, TRACE SILT
	33 30	RECOVERY - 12"
130 - 132	WOR 17	DARK GRAY FINE SAND, TRACE SILT
	25 24	RECOVERY - 14"
135 - 137	5 8	SAME AS ABOVE
	17 16	RECOVERY - 20"
140 - 142	6 6	DARK GRAY SILT AND CLAY
	10 9	RECOVERY - 24"
		END OF BORING - 142 FT

LITHOLOGY

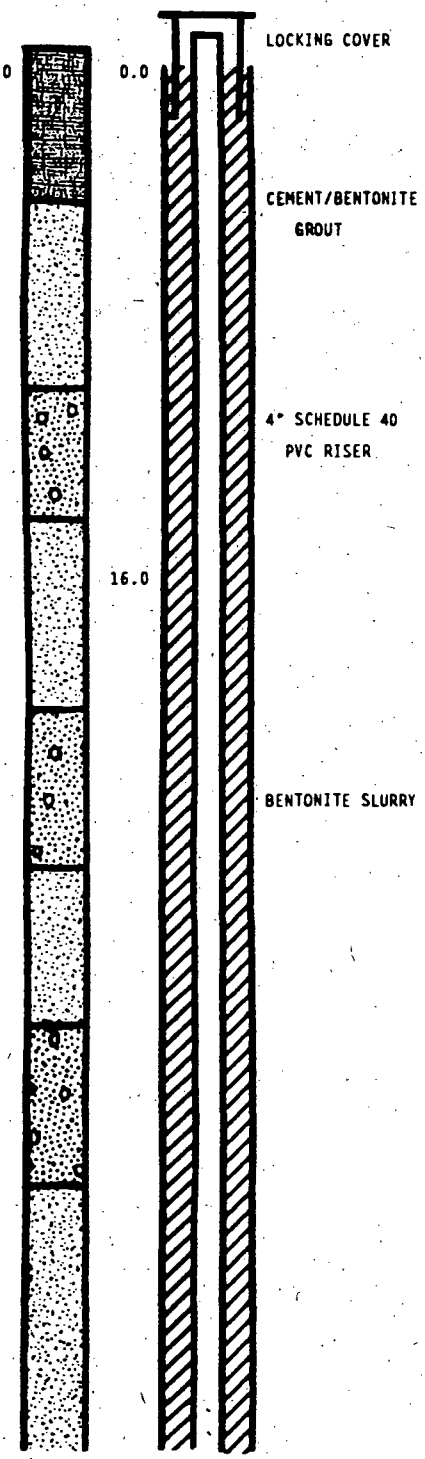


WELL CONSTRUCTION



BORING NO.:	SC-170	CONTRACTOR:	EMPIRE SOILS	DATE STARTED:	11/14/90
PROJECT NO.:	7650-N51	DRILLERS:	EMPSON, SNYDER	DATE COMPLETED:	11/26/90
PROJECT:	SHIELD ALLOY	TRC INSPECTOR:	GLEZEN	WATER TABLE LEVEL:	16.0 FT
CLIENT:	SMC	DRILLING METHOD:	MUD ROTARY	LOCATION:	N 257933.76
LOCATION:	NEWFIELD, NJ	GROUND ELEVATION:	106.48		E 1699201.04
BORING DEPTH:	155 FT	INNER CASING ELEVATION:	108.07	NJDEP PERMIT NUMBER:	3135223-5

DEPTH (FT)	BLOWS	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION
0 - 2	3 1	ORANGE/BROWN SILT AND FINE SAND, SOME WOOD FRAGMENTS IN TIP	0.0	0.0
	2 5	RECOVERY - 3"		
2 - 4	6 10	ORANGE FINE SAND AND SILT, TRACE MEDIUM SAND, TRACE GRAVEL		
	6 11	RECOVERY - 12"		
4 - 6	14 22	ORANGE FINE TO MEDIUM SAND AND GRAVEL, TRACE COBBLES		
	24 28	RECOVERY - 12"		
6 - 6	17 26	ORANGE FINE TO MEDIUM SAND, SOME GRAVEL, TRACE COBBLES		
	28 28	RECOVERY - 18"		
6 - 10	17 24	ORANGE FINE TO MEDIUM SAND, SOME COARSE SAND, LITTLE GRAVEL, TRACE SILT		
	26 27	RECOVERY - 22"		
10 - 12	6 6	ORANGE MEDIUM TO COARSE SAND, SOME GRAVEL		
	9 12	RECOVERY - 18"		
12 - 14	12 7	SAME AS ABOVE		
	13 13	RECOVERY - 18"		
14 - 16	16 22	ORANGE FINE TO MEDIUM SAND, TRACE SILT, MOIST		
	20 27	RECOVERY - 19"		
16 - 18		ORANGE FINE TO MEDIUM SAND, SOME COARSE SAND, TRACE SILT, WET		16.0
		RECOVERY - 18"		
20 - 22	11 18	LT. BROWN MEDIUM TO COARSE SAND, LITTLE GRAVEL		
	22 29	RECOVERY - 18"		
25 - 27	10 12	LT. TAN FINE TO MEDIUM SAND, TRACE COARSE SAND, 1" OF WHITE SILTY		
	11 26	CLAY IN TIP OF SPOON. RECOVERY - 8"		
30 - 32	10 16	BROWN MEDIUM TO COARSE SAND, SOME GRAVEL, TRACE CLAY		
	16 21	RECOVERY - 14"		
35 - 37		LT. BROWN/PINK FINE TO MEDIUM SAND		
		RECOVERY - 12"		
40 - 42	28 64	LT. TAN/PINK FINE TO MEDIUM SAND, TRACE COARSE SAND, TIGHT		
	73 78	RECOVERY - 12"		
		CONTINUED ON NEXT PAGE	CONTINUED	CONTINUED



DEPTH (FT)	BLOWS	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION
45 - 47	15 35 66 65	LT. TAN/PINK FINE TO MEDIUM SAND, TRACE COARSE SAND, TIGHT RECOVERY - 5"		
50 - 52	12 14 26 32	LT. BROWN MEDIUM TO COARSE SAND, LITTLE GRAVEL RECOVERY - 12"		
55 - 57	21 35 100/6"	TAN/PINK FINE TO MEDIUM SAND, TRACE COARSE SAND RECOVERY - 4"		4" SCHEDULE 40 PVC RISER
60 - 62	22 43 44 59	LT. TAN/PINK FINE TO MEDIUM SAND, TRACE COARSE SAND, TIGHT RECOVERY - 12"		
66 - 67	18 60 71 60	LT. TAN/PINK FINE SAND, TRACE MEDIUM SAND, TIGHT RECOVERY - 8"		
70 - 72	24 26 36 32	SAME AS ABOVE, SOME COARSE SAND RECOVERY - 8"		BENTONITE SLURRY
75 - 77	36 22 28 28	LT. TAN/PINK FINE TO MEDIUM SAND, SOME COARSE SAND, LITTLE GRAVEL RECOVERY - 8"		
80 - 82	18 22 26 26	LT. TAN/PINK FINE SAND, SOME SILT, WITH FINE LAMINATIONS OF WHITE SILT RECOVERY - 14"		
66 - 67	6 13 16 35	LT. TAN FINE TO VERY FINE SAND, SOME SILT, WITH SMALL WHITE SILT LAYERS RECOVERY - 14"		
68 - 90	18 35 75/6"	PINK/TAN FINE TO VERY FINE SAND, LITTLE SILT RECOVERY - 6"		

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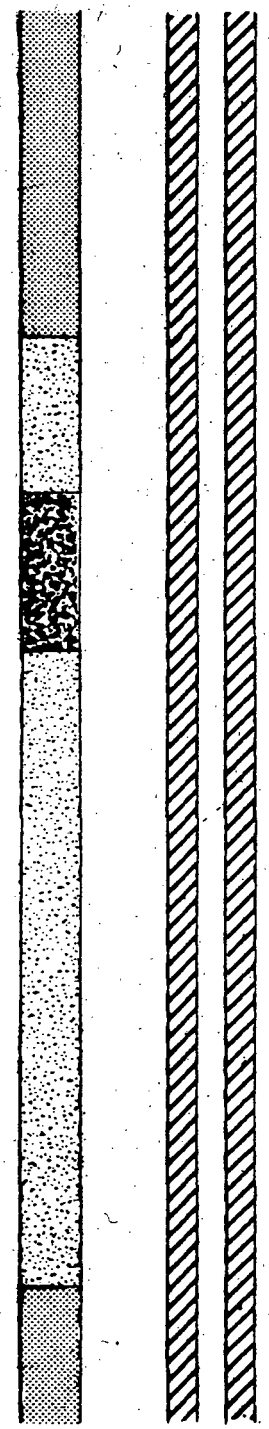
DEPTH (FT)	BLOWS	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION
93 - 95	14 26 34 36	BROWN/ORANGE FINE SAND, TRACE SILT, SOME SMALL UMITE SILTY CLAY LAMINATIONS. RECOVERY - 18"		
98 - 100	30 50 75/6"	LT. TAN FINE SAND, LITTLE MEDIUM SAND, TRACE SILT, SOME SMALL VARVED CLAY LAYERS. RECOVERY - 14"		4" SCHEDULE 40 PVC RISER
103 - 105	35 75/6"	BROWN/ORANGE FINE TO MEDIUM SAND, SOME COARSE SAND, TRACE CLAY RECOVERY - 12"		
108 - 110	32 55 75/6"	LT. TAN FINE TO COARSE SAND, LITTLE FINE GRAVEL RECOVERY - 12"		BENTONITE SLURRY
113 - 116	38 76/6"	BROWN/ORANGE FINE TO MEDIUM SAND, SOME COARSE SAND, TRACE GRAVEL RECOVERY - 6"		
118 - 120	38 76/6"	BROWN/ORANGE FINE TO MEDIUM SAND, LITTLE SILI RECOVERY - 4"		
123 - 126	46 62 48 30	LT. TAN FINE TO MEDIUM SAND, SOME COARSE SAND, LITTLE GRAVEL RECOVERY - 14"		
125 - 130	46 26 16 10	NO RECOVERY		
133 - 135	15 22 24 30	LT. TAN FINE TO VERY FINE SAND, SOME MEDIUM SAND, LITTLE SILT RECOVERY - 12"		



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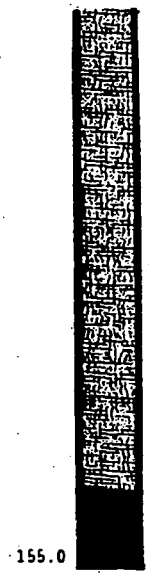
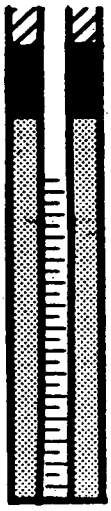
DEPTH (FT)	BLOWS	SOIL DESCRIPTION
138 - 140	28 18 15 10	LT. TAN/GRAY FINE TO VERY FINE SAND AND SILT, TRACE CLAY RECOVERY - 12"
143 - 145	12 27 27 23	SAME AS ABOVE
148 - 150	89 92 29 30	0-8" LT. TAN FINE TO COARSE SAND AND GRAVEL 8-12" LT. TAN FINE SAND AND SILT, LITTLE CLAY
153 - 155	8 10 17 23	VARVED DARK GRAY SILTY CLAY, WITH SMALL SILT LAYERS

END OF BORING - 155 FT

LITHOLOGY



WELL CONSTRUCTION



BORING NO.:	SC-22D	CONTRACTOR:	EMPIRE SOILS	DATE STARTED:	11/16/90
PROJECT NO.:	7650-N61	DRILLERS:	EMPSON, SNYDER	DATE COMPLETED:	
PROJECT:	SMIELO ALLOY	TRC INSPECTOR:	GLEZEN	WATER TABLE LEVEL:	5.0 FT
CLIENT:	SMC	DRILLING METHOD:	MUD ROTARY	LOCATION:	N 257593.05
LOCATION:	NEUFIELD, NJ	GROUND ELEVATION:	96.18		E 1900417.75
BORING DEPTH:	122 FT	INNER CASING ELEVATION:	98.72	NJDEP PERMIT NUMBER:	3135222-7

DEPTH (FT)	BLOWS	SOIL DESCRIPTION
0 - 2	3 3	BROWN MEDIUM SAND, SOME GRAVEL, MOIST
	2 2	RECOVERY = 10"
2 - 4	1 1	BROWN COARSE TO MEDIUM SAND, SOME GRAVEL, MOIST
	2 2	RECOVERY = 10"
4 - 6	3 3	SAME AS ABOVE, WET
	5 6	RECOVERY = 10"
9 - 11	2 2	SAME AS ABOVE
	4 3	RECOVERY = 16"
14 - 16	2 2	TAN/ORANGE COARSE SAND, TRACE GRAVEL
	4 6	
20 - 22	13 17	ORANGE MEDIUM TO COARSE SAND, TRACE GRAVEL
	17 21	RECOVERY = 5"
26 - 27	16 18	BROWN/ORANGE MEDIUM TO COARSE SAND, SOME FINE SAND, TRACE GRAVEL
	17 16	RECOVERY = 12"
30 - 32	5 4	0-4" LT. BROWN/RED SILT AND CLAY, SOME FINE SAND
	6 7	4-20" BROWN/RED FINE SAND, SOME SILT, SOME CLAY
		NOTE: CLAY OCCURS IN WHITE/PINK LAYERS
36 - 37	7 7	ORANGE/PINK FINE TO VERY FINE SAND, SOME SILT, SOME CLAY WITH STRINGERS
	6 7	RECOVERY = 16"
40 - 42	2 2	ORANGE SILT AND FINE SAND WITH WHITE/GRAY CLAY LAYERS
	3 2	RECOVERY = 24"

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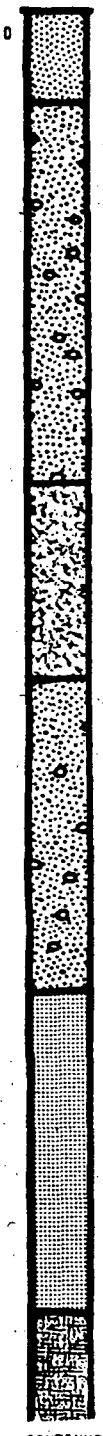
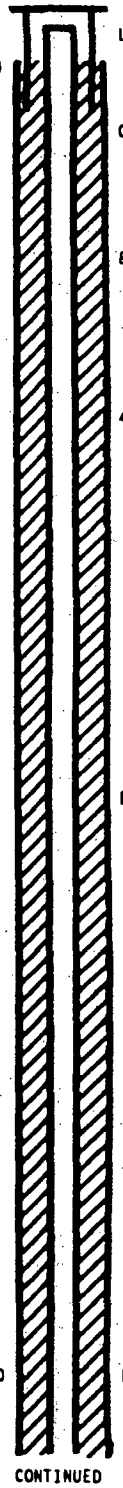
LITHOLOGY



WELL CONSTRUCTION



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DEPTH (FT)	BLOWS	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION
46 - 47	33 33 46 42	RED/ORANGE MEDIUM TO COARSE SAND, SOME FINE SAND, TRACE GRAVEL RECOVERY - 16"		
50 - 52	34 43 46 53	ORANGE MEDIUM SAND, SOME COARSE SAND, LITTLE FINE SAND, TRACE GRAVEL RECOVERY - 14"		
55 - 57	8 12 19 24	LT. TAN/PINK FINE TO MEDIUM SAND, SOME COARSE SAND, TRACE GRAVEL RECOVERY - 16"		4" SCHEDULE 40 PVC RISER
60 - 62	16 23 26 30	ORANGE MEDIUM TO COARSE SAND, SOME FINE SAND, TRACE SILT RECOVERY - 14"		
65 - 67	13 25 28 28	LT. TAN FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE SILT RECOVERY - 12"		
70 - 72	8 12 13 13	TAN FINE TO MEDIUM SAND, LITTLE SILT RECOVERY -12"		BENTONITE SLURRY
75 - 77	24 43 38 50	TAN/PINK MEDIUM TO COARSE SAND, SOME FINE SAND, LITTLE GRAVEL RECOVERY - 14"		
80 - 82	15 9 7 7	ORANGE FINE TO MEDIUM SAND, TRACE CLAY RECOVERY - 7"		
85 - 87	60 100/6"	BROWN MEDIUM TO COARSE SAND, SOME GRAVEL, LITTLE FINE SAND RECOVERY - 12"		
90 - 92	43 100/6"	BROWN/PINK FINE TO MEDIUM SAND, SOME COARSE SAND RECOVERY - 12"		

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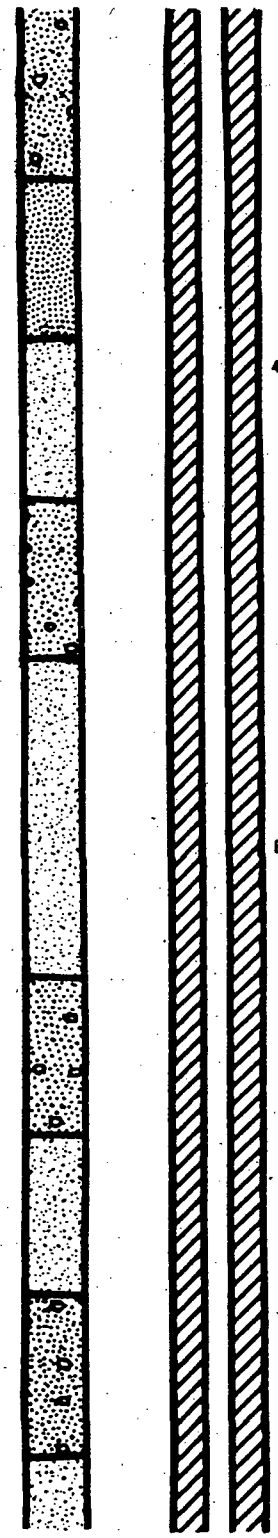
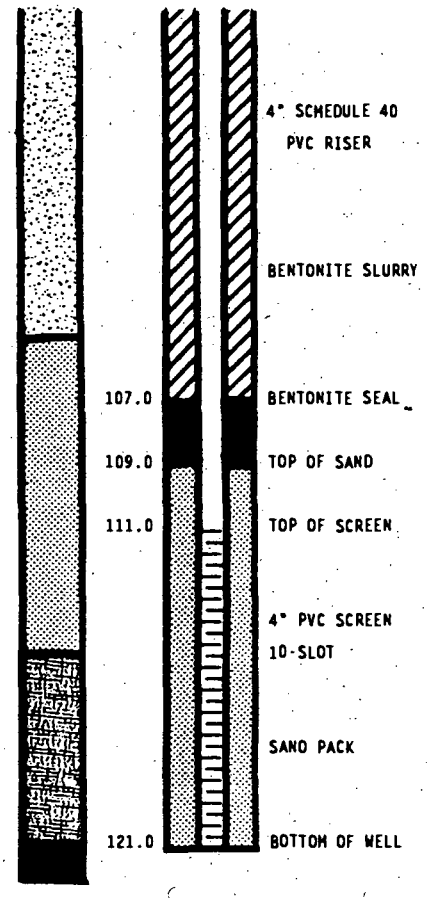


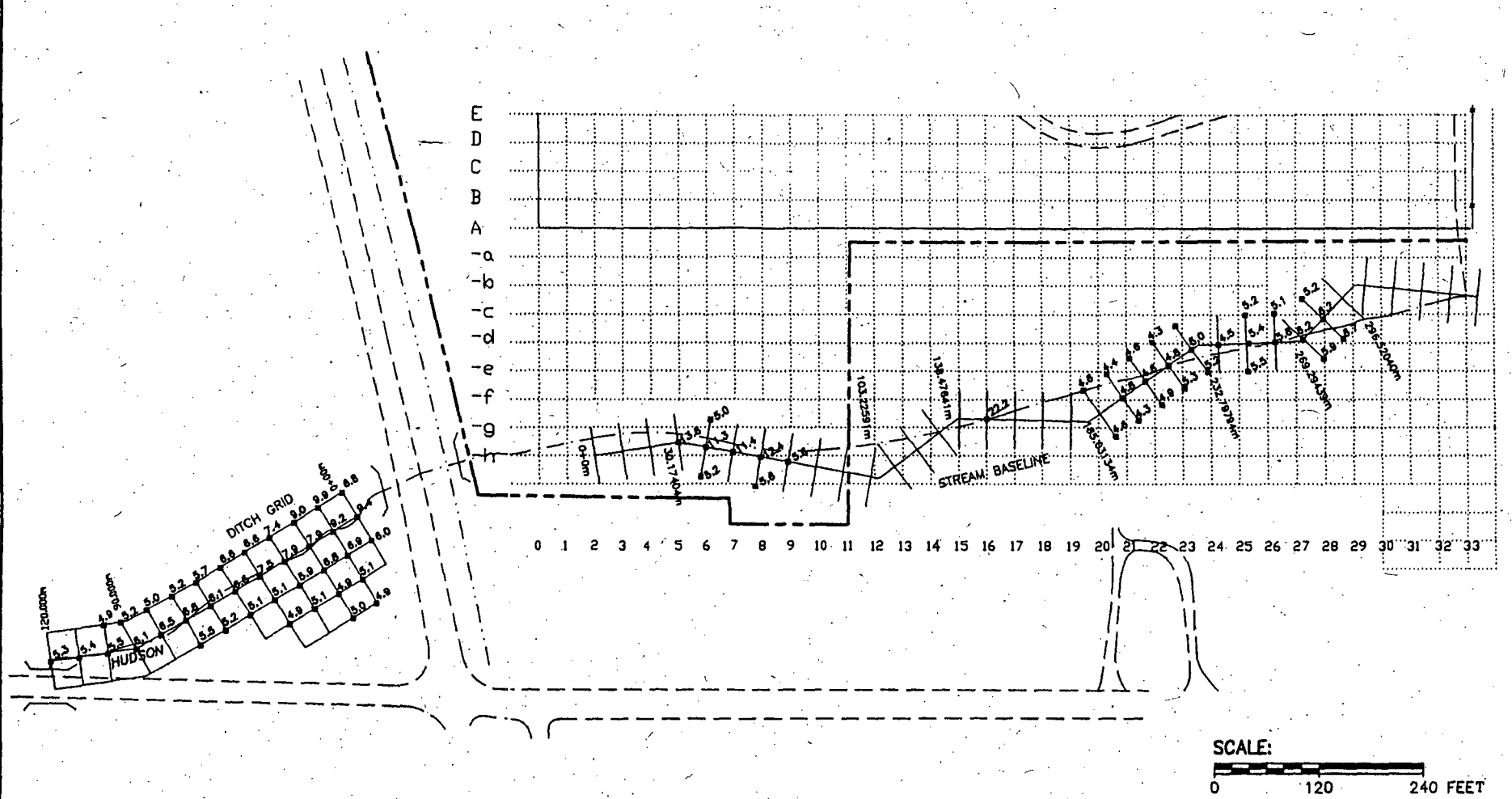
DEPTH (FT)	BLOWS	SOIL DESCRIPTION
96 - 97	100/6"	LT. BROWN/ORANGE FINE TO MEDIUM SAND, TRACE3 COARSE SAND RECOVERY - 6"
100 - 102	43 100/6"	LT. BROWN FINE TO MEDIUM SAND, LITTLE COARSE SAND, TRACE GRAVEL RECOVERY - 12"
106 - 107	100/6"	LT. BROWN FINE SAND, LITTLE MEDIUM SAND, TRACE SILT RECOVERY - 6"
110 - 112	22 30 75/6"	LT. TAN/ORANGE FINE TO VERY FINE SAND, LITTLE SILT RECOVERY - 12"
116 - 117	50 60 75/6"	ORANGE/RED VERY FINE SAND AND SILT, DENSE RECOVERY - 6"
120 - 122	20 23 25 27	0-12" LT. TAN FINE TO VERY FINE SAND WITH LIGHT GRAY CLAY INTERBEDS 12-14" DARK GRAY SILTY CLAY, STIFF

END OF BORING - 122 FT

LITHOLOGY

WELL CONSTRUCTION





SCALE:

0 120 240 FEET

MAP 4

HUDSON'S BRANCH EXPOSURE RATES (μR/hr)

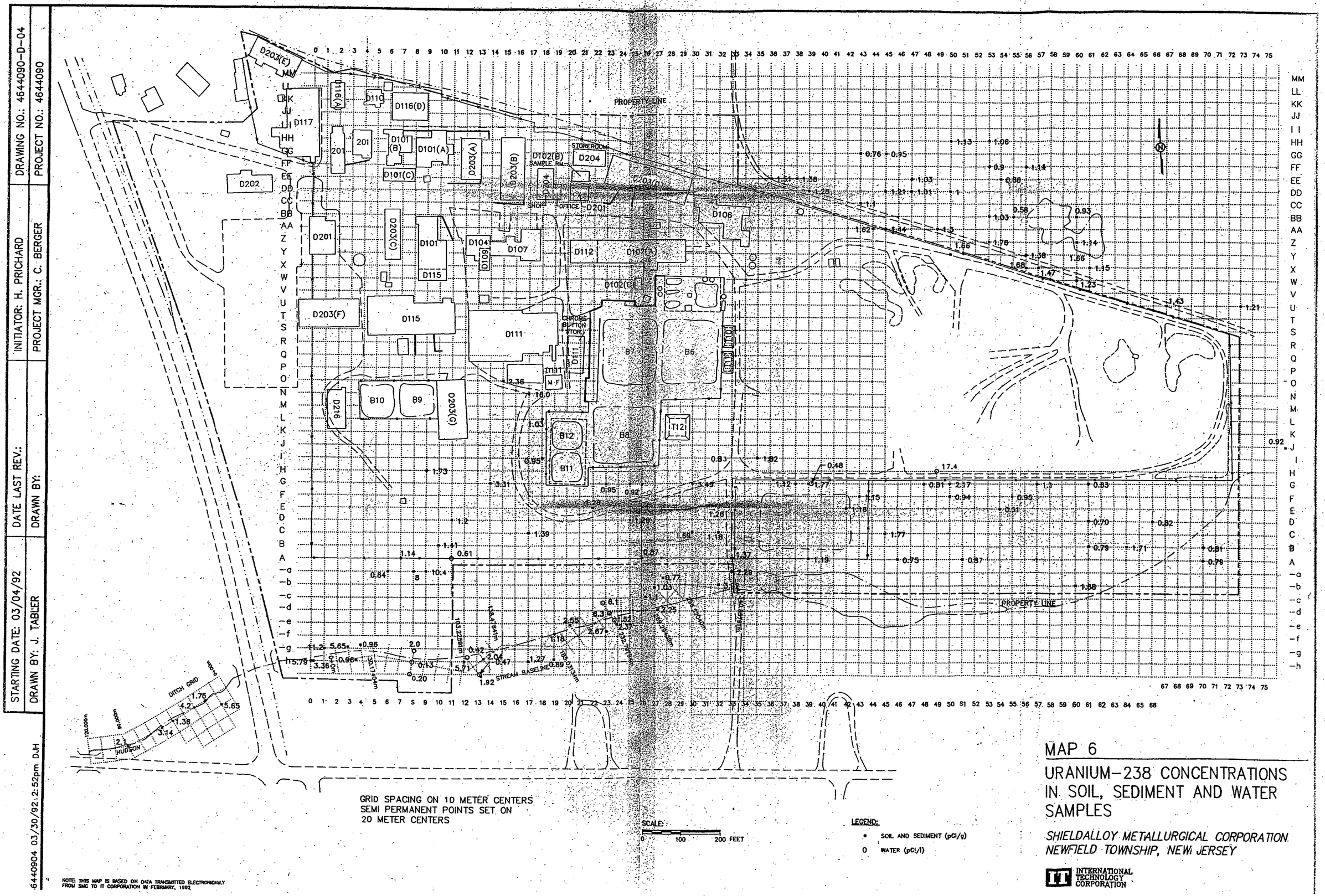
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD TOWNSHIP, NEW JERSEY

INTERNATIONAL TECHNOLOGY CORPORATION

NOTE: THIS MAP IS BASED ON DATA TRANSMITTED ELECTRONICALLY FROM SMC TO IT CORPORATION IN FEBRUARY, 1992

STARTING DATE: 03/17/92	DATE LAST REV.:	DRAFT. CHCK. BY: J. HUBBARD	INITIATOR: H. PRICHARD	DWG. NO.: 464409-B-05	
DRAWN BY: G. PACHECO	DRAWN BY:	ENGR. CHCK. BY: H. PRICHARD	PROJ. MGR.: C. BERGER	PROJ. NO.: 464409	

46440905 03/18/92 2:58pm EWB



GRID SPACING ON 10 METER CENTERS
SEMI PERMANENT POINTS SET ON
20 METER CENTERS

SCALE:
0 100 200 FEET

LEGEND:
• SOIL AND SEDIMENT (pCi/g)
O WATER (pCi/l)

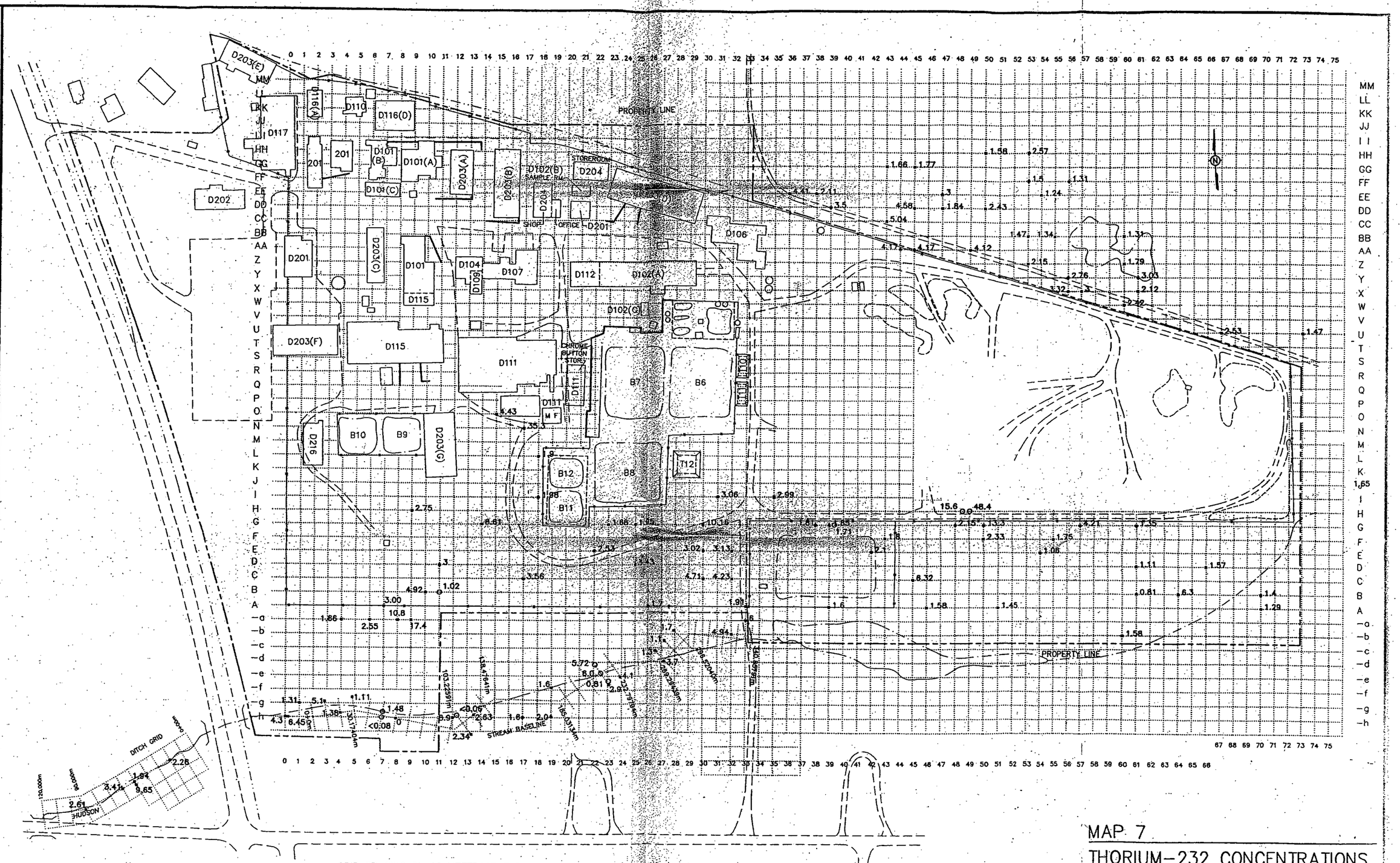
NOTE: THIS MAP IS BASED ON DATA TRANSMITTED ELECTRONICALLY FROM SMC TO IT CORPORATION IN FEBRUARY, 1992

MAP 6

URANIUM-238 CONCENTRATIONS IN SOIL, SEDIMENT AND WATER SAMPLES

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD TOWNSHIP, NEW JERSEY

INTERNATIONAL TECHNOLOGY CORPORATION



GRID SPACING ON 10 METER CENTERS
SEMI PERMANENT POINTS SET ON
20 METER CENTERS

(HUB, IRON PIN, RR SPIKE OR DRILL HOLE)

SCALE: 0 100 200 FEET

LEGEND:

- SOIL AND SEDIMENT (pCi/g)
- WATER (pCi/l)

MAP 7

THORIUM-232 CONCENTRATIONS IN SOIL AND WATER SAMPLES

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD TOWNSHIP, NEW JERSEY

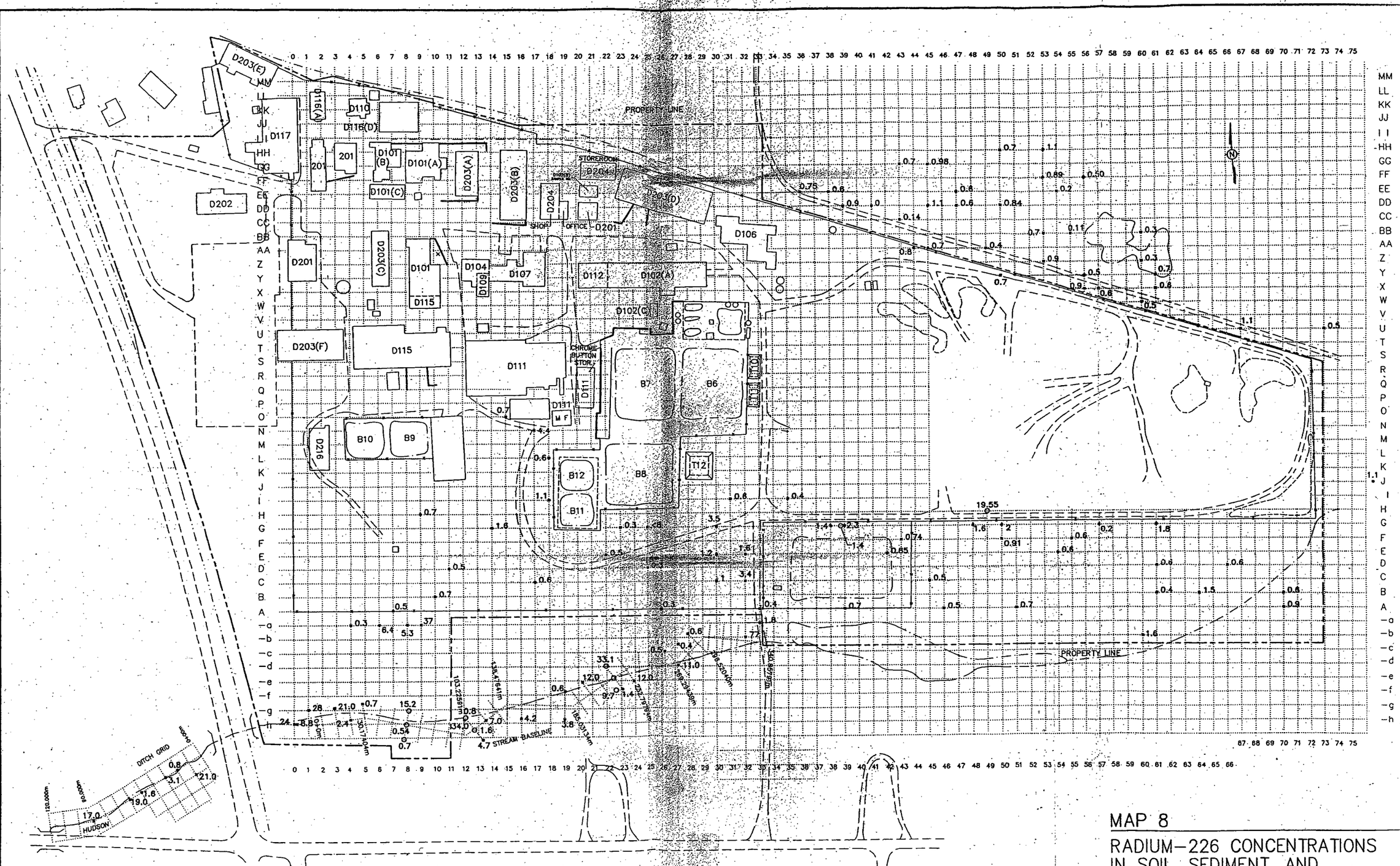
INTERNATIONAL TECHNOLOGY CORPORATION

NOTE: THIS MAP IS BASED ON DATA TRANSMITTED ELECTRONICALLY

DRAWING NO.: 464409-D-03	PROJECT NO.: 464409
INITIATOR: H. PRICHARD	PROJECT MGR.: C. BERGER
DATE LAST REV.:	
STARTING DATE: 03/06/92	DRAWN BY: S. OARDWELL
DRAWN BY:	

440903 03/28/92 1:24pm DJH

DRAWING NO.: 464409-D-07
PROJECT NO.: 464409
INITIATOR: H. PRICHARD
PROJECT MGR.: C. BERGER
STARTING DATE: 03/17/92
DRAWN BY: BILL SMITH
DATE LAST REV.:
DRAWN BY:



GRID SPACING ON 10 METER CENTERS
SEMI PERMANENT POINTS SET ON
20 METER CENTERS
(HUB, IRON PIN, RR SPIKE OR DRILL HOLE)

SCALE:
0 100 200 FEET

LEGEND:
• SOIL AND SEDIMENT (pCi/g)
O WATER (pCi/l)

MAP 8

RADIUM-226 CONCENTRATIONS IN SOIL, SEDIMENT, AND WATER SAMPLES

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD TOWNSHIP, NEW JERSEY

INTERNATIONAL TECHNOLOGY CORPORATION

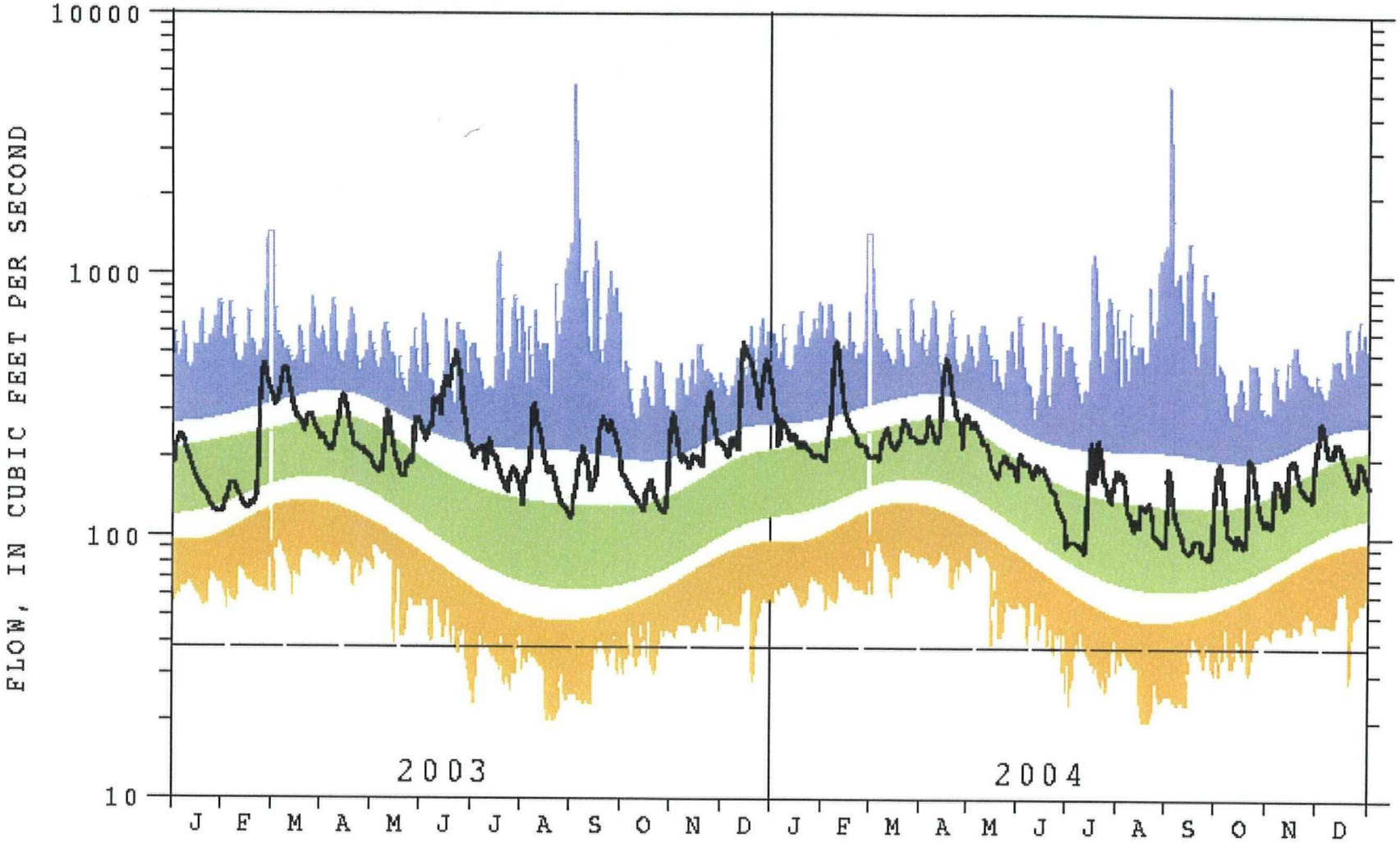
140907 03/26/92 1:53pm GWP

NOTE: THIS MAP IS BASED ON DATA TRANSMITTED ELECTRONICALLY

APPENDIX C - HYDROLOGIC DATA FOR THE MAURICE RIVER BASIN

STATION 01411500 MAURICE RIVER AT NORMA, NJ

US GEOLOGICAL SURVEY PROVISIONAL DATA - SUBJECT TO CHANGE
UNREGULATED FLOW
DRAINAGE AREA = 112 SQUARE MILES
NUMBER OF YEARS=73.0 DATE OF PLOT=02/28/05 7Q10=38.0



SOLID LINE = CURRENT DAILY VALUE FLOW
DASHED LINE = 7-DAY MINIMUM FLOW WITH A RECURRENCE INTERVAL OF 10 YEARS

BLUE (UPPER) BAND = 90- TO 100-PERCENTILE FLOWS (VERY WET CONDITIONS)
GREEN (MIDDLE) BAND = 25- TO 75-PERCENTILE FLOWS (NORMAL CONDITIONS)
GOLD (LOWER) BAND = 0- TO 10-PERCENTILE FLOWS (VERY DRY CONDITIONS)

APPENDIX C - HYDROLOGIC DATA FOR THE MAURICE RIVER BASIN

Average Monthly Discharges at the Maurice River Gauging Station (1/2003-12/2004)
Average Monthly Streamflows between 1932 and 2003
Water Quality Data for the Maurice River Basin
Low-Flow Characteristics and Flow Duration of New Jersey Streams – Maurice River Data

Water Resources

Data Category: Surface Water | Geographic Area: United States | go

Monthly Streamflow Statistics for the Nation

USGS 01411500 MAURICE RIVER AT NORMA NJ

Available data for this site: Surface-water: Monthly streamflow statistics | GO

Salem County, New Jersey
Hydrologic Unit Code 02040206
Latitude 39°29'44", Longitude 75°04'37" NAD83
Drainage area 112.00 square miles
Contributing drainage area 112.00 square miles
Gage datum 46.94 feet above sea level NGVD29

Output formats
- HTML table of all data
- Tab-separated data
- Reselect output format

YEAR	Monthly mean streamflow, in ft^3/s											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1932										88.5	251	166
1933	219	247	263	306	241	126	164	250	246	138	144	156
1934	183	118	229	219	206	130	117	194	148	153	149	171
1935	214	270	258	247	184	152	91.8	80.1	270	121	219	197
1936	380	333	358	300	147	125	100	62.2	117	101	80.7	161
1937	254	242	226	207	210	148	91.6	92.6	95.2	139	203	178
1938	155	171	172	141	110	130	293	230	298	252	212	248
1939	209	418	393	398	231	149	95.8	195	125	110	143	101
1940	101	143	219	276	250	184	96.7	133	591	157	208	187
1941	216	200	241	188	121	156	114	74.5	50.7	50.4	72.0	106
1942	94.6	145	190	161	93.6	77.5	90.5	140	78.8	128	129	159
1943	195	219	221	207	202	141	89.3	56.1	46.2	93.8	162	98.0
1944	193	139	243	286	199	134	71.8	76.1	122	92.9	111	198
1945	173	172	214	169	172	106	170	184	128	118	133	252
1946	277	222	220	189	228	239	204	152	99.0	97.3	97.4	118
1947	172	145	189	175	226	174	95.7	94.6	77.6	65.5	130	112
1948	204	200	227	248	308	277	167	225	102	98.7	134	237
1949	328	371	330	272	249	129	101	70.8	87.6	81.7	119	111
1950	106	161	186	156	153	118	108	68.5	140	90.8	138	196
1951	159	208	216	257	171	131	129	94.8	68.8	87.5	177	261

1952	280	304	323	290	304	227	134	254	149	105	166	216
1953	249	239	331	334	271	230	132	114	65.7	76.4	137	174
1954	149	142	181	153	153	71.3	52.0	54.8	117	67.2	115	138
1955	133	144	176	145	87.1	121	56.9	180	103	116	118	86.4
1956	94.6	181	206	187	141	119	140	106	106	102	233	200
1957	170	190	186	163	101	86.7	46.2	36.2	68.3	72.5	94.2	164
1958	209	223	401	361	387	185	224	327	234	262	220	186
1959	183	186	200	202	150	146	183	154	112	103	150	156
1960	172	193	200	201	169	123	94.4	118	345	222	186	170
1961	263	310	377	337	233	163	132	121	97.3	103	92.3	123
1962	155	145	255	266	146	128	96.7	87.7	72.5	85.4	137	127
1963	129	147	247	140	115	105	55.8	67.4	67.6	67.8	145	132
1964	192	211	195	241	189	96.1	74.4	47.5	44.8	83.3	63.2	116
1965	130	152	143	152	91.1	73.7	59.7	39.9	40.6	48.6	46.7	57.1
1966	64.7	109	106	90.9	96.0	57.7	35.6	34.6	64.7	137	110	122
1967	159	156	236	185	187	109	126	322	171	159	138	274
1968	291	183	259	178	186	247	133	75.8	55.9	63.4	112	113
1969	109	134	149	142	115	75.0	219	224	150	111	111	234
1970	238	208	174	341	193	158	106	99.6	46.3	77.8	142	138
1971	155	235	249	202	184	116	68.0	188	247	198	264	280
1972	240	277	278	269	253	247	234	120	101	140	330	385
1973	289	415	288	346	272	236	169	93.5	93.0	79.4	92.1	184
1974	213	160	184	243	163	114	81.7	112	117	96.5	86.6	178
1975	215	200	278	240	264	212	333	183	220	223	223	179
1976	303	272	199	164	130	82.9	77.0	86.5	55.1	115	103	104
1977	100	102	145	138	79.5	59.8	46.5	57.4	53.6	70.1	165	251
1978	376	229	282	225	287	178	185	169	108	80.6	85.5	158
1979	313	327	427	281	264	291	172	218	225	264	230	204
1980	202	159	211	282	200	156	127	97.5	66.0	88.6	96.8	85.3
1981	71.8	95.7	97.2	118	155	129	104	86.3	76.2	77.3	84.3	125
1982	141	178	148	179	163	161	98.8	72.6	57.2	58.5	86.9	118
1983	107	124	234	412	322	264	123	75.7	75.3	95.7	173	241
1984	199	239	350	437	268	259	290	160	117	117	119	123
1985	101	147	108	91.8	145	99.9	85.8	115	110	138	121	160
1986	148	211	178	187	124	76.0	69.6	63.9	63.1	79.2	122	239
1987	242	196	212	254	197	117	136	86.3	79.4	97.7	114	120
1988	138	208	169	173	166	90.1	74.0	65.7	73.2	68.0	112	120
1989	115	143	170	203	318	242	243	275	260	266	222	160

1990	232	204	187	220	243	191	126	155	110	108	99.1	137
1991	280	173	217	229	157	118	103	92.1	82.4	94.3	77.8	132
1992	111	108	129	110	93.5	144	86.5	98.5	80.5	74.0	113	171
1993	156	161	283	278	176	129	81.6	71.5	60.4	75.0	87.4	173
1994	197	243	371	311	186	101	107	142	88.1	73.5	81.3	104
1995	124	107	127	96.7	113	69.3	57.3	50.3	56.1	90.4	119	127
1996	204	201	205	266	215	140	183	158	127	179	138	348
1997	241	282	290	282	214	136	95.8	145	82.3	78.7	141	124
1998	171	224	339	239	238	170	96.2	82.0	55.9	55.1	56.2	61.7
1999	166	137	185	167	121	95.6	66.9	67.3	162	122	119	147
2000	126	176	260	220	140	114	95.2	114	100	84.7	89.4	149
2001	158	200	214	221	140	154	77.6	60.3	54.3	58.8	54.8	68.7
2002	79.5	69.4	89.9	92.7	104	111	57.6	32.1	53.8	77.4	151	173
2003	169	196	311	244	214	331	185	182	210			
Mean of monthly streamflows	187	198	230	221	188	148	122	123	120	111	136	164

Questions about data Water Webserver Team Top
Feedback on this website NWISWeb Support Team Explanation of terms

Surface Water data for USA: Monthly Streamflow Statistics
http://waterdata.usgs.gov/nwis/monthly?

Retrieved on 2005-04-29 16:21:40 EDT
Department of the Interior, U.S. Geological Survey
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1.37 1.12 nadww01

01411466 INDIAN BRANCH NEAR MALAGA, NJ

LOCATION.--Lat 39°35'27", long 75°03'35", Gloucester County, Hydrologic Unit 02040206, at bridge on U.S. Route 47 (Delsea Drive), 0.4 mi upstream of Malaga Lake, and 1.4 mi north of Malaga.

DRAINAGE AREA.--6.50 mi^2.

PERIOD OF RECORD.--Water years 1998 to current year.

REMARKS.--Total nitrogen (00600) equals the sum of dissolved ammonia plus organic nitrogen (00623), dissolved nitrite plus nitrate nitrogen (00631), and total particulate nitrogen (49570).

COOPERATION.--Determination of dissolved ammonia, total ammonia, dissolved nitrite, dissolved orthophosphate, biochemical oxygen demand, total suspended solids, fecal coliform, E. coli, and enterococcus bacteria was performed by the New Jersey Department of Health and Senior Services, Public Health and Environmental Laboratories, Environmental and Chemical Laboratory Services. Determination of chlorophyll a was performed by the New Jersey Department of Enviromnental Protection, Bureau of Freshwater and Biological Monitoring Laboratory.

COOPERATIVE NETWORK SITE DESCRIPTOR.--Undeveloped Land Use Indicator, New Jersey Department of Environmental Protection Watershed Management Area 17.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Instantaneous discharge, cfs (00061)	Turbidity, water, unfltrd field, NTU (61028)	UV absorbance, 254 nm, wat fit units /cm (50624)	UV absorbance, 280 nm, wat flt units /cm (61726)	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	Dissolved oxygen, percent of saturation (00301)	pH, water, unfltrd field, std units (00400)	Specif. conductance, wat unf uS/cm 25 degC (00095)	Temperature, air, deg C (00020)	Temperature, water, deg C (00010)	Hardness, water, unfltrd mg/L as CaCO3 (00900)
NOV													
25...	1010	7.3	0.7	0.728	0.552	762	8.6	70	3.7	93	15.0	6.5	11
MAR													
05...	0940	19	0.6	0.658	0.502	750	10.4	80	3.3	76	12.0	3.4	9
MAY													
13...	0950	13	0.6	0.935	0.726	748	5.3	52	3.7	63	15.5	13.3	7
AUG													
12...	1000	11	0.8	1.64	1.29	762	3.8	42	4.1	60	23.1	19.7	8

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Calcium water, fltrd, mg/L (00915)	Magnesium, water, fltrd, mg/L (00925)	Potassium, water, fltrd, mg/L (00935)	Sodium, water, fltrd, mg/L (00930)	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 (90410)	Chloride, water, fltrd, mg/L (00940)	Fluoride, water, fltrd, mg/L (00950)	Silica, water, fltrd, mg/L (00955)	Sulfate water, fltrd, mg/L (00945)	Residue on evap. at IS0degC wat flt mg/L (70300)	Residue total at 105 deg. C, suspended, mg/L (00530)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia water, fltrd, mg/L as N (00608)
NOV													
25...	1.75	1.49	0.73	3.26	--	5.38	<0.17	8.3	12.6	70	2	0.44	<0.030
MAR													
05...	1.50	1.16	0.85	2.92	<2	5.13	<0.17	5.9	11.5	57	1	0.37	<0.030
MAY													
13...	1.24	0.939	0.86	3.08	--	6.41	<0.17	5.6	7.1	59	1	0.46	<0.030
AUG													
12...	1.42	0.995	0.86	3.33	--	6.53	<0.17	8.0	4.4	74	1	0.84	0.036

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Ammonia water, unfltrd mg/L as N (00610)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Orthophosphate, water, fltrd, mg/L as P (00671)	Particulate nitrogen, susp, water, mg/L (49570)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd mg/L (00665)	Total nitrogen, water, fltrd, mg/L (00602)	Total nitrogen, water, unfltrd mg/L (00600)	Total carbon, suspnd sedimnt total, mg/L (00694)	Inorganic carbon, suspnd sedimnt total, mg/L (00688)	Organic carbon, suspnd sedimnt total, mg/L (00689)	Organic carbon, water, fltrd, mg/L (00681)
NOV													
25...	<0.030	0.34	E.003	--	0.03	0.006	0.007	0.78	0.81	0.2	<0.1	0.2	17.0
MAR													
05...	0.030	0.50	0.004	<0.020	0.03	0.004	0.016	0.88	0.90	0.3	<0.1	0.3	13.1
MAY													
13...	0.037	0.35	<0.003	<0.020	<0.02	0.005	0.008	0.81	--	0.2	<0.1	0.2	17.9
AUG													
12...	0.033	0.21	0.004	<0.020	0.03	0.011	0.013	1.0	1.1	0.2	<0.1	0.2	30.0

01411466 INDIAN BRANCH NEAR MALAGA, NJ—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	BOD, water, unfltrd 5 day, 20 degC mg/L (00310)	Chlorophyll a fluorometric method, corrctd ug/L (32209)	Boron, water, fltrd, ug/L (01020)	Iron, water, fltrd, ug/L (01046)
NOV				
25...	<1.0	--	19	--
MAR				
05...	<1.0	--	15	--
MAY				
13...	<1.0	1.60	13	--
AUG				
12...	<1.0	0.400	13	1,330

Remark codes used in this table:
< -- Less than
E -- Estimated value

WATER-COLUMN BACTERIA ANALYSES

Samples were collected synoptically over a 30-day period during the summer.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TQ SEPTEMBER 2003

Date	Time	Enterococci, m-E MF, water, col/ 100 mL (31649)	E coli, m-TEC MF, water, cbl/ 100 mL (31633)	Fecal coliform, ECbroth water, MPN/ 100 mL (31615)
JUL				
09...	1005	<10	<100	40
16...	1030	30	200	20
23...	1030	--	700	1,100
30...	1035	20	200	40
AUG				
06...	1045	180	500	230

Remark codes used in this table:
< -- Less than

01411500 MAURICE RIVER AT NORMA, NJ

LOCATION.--Lat 39°29'44", long 75°04'37", Salem County, Hydrologic Unit 02040206, at bridge on Almond Road (County Route 540) in Norma, 0.8 mi downsream from Blackwater Branch, and 2.9 mi west of Vineland.

DRAINAGE AREA.--112.0 mi^2.

PERIOD OF RECORD.--Water years 1953, 1962-63, 1965 to September 1997, December 1998 to current year.

REMARKS.--Total niurogen (00600) equals the sum of dissolved ammonia plus organic nitrogen (00623), dissolved nitrite plus nitrate nitrogen (00631), and total particulate nitrogen (49570).

COOPERATION.--Field data and samples for laboratory analyses were provided by the New Jersey Department of Environmental Protection. Detennination of dissolved ammonia, total ammonia, dissolved nitrite, dissolved ordhophosphate, biochemical oxygen demand, total suspended solids, fecal coliform, E. coli, and enterococcus bacteria was perfonned by the New Jersey Department of Health and Senior Services, Public Health and Environmental Laboratories, Environmental and Chemical Laboratory Services. Determination of chlorophyll a was performed by the New Jersey Department of Environmental Protection, Bureau of Freshwater and Biological Monitpring Laboratory.

COOPERATIVE NETWORK SITE DESCRIPTOR.--Watershed Integrator, New Jersey Department of Environmental Protection Watershed Management Area 17.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Instantaneous discharge, cfs (00061)	Turbidity, water, unfltrd field, NTU (61028)	UV absorbance, 254 nm, wat flt units /cm (50624)	UV absorbance, 280 nm, wat flt units /cm (61726)	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	Dissolved oxygen, percent of saturation (00301)	pH, water, unfltrd field, std units (00400)	Specif. conductance, wat inf uS/cm 25 degC (00095)	Temperature, air, deg C (00020)	Temperature, water, deg C (00010)	Hardness, water, unfltrd mg/L as CaCO3 (00900)
NOV													
13...	1000	146	1.7	0.402	0.319	762	7.3	68	6.2	105	8.0	12.0	25
FEB													
10...	1000	143	1.9	0.185	0.141	758	11.8	88	6.1	116	1.4	2.8	23
MAY													
21...	1000	166	2.2	0.500	0.389	764	7.6	75	6.3	99	12.8	15.1	22
AUG													
19...	0900	178	5.2	0.956	0.753	765	5.8	67	6.3	90	23.4	22.3	20

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Calcium water, fltrd, mg/L (00915)	Magnesium, water, fltrd, mg/L (00925)	Potassium, water, fltrd, mg/L (00935)	Sodiim, water, fltrd, mg/L (00930)	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 (90410)	Chloride, water, fltrd, mg/L (00940)	Fluoride, water, fltrd, mg/L (00950)	Silica, water, fltrd, mg/L (00955)	Sulfate water, fltrd, mg/L (00945)	Residue water, fltrd, sum of constituents mg/L (70301)	Residue on evap. at 180degC wat flt mg/L (70300)	Residue total at 105 deg. C, suspended, mg/L (00530)	Ammonia + org-N, water, fltrd, mg/L as N (00623)
NOV													
13...	5.40	2.92	3.18	7.31	E6	12.8	<0.17	6.6	15.2	--	82	3	0.33
FEB													
10...	4.62	2.78	1.78	8.40	5	13.8	<0.17	6.6	10.9	61	71	3	0.24
MAY													
21...	4.69	2.55	2.07	7.62	7	13.0	<0.17	4.9	7.8	54	80	3	0.49
AUG													
19...	4.15	2.37	2.20	7.13	10	12.7	<0.17	8.1	4.5	52	88	5	0.86

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Ammonia water, fltrd, mg/L as N (00608)	Ammonia water, unfltrd mg/L as N (00610)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Orthophosphate, water, fltrd, mg/L as P (00671)	Particulate nitrogen, susp, water, mg/L (49570)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd mg/L (00665)	Total nitrogen, water, fltrd, mg/L (00602)	Total nitrogen, water, unfltrd mg/L (00600)	Total carbon, suspnd sedimnt total, mg/L (00694)	Inorganic carbon, suspnd sedimnt total, mg/L (00688)	Organic carbon, suspnd sedinmt total, mg/L (00689)
NOV													
13...	<0.030	0.048	0.97	<0.003	<0.020	0.05	0.005	0.014	1.3	1.4	0.5	<0.1	0.5
FEB													
10...	0.030	0.036	1.93	<0.003	<0.020	0.04	0.006	0.010	2.2	2.2	0.3	<0.1	0.3
MAY													
21...	<0.030	0.054	1.50	0.003	<0.020	0.07	0.010	0.018	2.0	2.0	0.7	<0.1	0.7
AUG													
19...	0.066	0.065	0.87	0.007	<0.020	0.19	0.020	0.040	1.7	1.9	2.0	<0.1	1.9

01411500 MAURICE RIVER AT NORMA, NJ—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Organic carbon, water, fltrd, mg/L (00681)	BOD, water, unfltrd 5 day, 20 degC mg/L (00310)	Chloro-phyll a fluorp-metric method, corrctd ug/L (32209)	Boron, water, fltrd, ug/L (01020)	Iron, water, fltrd, ug/L (01046)
NOV					
13...	10.7	E1.2	--	95	--
FEB					
10...	4.4	<1.0	--	25	--
MAY					
21...	9.4	<1.0	1.00	32	--
AUG					
19...	17.0	<1.0	1.90	30	1,080

Remark codes used in this table:
< -- Less than
E -- Estimated value

WATER-COLUMN BACTERIA ANALYSES

Samples were collected synoptically over a 30-day period during the summer.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Entero-cocci, m-E MF, water, col/ 100 mL (31649)	E coli, m-TEC MF, water, col/ 100 mL (31633)	Fecal coli-form, ECbroth water, MPN/ 100 mL (31615)
AUG				
06...	1057	490	<100	800
18...	1155	110	100	20
20...	1030	60	<100	110
27...	1040	90	<100	<20
SEP				
03...	1015	100	200	110

Remark codes used in this table:
< -- Less than

01411955 GRAVELLY RUN AT LAUREL LAKE, NJ

LOCATION.--Lat 39°20'14", long 75°03'03", Cumberland County, Hydrologic Unit 02040206, at culvert on Battle Lane, 0.3 mi upstream from mouth and Buckshutem Creek, 1.1 mi west of community of Laurel Lake, and 2.5 mi southeast of Millville Municipal Airport.

DRAINAGE AREA.--3.19 mi^2.

PERIOD OF RECORD.--Water years 1998 to current year.

REMARKS.--For definition of the type of quality-control data listed under SAMPLE TYPE, refer to "Water-Quality Control Data" in the Explanation of Water-Quality Records section of this report. Total nitrogen (00600) equals the sum of dissolved ammonia plus organic nitrogen (00623), dissolved nitrite plus nitrate nitrogen (00631), and total particulate nitrogen (49570).

COOPERATION.--Determination of dissolved ammonia, total ammonia, dissolved nitrite, dissolved orthophosphate, biochemical oxygen demand, total suspended solids, total ammonia + organic nitrogen in bed sediment, total phosphorus in bed sediment, fecal coliform, E. coli, and enterococcus bacteria was performed by the New Jersey Department of Health and Senior Services, Public Health and Environmental Laboratories, Environmental and Chemical Laboratory Services. Determination of chlorophyll a was performed by the New Jersey Department of Environmental Protection, Bureau of Freshwater and Biological Monitoring Laboratory.

COOPERATIVE NETWORK SITE DESCRIPTOR.--Background, New Jersey Department of Environmental Protection Watershed Management Area 17.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Instantaneous discharge, cfs (00061)	Turbidity, water, unfltrd field, NTU (61028)	UV absorbance, 254 nm, wat flt units /cm (50624)	UV absorbance, 280 nm, wat flt units /cm (61726)	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	Dissolved oxygen, percent of saturation (00301)	pH, water, unfltrd field, std units (00400)	Specif. conductance, wat unf uS/cm 25 degC (00095)	Temperamre, air, deg C (00020)	Temperamre, water, deg C (00010)	Hardness, water, unfltrd mg/L as CaCO3 (00900)
NOV													
05...	1520	0.71	0.6	0.150	0.119	765	9.3	79	4.2	36	8.5	8.5	6
FEB													
25...	1120	4.4	1.1	0.374	0.281	771	12.6	92	3.9	59	5.0	2.7	6
MAY													
22...	1240	1.4	0.7	0.170	0.134	764	8.6	80	4.5	28	14.0	12.5	4
AUG													
21...	1130	0.69	0.8	0.187	0.151	764	7.3	77	4.2	26	28.0	18.1	3

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Calcium water, fltrd, mg/L (00915)	Magnesium, water, fltrd, mg/L (00925)	Potassium, water, fltrd, mg/L (00935)	Sodium, water, fltrd, mg/L (00930)	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 (90410)	Chloride, water, fltrd, mg/L (00940)	Fluoride, water, fltrd, mg/L (00950)	Silica, water, fltrd, mg/L (00955)	Sulfate water, fltrd, mg/L (00945)	Residue on evap. at 180degC wat flt mg/L (70300)	Residue total at 105 deg. C, suspended, mg/L (00530)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia water, fltrd, mg/L as N (00608)
NOV													
05...	0.80	0.867	0.44	2.49	<2	4.16	<0.17	7.7	4.8	26	2	E.10	<0.030
FEB													
25...	0.82	0.881	0.53	2.96	--	4.52	<0.17	5.4	8.5	46	<1	0.23	<0.030
MAY													
22...	0.52	0.540	0.52	2.29	<2	4.39	<0.17	5.6	2.7	27	1	0.11	<0.030
AUG													
21...	0.56	0.479	0.42	2.21	<2	4.22	<0.17	7.5	1.5	32	7	0.17	0.036

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Ammonia water, unfltrd mg/L as N (00610)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Orthophosphate, water, fltrd, mg/L as P (00671)	Particulate nitrogen, stisp, water, mg/L (49570)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd mg/L (00665)	Total nitrogen, water, fltrd, mg/L (00602)	Total nitrogen, water, unfltrd mg/L (00600)	Total carbon, suspnd sedimnt total, mg/L (00694)	Inorganic carbon, suspnd sedimnt total, mg/L (00688)	Organic carbon, suspnd sedimnt total, mg/L (00689)	Organic carbon, water, fltrd, mg/L (00681)
NOV													
05...	<0.030	0.10	<0.003	<0.020	<0.02	<0.004	E.003	--	--	<0.1	<0.1	<0.1	4.1
FEB													
25...	<0.030	0.10	0.003	0.024	<0.02	E.002	0.005	0.33	--	0.3	<0.1	0.3	8.7
MAY													
22...	<0.030	0.09	<0.003	<0.020	<0.02	<0.004	E.003	0.20	--	0.2	<0.1	0.2	4.0
AUG													
21...	0.032	0.14	<0.003	<0.020	0.03	0.005	0.007	0.30	0.33	0.3	<0.1	0.3	3.4

01411955 GRAVELLY RUN AT LAUREL LAKE, NJ—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	BOD, water, unfltrd 5 day, 20 degC mg/L (00310)	Chlorophyll a fluorometric methbd, corrctd ug/L (32209)	Boron, water, fltrd, ug/L (01020)
NOV			
05...	E1.9	--	E9.0
FEB			
25...	E2.0	--	16
MAY			
22...	2.3	6.50	E9.9
AUG			
21...	E1.7	0.200	14

Remark codes used in this table:
< -- Less than
E -- Estimated value

WATER-COLUMN AND BED-MATERIAL TRACE-ELEMENT ANALYSES

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Sample type	pH bed sedimnt std units (70310)	Ammonia + org-N, bed sed total, mg/kg as N (00626)	Phosphorus, bed sedimnt total, mg/kg (00668)	Total carbon, bed sedimnt total, g/kg (00693)	Inorganic carbon, bed sedimnt total, g/kg (00686)	Arsenic water unfltrd ug/L (01002)	Barium, water, unfltrd recoverable, ug/L (01007)	Beryllium, water, unfltrd recoverable, ug/L (01012)	Boron, water, unfltrd recoverable, ug/L (01022)
AUG											
21...	1128	Sampler Blank	--	--	--	--	--	--	--	--	--
21...	1129	Field Blank	--	--	--	--	--	--	--	--	--
21...	1130	Environmental	--	--	--	--	--	<2	15.0	E.06	10
21...	1130	Bed material	3.98	240	770	2.3	<0.2	--	--	--	--

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Cadmium water, unfltrd ug/L (01027)	Chromium, water, unfltrd recoverable, ug/L (01034)	Copper, water, fltrd, ug/L (01040)	Copper, water, unflml recoverable, ug/L (01042)	Iron, water, unfltrd recoverable, ug/L (01045)	Lead, water, fltrd, ug/L (01049)	Lead, water, unfltrd recoverable, ugIL (01051)	Manganese, water, unfltrd recoverable, ugIL (01055)	Mercury water, fltrd, ug/L (71890)	Mercury water, unfltrd recoverable, ug/L (71900)	Nickel, water, fltrd, ug/L (01065)	Nickel, water, unfltrd recoverable, ag/L (01067)	Selenium, water, unfltrd ug/L (01147)
AUG													
21...	--	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	<0.2	--	--	<0.08	--	--	<0.02	--	<0.06	--	--
21...	<0.04	<0.8	--	E.3	170	--	0.87	3.3	--	<0.02	--	0.53	E.4
21...	--	--	--	--	--	--	--	--	--	--	--	--	--

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Silver, water, unfltrd recoverable, ug/L (01077)	Zinc, water, flurd, ug/L (01090)	Zinc, water, unfltrd recoverable, ug/L (01092)	Arsenic bed sedimnt total, ug/g (01003)	Cadmium bed sedimnt recoverable, ug/g (01028)	Chromium, bed sedimnt recoverable, ug/g (01029)	Cobalt bed sedimnt recoverable, ug/g (01038)	Copper, bed sedimnt recoverable, ug/g (01043)	Iron, bed sedimnt total, ug/g (01170)	Lead, bed sedimnt recoverable, ug/g (01052)	Manganese, bed sedimnt recoverable, ug/g (01053)	Mercury bed sedimnt recoverable, ug/g (71921)	Nickel, bed sedinmt recoverable, ug/g (01068)
AUG													
21...	--	<1	--	--	--	--	--	--	--	--	--	--	--
21...	--	2	--	--	--	--	--	--	--	--	--	--	--
21...	<0.16	--	5	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	<i	0.010	2.4	0.320	<2	1,600	5.1	5.8	<0.01	1.1

01411955 GRAVELLY RUN AT LAUREL LAKE, NJ—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Selenium, bed sedimnt total, ug/g (01148)	Zinc, bed sedimnt recpver -able, ug/g (01093)	1,2-Dimethylnaphthalene, bed sed <2 mm, ug/kg (49403)	1,6-Dimethylnaphthalene, bed sed <2 mm, ug/kg (49404)	1Methyl-9H-fluorene, bed sed <2 mm, ug/kg (49398)	1-Methylphenanthrene, bed sed <2 mm, ug/kg (49410)	1-Methylpyrene, bed sed <2 mm, wsv nat ug/kg (49388)	236Trimethylnaphthalene, bed sed <2 mm, ug/kg (49405)	2,6-Dimethylnaphthalene, bed sed <2 mm, ug/kg (49406)	2-Ethylnaphthalene bed sed <2 mm wsv nat ug/kg (49948)	2-Methylanthracene, bed sed <2 mm, ug/kg (49435)	Cyclopentaphenanthrene, bed sed <2 mm, ug/kg (49411)	9H-Flourene, bed sed <2 mm, wsv nat ug/kg (49399)
AUG													
21...	--	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--	--	--
21...	<1	4.5	<50	<50	<50	<50	<50	<50	E13	<50	<50	<50	<50

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Acenaphthene, bed sed <2 mm, wsv nat ug/kg (49429)	Acenaphthylene, bed sed <2 mm, wsv nat ug/kg (49428)	Anthracene, bed sed <2 mm, wsv nat field, ug/kg (49434)	Benzo-[a]-anthracene, bed sed <2 mm, ug/kg (49436)	Benzo-[a]-pyrene, bed sed <2 mm, wsv nat ug/kg (49389)	Benzo-[b]-fluoranthene bed sed <2 mm ug/kg (49458)	Benzo-[ghi]-perylene, bed sed <2 mm, ug/kg (49408)	Benzo-[k]-fluoranthene bed sed <2 mm ug/kg (49397)	Chrysene, bed sed <2 mm, wsv nat field, ug/kg (49450)	Dibenzo-[a,h]-anthracene, bed sed <2 mm, ug/kg (49461)	Fluoranthene bed sed <2 mm wsv nat field, ug/kg (49466)	Indeno-[1,2,-3-cd]-pyrene, bed sed <2 mm ug/kg (49390)	Isophorone bed sed <2 mm, wsv nat field, ug/kg (49400)
AUG													
27...	--	--	--	--	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--	--	--
21...	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	E11	<50	<50

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Naphthalene, bed sed <2 mm wsv nat ug/kg (49402)	PCBs, bed sedimnt ug/kg (39519)	P-Cresol, bed sed <2 mm, wsv nat field, ug/kg (49451)	Phenanthrene, bed sed <2 mm, wsv nat field, ug/kg (49409)	Phenanthridine, bed sed <2 mm, wsv nat ug/kg (49393)	Pyrene, bed sed <2 mm, wsv nat field, ug/kg (49387)	Bed sediment, dry svd sve dia percent <.063mm (80164)	Bed sediment falldia dst wat percent <.002mm (80294)	Bed sediment, falldia dst wat percent <.004mm (80157)	Bed sediment falldia dst wat percent <.008mm (80293)	Bed sediment, falldia dst wat percent <.016mm (80282)	Bed sediment, falldia dst wat percent <.031mm (80283)
AUG												
21...	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--	--
21...	<50	<5	<50	<50	<50	E10	9.3	2.8	3.5	4.6	6.3	8.1

Remark codes used in this table:
< -- Less than
E -- Estimated value

WATER-COLUMN VOLATILE ORGANIC COMPOUND ANALYSES

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	1,1,1-Trichloroethane, water, unfltrd ug/L (34506)	CFC-113 water unfltrd ug/L (77652)	1,1-Dichloroethane, water unfltrd ug/L (34496)	1,1-Dichloroethene, water, unfltrd ug/L (34501)	1,2-Dichlorobenzene water unfltrd ug/L (34536)	1,2-Dichloroethane, water, unfltrd ug/L (32103)	1,2-Dichloropropane water unfltrd ug/L (34541)	1,3-Dichlorobenzene water unfltrd ug/L (34566)	1,4-Dichlorobenzene water unfltrd ug/L (34571)	Benzene water unfltrd ug/L (34030)	Bromodichloromethane water unfltrd ug/L (32101)	Chlorobenzene water unfltrd ug/L (34301)
FEB													
25...	1120	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	cis-1,2-Dichloroethene, water, unfltrd ug/L (77093)	Dibromochloromethane water unfltrd ug/L (32105)	Dichlorodifluoromethane wat unf ug/L (34668)	Dichloromethane water unfltrd ug/L (34423)	Diethyl ether, water, unfltrd ug/L (81576)	Diisopropyl ether, water, unfltrd ug/L (81577)	Ethylbenzene water unfltrd ug/L (34371)	Methyl tert-pentyl ether, water, unfltrd ug/L (50005)	meta- + para-Xylene, water, unfltrd ug/L (85795)	o-Xylene, water, unfltrd ug/L (77135)	Styrene water unfltrd ug/L (77128)	t-Butyl ethyl ether, water, unfltrd ug/L (50004)	Methyl t-butyl ether, water, unfltrd ug/L (78032)
FEB													
25...	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1	<0.2

01411955 GRAVELLY RUN AT LAUREL LAKE, NJ—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Tetra-chloro-ethene, water, unfltrd ug/L (34475)	Tetra-chloro-methane water unfltrd ug/L (32102)	Toluene water unfltrd ug/L (34010)	trans-1,2-Di-chloro-ethene, water, unfltrd ug/L (34546)	Tri-bromo-methane water unfltrd ug/L (32104)	Tri-chloro-ethene, water, unfltrd ug/L (39180)	Tri-chloro-fluoro-methane water unfltrd ug/L (34488)	Tri-chloro-methane water unfltrd ug/L (32106)	Vinyl chlor-ide, water, unfltrd ug/L (39175)
FEB									
25...	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.2	0.2	<0.2

Remark codes used in this table:
< -- Less than

WATER-COLUMN PESTICIDE ANALYSES

The following were determined using laboratory schedule 2001 (listed in its entirety, with laboratory reporting levels, in "Laboratory Measurements" in the Explanation of Water-Quality Records section of this report). Only pesticides detected in one or more surface-water samples are listed in the following table.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	2,6-Di-ethyl-aniline water fltrd 0.7u GF ug/L (82660)	CIAT, water, fltrd, ug/L (04040)	Aceto-chlor, water, fltrd, ug/L (49260)	Ala-chlor, water, fltrd, ug/L (46342)	alpha-HCH, water, fltrd, ug/L (34253)	Atra-ziine, water, fltrd, ug/L (39632)	Azin-phos-methyl, water, flud 0.7u GF ug/L (82686)	Ben-flur-alin, water, fltrd 0.7u GF ug/L (82673)	Butyl-ate, water, fltrd, ug/L (04028)	Car-baryl, water, fltrd 0.7u GF ug/L (82680)	Carbo-furan, water, fltrd 0.7u GF ug/L (82674)	cis-Per-methrin water fltrd 0.7u GF ug/L (82687)
MAY													
22...	1240	<0.006	<0.006	<0.006	<0.004	<0.005	<0.007	<0.050	<0.010	<0.002	<0.041	<0.020	<0.006

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	DCPA, water fltrd 0.7u GF ug/L (82682)	Desulf-inyl fipro-nil, water, fltrd, ug/L (62170)	Diazi-non, water, fltrd, ug/L (39572)	Diel-drin, water, fltrd, ug/L (39381)	EPTC, water, fltrd 0.7u GF ug/L (82668)	Desulf-inyl-fipro-nil amide, wat flt ug/L (62169)	Fipro-nil sulfide water, fltrd, ug/L (62167)	Fipro-nil sulfone water, fltrd, ug/L (62168)	Fipro-nil, water, fltrd, ug/L (62166)	Mala-thion, water, fltrd, ug/L (39532)	Metola-chlor, water, fltrd, ug/L (39415)	Metri-buzin, water, fltrd, ug/L (82630)	Naprop-amide, water, fltrd 0.7u GF ug/L (82684)
MAY													
22...	<0.003	<0.004	<0.005	<0.005	<0.002	<0.009	<0.005	<0.005	<0.007	<0.027	<0.013	<0.006	<0.007

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Pendi-meth-alin, water, fltrd 0.7u GF ug/L (82683)	Prome-ton, water, fltrd, ug/L (04037)	Sima-zine, water, fltrd, ug/L (04035)	Tebu-thiuron water fltrd 0.7u GF ug/L (82670)	Terba-cil, water, fltrd 0.7u GF ug/L (82665)	Tri-flur-alin, water, fltrd 0.7u GF ug/L (82661)
MAY						
22...	<0.022	<0.01	<0.005	<0.02	<0.034	<0.009

Remark codes used in this table:
< -- Less than

WATER-COLUMN BACTERIA ANALYSES

Samples were collected synoptically over a 30-day period during the summer.

01411955 GRAVELLY RUN AT LAUREL LAKE, NJ—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Entero-cocci, m-E MF, water, col/ 100 mL (31649)	E coli, m-TEC MF, water, col/ 100 mL (31633)	Fecal coli-form, ECbroth water, MPN/ 100 mL (31615)
AUG				
06...	0940	220	<100	110
19...	1120	110	100	130
20...	0935	50	<100	40
27...	0935	110	<100	20
SEP				
03...	0914	230	<100	170

Remark codes used in this table:
< -- Less than

01412005 MENANTICO CREEK AT ROUTE 49, AT MILLVILLE, NJ

LOCATION.--Lat 39°23'11", long 74°59'21", Cumberland County, Hydrologic Unit 02040206, at bridge on State Route 49, 1.1 mi upstream of Menantico Ponds, 2.8 mi east of Millville, and 4.5 mi west of Cumberland.

DR/UNAGE AREA.-- 26.32 mi^2.

PERIOD OF RECORD.--December 2002 to September 2003.

REMARKS.--Total nitrogen (00600) equals the sum of dissolved ammonia plus organic nitrogen (00623), dissolved nitrite plus nitrate nitrogen (00631), and total particulate nitrogen (49570).

COOPERATION.--Field data and samples for laboratory analyses were provided by the New Jersey Department of Environmental Protection. Determination of dissolved ammonia, total ammonia, dissolved nitrite, dissolved orthophosphate, biochemical oxygen demand, total suspended solids, total ammonia + organic nitrogen in bed sediment, total phosphorus in bed sediment, fecal coliform, E. coli, and enterococcus bacteria was performed by the New Jersey Department of Health and Senior Services, Public Health and Environmental Laboratories, Environmental and Chemical Laboratoty Services. Determination of chlorophyll a was performed by the New Jersey Department of Environmental Protection, Bureau of Freshwater and Biological Monitoring Laboratory.

COOPERATIVE NETWORK SITE DESCRIPTOR.--Statewide Status, New Jersey Department of Environmental Protection Watershed Management Area 17.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Turbidity, water, unfltrd field, NTU (61028)	UV absorbance, 254 nm, wat flt units /cm (50624)	UV absorbance, 280 nm, wat flt units /cm (61726)	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	Dissolved oxygen, percent of saturation (00301)	pH, water, unfltrd field, std units (00400)	Specif. conductance, wat unf uS/cm 25 degC (00095)	Temperature, air, deg C (00020)	Temperature, water, deg C (00010)	Hardness, water, unfltrd mg/L as CaCO3 (00900)	Calcium water, fltrd, mg/L (00915)
DEC													
04...	1000	2.6	0.121	0.092	772	11.6	85	7.0	143	4.7	3.1	46	10.4
MAR													
06...	1030	4.4	0.295	0.225	752	10.3	84	6.5	161	8.5	6.1	46	10.2
MAY													
20...	1000	3.4	0.155	0.119	768	7.2	66	6.5	149	22.4	11.9	42	9.50
AUG													
26...	0900	1.8	0.165	0.129	760	7.2	76	6.8	147	23.3	18.1	50	11.1

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Magnesium, water, fltrd, mg/L (00925)	Potassium, water, fltrd, mg/L (00935)	Sodium, water, fltrd, mg/L (00930)	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 (90410)	Chloride, water, fltrd, mg/L (00940)	Fluoride, water, fltrd, mg/L (00950)	Silica, water, fltrd, mg/L (00955)	Sulfate water, fltrd, mg/L (00945)	Residue water, fltrd, sum of constituents mg/L (70301)	Residue on evap. at 180degC wat flt mg/L (70300)	Residue total at 105 deg. C, suspended, mg/L (00530)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia water, fltrd, mg/L as N (00608)
DEC													
04...	4.93	4.25	5.39	5	12.6	<0.17	10.5	20.0	94	101	9	0.25	0.035
MAR													
06...	4.87	4.77	8.40	4	18.5	<0.17	6.6	19.1	99	113	4	0.42	<0.030
MAY													
20...	4.34	4.33	5.48	6	13.2	<0.17	9.0	15.0	88	108	4	0.32	<0.030
AUG													
26...	5.42	5.07	6.12	11	14.5	<0.17	9.1	14.5	95	93	11	0.33	<0.020

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Ammonia water, unfltrd mg/L as N (00610)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Orthophosphate, water, fltrd, mg/L as P (00671)	Particulate nitrogen, susp, water, mg/L (49570)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd mg/L (00665)	Total nitrogen, water, fltrd, mg/L (00602)	Total nitrogen, water, unflud mg/L (00600)	Total carbon, suspnd sedimnt total, mg/L (00694)	Inorganic carbon, suspnd sedimnt total, mg/L (00688)	Organic carbon, suspnd sedimnt total, mg/L (00689)	Organic carbon, water, fltrd, mg/L (00681)
DEC													
04...	0.062	5.24	0.005	0.032	0.03	0.010	0.037	5.5	5.5	0.4	<0.1	0.4	3.4
MAR													
06...	<0.030	5.38	0.004	0.025	0.13	0.021	0.055	5.8	5.9	0.7	<0.1	0.7	6.6
MAY													
20...	<0.030	5.22	0.006	<0.020	0.12	0.015	0.049	5.5	5.7	0.7	<0.1	0.7	3.6
AUG													
26...	<0.020	5.17	0.006	<0.020	0.05	0.017	0.036	5.5	5.6	0.2	<0.1	0.1	3.8

01412005 MENANTICO CREEK AT ROUTE 49, AT MILLVILLE, NJ—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	BOD, water, unfltrd 5 day, 20 degC mg/L (00310)	Chlorophyll a fluorometric method, corrctd ug/L (32209)	Boron, water, fltrd, ug/L (01020)
DEC			
04...	<1.0	--	19
MAR			
06...	<1.0	--	23
MAY			
20...	E1.9	1.30	15
AUG			
26...	E1.3	0.900	24

Remark codes used ih this table:
< -- Less than
E -- Estimated value

WATER-COLUMN AND BED-MATERIAL TRACE-ELEMENT ANALYSES

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	pH bed sedimnt std units (70310)	Ammonia + org-N, bed sed total, mg/kg as N (00626)	Phosphorus, bed sedimnt total, mg/kg (00668)	Total carbon, bed sedimnt total, g/kg (00693)	Inorganic carbon, bed sedimnt total, g/kg (00686)	Arsenic water unfltrd ug/L (01002)	Barium, water, unfltrd recoverable, ug/L (01007)	Beryllium, water, unfltrd recoverable, ug/L (01012)	Boron, water, unfltrd recoverable, ug/L (01022)	Cadmium water, unfltrd ug/L (01027)	Chromium, water, unfltrd recoverable, ug/L (01034)	Copper, water, unfltrd recoverable, ug/L (01042)
AUG													
26...	0900	--	--	--	--	--	<2	89.0	E.05	19	0.05	<0.8	0.6
26...	0900	6.34	20	900	1.0	<0.2	--	--	--	--	--	--	--

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Iron, water, unfltrd recoverable, ug/L (01045)	Lead, water, unfltrd recoverable, ug/L (01051)	Manganese, water, unfltrd recoverable, ug/L (01055)	Mercury water, unflod recoverable, ug/L (71900)	Nickel, water, unfltrd recoverable, ug/L (01067)	Selenium, water, unfltrd ug/L (01147)	Silver, water, unfltrd recoverable, ug/L (01077)	Zinc, water, unfltrd recoverable, ug/L (01092)	Arsenic bed sedimnt total, ug/g (01003)	Cadmiuin bed sedimnt recoverable, ug/g (01028)	Chromium, bed sedimnt recoverable, ug/g (01029)	Cobalt bed sedimnt recoverable, ug/g (01038)	Copper, bed sedimnt recoverable, ug/g (01043)
AUG													
26...	300	0.28	14.1	E.01	2.16	0.5	<0.16	6	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	<1	0.020	0.5	0.070	<2

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Iron, bed sedimnt total, ug/g (01170)	Lead, bed sedimnt recoverable, ug/g (01052)	Manganese, bed sedimnt recoverable, ug/g (01053)	Mercuy bed sedimnt recoverable, ug/g (71921)	Nickel, bed sedimnt recoverable, ug/g (01068)	Selenium, bed sedimnt total, ug/g (01148)	Zinc, bed sedimnt recoverable, ug/g (01093)	1,2-Dimethylnaphthalene, bed sed <2 mm, ug/kg (49403)	1,6-Dimethylnaphthalene, bed sed <2 mm, ug/kg (49404)	1Methyl -9H-fluorene, bed sed <2 inm, ug/kg (49398)	1-Methylphenanthrene, bed sed <2 mm, ug/kg (49410)	1-Methylpyrene, bed sed <2 mm, wsv nat ug/kg (49388)	236Trimethylnaphthalene, bed sed <2 mm, ug/kg (49405)
AUG													
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
26...	150	1.5	<0.3	<0.01	0.157	<1	<3.1	<50	<50	<50	<50	<50	<50

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	2,6-Dimethylnaphthalene, bed sed <2 mm, ug/kg (49406)	2-Ethyl naphthalene bed sed <2 mm wsv nat ug/kg (49948)	2-Methylanthracene, bed sed <2 mm, ug/kg (49435)	Cyclopentaphenanthrene, bed sed <2 mm, ug/kg (49411)	9H-Flourene, bed sed <2 mm, wsv nat ug/kg (49399)	Acenaphthene, bed sed <2 mm, wsv nat ug/kg (49429)	Acenaphthylene, bed sed <2 mm, wsv nat ug/kg (49428)	Anthracene, bed sed <2 mm, wsv nat field, ug/kg (49434)	Benzo[a]anthracene, bed sed <2 mm, ug/kg (49436)	Benzo[a]pyrene, bed sed <2 mm, wsv nat ug/kg (49389)	Benzo[b]fluoranthene bed sed <2 mm ug/kg (49458)	Benzo[ghi]perylene, bed sed <2 mm, ug/kg (49408)	Benzo[k]fluoranthene bed sed <2 mm ug/kg (49397)
AUG													
26...	--	--	--	--	--	--	--	--	--	--	--	--	--
26...	E13	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

01412005 MENANTICO CREEK AT ROUTE 49, AT MILLVILLE, NJ—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Chrysene, bed sed <2 mm, wsv nat field, ug/kg (49450)	Dibenzo-[a,h]-anthracene, bed sed <2 mm, ug/kg (49461)	Fluoranthene bed sed <2 mm wsv nat field, ug/kg (49466)	Indeno-[1,2,-3-cd]-pyrene, bed sed <2 mm ug/kg (49390)	Isophorone bed sed <2 mm, wsv nat field, ug/kg (49400)	Naphthalene, bed sed <2 mm wsv nat ug/kg (49402)	PCBs, bed sedimnt ug/kg (39519)	P-Cresol, bed sed <2 mm, wsv nat field, ug/kg (49451)	Phenanthrene, bed sed <2 mm, wsv nat field, ug/kg (49409)	Phenanthridine, bed sed <2 mm, wsv nat ug/kg (49393)	Pyrene, bed sed <2 mm, wsv nat field, ug/kg (49387)	Bed sediment, dry svd sve dia percent <.063mm (80164)
AUG												
26...	--	--	--	--	--	--	--	--	--	--	--	--
26...	<50	<50	<50	<50	<50	<50	<5	<50	<50	<50	E11	<1.0

Remark codes used in this table:
< -- Less than
E -- Estimated value

WATER-COLUMN VOLATILE ORGANIC COMPOUND ANALYSES

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	1,1,1-Trichloroethane, water, unfltrd ug/L (34506)	CFC-113 water unfltrd ug/L (77652)	1,1-Dichloroethane, water unfltrd ug/L (34496)	1,1-Dichloroethene, water, unfltrd ug/L (34501)	1,2-Dichlorobenzene water unfltrd ug/L (34536)	1,2-Dichloroethane, water, unfltrd ug/L (32103)	1,2-Dichloropropane water unfltrd ug/L (34541)	1,3-Dichlorobenzene water unfltrd ug/L (34566)	1,4-Dichlorobenzene water unfltrd ug/L (34571)	Benzene water unfltrd ug/L (34030)	Bromodichloromethane water unfltrd ug/L (32101)	Chlorobenzene water unfltrd ug/L (34301)
MAR													
06...	1030	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	cis-1,2-Dichloroethene, water, unfltrd ug/L (77093)	Dibromochloromethane water unfltrd ug/L (32105)	Dichlorodifluoromethane wat unf ug/L (34668)	Dichloromethane water unfltrd ug/L (34423)	Diethyl ether, water, unfltrd ug/L (81576)	Diisopropyl ether, water, unfltrd ug/L (81577)	Ethylbenzene water unfltrd ug/L (34371)	Methyl tert-pentyl ether, water, unfltrd ug/L (50005)	meta- + para-Xylene, water, unfltrd ug/L (85795)	o-Xylene, water, unfltrd ug/L (77135)	Styrene water unfltrd ug/L (77128)	t-Butyl ethyl ether, water, unfltrd ug/L (50004)	Methyl t-butyl ether, water, unfltrd ug/L (78032)
MAR													
06...	<0.1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	<0.2	<0.2	<0.1	<0.1	<0.1	<0.2

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Tetrachloroethene, water, unfltrd ug/L (34475)	Tetrachloromethane water unfltrd ug/L (32102)	Toluene water unfltrd ug/L (34010)	trans-1,2-Dichloroethene, water, unfltrd ug/L (34546)	Tribromomethane water unfltrd ug/L (32104)	Trichloroethene, water, unfltrd ug/L (39180)	Trichlorofluoromethane water unfltrd ug/L (34488)	Trichloromethane water unfltrd ug/L (32106)	Vinyl chloride, water, unfltrd ug/L (39175)
MAR									
06...	<0.1	<0.2	<0.1	<0.1	<0.2	<0.1	<0.2	<0.1	<0.2

Remark codes used in this table:
< -- Less than

WATER-COLUMN PESTICIDE ANALYSES

The following were determined using laboratory schedule 2001 (listed in its entirety, with laboratory reporting levels, in "Laboratory Measurements" in the Explanation of Water-Quality Records section of this report). Only pesticides detected by the analyses in one or more surface-water samples are listed in the following table.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	2,6-Diethylaniline water fltrd 0.7u GF ug/L (82660)	CIAT, water, fltrd, ug/L (04040)	Acetochlor, water, fltrd, ug/L (49260)	Alachlor, water, fltrd, ug/L (46342)	alpha-HCH, water, fltrd, ug/L (34253)	Atrazine, water, fltrd, ug/L (39632)	Azinphosmethyl, water, fltrd 0.7u GF ug/L (82686)	Benfluralin, water, fltrd 0.7u GF ug/L (82673)	Butylate, water, fltrd, ug/L (04028)	Carbaryl, water, fltrd 0.7u GF ug/L (82680)	Carbofuran, water, fltrd 0.7u GF ug/L (82674)	cis-Permethrin water fltrd 0.7u GF ug/L (82687)
MAY													
20...	1000	<0.006	<0.006	<0.006	<0.004	<0.005	<0.007	<0.050	<0.010	<0.002	E.029	<0.020	<0.006

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	DCPA, water fltrd 0.7u GF ug/L (82682)	Desulfinyl fipronil, water, fltrd, ug/L (62170)	Diazinon, water, fltrd, ng/L (39572)	Dieldrin, water, fltrd, ug/L (39381)	EPTC, water, fltrd 0.7u GF ug/L (82668)	Desulfinyl-fipronil amide, wat flt ug/L (62169)	Fipronil sulfide water, fltrd, ug/L (62167)	Fipronil sulfone water, fltrd, ug/L (62168)	Fipronil, water, fltrd, ug/L (62166)	Malathion, water, fltrd, ug/L (39532)	Metolachlor, water, fltrd, ug/L (39415)	Metribuzin, water, fltrd, ug/L (82630)	Napropamide, water, fltrd 0.7u GF ug/L (82684)
MAY													
20...	<0.003	<0.004	<0.005	<0.005	<0.002	<0.009	<0.005	<0.005	<0.007	<0.027	0.022	<0.006	<0.007

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Pendimethalin, water, fltrd 0.7u GF ug/L (82683)	Prometon, water, fltrd, ug/L (04037)	Simazine, water, fltrd, ug/L (04035)	Tebuthiuron water fltrd 0.7u GF ug/L (82670)	Terbacil, water, fltrd 0.7u GF ug/L (82665)	Trifluralin, water, fltrd 0.7u GF ug/L (82661)
MAY						
20...	<0.022	<0.01	<0.005	<0.02	<0.034	<0.009

Remark codes used in this table:
< -- Less than
E -- Estimated value

WATER-COLUMN BACTERIA ANALYSES

Samples were collected synoptically over a 30-day period during the summer.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Enterococci, m-E MF, water, col/100 mL (31649)	E coli, m-TEC MF, water, col/100 mL (31633)	Fecal coliform, ECbroth water, MPN/100 mL (31615)
AUG				
06...	1040	590	100	500
19...	1150	210	100	300
20...	1015	240	<100	20
27...	1020	140	100	20
SEP				
03...	0955	410	200	1,100

Remark codes used in this table:
< -- Less than

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOW-FLOW CHARACTERISTICS AND FLOW DURATION OF NEW JERSEY STREAMS

By Brian D. Gillespie and Robert D. Schopp

Open-File Report 81-1110

Prepared in cooperation with the
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION,
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UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information, write to:

U.S. Geological Survey
Room 430, Federal Building
402 East State Street
Trenton, New Jersey 08608

DELAWARE BAT BASINS

MAP NO.	STATION NUMBER	STATION NAME	QUADRANGLE MAP 7.5 MINUTE SERIES	PAGE
		DELAWARE BAT BASINS		
		FISHING CREEK BASIN		
1	01411400	FISHING CREEK AT RIO GRANDE	RIO GRANDE	116
		GREEN CREEK BASIN		
2	01411404	GREEN CREEK AT GREEN CREEK	RIO GRANDE	116
		DIAS CREEK BASIN		
3	01411408	DIAS CREEK NEAR CAPE MAY COURT HOUSE	STONE HARBOR	116
		BIDWELL DITCH BASIN		
		BIDWELL DITCH:		
4	01411410	BIDWELL DITCH TRIBUTARY NEAR CAPE MAY COURT HOUSE	STONE HARBOR	116
5	01411412	BIDWELL DITCH TRIBUTARY NO. 2 NEAR CAPE MAY COURT HOUSE	STONE HARBOR	117
		GOSHEN CREEK BASIN		
6	01411418	GOSHEN CREEK AT GOSHEN	WOODBINE	117
		DENNIS CREEK BASIN		
		DENNIS CREEK:		
7	01411430	SLUICE CREEK AT CLERMONT	WOODBINE	117
		MAURICE RIVER BASIN		
8	01411500	MAURICE RIVER AT NORMA	MILLVILLE	117
9	01411800	MAURICE RIVER NEAR MILLVILLE	MILLVILLE	118
10	01411850	MILL CREEK NEAR MILLVILLE	MILLVILLE	118
11	01412000	MENANTICO CREEK NEAR MILLVILLE	FIVE POINTS	118
12	01412100	MANUMUSKIN RIVER NEAR MANUMUSKIN	PORT ELIZABETH	118
13	01412500	WEST BRANCH COHANSEY RIVER AT SEELEY	SMILOH	119
		STOW CREEK BASIN		
14	01413050	STOW CREEK AT JERICHO	SHILOH	119
15	01413060	CANTON DRAIN NEAR CANTON	SALEM	119

01411412 BIDWELL DITCH TRIBUTARY NO. 2 NEAR CAPE MAY COURT HOUSE, NJ

LOCATION -- LAT 39 06 25, LONG 074 50 12, CAPE MAY COUNTY, AT CULVERT PIPE ON GOSHEN ROAD, 1.8 MI (2.9 KM) NORTHWEST OF CAPE MAY COURT HOUSE, 2.3 MI (3.7 KM) SOUTHEAST OF GOSHEN, AND 3.6 MI (5.8 KM) UPSTREAM FROM MOUTH.
DRAINAGE AREA -- 0.19 SQ-MI (0.49 SQ-KM)
TRIBUTARY TO -- BIDWELL DITCH
STATION TYPE -- LOW-FLOW PARTIAL-RECORD STATION
REMARKS -- LOW-FLOW FREQUENCY ESTIMATES BASED ON CORRELATIONS WITH GAGING STATIONS 01409500, 01410000, 01411000 AND 01411500. CORRELATIONS RATED GOOD.

LOW-FLOW FREQUENCY -- PERIOD 1967-72

PERIOD OF CONSECUTIVE DAYS	AVERAGE ANNUAL MINIMUM DISCHARGE IN CU FT/S (CU M/S) FOR INDICATED RECURRENCE INTERVALS	
	2 YEARS	10 YEARS
7	0.0 (0.00)	0.0 (0.00)

01411418 GOSHEN CREEK AT GOSHEN, NJ

LOCATION -- LAT 39 07 39, LONG 074 50 45, CAPE MAY COUNTY, AT CULVERT PIPE ON GOSHEN ROAD, 1.0 MI (1.6 KM) SOUTHEAST OF GOSHEN, 3.3 MI (5.3 KM) NORTHWEST OF CAPE MAY COURT HOUSE, AND 3.3 MI (5.3 KM) UPSTREAM FROM MOUTH.
DRAINAGE AREA -- 0.33 SQ-MI (0.85 SQ-KM)
TRIBUTARY TO -- DELAWARE BAY
STATION TYPE -- LOW-FLOW PARTIAL-RECORD STATION
REMARKS -- LOW-FLOW FREQUENCY ESTIMATES BASED ON CORRELATIONS WITH GAGING STATIONS 01409500, 01411000 AND 01411500. CORRELATIONS RATED GOOD.

LOW-FLOW FREQUENCY -- PERIOD 1967-72

PERIOD OF CONSECUTIVE DAYS	AVERAGE ANNUAL MINIMUM DISCHARGE IN CU FT/S (CU M/S) FOR INDICATED RECURRENCE INTERVALS	
	2 YEARS	10 YEARS
7	0.0 (0.00)	0.0 (0.00)

01411430 SLUICE CREEK AT CLERMONT, NJ

LOCATION -- LAT 39 09 26, LONG 074 46 18, CAPE MAY COUNTY, AT CULVERT PIPE ON STATE ROUTE 83, 0.6 MI (1.0 KM) NORTHWEST OF CLERMONT, 3.7 MI (6.0 KM) SOUTHEAST OF DENNISVILLE, AND 5.6 MI (9.0 KM) UPSTREAM FROM MOUTH.
DRAINAGE AREA -- 0.67 SQ-MI (1.74 SQ-KM)
TRIBUTARY TO -- DENNIS CREEK
STATION TYPE -- LOW-FLOW PARTIAL-RECORD STATION
REMARKS -- LOW-FLOW FREQUENCY ESTIMATES BASED ON CORRELATIONS WITH GAGING STATIONS 01409500, 01411000 AND 01411500. CORRELATIONS RATED GOOD.

LOW-FLOW FREQUENCY -- PERIOD 1967-72

PERIOD OF CONSECUTIVE DAYS	AVERAGE ANNUAL MINIMUM DISCHARGE IN CU FT/S (CU M/S) FOR INDICATED RECURRENCE INTERVALS	
	2 YEARS	10 YEARS
7	0.0 (0.00)	0.0 (0.00)

01411500 MAURICE RIVER AT NORMA, NJ

LOCATION -- LAT 39 29 42, LONG 075 04 38, SALEM COUNTY, ON RIGHT BANK JUST UPSTREAM FROM ALMOND ROAD BRIDGE IN NORMA, AND 0.8 MI (1.3 KM) DOWNSTREAM FROM BLACKWATER BRANCH.
DRAINAGE AREA -- 113 SQ-MI (293 SQ-KM)
TRIBUTARY TO -- DELAWARE BAY
STATION TYPE -- CONTINUOUS RECORD GAGING STATION
AVERAGE DISCHARGE -- 168 CU FT/S (4.76 CU M/S)
DAILY DISCHARGE EXTREMES -- MAXIMUM 5260 CU FT/S (149 CU M/S)
MINIMUM 23 CU FT/S (0.65 CU M/S)
REMARKS -- OCCASIONAL REGULATION; PROBABLY NOT SIGNIFICANT.

DURATION TABLE OF DAILY FLOW -- PERIOD 1933-75
DISCHARGE WHICH WAS EXCEEDED FOR INDICATED PERCENT OF TIME

	2.0%	5.0%	10.0%	20.0%	30.0%	40.0%	50.0%	60.0%	70.0%	80.0%	90.0%	95.0%	98.0%	99.0%	99.5%
CU FT/S	430	345	287	233	198	173	150	129	108	90.0	68.8	55.3	44.1	37.7	33.5
CU M/S	12.2	9.77	8.13	6.60	5.61	4.90	4.25	3.65	3.06	2.55	1.95	1.57	1.25	1.07	0.949

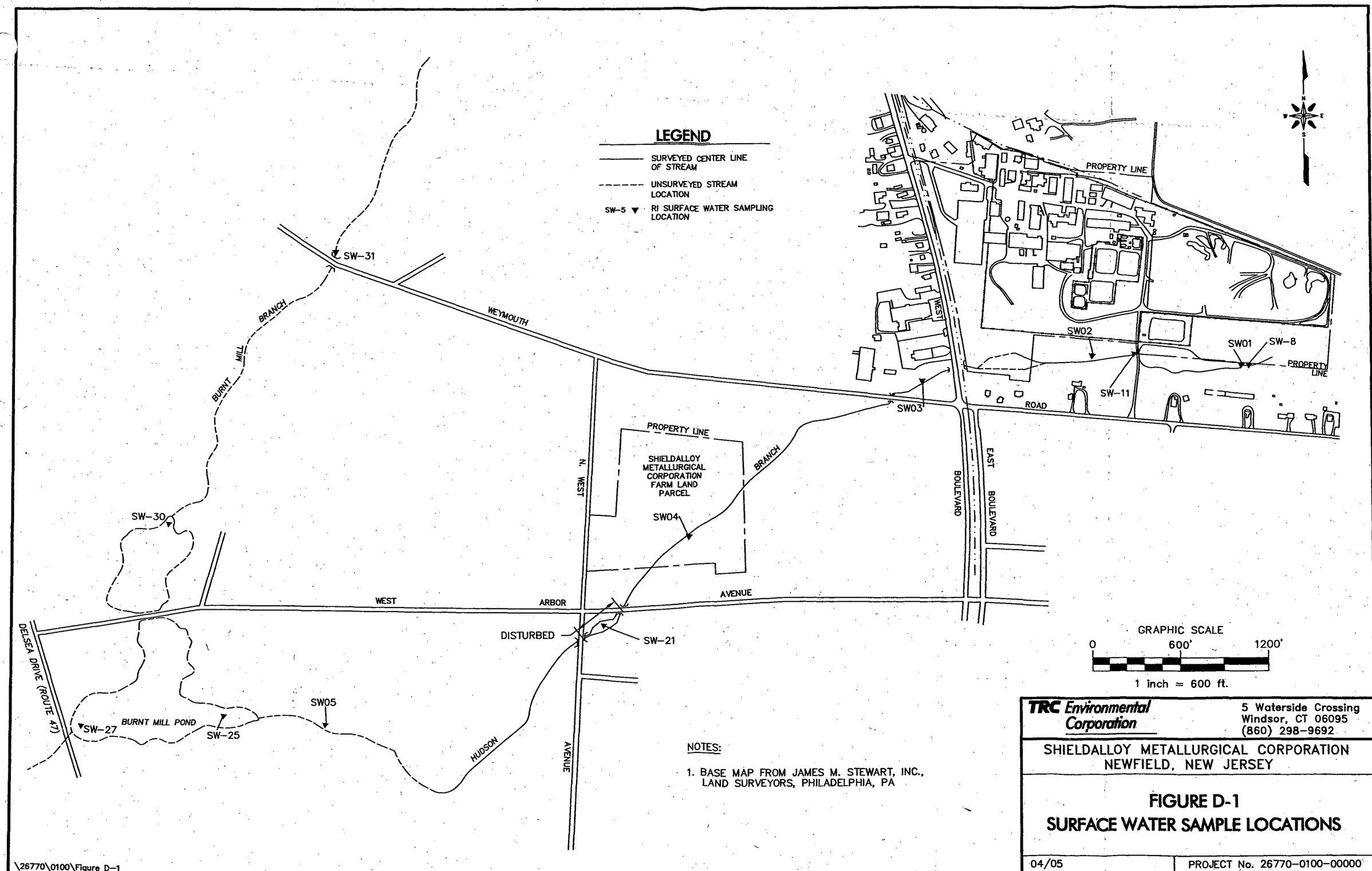
LOW-FLOW FREQUENCY -- PERIOD 1934-75

PERIOD OF CONSECUTIVE DAYS	AVERAGE ANNUAL MINIMUM DISCHARGE IN CU FT/S (CU M/S) FOR INDICATED RECURRENCE INTERVALS			
	2 YEARS	5 YEARS	10 YEARS	20 YEARS
3	53 (1.5)	39 (1.1)	33 (0.93)	28 (0.79)
7	59 (1.7)	44 (1.2)	37 (1.0)	32 (0.91)
30	70 (2.0)	51 (1.4)	43 (1.2)	38 (1.1)
90	90 (2.5)	66 (1.9)	55 (1.6)	47 (1.3)

APPENDIX D - SURFACE WATER SAMPLING RESULTS

APPENDIX D - SURFACE WATER SAMPLING RESULTS

Figure D-1 - Surface Water Sample Locations
Summary of Field Measurements - 1990 RI
Chemical Analysis Results - 1990 RI (Table 31a-31d)
Chemical Analysis Results - 1995 Supplemental Sampling (Table 1-9)



NOTES:

1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA

TRC Environmental Corporation
5 Waterside Crossing
Windsor, CT 06095
(860) 298-9692

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE D-1
SURFACE WATER SAMPLE LOCATIONS

04/05 | PROJECT No. 26770-0100-00000

\26770\0100\Figure D-1

TABLE 7

SHIELDALLOY METALLURGY CORPORATION
SURFACE WATER
FIELD MEASUREMENTS

SAMPLE ID NUMBER	TEMPERATURE (degree C)	pH	SPECIFIC CONDUCTIVITY (micromhos)
SMC-SW01-01	3.8	6.98	273
SMC-SW02-01	5.4	6.99	275
SMC-SW03-01	4.3	7.76	270
SMC-SW04-01	4.9	7.28	265
SMC-SW05-01	5.8	7.60	250

TABLE 31a
SHIELDALLOY METALLURGICAL CORPORATION
SUMMARY OF VOLATILE ORGANIC COMPOUNDS DETECTED IN SURFACE WATER SAMPLES

SAMPLE IDENTIFICATION:	SW1-01	SW2-01	SW3-01	SW10-01	SW4-01	SW6-01	SW6-01	SW7-01	SW8-01	SW9-01
VOLATILE ORGANICS (ppb)										
CHLOROMETHANE	–	–	–	–	9 J	–	–	–	–	–
BROMOMETHANE	–	–	–	–	–	–	–	–	–	–
VINLY CHLORIDE	–	–	–	–	–	–	–	–	–	–
CHLOROETHANE	–	–	–	–	–	–	–	–	–	–
METHYLENE CHLORIDE	19 R*	17 R*	18 R*	18 R*	10 BJ*	10 BJ*	41 R*	36 R*	35 R*	19 R*
ACETONE	12 BJ*	6 JB	6 JB	5 JB	7 JB	7 JB	6 N*	10 N*	9 N*	4 N*
CARBON DISULFIDE	–	–	–	–	–	–	2 N*	2 N*	2 N*	2 N*
1,1-DICHLORETHENE	–	–	–	–	–	–	–	–	–	–
1,1-DICHLORETHANE	–	–	–	–	–	–	–	–	–	–
1,2-DICHLORETHENE (total)	–	–	–	–	2 J	–	–	–	–	–
CHLOROFORM	–	–	–	–	–	–	–	–	–	–
1,2-DICHLORETHANE	–	–	–	–	–	–	–	–	–	–
2-BUTANONE	–	–	–	–	–	–	–	–	–	–
1,1,1-TRICHLOROETHANE	–	–	–	–	–	–	–	–	–	–
CARBON TETRACHLORIDE	–	–	–	–	–	–	–	–	–	–
VINYL ACETATE	–	–	–	–	–	–	–	–	–	–
BROMODICHLOROMETHANE	–	–	–	–	–	–	–	–	–	–
1,2-DICHLOROPROPANE	–	–	–	–	–	–	–	–	–	–
cis-1,3-DICHLOROPROPENE	–	–	–	–	–	–	–	–	–	–
TRICHLOROETHENE	–	–	–	–	3 J	–	–	–	–	–
DIBROMOCHLOROMETHANE	–	–	–	–	–	–	–	–	–	–
1,1,2-TRICHLOROETHANE	–	–	–	–	–	–	–	–	–	–
BENZENE	–	–	–	–	–	–	–	–	–	–
trans-1,3-DICHLOROPROPENE	–	–	–	–	–	–	–	–	–	–
BROMOFORM	–	–	–	–	–	–	–	–	–	–
4-METHYL1-2-PENTANONE	–	–	–	–	–	–	–	–	–	–
2-HEXANONE	–	–	–	–	–	–	–	–	–	–
TETRACHLOROETHENE	–	–	–	–	–	–	–	–	–	–
1,1,2,2-TETRACHLOROETHANE	–	–	–	–	–	–	–	–	–	–
TOLUENE	–	–	–	–	–	–	–	–	–	–
CHLOROBENZENE	–	–	–	–	–	–	–	–	–	–
ETHYLBENZENE	–	–	–	–	–	–	–	–	–	–
STYRENE	–	–	–	–	–	–	–	–	–	–
XYLENE (total)	–	–	–	–	–	–	–	–	–	–
TOTAL VOCs	12	6	6	5	31	17	8	0	0	0

B – QUALIFIER USED WHEN THE ANALYTE IS FOUND IN THE ASSOCIATED METHOD BLANK AS WELL AS IN THE SAMPLE. IT INDICATES POSSIBLE / PROBABLE CONTAMINATION.

J – QUALIFIER USED TO INDICATE AN ESTIMATED VALUE. THE CONCENTRATION IS QUANTITATIVELY QUAUFIED AND THE FINAL RESULT REPORTED IS ESTIMATED.

N – QUALIFIER INDICATES THE CONCENTRATION FOUND IN THE SAMPLE IS LESS THAN THREE TIMES THE CONCENTRATION FOUND IN THE ASSOCIATED BLANKS. THE PRESENCE OF THE ANALYTE IS NEGATED DUE TO LABORATORY CONTAMINATION.

R – DATA IS REJECTED DUE TO HOLDING TIME EXCEEDED, BLANK CONTAMINATION, INSTRUMENT CAUBRATION ERROR, OR OTHER MAJOR CONTROLUNG LIMITS ARE EXCEEDED.

* – INDICATES QUAUFIER PLACED BY TRC-ECL

N/A – NOT ANALYZED FOR THIS COMPOUND

'–' – NOT DETECTED TO THE REPORTED DETECTION LIMIT

TABLE 31b
SHIELDALLOY METALLURGICAL CORPORATION
SUMMARY OF VOLATILE ORGANIC COMPOUNDS DETECTED
IN SURFACE WATER SAMPLES

SAMPLE IDENTIFICATION:	SW1-01	SW2-01	SW3-01	SW10-01	SW4-01	SW5-01	SW6-01	SW7-01	SW8-01	SW9-01
BASE NEUTRAL / ACIDS (ppb)										
PHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
bis(2-CHLOROETHYL) ETHER	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2-CHLOROPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
1,3-DICHLOROBENZENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
1,4-DICHLORBENZENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
BENZYL ALCOHOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
1,2-DICHLOROBENZENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2-METHYLPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
bis(2-CHLOROISOPROPYL) ETHI	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4-METHYLPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
N-NITROSO-DI-N-PROPYLAM	–	N/A	N/A	N/A	–	N/A	–	–	–	–
HEXACHLOROETHANE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
NITROBENZENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ISOPHORONE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2-NITROPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2,4-DIMETHYLPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
BENZOIC ACID	–	N/A	N/A	N/A	–	N/A	–	–	–	–
bis(2-CHLOROETHOXY) METHAN	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2,4-DICHLOROPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
1,2,4-TRICHLOROBENZENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
NAPHTHALENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4-CHLOROANILINE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
HEXACHLOROBUTADIENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4-CHLORO-3-METHYLPHENOI	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2-METHYLNAPHTHALENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
HEXACHLOROCYCLOPENTADIEN	–	N/A	N/A	H/A	–	N/A	–	–	–	–
2,4,6-TRICHLOROPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2,4,5-TRICHLOROPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2-CHLORONAPHTHALENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2-NITROANILINE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
DIMETHYLPHTHALATE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ACENAPHTHYLENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2,6-DINITROTOLUENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–

B – QUALIFIER USED WHEN THE ANALYTE IS FOUND IN THE ASSOCIATED METHOD BLANK AS WELL AS IN THE SAMPLE. IT INDICATES POSSIBLE / PROBABLE CONTAMINATION.
J – QUALIFIER USED TO INDICATE AN ESTIMATED VALUE. THE CONCENTRATION IS QUANTITATIVELY QUALIFIED AND THE FINAL RESULT REPORTED IS ESTIMATED.
N – QUALIFIER INDICATES THE CONCENTRATION FOUND IN THE SAMPLE IS LESS THAN THREE TIMES THE CONCENTRATION FOUND IN THE ASSOCIATED BLANKS. THE PRESENCE OF THE ANALYTE IS NEGATED DUE TO LABORATORY CONTAMINATION.
R – DATA IS REJECTED DUE TO HOLDING TIME EXCEEDED, BLANK CONTAMINATION, INSTRUMENT CALIBRATION ERROR, OR OTHER MAJOR CONTROLUNG LIMITS ARE EXCEEDED.
* – INDICATES QUAUFIER PLACED BY TRC-ECL
N/A – NOT ANALYZED FOR THIS COMPOUND
'–' – NOT DETECTED TO THE REPORTED DETECTION LIMIT

TABLE 31b
SHIELDALLOY METALLURGICAL CORPORATION
SUMMARY OF VOLATILE ORGANIC COMPOUNDS DETECTED
IN SURFACE WATER SAMPLES

SAMPLE IDENTIFICATION:	SW1-01	SW2-01	SW3-01	SW10-01	SW4-01	SW5-01	SW6-01	SW7-01	SW8-01	SW9-01
BASE NEUTRAL / ACIDS (ppb) (connnuea)										
3-NITROANILINE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ACENAPHTHENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
1,4-DINITROPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4-NITROPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
DIBENZOFURAN	–	N/A	N/A	N/A	–	N/A	–	–	–	–
2,4-DINITROTOLUENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
DIETHYLPHTHALATE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4-CHLOROPHENYL-PHENYLET	–	N/A	N/A	N/A	–	N/A	–	–	–	–
FLUORENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4-NITROANILINE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4,6-DINITRO-2-METHYLPHENC	–	N/A	N/A	N/A	–	N/A	–	–	–	–
N-NITROSODIPHENYLAMINE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4-BROMOPHENYL-PHENYLETI-	–	N/A	N/A	N/A	–	N/A	–	–	–	–
HEXACHLOROBENZENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
PENTACHLOROPHENOL	–	N/A	N/A	N/A	–	N/A	–	–	–	–
PHENANTHRENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ANTHRACENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
DI-n-BUTYLPHALATE	1 J	N/A	N/A	N/A	1 J	N/A	–	2 J	2 J	1 J
FLUORANTHENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
PYRENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
BUTYLBENZYLPHTHALATE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
3,3'-DICHLOROBENZIDINE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
BENZO(a)ANTHRACENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
CHRYSENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
bis(2-ETHYLHEXYL)PHTHALATE	–	N/A	N/A	N/A	2 J	N/A	–	–	–	–
DI-n-OCTYL PHTHALATE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
BENZO(b)FLUORANTHENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
BENZO(k)FLUORANTHENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
BENZO(a)PYRENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
INDENO(1,2,3-cd)PYRENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
DIBENZO(A,H)ANTHBACENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
BENZO(g,h,I)PERYLENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
TOTAL caPAH	0	N/A	N/A	N/A	0	N/A	0	0	0	0

B – QUALIFIER USED WHEN THE ANALYTE IS FOUND IN THE ASSOCIATED METHOD BLANK AS WELL AS IN THE SAMPLE. IT INDICATES POSSIBLE / PROBABLE CONTAMINATION.
J – QUALIFIER USED TO INDICATE AN ESTIMATED VALUE. THE CONCENTRATION IS QUANTITATIVELY QUALIFIED AND THE FINAL RESULT REPORTED IS ESTIMATED.
N – QUAUFIER INDICATES THE CONCENTRATION FOUND IN THE SAMPLE IS LESS THAN THREE TIMES THE CONCENTRATION FOUND IN THE ASSOCIATED BLANKS. THE PRESENCE OF THE ANALYTE IS NEGATED DUE TO LABORATORY CONTAMINATION.
R – DATA IS REJECTED DUE TO HOLDING TIME EXCEEDED, BLANK CONTAMINATION, INSTRUMENT CALIBRATION ERROR, OR OTHER MAJOR CONTROLUNG LIMITS ARE EXCEEDED.
* – INDICATES QUAUFIER PLACED BY TRC-ECI.
N/A – NOT ANALYZED FOR THIS COMPOUND
'–' – NOT DETECTED TO THE REPORTED DETECTION LIMIT

TABLE 31c
SHIELDALLOY METALLURGICAL CORPORATION
SUMMARY OF PESTICIDES/PCB COMPOUNDS DETECTED
IN SURFACE WATER SAMPLES

SAMPLE IDENTIFICATION:	SW1-01	SW2-01	SW3-01	SW10-01	SW4-01	SW5-01	SW6-01	SW7-01	SW8-01	SW9-01
PESTICIDES/PCB'S (ppb)										
ALPHA-BHC	–	N/A	N/A	N/A	–	N/A	–	–	–	–
BETA-BHC	–	N/A	N/A	N/A	–	N/A	–	–	–	–
DELTA-BHC	–	N/A	N/A	N/A	–	N/A	–	–	–	–
GAMMA-BHC(UNDANE)	–	N/A	N/A	N/A	–	N/A	–	–	–	–
HEPTACHLOR	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ALDRIN	–	N/A	N/A	N/A	–	N/A	–	–	–	–
HEPTACHLOR EPOXIDE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ENDOSULFAN 1	–	N/A	N/A	N/A	–	N/A	–	–	–	–
DIELDRIN	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4,4-DDE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ENDRIN	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ENDOSULFAN II	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4,4-DDD	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ENDOSULFAN SULFATE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
4,4-DDT	–	N/A	N/A	N/A	–	N/A	–	–	–	–
METHOXYCHLOR	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ENDRIN KETONE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
ALPHA-CHLORDANE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
GAMMA-CHLORDANE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
TOXAPHENE	–	N/A	N/A	N/A	–	N/A	–	–	–	–
AROCLOR-1016	–	N/A	N/A	N/A	–	N/A	–	–	–	–
AROCLOR-1221	–	N/A	N/A	N/A	–	N/A	–	–	–	–
AROCLOR-1232	–	N/A	N/A	N/A	–	N/A	–	–	–	–
AROCLOR-1242	–	N/A	N/A	N/A	–	N/A	–	–	–	–
AROCLOR-1248	–	N/A	N/A	N/A	–	N/A	–	–	–	–
AROCLOR-1254	–	N/A	N/A	N/A	–	N/A	–	–	–	–
AROCLOR-1260	–	N/A	N/A	N/A	–	N/A	–	–	–	–

B – QUAUFIER USED WHEN THE ANALYTE IS FOUND IN THE ASSOCIATED METHOD BLANK AS WELL AS IN THE SAMPLE. IT INDICATES POSSIBLE / PROBABLE CONTAMINATION.

J – QUAUFIER USED TO INDICATE AN ESTIMATED VALUE. THE CONCENTRATION IS QUANTITATIVELY QUAUFIED AND THE FINAL RESULT REPORTED IS ESTIMATED.

N – QUALIFIER INDICATES THE CONCENTRATION FOUND IN THE SAMPLE IS LESS THAN THREE TIMES THE CONCENTRATION FOUND IN THE ASSOCIATED BLANKS. THE PRESENCE OF THE ANALYTE IS NEGATED DUE TO LABORATORY CONTAMINATION.

R – DATA IS REJECTED DUE TO HOLDING TIME EXCEEDED, BLANK CONTAMINATION, INSTRUMENT CAUBRATION ERROR, OR OTHER MAJOR CONTROLUNG LIMITS ARE EXCEEDED.

* – INDICATES QUALIFIER PLACED BY TRC-ECL

N/A – NOT ANALYZED FOR THIS COMPOUND

'–' – NOT DETECTED TO THE REPORTED DETECTION UMIT

TABLE 31d
SHIELDALLOY METALLURGICAL CORPORATION
SUMMARY OF INORGANIC COMPOUNDS DETECTED
IN SURFACE WATER SAMPLES

SAMPLE IDENTIFICATION:	SW1-01	SW2-01	SW3-01	SW10-01	SW4-01	SW9-01	SW5-01	SW7-01	SW8-01	SW9-01
INORGANICS (ppb)										
ALUMINUM	4610	44800	544	442	319	224	3460	48100	12800	9300
ANTIMONY	44.2 B	151	–	–	–	–	–	–	–	–
ARSENIC	2.0 B	34.6	–	–	2.4 B	–	–	116	2.4 B	2.2 B
BARIUM	78.2 B	962	44.4 B	43.6 B	40.8 B	24.5 B	205	400	65.1 B	160 B
BERYLUUM	1.3 B	25.1	1.0 B	1.0 B	1.0 B	–	–	468	15.4	37.2
CADMIUM	–	9.0	–	–	–	–	–	5.2	–	–
CALCIUM	5480	18100	4040 B	3960 B	4600 B	4940 B	9200	30300	13300	11000
CHROMIUM	43.3	8520	120	106	208	99.0	29.8	313	91.4	283
CHROMIUM VI	–	–	–	–	0.054	–	0.031	0.057	0.028	0.14
COBALT	–	62.2	–	–	–	–	–	13.1 B	–	–
COPPER	8.0 B	432	13.7 B	11.8 B	7.7 B	7.3 B	6.3 B	64.2	16.3 B	23.2 B
CYANIDE, TOTAL (UG/L)	–	11.0J*	–	–	–	–	–	94.4	–	12.3
IRON	4660	71000	1210	1020	933	697	128	13900	14200	6820
LEAD	28.0	–	7.6	9.3	3.8 B	5.5 B	8	1240	1050	170
MAGNESIUM	9250	5670	1700 B	1690 B	2060 B	2400 B	16500	63200	12000	27800
MANGANESE	622	2590	220	219	342	131	10.7 B	1160	223	500
MERCURY	–	21.4	–	–	–	–	–	–	–	–
NICKEL	20 8 B	618	29.6 B	34.5 B	17.7 B	17.1 B	–	415	49.2	242
POTASSIUM	8670	4670 B	1610 B	1890 B	4310 B	4490 B	9300	171000	6890	14400
SELENIUM	–	–	–	–	–	–	–	29 B	–	2.1 B
SILVER	–	–	–	–	–	–	–	–	–	–
SODIUM	25900	20300	24400	23900	107000	65200	64900	90100	23800	80700
THALLIUM	–	–	–	–	–	–	–	–	–	–
VANADIUM	272	5700	310	307	246	286	1410	8650	3380	8350
ZINC	56.4	1070	41.8	32.4	25.4	20.8	58.6	942	108	234
BORON	828	N/A	N/A	N/A	585	N/A	14100	4960	286	320
NIOBIUM	–	N/A	N/A	N/A	–	N/A	–	527	–	–
STRONTIUM	–	N/A	N/A	N/A	–	N/A	221	–	–	–
TITANIUM	–	N/A	N/A	N/A	–	N/A	–	443	193	143
ZIRCONIUM	–	N/A	N/A	N/A	–	N/A	N/A	N/A	N/A	N/A
FLUORIDE	0.87	0.92	1.1	1.1	0.84	0.97	N/A	N/A	N/A	N/A
SULPHATE	68.7	25.8	12.2	11.7	139	80.2	N/A	N/A	N/A	N/A

B – INDICATES THAT THE REPORTED VALUE IS LESS THAN THE CRDL BUT GREATER THAN THE IDL.
J – QUAUFIER USED TO INDICATE AN ESTIMATED VALUE. THE CONCENTRATION IS OUANTITATIVELY QUAUFIED AND THE FINAL RESULT REPORTED IS ESTIMATED.
* – INDICATES QUAUFIER PLACED BY TRC–ECL
N/A – NOT ANALYZED FOR THIS COMPOUND
'–' – NOT DETECTED TO THE REPORTED DETECTION LIMIT
CRDL – CONTRACT REQUIRED DETECTION LIMITS.
IDL – INSTRUMENT DETECTION LIMITS.

TABLE 1-9
SURFACE WATER SUMMARY TABLE
INORGANICS
SUPPLEMENTAL SAMPLING INVESTIGATION
SHIELDALLOY METALLURGICAL CORPORATION

SAMPLE ID:	SW-8	SW-11	SW-32 Dup of SW-11	SW-21	SW-25	SW-27	SW-30	SW-31
INORGANICS (pg/L)								
Aluminum	979	1,770	227	169	2310	286	163	127
Antimony	27.2 u	27.2 u	27.2 u	27.2 u	27.2 u	27.2 u	27.2 u	27.2 u
Arsenic	3.2	1.8 u	1.8 u	1.8 u	2.8	1.8 u	1.8 u	1.8 u
Barium	34	53.3	21.1	40.4	87.1	119	174	162
Beryllium	0.7 u	0.7 u	0.7 u	1	2.6	1	0.7 u	0.7 u
Cadmium	2.9 u	2.9 u	2.9 u	2.9 u	3.1 u	3.1 u	3.1 u	3.1 u
Calcium	3,650	4,250	4,200	5,189	4660	5220	8960	8330
Chromium	101	47.6	23	19.6	46.8	38.7	2.7 u	2.7 u
Chromium VI (mg/L)	0.02 u	0.02 u	0.02 u	0.02 u	0.02 u	0.02 u	0.02 u	0.02 u
Cobalt	2.9 u	4.9	2.9 u	2.9 u	10.1	7.4	6.3	7.9
Copper	23.2	17.6	13.5	6.2	7.9	6	2.7	3.3
Iron	655	1,710	143	150	3080	374	301	259
Lead	2.9	0.7 u	0.7 u	0.7 u	2.7	3.4	0.9 u	0.9 u
Magnesium	3,210	7,770	3,620	3,860	8670	2620	4440	4160
Manganese	42.3	42.3	28.2	9.4	88	194	180	271
Mercury	0.1 u	0.1 u	0.1 u	0.1 u	0.1 u	0.1 u	0.1 u	0.1 u
Nickel	10.2	12.3	6.8 u	6.8 u	19.2	8.1	6.9 u	10.5
Potassium	18,600	21,000	22,700	15,800	8960	4890	3080	2600
Selenium	4.4	1.2 u	1.2 u	1.2 u	1.7	1.5 u	1.5 u	1.5 u
Silver	2.5 u	2.5 u	2.5 u	2.5 u	2.5 u	2.5 u	2.5 u	2.5 u
Sodium	177,000	196,000	215,000	150,000	44,600	15,000	6390	5970
Vanadium	64.3	33	33.9	257	413	144	3.5 u	3.5 u
Zinc	287	54.1	54.4	47.5	24.6	55.1	77.6	85.9
Thallium	2 u	2 u	2 u	2 u	2 u	2 u	2 u	2 u
Cyanide	5 u	5 u	5 u	5 u	5 u	5 u	5 u	5 u
Hardness (mg/L)	21.6	22.5	22.5	20.6	23.5	29.4	38.3	37.4

µg/L=micrograms per liter
mg/L=milligrams per liter
u=Analyzed, Not Detected

APPENDIX E - REGIONAL HYDROGEOLOGIC INFORMATION

APPENDIX E - REGIONAL HYDROGEOLOGIC INFORMATION

Qualitative Description of the New Jersey Coastal Plain Aquifer System
New Jersey Coastal Plain Aquifer System Sole Source Aquifer Designation
Regional Ground Water Quality: Gloucester and Cumberland Counties, New Jersey; USGS Well MW-24
Regional Ground Water Quality: Gloucester and Cumberland Counties, New Jersey; USGS Well OU02

New Jersey Coastal Plain Aquifer

Support Document

Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Middlesex, Monmouth, Ocean, and Salem Counties New Jersey
May 1988

- I. Introduction
  - A. Statement of Section 1424 (e)
  - B. Receipt of Petition
  - C. Area of Consideration
  - D. Topography
- IL Hydrogeology
  - A. Geologic Framework
  - B. Geologic Setting (Major Aquifers and Confining Units)
  - C. Ground Water Hydrology
    - 1. Recharge
    - 2. Discharge
    - 3. Streamflow Source Zone
  - D. Ground Water Quality
  - E. Designated Areas
  - F. Ground Water Use
- III. Susceptibility to Contamination
- IV. Alternative Sources of Drinking Water
- V. Summary
- VI. Selected References
- VII. Tables
  - Table 1. Characteristics of the New Jersey Coastal Plain Aquifer System
  - Table 2. Total Drinking Water Pumped from the New Jersey Coastal Plain Area
  - Table 3. Major Ground Water Withdrawals from the Coastal Plain Area
  - Table 4. Population within Coastal Plain Aquifer System
- VIII. Figures
  - Figure 1. The Coastal Plain of New Jersey
  - Figure 2. Physiographic Provinces of New Jersey
  - Figure 3. Coastal Plain Aquifer System Designated Area
  - Figure 4. Aquifer Outcrop Areas of the Coastal Plain
  - Figure 5. Generalized Cross Section of the Coastal Plain Aquifers
  - Figure 6. Drainage Basins in the Coastal Plain of New Jersey
  - Figure 7. Delineation of Fall Line

I. Introduction

A. Statement of Section 1424 (e)

The Safe Drinking Water Act (SDWA), Public Law 93-523, of December 16, 1974 contains a provision in Section 1424(e), which states that:

> If the Administrator determines, on his own initiative or upon petition, that an area has an aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create signiticant hazard to public health, he shall publish notice of that determination in the Federal Register. After the publication of any such notice, no commitment for Federal tinancial assistance (thrpugh a grant, contract, loan guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such aquifer through a recharge zone so as to create a signiticant hazard to public health, but a commitment for Federal tinancial assistance may, if authorized under another provision of law, be entered into to plan or design the project to assure that it will not so contaminate the aquifer.

This section allows for the specitic designation of areas which are dependent upon ground water supplies. Following designation, the review process will ensure that federal agencies will not commit funds toward projects which may contaminate these ground water supplies.

B. Receipt of Petition

On December 4, 1978 the Environmental Defense Fund, Inc. and Sierra Club New Jersey Chapter petitioned the U.S. Environmental Protection Agency (EPA) Administrator to determine that the Counties of Monmouth, Burlington, Ocean, Camden, Gloucester, Atiantic, Salem, Cumberland, Cape May and portions of Mercer and Middlesex Counties, New Jersey, constitute ah area whose aquifer system is "the sole or prlncipal drlnking water source for the area and which, if contaminated, would create a signiticant hazard to public health".

C. Area of Consideration

The area of the New Jersey Coastal Plain Aquifer System includes the area for the Counties of Monmouth, Burlington, Ocean, Camden, Gloucester, Atiantic, Salem, Cumberland, Cape May and portions of Mercer and Middlesex Counties, New Jersey. Pursuant to section 1424(e), Federally assisted projects proposed for construction in the New Jersey Coastal Plain Area and the project review area within portions of its streamtiow source zone will be subject to EPA review.

The streamflow source zone for the New Jersey Coastal Plain Aquifer System includes upstream portions of the Delaware River Basin in the States of Delaware (New Castle County), New Jersey (Mercer-part, Hunterdon-part, Sussex-part, and Warren Counties), New York (Delaware, Orange, Sullivan and Ulster Counties), and Pennsylvania (Berks-part, Bucks, Carbon-part, Chester-part, Delaware, Lackawanna-part, Lancaster, Lehigh, Luzerne-part, Monroe, Montgomery, Northampton, Philadelphia, Pike, Schuykill and Wayne Counties).

The project review area includes that portion of the streamflow source zone which lies within two miles of the Delaware River in the States of New Jersey (in Mercer, Hunterdon, Sussex and Warren Counties), Delaware (in New Castle County), Pennsylvania (in Delaware, Philadelphia, Bucks, Monroe, Northampton, Pike and Wayne Counties) and New York (in Delaware, Orange and Sullivan Counties).

D. Topography

The New Jersey Coastal Plain is part of the Atiantic Plain physiographic province. The Coastal Plain physiographic province lies along the Atiantic and Gulf Coasts from Long Island to Mexico and contains one of the most prolitic system of aquifers in the country. The area petitioned by the Environmental Defense Fund, Inc. and the Sierra Club New Jersey Chapter is the New Jersey Coastal Plain Aquifer System, which is located between the Delaware River and Bay, the Atiantic Coast, Staten Island and a belt of more rugged, generally higher terrain called the Piedrhont province. A Fall Line, extending northeast along the Delaware River and through Mercer and Middlesex counties, separates the Coastal Plain from the Appalachian Highlands. The Fall Line separates areas with major differences in topography, geology, and hydrology.

The New Jersey Coastal Plain Aquifer System, lying southeast of the Fall Line, covers about 4,200 square miles. More than half of the land area is below an altitude of tifty feet (50') above sea level (NGVD). The area is largely surrounded by salty or brackish water and is bounded by the Delaware River on the west, Delaware Bay on the south, the Atlantic Ocean on the east, and Raritan Bay on the north.

The land surface is divided into drainage basins. A drainage basin is an area that contributes runoff to a stream and its tributaries. A drainage divide marks the topographic boundary between adjacent drainage basins. A major stream divide in the Goastal Plain of New Jersey separates streams flowing to the Delaware River and the Atiantic Ocean.

II. Hydrogeology

A. Geologic Framework

The following physiographic and hydrogeologic descriptions are excerpted from the United States Geological Survey (USGS) Report on the New Jersey Coastal Plain Area (Vowinkel and Foster, 1981). The New Jersey Coastal Plain is underiain by a wedge shaped mass of unconsolidated sediments composed of clay, silt, sand and gravel. The wedge thins to a featheredge along the Fall Line and attains a thickness of over six-thousand feet (6,000') at the tip of Cape May County, New Jersey. These sediments range in age from Cretaceous to Holocene and can be classified as continental, coastal or marine deposits. The Cretaceous and Tertiary age sediments generally stnke on a northeast-southwest direction arid dip gently to the southeast from ten to sixty feet (10 - 60') per mile. The overlying Quaternary deposits, where present, are basically flat lying. The unconsolidated Coastal Plain deposits, are unconformably underlain by a Pre-Cretaceous basement bedrock complex, which consists primarily of Precambrian and early Paleozoic age rocks. Locally, along the Fall Line in Mercer and Middlesex Counties, Triassic age rocks underiie the unconsolidated sediments.

Potomac Raritan Magothy aquifer system is divided into two aquifers. They are the Farrington aquifer and the Old Bridge aquifer. These aquifers are both upper Cretaceous in age and would be stratigraphically equivalent to the Raritan and Magothy formations, respectively.

B. Geologic Setting (Major Aquifers and Confining Units)

The wedge of sediment comprises one interrelated aquifer system that includes several aquifers and contining units. These sediments range in age from Cretaceous to Holocene and can be classitied as continental, coastal or maririe

deposits. In general, aquifers and confining units in the Coastal Plain Aquifer System correspond to the geologic fprmafions presented in Table 1. However, the boundaries of the aquifers and confining beds may not be the same as the geologic fdrmafions for the following reasons: (1) the formations may change in physical character from place to place and may act as an aquifer in one area or a confining bed in another; (2) some formafions are divided into several aquifers and confining beds; and (3) adjacent formations may form a single aquifer or confining bed.

There are five major aquifers in the New Jersey Coastal Plain Aquifer System. They are the Potomac-Raritan-Magothy aquifer system, Englishtown aquifer, Wenonah-Mount Laurel aquifer, lower "800 foot" sand aquifer of the Kirkwood Formafion and the Kirkwood-Cohansey aquifer. The major aquifers and their respective confining units are described in ascending order from the bedrock surface.

Overlying the consolidated rocks of the bedrock is the Potomac-Raritan-Magothy aquifer system. This wedgeshaped mass of sediments of Cretaceous age is composed of altemafing layers of clay, silt, sand, and gravel. These deposits range in thickness from a featheredge along the Fall Line to more than 4,100 feet beneath Cape May County. The Potomac-Raritan-Magothy aquifer system is exposed in a narrow outcrop along the Fall Line and the Delaware River. The aquifer is confined except in outcrop areas by the underlying crystalline rocks and the overlying Merchantville-Woodbury confining unit. In the northern part of the Coastal Plain, the Potomac-Raritan-Magothy aquifer system is divided into two aquifers. They are the Farrington aquifer (mainly Raritan age) and the Old Bridge aquifer (Magothy age).

The Merchantville Formafion and Woodbury Clay form a major confining unit throughout most of the Coastal Plain of New Jersey. Although their permeability is very low, the Merchantville-Woodbury confining unit can transmit significant quaritities of water when sizeable differences in potentiometric head exist between overlying and underlying aquifers.

The Englishtown aquifer overlies the Merchantville and Woodbury confining unit in the central and northern parts of the Coastal Plain. The aquifer is a significant source of water for Ocean and Monmouth Counfies. In northern and eastern Ocean County, the Englishtown aquifer can be subdivided into two waterbearing sands. Upper and lower units of quartz sand with thin interbeds of dark sandy silt are separated by a thick sequence of sandy and clayey lignitic silt (Nichols, 1977).

The Marshalltown Formafion overlies the Englishtown sand in most of the Coastal Plain but overlies the Woodbury Clay in much of Salem County. The formafion has a maximum thickness of thirty feet (30'). Because the Marshalltown Fprmafion is thin and contains some slightly to moderately permeable beds, it acts as a leaky confining bed.

Although the Wenonah Formation and Mount Laurel Sand are disfinct lithologic units, they are hydraulically connected arid together form the Wenonah-Mount Laurel aquifer. The Mount Laurel Sand, a coarser sandunit than the Wenoriah Formafion, is the major component of the aquifer. The combined thickness of the Wenonah Formafion and Mount Laurel Sand in outcrop is as much as one hundred feet (100'). In the subsurface they range in thickness from forty feet (40') to slightly more than two hundred feet (200') (Nemickas, 1976). The Wenonah-Mount Laurel aquifer is an important water producing aquifer in the northern and western parts of the Coastal Plain.

Overlying the Wenonah-Mount Laurel aquifer is a confining unit that comprises several geologic units. The confining unit consists of the Navesink Formafion, Red Bank Sand, Tinton Sand, Hornerstown Sand, Vincentown Formafion, Mariasquan Formafion, Shark River Marl, Piney Point Formafion and the basal clay of the

Kirkwood Formation. Some of these geologic units may act as aquifers on a local basis.

The Kirkwood Formation includes several waterbearing units. The major Kirkwood aquifer is the principal artesian aquifer within the Kirkwood Formation, also known as the Atlantic City "800 foot" sand (Barksdale and others, 1936). The Kirkwood "800 foot" sand aquifer extends along the Atiantic Coast frpm Cape May to Barnegat Light and some distance inland. In Cape May and Cumberland Counties, the upper artesian aquifer of the Kirkwood Formation is detined as the Rio Grande waterbeanng zone (Gill, 1962). This aquifer is productive only locally in Cape May County. Along the coast north of Barnegat Ligint and inland from the coast in Gcean, Buriington, Atlantic, and the western part of Cumberland Counties, the sands of the upper part of the Kirkwood Formation are hydraulically connected to the overiying Cohansey Sand.

The Cohansey Sand is typically a lightcolpred quartzose sand with lenses of silt arid clay. The Cohansey Sand is exposed throughout most of the outer part of the Coastal Plain and attains a maximum thickness of about two hundred tifty feet (250'). Ground water in the Cohansey aquifer occurs generally under watertable conditibns except Cape May County, where the aquifer is contined. Inland from the coast and in the northern part of Ocean County, the upper part of the Kirkwood Formation is in hydraulic connection with the Cohansey Sand and they act as a single aquifer.

C. Ground Water Hydrology

Man has moditied the natural equilibrium of the New Jersey Coastal Plain Aquifer System by increasing the rate of outflow from the system to the ocean. One major effect of the increased outflow of water is a regional decline in ground water levels. This decline in potentiometric head (the level to which water will rise under a given pressure with respect to aknown datum) within the aquifers may change the directiori of ground water flow and cause induced recharge and/or saltwater encroachment into the system. Signiticant regional waterievel declines have occurred in the Potomac-Raritan-Magothy aquifer system, Englishtown aquifer, Wenonah-Mount Laurel aquifer arid the "800 foot" sand aquifer of the Kirkwood Formation. Ground water withdrawals from the Potomac-Raritan-Magothy aquifer system have resulted in ground water level declines of 1.5 to 2.5 feet per year from 1966 to 1976 (Luzier, 1980). These declines in head are causing a reversal in the direction of ground water flow near pumping centers. Model studies have indicated that about forty three percent (43%) of the total inflow to the Potomac-Raritan-Magothy aquifer system in 1973 was induced recharge from the Delaware River (Luzier, 1980). Saline water in the Delaware River Estuary threatens water quality in the aquifers along Salem and Gloucester Counties. sustained increases in the rate of withdrawal from the Potomac-Raritan-Magothy and in the consumptive uses of Delaware River water portends continued and increased movement of inferior quality water into the aquifer.

The head reductions in the Potomac-Raritan-Magothy aquifer system have also increased leakage from the overiying Englishtown and Wenonah-Mount Laurel aquifers through the Merchantville Formation Woodbury Clay contining unit. In model simulation, approximately thirty percent (30%) of the recharge to the Potomac-Raritan-Magothy aquifer system in 1973 was due to leakage from overlying aquifers (Luzier, 1980).

Withdrawal of water from the Englishtown aquifer has had a marked effect on the water level in the overlying Wenonah-Mount Laurel aquifer. Decline in head in the Englishtown aquifer from 1959 to 1970 was 8 to 12 ft/yr over a large area. As a consequence of this change in head, increased quantities of water apparently leak from the Wenonah-Mount Laurel aquifer, through the contining layers, and into the

Englishtown aquifer (Nichols, 1977).

Since the recharge from precipitation and induced infiltration is insufficient to replace ground water in heavily pumped areas close to the saltwater-freshwater interface, the interface can advance toward pumping centers.

1. Recharge

The Delaware River and Estuary, Sandy Hook Bay, the Afianfic Coast and the older, harder rocks of the Piedmont province constitute the recharge boundaries of the New Jersey Coastal Plain aquifers. These hydrographicfeatures represent the interfaces across which water either moves into or out pf the ground water reservoir. Natural recharge occurs primarily through direct precipitation on the outcrop area of the geologic formations. A smaller component of natural recharge to the deeper layers of the system occurs by vertical leakage from the upper layers. This accounts for a small percentage of the total amount of recharge; however, over a large area and a long period of fime the amount of water transmitted can be significant.

Natural recharge to the New Jersey Coastal Plain Area occurs primarily through direct precipitation on the outcrop area of the geologic formations. Based primarily on esfimates of ground water contributing to streamflow and basin runoff, several estimates of ground water recharge in the Coastal Plain have been made. In the outcrop areas of the Potomac - Raritan - Magothy aquifer system, where it is unconflned, recharge to the aquifer is about twelve (12) inches per year (in/yr). In the outcrop area of the Farrington aquifer, the recharge to ground water is twelve (12) in/yr. Recharge ranges from twelve to twenty (12 - 20) in/yr in the outcrop of the Old Bridge aquifer.

Another component of natural recharge to deep, confined aquifers is primarily by vertical leakage from the upper layers. Only a small percentage of the water within the unconfined ground water system leaks to the confined aquifers; but over a large area and a long period of fime, the amount of water transmitted can be significant (Vowinkel & Foster, 1981).

2. Discharge

The New Jersey Coastal Plain Aquifer discharges to the surface through streams, springs and evapotranspiration. Many streams ultimately flow into bays or direcfiy into the ocean. Development of the ground water reservoir as a water supply source constitutes another discharge component which today accounts for a significant portion of discharge from the overall system. In certain areas (e.g., along the Delaware River) heavy pumping has caused a reversal in the normal discharge from the aquifer (Raritan-Magothy) such that the surface stream (Delaware River) now recharges the aquifer. This phenomenon implies that, in addifion to the New Jersey Coastal Plain Area, the Delaware River Basin within Delaware, New Jersey, Pennsylvania and New York must be regarded as a streamflow source zone (an upstream headwaters area which drains into a recharge zone), which flows into the Coastal Plain Area.

3. Streamflow Source Zone

The New Jersey Coastal Plain Aquifer System discharge to the surface through streams, springs and evapotranspiration. Many streams ultimately flow into bays or directly into the ocean. Development of the ground water reservoir as a water supply source constitutes another discharge component which today accounts for a significant portion of discharge from the overall system. In certain areas (e.g. along the Delaware River) heavy pumping has caused a reversal in the normal discharge from the aquifer (Raritan-Magothy) such that the surface stream (Delaware River) now recharges the aquifer. This phenomena implies that, in addition to the New Jersey Coastal Plain Area, a major portion of the Delaware River Basin must be regarded as a streamflow source zone (an upstream headwaters area which drains into a recharge zone), which flows into the designated area.

D. Ground Water Quality

Fresh, uncontaminated ground water in the New Jersey Coastal Plairi is low in dissolved solids (generally less than 150 milligrams per liter (mg/l). Calcium and bicarbonate are usually dominant ions in solution with smaller amounts of sodium, potassium, magnesium sulfate and chloride. Locally, concentrations of iron and manganese present a problem near the water table because the ground water tends to have a low pH. These waters are treated to make them palatable. Historically, no signiticant quantities of heavy metals, pesticides, organics or coliform bacteria have been found in the artesian aquifers. Except for specitic parameters (e.g. iron) and contamination incidents, water quality in the artesian ground water system meets or exceeds Federal and State drinking water standards. The quality of ground water in the outcrop area, on the other hand, is variable, being largely determined by local conditions at the land surface.

A large part of the Potomac-Raritan-Magothy aquifer system in the southern Coastal Plain of New Jersey contains salty ground water with chlonde concentrations ranging from less than 250 to as high as 27,000 mg/L (Luzier, 1980). The concentrations of chloride increase with depth as well as toward the ocean.

E. Designated Areas

The proposed Sole Source Aquifer designation areas for the New Jersey Coastal Plain Aquifer System are detined within the Counties of Monmouth, Buriington, Ocean, Cumberiand and Cape May, and portions of Mercer and Middlesex Counties, New Jersey, and that portion of the streamflow source zbnewhich lies within two miles of the Delaware River in the States of New Jersey (in Mercer, Hunterdon, Sussex and Warren Counties), Delaware (in New Castie County), Pennsylvania (in Delaware, Philadelphia, Bucks, Monroe, Northampton, Pike and Wayne Counties) and New York (in Delaware, Orange and Sullivan Counties). Outside the New Jersey Coastal Plain Area and further than two miles from the Delaware River in the streamtiow source zone, only those Federally assisted proposed projects requiring the preparation of an Environmental impact Statement will be reviewed. The two-mile limit for the project review area along the Delaware River is based on the climate and hydrologic setting of the area.

F. Ground Water Use

Ground water use for public supply in the Coastal Plain area, was about 250 million gallons per day (MGD) in 1978. Use of surface water for public supply in this same area amounts to 79 MOD. Of the estimated 400 MGD withdrawn from the Coastal Plain aquifer system in 1978, approximately seventy-tive percent (75%) was used

for drinking water purposes to serve 2.3 million people.

Estimates for industrial and commercial consumption of ground water range from 75 MGD (USGS, 1978) to 97 MGD (NJ Water Supply Master Plan, WSMP, 1976). Agriculture is also a major consumer of ground water, pumping anywhere from 11 MGD (USGS, 1978) to 50 MGD (NJWSMP, 1976).

No accurate tally of domestic consumption in the Coastal Plain Area is available; however, the New Jersey Water Supply Master Plan estimates that as much as 40 MGD of ground water was pumped to private households.

The PotomacRaritanMagothy aquifer system is the most widely used aquifer in the Coastal Plain, but it is not the primary source of drinking water for every county. The Cohansey and Kirkwood aquifers are the primary sources of ground water in Atlantic, Cape May and Cumberland County. In these counties, the Potomac-Raritan-Magothy aquifer contains saltwater. The Englishtown and Wenonah-Mount Laurel aquifers are productive mainly in the northern and central counties of the Coastal Plain.

III. Susceptibility to Contamination

The New Jersey Coastal Plain Aquifer System is susceptible to contamination across several interfaces. In the outcrop areas, the water table conditions and the highly permeable nature of the soil, with its low attenuation capability, facilitate the movement of contaminants from the land surface into the system. Significant pollution sources include septic tanks, landfills, chemical spills and dumping, chemical storage leaks, industrial waste lagoons, highway deicing and agricultural chemicals. These sources have immediate local impacts as well as long term cumulative impacts as they progress through to the lower system.

EPA has identified roughly 150 hazardous waste disposal sites within the New Jersey Coastal Plain area which have the potential for contaminating the environment.

Municipal Land Disposal

Municipal land disposal sites frequently are discovered to contain other than municipal wastes. One example is Jackson Township, Ocean County. The Township disposal site has been found to be leaching chlorinated industrial solvents and other toxic organic chemicals into the aquifer that serves private drinking water wells of more than 100 homes in a nearby development. A second site is the Price Landfill in Pleasantville, New Jersey. The contamination emanating from this site does threaten the Atlantic City water supply.

Pipelines and Storage Tanks

Pipelines and tanks which carry and store petroleum products and other chemicals are subject to accidental rupture, external corrosion, and structural failure from a wide variety of causes. In the Pinelands, there are fourteen (14) storage tanks which are required to have Federal and/or State permits because of their size. Approximately 13.9 million gallons are stored in these facilities, and additional amounts are transferred through them.

Industrial Waste Lagoons

Industrial waste lagoons are constructed for the primary purpose of providing temporary storage of waste materials. Seven industrial lagoons have been

identitied in the Pinelands, and three have been linked to contaminated wells (New Jersey Pinelands Comprehensive Management Plan, 1980).

Hazardous\Waste Sites

The lower Delaware along the TriCounty and Salem County area is highly industrialized, densely populated and contains a concentration of hazardous waste sites as well as an assortment of treatment, storage and disposal facilities. The potential for pointsource contamination of ground andsurface water quality is therefore greater in this area.

Fertilizer

In the Pinelands, there is increasing evidence to support an association between fertilizer use and nitrate in ground water. For example, high ground water nitrate levels possibly stemming from agricultural fertilization has been noted in Winslow Township. (New Jersey Pinelands Comprehensive Management Plan)

Hydraulic Gradient Variability Across Contining Units

Contamination across the confining units is another mechanism through which the Coastal Plain aquifer system is susceptible to contamination. Signiticant hydraulic gradients and variabilities in the integrity of these units has facilitated the migration of pollutants from one formation into another in South Brunswick (Geraghty arid Miller, 1979)

Salt Water Encroachment

The Coastal Plain aquifers are also susceptible to contamination by saltwater encroachment. A large part of the Potomac-Raritan-Magothy aquifer system in the southem Coastal Plain of New Jersey contains saline ground water. m e concentrations of chloride increase with depth as well as distance toward the ocean. According to Luzier (1980), head reductions caused by withdrawal bf ground water near the saltwater interface are more than sufticient to cause the slow migration of the saltwater toward pumping centers.

Lateral Salt Water Intrusion

Lateral saltwater intrusion is occurring in a part of the Old Bridge aquifer in the vicinity of Keyport and Union Beach Boroughs in Monmouth County, NJ. The reduction in water levels has caused a reversal in the direction of ground water flbw in the Old Bridge aquifer. Prior to development, water in the aquifer flowed into Raritan Bay; however, saltwater is now flowing inland from the submerged (exposed) outcrop of the aquifer beneath Raritan Bay. As previously discussed, saltwater contamination is a threat to the Potomac-Raritan-Magothy Aquifer along the Delaware River.

In summary, problems in the New Jersey Coastal Plain Aquifer System revolve around rapid migration of contaminants as a result of the predominantly permeable hydrogeology. This poses an immediate threat to existing water supplies, as in the case of the Price Landtill, or may result in a more chronic contamination of the large interrelated aquifers.

IV. Alternative Sources of Drinking Water

The New Jersey Coastal Plain Aquifer Systerh area is heavily dependent upon the ground water system for its drinking water supply. The many streams throughout

the area might be considered altemative supplies; however, the streams are not as readily accessible to everyone as is ground water. Since the ground water has historically been the primary source of supply, considerable cost would be associated with tapping, treating and distributing this surface resource as an alternative supply. Most importantiy, the close interrelationship between the ground water system and quality and baseflow of the streams precludes stream resource as a viable longterm altemative in the event of ground water contamination. The Delaware River may be considered an alternative source of supply for portions of the area; however, existing competitive uses severely limit the availability of additional water for drinking purposes.

In the event of contamination, it is possible to relocate drinking water wells to different depths and, in some portions of the Coastal Plain, to different formations. Deeper wells inevitably incur higher costs for drilling, piping and pumping. As evidenced in the discussions on ground water movement and susceptibility to contamination, the practical lifetime of this alternative can be limited and very costly.

Desalinization is also an altemative source of drinking water for the Cbastal and Bay areas; however, conversion of saltwater requires considerable energy and the economic constraints make desalinization an impractical alternative.

Since the ground water resources of the New Jersey Coastal Plain Aquifer System are vast in magnitude and distribution, no alternative sources of water supply are considered viable.

V. Summary

Based upon the Information presented, the New Jersey Coastal Plain Aquifer System, as detined in this documerit, meet the technical requirements for Sole Source Aquifer designation. More than tifty percent (50%) of the drinking water for the aquifer service areas is supplied by the aquifer system. In addition, there are nb economically feasible alternative drinking water sources which could replace the aquifer systems. Therefore, it is recommended that the New Jersey Coastal Plain Aquifer System be designated a Sole Source Aquifer. This will provide an additional review of ground water protection measures, incorporating state and local measures whenever possible, for only those projects which request Federal tinancial assistance.

The Coastal Plain Aquifer System of New Jersey is an interrelated hydrologic system which responds to natural and manmade stresses. The wedge of unconsolidated sediments underlying the Coastal Plain Aquifer System of New Jersey is comprised of a series of hydrologic units that have varying thickness, lateral extent, and waterbearing characteristics. Some of the units act as aquifers, while others act as contining beds. Previous to development by wells, the groundwater system is in a state of dynamic equilibrium.

Withdrawal of ground water by wells is a stress superimposed on a previously balanced groundwater system. The response of an aquifer to pumping stresses may result in an increase in recharge to the aquifer, a decrease in the riatural discharge, a loss of storage within the aquifer, or a combination of these effects. Also, the response of an aquifer to stress may extend beyond the limits of the aquifer being evaluated.

The following tindings, which are the basis for the determination:

(1.) The New Jersey Coastal Plain Area depends upon the under-lying Coastal Plain Aquifer System for seventy-tive percent (75%) or more of its dririking water to

serve 3 million people.

(2.) Data show that the formations of the New Jersey Coastal Plain Area are hydrologically inter-connected such that they respond collectively as an interrelated aquifer system.

(3.) If the aquifer were to become contaminated, exposure of the persons served by the system would constitute a signiticant hazard to public health.

(4.) Alternative supplies capable of providing tifty (50) percent or more of the drinking water to the designated area are not available at similar economic costs.

VI. Selected References

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22. U.S. Department of Interior, Northeast Regional Oftice, Heritage Conservation and Recreation Service, September 1980, Draft Environmental Impact Statement, Proposed Comprehensive Management Plan for the Pinelands National Reserve.

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VII. Tables

Table 1. Characteristics of the New Jersey Coastal Plain Aquifer System

System	Formation	Thickness	Lithology
Quaternary	Alluvial & Cape May Formation	80'	Sand, silt, black mud
	Pennsauken &		Sand, quartz, light-colored

Tertiary	Bndgeton Formafion	200'	clayey, pebbly, glaucbnite
	Beacon Hill Formation	40'	Gravel, quartz, light-colored sandy
	Cohansey Sand	250'	Sand, quartz, light-colored, medium to coarse-grained, pebbly; local clay beds
	Kirkwood Forrhation	780'	Sand, quartz, gray to tan, very fine- to medium-grained, micaceous
	Piney Point Formation	220'	Sand, quartz and glaucbnite, fine- to coarse-grained
	Shark River Marl	140' ?	Sand, quartz and glauconite, gray, brown, and green, fine- to coarse-grained, clayey and green silty and sandy clay
	Manasquan Fprmation	180'	Sand, quartz and glauconite, gray, brown, and green, fine- to coarse-grained, clayey and green silty and sandy clay
	Vincentown Formation	100'	Sand, quartz, gray and green, fine- to coarse-grained, glauconitic, and brown clayey, very fossiliferous, glauconite and quartz calcarenite
	Hornerstown Sand	35'	Sand, glauconite, green, medium- to coarse-grained, clayey
Cretaceous	Tinton Sand	25'	Sand, quartz, and glauconite, brown and gray, fine- to coarse grained, clayey, micaceous
	Red Band Sand	150'	Sand, quartz, and glauconite, brown and gray, fine- to coarse grained, clayey, micaceous
	Navesink Formation	50'	Sand, glauconite, and quartz, green, black and brown, medium- to coarse grained, clayey
	Mount Laurel Sand / Wenonah Formafion	220'	Sand, quartz, brown and gray, fine- to coarse-grained, glauconitic
	Marshalltown Formafion	30'	Sand, quartz, and glauconite, gray and black, very fine- to medium-grained, very clayey
	Englishtown Formation	220'	Sand, quartz, tan and gray, fine- to medium-grained; local clay beds
	Woodbury Clay / Merchantville Formation	325'	Clay, gray and black, micaceous, glauconitic, silty
	Magothy - Ranton - Potomac Formations	4100'	Sand, quartz, light-gray, fine- to coarse-grained, pebbly, arkosic, dark-gray lignitic clay/red, white and varigated clay/alternafing clay, silt, sand and grayel

Pre-Cretaceous	Pre-Cretaceous Unconsolidated rocks and Wissahickon Formation	?	Precambrian and lower Paleozoic crystalline rocks, metamorphic schist and gneiss; locally Triassic basalt, sandstone, and shale

Table 2. Total Drinking Water Pumped from the New Jersey Coastal Plain Area

	(Million Gallons per day)			
County	USGS (a)	208 Plan (b)	NJWSMP ©	Est. Private Use ©
Atlantic	20.1	28.5	17.7	4.4
Burlington	30.5	25.5	32.4	4.7
Camden	67.5	66.7	70.3	2.4
Cape May	10.9	9.0	11.3	2.5
Cumberland	14.2	13.5	13.5	4.2
Gloucester	16.6	15.0	16.0	4.0
Mercer	7.2	6.5	4.5	1.5
Middlesex	24.7	25.8	24.1	1.5
Monmouth	26.0	28.6	28.6	4.2
Ocean	29.6	28.5	29.5	3.1
Salem	2.8	3.0	3.0	2.2
TOTAL	251.0	251.0	251.0	39.6

Sources of information:
(a) USGS Report on the NJ Coastal Plain Area; Database: 1978.
(b) Respective Water Quality Management Plans; database: 1970-75.
© New Jersey Water Supply Master Plan; database: 1976.

Table 3. Major Ground Water Withdrawals from the Coastal Plain Area

	(Million Gallons per day)					
County	PRM	E	W-M	K	K-C	Other
Atlantic	---	---	---	9.12	16.75	0.30
Burlington	38.96	0.49	1.14	---	0.36	---
Camden	69.57	0.76	0.88	---	0.04	0.98
Cape May	---	---	---	5.36	0.38	0.56
Cumberland	---	---	---	0.80	20.12	0.45
Gloucester	25.19	---	0.02	---	1.76	---
Mercer	8.12	---	---	---	---	---
Middlesex	49.38	---	---	---	---	---
Monmouth	21.60	6.25	1.31	---	1.14	0.31
Ocean	11.53	4.59	0.03	4.22	12.50	4.84

Salem	6.10	---	1.32	---	1.86	0.82
TOTAL	230.45	12.09	4.70	19.50	60.92	8.26

PRM = Potomac-Raritan-Magothy
W = Englishtown
WM = Wenonah-Mount Laurel
K = Kirkwood
KC = Kirkwood-Cohansey
Source: Vonwinkle and Foster, 1981.

Table 4. Population within Coastal Plain Aquifer System

County	1985	2000	Change
Atlantic	226,800	277,400	50,600
Burlington	372,900	471,900	99,000
Camden	482,600	555,900	73,300
Cape May	85,500	91,600	6,100
Cumberland	135,100	142,600	7,500
Gloucester	206,300	269,100	62,800
Mercer	100,330	111,602	11,272
Middlesex	256,440	302,840	46,400
Monmouth	515,700	588,200	72,500
Ocean	370,100	447,300	77,200
Salem	66,500	6,100	2,600
TOTAL	2,818,270	3,327,542	509,272

VIII. Figures

Coastal Plain Figures

For information on this page, contact: Rinaldo.Lawrence@epamail.epa.gov

Biosolids
Dredging
Drinking Water
Estuaries
Great Lakes
Groundwater
Infrastructure
Lakes, Rivers, Streams
Non-point Pollution
Oceans
Permits & Compliance
Stormwater
Waste Water
Water Quality
Watershed Protection
Wetlands

New Jersey Coastal Plain Aquifer

Federal Register Notice

Volume 53, No. 122, Page 23791
Friday, June 24, 1988
Sole Source Aquifer Determination
for the New Jersey Coastal Plain Aquifer System

- AGENCY
- ACTION
- SUMMARY
- DATES
- SUPPLEMENTARY INFORMATION
  - I. Background
  - II. Basis for the Determination
  - III. Description of the New Jersey Coastal Plain Area Aquifer Systems, Its Recharge Zone and Its Streamflow Source Zone
  - IV. Information Utilized in Determination
  - V. Project Review
  - VI. Summary and Discussion of Public Comments

AGENCY

Environmental Protection Agency

ACTION

Notice.

SUMMARY

Notice is hereby given that, pursuant to section 1424(e) of the Safe Drinking Water Act, the Administrator of the U.S. Environmental Prbtection Agency (EPA) has determined that the New Jersey Coastal Plain Aquifer System, underlying the New Jersey Coastal Plain Area, is the sole or principal source of drinking water for the Counties of Monmouth, Burlington, Ocean, Camderi, Gloucester, Atlantic, Salem, Cumberland, Cap May and portions of Mercer and Middlesex Counfles, New Jersey, and that the aquifer, if contaminated, would create a significant hazard to public health.

As a result of this action EPA will review Federally assisted projects (projects which receive Federal financial assistance through a grant, contract, loan guarantee, or otherwise) proposed for constructed in a project review area which includes the New Jersey Coastal Plain Area and a portion of the aquifer streamflow source zone.

The streamflow source zone includes upstream portions of the Delaware River Basin in the States of Delaware, New Jersey, New York and Pennsylvania. Federally assisted projects will be reviewed to ensure that they are designed and constructed so that they do not

create a significant hazard tp public health. Projects outside of the project review area but within the streamflow source zone will be reviewed if they require an Envirorimental Impact Statement (EIS).

DATES

This determination shall be promulgated for purposes of judicial review at 1:00 P.M., Eastern Time on July 7, 1988. This determination shall become effective on August 8, 1988.

ADDRESS: The data on which these tindings are based, detailed maps of the New Jersey Coastal Plain Area and the project review area, a compilation of public comments and the Agency's response to those comments, are available to the public and may be inspected during normal business hours at the U.S. Environmental Protection Agency, Water Management Division, 26 Federal Plaza, New York, New York 10278. In addition, copies of a map showing the designated area and a responsiveness summary to public comment are available upon request.

FOR FURTHER INFORMATION CONTACT: John S. Malleck, Chief, Office of Ground Water Management, U.S. Environmental Protection Agency, 26 Federal Plaza, New York, NY 10278, (212) 264-5635.

SUPPLEMENTARY INFORMATION

Notice is hereby given that pursuant to section 1424(e) of the Safe Drinking Water Act (42 U.S.C., 300f, 300h-3(e), Pub. L. 93-523), the Administrator of the U.S. Environmental Protection Agency (EPA) has determined that the New Jersey Coastal Plain Aquifer System, underlying the New Jersey Coastal Plain Area, is the sole or principal source of drinking water for the Counties of Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Monmouth, Ocean, Salem, and portions of Mercer and Middlesex Counties, New Jersey.

Pursuant to section 1424(e), Federally assisted projects proposed for construction in the New Jersey Coastal Plain Area and the project review area within portions of its streamflow source zone will be subject to EPA review.

The streamflow source zone for the New Jersey Coastal Plain Aquifer System includes upstream portions of the Delaware River Basin in the States of Delaware (New Castle County), New Jersey (Mercer-part, Hunterdon-part, Sussex-part, and Warren Counties), New York (Delaware, Orange, Sullivan and Ulster Counties), and Pennsylvania (Berks-part, Bucks, Carbon-part, Chester-part, Delaware, Lackawanna-part, Lancaster, Lehigh, Luzerne-part, Monroe, Montgomery, Northampton, Philadelphia, Pike, Schuykill and Wayne Counties).

The project review area includes that portion of the streamflow source zone which lies within two miles of the Delaware River in the States of New Jersey (in Mercer, Hunterdon, Sussex and Warren Counties), Delaware (in New Castle County), Pennsylvania (in Delaware, Philadelphia, Bucks, Monroe, Northampton, Pike and Wayne Counties) and New York (in Delaware, Orange and Sullivan Counties).

I. Background

Section 1424(e) of the Safe Drinking Water Act states: (e) If the Administrator determines, on his own initiative or upon petition, that an area has an aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health, he shall publish a notice of the determination in the Federal Register. After the publication of any such notice, no commitment for Federal financial assistance (through a grant, contract, loan guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such aquifer through a recharge zone so as to create a significant hazard to public health, but a

commitment for Federal financial as-sistarice may, if authorized under another provision of law, be entered into to plan or design the project to assure that it will rtot so contaminate the aquifer.

On December 4, 1978 the Environmental Defense Fund, Inc., and Sierra Club New Jersey Chapter petitioned the EPA Administrator to determine that the Counties of Monmouth, Buriington, Ocean, Camderi, Gloucester, Atlantic, Salem, Cumberland, Cap May and portions of Mercer and Middlesex Counties, New Jersey, constitute an area whose aquifer system is "the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health," On March 21, 1979, EPA published the petition in the Federal Register. Public hearings on the petition request were heal May 1, 15 and 17, 1979 in Lindenwold, Trenton, Freehold and Pomona, New Jersey. A May 19, 1983 Federal Register notice announced the availability of additional technical information and the extension of public cpmment period to July 15, 1983.

II. Basis for the Determination

Among the factors to be considered by the Administrator in con-nection with the de-signating an area under section 1424(e) are:

(1) Whether the aquifer is the area's sole or principal source of drinking water and (2) whether contamination of the aquifer would create a significant hazard to public health.

On the basis of information available to this Agency, the Administrator has made the following findings, which are the basis for the determination noted above:

(1.) The New Jersey Coastal Plain Area depends upon the under-lying Coastal Plain Aquifer System for seventy-five (75) percent or more of its drinking water to serye 3 million people.

(2.) Data show that the formations of the New Jersey Coastal Plain Area are hydrologically inter-connected such that they respond collectively as an interrelated aquifer system.

(3.) If the aquifer were to become contaminated, exposure of the persons served by the system would constitute a significant hazard to public health.

(4.) Alternative supplies capable of providing fifty (50) percent or more of the drinking water to the designated area are not available at similar economic costs.

The New Jersey Coastal Plain Aquifer System is highly susceptible to contamination through its recharge zone from a number of sources, including but not limited to, chemical spills, leachate from landfills, stormwater runoff, highway deicing, faulty septic systems, wastewater treatment systems and waste disposal lagoons. The aquifer is also susceptible to contamination to a lesser degree fro the same sources through its streamflow source zone. Since ground water contaminatiori can be difficult or impossible to reverse completely and since the aquifer in this area is solely or principally relied upon for drinking water purposes by the population of the New Jersey Coastal Plain Area, contamination of the aquifer could pose a significant hazard to public health.

III. Description of the New Jersey Coastal Plain Area Aquifer Systems, its Recharge Zone and Its Streamflow Source Zone

The New Jersey Coastal Plain Aquifer System consists of a wedge-shaped mass of unconsolidated sediments composed of clay, silt, sand and gravel. The wedge thins to a feathered edge along the Fall Line and attains a thickness of 6,000 feet at the fip of Cape May County, New Jersey.

These sediments range in age from Cretaceous to Holocene and can be classified as continental, coastal or marine deposits. There are five major aquifers within the Coastal Plain Aquifer System. They are the Potomac-Raritan-Magothy Aquifer System, Englishtown

Aquifer, Wenonah-Mount Laurel Aquifer, Kirkwood Aquifer and the Cohansey Aquifer. Natural recharge to the New Jersey Coastal Plain Aquifer System occurs primarily through direct precipitation on the outcrop area of the geologic formations. A smaller component of natural recharge to the deeper layers of the system occurs by vertical leakage from the upper layers. This accounts for a small percentage of the total amount of recharge; however, over a large area and a long period of time the amount of water transmitted can be significant.

The New Jersey Coastal Plain Aquifer discharges to the surface through streams, springs and evapotranspiration. Many streams ultimately flow into bays or directly into the ocean. Development of the ground water reservoir as a water supply spurce constitutes another discharge component which today accounts for a significant portion of discharge from the overall system. In certain areas (e.g., along the Delaware River) heavy pumping has caused a reversal in the normal discharge from the aquifer (Raritan-Magothy) such that the suriace stream (Delaware River) now recharges the aquifer. This phenomenon implies that, in addition to the New Jersey Coastal Plain Area, the Delaware River Basin within Delaware, New Jersey, Pennsylvania and New York must be regarded as a streamflow source zone (an upstream headwaters area which drains into a recharge zone), which flows into the Coastal Plain Area.

iV. Information Utilized in Determination

The information utilized in this determination includes the petition, written and verbal comments submitted by the public, and various technical publications. The above data are available to the public and may be inspected during normal business hours at the U.S. Environmental Protection Agency, Region II, Water Mariagement Division, 26 Federal Plaza, New York, New York 10278.

V. Project Review

When the EPA Administrator publishes his determination for a sole or principal drinking water source, no commitment fpr Federal tinancial assistance may be committed if the Administrator finds that the Federally assisted project may contaminate the aquifer through a recharge zone so as to create a significant hazard to public health...Safe Drinking Water Act section 1424(e), 42 U.S.C. 300h-3(e). In many cases, these Federally assisted projects would also be analyzed in an "Environmental Impact Statement" (EIS) under the National Environ-mental Policy Act (NEPA), 42 U.S.C. 4332(2)(C). All EIS's, as well as any other proposed Federal actions affecting an EPA program or responsibility, are required by Federal law (under the so-called "NEPA/309" process) to be reviewed and commented upon by the EPA Administrator. Therefore, in order to streamline EPA's review of the possible environmental impacts on designated aquifers, when an action is analyzed iri an EIS, the two reviews will be consolidated and both authorities cited. The EPA review (under the Safe Drinking Water Act) of Federally assisted projects potentially affecting sole or principal source aquifers, will be included in the EPA review (under the "NEPA/309" process) of any EIS accompanying the same Federally assisted project. The letter transmitting EPA's comments on the tinal EIS to the lead agency will be the vehicle for informing the lead agency of EPA's actions under Section 1424(e).

All Federally assisted proposed projects will be reviewed, within the New Jersey Coastal Plain Area (Counties of Monmouth, Buriington, Ocean, Cumberiand and Cape May, and portions of Mercer and Middlesex Counties, New Jersey (as delineated on maps included in the petition), and that portion of the streamflow source zone which lies within two miles of the Delaware River in the States of New Jersey (in Mercer, Hunterdon, Sussex and Warren Counties), Delaware (in New Castie County), Pennsylvania (in Delaware, Philadelphia, Bucks, Monroe, Northampton, Pike and Wayne Counties) and New York (in Delaware, Orange and Sullivan Counties) (asdelineated on maps included in the public record).

Outside the New Jersey Coastal Plain Area and further than two miles from the Delaware River in the streamflow source zone, only those Federally assisted proposed projects requiring the preparation of an EIS will be reviewed. The Agency has chosen a two-mile limit for the project review area along the Delaware River based on the climate and hydrologic setting of the area. The two-mile distance is consistent with the two-mile review

radius included in the EPA guidelines for Ground Water Classification and is protective of human health.

VI. Summary and Discussion of Public Comments

There has been much controversy over the possible designation of this aquifer system. The majority of the public comments from the original 1979 public hearings were in direct opposition to such a designation. More than half of all responses received were against designation. Several commenters felt constrained by the original comment period and thereby requested an extension. EPA complied with this request on two occasions, once by announcing at the four public hearings it held throughout the area under consideration that the agency had extended the formal comment period from May 14, 1979, to December 31, 1979, and again in a May 19, 1983 Federal Register Notice that announced the availability of additional information and extension of the public comment period to July 15, 1983. Although a number of ground water protection measures are available at the Federal, State and local level, none of these, either individually or collectively, permit EPA to act as directly as would a sole source aquifer designation in the review and approval of Federally assisted projects. In addition, EPA feels that the sole source project review process will foster integration rather than duplication of environmental review efforts. Memoranda of Understanding have been negotiated with various Federal agencies with the purpose of streamlining the review process and minimizing project delays. Most of the commenters expressed concern that a designation would be a duplication of efforts already existing on the state and local levels. Some commenters felt that a sole source aquifer designation would give EPA the power to reject any applications for Federally funded projects indiscriminately and to delay any project uridenvay. Another main concern of many commenters was that a designation would cause a strong negative impact on the area in question and curtail needed development, thus eliminating jobs. EPA is sympathetic to the concerns of the commenters; however, the Agency feels that a sole source aquifer designation would not interfere with economic development. Federal financial assistance will be withheld only in those instances where it is determined that a proposed project may contaminate the aquifer so as to create a signiticant hazard to public health and no acceptable remedial measures are available to prevent the potential hazard.

Dated: June 16, 1988.
Lee M. Thomas, Administrator

[FR Doc. 8814293 Filed 6/23/88; 8:45 am]
BILLING CODE 656050M

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Regional Ground Water Quality: Gloucester and Cumberland Counties, New Jersey
(Source: USGS Water Quality Database)

USGS Well MW-24, Station Number 394014075060001, Camden, NJ - Gloucester County		
Parameter	Units	Concentration 8/22/2000
Temperature	deg C	16
Barometric pressure	mm Hg	765
Specific conductance	ms/cm	245
Dissolved oxygen mg/L	mg/L	10.5
pH		4.5
Ammonia (filtered)	mg/L	0.02
Nitrite (filtered)	mg/L	0.01
Ammonia	mg/L	0.09
Nitrite	mg/L	10.9
Orthophosphate	mg/L	0.01
Organic carbon	mg/L	3.2
Calcium	mg/L	20.1
Magnesium	mg/L	6.56
Sodium	mg/L	1.85
Potassium	mg/L	3.01
Chloride	mg/L	16.2
Sulfate	mg/L	29.1
Fluoride	mg/L	0.1
Silica	mg/L	8.2
Arsenic	mg/L	0.9
Barium	mg/L	331
Boron	mg/L	12
Cadmium	mg/L	1
Chromium	mg/L	0.8
Copper	mg/L	1.2
Iron	mg/L	7
Lead	mg/L	1.73
Manganese	mg/L	93.5
Silver	mg/L	1
Zinc	mg/L	1
Aluminum	mg/L	383
Selenium	mg/L	2.5
Gross beta radioactivity	pci/L	4
Propachlor	ug/L	0.007
Butylate	ug/L	0.002
Simazine	ug/L	0.005
Prometon	ug/L	0.02
2-Chloro-4-isopropylamino-6-amino-s-triazine	ug/L	0.093
Cyanazine	ug/L	0.004
Fonofos	ug/L	0.003
Alpha radioactivity	ug/L	6.2
Bromodichloromethane	ug/L	0.1
Tetrachlorometharie	ug/L	0.2
1,2-Dichloroethane	ug/L	0.2

Regional Ground Water Quality: Gloucester and Cumberland Counties, New Jersey
(Source: USGS Water Quality Database)

USGS Well MW 24, Station Number 394014075060001, Camden, NJ - Gloucester County		
Parameter	Units	Concentration
		8/22/2000
Tribromomethane	ug/L	0.2
Dibromochloromethane	ug/L	0.2
Trichloromethane	ug/L	0.1
Toluene	ug/L	0.1
Benzene	ug/L	0.1
alpha-HCH	ug/L	0.002
Chlorobenzene	ug/L	0.1
Ethylbenzene	ug/L	0.1
Dichloromethane	ug/L	0.2
Tetrachloroethene	ug/L	0.1
Trichlorofluoromethane	ug/L	0.2
1,1-Dichloroethane	ug/L	0.1
1,1-Dichloroethene	ug/L	0.1
1,1,1-Trichloroethane	ug/L	0.1
1,2-Dichlorobenzene	ug/L	0.1
1,2-Dichloropropane	ug/L	0.1
trans-1,2-Dichloroethene	ug/L	0.1
1,3-Dichlorobenzene	ug/L	0.1
1,4-Dichlorobenzene	ug/L	0.1
p,p'-DDE	ug/L	0.006
Dichlorodifluoromethane	ug/L	0.2
Chlorpyrifos	ug/L	0.004
Vinyl chloride	ug/L	0.2
Trichloroethene	ug/L	0.1
Lindane	ug/L	0.004
Dieldrin	ug/L	0.013
Metolachlor	ug/L	0.002
Malathion	ug/L	0.005
Parathion	ug/L	0.004
Diazinon	ug/L	0.002
Atrazine	ug/L	0.177
Alachlor	ug/L	0.013
Acetochlor	ug/L	0.002
tert-Butyl ethyl ether	ug/L	0.1
Methyl tert-pentyl ether	ug/L	0.2
Turbidity	ug/L	4.2
Mercury	ug/L	0.2
Alpha radioactivity 2-sigma	ug/L	3.2
Beta radioactivity 2-sigma	ug/L	4.1
cis-1,2-Dichloroethene	ug/L	0.1
Styrene	ug/L	0.1
o-Xylene	ug/L	0.1
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	0.1
Methyl tert-butyl ether	ug/L	0.2

Regional Ground Water Quality: Gloucester and Cumberland Counties, New Jersey
(Source: USGS Water Quality Database)

USGS Well MW-24, Station Number 394014075060001 Camden, NJ - Gloucester County		
Parameter	Units	Concentration 8/22/2000
Diethyl ether	ug/L	0.2
Diisopropyl ether	ug/L	0.2
Sampling method	ug/L	4040
Metribuzin	ug/L	0.004
2,6-Diethylaniline	ug/L	0.003
Trifluralin	ug/L	0.002
Ethalfluralin	ug/L	0.004
Phorate	ug/L	0.002
Terbacil	ug/L	0.007
Linuron	ug/L	0.002
Methyl parathion	ug/L	0.006
EPTC	ug/L	0.002
Pebulate	ug/L	0.004
Tebuthiuron	ug/L	0.01
Molinate	ug/L	0.004
Ethoprop	ug/L	0.003
Benfluralin	ug/L	0.002
Carbofuran	ug/L	0.003
Terbufos	ug/L	0.01
Propyzamide	ug/L	0.003
Disulfoton	ug/L	0.02
Triallate	ug/L	0.001
Propanil	ug/L	0.004
Carbaryl	ug/L	0.003
Thiobencarb	ug/L	0.002
DCPA	ug/L	0.002
Pendimethalin	ug/L	0.004
Napropamide	ug/L	0.003
Propargite	ug/L	0.01
Azinphos-methyl	ug/L	0.001
cis-Permethrin	ug/L	0.005
m-Xylene plus p-xylene	ug/L	0.2
Specific conductance	ug/L	227
Acid neutralizirig capacity	ug/L	1
Diazinon-d10	ug/L	104
alpha-HCH-d6	ug/L	85.5
1,2-Dichloroethane-d4, surrogate	ug/L	106
Toluene-d8, surrogate	ug/L	103
1-Bromo-4-fluorobenzene	ug/L	87.8

Regional Ground Water Quality: Gloucester and Cumberland Counties, New Jersey
(Source: USGS Water Quality Database)

USGS Woll OU02, Station Number 392920075011901, Vineland, NJ - Cumberland County									
Parameter	Unit	Concentration							
		9/24/1996	9/24/1996	9/24/1996	9/24/1996	12/18/1996	12/18/1996	12/18/1996	9/13/1999
Temperature	dec C						15.8	15.9	20
Barometric Pressure	mm Hg						756		763
Specific conductance	ms/cm						232	236	250
Dissolved Oxygen	mg/L						6.3	5.7	6
pH							4.4	4.5	4.4
Bicarbonate	mg/L						0		
Ammonia	mg/L						≤.01	≤.01	≤.02
Nitrite	mg/L						≤.010	0.01	≤.010
Ammonia	mg/L						0.04	≤.20	0.1
Nitrite	mg/L						4.3	4.3	2.77
Phosphorus	mg/L						≤.01		
Orthophosphorus	mg/L						≤.01	≤.01	≤.01
Organic Carbon	mg/L						0.9	0.9	0.9
Calcium	mg/L						8.5	8.6	10.1
Magnesium	mg/L						3.4	3.6	4.21
Sodium	mg/L						25	23	23.5
Potassium	mg/L						3	2.9	3.89
Chloride	mg/L						26		43.2
Sulfate	mg/L						38		27
Fluoride	mg/L						≤.1		≤.1
Silica	mg/L						4.9	5	6
Arsenic	ug/L							≤1	≤1
Barium,	ug/L							82	116
Beryllium	ug/L							≤1.00	
Boron	ug/L							44	
Cadmium	ug/L							≤1.00	≤1.0
Chromium	ug/L							2	≤1.0
Cobalt	ug/L							4	
Copper	ug/L							≤1.0	1.5
Iron	ug/L						23	4	≤10
Lead	ug/L							≤1.00	≤1
Manganese	ug/L						30	30	36.8
Molybdenum	ug/L							≤1.0	
Nickel	ug/L							3	
Silver	ug/L							≤1.0	≤1.0
Strontium	ug/L							23	
Zinc	ug/L							6	23
Antimony	ug/L							≤1.00	
Aluminum	ug/L							315	470
Selenium	ug/L								1
Gross beta	pCi/L								25.6
Propachlor	ug/L						≤.007		≤.007
Butylate	ug/L						≤.002		≤.002
Bromacil	ug/L						≤.04		
Simazine	ug/L						Est.≤.004		≤.005
Prometon	ug/L						≤.02		≤.02
CIAT	ug/L						≤.002		≤.002
Cyanazine	ug/L						≤.004		≤.004
Fonofos	ug/L						≤.003		≤.003
Gross Alpha	pCi/L								35.4
Ra-226,	pCi/L							0.42	
Uranium	ug/L							≤1.00	
Dibromomethane	ug/L					≤.10			
Bromodichloromethane	ug/L					≤.10			≤.1
Tetrachloromethane	ug/L					≤.05			≤.2
1,2-Dichloroethane	ug/L					≤.1			≤.2
Tribromomethane	ug/L					≤.20			≤.2

Regional Ground Water Quality: Gloucester and Cumberland Counties, New Jersey
(Source: USGS Water Quality Database)

USGS Well QU02 Station Number 392920075011901 Vineland, NJ - Cumberland County									
Parameter	Units	Concentration							
		9/24/1996	9/24/1996	9/24/1996	9/24/1996	12/18/1996	12/18/1996	12/18/1996	9/13/1999
Debromochlormethane	ug/L					≤.1			≤.2
Trechloromethane	ug/L					Est.≤.04			≤.1
Toluene	ug/L					≤.05			≤.1
Benzene	ug/L					≤.05			≤.1
Acrolien	ug/L					≤2			
Acrylonitrile	ug/L					≤2			
Alpha-HCH	ug/L						≤.002		≤.002
Chlorobenzene	ug/L					≤.05			≤.1
Chloroethane	ug/L					≤.1			
Ethylbenzene	ug/L					≤.05			≤.1
Hexachloroethane	ug/L					≤.1			
Bromomethane	ug/L					≤.1			
Chloromethane	ug/L					≤.2			
Dichloromethane	ug/L					≤.1			≤.2
Tetrachloroethene	ug/L					≤.1			≤.1
Trichlorofluoromethane	ug/L					≤.10			≤.2
1,1-Dichloroethane	ug/L					≤.05			≤.1
1,1-Dichloroethene	ug/L					≤.10			≤.1
1,1,1-Trichloroethane	ug/L					≤.05			≤.1
1,1,2-Tetrachloroethane	ug/L					≤.10			
1,1,2,2-Tetrachloroethane	ug/L					≤.10			
1,2-Dichlorobenzene	ug/L					≤.05			≤.1
1,2-Dichloropropane	ug/L					≤.05			≤.1
1,2-Dichloroethene	ug/L					≤.05			≤.1
1,2,4-Trichlorobenzene	ug/L					≤.2			
1,3-Dichlorobenzene	ug/L					≤.05			≤.1
1,4-Dichlorobenzehe	ug/L					≤.05			≤.1
p,p'-DDE,	ug/L						≤.006		≤.006
Dichlorodofluoromethane	ug/L					≤.2			≤.2
Naphthalene,	ug/L					≤.2			
tran≤-1,3-Dichloropropene	ug/L					≤.10			
cis-1,3-Dichloropropene	ug/L					≤.10			
Dicamba	ug/L						≤.04		
Linuron	ug/L						≤.02		
MCPA	ug/L						≤.05		
MCPB	ug/L						≤.04		
Methiocarb	ug/L						≤.03		
Propoxur	ug/L						≤.04		
Bentazon	ug/L						≤.01		
2,4-DB	ug/L						≤.04		
Fluometuron	ug/L						≤.04		
Oxamyl	ug/L						≤.02		
Chlorpyrifos	ug/L						≤.004		≤.004
Vinyl Chloride	ug/L					≤.1			≤.2
Trichloroethene	ug/L					≤.05			≤.1
Aldrin	ug/L						≤.01		
Lindane	ug/L						≤.004		≤.004
Chlordane	ug/L						≤.1		
p,p'-DDD	ug/L						≤.01		
p,p'-DDE	ug/L						≤.01		
p,p'-DDT	ug/L						≤.01		
Dieldrin	ug/L						0.06		0.108
Endrin	ug/L						≤.01		
Toxaphene	ug/L						≤1		
Heptachlor	ug/L						≤.01		
Metolachlor	ug/L						≤.002		≤.002
Heptachlorepoxide	ug/L						≤.01		

Regional Ground Water Quality: Gloucester and Cumberland Counties, New Jersey
(Source: USGS Water Quality Database)

USGS Well OU02, Station Number 392920075011901, Vineland, NJ, Cumberland County									
Parameter	Units	Concentration							
		9/24/1996	9/24/1996	9/24/1996	9/24/1996	12/18/1996	12/18/1996	12/18/1996	9/13/1999
PCBs	ug/L						≤.1		
Malathion	ug/L						≤.005		≤.005
Parathion	ug/L						≤.004		≤.004
Diazinon	ug/L						≤.002		≤.002
Atrazine	ug/L						≤.001		≤.004
Hexachlorobutadiene	ug/L					≤.2			
Picloram	ug/L						≤.01		
2,4-D	ug/L						≤.01		
2,4-D	ug/L						≤.04		
2,4,5-T	ug/L						≤.01		
2,4,5-T	ug/L						≤.04		
Mirex	ug/L						≤.01		
Silvex	ug/L						≤.01		
Silvex	ug/L						≤.02		
Alachlor	ug/L						≤.002		≤.002
Triclopyr	ug/L						≤.05		
Propham	ug/L						≤.04		
Acetochlor	ug/L						≤.002		≤.002
Picloram	ug/L						≤.05		
Oryzalin	ug/L						≤.02		
Norflurazon	ug/L						≤.02		
Neburon	ug/L						≤.01		
1-Naphthol	ug/L						≤.01		
Methomyl	ug/L						≤.02		
Fenuron	ug/L						≤.01		
Esfenvalerate	ug/L						≤.02		
2Methyl4,6dinitrophenol	ug/L						≤.04		
Diuron	ug/L						≤.02		
Dinoseb	ug/L						≤.04		
Dichlorprop	ug/L						≤.03		
Dichlobenil	ug/L						≤.02		
Dacthalmonoacid	ug/L						≤.02		
Clopyralid	ug/L						≤.05		
Chlorothalonil	ug/L						≤.04		
Hydroxycarbofuran	ug/L						≤.01		
Carbofuron	ug/L						≤.03		
Carbaryl	ug/L						≤.008		
Bromoxynil	ug/L						≤.04		
Aldicarb	ug/L						≤.02		
Aldicarb sulfone	ug/L						≤.02		
Aldicarbsulfoxide	ug/L						≤.02		
Acifluorfen	ug/L						≤.04		
Methylacrylate	ug/L					≤2			
Tetramethylbenzene	ug/L					≤.1			
1,2,3,5-Tetramethylbenzene	ug/L					≤.1			
Bromoethene	ug/L					≤.1			
t-Butylethylether	ug/L					≤.10			≤.1
Methyltertpentylether	ug/L					≤.1			≤.2
Turbidity	NTU							0.2	4.1
Chlorambenmethylester	ug/L						≤.01		
Solids	mm	0.6	0.5	0.4	0.4				
Solids	mm	1.4	1.5	1.1	0.9				
Solids,	mm	2.4	3.1	2	1.4				
Bromide	mg/L						0.08		
Mercury	ug/L							0.2	≤.1
trans-1,4-Dichlorpbutene	ug/L					≤5.0			
Ethylmethacrylate	ug/L					≤1.0			

Regional Ground Water Quality: Gloucester and Cumberland Counties, New Jersey
(Source: USGS Water Quality Database)

USGS Well QU02, Station Number 392920075111901, Vineland, NJ, Cumberland County

Parameter	Units	Concentration							
		9/24/1996	9/24/1996	9/24/1996	9/24/1996	12/18/1996	12/18/1996	12/18/1996	9/13/1999
Alpha radioactivity	pCi/L								6.8
Beta radioactivity	pCi/L								5.3
Ra-228	pCi/L							1.4	
Ra-226	pCi/L							0.07	
Rn-222	pCi/L							36	
Carbon disulfide	ug/L					≤.05			
Vinyl acetate	ug/L					≤5			
cis-1,2-Dichloroethene	ug/L					≤.05			≤.1
Methyl n-butylketone	ug/L					≤5.0			
Styrene	ug/L					≤.05			≤.1
Xylene	ug/L					≤.05			≤.1
1,1-Dichloropropene	ug/L					≤.05			
2,2-Dichloropropane	ug/L					≤.05			
1,3-Dichldropropane	ug/L					≤.1			
Ethyltoluene	ug/L					≤.05			
1,2,3-Trimethylbenzene	ug/L					≤.1			
1,2,4-Trimethylbenzene	ug/L					≤.05			
Isopropylbenzene	ug/L					≤.05			
n-propylbenzene	ug/L					≤.05			
1,3,5-Trimethylbenzene	ug/L					≤.05			
2-Clorotoluene	ug/L					≤.05			
4-Chlorotoluene	ug/L					≤.05			
Bromochloromethane	ug/L					≤.10			
n-Butylbenzene	ug/L					≤.1			
sec-Butylbenzene	ug/L					≤.05			
tert-Butylbenzene	ug/L					≤.05			
4-Isopropyltoluene	ug/L					≤.05			
Iodomethane	ug/L					Má			
1,2,3-Trichloropropane	ug/L					≤.2			
1,1,1,2-Tetrachloroethane	ug/L					≤.05			
1m2m3-Trechlorobenzene	ug/L					≤.2			
1,2-Dibromoethane	ug/L					≤.10			
CFC-113	ug/L					≤.05			≤.1
Methyl-t-butylether	ug/L					0.3			0.4
Chloropropene	ug/L					≤.1			
Isobutylmethylketone	ug/L					≤5.0			
Ra-228	pCi/L							6	
Acetone	ug/L					≤5			
Bromobenzene	ug/L					≤.05			
Di-ethylether	ug/L					≤.1			≤.2
Diisopropylether	ug/L								≤.2
Methylacrylonitrile	ug/L					≤2.0			
Ethylmethylketone	ug/L					≤5			
Methylmethacrylate	ug/L					≤1.0			
Tetrahydrofuran	ug/L					≤5			
Dicamba	ug/L						≤.01		
Dichlorprop	ug/L						≤.01		
Rn-222	pCi/L							300	
p,p'-Ethyl-DDD	ug/L						≤.1		
p,p'-Metfioxychlor	ug/L						≤.01		
alpha-Endosulfan	ug/L						≤.01		
PCNs	ug/L						≤.1		
Dibromochloropropane	ug/L					≤.5			
Metribuzin	ug/L						≤.004		≤.004
2,6-Di-ethylaniline	ug/L						≤.003		≤.003
Trifluralin	ug/L						≤.002		≤.002

APPENDIX F - LOCAL HYDROGEOLOGIC DATA

APPENDIX F - LOCAL HYDROGEOLOGIC DATA

Table F-1A Summary of Large Capacity Well Search Results
Table F-1B Summary of Well Search Results – Lower Capacity Wells
Figure F-1 - Locations of Large Capacity Water Supply Wells
Figure F-2 - Weil Restriction Area
City of Vineland Well Restriction Area
Figure F-3 - Ground Water Contours - Shallow Wells, July 2005
Figure F-4 - Ground Water Contours - Deep Wells, July 2005
Table F-2 July 2005 Quarterly Ground Water Sampling Results - On-site Wells
Table F-3 July 2005 Quarterly Ground Water Sampling Results - Off-site Wells
Ground Water Contaminant Isopleth Maps
- Figure F-5 TCE Concentration (ppb); Shallow Wells, April 2005
- Figure F-6 TCE Concentration (ppb); Deep Wells, April 2005
- Figure F-7 Total Chromium Concentration (ppb); Shallow Wells, April 2005
- Figure F-8 Total Chromium Concentration (ppb); Deep Wells, April 2005
- Figure F-9 Hexavalent Chromium Concentration (ppb); Shallow Wells, April 2005
- Figure F-10 Hexavalent Chromium Concentration (ppb); Deep Wells, April 2005

Table F-4 Ground Water/Suspended Solids Radiological Results - April 2004
June 9, 2005 Letter Report - Results of Ground Water Sampling (April 13, 2005)

Table F-1A
Summary of Large Capacity Well Search Results
Shieldalloy Metallurgical Corporation

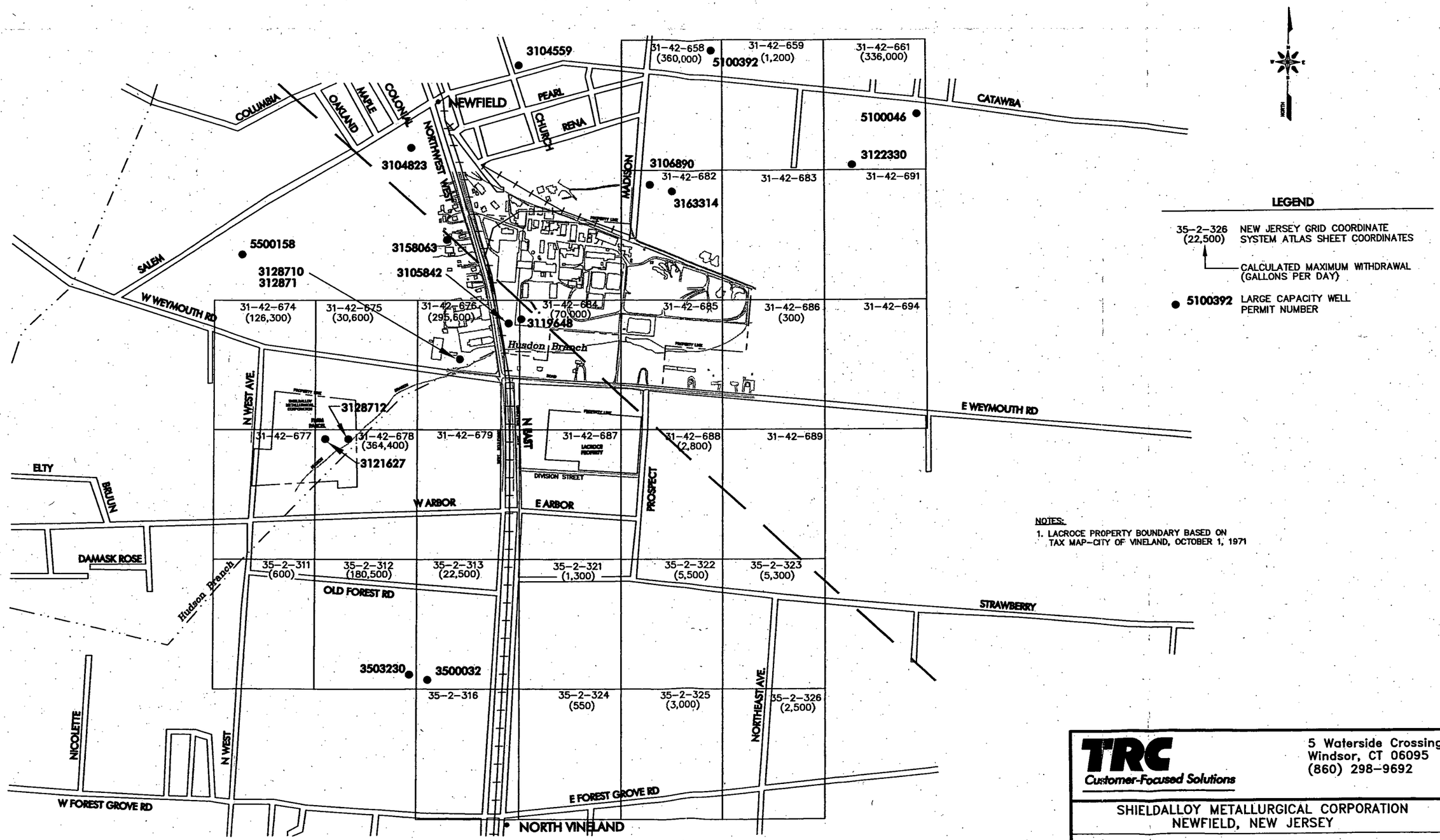
Number	Owner's Name	Permit Number	Local Identification	Latitude	Longitude	Distance / Direction (miles) / (Compass)	Well Depth (feet)	Pump Capacity (gpm)	Withdrawal Rate (gpd)
2237P	Shieldalloy Metalurgical Corp.	3119648	W9	393224	750120	0.30/SW	130	100	70000
2237P	Shieldalloy Metalurgical Corp.	3105842	Layne	393224	750123	0.33/SW	47	100	30000
2237P	Shieldalloy Metalurgical Corp.	3128710	RW6S	393220	750128	0.43/SW	75	100	135000
2237P	Shieldalloy Metalurgical Corp.	3128711	RW6D	393220	750128	0.43/SW	125	100	130000
2237P	Shieldalloy Metalurgical Corp.	3128712	RIW2	393213	750143	0.69/SW	75	200	220000
5147	Newfield Borough Water Dept	3104559	3	393254	750121	0.54/NW	162	400	265000
5147	Newfield Borough Water Dept	5100046	5	393246	750031	0.59/NE	140	500	335000
CU0029	Sepers Nursery	5500158	Well 5	393232	750157	0.84/W	85	300	108000
CU0129	Petronglo Farms, Inc.	3121627	Well 6	393213	750146	0.73/SW	100	350	126000
CU105R	Lopergolo, Mike	3500032	Well 1	393147	750143	0.89/SW	129	90	21,600*
GL0048	Pine Grove Camp, Inc.	3503230	Well 1	393148	750145	0.91/SW	100	500	180000
GL0182	Leshay Farms, Samuel	3104823	Well 2	393243	750132	0.59/NW	130	1000	360000
GL0182	Leshay Farms, Samuel	5100392	Well 1	393253	750045	0.49/N	104	1000	360000
	Leshay Farms, Samuel**	3122330	Well 3	393241	750035	0.43/NE	130		
	Leshay Farms, Samuel**	3158063	Well 4	393233	750128	0.45/NW	100		
	Leshay Farms, Samuel**	3163314	Well 5	393238	750059	0.20/N	109		
	Leshay Farms, Samuel**	3106890	Well 6	393239	750102	0.22/NW	100		

Notes:
Source: NJDEP - Water Supply Element, Bureau of Water Allocation; Large Capacity (100,000 GPD) Well Search Within 5 Miles of Site Focus; Performed on 3/17/00
Number field indicates either a Water Allocation Permit, Agricultural Certification, or Registration Number
Distance field indicates the distance in miles between the well current slag pile.
Direction field indicates compass direction from the search focus.
Withdrawal rate for Shieldallow Metalurgical Corp. wells based on ground water remediation system operation records
Withdrawal rates for Newfield Borough Water Dept wells based on repprts by Mr. Jack Harris, Water Department Superintendant, Borough of Newfield
* Maximum pumping rate from well permit
** Information provided to TRC by NJDEP July 26, 2004

Table F-1B
Summary of Well Search Results - Lower Capacity Wells[1]
Shieldalloy Metallurgical Corporation

Permit Number	Install Date	Well Owner	Owner's Address	Well Location Address	Atlas Sheet Coordinates	Well Location Lot/Block	Screen Diameter	Screened Interval (FBG)	Average Withdrawal (GPD)	Maximum Pumping Rate (GPD)	Specific Capacity (GPM/FT)	Pump Capacity (GPM)	Well Usage
Sheet 31													
31-6890	4/18/1973	Leshay Bros.	Newfield	Catawba Ave	31 42 658		6	70-100			50		Irrigation
31-31660	8/29/1989	Sam Le Shay	Catawba Ave., Newfield	Same	31 42 659	17/24	4	75-85			1.58		Domestic
31-31859	8/29/1989	Sam Le Shay	Catawba Ave., Newfield	Same	31 42 659	18a/24	4	80-90			1.58		Domestic
31-20606	3/20/1964	D&M Builders	596 Clayton Rd., Franklin Twp.		31 42 661	3c/519	2	55-59	500	500		9	Domestic
31-20755	7/20/1984	D&M Builders	596 Clayton Rd., Franklin Twp.		31 42 661	3d/519	2	54-58	500	500		8	Domestic
31-21627	6/12/1984	Carman Petronglo	5014 N. Delsea Drive, Vineland		31 42 674	13/83	5	40-60				350*	Irrigation
31-28468	5/20/1989	Sel Finkelstein	882 S. Spring Rd, Vineland		31 42 674	1.05/43	2	145-150	150	300		10	Domestic
31-19465	9/18/1982	James Bringer	555 E. Elm Rd., Vineland		31 42 875	3/968	4	75-85				15	Domestic
31-143	5/15/1950	Gue Haussr	Weymouth Rd., Newfield		31 42 675		4	140-150		30,000	25	NI	Irrigation
31-49153	4/27/1996	Eugene Magliocco	756 Strawberry Ave., Vineland	Same	31 42 676	4/6901	4	90-100				12	Domestic
31-19723	4/5/1983	Petronglo Farms	5014 N. Delsea Drive, Newfield		31 42 678	10/83	6	42-82					Inigation
31-9125	8/14/1975	J. Ruberto	605 W. Arbor Ave., Vinelarid	Arbor Ave/West Ave	31 42 678		2	51-61	300	400		60	Domestic
31-23513	9/12/1985	Bruce Wean	R.D. 1 Box 511 W. Garden Rd.	Pottsgrove Twp.	31 42 678	46/67	3	62-72				50	Inigation
31-6092	11/3/1969	Borough ot Newfield	Borough Hall, Newfield	Main St., Newfield	31 42 685		10	129-149			21.91	500	Public Supply
31-13812	6/13/1978	Krykory Torgover	Weymouth Rd., Vineland	Same	31 42 686	6b/581	2	53-58	200	300			Domestic
31-21871	9/1/1984	Newlin Caudill	Aura Willow Grove Rd.	Weymouth Rd.	31 42 688		4	90-100	500	600		12	Domestic
31-21871	9/26/1984	Newlin Caudill	Aura Willow Grove Rd.	Weymouth Rd.	31 42 688	6c/581	4	80-90	500	600		16	Domestic
31-19468	9/27/1982	Richard Krason	3151 North East Ave., Vineland	East Avenue	31 42 688		3	70-80				15	Domestic
31-1066	7/10/53	Louis Pelts	Prospect Ave., Vineland	Same	31 42 688		4	45-51	500	600		10	Domestic and Poultry
31-1133	9/12/1953	Alfred Osterman	Arbor Ave., Vineland	Same	31 42 688		4	65-71	300	400	5 5	10	Domestic
Sheet 55													
35-12130	7/15/1991	Frank Marchisella	3183 N. East Blvd, Vineland	Same	35 02 311	12/114	4	90-100				11	Domestic
35-2734	1/1982	Gene Brenner	Arbor Ave, Vineland	Same	35 02 312		2	65-70	200	500		12	Domestic
35-3230	4/12/1982	Joseph Petronglo Jr.	4724 N. Delsea Dr.	West Ave	35 02 312		3	34-64				500*	Inigation
35-32	7/12/1950	Frank Russo	West Blvd, N. Vineland	Same	35 02 313		4	99-129		21600	8.25	80	Irrigation
35-4248	7/1/1984	Bob Carpenter	168 Arbor Ave., Vineland	Same	35 02 313	8/83	2	80-95				10	Domestic
35-75	3/5/1952	Joseph Girardi	E. Blvd & Strawberry Ave., Vineland	Same	35 02 313		4	25.5-31.5	300	300		8	Domestic
35-14281	8/18/1993	John Rugglano	311 Baylor Ave., Vineland	Strawbeny Ave.	35 02 321	24.03/114	4	80-90					Return
35-1653	5/10/1978	Ronald Jacobson	181 Strawbeny Ave		35 02 321		3	84-94	200	400			Domestic
35-18262	12/14/1997	W. Serad	745 Strawbeny Ave.	Same	3S 02 321	67/7004	4	80-100				12	Domestic
35-5352	2/24/1986	Leo Palmpnal	3127 N.E. Blvd		35 02 321	10/114	4	80-90	150	300			Domestic
35-11946	5/16/1991	Richard Bruno	3120 N. East Ave., Vineland	Same	35 02 322	28/114	4	85-106	400	600		25	Domestic
35-12625	1/7/1992	Richard Lorenzini	3181 N. East Ave., Vineland	Same	35 02 322	20/121	4	80-100	400	500		10	Domestic
35-13775	8/16/1993	John & Margaret Rugglano	311 Baylor Ave., Vineland	Strawberry Ave.	35 02 322	24.03/114	4	85-95				25	Domestic
35-14414	9/27/94	Richard Linn	1069 Linda Lane, Vineland	Strawberry Ave.	35 02 322	24.02/114	4	108-118	500	750		20	Domestic
35-14783	4/11/1985	Wells Cornell	1022 Holmes Ave, Vineland	Strawberry Ave.	35 02 322	24.03/114	4	73-83	S00	1800	2 08		Domestic
3S-15257	9/27/1994	Richard Linn	1019 Linda Lane, Vineland	Strawbeny Ave.	35 02 322	24.02/114	4	100-110					Heat Pump Discharge
35-3132	2/2/1982	Daniel S. Falasca	Box 127 Morris Ave.	Strawberry Ave.	35 02 322		3	69-79				16	Domestic
35-3133	2/2/1982	Daniel S. Falasca	Box 127 Monis Ave.	Strawberry Ave.	35 02 322		3	69-79				16	Domestic
35-06267	5/15/1987	KDR Contractors	PO Box 2370, Vineland		35 02 323	32.01/114	2	84-90	500	600		10	Domestic
35-10153	1/24/1990	James Schrier	560 E. Forest Grove Rd.	Same	35 02 323	11/121	4	115-130				15	Domestic
35-12597	11/13/1992	Phil Schreiber	935 Magnolia Rd	N. E. Ave	35 02 323	32/114	4	80-90				25	Domestic
35-12842	3/21/1992	Louis Dalesandro	3005 N. East Ave., Vineland	Same	35 02 323	15/121	4	58-68	500	1800		12	Domestic
35-13276	8/28/1992	Charles Schaser	3176 N. East Ave., Vineland	Same	35 02 323		4	110-120	400	600		20	Domestic
35-3611	3/17/1983	Charles R. Johnson	741 Strawberry Ave.		35 02 323	1B/583	2	120-127					Domestic
35-4916	9/14/1985	Robert Petronglo	2060 Weymouth Rd.		35 02 323	1/46	4	125-135	200	500		25	Domestic
35-08272	2/15/1989	Garden Homes	N. Delsea Dr. / Garden Rd.	Forest Grove Rd.	35 02 324	32 02/114	4	73-83	150	150	1.1	11	Domestic
35-13626	12/23/1992	Mary H. Gamba	3095 North East Blvd. Vineland	Same	35 02 324	9/114	2	88-88	300	400	7.8	10	Domestic
35-05892	5/20/1987	Daniel McDennott	2668 Division St, Vineland	Same	35 02 325	34/114	2	78-85					Domestic
35-14509	12/17/1993	Philo & Maxine Chapman	2388 N. East Ave	Same	35 02 325	5/127	4	80-80	400	600		15	Domestic
35-15381	10/31/1994	Mary C. Meyer-Bowen	855 E. Forest Grove Rd., Vineland	Same	35 02 325	4/128	4	86-86	400	600		10	Domestic
35-17000	6/21/1996	Audrey McDermott	330 Grove Road, Vineland	Same	35 02 325	35/114	4	73-83				20	Domestic
35-17367	1/20/1997	Edward & Bridget Conrow	311 Central Ave, Vineland	Forest Grove Rd.	35 02 325	1/124	4	80-100				25	Domestic
35-15575	1/20/1995	Steven Gatler	267 E. Forest Grove Rd.	Same	35 02 326	6/123	4	76-85	300	400		8	Domestic
35-02260	4/1/1981	Richard McDermott	Division Street		35 02 326		2	71-76	200	500		18	Domestic
35-3929	11/15/1984	William Sirawatka			35 02 326	9.10/121	2	72-79				NI	Domestic
35-07901	7/2/1988	Lottie Reed Jones	304 E. Forest Grove Rd.	Same	35 02 326	36/114	4	90-100	500	750		11	Domestic

[1] Source: NJDEP - Water Supply Element, Bureau of Water Allocation; Well Permit Search Within 1 Mile of Site Focus; Performed March 2000
NI - Pump not installed
* - Pump capacity reported in Large Capacity Well Search



LEGEND

35-2-326 (22,500) — NEW JERSEY GRID COORDINATE SYSTEM ATLAS SHEET COORDINATES; CALCULATED MAXIMUM WITHDRAWAL (GALLONS PER DAY)

● 5100392 — LARGE CAPACITY WELL PERMIT NUMBER

NOTES:

1. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971

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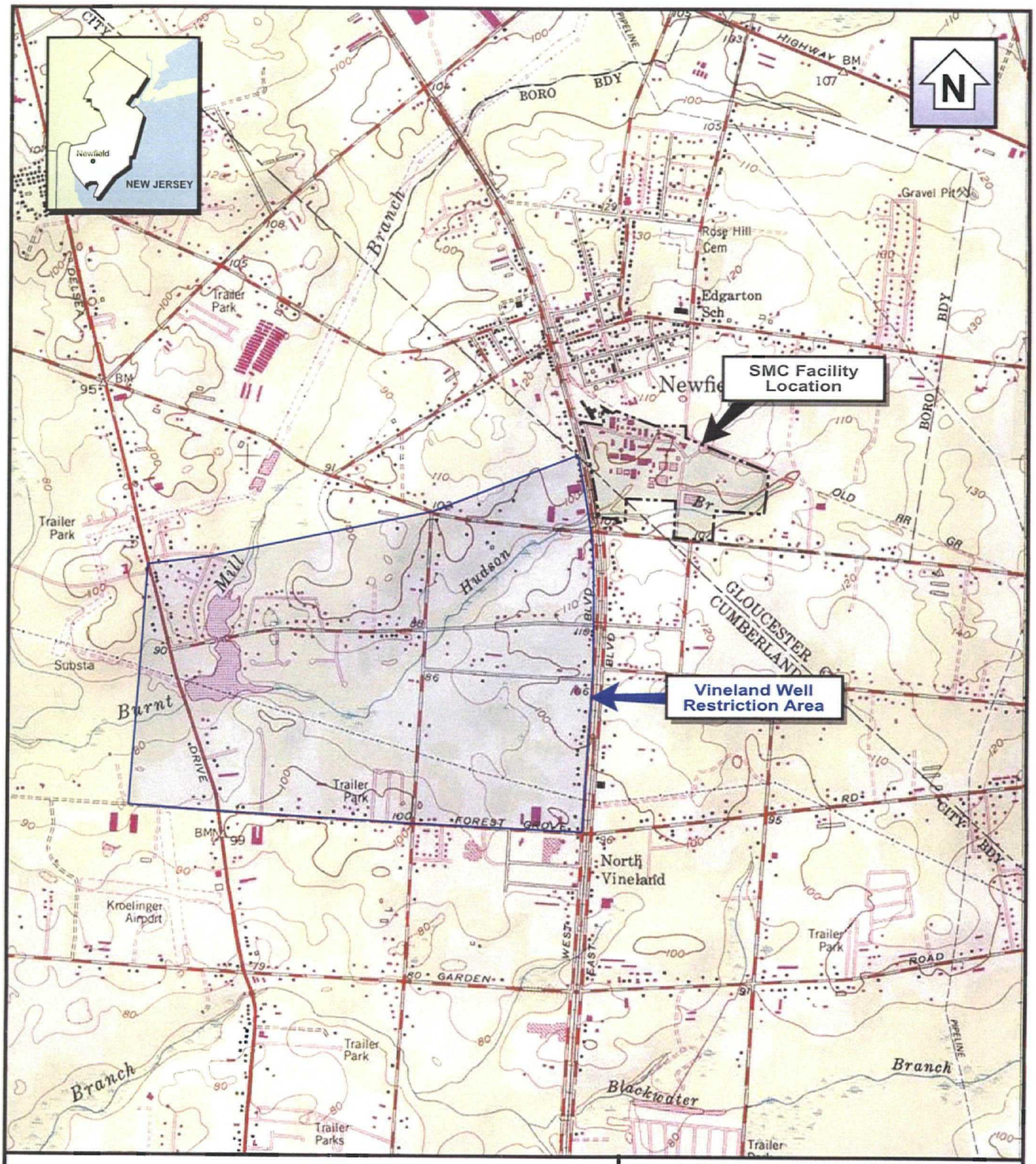
NEWFIELD, NEW JERSEY

FIGURE F-1
LOCATION OF HIGH-CAPACITY WATER SUPPLY WELLS

Date: 04/05 | Project No. 26770-0100-00000

\26770\0100\Figure F-1



0 2000
SCALE FEET

0 1
SCALE 1:24000 MILE

BASE CREATED WITH TOPO™ © 1996 WILDFLOWERS PRODUCTIONS, www.topo.com
7.5' USGS TOPOGRAPHIC MAP

PERS/JW/HAZ/SMC/WELL RESTRICTION.fh10

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FIGURE F-2
LOCATION OF VINELAND WELL RESTRICTION AREA

Date: 04/05 | **Project No.** 26770-0100-00000

CITY OF VINELAND
WATER-SEWER UTILITY

FACSIMILE COVER SHEET

DATE: 6-3-91 FAX NO: 697-9025

TO: Shirley Allot

ATTENTION: Mr. Jim Valente

FROM: Paul Horner

TOTAL NUMBER OF SHEETS INCLUDING COVER SHEET: 02

COMMENTS: Description of Well Restriction Area in North Vineland

FAX # 609-794-6181

TEL # 609-794-4056

WHEREAS, the State legislature has provided, in N.J.S. 40:65-52, et seq., for local ordinances requiring mandatory connection with water systems, and the State of New Jersey, Department of Environmental Protection, has ordered mandatory sealing of wells in accordance with N.J.S.A. 58:4A-4.1 et seq., and N.J.S.A. 58:12A-1 et seq.;

NOW, THEREFORE, BE IT ORDAINED by the City Council of the City of Vineland, County of Cumberland, and State of New Jersey, as follows:

1. All buildings located upon a street in which the public water supply main is constructed in the area designated by the State of New Jersey, Department of Environmental Protection, identified in Section 2 of this Ordinance, shall be connected with the public water supply main, and the private water supply well shall be permanently sealed.

2. All private water supply wells in the following area shall be sealed pursuant to mandatory order issued by the State Department of Environmental Protection, and the City of Vineland shall contract therefor upon connection of all properties to the Municipal Water Utility's distribution mains in said area: N. West Avenue, from Weymouth Road to Forest Grove Road; W. Arbor Avenue, from N.J. Route No. 47 (Delsea Drive) to N. West Boulevard; Old Forest Road, from N. West Avenue to N. West Boulevard; W. Forest Grove Road, from 1,225 feet west of N.J. Route No. 47 (Delsea Drive) to N. West Boulevard; N.J. Route No. 47, from W. Forest Grove Road to 1,200 feet north of W. Arbor Avenue; N. West Boulevard, from W. Forest Grove Road to City Limit; W. Weyncurh Road, from 210 feet west of N. West Avenue to N. West Boulevard: Garrow Avenue, from W. Arbor Avenue to Bity Avenue; Bity Avenue, from Garrow Avenue to Bruun Avenue; Bruun Avenue, from Bity Avenue to W. Arbor Avenue; Burnt Mill Road, from W. Arbor Avenue to Regina Elena Avenue; Tess Court, from Burnt Mill Drive to cul-de-sac; Regina Elena Avenue, from Burnt Mill Drive to easterly terminus.

LEGEND

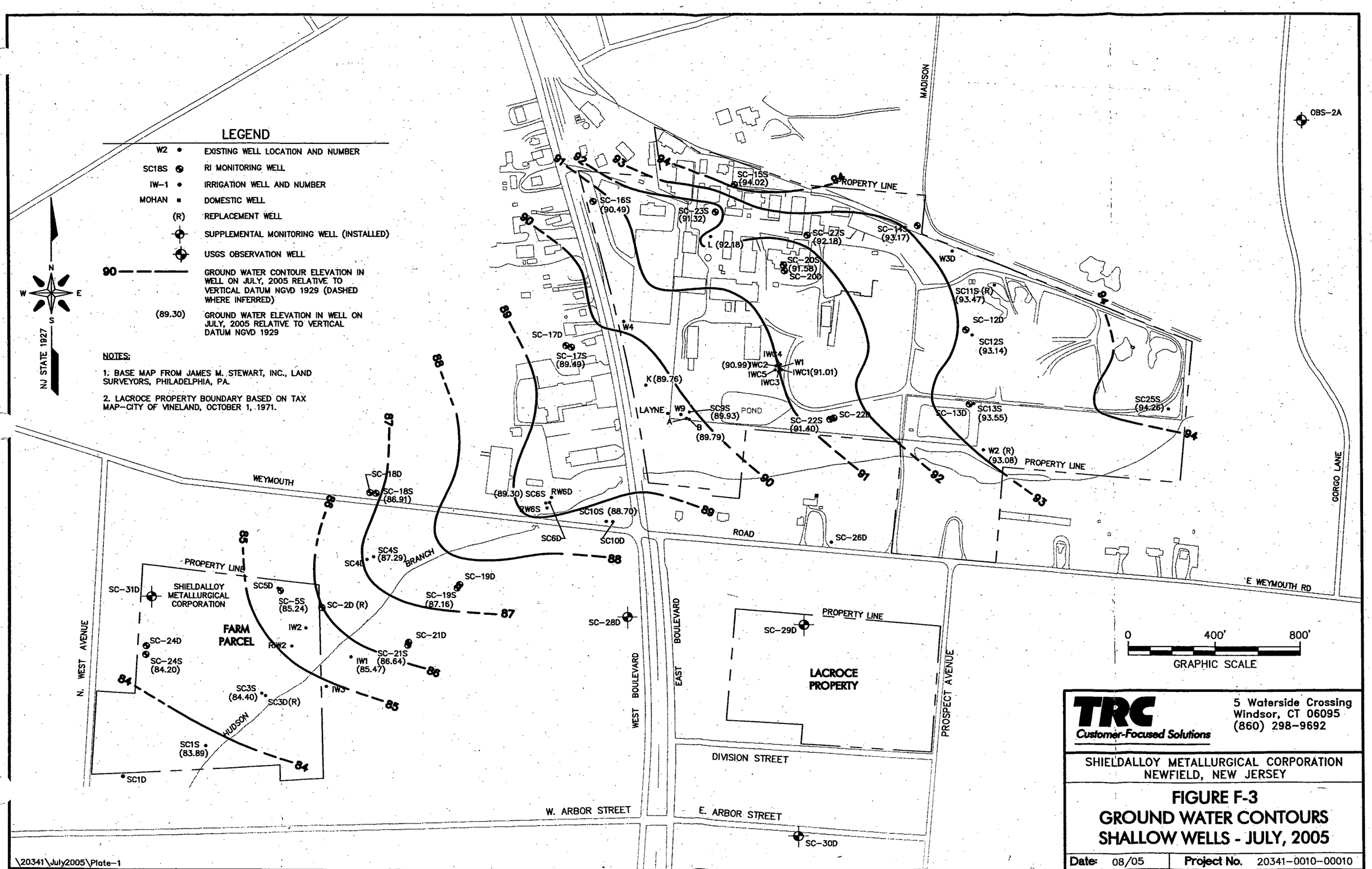
W2 •	EXISTING WELL LOCATION AND NUMBER
SC18S	RI MONITORING WELL
IW-1 •	IRRIGATION WELL AND NUMBER
MOHAN ■	DOMESTIC WELL
(R)	REPLACEMENT WELL
	SUPPLEMENTAL MONITORING WELL (INSTALLED)
	USGS OBSERVATION WELL
90 — — —	GROUND WATER CONTOUR ELEVATION IN WELL ON JULY, 2005 RELATIVE TO VERTICAL DATUM NGVD 1929 (DASHED WHERE INFERRED)
(89.30)	GROUND WATER ELEVATION IN WELL ON JULY, 2005 RELATIVE TO VERTICAL DATUM NGVD 1929

NJ STATE 1927

NOTES:

1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA.

2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971.



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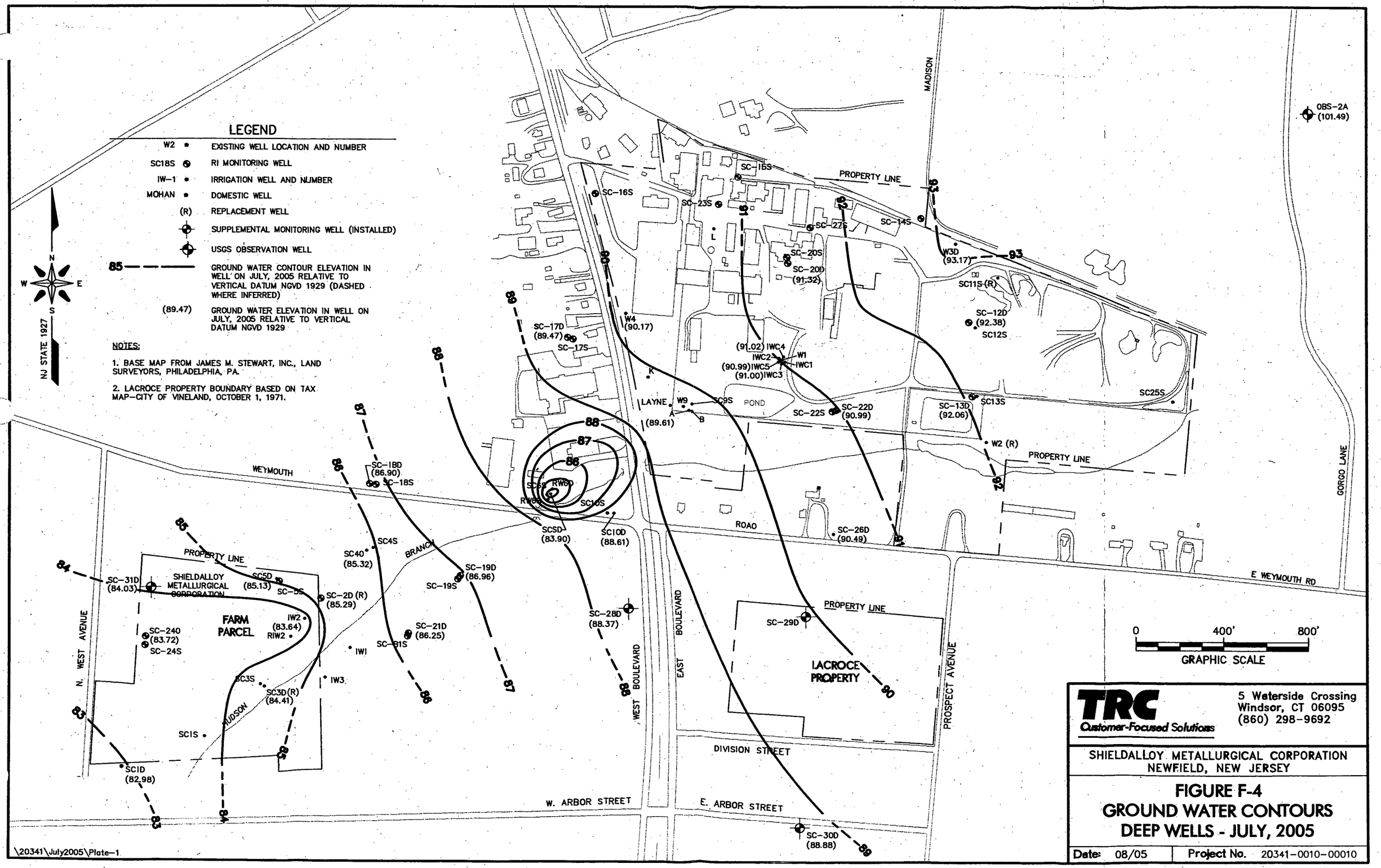
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE F-3
GROUND WATER CONTOURS
SHALLOW WELLS - JULY, 2005

Date: 08/05	Project No. 20341-0010-00010

\20341\July2005\Plate-1


LEGEND
W2 EXISTING WELL LOCATION AND NUMBER
SC18S RI MONITORING WELL
IW-1 IRRIGATION WELL AND NUMBER
MOHAN DOMESTIC WELL
(R) REPLACEMENT WELL
SUPPLEMENTAL MONITORING WELL (INSTALLED)
USGS OBSERVATION WELL
85 GROUND WATER CONTOUR ELEVATION IN WELL ON JULY, 2005 RELATIVE TO VERTICAL DATUM NGVD 1929 (DASHED WHERE INFERRED)
(89.47) GROUND WATER ELEVATION IN WELL ON JULY, 2005 RELATIVE TO VERTICAL DATUM NGVD 1929
NOTES:
1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA.
2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971.
N
W
E
S
NJ STATE 1927
OBS-2A (101.49)
MADISON
PROPERTY LINE
SC-15S
SC-16S
SC-23S
SC-27S
SC-14S
SC-20S
SC-20D (91.32)
W3D (93.17)
SC11S (R)
SC-12D (92.38)
SC12S
SC-17D (89.47)
SC-17S
W4 (90.17)
(91.02) IWC4
IWC2
W1
IWC1
(90.99) IWC5
(91.00) IWC3
LAYNE
W9
SC9S
POND
(89.61)
SC-22S
SC-22D (90.99)
SC-13D (92.06)
SC13S
SC25S
W2 (R)
PROPERTY LINE
WEYMOUTH
SC-18D (86.90)
SC-18S
SC6S
RW6D
RW6S
SC10S
SCSD (83.90)
SC10D (88.61)
ROAD
SC-26D (90.49)
GORGO LANE
E. WEYMOUTH RD
SC4S
SC40 (85.32)
BRANCH
SC-19D (86.96)
SC-19S
PROPERTY LINE
SC-31D (84.03)
SHIELDALLOY METALLURGICAL CORPORATION
SC5D (85.13)
SC-5S
SC-2D (R) (85.29)
FARM PARCEL
IW2 (83.64)
RIW2
SC-240 (83.72)
SC-24S
IW1
SC-21D (86.25)
SC-21S
SC-28D (88.37)
PROPERTY LINE
SC-29D
LACROCE PROPERTY
N. WEST AVENUE
WEST BOULEVARD
EAST BOULEVARD
PROSPECT AVENUE
SC3S
SC3D (R) (84.41)
IW3
HUDSON
SC1S
SC1D (82.98)
DIVISION STREET
W. ARBOR STREET
E. ARBOR STREET
SC-30D (88.88)
0 400' 800'
GRAPHIC SCALE
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SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
FIGURE F-4
GROUND WATER CONTOURS
DEEP WELLS - JULY, 2005
Date: 08/05
Project No. 20341-0010-00010
\20341\July2005\Plate-1

TABLE F-2
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NJ
GROUND WATER ANALYTICAL RESULTS
ONSITE WELLS
JULY 2005

WELL NUMBER, SCREENED INTERVAL (FT)	A 114-124	B 36-46	K 36-46	SC34S(2) 36-46	L 42-52	IWC1 15-20	IWC2 35-40	IWCS 55-60	IWC4 75-80	IWC5 95-100	W2 (R) 2-17	W4 55-75	SC9S 15-30	SC11S (R) 9-24	SC12S 15-25	SC32S (1) 15-25	SC12D 126-136	SC13S 14.7-24.7	SC13D 127-137	SC14S 12-27	SC15S 12.5-27.5	SC16S 12-27	SC20S 7-22	SC20D 129-139	SC22S 3-18	SC22D 111-121	SC23S 9-24	SC25S 7-22	SC27S 7-22	W9 110-130	LAYNE 42-47	PLANT INFLUENT	PLANT EFFLUENT	TB071905	TB071905A	TB072005
PARAMETER																																				
VOCs (ug/L)																																				
Chloromethane	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Bromomethane	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Chloroethane	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
1,1-Dichloroethene	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
1,2-Dichloroethene (total)	U	U	0.28J	0.32J	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	0.55J	U	NA	NA	NA	NA	1.7	U	U	U	U
Acetone	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Carbon Disulfide	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Methylene Chloride	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
cis-1,2-Dichloroethene	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
2-6utanone	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Chloroform	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	0.5J	U	U	U	U
Benzene	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
1,4-Dichlorobenzene	U	U	21	21	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Trichloroethene	8.6	0.89J	3.8	3.8	NA	NA	0.74J	NA	NA	0.43J	NA	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	29	U	NA	NA	NA	NA	8.8	U	U	U	U
1,2-Dichloropropane	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Bromodichloromethane	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Toluene	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	34.1	NA	NA	NA	NA	U	U	U	U	U
1,1,2,2-Trichloroethane	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Chlorobenzene	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Tetrachloroethene	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	2	U	U	U	U
Ethylbenzene	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	607	NA	NA	NA	NA	U	U	U	U	U
Total Xylenes	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	0.92J	2830	NA	NA	NA	NA	U	U	U	U	U
Vinyl Chloride	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	U	U	NA	NA	NA	NA	U	U	U	U	U
Volatile TICs	U	U	U	U	NA	NA	U	NA	NA	U	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	9.56JN	6111.6JN	NA	NA	NA	NA	U	U	U	U	U
INORGANICS (ug/L)																																				
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	603	NA	NA	243	383	370	259	823	398	U	NA	NA	NA	NA	NA	NA	NA	429	NA	NA	NA	NA	NA	NA	NA	NA
Boron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	125	NA	NA	474	6200	5800	U	2620	U	1180	NA	NA	NA	NA	NA	NA	NA	6960	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (Total)	9210	336	785	749	98.6	NA	1140	NA	NA	338	15.3	NA	11.1	10.3	400	357	U	U	U	108	NA	NA	NA	NA	U	34600	415	U	NA	5150	1150	NA	NA	NA	NA	NA
Hexavalent Chromium	U	U	730	720	U	NA	980	NA	NA	33	14	NA	U	U	97	120	U	U	U	73	NA	NA	NA	NA	U	U	200	U	NA	5700	1200	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	U	NA	NA	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	19800	182000	56500	55300	13500	NA	147000	NA	NA	86800	2800	NA	86500	15600	170000	160000	2630	213000	3510	18500	NA	NA	NA	NA	42100	648000	35100	67000	NA	74300	126000	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	892	NA	NA	U	2160	2400	U	27100	U	U	NA	NA	NA	NA	NA	NA	NA	U	NA	NA	NA	NA	NA	NA	NA	NA
OTHER PARAMETERS (mg/L)																																				
pH	7.20	7.00	6.79	6.79	6.70	NA	7.70	NA	NA	11.00	7.32	NA	7.22	8.86	7.30	7.30	7.44	10.06	7.75	6.01	NA	NA	NA	NA	7.11	12.07	6.53	8.25	NA	7.62	7.09	6.85	7.68	NA	NA	NA
Sulfate	46.8	207	11.1	10.5	5.0	NA	85.6	NA	NA	4.8	6.7	NA	64.6	16.4	81.4	79.5	7.8	154	6.6	17	NA	NA	NA	NA	30	60.4	71.6	7.1	NA	70.9	114	NA	NA	NA	NA	NA

VOC Analysis performed via Method 624
Total metals performed via Method 6010B; Hexavalent Chromium via Method 7196A; and Sulfate via Method 300.0.
FT - Feet below ground surface.
U - Indicates compound analyzed for but not detected (organics and inorganics).
J - Indicates an estimated value (organics).
B - The analyte is found in the associated blank as well as in the sample (organics) or the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but not greater than or equal to the Instrument Detection Limit (IDL) (inorganics).
NA - Not analyzed
(1) - Duplicate sample of well SC12S
(2) - Duplicate sample of well K

TABLE F-3
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NJ
GROUND WATER ANALYTICAL RESULTS
OFF-SITE WELLS
JULY 2005

WELL NUMBER SCREENED INTERVAL (FT) PARAMETER	SC1S 35-55	SC1D 85-95/ 100-115	SC2D (R) 106-116	SC3S 35-55	SC3D (R) 102-112	SC32D(R) (1) 102-112	SC4S 35-45	SC4D 110-120	SC5S 5-20	SC5D 90-120	SC6S 45-75	SC6D 110-120	SC10S 35-55	SC10D 105-125	SC17S 13-28	SC17D 143-153	SC18S 4-19	SC18D 119-129	SC19S 2-17	SC19D 120-130	SC21S 3-18	SC21D 125-135	SC24S 5-20	SC24D 105-115	SC26D 127-137	SC28D 133-153	SC-30D 147-157	SC-31D 120-130	IW1 32-62	IW2 40-70	RW6S 55-75	RW6D 90-125	RIW2 30-55	OBS-2A 129-149	TB071905	TB071905A	TB072005
VOCs (ug/L)																																					
Chloromethane	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Bromomethane	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Chloroethane	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
1,1-Dichloroethene	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	2.1	NA	NA	NA	NA	U	U	U
1,2-Dichlorbethene (total)	U	U	0.34J	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	1.6	NA	NA	NA	NA	U	U	U
Acetone	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Carbon Disulfide	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Methylene Chipride	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
1,1-Dichloroethane	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
cis-1,2-Dichloroethene	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	3.5	U	U	NA	U	NA	NA	NA	NA	U	U	U
p-Dichlorobenzene	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
trans-Dichloroethylene	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
trans-1,2-Dichloroethylene	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	0.26J	U	U	NA	U	NA	NA	NA	NA	U	U	U
2-Butanone	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Chloroform	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	1.5	NA	NA	NA	NA	U	U	U
Benzene	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Trichloroethene	2.1	11.1	4.4	1.8	8.6	9	NA	NA	U	8.8	0.79J	3.9	NA	NA	NA	NA	NA	NA	U	1.1	U	1.6	U	9.5	1.6	11.6	U	19.4	NA	16.1	NA	NA	NA	NA	U	U	U
1,2-Dichloropropane	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Bromodichloromethane	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Toluene	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
1,1,2,2-Trichloroethane	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Chlorobenzene	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Tetrachloroethene	U	U	0.56J	U	U	U	NA	NA	U	0.57J	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	0.47J	U	U	1.3	2.6	NA	2.1	NA	NA	NA	NA	U	U	U
Ethylbenzene	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Total Xylenes	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Vinyl Chloride	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Naphthalene	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	U	U	U	U	U	U	U	U	U	U	NA	U	NA	NA	NA	NA	U	U	U
Volatile TICs	U	U	U	U	U	U	NA	NA	U	U	U	U	NA	NA	NA	NA	NA	NA	8 6JN	U	0.49J	U	U	U	U	0.21J	U	4.17J	NA	0.52JN	NA	NA	NA	NA	U	U	U
INORGANICS (ug/L)																																					
Chromium (Total)	U	U	7020	U	U	U	NA	NA	U	320	15.8	1840	U	1070	NA	NA	NA	NA	U	U	U	U	U	U	U	96.1	U	U	U	2880	505	3640	1480	NA	NA	NA	NA
Hexavalent Chromium	U	U	5400	U	U	U	NA	NA	U	300	U	1500	U	1100	NA	NA	NA	NA	U	U	U	U	U	U	U	94	U	U	U	2500	430	2600	1400	NA	NA	NA	NA
Sodium	66000	48200	60500	87200	31000	31300	NA	NA	4840	41400	97200	108000	108000	225000	NA	NA	NA	NA	4250	24500	7440	17200	8890	33000	3340	169000	4500	38900	62900	72000	134000	111000	74200	NA	NA	NA	NA
OTHER PARAMETERS (mg/L)																																					
pH	6.42	6.73	6.38	5.54	6.04	6.04	NA	NA	5.11	5.56	6.58	6.65	6.65	6.22	NA	NA	NA	NA	5.56	4.76	6.70	5.06	4.49	5.33	5.67	6.56	5.05	5.14	6.20	6.19	6.48	6.80	5.82	NA	NA	NA	NA
Sulfate	80.1	28.6	49.6	123	22.1	22.9	NA	NA	9.2	49.9	128	176	105	136	NA	NA	NA	NA	28.5	17.9	25.4	7.5	75.9	48	U	160	U	34	71.4	51.8	106	118	114	NA	NA	NA	NA

FT - Feet below ground surface.
VOC Analysis performed via Method 524.2 (well SC28D), all other sample results via Method 624.
Total metals performed via Method 6010B; Hexavalent Chromium via Method 7196A; and Sulfate via Method 300.0.
U - Indicates compound analyzed for but not detected (organics and inorganics).
J - Indicates an estimated value (organics).
B - The analyte is found in the associated blank as well as in the sample (organics) or the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but not greater than or equal to the Instrument Detection Limit (IDL) (inorganics).
NA - Not analyzed.
(1) - Duplicate sample of well SC3D (R).

LEGEND

W2 •	EXISTING WELL LOCATION AND NUMBER
SC18S ⊕	RI MONITORING WELL
IW-1 •	IRRIGATION WELL AND NUMBER
MOHAN ■	DOMESTIC WELL
(R)	REPLACEMENT WELL
⊕	SUPPLEMENTAL MONITORING WELL (INSTALLED)
⊕	USGS OBSERVATION WELL
100 ———	TCE CONCENTRATION CONTOUR ELEVATION IN WELL ON APRIL, 2005 IN PARTS PER BILLION (ppb)
(220)	TCE CONCENTRATION ELEVATION IN WELL ON APRIL, 2005 IN PARTS PER BILLION (ppb)
(ND)	NONE DETECTED
(NA)	NOT ANALYZED

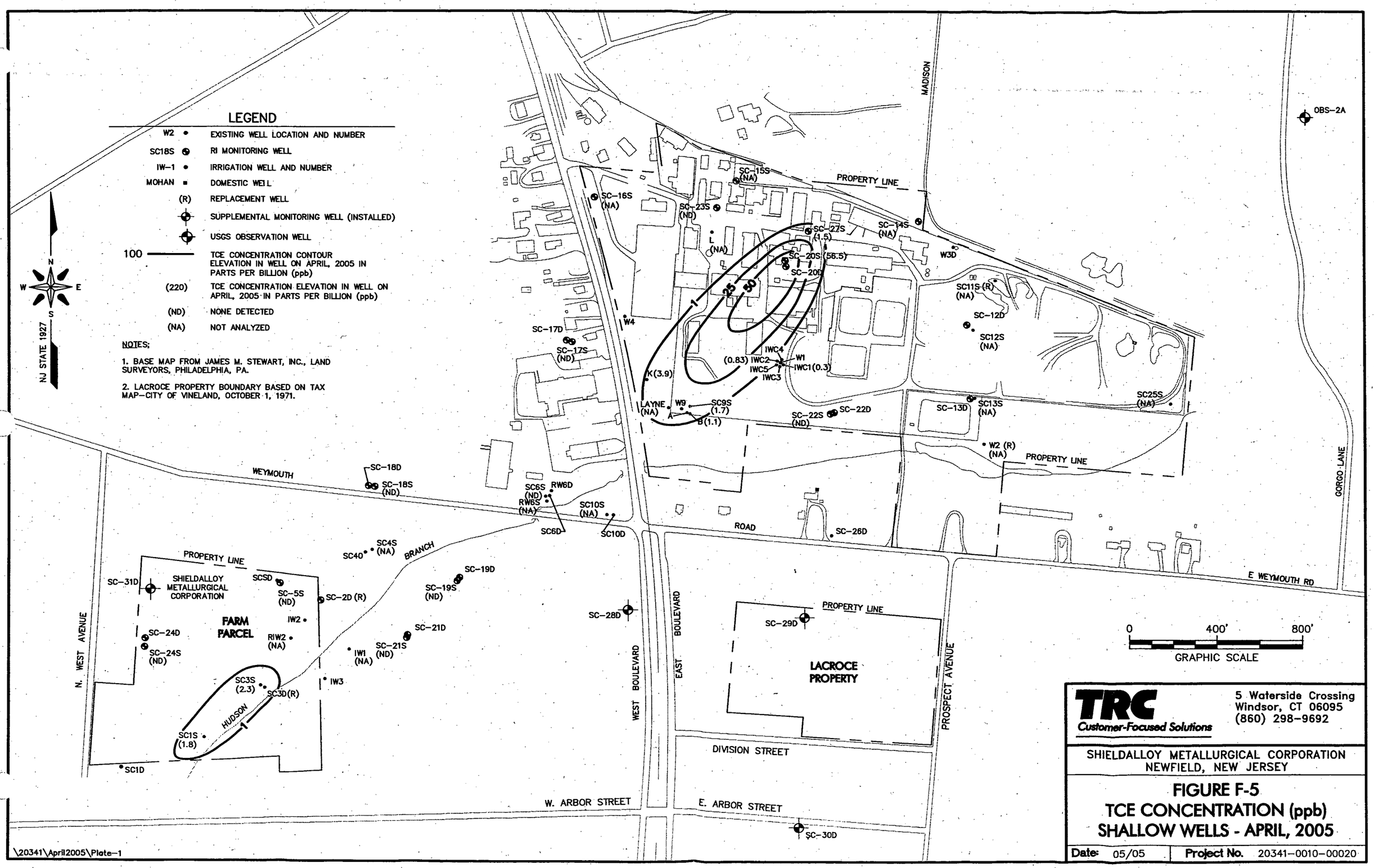
NOTES;

1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA.

2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP–CITY OF VINELAND, OCTOBER 1, 1971.

N W E S

NJ STATE 1927



\20341\April2005\Plate-1

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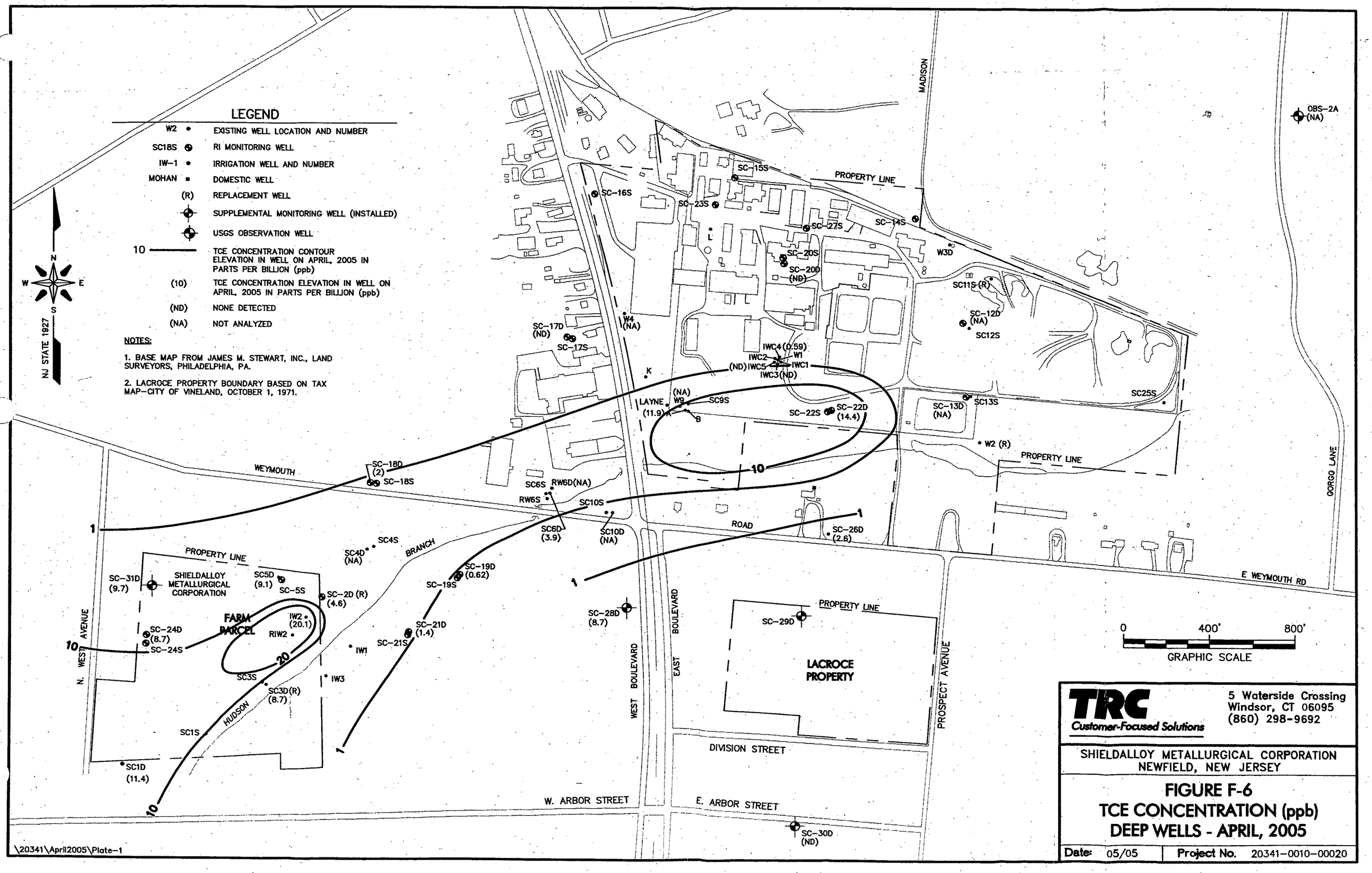
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE F-5
TCE CONCENTRATION (ppb)
SHALLOW WELLS - APRIL, 2005

Date: 05/05 | Project No. 20341-0010-00020


LEGEND
W2 EXISTING WELL LOCATION AND NUMBER
SC18S RI MONITORING WELL
IW-1 IRRIGATION WELL AND NUMBER
MOHAN DOMESTIC WELL
(R) REPLACEMENT WELL
SUPPLEMENTAL MONITORING WELL (INSTALLED)
USGS OBSERVATION WELL
10 TCE CONCENTRATION CONTOUR ELEVATION IN WELL ON APRIL, 2005 IN PARTS PER BILLION (ppb)
(10) TCE CONCENTRATION ELEVATION IN WELL ON APRIL, 2005 IN PARTS PER BILLION (ppb)
(ND) NONE DETECTED
(NA) NOT ANALYZED
NOTES:
1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA.
2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971.
N
W
E
S
NJ STATE 1927
MADISON
PROPERTY LINE
SC-15S
SC-16S
SC-23S
SC-27S
SC-14S
SC-20S
SC-20D (ND)
W3D
SC11S (R)
SC-12D (NA)
SC12S
SC-17D (ND)
SC-17S
W4 (NA)
IWC4 (0.59)
W1
IWC2
(ND) IWC5
IWC1
IWC3 (ND)
K
LAYNE
(11.9)
(NA) W9
SC9S
B
SC-22S
SC-22D (14.4)
SC-13D (NA)
SC13S
SC25S
W2 (R)
OBS-2A (NA)
WEYMOUTH
SC-18D (2)
SC-18S
SC6S
RW6D (NA)
RW6S
SC10S
SC6D (3.9)
SC10D (NA)
ROAD
SC-26D (2.6)
E WEYMOUTH RD
GORGO LANE
SC4S
SC4D (NA)
BRANCH
SC-19D (0.62)
SC-19S
SC-31D (9.7)
SHIELDALLOY METALLURGICAL CORPORATION
SC5D (9.1)
SC-5S
SC-2D (R) (4.6)
FARM PARCEL
IW2 (20.1)
RIW2
SC-24D (8.7)
SC-24S
N. WEST AVENUE
SC-21D (1.4)
SC-21S
IW1
IW3
SC3S
SC3D (R) (8.7)
HUDSON
SC1S
SC1D (11.4)
SC-28D (8.7)
WEST BOULEVARD
EAST BOULEVARD
PROPERTY LINE
SC-29D
LACROCE PROPERTY
PROSPECT AVENUE
DIVISION STREET
W. ARBOR STREET
E. ARBOR STREET
SC-30D (ND)
1
10
20
0 400' 800'
GRAPHIC SCALE
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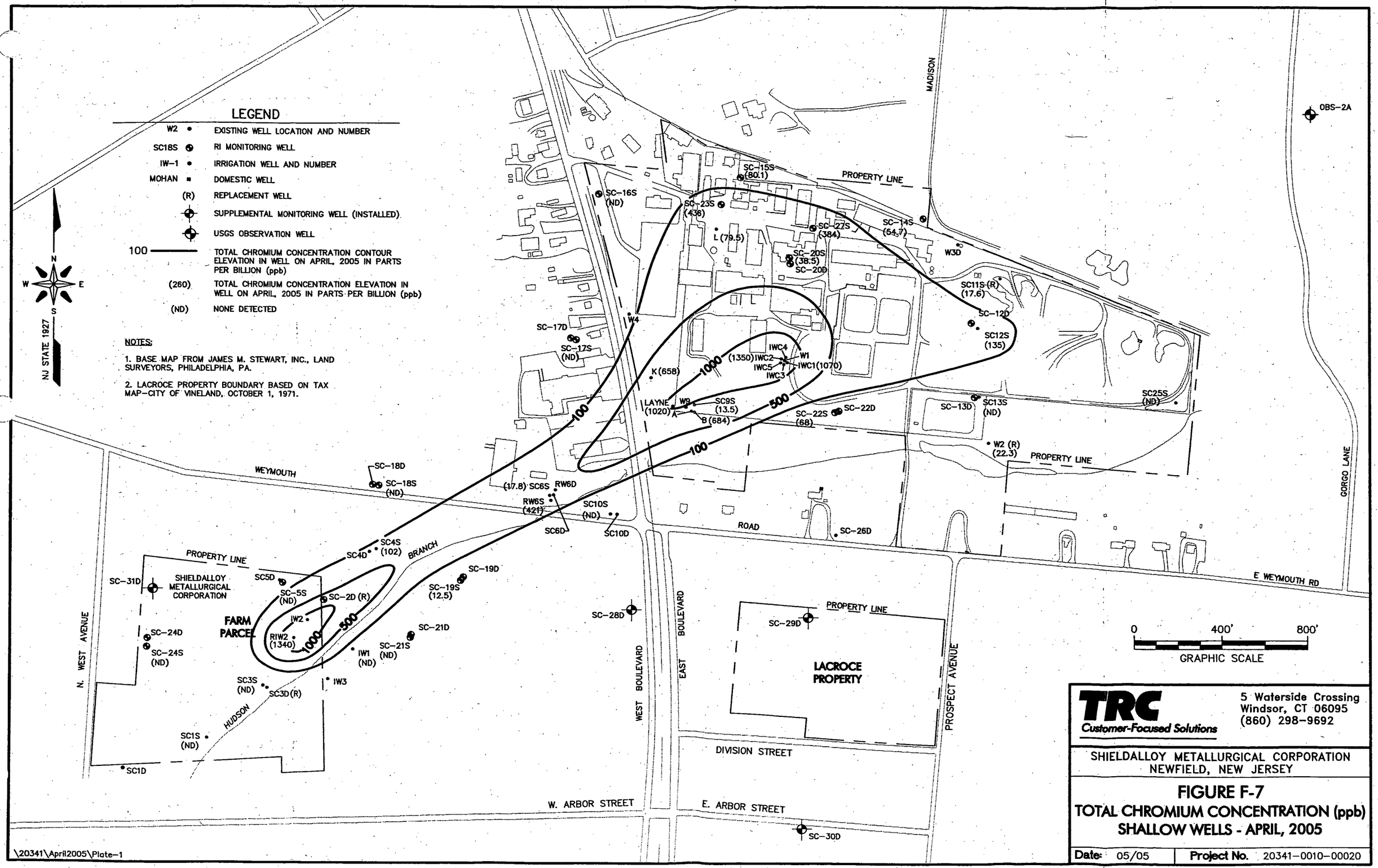
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
FIGURE F-6
TCE CONCENTRATION (ppb)
DEEP WELLS - APRIL, 2005
Date: 05/05
Project No. 20341-0010-00020
\20341\April2005\Plate-1



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SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE F-7
TOTAL CHROMIUM CONCENTRATION (ppb)
SHALLOW WELLS - APRIL, 2005

Date: 05/05	Project No. 20341-0010-00020

LEGEND

W2 •	EXISTING WELL LOCATION AND NUMBER
SC18S ⊕	RI MONITORING WELL
IW-1 •	IRRIGATION WELL AND NUMBER
MOHAN ▪	DOMESTIC WELL
(R)	REPLACEMENT WELL
⊕	SUPPLEMENTAL MONITORING WELL (INSTALLED)
⊕	USGS OBSERVATION WELL
100 ———	TOTAL CHROMIUM CONCENTRATION CONTOUR ELEVATION IN WELL ON APRIL, 2005 IN PARTS PER BILLION (ppb)
(299)	TOTAL CHROMIUM CONCENTRATION ELEVATION IN WELL ON APRIL, 2005 IN PARTS PER BILLION (ppb)
(ND)	NONE DETECTED

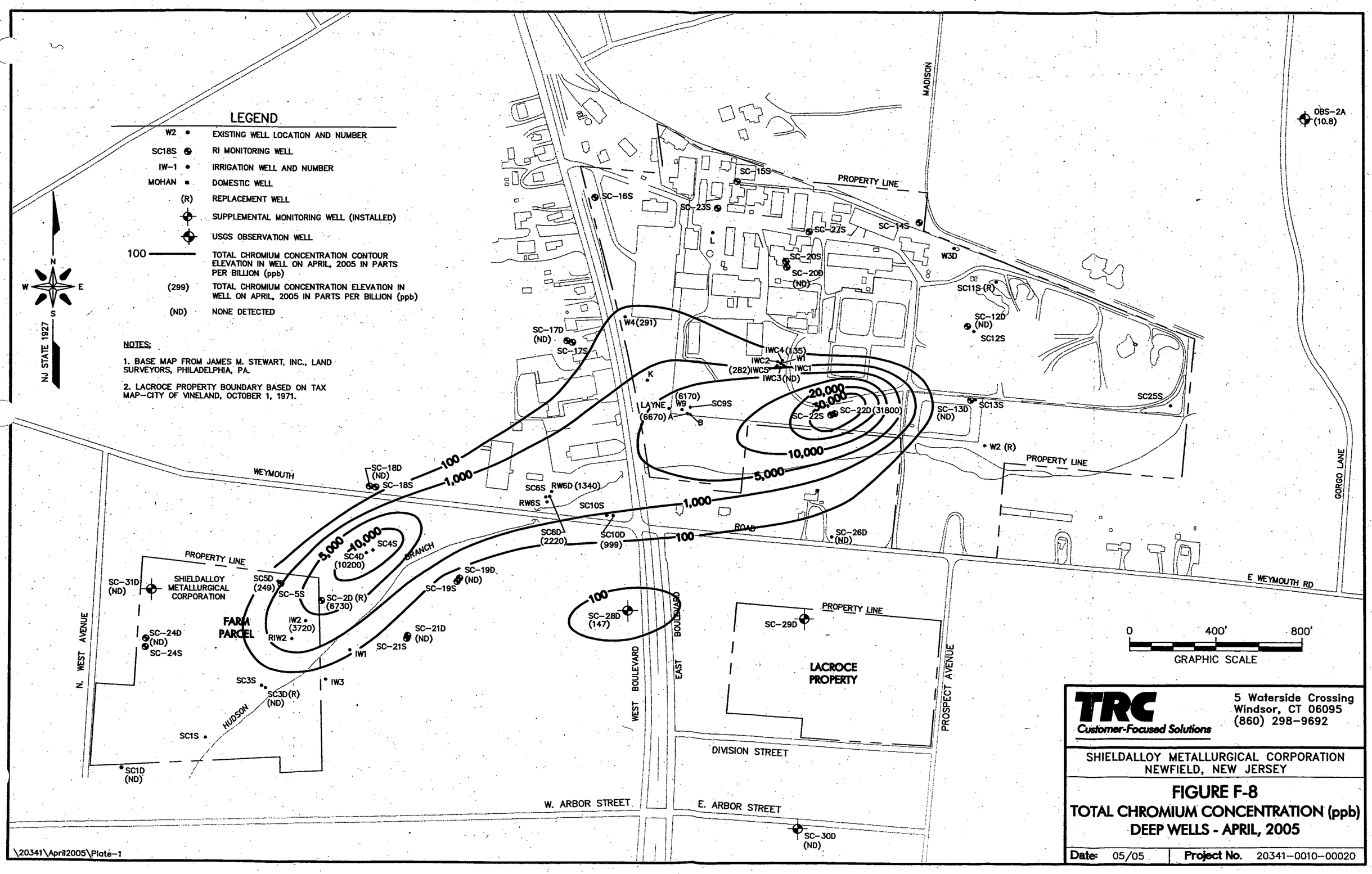
NOTES:

1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA.

2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP–CITY OF VINELAND, OCTOBER 1, 1971.

NJ STATE 1927

N W E S



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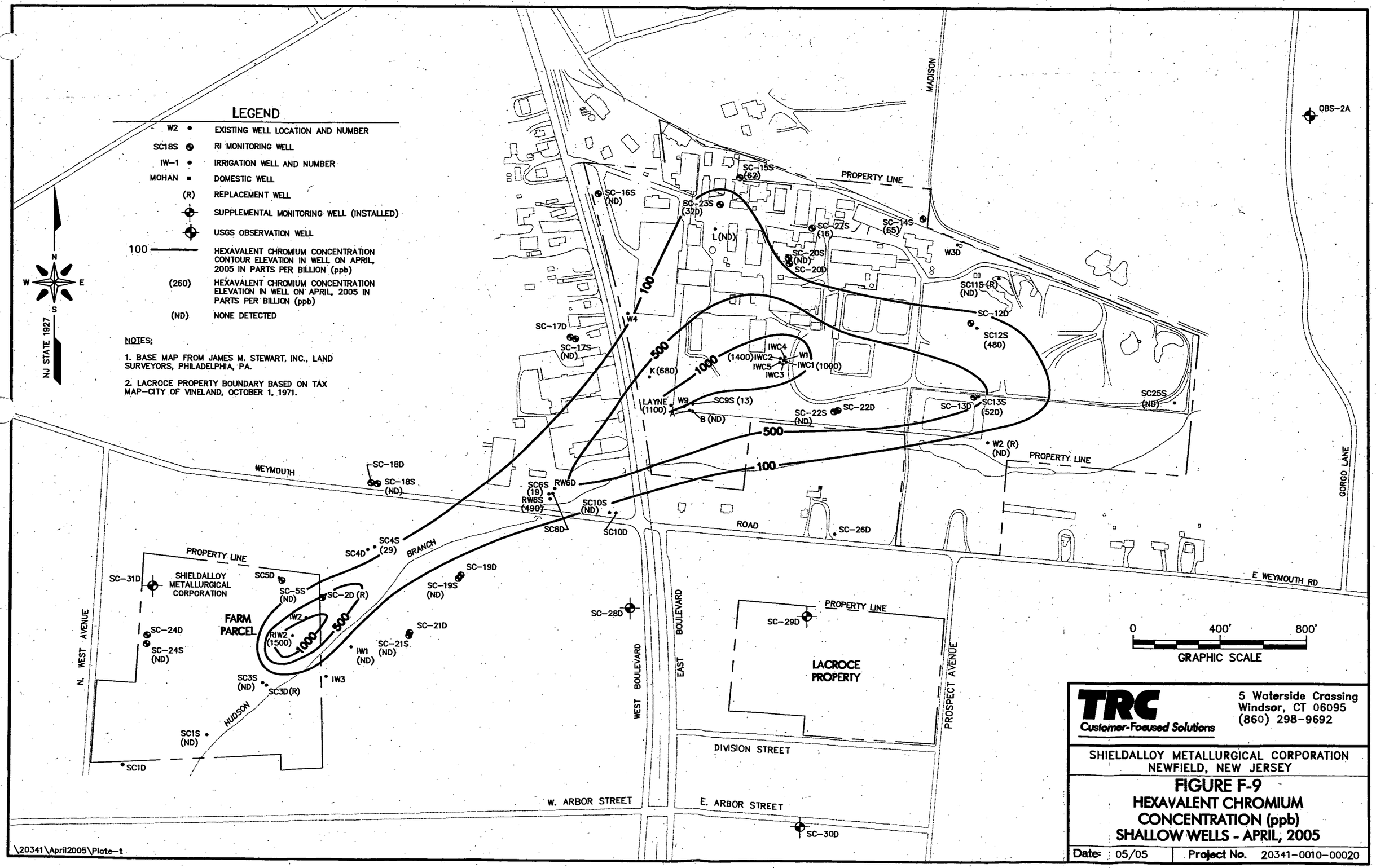
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE F-8
TOTAL CHROMIUM CONCENTRATION (ppb)
DEEP WELLS - APRIL, 2005

Date: 05/05 | Project No. 20341–0010–00020

\20341\April2005\Plate-1

\Gen\20341\April2005\plate-1.dwg, FIG F-8, 10/8/2005 2:34:39 PM



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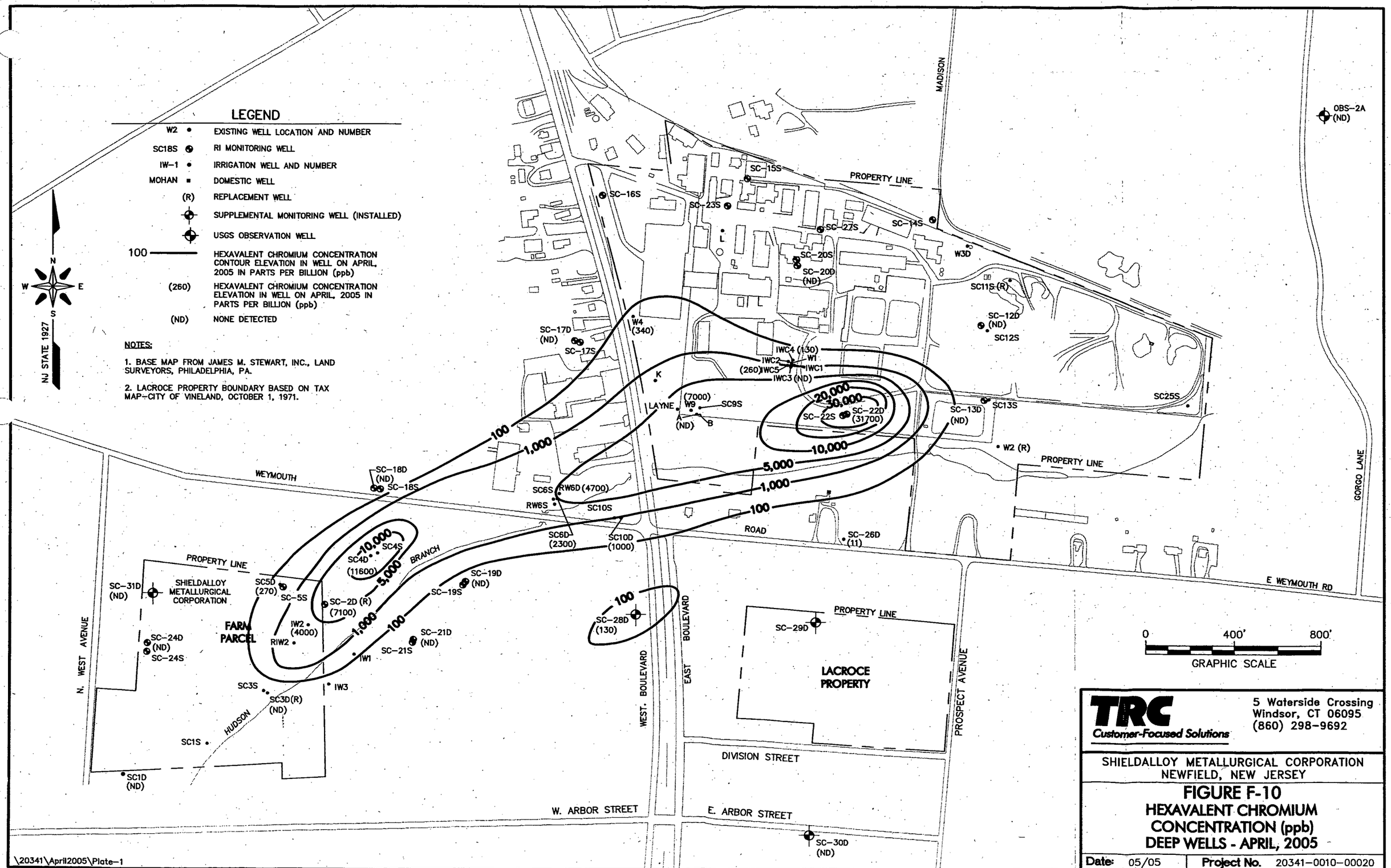
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

FIGURE F-9
HEXAVALENT CHROMIUM CONCENTRATION (ppb)
SHALLOW WELLS - APRIL, 2005

Date: 05/05	Project No. 20341-0010-00020


LEGEND
W2 EXISTING WELL LOCATION AND NUMBER
SC18S RI MONITORING WELL
IW-1 IRRIGATION WELL AND NUMBER
MOHAN DOMESTIC WELL
(R) REPLACEMENT WELL
SUPPLEMENTAL MONITORING WELL (INSTALLED)
USGS OBSERVATION WELL
100 HEXAVALENT CHROMIUM CONCENTRATION CONTOUR ELEVATION IN WELL ON APRIL, 2005 IN PARTS PER BILLION (ppb)
(260) HEXAVALENT CHROMIUM CONCENTRATION ELEVATION IN WELL ON APRIL, 2005 IN PARTS PER BILLION (ppb)
(ND) NONE DETECTED
NOTES:
1. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA.
2. LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971.
N
W
E
S
NJ STATE 1927
MADISON
PROPERTY LINE
SC-15S
SC-16S
SC-23S
SC-27S
SC-14S
W3D
SC-20S
SC-20D (ND)
SC11S (R)
SC-12D (ND)
SC12S
SC-17D (ND)
SC-17S
W4 (340)
IWC4 (130)
W1
IWC2
IWC1
(260) IWC5
IWC3 (ND)
K
LAYNE
(7000) W9
SC9S
A (ND)
B
20,000
30,000
SC-22S
SC-22D (31700)
10,000
SC-13D (ND)
SC13S
SC25S
W2 (R)
PROPERTY LINE
100
1,000
5,000
1,000
100
WEYMOUTH
SC-18D (ND)
SC-18S
SC6S
RW6D (4700)
RW6S
SC10S
SC6D (2300)
SC10D (1000)
ROAD
SC-26D (11)
GORGO LANE
10,000
SC4S
SC4D
(11600)
5,000
BRANCH
PROPERTY LINE
SC-31D (ND)
SHIELDALLOY METALLURGICAL CORPORATION
SC5D (270)
SC-5S
SC-2D (R) (7100)
SC-19D (ND)
SC-19S
E WEYMOUTH RD
FARM PARCEL
IW2 (4000)
RIW2
1,000
100
SC-21D (ND)
SC-21S
IW1
100
SC-28D (130)
BOULEVARD
EAST
PROPERTY LINE
SC-29D
LACROCE PROPERTY
PROSPECT AVENUE
N. WEST AVENUE
SC-24D (ND)
SC-24S
SC3S
SC3D(R) (ND)
IW3
HUDSON
SC1S
SC1D (ND)
WEST. BOULEVARD
DIVISION STREET
W. ARBOR STREET
E. ARBOR STREET
SC-30D (ND)
OBS-2A (ND)
0
400'
800'
GRAPHIC SCALE
TRC
Customer-Focused Solutions
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Windsor, CT 06095
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SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
FIGURE F-10
HEXAVALENT CHROMIUM CONCENTRATION (ppb)
DEEP WELLS - APRIL, 2005
Date: 05/05
Project No. 20341-0010-00020
\20341\April2005\Plate-1

TABLE F-4

GROUND WATER / SUSPENDED SOLIDS RADIOLOGICAL RESULTS
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NJ
APRIL 2004

WELL NUMBER	A			W2(R)			OBS-2A [1]			8C11S(R)		
SCREENED INTERVAL (FT)	114-124			2-17			129-149			9-24		
LABORATORY ID NUMBER	F4D100111-006	F4D100111-014	F4D100111-022	F4D100111-005	F4D100111-013	F4D100111-021	F4D100111-008	F4D100111-016	F4D100111-024	F4D100111-002	F4D100111-010	F4D100111-018
UNFILTERED/FILTERED/FILTER PAPER	Unfiltered	Filtered	Filter Paper	Unfiltered	Filtered	Filter Paper	Unfiltered	Filtered	Filter Paper	Unfiltered	Filtered	Filter Paper
PARAMETERS												
Radiochemical Parameter (pCi/L)												
Gross Alpha	0.7U +/- 1.1	0.65U +/- 0.9	NA	1.75J +/- 0.98	0.32U +/- 0.57	NA	4.0 +/- 1.2	2.08J +/- 0.83	NA	0.59U +/- 0.87	0.52U +/- 0.56	NA
Gross Beta	1.9J +/- 1.2	13.0 +/- 2.0	NA	3.4J +/- 1.2	1.6U +/- 1.1	NA	3.4J +/- 1.2	3.0J +/- 1.2	NA	2.7J +/- 1.2	2.5J +/- 0.94	NA
Radium 226	0.1U +/- 0.1	0.11U +/- 0.12	NA	0.05U +/- 0.13	0.13U +/- 0.11	NA	0.95J +/- 0.26	1.23 +/- 0.28	NA	0.14U +/- 0.13	0.17U +/- 0.13	NA
Radium 228	-0.11U +/- 0.3	0.38U +/- 0.38	NA	0.16U +/- 0.34	0.22U +/- 0.34	NA	0.58J +/- 0.33	0.68J +/- 0.39	NA	-0.14U +/- 0.27	0.24U +/- 0.36	NA
Uranium 238 (pCi/sample) [4]	NA	NA	0.31J +/- 0.12	NA	NA	0.38J +/- 0.13	NA	NA	0.32J +/- 0.13	NA	NA	0.29J +/- 0.12

WELL NUMBER	SC12S			SC32S [2]			8C138			SC14S		
SCREENED INTERVAL (FT)	15-25			15-25			14.7-24.7			12-27		
LABORATORY ID NUMBER	F4D100111-003	F4D100111-011	F4D100111-019	F4D100111-004	F4D100111-012	F4D100111-020	F4D100111-007	F4D100111-015	F4D100111-023	F4D100111-001	F4D100111-009	F4D100111-017
UNFILTERED/FILTERED/FILTER PAPER	Unfiltered [3]	Filtered	Filter Paper	Unfiltered [3]	Filtered	Filter Paper	Unfiltered	Filtered	Filter Paper	Unfiltered	Filtered	Filter Paper
PARAMETERS												
Radiochemical Parameter (pCi/L)												
Gross Alpha	8.8U +/- 9.8	0.91U +/- 0.97	NA	14.0U +/- 10.0	0.29U +/- 0.85	NA	2.6U +/- 2.4	-0.3U +/- 1.5	NA	1.1U +/- 1.0	0.41U +/- 0.84	NA
Gross Beta	128 +/- 16.0	14.0 +/- 2.1	NA	115 +/- 15.0	15.3 +/- 2.3	NA	17.6 +/- 2.5	2.3J +/- 1.2	NA	5.3 +/- 1.5	7.3 +/- 1.4	NA
Radium 226	0.52J +/- 0.18	0.82J +/- 0.24	NA	0.98J +/- 0.24	1.09 +/- 0.26	NA	0.3J +/- 0.17	0.41J +/- 0.17	NA	0.11U +/- 0.1	0.33J +/- 0.15	NA
Radium 228	0.42U +/- 0.31	0.58U +/- 0.41	NA	0.61J +/- 0.37	1.24 +/- 0.43	NA	0.39U +/- 0.27	0.1U +/- 0.36	NA	0.91J +/- 0.36	0.89J +/- 0.32	NA
Uranium 238 (pCi/sample) [4]	NA	NA	0.43J +/- 0.14	NA	NA	0.48J +/- 0.15	NA	NA	0.24J +/- 0.11	NA	NA	0.31J +/- 0.12

Notes:
- FT - Feet below ground surface.
- pCi/L - Picocuries per liter
- NA - Not analyzed
- J - Result is greater than sample detection limit but less than stated reporting limit
- U - Result is less than the sample detection limit.
- (1) - USGS observation well (NJ-WRD Well Number 15-0372) located northeast of the SMC site.
- (2) - Duplicate sample of well SC12S.
- (3) - The standard reporting limit was exceeded due to a reduction of sample size attributed to the sample's high residual mass. The analytical results are reported with the MDA achieved.
- (4) - Isotopic uranium (U-238) analysis was conducted on the sediment retained on the filter.

Sample Analyses:
- Gross Alpha/Beta by GFPC (EPA 900.0 MOD).
- Radium-226 by EPA 903.0 MOD.
- Radium-228 by GFPC (EPA 904 MOD).
- Isotopic Uranium by Alpha Spectroscopy (OOE A-01-R MOD).

June 9, 2005

Mr. David R. Smith
Shieldalloy Metallurgical Corporation
12 West Boulevard, PO Box 768
Newfield, NJ 08344

Re: Results of Ground Water Sampling (April 13, 2005)

Dear Mr. Smith:

Integrated Environmental Management, Inc. (IEM) is pleased to provide you with the Certificates of Analysis from a groundwater sampling round that took place on April 13, 2005. The samples were collected from four (4) on-site wells and from a well that belongs to the Borough of Newfield.[1]

The samples were collected by a representative of TRC, Inc., and forwarded, without preservative, to Outreach Laboratory in Broken Arrow, OK.[2] Attachment 1 contains the specifications for analysis of the samples. Attachment 2 contains the Certificates of Analysis. Table 1, below, is a summary of findings for an "unfiltered" aliquot:[3,4]

Table 1

Well ID	Radionuclide Concentration (picocuries per liter)*							
	Ra-226	Ra-228	Th-232	Th-230	Th-228	U-238	U-235	U-234
SC25S	< 0.454	16.9	<0.335	<0.751	<0.455	0.725	0.628	3.65
SC11S	<0.293	1.79	<0.336	<0.636	<0.366	3.03	<1.29	2.89
SC12S	<0.325	4.47	<0.246	<0.674	<0.227	<0.272	<0.154	0.427
SC13S	<0.418	7.64	<0.219	<0.606	<0.267	1.86	<0.498	2.57
*BN4-05***	*<1.00*	*5.54*	*0.144*	*<0.653*	*<0.405*	*<0.271*	*0.532*	*0.615*

* Statistically-significant results are shaded.
** Background (up-gradient and off of the Shieldalloy property) well

[1] The Newfield well is up-gradient of the Shieldalloy Metallurgical Corporatioh (Shieldalloy) plant, and is thus representative of "background" groumdwater.

[2] Outreach Laboratpry is a NELAC-Certified laboratory for radioanalytical services.

[3] The gross alpha and gross beta results, which would typically be useful as screening values, are not reported in the tables in this letter since isotopic analyses were perfomied on all samples. They are, however, contained in the Certificates of Analysis.

[4] If an analytical result did not have statistical confidence (i.e., the result is lower than the minimum detectable concentration calculated for each analysis), a "<MDC" value is recorded in the tables instead.

Table 2 is a summary of findings for a "filtered" aliquot, the result of which can be compared to applicable drinking water standards:

Table 2

Well ID	Radionuclide Concentration (picocuries per liter)*							
	Ra-226	Ra-228	Th-232	Th-230	Th-228	U-238	U-235	U-234
SC25S	<0.352	1.18	<0.301	<0.811	<0.455	0.725	0.628	3.65
SC11S	<0.431	5.50	<0.256	<0.696	0.373	<1.77	<0.942	<1.91
SC12S	0.598	2.28	0.312	<0.648	<0.222	<0.483	<0.281	0.666
SC13S	<0.715	<0.532	<0.207	<0.587	<0.232	1.25	<0.220	1.14
*BN4-05***	<0.459	6.39	0.940	<0.616	0.177	0.527	0.331	1.23

* Statistically-significant results are shaded.
** Background (up-gradient and off of the Shieldalloy property) well

To interpret the Table 2 data, a comparison to the maximum contaminant levels (MCLs) for radionuclides promulgated by the U. S. Environmental Protection Agency in 40 CFR §141.66 may be helpful.[5] A specific MCL is given for Ra-226 and Ra-228, combined, in 40 CFR §141.66(b). For the remaining radionuclides shown in Table 2, 40 CFR §141.66(d)(2) limits the concentration to that which would deliver a radiation dose of four (4) millirem per year if ingested at the rate of two liters of water per day for 365 days as follows:

$$\frac{picocurie}{\ell} \times \frac{2\ \ell}{day} \times \frac{365\ day}{year} \times DCF\ (\frac{millirem}{picocurie}) < \frac{4\ millirem}{year}$$

where picocurie/l = the concentration of the radionuclide in question, and DCF = a dose conversion factor that translates ingestion intake into radiation dose. Using the ingestion dose conversion factors listed in the USEPA's Federal Guidance Report No. 11 for the calculations, the following table of MCLs results:[6]

Table 3

Maximum Contaminant Levels in Drinking Water (picocuries per liter)						
Ra-226 + Ra-228	Th-232	Th-230	Th-228	U-238	U-235	U-234
5	2	10	14	231	205	210

While MCL for the radium isotopes stands alone, the radiation dose limit of four (4) millirem per year is for all other radionuclides combined. Therefore, in order to determine compliance with the MCLs for the non-radium isotopes, the "unity rule", where the sum of the ratio of isotopes to its MCL must be less than one (1). In other words:

$$\frac{[Th\text{-}232]}{MCL_{Th\text{-}232}} + \frac{[Th\text{-}230]}{MCL_{Th\text{-}230}} + \frac{[Th\text{-}228]}{MCL_{Th\text{-}228}} + \frac{[U\text{-}238]}{MCL_{U\text{-}238}} + \frac{[U\text{-}235]}{MCL_{U\text{-}235}} + \frac{[U\text{-}234]}{MCL_{U\text{-}234}} < 1$$

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[5] Title 40, Code of Federal Regulations, Part 141, "National Primary Drinking Water Regulations".

[6] U. S. Environmental Protection Agency, EPA-520/1-88-020, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion and Ingestion: Federal Guidance Report No. 11", September, 1988.

Using the Table 2 results for the sample collected from the Borough of Newfield's well as an example:[7]

$$\frac{0.310}{2} + \frac{0.616}{10} + \frac{0.117}{14} + \frac{0.527}{231} + \frac{0.331}{205} + \frac{1.23}{210} = 0.23$$

Because the result is less than unity, the non-radium isotopes in that sample meet the USEPA's drinking water standard for those radionuclides. On the other hand, because the combined Ra-226 and Ra-228 result is slightly greater than five (5) picocuries per liter, the standard for radium cannot be met. However, it is important to note that demonstration of compliance with the drinking water standards for public water supplies is based upon an annual average radionuclide concentration (i.e., multiple analyses per year or one analysis of a composite sample collected over a period of one year), not on one sample collected at a single point in time.[8]

An important finding from this sampling campaign is that the radionuclide content of the groundwater under the Shieldalloy site cannot be distinguished from background. It is thus reasonable to conclude that the presence of licensed radioactive materials at the plant over all of these years is having no impact on the radiological quality of the groundwater.

Thank you for the opportunity of assisting you in completing this interesting assessment. If I can answer any questions or provide you with additional information on this or any other radiation-related matter, please don't hesitate to call me at (240) 631-8990. I look forward to speaking with you again soon.

Sincerely,

INTEGRATED ENVIRONMENTAL MANAGEMENT, INC.

Carol D. Berger, CHP

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[7] To ehsure a level oficonservatism in this evaluation, the minimum detectable concentrations shown in Table 2 are taken to be actual concentrations.

[8] See 40 CFR §141.26, "Monitoring Frequency and Compliance Requirements for Radionuclides in Community Water Systems".

APPENDIX G - ECOLOGICAL DATA

APPENDIX G - ECOLOGICAL DATA

Table G-1 - Partial List of Plant Species within Forested Uplands
Table G-2 - Wildlife Species that May Potentially Inhabit the Upland Grasslands, Forested Wetlands/Uplands, and the Hudson Branch
Table G-3 - Results of Qualitative Macroinvertebrate Collection from Selected Sampling Locations
New Jersey Natural Heritage Program Correspondence
U.S. Fish and Wildlife Program Correspondence
Endangered and Threatened Plant Species Survey Report (Amy S. Greene, Inc., 1994)

TABLE G-1
PLANT RECEPTOR SPECIES

Common Name	Scientific Name
Herbs	
Cattail	*Typha latifolia*
Giant Reed	*Phragmites australis*
Sensitive Fern	*Onoclea sensibilis*
Cinnamon Fern	*Osmunda cinnamomea*
Sofl Rush	*Juncus effusus*
Japanese Knotweed	*Polygonum cuspidatum*
Sphagnum Moss	*Sphagnum spp.*
Poison Ivy	*Rhus radicans*
Jewel Weed	*Impatiens capensis*
Comrnon Elder	*Sambucus canadensis*
Duckweed	*Lemna spp.*
Marsh Marigold	*Caltha palustris*
Goldenrod	*Salidago spp.*
Bracken Fern	*Pteridium aquilinum*
Crows Foot Club Moss	*Lycopodium*
Shrubs	
Swamp Magnolia	*Magnolia virginiana*
Sweet Pepperbush	*Clethra alnifolia*
Blueberry	*Vaccinium spp.*
Mountain Laurel	*Kalmia latifolia*
Greenbrier	*Smilax spp.*
Multiflora Rose	*Rosa multiflora*
Honeysuckle	*Lonicera spp.*
Bear Oak	*Quercus ilicifolia*
Holly	*Ilex opaca*
Staghorn Sumac	*Rhus typhina*
Trees	
Black Tupelo	*Nyssa sylvatica*
Red Maple	*Acer rubrum*
Atlantic Eastern Red Cedar	*Juniperus virginiana*
Atlantic White Cedar	*Chamaecyparis thyoides*
Willow	*Salix spp.*
White Oak	*Quercus alba*
Northern Red Oak	*Quercus rubra*
Pitch Pine	*Pinus rigida*

TABLE G-1
PLANT RECEPTOR SPECIES

Common Name	Scientific Name
Herbs	
Box Elder	*Acer negundo*
Black Cherry	*Prunus serotina*
Bigtooth Aspen	*Populus grandidentata*
Sassafras	*Sassafras albidum*
Flowering Dogwood	*Cornus florida*
Norway Maple	*Acer platanoides*
Black Locust	*Robinia pseudoacacia*

TABLE G-2
POTENTIAL WILDLIFE SPECIES RECEPTORS
SMC FACILITY, NEWFIELD, NJ(1)

Family	Common Name	Scientific Name	Guild(2)	Forage Method	Breeding Substrate	Habitats Used		
						Pond/Stream	Grass	Forest
Amphibians								
Bufonidae	Fowler's Toad	*Bufo woodhousei fowleri*	I	Ground Ambusher	Water	X	X	X
Hylidae	Gray Treefrog	*Hyla versicolor*	I	Bark Ambusher	Water	X		X
	Northern Cricket Frog	*Acris crepitans*	I	Riparian Ambusher	Water	X		
	Northern Spring Peeper	*Pseudacris c. crucifer*	I	Riparian Ambusher	Water	X		X
Pelobatidae	Eastern Spadefoot	*Scaphiopus holbrookii*	I	Ground Ambusher	Water			X
Plethodontidae	Mud Salamander	*Pseudotriton montanus*	I	Water Gleaner	Water	X		
	Redback Salamander	*Plethodon c. cinereus*	I	Ground Gleaner	Terrestrial Subsurface			X
Ranidae	Bullfrog	*Rana catesbeiana*	C	Water Ambusher	Water	X		
	Green Frog	*Rana clamitans melanota*	I	Riparian Ambusher	Water	X		X
	Southern Leopard Frog	*Rana utricularia*	I	Riparian Ambusher	Water	X		
	Wood Frog	*Rana sylvatica*	L	Ground Ambusher	Water	X		X
Salamandridae	Red-spotted Newt	*Notophthalmus viridescens*	I	Water Gleaner	Water	X		X
Birds								
Accipitridae	Broad-winged Hawk	*Buteo platypterus*	C	Ground Pouncer	Tree-Branch		X	X
	Red-tailed Hawk	*Buteo jamaicensis*	C	Ground Pouncer	Tree-Branch		X	
Alcedinidae	Belted Kingfisher	*Ceryle alcyon*	P	Water Plunger	Riparian Subsurface	X		
Anatidae	Canada Goose	*Branta canadensis*	H	Ground Grazer	Riparian Ground	X	X	
	Mallard	*Anas platyrhynchos*	G	Water Forager	Riparian Ground	X		
	Wood Duck	*Aix sponsa*	G	Water Forager	Riparian Tree Cavity	X		
Apodidae	Chimney Swift	*Chaetura pelagica*	I	Air Screener	Buildings		X	
Ardeidae	Great Blue Heron	*Ardea herodias*	C	Water Ambusher	Riparian Twig-Branch	X		
	Green-backed Heron	*Butorides striatus*	C	Water Ambusher	Riparian Shmb	X		
Bombycillidae	Cedar Waxwing	*Bombycilla cedrorum*	P	Upper Canopy Gleaner	Tree-Twig		X	
Caprimulgidae	Common Nighthawk	*Chordeiles minor*	I	Air Screener	Buildings		X	
Gharadriidae	Killdeer	*Charadrius vociferus*	I	Ground Gleaner	Ground-Herb		X	
Columbidae	Mourning Dove	*Zenaida macroura*	G	Ground Gleaner	Tree-Branch		X	X
	Rock Dove	*Columba livia*	O	Ground Gleaner	Buildings		X	
Corvidae	American Crow	*Corvus brachyrhynchos*	O	Ground Gleaner	Tree-Branch		X	

TABLE G-2
POTENTIAL WILDLIFE SPECIES RECEPTORS
SMC FACILITY, NEWFIELD, NJ(1)

Family	Common Name	Scientific Name	Guild(2)	Forage Method	Breeding Substrate	Habitats Used		
						Pond/Stream	Grass	Forest
	Blue Jay	*Cyanocitta cristata*	O	Ground Gleaner	Tree-Branch			X
Cuculidae	Black-billed Cuckoo	*Coccyzus erythropthalmus*	I	Lower Canopy Gleaner	Tree-Branch			X
	Yellow-billed Cuckoo	*Coccyzus americanus*	I	Lower Canopy Gleaner	Tree-Branch			X
Falconidae	American Kestrel	*Falco sparverius*	C	Ground Pouncer	Tree Cavity-Crevice		X	
Fringillidae	American Goldfinch	*Carduelis tristis*	O	Ground Gleaner	Shrub		X	
	Blue Grosbeak	*Guiraca caerulea*	O	Ground Gleaner	Shrub	X		X
	Chipping Sparrow	*Spizella passerina*	O	Ground Gleaner	Shrub		X	X
	Field Sparrow	*Spizella pusilla*	O	Ground Gleaner	Ground-Herb		X	
	Indigo Bunting	*Passerina cyanea*	I	Lower Canopy Gleaner	Ground-Herb		X	X
	Northern Cardinal	*Cardinalis cardinalis*	O	Ground Gleaner	Shrub			X
	Song Sparrow	*Melospiza melodia*	O	Ground Gleaner	Ground-Herb	X	X	
	Swamp Sparrow	*Melospiza georgiana*	I	Ground Gleaner	Riparian Ground	X		
Hirundinidae	Barn Swallow	*Hirundo rustica*	I	Air Screener	Buildings		X	
	Tree Swallow	*Tachycineata bicolor*	I	Air Screener	Tree Cavity-Crevice	X	X	
Icteridae	Baltimore Oriole	*Icterus galbula*	O	Upper Canopy Gleaner	Tree-Twig			X
	Brown-headed Cowbird	*Molothrus ater*	O	Ground Gleaner	Nest Parasite	X	X	X
	Common Grackle	*Quiscalus quiscula*	O	Ground Gleaner	Tree-Branch	X	X	X
	Red-winged Blackbird	*Agelaius phoeniceus*	O	Ground Gleaner	Shrub	X	X	
Laridae	Herring Gull	*Larus argentatus*	C	Coastal Scavenger	Beach-Rock-Dune		X	
Mimidae	Brown Thrasher	*Toxostoma rufum*	O	Ground Gleaner	Shrub		X	
	Gray Catbird	*Dumetella carolinensis*	O	Ground Gleaner	Shrub	X	X	X
	Northern Mockingbird	*Mimus polyglottos*	O	Ground Gleaner	Shrub		X	
Paridae	Carolina Chickadee	*Parus carolinensis*	I	Lower Canopy Gleaner	Tree Cavity-Crevice			X
	Tufted Titmouse	*Parus bicolor*	I	Lower Canopy Gleaner	Tree Cavity-Crevice			X
Parulidae	American Redstart	*Setophaga ruticilla*	I	Lower Canopy Gleaner	Tree-Twig			X
	Black-and-White Warbler	*Mniotilta varia*	I	Bark Gleaner	Ground-Herb			X
	Common Yellowthroat	*Geothlypis trichas*	I	Lower Canopy Gleaner	Ground-Herb	X		X
	Prothonotary Warbler	*Protonotaria citrea*	I	Ground Gleaner	Tree Cavity-Crevice	X		X
	Yellow Warbler	*Dendroica petechia*	I	Lower Canopy Gleaner	Shrub	X		
Phasianidae	Northern Bobwhite	*Colinus virginianus*	O	Ground Gleaner	Ground-Herb		X	
Picidae	Downy Woodpecker	*Picoides pubescens*	I	Bark Gleaner	Tree Cavity-Crevice			X

TABLE G-2
POTENTIAL WILDLIFE SPECIES RECEPTORS
SMC FACILITY, NEWFIELD, NJ(1)

Family	Common Name	Scientific Name	Guild(2)	Forage Method	Breeding Substrate	Habitats Used		
						Pond/Stream	Grass	Forest
	Northern Flicker	*Colaptes durdtus*	I	Ground Gleaner	Tree Cavity-Crevice		X	X
Ploceidae	House Sparrow	*Passer domesticus*	G	Ground Gleaner	Buildings		X	
Scolopacidae	American Woodcock	*Scolopax minor*	I	Ground Prober	Ground-Herb		X	X
	Spotted Sandpiper	*Actitis macularia*	O	Riparian Gleaner	Ground-Herb	X		
Sittidae	White-breasted Nuthatch	*Sitta carolinensis*	I	Bark Gleaner	Tree Cavity-Crevice			X
Strigidae	Eastern Screech-Owl	*Otus asio*	C	Ground Pouncer	Tree Cavity-Crevice		X	
	Great Horned Owl	*Bubo virginianus*	C	Ground Pouncer	Tree-Branch		X	X
Sturnidae	European Starling	*Sturnus vulgaris*	O	Ground Gleaner	Buildings	X	X	
Sylviidae	Blue-gray Gnatcatcher	*Polioptila caerulea*	I	Upper Canopy Gleaner	Tree-Branch			X
Thraupidae	Scarlet Tanager	*Piranga olivacea*	I	Upper Canopy Gleaner	Tree-Twig			X
Trochilidae	Ruby-throated Hummingbird	*Archilochus colubris*	O	Floral Hover-Gleaner	Tree-Branch			X
Troglodytidae	Carolina Wren	*Thryothorus ludovicianus*	I	Lower Canopy Gleaner	Tree Cavity-Crevice			X
	House Wren	*Troglodytes aedon*	I	Lower Canopy Gleaner	Tree Cavity-Crevice			X
Turdidae	American Robin	*Turdus migratorius*	O	Ground Gleaner	Tree-Branch	X	X	X
	Eastern Bluebird	*Sialia sialis*	O	Ground Gleaner	Tree Cavity-Crevice		X	
	Wood Thrush	*Hylocichla mustelina*	O	Ground Gleaner	Tree-Branch			X
Tyrannidae	Eastern Kingbird	*Tyrannus tyrannus*	I	Air Sallier	Tree-Twig	X	X	
	Eastern Phoebe	*Sayornis phoebe*	I	Air Sallier	Buildings	X	X	
	Eastern Wood-Pewee	*Contopus virens*	I	Air Sallier	Tree Branch			X
Tytonidae	Common Barn-Owl	*Tyto alba*	C	Groimd Pouncer	Buildings		X	
Vireonidae	Red-eyed Vireo	*Vireo olivaceus*	I	Upper Canopy Gleaner	Tree-Twig			X
Mammals								
Canidae	Coyote	*Canis latrans*	O	Ground Forager	Terrestrial Subsurface			X
	Red Fox	*Vulpes vulpes*	O	Ground Forager	Terrestrial Subsurface		X	X
Cervidae	White-tailed Deer	*Odocoileus virginianus*	H	Ground Grazer	Ground-Herb		X	X
Cricetidae	Meadow Vole	*Microtus pennsylvanicus*	H	Ground Grazer	Terrestrial Subsurface		X	
	Muskrat	*Ondatra zibethicus*	H	Water Grazer	Riparian Subsurface	X		
	White-footed Mouse	*Peromyscus leucopus*	O	Ground Forager	Terrestrial Subsurface		X	X
	Woodland Vole	*Microtus pinetorum*	H	Ground Grazer	Terrestrial Subsurface			X
Didelphidae	Virginia Opossum	*Didelphis virginiana*	O	Ground Forager	Tree Cavity-Crevice	X	X	X

TABLE G-2
POTENTIAL WILDLIFE SPECIES RECEPTORS
SMC FACILITY, NEWFIELD, NJ(1)

Family	Common Name	Scientific Name	Guild(2)	Forage Method	Breeding Substrate	Habitats Used		
						Pond/Stream	Grass	Forest
Leporidae	Eastern Cottontail	*Sylvilagus floridanus*	H	Ground Grazer	Ground-Herb		X	X
Muridae	House Mouse	*Mus musculus*	O	Ground Forager	Buildings		X	
	Norway Rat	*Rattus norvegicus*	O	Ground Forager	Terrestrial Subsurface		X	
Mustelidae	Ermine	*Mustela erminea*	C	Ground Pursuer	Ground-Herb			X
	Long-tailed Weasel	*Mustela frenata*	C	Ground Pursuer	Terrestrial Subsurface			X
	Striped Skunk	*Mephitis mephitis*	O	Ground Forager	Terrestrial Subsurface		X	X
Procyonidae	Raccoon	*Procyon lotor*	O	Ground Forager	Tree Cavity-Crevice	X	X	X
Sciuridae	Red Squirrel	*Tamiasciurus hudsonicus*	G	Upper Canopy Forager	Tree Cavity-Crevice			X
	Woodchuck	*Marmota monax*	H	Ground Grazer	Terrestrial Subsurface		X	
Soricidae	Masked Shrew	*Sorex cinereus*	I	Ground Gleaner	Terrestrial Subsurface		X	X
	N. Short-tailed Shrew	*Blarina brevicauda*	I	Ground Gleaner	Terrestrial Subsurface		X	X
Talpidae	Eastern Mole	*Scalopus aquaticus*	I	Ground Gleaner	Terrestrial Subsurface		X	
Vespertilionidae	Big Brown Bat	*Eptesicus fuscus*	I	Air Hawker	Buildings	X	X	
	Little Brown Bat	*Myotis lucifugus*	I	Air Hawker	Buildings	X	X	
	Red Bat	*Lasiurus borealis*	I	Air Hawker	Tree-Twig	X	X	X
Zapodidae	Meadow Jumping Mouse	*Zapus hudsonius*	O	Ground Forager	Ground-Herb		X	X
	Woodland Jumping Mouse	*Napaeozapus insignis*	O	Ground Forager	Ground-Herb			X
Reptiles								
Chelydridae	Snapping Turtle	*Chelydra serpentina*	O	Bottom Forager	Riparian Subsurface	X		
Colubridae	Black Rat Snake	*Elaphe o. obsoleta*	C	Ground Ambusher	Terrestrial Subsurface			X
	Eastern Garter Snake	*Thamnophia s. sirtalis*	C	Ground Ambusher	Terrestrial Subsurface	X	X	X
	Eastern Hognose Snake	*Heterodon platyrhinos*	C	Ground Ambusher	Terrestrial Subsurface		X	
	Eastern Kingsnake	*Lampropeltis getulus*	C	Ground Ambusher	Terrestrial Subsurface	X		X
	Eastern Milk Snake	*Lampropeltis t. triangulum*	C	Ground Ambusher	Terrestrial Subsurface		X	X
	Eastern Ribbon Snake	*Thamnophis s. sauritus*	C	Water Ambusher	Riparian Subsurface	X		
	Northern Black Racer	*Coluber c. constrictor*	C	Ground Ambusher	Terrestrial Subsurface		X	X
	Northern Brown Snake	*Storeria d. dekayi*	I	Ground Ambusher	Terrestrial Subsurface		X	X
	Northern Redbelly Snake	*Storeria o. occipitomaculata*	I	Ground Ambusher	Terrestrial Subsurface		X	X

TABLE G-2
POTENTIAL WILDLIFE SPECIES RECEPTORS
SMC FACILITY, NEWFIELD, NJ(1)

Family	Common Name	Scientific Name	Guild(2)	Forage Method	Breeding Substrate	Habitats Used		
						Pond/Stream	Grass	Forest
	Northern Ringneck Snake	*Diadophis punctatus edwardsi*	C	Ground Ambusher	Terrestrial Subsurface		X	X
	Northern Water Snake	*Nerodia s. sipedon*	C	Water Ambusher	Riparian Subsurface	X		X
	Rough Green Snake	*Opheodrys aestivus*	C	Ground Ambusher	Riparian Subsurface	X		X
Emydidae	Eastern Box Turtle	*Terrapene c. carolina*	G	Ground Forager	Terrestrial Subsurface		X	X
	Eastern Painted Turtle	*Chrysemys p. picta*	O	Bottom Forager	Terrestrial Subsurface	X		
	Red-bellied Turtle	*Chrysemys rubriventris*	O	Bottom Forager	Terrestrial Subsurface	X		
	Spotted Turtle	*Clemmys guttata*	O	Bottom Forager	Riparian Subsurface	X		
Kinosternidae	Musk Turtle	*Sternotherus odoratus*	C	Bottom Forager	Riparian Subsurface	X		
	Mud Turtle	*Kinosternon subrubrum*	O	Bottom Forager	Riparian Subsurface	X		
Scincidae	Five-lined Skink	*Eumeces fasciatus*	I	Ground Ambusher	Terrestrial Subsurface			X

(1) Includes resident and breeding amphibian, avian, mammalian, and reptilian species within the areas of aquatic habitat, grassland, and forest. Migratory and wintering species are also likely to use the area; however, these species would have a lesser potential for exposure to site contaminants than species inhabiting the site for extended periods.

(2) Guilds include:
C: Carnivore I: Insectivore P: Piscivore
H: Herbivore O: Omnivore G: Granivore
F: Frugivore (fruit-eating)

TABLE G-3

MACROBENTHIC SURVEY RESULTS

	Functional Group	Sample ID							
		SD-9A	SD-10	SD-14	SD-17	SD-19	SD-23	SD-30	SD-35
EPHEMEROPTERA									
Caenis	COLLECTOR	97	34	0	1	9	0	0	0
Baetis	COLLECTOR	0	0	0	19	4	0	0	1
Callibaetis	COLLECTOR	6	6	5	0	3	0	0	0
Siphlonurus	COLLECTOR	0	0	1	0	0	0	0	0
TOTAL		103	40	6	20	16	0	0	1
ODONATA									
Enallagma	PREDATOR	131	74	1	0	36	0	0	16
Tetragoneuria	PREDATOR	1	0	0	0	0	0	0	0
Calopteryx	PREDATOR	0	0	0	1	0	0	1	8
Argia	PREDATOR	0	0	0	3	0	0	0	0
Erythemis	PREDATOR	1	0	0	0	0	0	0	0
Aeshna	PREDATOR	4	0	0	0	0	0	0	0
Anax	PREDATOR	0	5	0	0	0	0	0	0
Pantala	PREDATOR	0	2	0	0	6	0	0	0
Tramea	PREDATOR	0	3	0	0	1	0	0	0
Libellola	PREDATOR	0	0	4	0	0	0	1	0
Neurocordulia	PREDATOR	0	0	0	0	0	0	0	1
Basiaeschna	PREDATOR	0	0	0	0	0	0	0	4
TOTAL		137	84	5	4	43	0	2	29
HEMIPTERA									
Ranatra	PREDATOR	1	0	0	0	0	0	0	0
Pelocoris	PREDATOR	0	4	0	0	1	0	1	0
Belostoma	PREDATOR	0	1	0	1	0	0	0	0
Buenoa	PREDATOR	0	1	0	0	0	0	0	0
Notonecta	PREDATOR	0	2	0	0	0	0	0	5
Rheumatobates	PREDATOR	0	1	0	0	0	0	0	0
Limnogonus	PREDATOR	0	0	1	0	1	0	6	6
Callecorixia	PREDATOR	0	0	0	1	0	0	0	0
TOTAL		1	9	1	2	2	0	7	11
MEGALOPTERA									
Sialis	PREDATOR	1	0	0	0	2	0	0	0
TOTAL		1	0	0	0	2	0	0	0
TRICHOPTERA									
Ptilostomis	SHREDDER	0	0	2	1	0	0	0	0
Cheumatopsyche	COLLECTOR	0	0	1	6	0	0	0	0
Oecitis	PREDATOR	0	0	1	0	0	0	0	0
Polycentropus	PREDATOR	0	0	0	0	0	0	0	2
Platycentropus	PREDATOR	0	0	0	0	0	0	0	1
Linmephilus	SHREDDER	0	0	0	0	0	0	0	4
TOTAL		0	0	4	7	0	0	0	7
LEPIDOPTERA									
Paraponynx	SHREDDER	0	0	0	0	0	0	0	1
TOTAL		0	0	0	0	0	0	0	1
COLEOPTERA									
Dineutus	PREDATOR	0	1	0	1	0	0	0	0
Peltodytes	PREDATOR	0	1	0	4	3	0	0	0
Laccophilus	PREDATOR	0	1	0	0	0	0	0	0
Agabus	PREDATOR	0	0	0	0	0	0	0	6
Elmidae(?)	SCRAPER	0	0	0	0	0	0	1	0

TABLE G-3

MACROBENTHIC SURVEY RESULTS

	Functional Group	Sample ID							
		SD-9A	SD-10	SD-14	SD-17	SD-19	SD-23	SD-30	SD-35
TOTAL		0	3	0	5	3	0	1	6
DIPTERA									
Chironomidae	COLLECTOR	93	186	48	19	46	0	5	14
Tipula	SHREDDER	0	0	0	0	0	0	1	0
Tabanus	PREDATOR	0	0	1	0	0	0	0	0
Bezzia	PREDATOR	0	0	1	0	0	0	0	0
Stratiomys	COLLECTOR	1	0	0	0	0	0	0	0
TOTAL		94	186	50	19	46	0	6	14
OLIGOCHAETA	COLLECTOR	2	4	1	2	1	0	24	15
MOLLUSCA									
Pisidium	FILTERER	0	0	0	0	0	113	15	15
Planorbidae	SCRAPER	0	0	0	0	0	0	0	1
Physidae	SCRAPER	31	37	2	0	3	184	1	5
TOTAL		31	37	2	0	3	297	16	21
CRUSTACEA									
Orconectes	COLLECTOR	0	0	0	3	0	0	0	0
Hyalella	COLLECTOR	17	20	0	1	0	0	62	0
Caecidotea	COLLECTOR	0	0	0	0	0	0	0	6
TOTAL		17	20	0	4	0	0	62	6
HIRUDINEA	PARASITE	0	1	0	0	0	1	2	0
HYDRACHNIDIA									
Rhyncholimnochares	PARASITE	5	0	0	1	3	0	0	0
Protzia	PARASITE	0	1	0	0	0	0	0	0
TOTAL		5	1	0	1	3	0	0	0

NA = Not Available

State of New Jersey

Richard J. Codey
Acting Governor

Department of Environmental Protection

Division of Parks and Forestry
Office of Natural Lands Management
Natural Heritage Program
P.O. Box 404
Trenton, NJ 08625-0404
Tel. #609-984-1339
Fax. #609-984-1427

Bradley M. Campbell
Commissioner

January 20, 2005

Jean Oliva
TRC Environmental Corporation
5 Waterside Crossing
Windsor, CT 06095-1563

Re: Shieldalloy Metallurgical Corporation, 12 West Boulevard, Newfield, NJ

Dear Ms. Oliva:

Thank you for your data request regarding rare species information for the above referenced project site in Newfield Borough and Vineland City, Gloucester and Cumberland Counties.

Searches of the Natural Heritage Database and the Landscape Project (Version 2) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Natural Heritage Database and the Landscape Project habitat mapping for occurrences of any rare wildlife species or wildlife habitat on the referenced site. Please see Table 1 for species list and conservation status.

Table 1 (on referenced sife).

Common Name	Scientific Name	Federal Status	State Status	Grank	Srank
eastern box turtle	*Terrapene carolina*		Special Concern	G5	S5B

Neither the Natural Heritage Database nor the Landscape Project has records for any additional rare wildlife species or wildlife habitat within 1/4 mile of the referenced site.

We have also checked the Natural Heritage Database for occurrences of rare plant species or natural communities. The Natural Heritage Data Base does not have any records for rare plants or natural communities on or within 1/4 mile of the site.

Attached are lists of rare species and natural communities that have been documented from Gloucester and Cumberland Counties. If suitable habitat is present at the project site, these species have potential to be present.

Status and rank codes used in the tables and lists are defined in the attached EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive I-Map-NJ website at the following URL, http://www.state.nj.us/dep/gis/imapnj/imapnj.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program.

PLEASE SEE THE ATTACHED 'CAUTIONS AND RESTRICTIONS ON NHP DATA'.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Herbert A. Lord

Herbert A. Lord
Data Request Specialist

cc: Robert J. Cartica
Lawrence Niles
NHP File No. 05-3907551

CAUTIONS AND RESTRICTIONS ON NATURAL HERITAGE DATA

The quantity and quality of data collected by the Natural Heritage Program is dependent on the research and observations of many individuals and organizations. Not all of this information is the result of comprehensive or site-specific field surveys. Some natural areas in New Jersey have never been thoroughly sun/eyed. As a result, new locations for plant and animal species are continuously added to the database. Since data acquisition is a dynamic, ongoing process, the Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements iri any part of New Jersey. Information supplied by the Natural Heritage Program summarizes existing data known to the program at the fime of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The attached data is provided as one source of information to assist others in the preservation of natural diversity.

This office cannot provide a letter of interpretation or a statement addressing the classification of wetlands as defined by the Freshwater Wetlands Act. Requests for such determination should be sent to the DEP Land Use Regulation Program, P.O. Box 401, Trenton, NJ 08625-0401.

The Landscape Project was developed by the Division of Fish & Wildlife, Endangered and Nongame Species Program to map critical habitat for rare animal species. Some of the rare species data in the Landscape Project is in the Natural Heritage Database, while other records were obtained from other sources. Natural Heritage Database response letters will list all speoies (if any) found during a search of the Landscape Project. However, any reports that are included with the response letter will only reference specific records if they are in the Natural Heritage Database. This office cannot answer any inquiries about the Landscape Project. All questiohs should be directed to the DEP Division of Fish and Wildlife, Endangered and Nongame Species Program, P.O. Box 400, Trenton, NJ 08625-0400.

This cautions and restrictions notice must be included whenever information provided by the Natural Heritage Database is published.

NJ Department of Environmental Protection
Division of Parks and Forestry
Natural Lands Management

EXPLANATIONS OF CODES USED IN NATURAL HERITAGE REPORTS

FEDERAL STATUS CODES

The following U.S. Fish and Wildlife Service categories and their definitions of endangered and threatened plants and animals have been modified from the U.S. Fish and Wildlife Service (F.R. Vol. 50 No. 188; Vol. 61, No. 40; F.R. 50 CFR Part 17). Federal Status codes reported for species follow the most recent listing.

LE	Taxa formally listed as endangered.
LT	Taxa formally listed as threatened.
PE	Taxa already proposed to be formally listed as endangered.
PT	Taxa already proposed to be formally listed as threatened.
C	Taxa for which the Service currently has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species.
S/A	Similarity of appearance species.

STATE STATUS CODES

Two animal lists provide state status codes after the Endangered and Nongame Species Conservation Act of 1973 (NSSA 23:2A-13 et. seq.): the list of endangered species (N.J.A.C. 7:25-4.13) and the list defining status of indigenous, nongame wildlife species of New Jersey (N J.A.C. 7:25-4.17(a)). The status of animal species is determined by the Nongame and Endangered Species Program (ENSP). The state status codes and definitions provided reflect the most recent lists that were revised in the New Jersey Register, Monday, June 3, 1991.

D	Declining species-a species which has exhibited a continued decline in population numbers over the years.
E	Endangered species-an endangered species is one whose prospects for survival within the state are in immediate danger due to one or many factors - a loss of habitat, over exploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.
EX	Extirpated species-a species that formerly occurred in New Jersey, but is not now known to exist within the state.
I	Introduced species-a species not native to New Jersey that could not have established itself here without the assistance of man.
INC	Increasing species-a species whose population has exhibited a significant increase, beyond the normal range of its life cycle, over a long term period.
T	Threatened species-a species that may become endangered if conditions surrounding the species begin to or continue to deteriorate.
P	Peripheral species-a species whose occurrence in New Jersey is at the extreme edge of its present natural range.
S	Stable species-a species whose population is not undergoing any long-term increase/decrease within its natural cycle.
U	Undetermined species-a species about which there is not enough information available to determine the status.

Status for animals separated by a slash(/) indicate a duel status. First status refers to the state breeding population, and the second status refers to the migratory or winter population.

Plant taxa listed as endangered are from New Jersey's official Endangered Plant Species List N.J.S.A. 131B-15.151 et seq.

E Native New Jersey plant species whose survival in the State or nation is in Jeopardy.

REGIONAL STATUS CODES FOR PLANTS

LP Indicates taxa listed by the Pinelands Commission as endangered or threatened within their legal Jurisdiction. Not all species currently tracked by the Pinelands Commission are tracked by the Natural Heritage Program. A complete list of endangered and threatened Pineland species is included in the New Jersey Pinelands Comprehensive Management Plan.

EXPLANATION OF GLOBAL AND STATE ELEMENT RANKS

The Nature Conservancy has developed a ranking system for use in identifying elements (rare species and natural communities) of natural diversity most endangered witb extinction. Each element is ranked according to its global, national, and state (or subnational in other countries) rarity. These ranks are used to prioritize conservation work so that the most endangered elements receive attention first. Definitions for element ranks are after The Nature Conservancy (1982: Chapter 4, 4.1-1 through 4.4.1.3-3).

GLOBAL ELEMENT RANKS

G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) pr because of some factor(s) making it especially vulnerable to extinction.

G2 Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factdr(s) making it very vulnerable to extinction throughout its range.

G3 Either very rare and local throughout its range or found locally (even abundantly at sorne of Its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout it's range; with the number of occurrences In the range of 21 to 100.

G4 Apparently secure globally; although it may be quite rare in parts of its range, especially at the periphery.

C5 Demonstrably secure globally; although it may be quite rare in parts of its range, especially at the periphery.

GH Of historical occurrence throughout its range i.e., formerly part of the established biota, with the expectation that it may be rediscovered.

GU Possibly in peril range-wide but status uncertain; more information needed.

GX Believed to be extinct throughout range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered.

G? Species has not yet been ranked.

STATE ELEMENT RANKS

S1 Critically imperiled in New Jersey because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to ah extremely small geographical area of the state. Also included are elements which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced iri abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.

S2 Imperiled in New Jersey because of rarity (6 to 20 occurrences). Historically many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.

S3 Rare in state with 21 to 100 occurrences (plant species in this category have only 21 to 50 occurrences). Includes elements which are widely distributed in the state but with small populations/acreage or elements with restricted distribution, but locally abundant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.

S4 Apparently secure in state, with many occurrences.

S5 Demonstrably secure in state and essentially ineradicable under present conditions.

SA Accidental in state, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded; examples include European strays or western birds on the East Coast and vice-versa.

SE Elements that are clearly exotic in New Jersey including those taxa not native to North America (introduced taxa) or taxa deliberately or accidentally introduced Into the State from other parts of North America (adventive taxa). Taxa ranked SE are not a conservation priority (viable introduced occurrences of G1 or G2 elements may be exceptions).

SH Elements of historical occurrence in New Jersey. Despite sonie searching of historical occurrences and/or potential habitat, no extant occurrences are known. Since not all of the historical occurrences have been field surveyed, and unsearched potential habitat remains, historically ranked taxa are considered possibly extant, and remain a conservation priority for continued field work.

SP Element has potential to occur in New Jersey, but no occurrences have been reported.

SR Elements reported from New Jersey, but without persuasive documentation which would provide a basis for either accepting or rejecting the report. In some instances documentation may exist, but as of yet, its source or location has not been determined.

SRF Elements erroneously reported from New Jersey, but this error persists in the literature.

SU Elements believed to be in peril but the degree of rarity uncertain. Also included are rare taxa of uncertain taxonomical standing. More information is needed to resolve rank.

SX Elements that have been determined or are presumed to be extirpated from New Jersey. All historical occurrences have been searched ahd a reasonable search of potential habitat has been completed. Extirpated taxa are not a current conservation priority.

SXC Elements presumed extirpated from New Jersey, but native populations collected from the wild exist in cultivation.

SZ Not of practical conservation concern ih New Jersey, because there are ho definable occurrences, ahhough the taxon is native and appears regularly in the state. An SZ rank will generally be used for long distance migrants whose occurrences during their migrations are too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped and protected. In other words, the migrant regularly passes through the state, but enduring, mappable element occurrences cannot be defined.

Typically, the SZ rank applies to a non-breeding population (N) in the state - for example, birds on migration. An SZ rank may in a few instances also apply to a breeding population (B), for example certain lepidoptera which regularly die out every year with no significant return migration.

Although the SZ rank typically applies to migrants, it should not be used indiscriminately. Just because a species is on migration does not mean it receives an SZ rank. SZ will only apply when the migrants occur in an irregular, transitory and dispersed manner.

B Refers to the breeding population of the element in the state.

N Refers to the non-breeding population of the element in the state.

T Element ranks containing a "T" indicate that the infraspecific taxon is being ranked differently than the full species. For example *Stachys palustris* var. *homotricha* is ranked "GST? SH" meaning the full species is globally secure but the global rarity of the var. *homotricha* has not been determined; in New Jersey the variety is ranked historic.

Q Elements containing a "Q" in the global portion of its rank indicates that the taxon is of questionable, or uncertain taxonomical standing, e.g., some authors regard it as a full species, while others treat it at the subspecific level.

.1 Elements documented from a single location.

Note: To express uncertainty, the most likely rank is assigned and a question mark added (e.g., G2?). A range is indicated by combining two ranks (e.g., G1G2, S1S3).

IDENTIFICATION CODES

codes refer to whether the identification of the species or community has been checked by a reliable individual and is indicative of significant habitat.

Y Identification has been verified and is indicative of significant habitat.

BLANK Identification has not been verified but there is no reason to believe it is not indicative of significant habitat.

? Either it has not been determined if the record is indicative of significant habitat or the identification of the species or community may be confusing or disputed.

CUMBERLAND COUNTY
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
*** Vertebrates						
ACCIPITER COOPERII	COOPER'S HAWK		T/T		GS	S3B,S4N
AMBYSTOMA TIGRINUM TIGRINUM	EASTERN TIGER SALAMANDER		E		OSTS	S2
AMMODRAMUS HENSLOWII	HENSLOW'S SPARROW		E		G4	SIB
AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW		T/S		GS	S2B
ARDEA HERODIAS	GREAT BLUE HERON		S/S		GS	S2B,S4H
BUTEO LINEATUS	RED-SHOULDERED HAWK		E/T		GS	S1B,S2N
CALIDRIS CANUTUS	RED KNOT		T		GS	S3N
CIRCUS CYANEUS	NORTHERN HARRIER		E/U		GS	S1B,S3H
CISTOTHORUS PLATENSIS	SEDGE WREN		E		GS	SIB
CROTALUS HORRIDUS HORRIDUS	TIMBER RATTLESNAKE		E		G4T4	S2
ELAPHE GUTTATA GUTTATA	CORN SNAKE		E		GST5	S1
EUMECES FASCIATUS	FIVE-LINED SKINK		U		GS	S3
FALCO PEREGRINUS	PEREGRINE FALCON		E		G4	S1B,S?N
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	LT	E		G4	S1B,S2N
HYLA ANDERSONII	PINE BARRENS TREEFROG		T		G4	S3
HYLA CHRYSOSCELIS	COPE'S GRAY TREEFROG		E		G5	S2
IXOBRYCHUS EXILIS	LEAST BITTERN		D/S		GS	S3B
LATERALLUS JAMAICENSIS	BLACK RAIL		T/T		G4	S2B
MELANERPES ERYTHROCEPHALUS	RED-HEADED WOODPECKER		T/T		GS	S2B,S2N
NOTROPIS CHALYBAEUS	IRONCOLOR SHINER				G4	S1S2
PANDION HALIAETUS	OSPREY		T/T		GS	S2B
PASSERCULUS SANDWICHENSIS	SAVANNAH SPARROW		T/T		G5	S2B,S4N
PITUOPHIS MELANOLEUCUS MELANOLEUCUS	NORTHERN PINE SNAKE		T		G4T4	S3
POOECETES GRAMINEUS	VESPER SPARROW		E		G5	S1B,S2N
STERNA ANTILLARUM	LEAST TERN		E		G4	SIB
STRIX VARIA	BARRED OWL		T/T		G5	S3B
SYNAPTOMYS COOPERI	SOUTHERN BOG LEMMING		U		GS	S2
VIRGINIA VALERIAS VALERIAE	EASTERN SMOOTH EARTH SNAKE		U		G5T5	SU

CUMBERLAND COUNTY
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
*** Ecosystems						
BRACKISH TIDAL MARSH COMPLEX	BRACKISH TIDAL MARSH COMPLEX				G4	S2?
CAREX STRIATA VAR BREVIS HERBACEOUS VEGETATION	WALTER'S SEDGE COASTAL PLAIN INTERMITTENT POND HERBACEOUS VEGETATION				G?	S1S3
COASTAL PLAIN INTERMITTENT POND	VERNAL POND				G3?	S2S3
FRESHWATER TIDAL MARSH COMPLEX	FRESHWATER TIDAL MARSH COMPLEX				G4?	S3?
PANICUM RIGIDULUM VAR PUBESCENS - DICHANTHELIUM SP / SPHACNUM SPP HERBACEOUS VEGETATION	REDTOP PANICGRASS - ROSETTE GRASS / SPHAGNUM MOSS COASTAL PLAIN INTERMITTENT POND HERBACEOUS VEGETATION				G2	S2
PANICUM VIRGATUM HERBACEOUS VEGETATION	SWITCHGRASS COASTAL PLAIN INTERMITTENT POND HERBACEOUS VEGETATION				G?	S1?
RHEXIA VIRGINICA - PANICUM VERRUCOSUM HERBACEOUS VEGETATION	VIRGINIA MEADOW-BEAUTY - WARTY PANICGRASS COASTAL PLAIN INTERMITTENT POND HERBACEOUS VEGETATION				G2G3	S1S3
*** Invertebrates						
ANAX LONGIPES	COMET DARNER				G5	S2S3
APAMEA APAMIFORMIS	A NOCTUID MOTH				G4	S2S4
APAMEA INEBRIATA	A NOCTUID MOTH				G3G4	S2S4
BOLORIA SELENE MYRINA	A SILVER-BORDERED FRITILLARY		T		G5T5	S2
CALLOPHRYS HENRICI	HENRY'S ELFIN				G5	S3S4
CALLOPHRYS HESSELI	HESSEL'S HAIRSTREAK				G3G4	S3S4
CALLOPHRYS IRUS	FROSTED ELFIN		T		G3	S2S3
CATOCALA CONSORS SORSCONI	THE CONSORT UNDERWING				G4T2T4	S1S3

CUMBERLAND COUNTY
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NBW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
CATOCALA PRETIOSA PRETIOSA	PRECIOUS UNDERWING				G4T2T3	S2S3
CELITHEMIS MARTHA	MARTHA'S PENNANT				G4	S3S4
CELITHEMIS VERNA	DOUBLE-RINGED PENNANT				GS	S2
CHLOROPTERYX TEPPERARIA	ANGLE WINGED EMERALD MOTH				G4	SU
CISTHENE KENTUCKIENSIS	KENTUCKY LICHEN MOTH				G4	SH
ENALLAGMA PICTUM	SCARLET BLUET				G3	S3
ENALLAGMA RECURVATUM	PINE BARRENS BLUET				G3	S3
EUSARCA FUNDARIA	A GEOMETRID MOTH				G4	S2S3
FARONTA RUBRIPENNIS	PINK STREAK				G3G4	S3
GOMPHUS APOMYIUS	BANNER CLUBTAIL				G4	S1
HEMARIS GRACILIS	GRACEFUL CLEARWING				G3G4	SU
HESPERIA ATTALUS SLOSSONAE	DOTTED SKIPPER				G3G4T3	S2S3
HESPERIA LEONARDUS	LEONARD'S SKIPPER				G4	S2
IDAEA OBPUSARIA	RIPPLED WAVE				G4G5	S2S4
IDAEA VIOLACEARIA	A GEOMETRID MOTH				G4	S1S3
LIBELLULA AURIPENNIS	GOLDEN-WINGED SKIMMER				GS	S1S2
LIBELLULA AXILENA	BAR-WINGED SKIMMER				GS	S3B,S2N
LIGUMIA NASUTA	EASTERN PONDMUSSEL		T		G4G5	S1
LITHOPHANE LEMMERI	LEMMER'S NOCTUID MOTH				G3G4	S2
LITHOPHANE LEPIDA ADIPEL	A NOCTUID MOTH				G4T4	S3S4
LYCAENA HYLLUS	BRONZE COPPER		E		G5	S2
MACROCHILO HYPOCRITALIS	A NOCTUID MOTH				G4	S3S4
MACROCHILO SANTERIVALIS	A NOCTUID MOTH				G3G4	S1S3
MACROCHILO SP 1	A NOCTUID MOTH				G3	53
MEROPLEON TITAN	A NOCTUID MOTH				G2G4	S1
METARRANTHIS PILOSARIA	COASTAL BOG METARRANTHIS				G3G4	S3S4
METARRANTHIS SP 1	A GEOMETRID MOTH				G3	S2
PAPAIPEMA STENOCELIS	CHAIN FERN BORER MOTH				G4	S3
PROBLEMA BULENTA	RARE SKIPPER				G2G3	S2
SOMATOCHLORA PROVOCANS	TREETOP EMERALD				G4	S2S3

CUMBERLAND COUNTY

RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN

THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
SPEYERIA IDALIA	REGAL FRITILLARY				G3	SH
SYMPETRUM AMBIGUUM	BLUE-FACED MEADOWHAWK				G5	S2
TARACHIDIA SEMIFLAVA	HALF YELLOW MOTH				G4	S2S4
*** Other types						
BALD EAGLE WINTERING SITE	BALD EAGLE WINTERING SITE				G?	S?
MIGRATORY SHOREBIRD	MIGRATORY SHOREBIRD				G?	S?
CONCENTRATION SITE	CONCENTRATION SITE					
PRIMEVAL FOREST	PRIMEVAL FOREST				G3?	S1
*** Vascular plants						
AESCHYNOMENE VIRGINICA	SENSITIVE JOINT-VETCH	LT	E	LP	G2	S1
AGASTACHE SCROPHULARIIFOLIA	PURPLE GIANT-HYSSOP				G4	S2
ARETHUSA BULBOSA	DRAGON MOUTH				G4	S2
ARISTIDA VIRGATA	WAND-LIKE THREE-AWN GRASS				G5T4T5	S2
ASCLEPIAS RUBRA	RED MILKWEED			LP	G4G5	S2
ASCLEPIAS VARIEGATA	WHITE MILKWEED				G5	S2
ASTER CONCOLOR	EASTERN SILVERY ASTER			LP	G4?	S2
BIDENS BIDENTOIDES	ESTUARY BURR-MARIGOLD				G3	S2
BOLTONIA ASTEROIDES VAR ASTEROIDES	ASTER-LIKE BOLTONIA				G5T4T5	S2
CALYSTEGIA SPITHAMAEA	ERECT BINDWEED		E		G4G5T4T5	S1
CAREX BARRATTII	BARRATT'S SEDGE			LP	G4	S4
CAREX MITCHELLIANA	MITCHELL'S SEDGE				G3G4	S2
CAREX TYPHINA	CAT-TAIL SEDGE				G5	S3
CAREX UTRICULATA	BOTTLE-SHAPED SEDGE				G5	S2
CHENOPODIUM PRATERICOLA	NARROW-LEAF GOOSEFOOT				GS	S2
CHIONANTHUS VIRGINICUS	FRINGETREE				GS	S3
CLITORIA MARIANA	BUTTERFLY-PEA		E		GS	S1
COREOPSIS ROSEA	ROSE-COLOR COREOPSIS			LP	G3	S2

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NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
CROTON WILLDENOWII	ELLIPTICAL RUSHFOIL			LP	GS	S2
CUSCUTA CORYLI	HAZEL DODDER				G5	S2
CUSCUTA POLYGONORUM	SMARTWEED DODDER				GS	S2
CYPERUS ENGELMANNII	ENGELMANN'S FLAT SEDGE				G4Q	S2
CYPERUS POLYSTACHYOS	COAST FLAT SEDGE		E		GST5	S1
DESMODIUM LAEVIGATUM	SMOOTH TICK-TREFOIL				G5	S3
DESMODIUM STRICTUM	PINELAND TICK-TREFOIL			LP	G4	S2
DESMODIUM VIRIDIFLORUM	VELVETY TICK-TREEFOIL				G5?	S2
DIOSCOREA VILLOSA VAR HIRTICAULIS	HAIRY-STEM WILD YAM				G4G5T3Q	S2
ELATINE AMERICANA	AMERICAN WATERWORT				G4	S2
ELATINE MINIMA	SMALL WATERWORT				OS	S2
ELEOCHARIS EQUISETOIDES	KNOTTED SPIKE-RUSH		E	LP	G4	S1
ELEOCHARIS MELANOCARPA	BLACK-FRUIT SPIKE-RUSH		E		G4	S1
ELEOCHARIS QUADRANGULATA	ANGLED SPIKE-RUSH				G4	S2
ELEOCHARIS TORTILIS	TWISTED SPIKE-RUSH		E		G5	S1
ERAGROSTIS HIRSUTA	STOUT LOVE GRASS				G5	S1.1
ERIOCAULON PARKERI	PARKER'S PIPEWORT				G3	S2
ERIOPHORUM TENELLUM	ROUGH COTTON-GRASS		E		G5	S1
EUPATORIUM AROMATICUM VAR AROMATICUM	SMALLER WHITE SNAKEROOT				G5T5	S1
EUPATORIUM CAPILLIFOLIUM	DOG-FENNEL THOROUGHWORT		E		G5	S1
EUPATORIUM RESINOSUM	PINE BARREN BONESET		E	LP	G3	S2
GALACTIA VOLUBILIS	DOWNY MILK-PEA		E		G5	SH
GENTIANA AUTUMNALIS	PINE BARREN GENTIAN			LP	G3	S3
GENTIANA VILLOSA	STRIPED GENTIAN				G4	SX.1
GNAPHALIUM HELLERI	SMALL EVERLASTING		E		G4GST3?	SH
GRATIOLA VIRGINIANA	ROUND-FRUIT HEDGE-HYSSOP				GS	S2
HELONIAS BULLATA	SWAMP-PINK	LT	E	LP	G3	S3
HYPERICUM ADPRESSUM	BARTON'S ST. JOHN'S-WORT		E		G2G3	S2

CUMBERLAND COUNTY

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NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
HYPERICUM GYMNANTHUM	CLASPING-LEAF ST. JOHN'S-WORT				G4	S1
JUNCUS CAESARIENSIS	NEW JERSEY RUSH		E	LP	G2	S2
LESPEDEZA STUEVEI	STUEVE'S DOWNY BUSH-CLOVER				G4?	S2
LOBELIA CANBYI	CANBY'S LOBELIA			LP	G4	S3
MALUS ANGUSTIFOLIA VAR PUBERULA	SPINY WILD CRABAPPLE				G5?T2T4	S2
MUHLENBERGIA TORREYANA	PINE BARREN SMOKE GRASS			LP	G3	S3
MYRIOPHYLLUM PINNATUM	CUTLEAF WATER-MILFOIL		E		GS	S1
MYRIOPHYLLUM VERTICILLATUM	WHORLED WATER-MILFOIL		E		GS	SH
NUPHAR MICROPHYLLUM	SMALL YELLOW POND-LILY		E		GST4T5	SH
NYMPHOIDES CORDATA	FLOATINGHEART			LP	GS	S3
OBOLARIA VIRGINICA	VIRGINIA PENNYWORT				GS	S2
ONOSMODIUM VIRGINIANUM	VIRGINIA FALSE-GROMWELL		E		G4	S1
OPHIOGLOSSUM VULGATUM VAR PYCNOSTICHUM	SOUTHERN ADDER'S-TONGUE		E		GS	S1
PANICUM HEMITOMON	MAIDEN-CANE			LP	G5?	S2
PANICUM WRIGHTIANUM	WRIGHT'S PANIC GRASS				G4	S2
PASPALUM DISSECTUM	MUDBANK CROWN GRASS				G4?	S2
PENSTEMON LAEVIGATUS	SMOOTH BEARDTONGUE		E		G5	S1
PHORADENDRON LEUCARPUM	AMERICAN MISTLETOE			LP	G5	S2
PINUS SEROTINA	POND PINE				GS	S2
PINUS TAEDA	LOBLOLLY PINE				G5	S2
PLATANTHERA GILIARIS	YELLOW FRINGED ORCHID			LP	G5	S2
POLYGALA INCARNATA	PINK MILKWORT		E		GS	SH
POLYGALA MARIANA	MARYLAND MILKWORT			LP	GS	S2
POLYGALA POLYGAMA	RACEMED MILKWORT				G5	S2
POLYGONUM DENSIFLORUM	DENSE-FLOWER KNOTWEED		E		GS	S1
POTAMOGETON OAKESIANUS	OAKES' PONDWEED				G4	S2
PRENANTHES AUTUMNALIS	PINE BARREN RATTLESNAKE-ROOT			LP	G4G5	S2
PRUNUS ANGUSTIFOLIA	CHICKASAW PLUM		E		GST4T5	S2

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PUCCINELLIA PASCICULATA	SALTMARSH ALKALI GRASS				G3G5	S2
QUERCUS LYRATA	OVERCUP OAK		E		GS	S1
QUERCUS NIGRA	WATER OAK		E		GS	S1
RHODODENDRON ATLANTICUM	DWARF AZALEA		E		G4G5	S1
RHYNCHOSPORA MICROCEPHALA	SMALL-HEAD BEAKED-RUSH		E		G5T5	S1
RHYNCHOSPORA NITENS	SHORT-BEAKED BALD-RUSH				G4?	S2
RHYNCHOSPORA PALLIDA	PALE BEAKED-RUSH				G3	S3
RUELLIA CAROLINIENSIS	CAROLINA PETUNIA		E		G5	SH
SAGITTARIA SUBULATA	AWL-LEAF ARROWHEAD				G4	S2
SCHI2AEA PUSILLA	CURLY GRASS FERN			LP	G3	S3
SCHOENOPLECTUS NOVAE-ANGLIAE	NEW ENGLAND BULRUSH				G5	S2
SCHWALBEA AMERICANA	CHAFFSEED	LE	E	LP	G2	S1
SCIRPUS MARITIMUS	SALTMARSH BULRUSH		E		GS	SH
SCLERIA MINOR	SLENDER NUT-RUSH			LP	G4	S4
SENEGIO TOMENTOSUS	WOOLLY RAGWORT				G4G5	S2
SETARIA MAGNA	GIANT FOX-TAIL				G4G5	S2
SISYRINCHIUM FUSCATUM	SAND-PLAIN BLUE-EYED GRASS				G5?	S2
SPIRANTHES ODORATA	FRAGRANT LADIES'-TRESSES				GS	S2
SPOROBOLUS COMPOSITUS VAR COMPOSITUS	LONG-LEAF RUSH-GRASS				G5T5	S2
STACHYS HYSSOPIFOLIA	HYSSOP HEDGE-NETTLE				GS	S2
STYLOSANTHES BIFLORA	PENCIL-FLOWER				GS	S3
TRICHOSTEMA SETACEUM	NARROW-LEAF BLUECURLS				G5	S2
UTRICULARIA PURPUREA	PURPLE BLADDERWORT			LP	GS	S3
VALERIANELLA RADIATA	BEAKED CORNSALAD		E		GS	S1
VERNONIA GLAUCA	BROAD-LEAF IRONWEED		E		GS	S1
VIOIA BRITTONIANA VAR BRITTONIANA	BRITTON'S COAST VIOLET				G4G5T4TS	S3

179 Records Processed

GLOUCESTER COUNTY

RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN

THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
*** Vertebrates						
ACCIPITER COOPERII	COOPER'S HAWK		T/T		GS	S3B,S4N
AMBYSTOMA TIGRINUM TIGRINUM	EASTERN TIGER SALAMANDER		E		G5TS	S2
AMMODRAMUS HENSLOWII	HENSLOW'S SPARROW		E		G4	S1B
AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW		T/S		G5	S2B
ARDEA HERODIAS	GREAT BLUE HERON		S/S		G5	S2B,S4N
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		E		GS	S1B
BUTEO LINEATUS	RED-SHOULDERED HAWK		E/T		G5	S1B,S2N
CLEMMYS INSCULPTA	WOOD TURTLE		T		G4	S3
CLEMMYS MUHLENBERGII	BOG TURTLE	LT	E		G3	S2
DOLICHONYX ORYZIVORUS	BOBOLINK		T/T		G5	S2B
FALCO PEREGRINUS	PEREGRINE FALCON		E		G4	S1B,S?N
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	LT	E		G4	S1B,S2N
HYLA ANDERSONII	PINE BARRENS TREEFROG		T		G4	S3
MELANERPES ERYTHROCEPHALUS	RED-HEADED WOODPECKER		T/T		G5	S2B,S2N
PANDION HALIAETUS	OSPREY		T/T		GS	S2B
PITUOPHIS MELANOLEUCUS MELANOLEUCUS	NORTHERN PINE SNAKE		T		G4T4	S3
PODILYMBUS PODICEPS	PIED-BILLED GREBE		E/S		GS	S1B,S3N
POOECETES GRAMINEUS	VESPER SPARROW		E		G5	S1B,S2N
STRIX VARIA	BARRED OWL		T/T		GS	S3B
*** Ecosystems						
CLADIUM MARISCOIDES	TWIG-RUSH COASTAL PLAIN				G3	S2
HERBACEOUS VEGETATION	INTERMITTENT POND HERBACEOUS VEGETATION					

GLOUCESTER COUNTY
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NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
ELEOCHARIS (OLIVACEA, MICROCARPA, ROBBINSII) - XYRIS (DIFFORMIS VAR DIFFORMIS, SMALLIANA) HERBACEOUS VEGETATION	SPIKERUSH (SMALLFRUIT, BRIGHT GREEN, ROBBIN'S) - YELLOWEYED GRASS (BOG, SMALL'S) COASTAL PLAIN INTERMITTENT POND HERBACEOUS VEGETATION				G2	S2
FRESHWATER TIDAL MARSH COMPLEX	FRESHWATER TIDAL MARSH COMPLEX				G4?	S3?
RHEXIA VIRGINICA - PANICUM VERRUCOSUM HERBACEOUS VEGETATION	VIRGINIA MEADOW-BEAUTY - WARTY PANICGRASS COASTAL PLAIN INTERMITTENT POND HERBACEOUS VEGETATION				G2G3	S1S3
*** Invertebrates						
ALASMIDONTA UNDULATA	TRIANGLE FLOATER		T		G4	S3
CATOCALA PRETIOSA PRETIOSA	PRECIOUS UNDERWING				G4T2T3	S2S3
CELITHEMIS MARTHA	MARTHA'S PENNANT				G4	S3S4
ENALLAGMA PICTUM	SCARLET BLUET				G3	S3
FARONTA RUBRIPENNIS	PINK STREAK				G3G4	S3
GOMPHUS APOMYIUS	BANNER CLUBTAIL				G4	S1
ITAME SP 1	BARRENS ITAME				G3	S3
LAMPSILIS CARIOSA	YELLOW LAMPMUSSEL		T		G3G4	S1
LAMPSILIS RADIATA	EASTERN LAMPMUSSEL		T		GS	S3
LEPTODEA OCHRACEA	TIDEWATER MUCKET		T		G4	S1
LIBELLULA AURIPENNIS	GOLDEN-WINGED SKIMMER				GS	S1S2
LIGUMIA NASUTA	EASTERN PONDMUSSEL		T		G4G5	S1
LITHOPHANE LEMMERI	LEMMER'S NOCTUID MOTH				G3G4	S2
MACROCHILO LOUISIANA	A NOCTUID MOTH				G4	S2S3
MACROCHILO SANTERIVALIS	A NOCTUID MOTH				G3G4	S1S3
MONOLEUCA SEMIFASCIA	A SLUG MOTH				G4G5	S2S3
NICROPHORUS AMERICANUS	AMERICAN BURYING BEETLE	LE	E		G2G3	SH

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NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
PYRGUS WYANDOT	APPALACHIAN GRIZZLED SKIPPER		E		G2	SH
ZANCLOGNATHA SP 1	A NOCTUID MOTH				G3G4	S3
*** Other types						
BALD EAGLE WINTERING SITE	BALD EAGLE WINTERING SITE				G?	S?
*** Vascular plants						
AESCHYNOMENE VIRGINICA	SENSITIVE JOINT-VETCH	LT	E	LP	G2	S1
AGASTACHE NEPETOIDES	YELLOW GIANT-HYSSOP				GS	S2
ALOPECURUS CAROLINIANUS	TUFTED MEADOW-FOXTAIL				G5	S3S4
AMIANTHIUM MUSCITOXICUM	FLY POISON				G4G5	S2
ANEMONE CANADENSIS	CANADA ANEMONE				GS	SX
APLECTRUM HYEMALE	PUTTYROOT		E		GS	S1
ARISTIDA DICHOTOMA VAR CURTISSII	CURTISS' THREE-AWN GRASS				G5T5	S2
ASCLEPIAS RUBRA	RED MILKWEED			LP	G4GS	S2
ASCLEPIAS VARIEGATA	WHITE MILKWEED				G5	S2
ASCLEPIAS VERTICILLATA	WHORLED MILKWEED				GS	S2
ASIMINA TRILOBA	PAWPAW		E		GS	S1
ASTER CONCOLOR	EASTERN SILVERY ASTER			LP	G4?	S2
ASTER RADULA	LOW ROUGH ASTER		E		G5	S1
BIDENS BIDENTOIDES	ESTUARY BURR-MARIGOLD				G3	S2
BOUTELOUA CURTIPENDULA	SIDE-OATS GRAMA GRASS		E		G5TS	S1
CACALIA ATRIPLICIFOLIA	PALE INDIAN PLANTAIN		E		G4G5	S1
CALLITRICHE PALUSTRIS	MARSH WATER-STARWORT				GS	S2
CARDAMINE LONGII	LONG'S BITTERCRESS		E		G3	SH
CAREX BARRATTII	BARRATT'S SEDGE			LP	G4	S4
CAREX FRANKII	FRANK'S SEDGE				G5	S3
CAREX LIMOSA	MUD SEDGE		E		G5	S1
CAREX MITCHELLIANA	MITCHELL'S SEDGE				G3G4	S2

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CAREX POLYMORPHA	VARIABLE SEDGE		E		G3	S1
CAREX PRAIREA	PRAIRIE SEDGE				G5?	S2
CAREX UTRICULATA	BOTTLE-SHAPED SEDGE				G5	S2
CASTANEA PUMILA	CHINQUAPIN		E		GS	S1
CASTILLEJA COCCINEA	SCARLET INDIAN-PAINTBRUSH				G5	S2
CORALLORHIZA WISTERIANA	SPRING CORALROOT				G5	SX
COREOPSIS ROSEA	ROSE-COLOR COREOPSIS			LP	G3	S2
CROTON WILLDENOWII	ELLIPTICAL RUSHFOIL			LP	G5	S2
CUPHEA VISCOSISSIMA	BLUE WAXWEED				G5?	S3
CYPERUS ENGELMANNII	ENGELMANN'S FLAT SEDGE				G4Q	S2
CYPERUS LANCASTRIENSIS	LANCASTER FLAT SEDGE		E		G5	S1
CYPERUS RETROFRACTUS	ROUGH FLATSEDGE		E		GS	SH
DALIBARDA REPENS	ROBIN-RUN-AWAY		E		G5	SH.1
DESMODIUM LAEVIGATUM	SMOOTH TICK-TREFOIL				G5	S3
DESMODIUM STRICTUM	PINELAND TICK-TREFOIL			LP	G4	S2
DESMODIUM VIRIDIFLORUM	VELVETY TICK-TREEFOIL				GS?	S2
DOELLINGERIA INFIRMA	CORNEL-LEAF ASTER				GS	S2
DRABA REPTANS	CAROLINA WHITLOW-GRASS		E		GS	SH
ELEOCHARIS EQUISETOIDES	KNOTTED SPIKE-RUSH		E	LP	G4	S1
ELEOCHARIS TORTILIS	TWISTED SPIKE-RUSH		E		G5	S1
ELEPHANTOPUS CAROLINIANUS	CAROLINA ELEPHANT-FOOT		E		GS	SH
EPILOBIUM ANGUSTIFOLIUM SSP CIRCUMVAGUM	NARROW-LEAF FIREWEED				G5T5	S1
EPILOBIUM STRICTUM	DOWNY WILLOWHERB				GS?	S2
ERIOCAULON PARKERI	PARKER'S PIPEWORT				G3	S2
ERIOPHORUM GRACILE	SLENDER COTTON-GRASS		E		G5T?	SH
ERIOPHORUM TENELLUM	ROUGH COTTON-GRASS		E		GS	S1
EUPATORIUM RESINOSUM	PINE BARREN BONESET		E	LP	G3	S2
GLYCERIA LAXA	NORTHERN MANNA GRASS				GS	S1
GYMNOPOGON BREVIFOLIUS	SHORT-LEAF SKELETON GRASS		E		GS	S1

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NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
HELONIAS BULLATA	SWAMP-PINK	LT	E	LP	G3	S3
HETERANTHERA MULTIFLORA	BOUQUET MUD-PLANTAIN				G4	S2
LESPEDEZA STUEVEI	STUEVE'S DOWNY BUSH-CLOVER				G4?	S2
LUDWIGIA LINEARIS	NARROW-LEAF PRIMROSE-WILLOW			LP	GS	S2
LUZULA ACUMINATA	HAIRY WOOD-RUSH		E		G5T4T5	S2
LYCOPODIELLA INUNDATA	NORTHERN BOG CLUB-MOSS				GS	S2
LYGODIUM PALMATUM	CLIMBING FERN			LP	G4	S2
LYSIMACHIA HYBRIDA	LOWLAND LOOSESTRIFE				G5	S3
MALAXIS UNIFOLIA	GREEN ADDER'S-MOUTH				G5	S2
MELANTHIUM VIRGINICUM	VIRGINIA BUNCHFLOWER		E		GS	S1
MICRANTHEMUM MICRANTHEMOIDES	NUTTALL'S MUDWORT		E		GH	SH
MUHLENBERGIA CAPILLARIS	LONG-AWN SMOKE GRASS		E		G5T?	S1
MUHLENBERGIA TORREYANA	PINE BARREN SMOKE GRASS			LP	G3	S3
NYMPHOIDES CORDATA	FLOATINGHEART			LP	GS	S3
OBOLARIA VIRGINICA	VIRGINIA PENNYWORT				G5	S2
ONOSMODIUM VIRGINIANUM	VIRGINIA FALSE-GROMWELL		E		G4	S1
PANICUM ACICULARE	BRISTLING PANIC GRASS		E		G4G5	S1
PASPALUM DISSECTUM	MUDBANK CROWN GRASS				G4?	S2
PENSTEMON LAEVIGATUS	SMOOTH BEARDTONGUE		E		GS	S1
PHASEOLUS POLYSTACHIOS VAR POLYSTACHIOS	WILD KIDNEY BEAN				G4T?	S2
PHLOX MACULATA VAR MACULATA	SPOTTED PHLOX				G5T?	S3
PHORADENDRON LEUCARPUM	AMERICAN MISTLETOE			LP	GS	S2
PINUS SEROTINA	POND PINE				G5	S2
PLATANTHERA CILIARIS	YELLOW FRINGED ORCHID			LP	GS	S2
POLYGALA INCARNATA	PINK MILKWORT		E		GS	SH
POLYGALA MARIANA	MARYLAND MILKWORT			LP	GS	S2
POLYGONUM HYDROPIPEROIDES VAR OPELOUSANUM	OPELOUSAS WATER-PEPPER				G5T?Q	S2
PRUNUS ANGUSTIFOLIA	CHICKASAW PLUM		E		G5T4T5	S2

GLOUCESTER COUNTY
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
PUCCINELLIA FASCICULATA	SALTMARSH ALKALI GRASS				G3GS	S2
PYCNANTHEMUM TORREI	TORREY'S MOUNTAIN-MINT		E		G2	S1
QUERCUS IMBRICARIA	SHINGLE OAK		E		GS	S1.1
QUERCUS MUEHLENBERGII	YELLOW OAK				GS	S3
RANUNCULUS AMBIGENS	WATER-PLANTAIN SPEARWORT				G4	S2
RANUNCULUS LONGIROSTRIS	LONG-BEAK WATER BUTTERCUP				GS	S2
RHYNCHOSPORA GLOBULARIS	COARSE GRASS-LIKE BEAKED-RUSH		E		G5?	S1
RHYNCHOSPORA INUNDATA	SLENDER HORNED-RUSH			LP	G3G4	S2
RHYNCHOSPORA NITENS	SHORT-BEAKED BALD-RUSH				G4?	S2
RHYNCHOSPORA PALLIDA	PALE BEAKED-RUSH				G3	S3
RHYNCHOSPORA SCIRPOIDES	LONG-BEAK BALD-RUSH				G4	S2
ROTALA RAMOSIOR	TOOTHCUP				G5	S3
SAGITTARIA SUBULATA	AWL-LEAF ARROWHEAD				G4	S2
SCHEUCHZERIA PALUSTRIS	ARROW-GRASS		E		G5T5	SH
SCHIZAEA PUSILLA	CURLY GRASS FERN			LP	G3	S3
SCUTELLARIA NERVOSA	VEINED SKULLCAP				G5	S2
SISYRINCHIUM FUSCATUM	SAND-PLAIN BLUE-EYED GRASS				GS?	S2
SPHENOPHOLIS PENSYLVANICA	SWAMP OATS				G4	S2
SPIRANTHES LACINIATA	LACE-LIP LADIES'-TRESSES		E		G4G5	SI
SPIRANTHES ODORATA	FRAGRANT LADIES'-TRESSES				GS	S2
SPOROBOLUS COMPOSITUS VAR COMPOSITUS	LONG-LEAF RUSH-GRASS				GSTS	S2
STACHYS HYSSOPIFOLIA	HYSSOP HEDGE-NETTLE				G5	S2
STACHYS TENUIFOLIA	SMOOTH HEDGE-NETTLE				GS	S3
THASPIUM BARBINODE	HAIRY-JOINT MEADOW-PARSNIP				GS	SX
TIPULARIA DISCOLOR	CRANEFLY ORCHID				G4G5	S3
TRICHOSTEMA SETACEUM	NARROW-LEAF BLUECURLS				GS	S2
UTRICULARIA BIFLORA	TWO-FLOWER BLADDERWORT		E		G5	S1
UTRICULARIA GIBBA	HUMPED BLADDERWORT			LP	G5	S3
VALERIANELLA RADIATA	BEAKED CORNSALAD		E		G5	S1

GLOUCESTER COUNTY
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK
VERBENA SIMPLEX	NARROW-LEAF VERVAIN		E		GS	S1
VERNONIA GLAUCA	BROAD-LEAF IRONWEED		E		GS	S1
VULPIA ELLIOTEA	SQUIRREL-TAIL SIX-WEEKS GRASS		E		GS	SH

154 Records Processed

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
Ecological Service
927 North Main Street, Building D
Fleasantville, New Jersey 08232
Tel: 609-646-9310
Fax: 609-646-0352
http://njfieldaffice.fws.gov

IN REPLY REFER TO:
ES-05-NE-010

JAN 3 1 2005

Jean M. Oliva, Seuior Consulting Engineer
TRC
5 Waterside Crossing
Windsor, Connecticut 06095-1563
Fax number: (860) 298-6399

Reference: Threatened aad endangered spacies review within the vicinity of the proposed Shieldalloy Metallurgical Corpnrabion radio logical remedial action (TRC Project No. 26770-0100-00000), located within Newfield, Gloucester County New Jersey

The U.S. Fish and Wildlife Service (Service) has reviewed the above-referenced proposed project pursuant to Section 7 of the Endangered Speeies Act of 1973 (S7 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of federally listed endangered and threatened species. The following comments do not address all Service concerns for fish and wildlife resources and do not preclude separate review and comment by the Service as afforded by other applicable environmental legislation.

Except for an occasional transient bald eagle (*Haliaeetus leucocephalus*), no other federally listed or proposed endangered or threatened flora or fauna under Service jurisdiction are known to occur within the vicinity of the proposed project site. Therefeie, no further consultation pursuant to Section 7 of the Endangered Species Act is required by the Service. Tlus deteminabon ia based on the best available infonnation. If additional information on federally listed species becomes avadable, or if project plans change, this detennination may be reconsidered. Please be aware that this determination is valid for 90 days; therefore, if the project is not initiated within this time, the Service should be cuntacted pnor to project implementation to verify the accuracy of this infomiation. The Service will review current information to ensure that no federally listed threatened or endangered species will be adversely affected by the proposed project.

Enclosed is current informaation regarding federally listed and candidate species occurring in New Jersey. The Service encourages federal agencies and other planners to consider candidate species in project planning. The addresses of State agencies that may be eonlacted for current aite-speoifle information regarding federal candidate and State-listed species are also enclosed.

Authorizing Supervisor: _____

Enclosures: Current summaries of federally listed and candidate species in New Jeisey
Addresses for additional information on candidate and State-listed species

Sect 7 (es-NEeot7.fax) 11/24/03

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN NEW JERSEY

An ENDANGERED species is any species that is in danger of extinction throughout all or a significant portion of its range.

A THREATENED species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

	COMMON NAME	SCIENTIFIC NAME	STATUS
FISHES	Shortnose sturgeon	*Acipenser brevirastrum*	E
REPTILES	Bog turtle	*Clemmys muhlenbergii*	T
	Atlantic Ridley turtle	*Lepidochelys kempii*	E
	Green turtle	*Chelonia mydas*	T
	Hawksbill turtle	*Eretmochelys imbricala*	E
	Leatherback turtle	*Dermochelys coriacea*	E
	Loggerhead turtle	*Caretta caretta*	T
BIRDS	Bald eagle	*Haliaeetus leucocephalus*	T
	Piping plover	*Charadrius melodus*	T
	Roseate tern	*Sterna dougallii dougallii*	E
MAMMALS	Eastern cougar	*Felis concolor couguar*	E+
	Indiana bat	*Myotis sodalis*	E
	Gray wolf	*Canis lupus*	E+
	Delmarva fox squirrel	*Sciurus niger cimereus*	E+
	Blue whale*	*Balaenopiera musculus*	E
	Finback whale*	*Balaenoptera physalus*	E
	Humpback whale*	*Megaptera novaeangliae*	E
	Right whale*	*Balaena glacialis*	E
	Sei whale*	*Balaenoptera borealis*	E
	Sperm whale*	*Physeter macrocephalus*	E

	COMMON NAME	SCIENTIFIC NAME	STATUS
INVERTEBRATES	Dwarf wedgemussel	*Alasmidonta heterodon*	E
	Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*	T
	Mitchell's satyr butterfly	*Neonympha m. mitchellii*	E+
	American burying beetle	*Nicrophorus americanus*	E+
PLANTS	Small whorled pogonia	*Isotria medeoloides*	T
	Swamp pink	*Helonias bullata*	T
	Knieskern's beaked-rush	*Rhynchospora knieskernii*	T
	American chaffseed	*Schwalbea americaua*	E
	Sensitive joint-vetch	*Aeschynomene virginica*	T
	Seabeach amaranth	*Amaranthus pumilus*	T

STATUS			
E	endangered species	PE	proposed endangered
T	threatened species	PT	proposed threatened
+	presumed extirpated**		

* Exoept for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service.

** Current records indicate the species does not presently occur in New Jersey, although the species did occur in the State historioally.

Note: for a complete listing of Endangered and Threatened Wildlife and Plants, refer to 50 CFR 17.11 and 17.12.

For further information, please contact:

U.S. Fish and Wildlife Service
New Jersey Field Office
927 N. Main Street, Building D
Pleasantville, New Jersey 08232
Phone: (609) 646-9310
Fax: (609) 646-0352

Revised 12/15/04

FEDERAL CANDIDATE SPECIES IN NEW JERSEY

CANDIDATE SPECIES are species that appear to warrant consideration for addition to the federal List of Endangered and Threatened Wildhfe and Plants. Although these species receive no substantive or procedural protection uoder the Endangered Species Act, the U.S. Fish and Wildlife Service encourages federal agencies and other planners to give consideration to these species in the environmental planning process.

SPECIES	SCIENTIFIC NAME
Bog asphodel	*Narthecium americanum*
Hirstie panicgrass	*Dichanthelium hirstii*

Note: For complete listings of taxa under review as candidate species, refer to Federal Register Vol. 69, No. 86, May 4, 2004 (Endangered and Threatened Wildlife and Plants; Review of Species that are Candidates or Proposed for Listing as Endangered or Threatened).

Revised June 2004

EEDERAL CANDIDATE AND STATE-LISTED SPECIES

Candidate species are speciea under consideration by the U.S. Fish aod Wildlife Service (Service) for possible inclusion on tbe List of Endangered and Threatened Wildlife aad Plants. Although these species reccive no substantive or procedural protection under the Endaogered Species Act, the Service encourages federal agencies and other planners to consider federsl candidate speciea in project planning.

The New Jersey Natural Heritage Program maintains the most up-to-date information on federal candidate species and State-listed species in New Jersey and may be contacted at the following address:

Coordinator
Natural Heritage Program
Division of Padcs and Forestry
P.O. Box 404
Trenton, New Jersey 08625
(609) 984-0097

Additionally, infonnation on New Jersey's State-listed wildlife species may be obtained from the following office:

Dr. Lariy Niles
Endangered and Nongame Species Program
Division of Fish and Wildlife
P.O. Box 400
Trenton, New Jersey 08625
(609) 292-9400

If information from either of the aforementioned sources reveals the preseace of any federal candidate species within a project area, the Service shoudd be contacted to ensure that these species are not adversely affected by project activities.

Revised 07/03

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.
18 COMMERCE STREET PLAZA • FLEMINGTON, NJ 08822
(908) 788-9676 • FAX (908) 788-6788
PA (610) 250-0773

June 14, 1994

Mr. Sean Hayden
TRC Environmental Corporation
5 Waterside Crossing
Windsor, CT 06095

Re: Endangered and Threatened Plant Species Survey
and Stressed Vegetation Survey
Shieldalloy Metallurgical Corporation Superfund Site
Newfield Borongh, Gloucester County, NJ
City of Vineland, Cumberland County, NJ
ASGBCI Project #1111

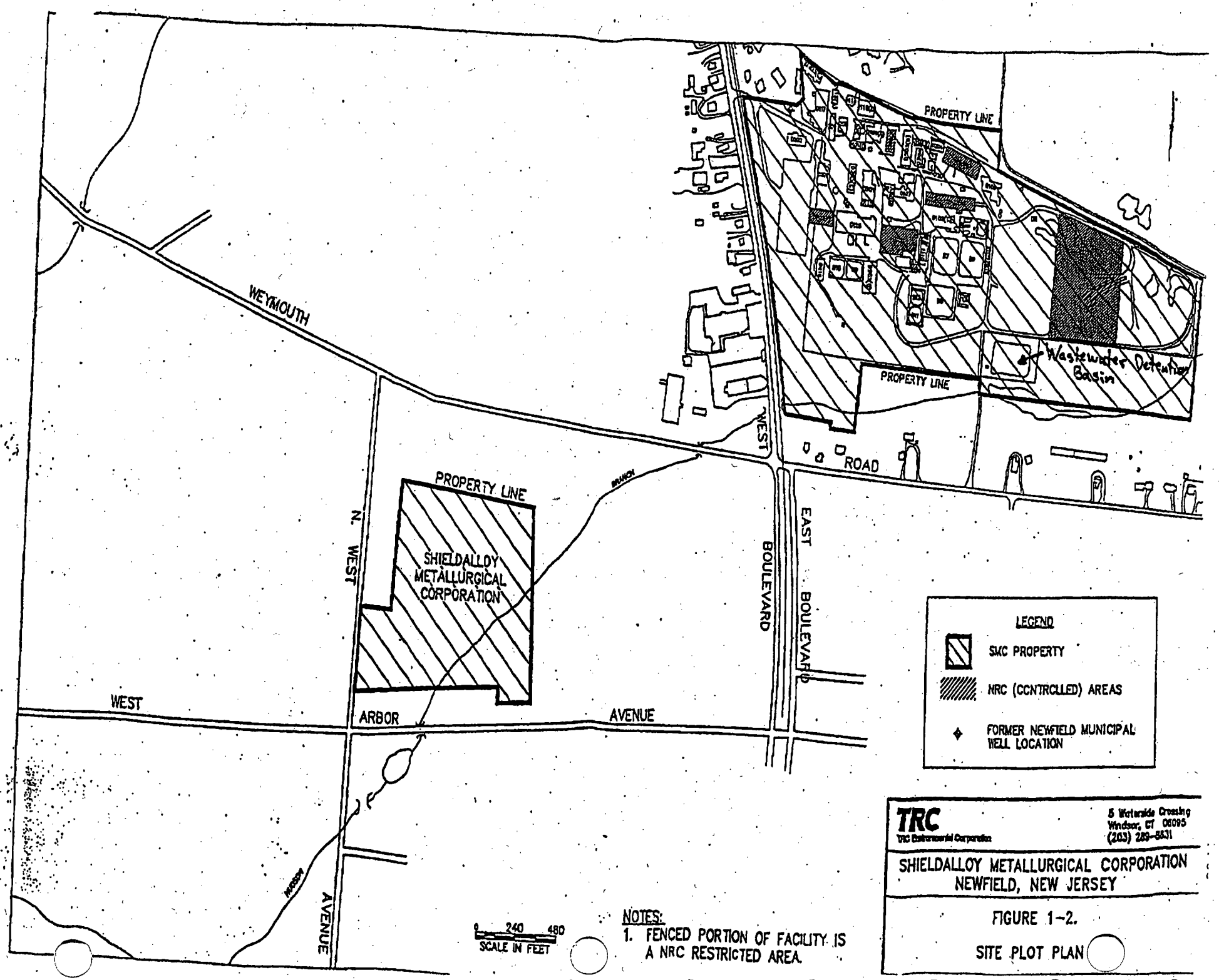
Dear Mr. Hayden:

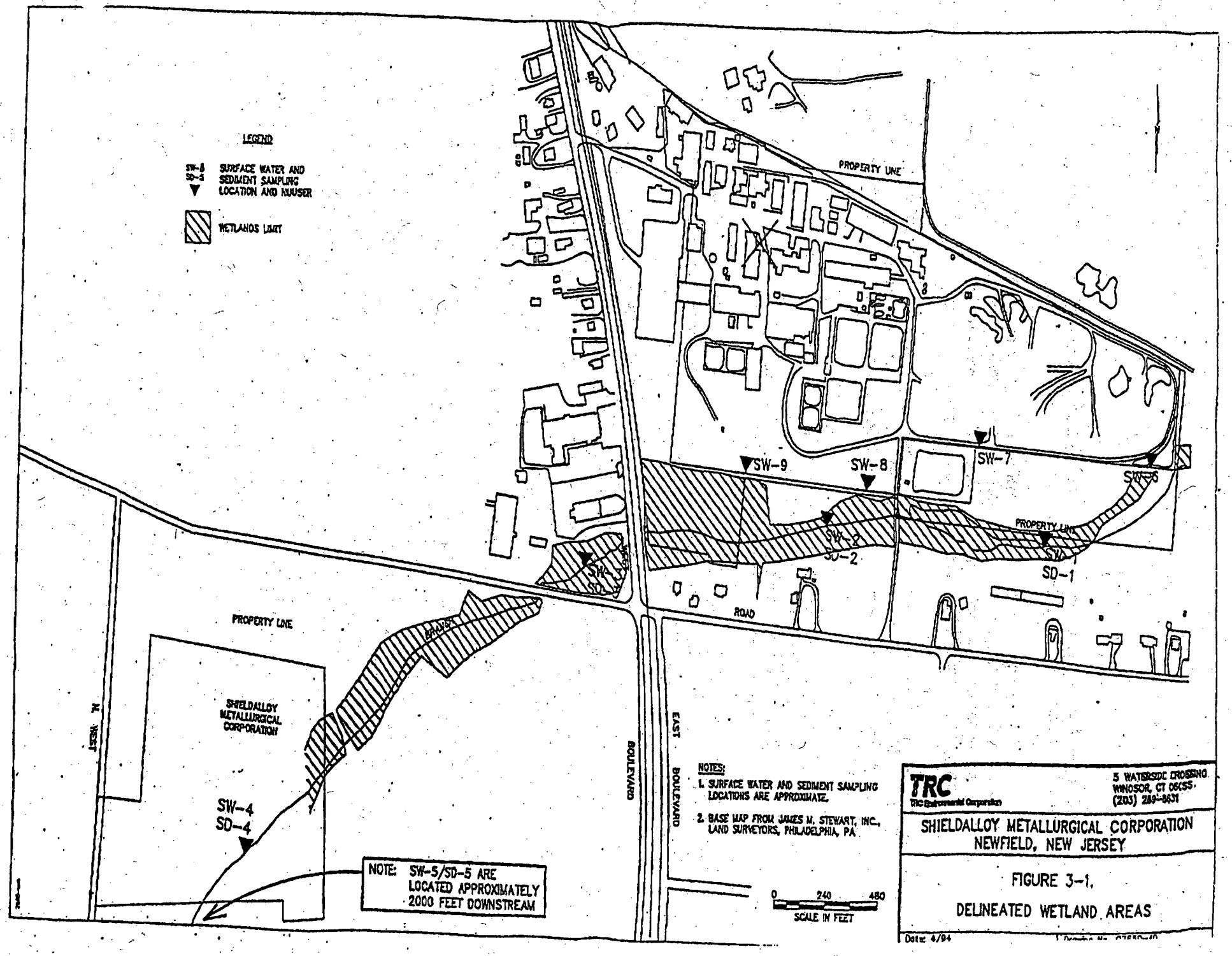
We are pleased to submit this Endangered and Threatened Plant Species Survey and Stressed Vegetation Survey Report for the above referenced site. The objective of these Surveys is to determine the presence or absence of the following species of concern: Barratt's sedge (*Carex barrattii*), pink tickseed (*Coreopsis rosea*), Pine Barren boneset (*Eapatorium resinosum*) and swamp pink (*Helonias bullata*) and analysis of the existence of stressed vegetation. Resumes of preparers of this report have been included.

The following summarizes the findings of the field investigation and review of existing information for the Shieldalloy Metallurgical Corporation Superfund Site located in Newfield Borough, Gloucester County, and the City of Vineland, Cumberland County, New Jersey. The field investigation was performed on June 6, 1994.

1. Intrcduction

The survey was conducted over approximately 100 acres, of which the manufacturing facility occupies approximately 60 acres. The northern property, containing the facility, is an irregularly shaped parcel located in Newfield Borough (Figure 1-2). The study area included adjacent wetlands in Newfield and Vineland that are primarily forested and associated with the Hudson Branch (Figure 3-1), The overall


WEYMOUTH
WEST
ROAD
PROPERTY LINE
PROPERTY LINE
Wastewater Detention Basin
WEST
BOULEVARD
EAST
BOULEVARD
PROPERTY LINE
SHIELDALLOY METALLURGICAL CORPORATION
BRANCH
N. WEST
WEST
ARBOR
AVENUE
AVENUE
LEGEND
SMC PROPERTY
NRC (CONTROLLED) AREAS
FORMER NEWFIELD MUNICIPAL WELL LOCATION
0 240 480
SCALE IN FEET
NOTES:
1. FENCED PORTION OF FACILITY IS A NRC RESTRICTED AREA.
TRC
TRC Environmental Corporation
5 Waterside Crossing
Windsor, CT 06095
(203) 289-8631
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
FIGURE 1-2.
SITE PLOT PLAN


LEGEND
SW-5 SD-5 SURFACE WATER AND SEDIMENT SAMPLING LOCATION AND NUMBER
WETLANDS LIMIT
PROPERTY LINE
SW-9
SW-8
SW-7
SW-6
SW-2
SD-2
SW-1
SD-1
SW-3
SD-3
PROPERTY LINE
ROAD
PROPERTY LINE
SHIELDALLOY METALLURGICAL CORPORATION
SW-4
SD-4
NOTE: SW-5/SD-5 ARE LOCATED APPROXIMATELY 2000 FEET DOWNSTREAM
N. WEST BOULEVARD
EAST BOULEVARD
NOTES:
1. SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS ARE APPROXIMATE.
2. BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA
0 240 480
SCALE IN FEET
TRC
TRC Environmental Corporation
5 WATERSIDE CROSSING
WINDSOR, CT 06095
(203) 289-8631
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
FIGURE 3-1.
DELINEATED WETLAND AREAS
Date: 4/94

topography of the study area consisted of relatively flat to gently sloping terrain.

The study area is located in the Maurice River Watershed within the Delaware Bay Drainage Basin. The wetlands are drained by the Hudson Branch which is tributary to the Burnt Mill Branch of the Maurice River.

According to the State of New Jersey List of Endangered Plant Species and Plant Species of Concern (N.J.A.C. 7:5C-1.1 et seg.), the species of concern have been classified as follows:

- Barratt's sedge - rare (S3)
- pink tickseed - imperiled (S2)
- Pine Barren boneset - endangered (E)
- swamp pink - endangered (B)

Additionally, swamp pink is also classified as threatened according to the Federally Listed Endangered and Threatened Species in New Jersey (50 CFR 17.11 & 17.12, 1990).

Evaluations of the study area were made as to the suitability of existing habitat for these rare species. The stressed vegetation survey was conducted in order to visually identify evidence of the effects of potential contamination on plant species.

IT. SAMPLING METHODOLOGY

A habitat evaluation was conducted over the Shield Metallurgy Corporation facility including adjacent wetlands associated with the Hudson Branch. In order to perform the biological survey for the species of concern and stressed vegetation survey, a meander survey was conducted to cover the entire study area. During tbe field investigation, special attention was given to areas with suitable habitat for the species of concern. The Britton and Brown (1970) plant identification key "An Illustrated Flora of the Northern United States and Canada" was used to determine plant species characteristics and to provide habitat information. Other sources to evaluate the habitat onsite included the use of published literature, site maps and topographic maps.

During the course of the inyestigation items including, but not limited to, chlorosis, stunted growth and abnormal physiological characteristics were used as criteria to evaluate evidence of stressed vegetation.

III. RESULTS OF STUDY

Our findings of the biological survey indicate that there were no occurrences of Barratt's sedge, pihk tickseed, Pine Barren boneset ahd swamp pink within the study area.

The stressed vegetation survey conducted ih conjunction with the biological survey indicated relatively normal growth over the study area, although the site has been subject to manmade disturbances in the past. These disturbances have led to invasive plant species becoming dominant in some portions of wetland and upland areas.

The forested wetlands onsite supported a dominant canopy layer of red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*) and black willow (*Salix nigra*). An often dense, understory growth included southern arrowwood (*Viburnum dentatnm*), silky dogwood (*Cornns amomum*), highbush blueberry (*Vaccinium corymbosum*), sweet pepperbush (*Clethra alnifolia*), elderberry (*Sambucus canadensis*) and greenbrier (*Smilax rotundifolia*). The herbaceous layer consisted of an abundance of cinnamon fern (*Osmunda cinnamomea*), tussock sedge (*Carex stricta*) and spotted jewelweed (*Impatieas capensis*). Scrub/shrub wetlands also observed onsite were generally overgrown with similar understory species including fetterbush (*Leucothoe racemosa*).

Emergent wetlands located on the facility site, withih a wastewater detention pond, and associated with the Hudson Branch contained a dominance of spika rush (*Eleocharis* spp.), bog rnsh (*Juncus pelocarpus*), common rush, three square (*Scirpus americanus*), whitened sedge (*Carex alboiutescens*), Canada rnsh (*Juncus canadensis*), slender rush (*Juncus tenuis*), cosmon reedgrass (*Phragmites australis*), tussock sedge (*Carex striata*), pointed broom sedge (*Carex scoparia*), sallow sedge (*Carex iurida*), larger water-starwort (*Callitriche heterophylla*) and spotted jewelweed.

Forested upland areas throughout the study area contained a dominant canopy layer of southern red oak (*Quercus falcata*), scarlet oak (*Quercus coccinea*), white oak (*Quercus alba*), red maple, black locust (*Robinia psuedoacacia*), mockernut (*Carya tomentosa*) and sand hickory (*Carya pallida*). The understory was supported by similar species in the sapling layer and the dominant vegetation in the shrub layer consisted of black huckleberry (*Gaylnssacia baccata*), dangleberry (*Gaylussacia fronddsa*), lowbush blueberry (*Vaccinium vacillans*), mountain laurel (*Kalmia latifolia*), sheep lanrel (*Kalmia angustifolia*), multiflora

rose (*Rosa multiflora*), greenbrier (*Smilax rotundifolia*) and Japanese honeysuckle (*Lonicera Japonica*).

The forested areas in the study area appeared to be secondary growth, not mature, which have undergone disturbances in the past. Based on professional judgement, the trees appeared to be the proper height for their age. Other vegetation did not show signs of stunted growth or chlorosis.

The biological survey for Barratt's sedge revealed no findings of this rare species within the study area. Habitat requirements are open, undisturbed, emergent wetlands; not usually occurring in standing water. This habitat was not found due to the sites' disturbed nature. Barratt's sedge is commonly associated with Pineland swamps and bogs, blooming and fruiting from late April to July.

No species of pink tickseed were found over the study area. Pink tickseed habitat requirements are vernal ponds (i.e., shallow, isolated ponds not fed by a spring or stream) or open, emergent wetland areas which are ponded for most of the year and dry up in the summer. The biological survey for this species was conducted at a time of year when sufficient growth for identification may not be present. Pink tickseed flowers from July through late September. The only potential habitat identified within the study area was on the facility site within the wastewater detention basin (reference Figure 1-2). This area was observed to contain emergent wetland species and ponding. An additionai site visit later in the growing season may be warranted in order to definitively assess the presence or absence of pink tickseed.

Pine Barren boneset was not identified within the study area limits. Habitat for this species of concern is open, undisturbed, emergent wetland communities and streamsides; located mostly in the Pine Barrens. Flowering of this species occurs from early July to October.

The biological survey for swamp pink was conducted at a time of the year when it would be in flower; the evergreen leaves, which grow in a basal rosette, are also readily identifiable. No swamp pink populations were found. The habitat type that supports swamp pink consists of deciduous, forested wetland communities and stands of Atlantic white cedar (*Chamaecyparis thyoides*). The forested wetland areas onsite would not provide habitat for swamp pink due to their disturbed nature and lack of Atlantic white cedar occurrences. Additionally, dense scrub/shrub wetland areas

provided inadequate sunlight and increased dospetition among plant species thereby creating poor habitat for swamp pink.

rV. Conclusion

In summary, habitats specific to the species of concern (Barratt's sedge, pink tickseed, Pine Barren boneset and swamp pink) were thoroughly searched and no specimens were identified as a result of our detailed biological survey. No suitable habitat was found onsite for Barratt's sedge, Pine Barren boneset and swamp pink. However, based on the field suryey, the facility portion of the study area may contain potentially suitable habitat within the wastewater detention basin (emergent wetland) to support pink tickseed; although no individuals were identified during the site investigation.

No evidence of stressed vegetation within the wetland and upland communities was observed during the meander survey.

If you have any questions or comments concerning this submission please contact me.

Sincerely,
AMY S. GREENE ENVIRONMENTAL
CONSULTANTS, INC.

Thomas S. Brodde

Thomas S. Brodde
Project Manager

enc.

APPENDIX H - CULTURAL RESOURCE INFORMATION

Pam / Donna

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection
DIVISION OF PARKS AND FORESTRY
HISTORIC PRESERVATION OFFICE
CN-404
TRENTON, N.J. 08625-0404
TEL: (609) 292-2023
FAX: (609) 984-0578

Robert C. Shinn, Jr.
Commissioner

HPO-A96-37

MEMORANDUM

TO: Bruce Venner, Chief
Bureau of Federal Case Management, NJ DEP

FROM: Dorothy Guzzo, Administrator, Historic Preservation Office,
Deputy State Historic Preservation Officer

DATE: January 5, 1995

RE: Gloucester County, Newfield Borough
Shieldalloy Metallurgical Superfund Site
Section 106 Consultation Comments

I am offering consultation comments on this proposed undertaking under Section 106 of the National Historic Preservation Act in response to your memorandum of October 24, 1995 requesting review of the following report:

The Cultural Resource Consulting Group
August 1995 Phase II Cultural Resources Study, Specialty Glass Corporation Melting Tank, Proposed Remediation of Shieldalloy Metallurgical Coinoration Property

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published in the Federal Register 2 September 1986 (51 31115-31125), I am providing the fpllowing comments.

800.4 Identifying Historic Properties

I concur with the Phase II Cultural Resource Study's conclusion that the stack/melting tank is eligible for the National Register under Criteria C and D. The stack/melting tank is eligible under Criteriion C as a well preserved, and rare, example of a glass stack/melting tank. The stack is eligible under Criterion D because of the information it may convey about New Jersey's historic glass industry given its rarity as a surviving glass melting stack.

800.5 Assessing Effects

The demolition of the stack will, of course, have an adverse effect on the stack/melting tank. Given the deteriorating condition of the stack, the high cost associated with stabilization of tall masonry stacks, and the groundwater pollution problems which are related to the metallurgical use of the stack since the 1950's, I see no feasible alternative to demolition of the stack.

Because the project will have an adverse effect on the stack, the Advisory Council on Historic Preservation must be notified of the adverse effect and sent the documentation listed under 800.8 (b) (copy attached). I have enclosed a draft Memorandum of Agreement (MOA) for the project for consideration. As mitigation for the demolition of the stack, the MOA calls for documentation of the stack to HABS/HAER Standards. The level of HABS/HAER documentation for a property is determined by the National Park Service (see the attached sheet). I suggest that a copy of the Phase II Cultural Resource Study be sent to the NPS to help in their determination of the appropriate level of documentation.

Should you have any questions, please contact Dan Saunders of my staff at (609) 984-0140.

Sincerely,

Dorothy P. Guzzo

Dorothy P. Guzzo
Deputy State Historic
Preservation Officer

DPG/ds96226

c: Advisory Council On Historic Preservation
Joseph Gowers, EPA
John Vetter, EPA
Donna Gaffigan, NJDEP-BFCM
David R. Smith, SMC

DRAFT

MEMORANDUM OF AGREEMENT
AMONG
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF FEDERAL CASE MANAGEMENT, SHIELDALLOY METALLURGICAL CORPORATION
AND
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICER
SUBMITTED TO THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
PURSUANT TO 36 CFR 800.6(A)

WHEREAS, the Environmental Protection Agency (EPA) has determined that the remediation of the Shieldalloy Metallurgical Corporation (SMC) site will have an adverse effect on the Specialty Glass Corporation Melting Tank, a property which is eligible for listing on the National Register of Historic Places, and has consulted with the New Jersey state Historic Preservatibn Officer (SHPO) pursuant to the regulations (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act (16 U.S.C> Part 470f0; and

WHEREAS, EPA has considered the alternatives to demolition of the Specialty Glass corporation Melting Tank and concluded, in concurrence with the New Jersey SHPO, that there is no reasonable way to avoid the adverse effect of demolition of the Glass Melting Tank; and

WHEREAS, New Jersey Department of Environmental Protection, Bureau of Federal Case Management (NJDEP-BCA) and SMC, the owner of the site, have participated in the consultation and have been invited to concur in this Memorandum of Agreement,

NOW, THEREFORE, the EPA, NJDEP-BCA, the New Jersey SHPO, and SMC agree that the undertaking shall be implemented in accordance with the following stipulation in order to take into account the effect of the undertaking on historic properties.

Stipulations

EPA will ensure that the following measures are carried out:

1. The applicant shall contact the National Park Service (NPS), Northeast Field Office to determine what level and kind of HABS/HAER recordation is required for the Melting Tank. The applicant will complete all required recordation and secure NPS approval prior to initiating demolition of the Melting Tank. Copies of this documentation with original photographs will be provided to the Corps, the NJ SHPO, and Wheaton Village.

Execution of this Memorandum of agreement and implementation of its terms evidence that EPA has afforded the Council an opportunity to comment on the demolition of the Specialty Glass Corporation Melting tank, and that EPA taken into account the effect of the undertaking on historic properties.

DRAFT

ENVIRONMENTAL PROTECTION AGENCY

BY:_____DATE:_____

NEW JERSEY STATE HISTORIC PRESERVATION OFFICER

BY:_____DATE:_____

CONCUR:

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF FEDERAL CASE MANAGEMENT

BY:_____DATE:_____

SHIELDALLOY METTALDRGICAL CORPORATION

BY:_____DATE:_____

ACCEPTED:

ADVISORY COUNCIL ON HISTORIC PRESERVATION

BY:_____DATE:_____

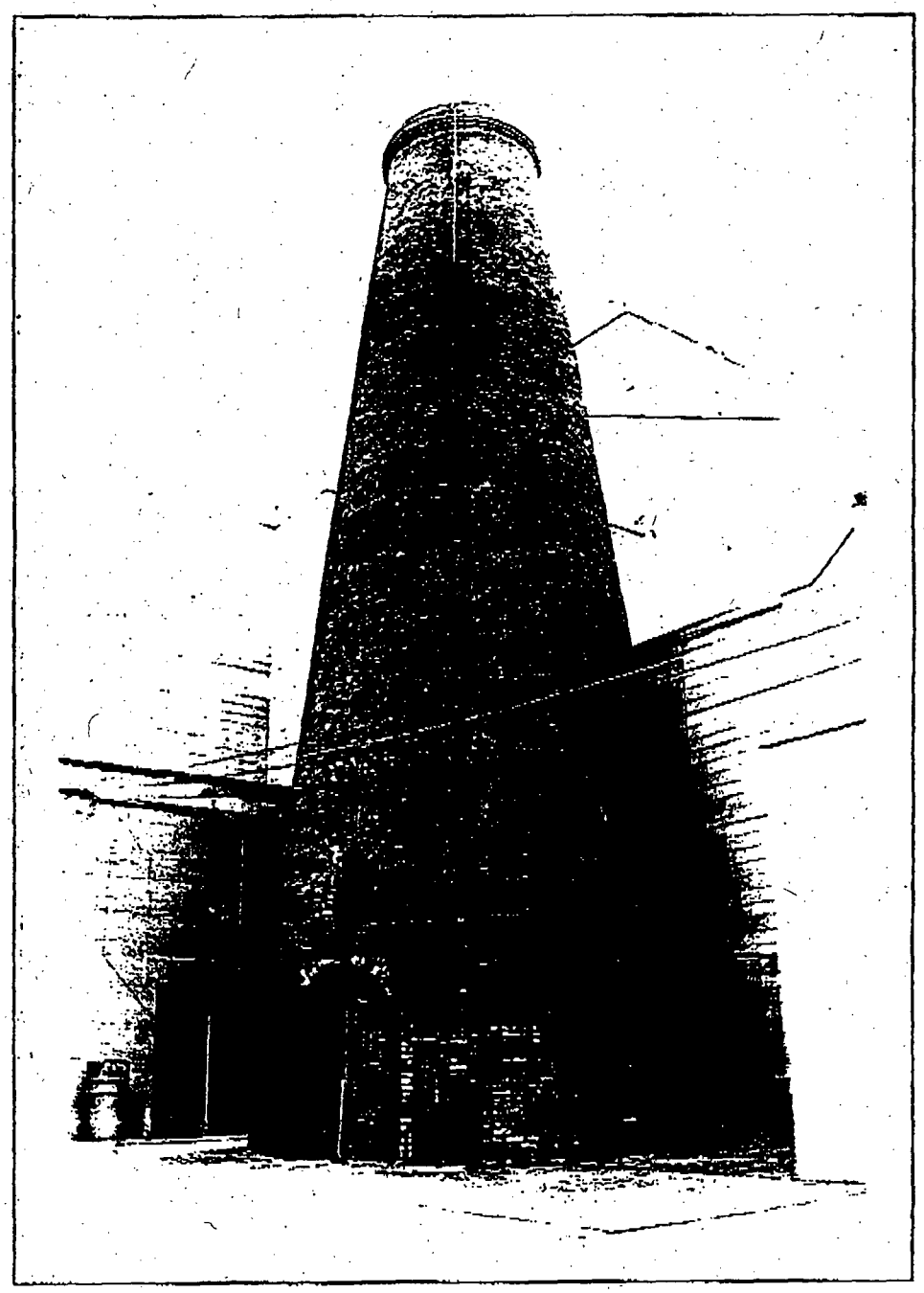


Illustration 13: Current condition of the glassworks stack (August 1995).

photographer: Richard Veit
date: August 1995
roll 3, neg. 9, exp. 21

Documentation required for consultation

(b) Finding of adverse effect. The required documentation is as follows:

(1) A description of the undertaking, including photographs, maps, and drawings, as necessary;

(2) A description of the efforts to identify historic properties;

(3) A description of the affected historic properties, using materials already compiled during the evaluation of significance, as appropriate; and

(4) A description of the undertaking's effects on historic properties.

Documentation required for submitting a signed MOA for Council review

(c) Memorandum of Agreement. When a memorandum is submitted for review in accordance with Section 800.6(a)(1), the documentation, in addition to that specified in Section 800.8(b), shall also include a description and evaluation of any proposed mitigation measures or alternatives that were considered to deal with the undertaking's effects and a summary of the views of the State Historic Preservation Officer and any interested persons.

Documentation required for requesting written Council comment, absent an MOA

(d) Requests for comment when there is no agreement. The purpose of this documentation is to provide the Council with sufficient information to make an independent review of the undertaking's effects on historic properties as the basis for informed and meaningful comments to the Agency Official. The required documentation is as follows:

(1) A description of the undertaking, with photographs, maps, and drawings, as necessary;

(2) A description of the efforts to identify historic properties;

(3) A description of the affected historic properties, with information on the significant characteristics of each property;

(4) A description of the effects of the undertaking on historic properties and the basis for the determinatione;

(5) A description and evaluation of any alternatives or mitigation measures that the Agency Official proposes for dealing with the undertaking's effects;

(6) A description of any alternatives or mitigation measures that were considered but not chosen and the reasons for their rejection;

(7) Documentation of consultation with the State Historic Preservation Officer regarding the identification and evaluation of historic properties, assessment of effect, and any consideration of alternatives or mitigation measures;

(8) A description of the Agency Official's efforts to obtain and consider the views of affected local governments, Indian tribes, and other interested persons;

(9) The planning and approval schedule for the undertaking; and

United States Department of the Interior

NATIONAL PARK SERVICE
MID-ATLANTIC REGION
NATIONAL REGISTER PROGRAMS DIVISION
U.S. CUSTOM HOUSE, ROOM 251
2ND & CHESTNUT STREET
PHILADELPHIA, PA 19106

IN REPLY REFER TO:

Information Needed to Obtain a Level of Documentation for the Historic American Building Survey / Historic American Engineering Record (HABS/HAER)

To provide a level of documentation, the National Park Service (NPS) Regional Office requires concise information on the property's appearance and significance. Information on the condition of the property is only necessary when it can help determine whether there is original material that can still be documented; this is most often applicable to interiors of buildings. Lengthy reports or justifications of why the property must be demolished are not necessary; once the decision to document the property has been reached between the Federal Agency and the State Historic Preservation Office, the NPS's only role is to determine the level of documentation, which is based on the property's significance and complexity.

Please write to this office to request a level of HABS/HAER documentation for the property. Include with your request:

1. A copy of the signed Memorandum of Agreement or other document requiring HABS/HAER documentation. If some or all signatures are still pending, include correspondence from the State Historic Preservation Office indicating that HABS/HAER documentation will be required. Other correspondence on the project is generally not necessary, unless it provides other required information.

2. The name, address/location of the property, and the county in which it is located. If it is not located in a town or city, please identify the nearest town or city, (not a township) in the same State.

3. Concise information on the history and appearance of the property. This can usually be excerpted from existing documents (such as a survey report, National Register nomination, or correspondence from the State Historic Preservation Office) without doing additional work. Snapshots (not Polaroids) are usually necessary to convey the scale, and the amount of architectural or engineering detail, of the property. When there are no photographs of a building's interior, indicate how much original detailing, furnishings and/or equipmem are inside; this will help us determine how much of the interior needs to be documented.

If you have questions about what to send, call the National Park Service at (215) 597-6484. You should receive a Schedule of Documentation, including guidelines for preparing the required documentation, within 30 days of our receipt of your request.

(November 1994)

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection

Robert C. Shinn, Jr.
Commissioner

JUL 24 1996

Jean Oliva
Senior Consulting Engineer
TRC Environmental Corporation
5 Waterside Crossing
Windsor CT 06095

Dear Ms. Oliva:

Enclosed please find a disk containing NJDEP's comments on the Feasibility Study and Ecological Risk Assessment for the Shieldalloy Metallurgical Corporation site. The file is named FS&ERA.SMC.

If you have any questions, you may contact me at (609) 633-1394.

Sincerely,

Donna L. Gaffigan

Donna L. Gaffigan, Case Manager
Bureau of Federal Case Management

Enclosure

Draft Final
FEASIBILITY STUDY REPORT - VOLUME II
Soil Feasibility Study

1. General
NJDEP's Guidance Document for the Remediation of Contaminated Soils dated June 1994 contains information on capping as a remedial action. Of particular importance is the section on post-capping operation, maintenance and monitoring since such actions will be required after implementation of the remedy.

2. Risk Commission Report
TRC has elected to support its proposal to use a one in one hundred thousand (1×10^{-5}) cancer risk endpoint based on a draft report issued by the Environmental Risk Assessment and Risk Management Study Commission. This Commission was established in 1994 pursuant to a provision in HSRA. The NJDEP's cancer risk endpoint is currently 1×10^{-6}. The Commission's proposal to modify the cancer risk value for developing soil remediation standards is still only a draft recommendation. Until such time that a new risk level is promulgated by the New Jersey legislature, the Department will continue to require the 1×10^{-6} value.

3. Compliance Averaging, Section 2.1
It should be noted that although "guidance" has been developed for compliance averaging, the concept and the particular conditions for implementing compliance averaging have a regulatory basis and are contained in the *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E-4.9(c)3i).

4. Compliance in Manufacturing Area - Dept 102, Section 2.1.1
Elevated chromium and hexavalent chromium contamination has been detected in the Department 102 area. Based on the minimum exceedances, TRC has proposed no further action. This is acceptable provided the existing containment (pavement) is properly maintained as part of the remedial action and the subsequent O&M phase.

5. Compliance in Manufacturing Area - RR Siding, Section 2.1.1
Elevated arsenic contamination has been detected in one sample collected in the Raikoad Siding area. Based on the mimmum exceedances, TRC has proposed no further action. This is acceptable provided the existing containment (pavement) is properly maintained as part of the remedial action and the subsequent O&M phase.

6. Compliance in Manufacturing Area - Beryllium, Section 2.1.1
a. The FS states that the compliance averaging ceiling for beryllium is 2 ppm. While this is true using the RDCSCC, SMC is utilizing the NRDCSCC values for the interior of the site (not off-

site). Since the heahh-based criteria for beryllium at non-residential sites is 0.7 ppm, the compliance averagihg ceiling is 7 ppm. This adjusted many of the calculations for beryllium and thus reduced the total area of soil requiring remediation. This issue was discussed at a meeting held on May 19, 1996 between NJDEP and TRC. The agreeneuts reaehed wili be suinmarized in a letter from TRC, however, they must be reflected in the FS as well, unless superseded by the results of the bioavailability study discussed below.

b. There have been discussions with TRC/SMC regarding an Altemate Cleanup Standard (ACS) application for beryllium based on bioavailability. At NJDEP recommendation, SMC submitted a work plan on May 24, 1996 oiitlining how they proposed to deten nine site-specific bioavailability percentages. This data will assist the NJDEP in making a risk management decision based on the strength of evidence surrounding the beryllium contaminant levels at the site and the appropnateness of an ACS.

7. Compliance - Former Material Storage Area, Section 2.1.2
PCB contaniination in excess of the NRDCSCC values has been discovered in the Former Material Storage Area. The FS Report must include this area of concem (AOC) as an area requiring remediation. Pre-design sampling can be employed to further define the lihits of contarhination.

8. Compliance - North/South Subsurface DDT Areas, Section 2.1.2
Due to the depth of the reported contamination and the inability to reconfirm the results, the DDT contamination in these two AOCs is either very limited or non-existent. Therefore, the existing soil "cap" is sufficient and SMC may consider no fiirther action for these. However, the "presence" of these AOCs ihust be documented in the DER.

9. Compliance - On-Site Delineated Wetlands Area, Section 2.1.2
Elevated contaminant levels at RA-12 were compared to the SCC values in the FS Report. Since this area is within the delineated wetlands, it can be qiiestioned whether these results should be compared to soil or sediment criteria. It is recommended that the results should be compared to both criteria. When compared to the SCC, there are exceedances for several inorganic parameters, therefore, the recommendation on page 2-12 with respect to no further action in this area is not acceptable. Further, this statement is inconsistent with Section 2.4.3 (page 2-43) which defers the remediation of this area to Volume III of the FS (Surface Water and Sediment) and is also inconsistent with Volume III, itself.

10. Compliance - Other Areas of Concem, Section 2.1.2
Due to the depth of the reported cohtamination and the inability to reconfirm the results, the beryllium contamination at SB-25 and SB-12 is either very linited or non-existent. Therefore, the existing soil "cap" is sufficient and SMC may consider no fiirther action for these areas. However, the "presence" of these AOCs must be documented in the DER.

12. Compliance - Off-Site Dellneated Wetiands Area, Section 2.1.5, p. 2-25
Elevated contaminant levels at RA-13 and RA-14, located on SMC's property boundary, were compared to the SCC values in the FS Report. Since this area is within the delineated wetlands, it can be questioned whether these results should be compared to soil or sediment criteria. It is recommended that the results should be compared to both criteria. Two issues are involved here, the on-site and the off-site areas adjacent to the site.

a. On-site - Based on the SCC, there are exceedances for several inorganic parameters. Therefore, the on-site portion of this area requires remediation, but is not discussed in the document. This is inconsistent with Volume IH which show that remediation of this area is proposed.

b. Off-site - Based on the RDCSCC no flirther action is acceptable, but it may not be acceptable based on the sedinnent criteria and may be inconsistent with Volume HI of the FS Report (see Figure 3-2 of Volume III).

13. Department 106, Section 2.1.1
There is no discussion regarding the Department 106 building and the level of contamination coating the building materials. As identified in NJDEP's letter dated November 3, 1995, SMC must discuss the need to remediate the building as a source of chromium contamination to soil and/or groundwater.

Altemative S-4-1 (Glass Stack), Section 4.2.7
a. There is concem about the proposal under recommended Soil Altemative S-4-1 to remediate potential chromium contaminated soil in the Department 101(b) Glass Stack Area. The Glass Stack was detemined to be ellgible for inclusion in the National Register of historic Places and is, therefore, subject to National Historic Preservation Act (NHPA) requh ements. The proposal is to raze the stack and to excavate the soil in its footprint. The need for remedial action in this area seems to be based primarily upon the results of one soil sample (RA-64) collected from the tumel adjacent to the stack. Additional soll samples should be collected from beneath the stack to show that the remedial action proposed is justified as discussed in the May 7 meeting.

b. It is indicated on page 4-16 that the cultural resource survey was submitted to the New Jersey State Historic Preservation Office (SHPO) with a request for detennination of Historic American Bullding Survey (HABS) documentation required prior to the stack's demolition. It should be noted that the National Park Service (NPS) makes the determination of what level of documentation is required and whether HABS or Historic American Engineering Record (HAER) criteria are appropriate. Furthermore, it is the finction of EPA to request a HABS/HAER determination from the NPS. The Soll FS shall be revised to reflect that the ARAR requirements with respect to the NHPA have not yet been completed.

14. Remedial Alternative Recommendation, Section 4.5

NJDEP partially concurs with TRC's recommendation for the remediation of soils at the SMC site. Alternative S-4-1 (Remediation of Chromium Source Areas and Landfill Containment with Institutional Controls) will adequately address soil contamination at the site. However, Option A (10^{-6} risk-based) is dictated by HSRA and must be employed instead of the recommended Option B (10^{-5} risk-based).

APPENDIX I - VISUAL RESOURCE SURVEY

APPENDIX I - VISUAL RESOURCE SURVEY

Details of Visual Site Analysis Process
Figure I-1 Projected Existing Viewshed Relative to Agricultural and Forested Areas
Figure I-2 Projected Proposed Action Viewshed Relative to Agricultural and Forested Areas
Photo Log
Photos - Existing Conditions

DETAILS OF VISUAL SITE ANALYSIS PROCESS

Geographic Information Systems (GIS) are proven tools in the evaluation of the relationship between land-use and development. TRC uses GIS methodologies to analytically evaluate potential visibility issues. These methods include viewshed analyses and photosimulations or renderings of proposed projects, as described in more detail below.

Viewshed Mapping - A viewshed analysis was completed to predict the existing visual impact of current conditions at the SMC facility as well as evaluate the potential visual impact of the decommissioning altematives. The study area consisted of a 1-mile radius, using the center of the facility as the reference point. Base mapping and analytical data were acquired from the State of New Jersey GIS office. Site-specific existing and proposed topography was based on current site survey data and information developed in support of the evaluation of the Decommissioning Plan altematives. State-issued Digital Elevation grids (DEM I0M) were merged with the site-specific survey (1-foot resolution) to attain an accurate representation of the landscape. Once the elevation data were merged, vegetation coverage was processed as an impediment layer. The vegetation layer assigns a conservative vegetation height to areas containing vegetation cover exceeding 3 meters in height. Based on this information the visibility of the existing conditions is evaluated, as indicated in Figure I-1. For the altematives undergoing analysis, the proposed elevation change is added and the visibility analysis is recomputed for the proposed conditions. The visibihty analysis for the proposed action is presented in Figure 1-2. The output mapping is used to determine potential visibility of the project from areas within the 1-mile radius. It is also used as a guide for the selection of potential visual vantage points for renderings.

Photosimulation Methodologies - Computer-assisted photo simulations create very accurate representations of what a proposed project will look like. The process uses sophisticated computer imaging technology to allow decision-makers to evaluate the visibility and visual effect of a proposed project from a number of locations. It is critical that the process used is rigorous and scientifically accurate. In general, computerized perspective views rely on three-dimensional engineering models of proposed stmctures in a geo-referenced real-world environment. The model positions the viewer at the approximate receptor point, and specifies a field of view equal to that of the lens used to capture the actual photograph upon which the

rendering is based. The computerized perspective views are then superimposed oh the photographs to represent a visual depiction of the proposed changes at the site.

The photosimulation process begins with the collection of photographic images in the field at selected visual vantage points, referred to as viewpoints. Because photographic simulations are typically presented from a variety of prominent views and at different distances, photographs are taken at a variety of viewpoints based on the information gathered during the viewshed analysis. Information noted in the field during the collection of photographic images includes global positioning system (GPS) coordinates for the photo location, the compass angle of the camera at each location, the focal length of the camera, the time of day and date of the photo, the general direction of the target view of concem (in this instance, the Storage Yard area), and the height of the camera. The GPS position measured in the field determines the exact location of the camera and the location of specific reference points in the foreground to ensure accurate camera alignment. The day and time information is used to adjust for sun angle in the simulations, allowing computer graphics specialists to simulate lighting conditions for different times of day or days of the year.

Simulating a proposed project initially involves the input of information about the project's "stmctures," such as the location and size of structures, as well as proposed changes to the landscape. For the proposed action (the LTC altemative), the model of the stabilized pile was created based on the pile's engineering dimensions, while the model of the off-site disposal with license termination (LT) altemative was based on the total removal of all hcensed materials and the retum of the Storage Yard area to natural site elevations. This information, along with the field-collected data, is entered and accurately plotted within an AutoCAD® environment. This ensures that the positioning data (two-dimensional or 2D) is based on representative geographic coordinates. Next, the 2D data is converted to three-dimensional (3D) data to account for the height information (i.e., camera locations, existing structures, existing topography, and proposed changes in topography). The 3D data is processed using a computer program called Studio VIZ® 4.0. At this point, the alignment of all known points (longitude, latitude and height) is confirmed. Next, the lighting is calculated by creating a "sun" for a specific time and day of year. This information is used to create highlights and shadows for each of the photo elements. Finally, once the lighting is created, the overall image is rendered. The resulting renderings are intended to show not only the form and scale of the proposed changes,

but also the texture and materials proposed in the design. The final image is checked to ensure its accuracy in terms of location, scale and perspective.

When simulated and actual photos are placed side-by-side, the positioning and visibility of the simulated elements are often nearly identical. Because of their accuracy, visual simulations developed using such methods are well-received and accepted by regulatory agencies as an appropriate way to evaluate visual impacts.

New Jersey 2002 High Resolution
February-April, 2002.
The ortho-rectification process achieved a +/-4.0 ft. horizontal accuracy at a 95% confidence level
Publication_Date: 20030731

Abstract:

Visibility Analysis was produced using a bare earth Digital Elevation Model (DEM) with New Jersey Land Cover Data Set added to compensate for areas with vegetation. Site specific survey information for the proposed and existing footprints was utilized to adjust for elevation differences in this vicinity.

DEM Information: (10- by 10-m data spacing, elevations in decimeters) Elevation_resolution_ is 1 decimeter (0.1 meter). Elevation accuracy is 24,000 contour data, i.e. plus/minus half the contour interval.

POTENTIAL INCREMENTAL CAPPED PILE VIEWSHED POSITION AND ELEVATION ACQUIRED FROM FIGURE 1-1 ANALYSIS ASSUMED A CAPPED PILE HEIGHT OF 30'

ASSUMED MIXED FOREST APPROXIMATE 35 FOOT STAND

AGRICULTURAL AREAS

1 - MILE RADIUS

0 0.125 0.25 0.5 Miles

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

Projected Proposed Action Viewshed Relative to Agricultural and Forested Areas

FIGURE I-2

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
(978)970-5600

PROJ.26770-0100

PHOTO LOG NOTES

Photos were taken on March 14, 2005, looking towards the SMC facility, as indicated in the attached photo log. In some cases, upon completion of the initial photographic effort, it was determined that the direction in which the original photo was taken might capture the view towards the manufacturing portion of the facility, but would not necessarily completely capture the view in the direction of the Storage Yard. Therefore, on May 17, 2005, additional photos were taken from several of the viewpoints in a compass direction more reflective of the view towards the Storage Yard. These photos verified that the view of the Storage Yard from these locations would be blocked, mainly by existing vegetation.

Photo [illegible]
Shieldalloy Metallurgical Corporation, March 14, 2005

Photo #	Location	GPS Location	Compass heading	Distance of location from Storage Yard area	Land Use	Height of Camera	Focal Length for 35mm
1	Shieldalloy on-site-directly west of the pile	39°32 539N 075° 01.100W	130°	~600 feet west	Industrial	5.2'	35mm (f.stop 16)
2	Shieldalloy on-site – southwest of pile	39°32 428N 075° 01.115W	75°	~650 feet southwest	Industrial	5.2'	35mm (f.stop 16) Digital
3	Shieldalloy on-site - near Water Treatment Bldg	39°32 447N 075° 01.241W	88°	~1300 feet west and looking West	Industrial	5.2'	Digital
4 (2 digital photos)	Shieldalloy on-site - near Water Treatment Bldg	39°32 446N 075° 01.250W	88°	~1320 feet west	Industrial	5.2'	35mm (f.stop 16) Digital
5	Shieldalloy on-site - Truck entry roadway	39°32 559N 075° 01.296W	113°	~1450 feet west	Industrial	5.2'	35mm (f.stop 16) Digital
6	Strawberry Ave-development site for Genco Homes	39°31 964N 075° 00.862W	338°	~2950 feet south	Residential	5.2'	35mm (f.stop 16)
7	West Blvd north of power line	39°31 741N 075° 01.371W	8°	~4650 feet southwest	Highway/ Residential	5.2'	35mm (f.stop 16) Digital
8 (2 digital	West Blvd near Arbor Avenue	39°32 118N 075° 01.343W	6°	~2400 feet southwest	Residential	5.2'	35mm (f.stop 16) Digital

Shieldalloy Metallurgical Corporation, March 14, 2005

Photo #	Location	GPS Location	Compass heading	Distance of location from Storage Yard area	Land Use	Height of Camera	Focal Length for 35mm
photos)							
9	Arbor Avenue and North West Avenue	39°32 070N 075° 01.903W	30°	~4800 feet southwest	Residential	5.2'	35mm (f.stop 16) Digital
10	North West Avenue north of Arbor Avenue intersection	39°32 162N 075° 01.894W	60°	~4600 feet southwest	Residential	5.5'	Digital only
11	Weymouth Road at Salem Avenue	39°32 461N 075° 02.213W	100°	~5100 feet west	Residential	5.2'	Digital only
12 (2 digital photos)	Catawba Avenue and West Blvd.	39°32 790N 075° 01.504W	146°	~3100 feet north west	Commercial	5.2'	35mm (f.stop 16) Digital
13	Church Street south of Catawba Avenue	39°32 818N 075° 01.334W	162°	~5100 feet north	Residential	5.2'	Digital only
14	Edgarton School at Madison/Catawba Ave	39°32 847N 075° 01.051W	182°	~1900 feet north	Institutional	5.2'	Digital only
15	Edgarton School parking lot on Catawba Ave	39°32 857N 075° 01.128W	191°	~2100 feet north	Institutional	5.2'	Digital only

Photo Log
Shieldalloy Metallurgical Corporation, March 14, 2005

Photo #	Location	GPS Location	Compass heading	Distance of location from Storage Yard area	Land Use	Height of Camera	Focal Length for 35mm
16	Rosemont Avenue and Fawn Drive	39°33 320N 075° 01.251W	172°	~5200 feet north	Residential	5.2'	Digital only
17	Woodlawn Avenue at Covey Lane	39°32 975N 075° 00.433W	193°	~3700 feet northeast	Residential	5.2'	Digital only
18 (3 -35 mm & Dig. Photos)	Gorgo Lane south of Newfield water tower	39°32 540N 075° 00.730W	228° to 280°	~1300 feet northeast	Residential/ Undeveloped	5.2'	35mm (f.stop 16) Digital
19	Grace Orthodox Church – Weymouth near West Blvd	39°32 317N 075° 01.320W	41°	~1600 feet southwest	Mixed Residential	5.2'	Digital
20 (3 digital photos)	Columbia Avenue at County Bridge	39°32 797N 075° 02.121W	128° to 159°	~5280 feet northwest	Residential	5.2'	Digital
21	Christ Community Church parking lot-Salem Avenue west of West Blvd.	39°32 662N 075° 01.620W	130°	~3300 feet northwest	Residential	5.2'	35mm (f.stop 16) Digital
22	Notre Dame School on Church Street south of Conwell	39°32 922N 075° 01.362W	160°	~3300 feet north-northwest	Institutional/ Residential	5.2'	Digital
23	46 West Blvd-Cabinet Source Store	39°32 539N 075° 01.416W	98°	~1980 feet west	Mixed Residential	5.2'	35mm (f.stop 16) Digital

Photo Log
Shieldalloy Metallurgical Corporation, March 14, 2005

Photo #	Location	GPS Location	Compass heading	Distance of location from Storage Yard area	Land Use	Height of Camera	Focal Length for 35mm
24 (2 digital photos)	West Blvd and Sandy Drive	39°33 132N 075° 01.680W	140°	~5280 feet northwest	Residential	5.2'	Digital
25	Strawberry Avenue east of City Line Avenue	39°31 934N 075° 00.355W	295°	~3900 feet southeast	Residential	5.2'	35mm (f.stop 16)

Supplemental Photo Log
Shieldalloy Metallurgical Corporation, May 17, 2005

Supplemental Photo #	Location	Compass heading	Distance of location from Storage Yard area
15A	Edgarton School parking lot on Catawba Ave	165°	~2100 feet north
19A	Grace Orthodox Church – Weymouth near West Blvd	55°	~1600 feet southwest
20A	Columbia Avenue at County Bridge	120°	~5280 feet northwest
25A	Strawberry Avenue east of City Line Avenue	325°	~3900 feet southeast

Photo 1. View of northern portion of Storage Yard taken just west of the Storage Yard.

Photo 2. View of southern portion of Storage Yard taken from the unpaved SMC access road.

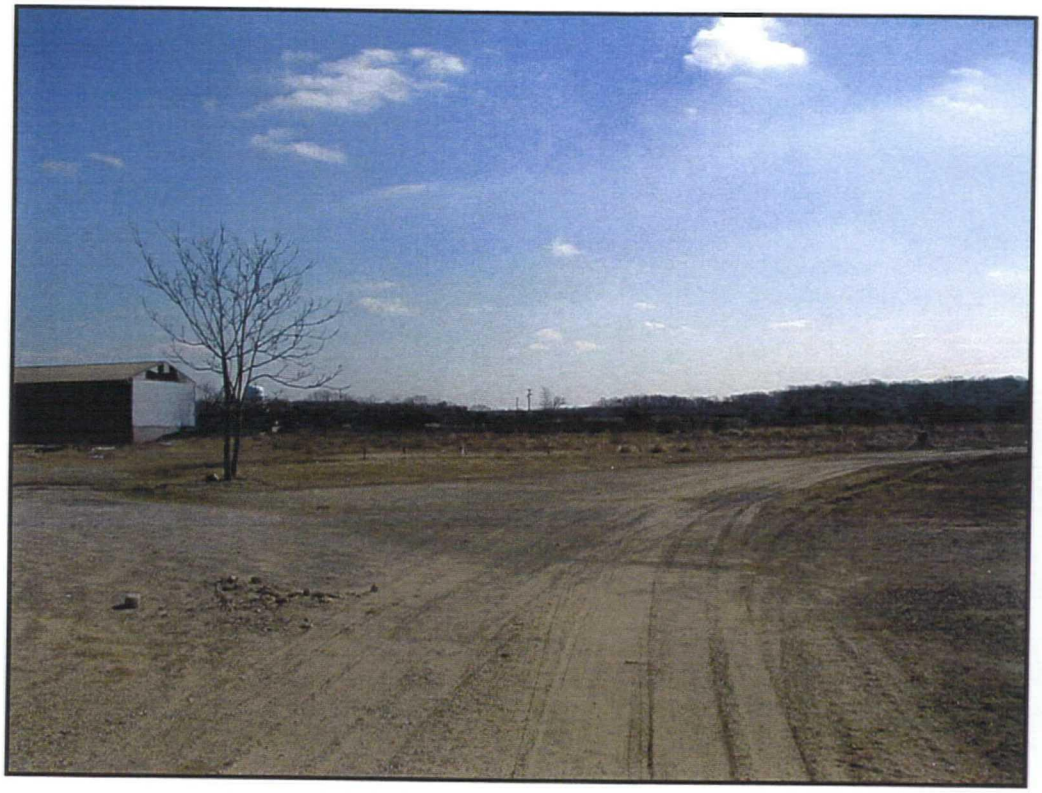


Photo 3. View toward the Storage Yard, taken near the SMC pond.

Photo 4. View toward the Storage Yard, taken near the SMC pond.

Photo 5. View toward the Storage Yard, from near the SMC administration building.

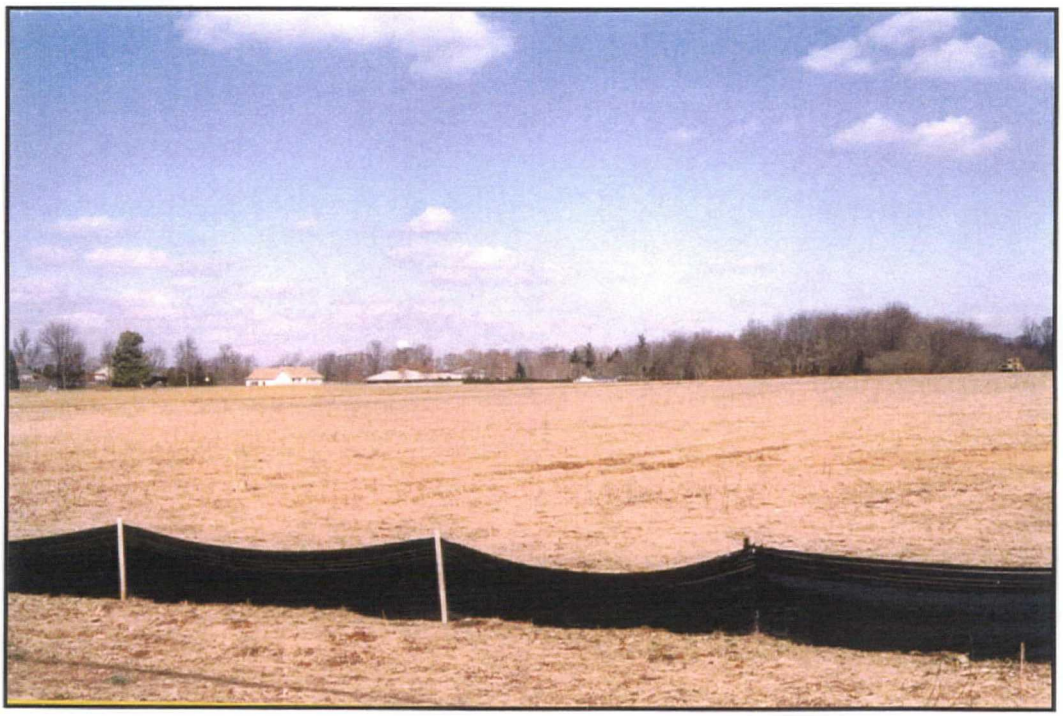


Photo 6. View toward the SMC site from Strawberry Ave- development site for Genco Homes.

Photo 7. View toward the SMC site from West Blvd north of power line.

Photo 8. View toward the SMC site from West Blvd near Arbor Avenue

Photo 9. View toward the SMC site from Arbor Avenue and North West Avenue

Photo 10. View toward the SMC site from North West Avenue north of Arbor Avenue intersection

Photo 11. View toward the SMC site from Weymouth Road at Salem Avenue

Photo 12. View toward the SMC site from Catawba Avenue and West Blvd.

Photo 13. View toward the SMC site from Church Street south of Catawba Avenue.

Photo 14. View toward the SMC site from Edgarton School at Madison/Catawba Ave

Photo 15. View toward the SMC site from Edgarton School parking lot on Catawba Ave.

Photo 16. View toward the SMC site from Rosemont Avenue and Fawn Drive.

Photo 17. View toward the SMC site from Woodlawn Avenue at Covey Lane

Photo 18. View toward the SMC site from Gorgo Lane south of Newfield water tower

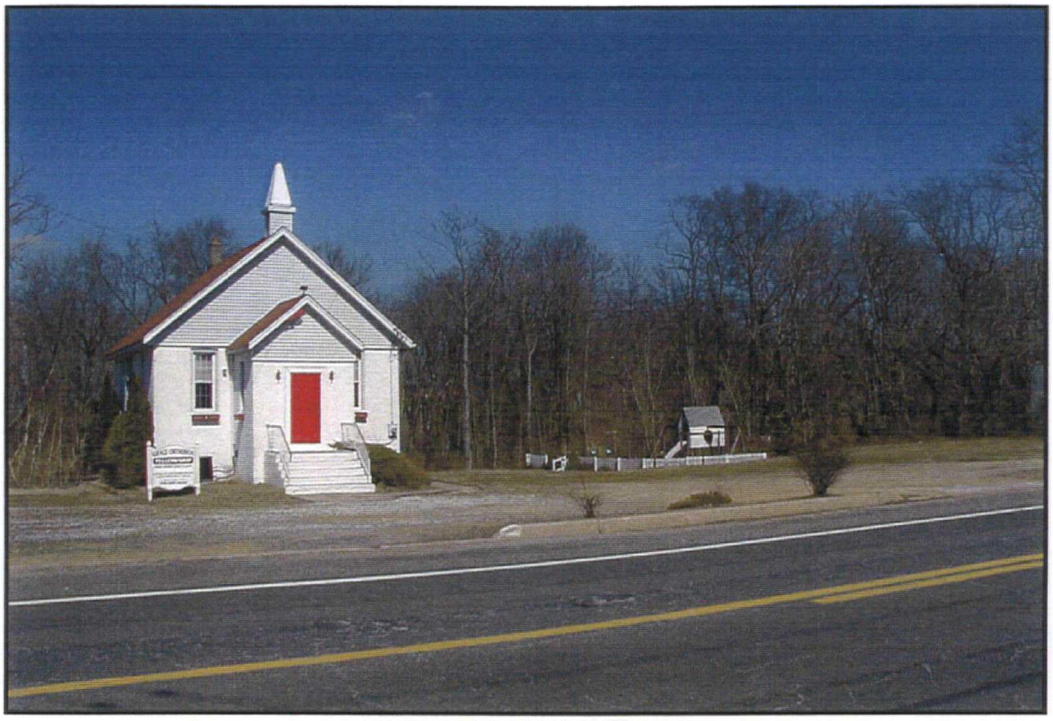


Photo 19. View toward the SMC site from Grace Orthodox Church at Weymouth near West Blvd

Photo 20. View toward the SMC site from Columbia Avenue at County Bridge

Photo 21. View toward the SMC site from Christ Community on Church Salem Avenue.

Photo 22. View toward the SMC site from Notre Dame School on Church Street.

Photo 23. View toward the SMC site from 46 West Blvd- Cabinet Source Store.

Photo 24. View toward the SMC site from West Blvd and Sandy Drive.

Photo 25. View toward the SMC site from Strawberry Avenue, east City Line Avenue.

Photo 15A. View toward Storage Yard at the SMC site from Edgarton School parking lot on Catawba Avenue.

Photo 19A. View toward Storage Yard at the SMC site from Grace Orthodox Church at Weymouth near West Blvd.

Photo 20A. View toward Storage Yard at the SMC site from Columbia Avenue at County Bridge.

Photo 25A. View toward Storage Yard at the SMC site from Strawberry Avenue east of City Line Avenue.

APPENDIX J - SELECT SOCIOECONOMIC DATA

APPENDIX J - SELECT SOCIOECONOMIC DATA

Census Data

- Total Population – by State, County and Block
- Hispanic and Latino, or Not Hispanic or Latino, by Race – by State, County and Block Group
- Poverty Status in 1999 by Age Race – by State, Gounty and Block Group
- Poverty Status in 1999 of Families by Family Type Race – by State, County and Block Group

P1. TOTAL POPULATION [1] - Universe: Total population
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data

NOTE: For information on confidentiality protection, nonsampling error, definitions, and count corrections see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

	New Jersey	Cumberland County, New Jersey	Gloucester County, New Jersey	Block 1000, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	Block 1001, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	Block 1002, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	Block 1003, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	Block 1017, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	Block 1018, Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	Block 2007, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey
Total	8,414,350	146,438	254,873	6	0	78	45	0	2	50

U.S. Census Bureau
Census 2000

Census count corrections for American Indian and Alaska Native Areas (AIANAs), states, counties, places, county subdivisions, census tracts, and blocks may have been released as a result of an external challenge through the Count Question Resolution Program.

Standard Error/Variance documentation for this dataset:
Accuracy of the Data: Census 2000 Summary File 1 (SF 1) 100-Percent Data (PDF 44KB)

P1. TOTAL POPULATION [1] - Universe: Total population
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data

NOTE: For information on confidentiality protection, nonsampling error, definitions, and count corrections see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

	Block 2008, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block 2009, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block 2010, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block 2011, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block 2012, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block 2019, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block 2020, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block 2021, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block 2022, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block 2023, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey
Total	32	0	0	38	16	56	0	0	31	32

U.S. Census Bureau
Census 2000

Census count corrections for American Indian and Alaska Native Areas (AIANAs), states, counties, places, county subdivisions, census tracts, and blocks may have been released as a result of an external challenge through the Count Question Resolution Program.

Standard Error/Variance documentation for this dataset:
Accuracy of the Data: Census 2000 Summary File 1 (SF 1) 100-Percent Data (PDF 44KB)

P1. TOTAL POPULATION [1] - Universe: Total population
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data

NOTE: For information on confidentiality protection, nonsampling error, definitions, and count corrections see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

	Block 2024, Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block 1006, Block Group 1, Census Tract 5017.03, Gloucester County, New Jersey	Block 1007, Block Group 1, Census Tract 5017.03, Gloucester County, New Jersey	Block 1006, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1007, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1008, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1012, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1013, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1014, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1015, Block Group 1, Census Tract 5018, Gloucester County, New Jersey
Total	112	202	0	92	62	35	15	13	64	0

U.S. Census Bureau
Census 2000

Census count corrections for American Indian and Alaska Native Areas (AIANAs), states, counties, places, county subdivisions, census tracts, and blocks may have been released as a result of an external challenge through the Count Question Resolution Program.

Standard Error/Variance documentation for this dataset:
Accuracy of the Data: Census 2000 Summary File 1 (SF 1) 100-Percent Data (PDF 44KB)

P1. TOTAL POPULATION [1] - Universe: Total population
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data

NOTE: For information on confidentiality protection, nonsampling error, definitions, and count corrections see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

	Block 1016, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1017, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1018, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1019, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1020, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1021, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1022, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 1023, Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block 2000, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	Block 2003, Block Group 2, Census Tract 5018, Gloucester County, New Jersey
Total	0	51	61	25	21	25	22	0	289	68

U.S. Census Bureau
Census 2000

Census count corrections for American Indian and Alaska Native Areas (AIANAs), states, counties, places, county subdivisions, census tracts, and blocks may have been released as a result of an external challenge through the Count Question Resolution Program.

Standard Error/Variance documentation for this dataset:
Accuracy of the Data: Census 2000 Summary File 1 (SF 1) 100-Percent Data (PDF 44KB)

P1. TOTAL POPULATION [1] - Universe: Total population
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data

NOTE: For information on confidentiality protection, nonsampling error, definitions, and count corrections see http://factfinder.census.gov/home/en/datandtes/expsf1u.hlm.

	Block 2004, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	Block 2005, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	Block 2006, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	Block 2007, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	Block 2008, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	Block 2009, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	Block 2014, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	Block 2015, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	Block 2016, Block Group 2, Census Tract 5018, Gloucester County, New Jersey	Block 2017, Block Group 2, Census Tract 5018, Gloucester County, New Jersey
Total	51	35	0	0	0	8	17	32	39	25

U.S. Census Bureau
Census 2000

Census count corrections for American Indian and Alaska Native Areas (AIANAs), states, counties, places, county subdivisions, census tracts, and blocks may have been released as a result of an external challenge through the Count Question Resolution Program.

Standard Error/Variance documentation for this dataset:
Accuracy of the Data: Census 2000 Summary File 1 (SF 1) 100-Percent Data (PDF 44KB)

P1. TOTAL POPULATION [1] - Universe: Total population
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data

NOTE: For information on confidentiality protection, nonsampling error, definitions, and count corrections see http://factfinder.census.gov/home/en/datanotes/expsf1u.htm.

	Block 2018, Block Group 2, Census Tract 5018, Gloucester County, New Jersey
Total	66

U.S. Census Bureau
Census 2000

Census count corrections for American Indian and Alaska Native Areas (AIANAs), states, counties, places, county subdivisions, census tracts, and blocks may have been released as a result of an external challenge through the Count Question Resolution Program.

Standard Error/Variance documentation for this dataset:
Accuracy of the Data: Census 2000 Summary File 1 (SF 1) 100-Percent Data (PDF 44KB)

P4. HISPANIC OR LATINO, AND NOT HISPANIC OR LATINO BY RACE [73] - Universe: Total population
Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data

NOTE: For inforrhalion oh confidentiality protection, nonsampling error, and definitions, see http://factfinder.census.gov/home/en/dalanotes/expsf1u.hlm.

	New Jersey	Cumberland County, New Jersey	Gloucester County, New Jersey	Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block Group 1, Census Tract 5017.03, Gloucester County, New Jersey	Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block Group 2, Census Tract 5018, Gloucester County, New Jersey
Total:	8,414,350	146,438	254,673	1,264	1,527	1,018	731	885
Hispanic or Latino	1,117,191	27,823	6,583	273	132	58	20	42
Not Hispanic or Latino:	7,297,159	118,615	248,090	991	1,395	960	711	843
Population of one race:	7,163,470	116,234	245,294	966	1,377	950	706	830
White alone	5,557,209	85,510	218,262	509	1,304	926	693	810
Black or African American alone	1,096,171	28,134	22,562	445	71	17	9	12
American Indian and Alaska Native alone	11,338	1,077	426	4	0	1	1	1
Asian alone	477,012	1,338	3,763	2	2	6	3	6
Native Hawaiian and Other Pacific Islander alone	2,175	39	60	1	0	0	0	0
Some other race alone	19,565	136	221	5	0	0	0	1
Population of two or more races:	133,689	2,381	2,796	25	18	10	5	13
Population of two races:	126,411	2,171	2,588	22	18	8	5	13
White; Black or African American	18,066	487	921	2	3	0	2	1
White; American Indian and Alaska Native	9,760	377	421	7	3	3	2	3
White; Asian	21,700	195	478	2	3	0	1	2
White; Native Hawaiian and Other Pacific Islander	1,008	16	40	0	0	0	0	0
White; Some other race	35,669	400	317	4	2	5	0	5
Black or African American; American Indian and Alaska Native	6,538	330	171	3	2	0	0	2
Black or African American; Asian	3,482	49	45	1	0	0	0	0
Black or African American; Native Hawaiian and Other Pacific Islander	1,307	35	12	0	0	0	0	0
Black or African American; Some other race	16,291	203	72	3	-1	0	0	0
American Indian and Alaska Native; Asian	2,067	10	13	0	0	0	0	0
American Indian and Alaska Native; Native Hawaiian and Other Pacific Islander	40	5	0	0	0	0	0	0
American Indian and Alaska Native; Some other race	455	30	5	0	0	0	0	0
Asian; Native Hawaiian and Other Pacific Islander	1,268	9	25	0	0	0	0	0
Asian; Some other race	8,513	19	63	0	0	0	0	0
Native Hawaiian and Other Pacific Islander; Some other race	247	6	5	0	4	0	0	0
Population of three races:	6,534	197	192	3	0	2	0	0
White; Black or African American; American Indian and Alaska Native	2,852	131	101	1	0	0	0	0

White; Black or African American; Asian	555	10	13	0	0	0	0	0
White; Black or African American; Native Hawaiian and Other Pacific Islander	57	4	0	0	0	0	0	0
White; Black or African American; Some other race	837	17	30	0	0	0	0	0
White; American Indian and Alaska Native; Asian	235	1	3	0	0	0	0	0
White; American Indian and Alaska Native; Native Hawaiian and Other Pacific Islander	35	0	0	0	0	0	0	0
White; American Indian and Alaska Native; Some other race	144	8	15	0	0	2	0	0
While; Asian; Native Hawaiian and Other Pacific Islander	286	2	3	0	0	0	0	0
White; Asian; Some other race	647	4	16	0	0	0	0	0
While; Native Hawaiian and Other Pacific Islander; Some other race	36	0	2	0	0	0	0	0
Black or African American; American Indian arid Alaska Native; Asian	138	5	2	0	0	0	0	0
Black or African American; American Indian and Alaska Native; Native Hawaiian and Other Pacific Islander	45	1	0	0	0	0	0	0
Black or African American; American Indian and Alaska Native; Some other race	187	6	0	0	0	0	0	0
Black or African American; Asian; Native Hawaiian and Other Pacific Islander	78	3	2	2	0	0	0	0
Black or African American; Asian;Some other race	232	2	3	0	0	0	0	0
Black or African American; Native Hawaiian and Other Pacific Islander; Some other race	70	1	1	0	0	0	0	0
American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander	19	1	0	0	0	0	0	0
American Indian and Alaska Native; Asian; Some other race	32	0	1	0	0	0	0	0
American Indian and Alaska Native; Native Hawaiian and Other Pacific Islander; Some other race	1	0	0	0	0	0	0	0
Asian; Native Hawaiian and Other Pacific Islander; Some other race	48	1	0	0	0	0	0	0
Population of four races:	535	9	14	0	0	0	0	0
White; Black or African American; American Indian and Alaska Native; Asian	349	4	8	0	0	0	0	0
White; Black or African American; American Indian and Alaska Native; Native Hawaiian and Other Pacific Islander	17	1	4	0	0	0	0	0
White; Black or African American; American Indian and Alaska Native; Some other race	55	2	1	0	0	0	0	0
White; Black or African American; Asian; Native Hawaiian and Other Pacific Islander	28	0	1	0	0	0	0	0
While; Black or African American; Asian; Some other race	30	0	0	0	0	0	0	0
White; Black or African American; Native Hawaiian and Other Pacific islander; Some other race	5	0	0	0	0	0	0	0
White; American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander	16	2	0	0	0	0	0	0
White; American Indian and Alaska Native; Asian; Some other race	4	0	0	0	0	0	0	0
White; American Indian and Alaska Native; Native Hawaiian and Other Pacific Islander; Some other race	1	0	0	0	0	0	0	0
White; Asian; Native Hawaiian and Other Pacific islander; Some other race	11	0	0	0	0	0	0	0
Black or African American; American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander	5	0	0	0	0	0	0	0

Black or African American; American Indian and Alaska Native; Asian; Some other race	4	0	0	0	0	0	0	0
Black or African American; American Indian and Alaska Native; Native Hawaiian and Other Pacific Islander; Some other race	3	0	0	0	0	0	0	0
Black or African American; Asian; Native Hawaiian and Other Pacific Islarider; Some other race	5	0	0	0	0	0	0	0
American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; Some other race	2	0	0	0	0	0	0	0
Population of five races:	193	4	2	0	0	0	0	0
White; Black or African American; American Indian and Alaska Native; Asian; Native Hawaiian ahd Other Pacific Islander	148	1	1	0	0	0	0	0
White; Black or African American; Americari Indian and Alaska Native; Asian; Some other race	26	3	1	0	0	0	0	0
While; Black or African American; American Indian and Alaska Native; Native Hawaiian and Other Pacific Islander; Some other race	0	0	0	0	0	0	0	0
White; Black or African American; Asian; Native Hawaiian and Other Pacific Islander; Some other race	11	0	0	0	0	0	0	0
White; Arnerican Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; Some other race	6	0	0	0	0	0	0	0
Black or African American; American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; Some other race	2	0	0	0	0	0	0	0
Population of six races:	16	0	0	0	0	0	0	0
White; Black er African American; American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; Some other race	16	0	0	0	0	0	0	0

U.S. Census Bureau
Census 2000

Standard Error/Variance documentation for this dataset:
Accuracy of the Data: Census 2000 Summary File 1 (SF 1) 100-Percent Data (PDF 44KB)

P87. POVERTY STATUS IN 1999 BY AGE [17] - Universe: Population for whom poverty status is determined
Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data

NOTE: Data based on a sample except in P3, P4, H3, and H4. For information on confidentiality protection, sampling error, nonsampling error, and definitions see http://factfinder.census.gov/home/en/datanotes/expsf3.htm.

	New Jersey	Cumberland County, New Jersey	Gloucester County, New Jersey	Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block Group 1, Census Tract 5017.03, Gloucester County, New Jersey	Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block Group 2, Census Tract 5018, Gloucester County, New Jersey
Total:	8,232,588	135,350	249,843	755	1,492	1,002	721	889
Income in 1999 below poverty level:	699,668	20,367	15,395	92	56	26	61	44
Under 5 years	63,044	2,000	1,167	20	0	0	7	7
5 years	13,402	472	190	17	0	0	2	0
6 to 11 years	82,757	2,775	1,605	0	0	0	12	8
12 to 17 years	68,551	2,286	1,618	0	0	0	2	0
18 to 64 years	388,578	10,537	8,809	21	31	26	27	26
65 to 74 years	38,435	1,115	838	8	0	0	2	1
75 years and over	44,901	1,182	1,168	26	25	0	9	2
Income in 1999 at or above poverty level:	7,532,920	114,983	234,448	663	1,436	976	660	845
Under 5 years	486,798	6,667	14,993	22	90	31	34	46
5 years	103,544	1,445	3,059	0	48	0	13	11
6 to 11 years	644,822	10,376	21,829	39	111	67	62	66
12 to 17 years	592,171	10,396	21,631	111	60	74	57	62
18 to 64 years	4,724,939	70,598	146,407	410	934	680	386	552
65 to 74 years	531,283	8,276	15,034	42	94	63	53	50
75 years and over	449,363	7,225	11,495	39	99	61	55	58

U.S. Census Bureau
Census 2000

Standard Error/Variance documentation for this dataset:
Accuracy of the Data: Census 2000 Summary File 3 (SF 3) - Sample Data (PDF 141.5KB)

P90. POVERTY STATUS IN 1999 OF FAMILIES BY FAMILY TYPE BY PRESENCE OF RELATED CHILDREN UNDER 18 YEARS BY AGE OF RELATED CHILDREN [41] - Universe: Families
Data Set: Census 2000 Summary File 3 (SF 3) - Sample Data

NOTE: Data based on a sample except in P3, P4, H3, and H4. For information on confidentiality protection, sampling error, nonsampling error, and definitions see http://factfinder.census.gov/home/en/datanotes/expsf3.htm.

	New Jersey	Cumberland County, New Jersey	Gloucester County, New Jersey	Block Group 1, Census Tract 409.02, Cumberland County, New Jersey	Block Group 2, Census Tract 409.02, Cumberland County, New Jersey	Block Group 1, Census Tract 5017.03, Gloucester County, New Jersey	Block Group 1, Census Tract 5018, Gloucester County, New Jersey	Block Group 2, Census Tract 5018, Gloucester County, New Jersey
Total:	2,167,577	35,373	67,528	204	426	272	216	261
Income in 1999 below poverty level:	135,549	4,004	2,873	12	0	0	12	14
Married-couple family:	50,751	1,157	946	6	0	0	6	7
With related children under 18 years:	32,125	718	551	6	0	0	6	2
Under 5 years only	6,588	157	97	0	0	0	2	0
Under 5 years and 5 to 17 years	9,897	257	164	6	0	0	2	2
5 to 17 years only	15,640	304	290	0	0	0	2	0
No related children under 18 years	18,626	439	395	0	0	0	0	5
Other family:	84,798	2,847	1,927	6	0	0	6	7
Male householder, no wife present:	12,537	416	268	0	0	0	0	0
With related children under 18 years:	9,128	353	217	0	0	0	0	0
Under 5 years only	2,275	102	46	0	0	0	0	0
Under 5 years and 5 to 17 years	2,183	107	49	0	0	0	0	0
5 to 17 years only	4,670	144	122	0	0	0	0	0
No related children under 18 years	3,409	63	51	0	0	0	0	0
Female householder, no husband present:	72,261	2,431	1,659	6	0	0	6	7
With related children under 18 years:	62,646	2,155	1,472	6	0	0	6	7
Under 5 years only	10,266	391	263	0	0	0	0	2
Under 5 years and 5 to 17 years	17,521	661	340	0	0	0	0	2
5 to 17 years only	34,859	1,103	869	6	0	0	6	3
No related children under 18 years	9,615	276	187	0	0	0	0	0
Income in 1999 at or above poverty level:	2,032,028	31,369	64,655	192	426	272	204	247
Married-couple family:	1,617,865	22,993	53,061	120	362	230	167	210
With related children under 18 years:	803,675	10,959	27,617	81	153	83	59	95
Under 5 years only	165,127	1,744	4,760	0	26	17	3	11
Under 5 years and 5 to 17 years	166,268	2,238	5,430	26	48	0	17	16
5 to 17 years only	472,280	6,977	17,427	55	79	66	39	68
No related children under 18 years	814,190	12,034	25,444	39	209	147	108	115
Other family:	414,163	8,376	11,594	72	64	42	37	37

Male householder, no wife present:	113,465	2,247	3,181	20	8	0	9	13
With related children under 18 years:	53,687	1,392	1,892	5	0	0	8	10
Under 5 years only	12,813	373	337	0	0	0	4	3
Under 5 years and 5 to 17 years	7,667	206	215	0	0	0	3	0
5 to 17 years only	33,207	813	1,340	5	0	0	1	7
No related children under 18 years	59,778	855	1,289	15	8	0	1	3
Female householder, no husband present:	300,698	6,129	8,413	52	56	42	28	24
With related children under 18 years:	165,656	3,734	4,665	8	5	19	15	15
Under 5 years only	23,885	496	718	0	5	7	0	3
Under 5 years and 5 to 17 years	22,926	611	425	0	0	0	2	2
5 to 17 years only	118,845	2,627	3,522	8	0	12	13	10
No related children under 18 years	135,042	2,395	3,748	44	51	23	13	9

U.S. Census Bureau
Census 2000

Standard Error/Variance documentation for this dataset:
Accuracy of the Data: Census 2000 Summary File 3 (SF 3) - Sample Data (PDF 141.5KB)

APPENDIX K – AIR MODELING INFORMATION

Area 1 Existing Storage Yard

The existing consolidated radioactive material pile will be consolidated within this area.

Area 2 Temporary D111 and D102/D112 Demolition Material Storage Area

The demolition materials will be moved from this area to the consolidated pile area located in Area 1.

Area 4 Roadways

The roadways are comprised of the paved and unpaved roads the construction vehicles associated with this alternative will utilize.

As Area 3, the Staging Area, is used only for materials crushing and train loading for the Off-Site Disposal and License Termination Alternative, it is not considered under the LTC alternative.

Emissions for the project steps that are expected to occur during implementation of this alternative, from material relocation through the placement of soil cover materials, were estimated. Multiple spreadsheets were used to estimate emissions, as presented in the attached tables. The following is a summary of the emission estimation methodologies and emission factors presented in each of the tables:

Table 1: Air Emission Details

The operational assumptions that are common to multiple aspects of the various emission estimates are summarized on Table 1. Included in the operational assumptions are operational times and material amounts handled.

Table 2: Material Description

The Storage Yard consists of several subpiles of different types of materials. This table presents the area, volume, mass, and physical characteristics of each subpile. The D111 and D102/D112 piles and the materials needed for the engineered barrier and soil cover are also listed in this table. Based on material composition the material density, silt content, and moisture content have been estimated for each subpile. Each material was matched with a similar material found in the USEPA Compilation of Air Pollutant Emission Factors AP-42 Table 13.2.4-1. Table 2 also presents a weighted average of the materials' physical characteristics that is used in some of the emission estimation tables.

Table 3: Material Handling – "Drop Emissions"

Fugitive PM_{10} "drop emissions" are created when a truck dumps material onto a pile or when material is loaded from a pile into a truck. The equation to estimate drop emissions is found in AP-42 Chapter 13.2.4, Aggregate Handling and Storage Piles. For this alternative, it is assumed that the drop emissions will occur when soil materials for the engineered barrier and soil cover are dumped on-site and when a loader moves material from an existing pile to the consolidated pile. One of the variables used in the equation, mean wind speed, is from the table of "Normals, Means, and Extremes for Philadelphia PA (PHL)" from Local Climatological Data (ISSN 0198-4535) published by the National Climatic Data Center (NCDC)(see Table 3-5). The pound per day emission estimate for each subpile assumes that every subpile has some material handling; therefore, the "Active 8-Hour Day" is a total of all the subpiles in each area.

Table 4: Material Handling – Active/Inactive Pile Emissions

Fugitive PM_{10} emissions are generated once a pile is disturbed and becomes "active," which is when pile material is dumped, loaded or otherwise handled. Per AP-42 Chapter 13.2.4, once a pile is disturbed the fines are may be disaggregated and released by wind events. There are also fugitive PM_{10} emissions generated when a disturbed pile is inactive due to wind erosion. As the undisturbed pile weathers, the potential for emissions is greatly reduced.

The emissions are estimated by using two emission factors published in the Air Pollution Engineering Manual 1992 (AP-40), Chapter 15, Table 1 (page 779), "Uncontrolled Particulate Emission Factors for Sand and Gravel Processing." One emission factor is for active storage piles during an active day. The active storage pile emission factor includes the following operations: loading (drop emissions), equipment traffic, and wind erosion. As there is no loading onto the storage piles being relocated, the emissions estimated using these factors will be conservative. The emission factor assumes that there is 8 to 10 hours of activity per 24 hours. The second emission factor is for a disturbed pile (recently active) that is inactive for the entire day. This emission factor represents wind erosion emissions. Both emission factors are for sand and gravel processing plants; the materials that are stored in Area 1 and Area 2 are similar to the types of materials associated with such operations.

The estimated daily emissions assume that only two subpiles have been disturbed and become active. Since the emission factor is based on the pile size, the daily emissions from the two largest subpiles are estimated (only the disturbed portion of the pile that will be removed and consolidated within the footprint of the final pile is considered). For the purposes of modeling each hour of the day, the wind erosion portion of the active emission factor was extracted. Material handling is assumed to occur for 8 work hours each day and thus material handling emissions are calculated based on 8 hours per day. Wind erosion is assumed to occur 24 hours per day. The emission factor was then adjusted to represent the 8 hour portion of the day that is active and the 16 hour inactive portion of the day when only wind erosion is a source of emissions.

Table 5: Heavy Equipment Operation

The emission factor used to estimate the fugitive PM_{10} emissions due to the operation of heavy equipment is from AP-42 Chapter 11.9 Western Surface Coal Mining. The heavy equipment assumed to be in use includes a dozer, loader and excavator. A dozer and loader are assumed to be used in Area 1 to consolidate the existing piles. The excavator and dozer are assumed to be used to shape the final pile and place the soil cap material. Only the loader is expected to be used in Area 2 to relocate the two piles. Dozer emissions are estimated using an equation for estimating emissions associated with the bulldozing of overburden. It is assumed that the emission rates for the loader and the excavator are the same as the dozer.

Table 6: Unpaved Roadways – Access Road

The emission estimates for fugitive PM_{10} from the unpaved access road are based on emission factors from AP-42 Chapter 13.2.2 Unpaved Roads, It is assumed that the vehicles using the road will be represented by heavy duty tri-axle trucks. The equation for unpaved surfaces at industrial sites is used for this project. Included in the equation is the number of days with precipitation greater than 0.01 inches. The precipitation data is from "Normals, Means, and Extremes for Philadelphia PA (PHL)" from Local Climatological Data (ISSN 0198-4535) published by NCDC (Table 3-5). The silt loading value is the weighted average of the materials' physical characteristics from Table 2. These calculations assume the unpaved roads will be treated each month with a chemical dust suppressant (palliative), which is expected to reduce PM_{10} emissions by 80% per AP-42 Figure 13.2.2-5. The daily number of vehicles assumes that the deliveries for the engineered barrier soils and cover soils occur on the same days.

Table 7: Paved Roadway Emissions

The emission estimates for fugitive PM_{10} from the paved road are based on AP-42 Chapter 13.2.1 Paved Roads. It is assumed that the vehicles using the road will be represented by heavy duty tri-axle trucks. AP-42 Chapter 13.2.1 Equation 1 is used to estimate emissions from the paved roads and the silt loading is the value for iron and steel production as presented in AP-42 Table 13.2.1-3. The daily number of vehicles assumes that the deliveries for the engineered barrier soil materials and cover materials occur on the same days.

Table 8: Exposed Ground Area Emissions

The emission factor for fugitive PM_{10} from the exposed ground area is presented in AP-42 Chapter 11.9.1, Table 11.9.4. Following USEPA guidance, the emission estimates assume that the wind erosion emissions from the exposed ground area will end during the revegetation period, 7 months after the start of material relocation. The emission factor is for PM_{30}, but the AP-42 table refers to Chapter 13.2.5 which has a particle distribution table that states typically 50% of PM_{30} emissions are PM_{10} when wind speed is a factor.

Table 9: Off-Road Diesel Engine Emissions

The emissions estimated and presented in this table are combustion emissions from off-road vehicle engines. Off-road vehicles have different emission factors than on-road vehicles because the manufacturers are subject to different emission standards for engine designs. The emission factors are from USEPA Report No. NR-009A Exhaust Emission Factors for Non-Road Engine Modeling – Compression-Ignition, dated February 13, 1998, revised June 15, 1998. It is assumed that the engines were manufactured between 2003 and 2006 and are regulated by Tier 2 emission standards for PM and NO_x. Due to expected USEPA implementation of the Ultra-Low Sulfur Diesel Rule in June 2006, it is assumed that the diesel fuel has a sulfur content of 15 parts per million.

Table 10: On-Road Engine Emissions

The emissions estimated and presented in this table are emissions from the on-road vehicle engines. Emission estimates include exhaust, brake, and tire wear. Emissions estimates are based on MOBILE6.2, a computerized model that provides emission estimates of present and future emissions from highway motor vehicles and is available through the EPA Office of Transportation and Air Quality. MOBILE6.2 allows the use of site specific and fleet specific parameters in order to develop emission estimates that best represent expected conditions and site location. Fleet vehicles that are less than 10 years old, utilized diesel fuel with 15 ppm sulfur content, and had an average speed of 10 miles per hour were modeled.

Table 11: Emissions Summary

The emissions from each of the tables described above are summarized by area on this table.

Off-Site Disposal and License Termination Alternative (LT)

This alternative involves removing the radioactive materials from the site by railcar, with some materials requiring crushing prior to off-site removal. It also conservatively assumes the placement of clean soil (cover material) over the Storage Yard after the materials have been removed. Under this alternative, active decommissioning measures will occur for eight hours per day, five days per week, five months per year, over a two year period. To analyze emissions generated from this alternative, the following operational areas have been considered:

Area 1 Existing Storage Yard

The majority of the material to be transported off-site is located in the Storage Yard. The material will be removed and brought to the Staging Area.

Area 2 Temporary Di11 and D102/D112 Demolition Material Storage Area

The demolition material will be removed and brought to the Staging Area.

Area 3 Staging Area

The Staging Area is used for materials crushing and train loading operations.

Area 4 Roadways

The roadways are comprised of the paved and unpaved roads the construction vehicles associated with the project will utilize.

Emissions were estimated for the project steps that are expected to occur during implementation of this altemative from material relocation through transportation off-site. Multiple spreadsheets were used to estimate emissions, as presented in the attached tables. The following is a summary of the emission estimation methodologies and emission factors presented in each of the tables:

Table 1: Air Emission Details

The operational assumptions that are common to multiple aspects of the various emission estimates are summarized on Table 1. Included in the operational assumptions are operational times and material amounts handled.

Table 2: Material Description

This table presents the area, volume, mass, and physical characteristics of each subpile of material in the Storage Yard as well as the Di11 and D102/D112 piles and cover materials. Based on material composition the density, silt content, and moisture content of each material was estimated. Each material was matched with a similar material found in AP-42 Table 13.2.4-1. Table 2 also presents weighted average of the materials' physical characteristics that is used in some of the emission estimation tables.

Table 3: Material Handling – "Drop Emissions"

Fugitive PM_{10} "drop emissions" are created when a truck dumps material onto a pile or when material is loaded from a pile into a truck. The equation to estimate drop emissions is found in AP-42 Chapter 13.2.4, Aggregate Handling and Storage Piles. For this altemative, it is assumed that the drop emissions will occur when cover materials are dumped on-site, when material is loaded onto a tri-axle truck for transfer to the Staging Area, and when the train is loaded with material. One of the variables used in the equation, mean wind speed, is from the table of "Normals, Means, and Extremes for

Philadelphia PA (PHL)" from Local Climatological Data (ISSN 0198-4535) published by the NCDC (Table 3-5).

Table 4: Material Handling – Crushing Emissions

Fugitive PM_{10} emissions are created when mechanical crushing is employed for material size reduction. Only piles with large material will be processed in the crusher. The emission factor is from EPA's Factor Information Retrieval (FIRE) Data System version 6.25. The source classification code (SCC) for the process is 3-05-020-02, which is for stone quarrying – processing, secondary crushing (no emission factors were available for primary crushing). The emission factor is for a crusher that employs wet suppression technology as an emission control. The daily amount of material crushed and the estimated PM_{10} emissions are limited by the amount of material that can be loaded into a rail car. Annual emissions assume that half the material will be crushed in the first year and the other half crushed in the second year.

Table 5: Material Handling – Active/Inactive Pile Emissions

Fugitive PM_{10} emissions are generated once a pile is disturbed and becomes "active", which is when pile material is dumped, loaded, or otherwise handled. Per AP-42 Chapter 13.2.4, once a pile is disturbed, the fines may be disaggregated and released by wind events. There are also fugitive PM_{10} emissions generated when a disturbed pile is inactive due to wind erosion. As the undisturbed pile weathers, the potential for emissions is greatly reduced.

The emissions are estimated by using two emission factors published in the Air Pollution Engineering Manual 1992 (AP-40), Chapter 15, Table 1 (page 779), "Uncontrolled Particulate Emission Factors for Sand and Gravel Processing". One emission factor is for active storage piles during an active day. The active storage pile emission factor includes the following operations: loading (drop emissions), equipment traffic, and wind erosion. The "drop emission" for loading into the Staging Area pile is included in the active pile emission factor. The emission factor assumes that there is 8 to 10 hours of activity per 24 hours. The second emission factor is for a disturbed pile (recently active) that is inactive for the entire day. This emission factor represents wind erosion emissions. Both emission factors are for sand and gravel processing plants; the materials that are stored in Area 1 and Area 2 are similar to the types of materials associated with such operations.

The estimated daily emissions assume that only two subpiles have been disturbed and become active. Since the emission factor is based on the pile size, the daily emissions from the two largest subpiles are estimated. For the purposes of modeling each hour of the day, the wind erosion portion of the active emission factor was extracted. Material handling is assumed to occur for 8 work hours each day and thus material handling emissions are calculated based on 8 hours per day. Wind erosion is assumed to occur 24 hours per day. The emission factor was then adjusted to represent the 8 hour portion of the day that is active and the 16 hour inactive portion of the day when only wind erosion is a source of emissions. Annual emissions assume that half the piles have been disturbed

and removed during the first year and the remaining piles are disturbed and removed during the second year

Table 6: Heavy Equipment Operation

The emission factor used to estimate the fugitive PM_{10} emissions due to the operation of heavy equipment is from AP-42 Chapter 11.9 Western Surface Coal Mining. The heavy equipment assumed to be used includes a dozer, loaders and an excavator. A dozer and loader are assumed to be used in Area 1 to remove the existing piles. Only the loader is expected to be used in Area 2 to relocate the two piles. A second loader is expected to be operating at the Staging Area. Dozer emissions are estimated using an equation for estimating emissions associated with the bulldozing of overburden materials. It is assumed that the emission rate for the loader is the same as the dozer.

Table 7: Unpaved Roadways – Access Road

The emission estimates for fugitive PM_{10} from the access road are based on emission factors from AP-42 Chapter 13.2.2 Unpaved Roads. It is assumed that the vehicles using the road will be represented by heavy duty tri-axle trucks. The equation for unpaved surfaces at industrial sites is used for this project. Included in the equation is the number of days with precipitation greater than 0.01 inches. The precipitation data is from "Normals, Means, and Extremes for Philadelphia PA (PHL)" from Local Climatological Data (ISSN 0198-4535) published by NCDC (Table 3-5). The silt loading value is the weighted average of the materials' physical characteristics from Table 2. The calculations assume the unpaved roads will be treated each month with a chemical dust suppressant, which is expected to reduce PM_{10} emissions by 80%, per AP-42 Figure 13.2.2-5. The daily number of vehicles assumes that the material transfer and the cover material deliveries occur on the same days.

Table 8: Paved Roadway Emissions

The emission estimates for fugitive PM_{10} from the paved road are based on AP-42 Chapter 13.2.1 Paved Roads. It is assumed that the vehicles using the road will be represented by heavy duty tri-axle trucks. AP-42 Chapter 13.2.1 Equation 1 is used to estimate emissions from the paved roads and the silt loading is the value for iron and steel production as presented in AP-42 Table 13.2.1-3.

Table 9: Exposed Ground Area Emissions

The emission factor for fugitive PM_{10} from the exposed ground area is presented in AP-42 Chapter 11.9.1, Table 11.9.4. Following EPA guidance, the emission estimates assume that re-vegetation (after the end of material relocation) will end the wind erosion emissions from the exposed ground area. The emission factor is for PM_{30}, but the AP-42 table refers to AP-42 Chapter 13.2.5, which has a particle distribution table that states typically 50% of PM_{30} emissions are PM_{10} when wind speed is a factor.

Table 10: Off-Road Diesel Engine Emissions

The emissions estimated and presented in this table are emissions from off-road vehicle engines. Emissions estimates include exhaust, brake and tire wear. Off-road vehicles have different emission factors than on-road vehicles because the manufacturers are subject to different emission standards for engine designs. The emission factors are from USEPA Report No. NR-009A Exhaust Emission Factors for Non-Road Engine Modeling – Compression-Ignition, dated February 13, 1998, revised June 15, 1998. It is assumed that the engines were manufactured between 2003 and 2006 and are regulated by Tier 2 emission standards for PM and NO_x. Due to expected USEPA implementation of the Ultra-Low Sulfur Diesel Rule in June 2006, it is assumed that the diesel fuel has a sulfur content of 15 parts per million.

Table 11: Crusher - Engine Emissions

The emissions estimated and presented in this table are combustion point source emissions from the diesel engine that powers the crusher. For the purpose of estimating emissions, it is assumed that the engine has a power rating of 300 HP. The emission factors used to estimate emissions are pubhshed in AP-42 Chapter 3.3, Table 3.3-1. Due to expected USEPA implementation of the Ultra-Low Sulfur Diesel Rule in June 2006, it is assumed that the diesel fuel has a sulfur content of 15 parts per million.

Table 12: Locomotive – Diesel Powered

The emissions estimated and presented in this table are combustion emissions from the diesel engine that powers the train. For the purpose of estimating emissions, it is assumed that the locomotive operates under "switch duty-cycle" as defined by USEPA and the engine has a power rating of 1,000 HP. The emission factors used to estimate emissions are pubhshed in USEPA's "Emission Standards Reference Guide for Heavy-Duty and Nonroad Engines – Locomotives". Emissions are based on the assumption that the engines were manufactured from 2000 to 2004. Due to expected USEPA implementation of the Ultra-Low Sulfur Diesel Rule in June 2006, it is assumed that the diesel fuel has a sulfur content of 15 parts per million.

Table 13: On-Road Engine Emissions

The emissions estimated and presented in this table are combustion emissions from the on-road vehicle engines. Emissions estimates are based on MOBILE6.2, a computerized model that provides emission estimates of present and future emissions from highway motor vehicles and is available through the EPA Office of Transportation and Air Quality. MOBILE6.2 allows the use of site-specific and fleet-specific parameters in order to develop emission estimates that best represent expected conditions and site location. TRC modeled fleet vehicles that are less than 10 years old, utilized diesel fuel with 15 ppm sulfur content, and had an average speed of 10 miles per hour. Emission estimates include brake and tire wear.

Table 14: Emissions Sununary

The emissions from each of the tables described above are summarized by area on this table.

License Continuation Alternative (LC)

The LC Altemative involves leaving the existing storage piles in-place. Under this altemative, it is expected that the area would become largely naturally vegetated over the long term. Areas that do not support vegetation, such as large pieces of slag, have been exposed to the wind for some time and wind erodible particles have been removed. USEPA notes that erodible materials are removed from an undisturbed surface in a matter of minutes by wind, and as long as the surface remains undisturbed, it is no longer a source of particle emissions (USEPA, AP-42, Compilation of Air Pollution Emission Factors, Section 13.2.5). Piles containing finer material will tend to form a natural crust, and again the erodible materials from the crusted surface have already been removed. There would be no vehicles or construction equipment used under this scenario.

There will be no emissions of NO_x attributable to this altemative, since there will be no combustion sources or engines employed. Airbome particle emissions under the LC Altemative will be negligible. USEPA does not consider inactive exposed areas and storage piles within industrial facilities to be sources of particle emissions. Under the LC Altemative, the site would have inconsequential impacts on air quality, since there would be virtually no emissions. Under this scenario, the air quality concentrations would be equal to the background concentrations.

Project Visibility Screening Modeling

The worst-case emission scenario (LT Altemative) was modeled using the EPA's visibility screening model, VISCREEN, to determine whether the Project would have any significant visibility impact on the nearest Prevention of Significant Deterioration (PSD) Class I area, the Brigantine National Wildlife Refuge. Modeling was performed in accordance with the Federal Land Manager's Air Quality Related Values Working Group (FLAG) Phase I Report (U.S. Forest Service, December 2000). The output of the VISCREEN model is attached and shows that the screening criteria for the maximum visual impacts are not exceeded either inside or outside the Class I area. Thus, since the other altematives have lower emission rates, all of the remediation alternatives will comply with the visibility screening criteria.

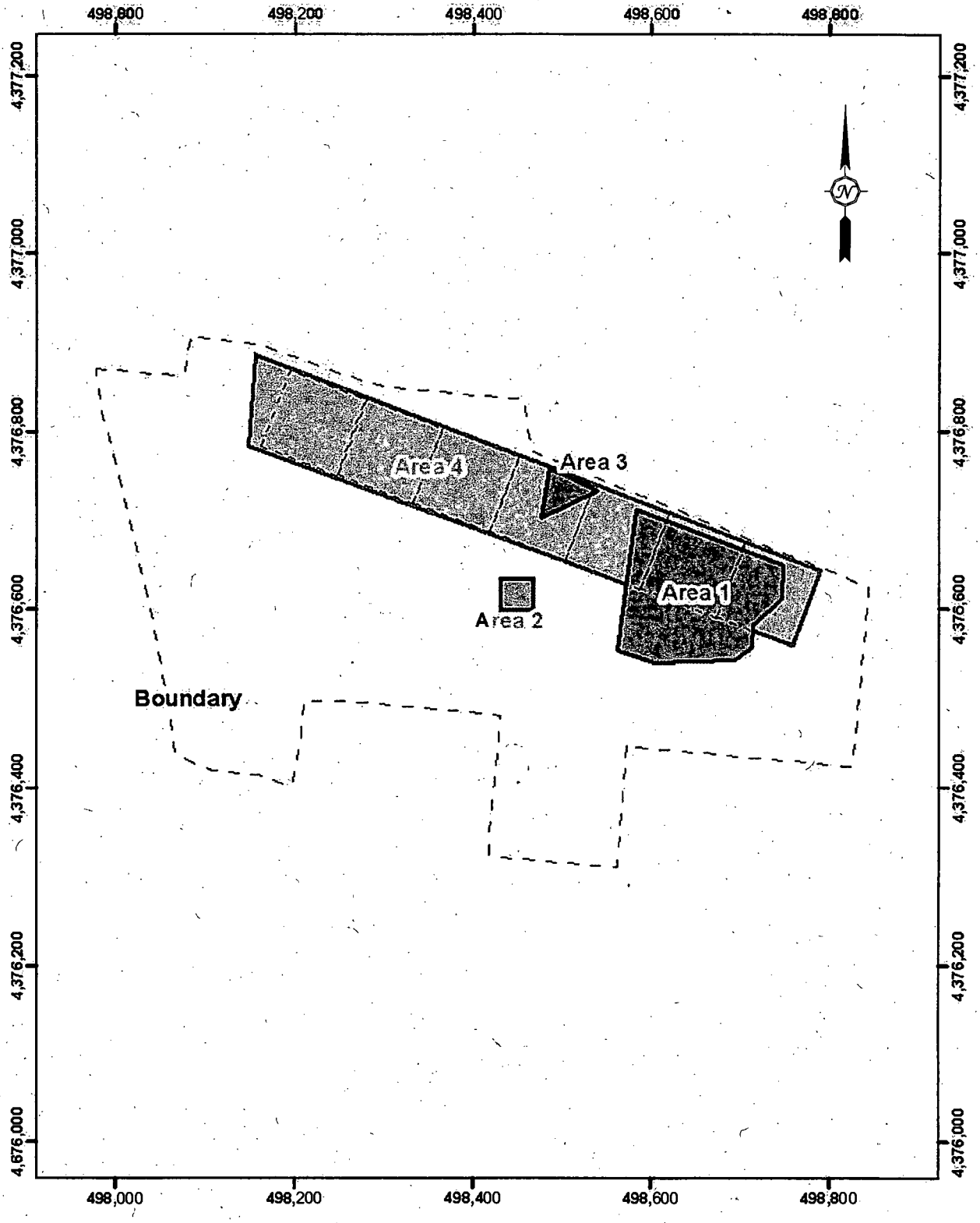


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FIGURE K-1

MAP SHOWING GEOMETRY OF POTENTIAL EMISSION SOURCES FOR THE PROPOSED DECOMMISSIONING ALTERNATIVES

Date: 09/05 | Project No. 26770-0000-00000

pers/jw/haz/26770 smc/ER Doc.fh10

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On-Site Stabilization and Long-Term Control

Table 1
Air Emission Details

Engineered Barrier Material			
Amount of Topsoil (cubic yards)		3,667	CAD-based Estimate
Amount of Soil Isolation & Frost Protection (cubic yards)		15,000	CAD-based Estimate
Amount of Sand Cushion (cubic yards)		6,000	CAD-based Estimate
Material Total (cubic yards)		24,667	
Amount of Topsoil (tons)		5,197	Cubic Yards x Pounds per Cubic Yard
Amount of Soil Isolation & Frost Protection (tons)		21,263	Cubic Yards x Pounds per Cubic Yard
Amount of Sand Cushion (tons)		8,910	Cubic Yards x Pounds per Cubic Yard
Material Total (tons)		35,370	
Number of Trucks		1,233	Material Needed / Yards per Load
Yards per Load		20	Given
Cubic Yards of Engineered Barrier Material Delivered		24,667	Number of Trucks x Yards per Load
Pounds per Cubic Foot of Topsoil & Soil Isolation, Density		105	From Table 2
Pounds per Cubic Yard, Density		2,835	Pounds per Cubic Foot x 27
Grams per Cubic Centimeter		1.68	From Table 2
Pounds per Cubic Foot of Sand, Density		110	Given
Pounds per Cubic Yard, Density		2,970	Pounds per Cubic Foot x 27
Grams per Cubic Centimeter		1.76	From Table 2
Soil Material Loaded per Truck (tons)		28	Yards per Load x Pounds per Cubic Yard
Weight per Empty Truck (tons)		15	Given
Weight per Loaded Tmck (tons)		43	Load per Truck + Weight of Empty Truck
Average Weight of a Soil Material Truck (tons)		29	Average of Empty Truck and Loaded Truck
Average Number of Wheels per Truck (10 unloaded, 14 loaded)		12	Given
Trucks per Project, Soil Material		1,233	Assumes Cover Operatiom = 90 Calendar Days (64 work days)
Trucks per Day, Soil Material		19.3	Trucks per Project / Time for Engineered Barrier (64 work days)
Tons Loaded per Day, Soil Material		546	Trucks per Day x Tons Loaded per Truck
Tons Loaded per Prpject, Soil Material		34,965	Trucks per Project x Tons Loaded per Truck
Soil Material for the Relocated Pile Area			
Engineered Banier Area Size (square feet)		196,858	CAD-based Estimate
Total Storage Yard Area Size (square feet)		310,687	CAD-based Estimate
Size of Area to be Covered (square feet)		113,829	Total Storage Yard Area - Engineered Barrier Area
Depth of Cover (feet)		1	Given
Number of Yards of Cover Needed (cubic yards)		4,216	Size of Area x Depth of Cover
Number of Trucks		211	Cover Needed / Yards per Load
Yards per Load		20	Given
Trucks per Day		24	Assume 3 Loads per Hour / 8 Hours Day
Yards per Day		480	Yards per Load x Trucks per Day
Pounds per Cubic Foot (same as Topsoil & Soil Insolation above)		105	From Table 2
Ton per Project		5,976	Pounds per Cubic Yard / Yards of Cover
Number of Days Needed		9	Number of Trucks / Yards per Load
Material Relocation by Truck (D111/D112)			
Number ot Trucks from Piles to Engineered Barrier Area		100	Cubic Yards / Yards per Load
Yards per Load		20	Given
Material to be Moved (cubic yards)		2,000	From Table 2
Material to be Moved (tons)		3,240	From Table 2
Trucks per Day		24	Assume 3 loads per Hour / 8 Hburs Day
Tons Material Loaded per Truck		32	Tons Material Moved / Number of Tmcks
Weight per Empty Truck (tons)		15	Given
Weight per Loaded Truck (tons)		47	Tons Material Moved + Ton per Empty Truck
Average Weight of a Material Truck (tons)		31	Average of Empty Truck and Loaded Material Truck
Average Weight of All Trucks (tons)		29	Weighted Average Weight (material trucks and cover trucks)
Operation Duration			
Total Time (MONTHS)		7	Given (see Figure 18.12 Project Schedule)
Time for Creating Consolidated Pile to Engineered Barrier (DAYS)	Calendar	90	Given (see Figure 18.12 Projecl Schedule)
	Work	64	Assumed
Time lor moving two piles (DAYS)	Work	4.2	Number of Trucks Material Relocation / Trucks per Day
Time (or Engineered Barrier (DAYS)	Calendar	90	Given (see Rgure 18.12 Project Schedule)
	Work	64	Assumed
Placement of Sand and Soil Barrier Layer (DAYS)	Calendar	60	Given (see Rgure 18.12 Project Schedule)
	Work	44	Assumed
Placement of Vegetation Layer (DAYS)	Calendar	30	Given (see Figure 18.12 Project Schedule)
	Work	20	Assumed
Vegetation Establishment Period (DAYS)		60	Given (see Rgure 18.12 Project Schedule)
Soil Cover for Non-Engineered Barrier Area (DAYS)	Calendar	13	Assumed
	Work	9	Assumed
Days per Week		5	Assumed
Hours per Day		8	Assumed
Length of UNPAVED Roadway (feet) - from Pile to Engineered Barrier		550	D111/D112 Material Piles Moved
Length of UNPAVED Roadway (feet) - to paved roadway		1,200	Cover & Engineered Barrier Material
Length of PAVED Roadway (feet)		1,650	Cover & Engineered Barrier Material
Daily/Annual Operating Rates			
Lcader(s) = Maximum Operating Hours per Day		8	Assumed
= Operating Hours per Year		1057	Assumed
Dozer = Maximum Operating Hours per Day		8	Assumed
= Operating Hours per Year		1057	Assumed
Excavator = Maximum Operating Hours per Day		4	Assumed
= Operating Hours per Year		256	Assumed
Dust Conlrol Truck = Maximum Operating Hours per Day		2	Assumed
= Number of Trips per Month		1	Assumed
= Number of Trips for Project		7	Assumed

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On-Site Stabilization and Long-Term Control

Table 2
Material Description

Parcel #	Material Type	Volume (cubic yard)	Pile Size (acre)	Density (lbs/ft^3)	Density (g/cm^3)	Mass (tons)	Silt * (%)	Moisture* (%)	AP-42 Material* Match
1	Excavated Soil Mixed with Slag	15,000	0.9	120	1.9	24,300	9.0	12.0	Cover
2	Excavated Soil from D i l i	1,000	0.2	105	1.68	1,418	9.0	12.0	Cover
3	Canal Slag (In & Out of Supersacs)	3,000	0.2	165	2.6	6,683	5.3	0.92	Slag
4	Slag	30,000	1.0	140	2.2	56,700	5.3	0.92	Slag
5	Slag & Demolition Concrete	5,000	0.5	140	2.2	9,450	5.3	0.92	Slag
6	Hi-Ratio Slag	2,000	0.3	140	2.2	3,780	5.3	0.92	Slag
7	Hi-Ratio Slag & D111 Flex Kleen Bags & D116 Polishing Compound Contaminated Equipment & Cleaning	1,000	0.3	130	2.1	1,755	5.3	0.92	Slag
8	Baghouse Dust	13,000	0.9	100	1.8	17,550	13.0	7.0	Flue Dust
9	Baghouse Dust Mixed with Slag	4,000	0.4	145	2.3	7,830	5.3	0.92	Slag
T12	D111/D112 Concrete	500	0.05	120	1.9	810	3.9	2.10	Limestone Products
E of N-S road; W of Storage Yard	D111/D112 Concrete	1,500	0.1	120	1.9	2,430	3.9	2.10	Limestone Products
CVR1	Cover for moved pile areas	4,216	0.5	105	1.68	5,976	9.0	12.00	Cover
EB1	Topsoil	3,667	0.5	105	1.68	5,197	9.0	12.00	Cover
EB2	Soil Isolation & Frost Protection	15,000	0.5	105	1.68	21,263	9.0	12.00	Cover
EB3	Sand	6,000	0.5	110	1.8	8,910	2.6	7.40	Sand
Weighted Average	(includes engineered barrier material and cover material)			123	2.0		7.44	6.17	
na	Unpaved Roadway						6.0		
na	Total Volume & Mass of Material	104,882				174,051			
	Controlled Materials:		76,000 cubic yards						

* Moisture and Silt percentages are from EPA's AP-42 Chapter 13.2.4, Table 13.2.4-1

** Assumed pile size for D112/D113 concrete similar by ratio of weight to Pile 5.

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On-Site Stabilization and Long-Term Control

Table 3
Material Handling - "Drop Emissions"

The "drop emission" factor accounts for the batch dropping of material while loaded or unloaded. Although batch dropping occurs when material is loaded into piles, the drop emissions associated with each activity are included in the emission factor for those processes.

$$E = k(0.0032) \times (U/5)^{1.3} / (M/2)^{1.4}$$

Emission factor equation from AP-42 5th Edition Section 13.2.4, January 1995

Material Type	Parcel#	Pile & Material Type	Amount of Pile To Be Moved (%)	Material Amounts (tons/project)	Material to be Handled (tons)	Number of Working Days	Material Amounts (tons/day)	Particulate Size	k Particulate Size Multiplier (dimensionless)	M Material Moisture Content (%)	U Mean Wind Speed (mph)	E Calculated Emission Factor (lb/ton)	Calculated Emissions (lb/day)	Calculated Emissions (ton/project)
EB Soil Placement	EB1	Topsoil	100	5,197	5,197	20	260	PM10	0.35	12.00	9.6	2.1E-04	0.06	5.5E-04
EB Soil Placement	EB2	Soil Isolation & Frost Protection	100	21,263	21,263	44	483	PM10	0.35	12.00	9.6	2.1E-04	0.10	2.36-03
EB Sand Placement	E63	Sand	100	8,910	8,910	44	203	PM10	0.35	9.7	9.6	2.9E-04	0.06	1.3E-03
Cover Placement	CVR1	Cover for moved pile areas	100	5,976	5,976	9	664	PM10	0.35	9.7	9.6	2.9E-04	0.19	8.6E-04
Loader Unloading	1	Excavated Soil Mixed with Slag	100	24,300	24,300	64	380	PM10	0.35	12	9.6	2.1E-04	0.08	2.6E-03
Loader Unloading	2	Excavated Soil from D111	100	1,418	1,418	64	22	PM10	0.35	12	9.6	2.1E-04	4.7E-03	1.5E-04
Loader Unloading	3	Canal Slag (In & Out of Supersacs)	50	6,683	3,341	64	52	PM10	0.35	0.92	9.6	7.8E-03	0.40	1.3E-02
Loader Unloading	4	Slag	25	56,700	14,175	64	221	PM10	0.35	0.92	9.6	7.8E-03	1.72	5.5E-02
Loader Unloading	5	Slag & Demolition Concrete	0	9,460	0	64	0	PM10	0.35	0.92	9.6	7.8E-03	0.0E+00	0.0E+00
Loader Unloading	6	Hi-Ratio Slag	20	3,780	756	64	12	PM10	0.35	0.92	9.6	7.8E-03	0.09	2.9E-03
Loader Unloading	7	Hi-Ratio Slag & D111 Flex	0	1,755	0	64	0	PM10	0.35	1	9.6	7.8E-03	0.0E+00	0.0E+00
Loader Unloading	8	Kleen Bags & D116 Polishing Baghouse Dust	20	17,550	3,510	64	55	PM10	0.35	7	9.6	4.5E-04	0.02	7.9E-04
Loader Unloading	9	Baghouse Dust Mixed with Slag	10	7,830	783	64	12	PM10	0.35	1	9.6	7.8E-03	9.5E-02	3.0E-03
Loader Unloading	T12	D111/D112 Concrete	100	810	810	64	13	PM10	0.35	2.10	9.6	2.4E-03	0.03	9.9E-04
Loader Unloading	E of N-S road; W of Storage Yard	D111/D112 Concrete	100	2,430	2,430	64	38	PM10	0.35	2.10	9.6	2.4E-03	0.09	3.0E-03

	Active 8 Hour Day (lbs/day)	Inactive Day (lbs/day)	March to Oct. (lbs/project)	Annual (ton/year)	March - Oct. (ton/project)
Primary Control Area	2.83	0	165	0.082	0.082
Secondary Storage Area	0.124	0	7.91	0.004	0.004

Estimates based on AP-42 Chapter 13.2.4 - Aggregate Handling and Storage Piles. Material moisture content are mean values of similar materials from AP-42 Table 13.2.4-1 and the mean wind speed is from Local Climatological Data (ISSN 0198-4535) Philadelphia, Pennsylvania.
EB = Engineered Barrier

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The emissions factor includes the emissions from loading material (drop emissions) into the pile, equipment traffic in the storage area, and wind erosion.

Table 4
Material Handling - Active/Inactive Pile Emissions

Parcel Number	Material Type	Activity	Estimated Pile Size (tons)	Estimated Pile Size (acre)	Amount of pile to be Moved or Uncovered (%)	Annual* Calendar Days of Operation (days/yr)	Fugitive Particulate Size	Emission Factor (lb/acre/day)	Calculated Emissions (lb/day)	Calculated Emissions (lbs/project)	Calculated Emissions (ton/project)
1	Excavated Soil Mixed with Slag	Active	24,300	0.9	100	64	PM10	6.3	5.67	363	0.18
		Inactive	24,300	0.9	100	26	PM10	1.7	1.53	40	0.02
2	Excavated Soil from D111	Active	1,418	0.2	100	64	PM10	6.3	1.01	65	3.2E-02
		Inactive	1,418	0.2	100	26	PM10	1.7	0.27	7	0.004
3	Canal Slag (In & Out of Supersacs)	Active	6,683	0.2	60	32	PM10	6.3	0.60	19	9.6E-03
		Inactive	6,683	0.2	50	53	PM10	1.7	0.16	9	0.005
4	Slag	Active	56,700	1.0	25	16	PM10	6.3	1.64	26	0.01
		Inactive	66,700	1.0	25	74	PM10	1.7	0.44	33	0.02
5	Slag & Demolition Concrete	Active	9,450	0.5	0	0	PM10	6.3	0.00	0	0.000
		Inactive	9,450	0.5	0	90	PM10	1.7	0.00	0	0.00
6	Hi-Ratio Slag	Active	3,780	0.3	20	13	PM10	6.3	0.40	5	2.6E-03
		Inactive	3,780	0.3	20	77	PM10	1.7	0.11	8	0.00
7	Hi-Ratio Slag & D111 Flex Kleen Bags & D116 Polishing Compound Contaminated Equipment & Cleaning	Active	1,755	0.3	0	0	PM10	6.3	0.00	0	0.0E+00
		Inactive	1,755	0.3	0	50	PM10	1.7	0.00	0	0.000
8	Baghouse Dust	Active	17,550	0.9	20	13	PM10	6.3	1.17	15	0.01
		Inactive	17,550	0.9	20	77	PM10	1.7	0.32	24	0.012
9	Baghouse Dust Mixed with Slag	Active	7,830	0.4	10	6	PM10	6.3	0.28	2	0.001
		Inactive	7,630	0.4	10	84	PM10	1.7	0.07	6	0.003
T12	D111/D112 Concrete	Active	810	0.05	100	1	PM10	6.3	0.30	0.31	1.5E-04
		Inactive	810	0.05	100	0	PM10	1.7	0.08	0	0.0E+00
E of N-S road; W of Storage Yard	D111/D112 Concrete	Active	2,430	0.1	100	3	PM10	6.3	0.89	2.6	1.4E-03
		Inactive	2,430	0.1	100	0	PM10	1.7	0.24	0	0.0E+00
EB1	Topsoil	Active	5,197	0.5	100	20	PM10	6.3	3.15	63	3.2E-02
		Inactive	6,197	0.5	100	10	PM10	1.7	0.85	9	0.004
EB2	Soil Isolation & Frost Protection	Active	21,263	0.5	100	44	PM10	6.3	3.15	139	6.9E-02
		Inactive	21,263	0.5	100	16	PM10	1.7	0.65	14	0.007
EB3	Sand	Active	8,910	0.5	100	44	PM10	6.3	3.15	139	6.9E-02
		Inactive	8,910	0.5	100	16	PM10	1.7	0.65	14	0.007
CVR1	Cover for moved pile areas	Active	5,976	0.5	100	9	PM10	6.3	3.15	26	1.4E-02
		Inactive	5,976	0.5	100	4	PM10	1.7	0.85	3	0.002

	March to Oct. (lbs/yr)	Annual (lbs/yr)
Primary Control Area	1,030	1,030
Secondary Control Area	3.08	3.08

Only maximum emission days are modeled, so weekend emissions with no activity will not be maximum emission days.

	Max Active Day Total Day Worst Pile 24 Hr Day (lbs/day)	Max Inactive Day Worst Pile 24 Hr Day (lbs/day)	Max Active Day Active Hours Worst Pile 8 Hr Day (lbs/day)	Max Active Day Inactive Hours Worst Pile 16 Hr Day (lbs/day)	Max Inactive Day* (weekday) 24 Hr Day (lbs/day)
*Primary Control Area	5.67	1.53	4.65	1.02	0.44
Secondary Control Area	0.888	0.240	0.729	0.160	0.080

Emission factor is from Air Pollution Engineering Manual 1992 (AP-40), Chapter 15, Table 1 (page 779) - Uncontrolled Particulate Emission Factors for Sand and Gravel Processing. Emission factor represents the following steps in the storage cycle:

1) loading of aggregate onto storage piles (batch or continuous drop operations),
2) equipment traffic in storage areas,
3) wind erosion of pile (batch or continuous drop operations). The emission factor assumes that the operation occurs during an 8 to 12 hours per day, the remainder of the day wind erosion of the pile occurs.

EB = Engineered Barrier

** Max Inactive Day represents maximum inactive emissions for the maximum active day that will be used for modeling a "worst case" active weekday. In the Primary Control Area assumes that only 2 piles have been disturbed and that on the maximum inactive day, one is active (the largest emitting pile used as the "Worst Pile") the other is inactive (the 2nd largest emitting pile).

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Table 5

Heavy Equipment Operation

The emission factor estimates emissions from the handling of material and the emissions from movement and traveling on the material. Some of these emissions estimates are double counted when the equipment is working with a pile.

Emission Factor Equations

Loader & Dozer Equation

$$PM10\ lbs/hr = 0.75\ (1.0(s)^{1.5}) / (M)^{1.4}$$

Emission factor equations from AP-42 5th Edition Supplement E, Table 11.9.1 July 1998

Heavy Equipment Type	Hours of Operation: Hours per Day (hours)	Hours of Operation: Based on (hours/year)	Vehicle Miles Traveled (miles)	s Site Estimated Material Silt Content (%)	M AP-42 Material Moisture Content (%)	S Average Speed (mph)	Particulate Size	Calculated Emission Factor (lb/hour)	Calculated Emission Factor (lbA/MT)	Calculated Emissions (lb/day)	Calculated Emissions 7 months (lbs/year)	Calculated Emissions 7 months (ton/yr)	Calculated Emissions (ton/project)
Loader	8	1,057		7.44	6.17		PM10	1.19		9.5	1,260	0.63	0.63
Dozer	8	1,057		7.44	6.17		PM10	1.19		9.5	1,260	0.63	0.63
Excavator	4	256		7.44	6.17		PM10	1.19		4.77	305	0.15	0.15

Moving Materials in Storage Area	64	work days
Moving Materials from Secondary Area	4	work days
Handling Engineered Barrier Material	64	work days

	8 Hr Day (lbs/day)	March to Oct. (lbs/year)	Annual (lbs/year)
Primary Controlled Area	23.8	2,745	2,745
Secondary Storage Area	19.1	79.4	79.4
Roadways	0	0	0

Emissions are based on AP-42 Chapter 11.9 - Western Surface Coal Mining.

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On-Site Stabilization and Long-Term Control

Table 6
UnPaved Roadways - Access Road

This equation is utilized to estimate emissions from the movement of vehicles on unpaved roadways. The particulate emissions estimated do not include particulate emissions from the engines.

Predictive Emission Factor Equation 1a from AP-42 5th Edition Section 13.2.2
Industrial Site Unpaved Roads dated December, 2003

$$E = k\,(s/12)^a\,(W/3)^b$$

Adjustment Factor Equation 2

$$Eext = E[(365-p)/365]$$

Given Variables for Estimating PM10 Emissions

1.5	k = base emission factor for pounds of PM-10 particulate per vehicle mile traveled
6.00	s = road surface silt loading (see Table 2)
0.9	a = per Table 13.2.2-2. Cpnstants for Equations 1a and 1b
29.3	W = average weight (tons) of vehicle traveling road
0.45	b = per Table 13.2.2-2. Constants for Equations 1a and 1b
2.24	E = Emission factor, uncontrolled, from Equation 1a
80%	Percent of control, based on Fig. 13.2.2-5, one month re-application, 0.17 gal/yd^2 petroleum resin
0.45	E = Emission factor, controlled, from Equation 1a
119	P = number of days with at least 0.01 inches of precipitation
0.30	Eext = annual size specific emission factor for natural mitigation, lb/vmt

D111/D112 Move to Engineered Barrier Area

550	Estimated feet traveled per vehicle one way, IN
550	Estimated feet traveled per vehicle one way, OUT
1,100	Estimated feet traveled per vehicle trip
24	Maximum number of vehicles per day
100	Maximum number of trucks making the trip per project
5.0	Maximum vehicle miles traveled per day
21	Maximum vehicle miles traveled per project

PM-10 Emissions Actual

2.24	Pounds per day of operation (assuming no rain on worst case day)
6	Pounds per Project
3.15E-03	Tons per Project
3.15E-03	Tons per Year

Engineered Barrier Material & Cover Material Vehicles & Dust Control Vehicle

1,200	Estimated feet traveled per vehicle one way, IN
1,200	Estimated feet traveled per vehicle one way, OUT
2,400	Estimated feet traveled per vehicle trip
43	Maximum number of vehicles per day
1	Dust Control vehicles per month
1,451	Maximum number of trucks making the trip per prject
20.1	Maximum vehicle miles traveled per day
660	Maximum vehicle miles traveled per project

PM-10 Emissions Actual

9.03	Maximum pounds per day of operation (assuming no rain on worst case day)
199	Pounds per Project
0.10	Tons per Project
0.10	Tons per Year

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On-Site Stabilization and Long-Term Control

Table 7
Paved Roadway Emissions

This equation is utilized to estimate emissions from the movement of vehicles on paved roadways. The particulate emissions estimated do not include particulate emissions from the engines.

Predictive Emission Factor Equation from AP-42 5th Edition Section 13.2 Paved Roads

$$E = (k(sL/2)^{0.65}) \times (W/3)^{1.5}$$

Given Variables

7.3	k = base emission factor for grams of PM-10 particulate per vehicle mile traveled
9.7	sL = road surface silt loading (grams per square meter for Iron & Steel Production))
29.175	W = average weight (tons) of vehicle traveling road
618	E = emission factor, grams of PM-10 particulate per vehicle mile traveled
1.36	E = emission factor, pounds of PM-10 particulate per vehicle mile traveled

Site variables

1,650	Estimated feet of traveled per vehicle one way, IN
1,650	Estimated feet of traveled per vehicle one way, OUT
0.63	Estimated miles of traveled per vehicle trip
43	Maximum number of vehicles per day
1,444	Number of trucks making the trip per project
27.0	Maximum vehicle miles traveled per day
903	Vehicle miles traveled per project

Estimated Emissions

PM-10 Emissions Actual

36.8	Pounds per day of operation
1,229	Pounds per project
0.61	Tons per project
0.61	Tons per year

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On-Site Stabilization and Long-Term Control

Table 8
Exposed Ground Area Emissions

This table estimates the emissions due to wind erosion to an exposed ground area. Emissions will only occur when the exposed ground is not vegetated.

Material Type	Area	Exposed Ground Area (sq ft)	Exposed Ground Area (acre)	Particulate Size	Emission Factor (ton/acre/year)	Emission Estimate Daily (lbs/day)	Hourly (lbs/hr)	Project (lbs/project)	Annual (lbs/year)
Exposed Ground Areas	Storage Area (EB Area)	196,858	4.52	PM30 (TSP)	0.35	8.67	0.361	1,845	1,845
Exposed Ground Areas	Storage Area (Non-EB Area)	113,829	2.61	PM30 (TSP)	0.35	5.01	0.209	1067	1,067

	Daily (lbs/day)	Hourly (lbs/hr)	March to Oct. (lbs/project)	Annual (lbs/year)
PM10*	6.8	0.285	1,456	1,456
PM30	13.7	0.570	2,912	2,912

Emission factor is from AP-42 Chapter 11.9.1, Table 11.9-4 - Uncontrolled Particulate Emission Factors for Open Dust Sources at Western Surface Coal Mines. Emission rate is an average for a year, typically emission rates decay sharply with time. From the time an area is disturbed until the new vegetation emerges, all disturbed areas are subject to wind erosion. This emission estimate assumes that the area will be become vegetated within 7 months of starting the material relocation/pile constmction phase.

*The PM10 emission factor has been adjusted from the PM30 emission factor, Table 11.9-4 refers to Section 13.2.5 which presents a distribution of particle sizes that are comparable for fugitive dust sources where wind speed is a factor.

Physical properties of the material used for development of the emission factor:
silt range of 5.1 - 21 with a mean of 15
moisture range of 2.8 - 20 with a mean of 6.9
Physical properties of the sand/gravel:
slit range of 1.2 - 4.2 with a mean of 2.16 (site specific data)
sand moisture content, a mean of 7.4 (AP-42 Table 13.2.4-1)

EB = Engineered Barrier

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On-Site Stabilization and Long-Term Control

Table 9
Off-Road Diesel Engine Emissions

These estimates for the operation of heavy equipment only estimate the emissions from the engine of the equipment, which would emitted from the exhaust. A portion of the particulate emissions are double counted due to the testing methods when developing the emissions factors associated with the piles.

Loader
145 Estimated HP
8 Hours per Day
128 Days per Primary Control Area
4 Days per Secondary Control Area
1057 Hours per Project
7.61 Estimated Fuel Use, gallons per hour (based on 7.05 lbs/gal)

Dozer
132 Estimated HP
8 Hours per Day
128 Days per Primary Control Area
4 Days per Secondary Control Area
1057 Hpurs per Project
7.08 Estimated Fuel Use, gallons per hour (based on 7.05 lbs/gal)

Excavator
145 Estimated HP
4 Hours per Day
64 Days per Primary Control Area
256 Hours per Project
7.61 Estimated Fuel Use, gallons per hour (based on 7.05 lbs/gal)

0.0015 % (15 ppm) Sulfur percentage content in fuel

Pollutant	Emission Factor Units	Loader			Dozer			Excavator			Totals	
		Emission Factor	pounds/day	pounds/year	Emission Factor	pounds/day	pounds/year	Emission Factor	pounds/day	pounds/year	pounds/day	pounds/year
PM	g/hp-hr	0 100	0 256	34	0.100	0.233	30 8	0.100	0.128	8.2	0.62	73
NOx	g/hp-hr	4.50	11.508	1,521	4.50	10.48	1,385	4.50	5.754	368	27 7	3,274
SOx	lb/1,000 gals	0.213	0.013	1.71	0.213	0.012	1.59	0.213	0.0065	0.41	0.03	3.7

	Primary Control Area			Secondary Control Area			Roadways		
	8 Hr Day (lbs/day)	March to Oct. (lbs/7 months)	Annual (lbs/year)	8 Hr Day (lbs/day)	March to Oct. (lbs/7 months)	Annual (lbs/year)	8 Hr Day (lbs/day)	March to Oct. (lbs/7 months)	Annual (lbs/year)
PM	0.616	71	71	0.489	2.04	2.04	0	0	0
NOx	27 7	3,182	3,182	22.0	91.6	91.6	0	0	0
SOx	0 032	3.62	3.62	0.025	0.104	0.104	0	0	0

Assumptions: The payloader is a L60E Volvo with a 145 HP engine, excavator is a Caterpillar 22B with a 145 HP engine, and the dozer is a Caterpillar D5H 132 HP engine. Emission factors are from USEPA Report No. NR-009A Exhaust Emission Factors for Nonroad Engine Modeling -- Compression-Ignition, dated February 13, 1998 , revised June 15, 1998. For the emission estimates of NOx and PM it is assumed that the equipment was manufactured between 2003 and 2006 which would be regulated under Tier 2 requirements. The SOx emissions are based on fuel sulfur content.

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On-Site Stabilization and Long-Term Control

Table 10
On-Road Engine Emissions
EPA Model MOBILE 6.2

EPA Model MOBILE6.2 estimates emission rates for a variety of vehicle classes. The emissions estimates are the engine exhaust emissions. The emissions below are for two classes of heavy duty diesel vehicles.

Maximum Miles per Day	
HDDV8A Miles per Day	13.1
HDDV8B Miles per Day	13.1
Miles per Year	
HDDV8A Miles per Year	792
HDDV8B Miles per Year	792
Idling	
Total hours of idling on site per day	1
Total hours of idling on site per year	132

EB Soil Material	
Trucks per day	19.3
Trucks for project	1,233
Trucks per year	1233
Miles per truck	1.08
Cover	
Trucks per day	24
Trucks for project	211
Trucks per year	211
Miles per truck	1.08

D111/D112 Relocation	
Trucks per day	24.0
Trucks for project	100
Trucks per year	100
Miles per truck	0.21
Dust Control Truck	
Trucks per day	1
Trucks for project	7
Trucks per year	7
Miles per truck	0.66

Pollutant	Operating Condition	HDDV8A (Heavy Duty Diesel Vehicle - >60,000 GVW)				HDDV8B (Heavy Duty Diesel Vehicle - 33,001 - 60,000 GVW)			
		grams/mile	grams/hour	max. pounds/day	pounds/year	grams/mile	grams/hour	max. pounds/day	pounds/year
PM10	10 mph average	0.254	NA	0.0073	0.44	0.25	NA	0.0073	0.44
	Idling	NA	1.0040	0.0022	0.29	NA	1.0040	0.0022	0.29
				0.0095	0.74			0.0095	0.73
SO2	10 mph average	0.0144	NA	4.2E-04	0.03	0.015	NA	4.4E-04	0.03
NOx	10 mph average	12.3	NA	0.354	21.4	13.9	NA	0.402	24.3

	PM10		SO2		NOx	
	max. pounds/day	pounds/year	max. pounds/day	pounds/year	max. pounds/day	pounds/year
Primary Control Area (50%)	0.0095	0.734	4.3E-04	0.0258	0.378	22.9
Secondary Storage Area (0%)	0	0	0	0	0	0
Roadways (50%)	0.0095	0.734	4.3E-04	0.0258	0.378	22.9

Emissions estimates are based on EPA's MOBILE6.2 Mobile Source Emission Factor Model. The emission factors include 6.65 starts per day. All particulate matter is 10 micrometers or less.
EB = Engineered Barrier

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On-Site Stabilization and Long-Term Control

Table 11
Emissions Summary

Source	Area 1 - Primary Controlled Area				Area 2 - Secondary Storage Area				Area 4 - Roadways	
	PM-10 Emissions				PM-10 Emissions				PM-10 Emissions	
	Active Day			12 month	Active Day			12 month	Active Day	12 month
	Active Piles	Active Piles (Inactive portion)	Inactive Piles		Active Piles	Active Piles (Inactivs portion)	Inactive Piles			
	lbs/day 8 hours	lbs/day 16 hours	lbs/day 24 hours	lbs/ysar	lbs/day 8 hours	lbs/day 16 hours	lbs/day 24 hours	lbs/year	lbs/day 8 hours	lbs/year
Material Handling (Table 3)	2.83			165	0.124			7 91		
Active/Inactive Piles (Table 4)	4.65	1.02	0.44	1,030	0.729	0.160	0.080	3.08		
Heavy Equipment (Table 5)	23.8			2,745	19.1			79.4		
Unpaved Roadways (Table 6)									11.3	206
Paved Rpadways (Table 7)									36.8	1,229
Exposed Ground Area (Table 8)	2 28		6.8	1,456						
Olf-Road Engines (Table 9)	0.616			70.7	0.489			2.04	0	0
On-Road Engines (Table 10)	0.0095			0.734					0.0095	0.734
TOTAL	34.2		7.3	5467 5	20.4		0.1	92 5	48.1	1435.9

Source	Area 1 - Primary Controlled Area		Area 2 - Secondary Storage Area		Area 4 - Roadways	
	SOx Emissions		SOx Emissions		SOx Emissions	
	Active Day lbs/day 8 hours	12 month lbs/year	Active Day lbs/day 8 hours	12 month lbs/year	Active Day lbs/day s hours	12 month lbs/year
Off-Road Engines (Table 9)	0.032	3.62	0.025	0.104	0	0
On-Rbad Engines (Table 10)	4.3E-04	0.0258	0	0	4.3E-04	0.0258

Source	Area 1 - Primary Controlled Area		Area 2 - Secondary Storage Area		Area 4 - Roadways	
	NOx Emissions		NOx Emissions		NOx Emissions	
	Active Day lbs/day 8 hours	12 month lbs/year	Active Day lbs/day 8 hours	12 month lbs/year	Active Day lbs/day 8 hours	12 month lbs/year
Otf-Rpad Engines (Table 9)	27 7	3,182	22.0	91.6	0	0
On-Road Engines (Table 10)	0 378	22.9	0	0	0.378	22.9

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Off-Site Disposal and License Termination

Table 1
Air Emission Details

Truck Operations		
Soil Cover After Removal of Piles		
Depth of Cover (feet)	1	Given
Area to be Covered (square feet)	310,687	Cad-Based Estimate
Area to be Covered (acres)	7.1	Square Feet / 43,560
Material Needed for Cover (cubic yards)	11,507	Depth x Area of Cover / 27
Yards per Load	20	Given
Number of Truck Trips	575	Material Needed / Yards per Load
Cubic Yards of Cover Delivered	11,507	Number of Tmck Trips x Yards per Load
Pounds per Cubic Foot of Cover, Density	105	From Table 2
Pounds per Cubic Yard, Density	2,835	Pounds per Cubic Foot x 27
Tons Cover Loaded per Truck	28	Yards per Load x Pounds per Cubic Yard
Weight per Empty Truck (tons)	15	Given
Weight per Loaded Truck (tons)	43	Load per Tmck + Weight of Empty Truck
Average Weight of a Cover Truck (tons)	29	Average of Empty and Loaded Truck
Average Number of Wheels per Truck (10 unloaded, 14 loaded)	12	
Tmcks per Year (last year of prpject, 5 months)	575	Assumes Cover Operation Duration = 5 Months
Trucks per Day	5.31	Tmcks per Year / (5/12 Months * 52 Weeks * 5 Days)
Tons Loaded per Day	151	Tmcks per Day x Tons of Cover per Tmck
Tons Loaded per Project	16,311	Tmcks per Year x Tons of Cover per Tmck
Material to Be Removed		
Number of Truck Trips to Staging Area	3,800	Cubic Yards / Yards per Load
Yards per Load	20	Given
Cubic Yards of Material to be Removed	76,000	From Table 2
Trucks per Day	18	Assumes Material Removal Operation = 2 Years @ 21 Weeks per 5 Days
Weight of Material Loaded per Tmck (tons)	35	Number of Truck Trips / Total Tons Material Removed
Weight per Empty Truck (tons)	15	Given
Weight per Loaded Truck (tons)	50	Tons Material Loaded per Tmck + Tons per Empty Tmck
Average Weight of a Material Tnuck (tons)	32	Average of an Empty Tmck and a Loaded Material Tmck
Average Weight of All Trucks (tons)	32	Weighted Average Weight (material trucks and cover trucks)
Number of Train Cars	1,475	Tons of Materiai Removed / Capacity per Train Car
Capacity per Tra'n Car (tons)	90	given
Total Tons of Material Removed	132,705	Tons from Table 2
Train Cars per Year	737	Number of Train Cars / 2 (which represents the two 5 month periods)
Train Cars per Day (also Tmcks to Staging Area)	7.0	Trains per Year / (Weeks per Year x Days per Week)
Tons Loaded per Day	632	Capacity per Train Car x Train Cars per Day
Tons Removed from DI11/112 Area	3240	Tons from Table 2
Days to Remove Material from DI11/D112	5	Tons Removed from DI11/D112 Area / Tons Loaded per Day
Project Duration		
Total Tme (MONTHS)	10	Given
Tme for Removal (MONTHS/year)	5	Given (for 2 years)
Time for Cover (MONTHS)	5	Assumed
Days per Week	5	Assumed
Weeks per Year	21	Assumed
Hours per Day	8	Assumed
Length of UNPAVED Roadway (feet) - storage area to staging area	1,100	Trip Length for Material Removed
Length of UNPAVED Roadway (feet) - to paved roadway	1,200	Trip Length for Cover Delivered
Length of PAVED Roadway (feet)	1,650	Trip Length for Cover Delivered
Material Removed, TONS	132,705	Number of Train Cars x Capacity per Train Car
Operating Daily/Hourly Operating Rates		
Loader(s) = Maximum Operating Hours per Day	16	Assumed
= Operating Hours per Year	1680	Assumed
= Yards moved each day (train load + truck load)	724	Assumed
Dozer = Maximum Operating Hours per Day	2	Assumed
= Operating Hours per Year	210	Assumed
Train = Maximum Operating Hours per Day	2	Assumed
= Operating Hours per Year	210	Assumed
Crusher = Maximum Operating Hours per Day	3	Assumed
= Operating Hours per Year	315	Assumed
Dust Control Vehicle = Maximum Operating Hours per Day	1	Assumed
= Number of Tips per Day	1	Assumed
= Number of Trips per Month	1	Assumed

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Off-Site Disposal and License Termination

Table 2
Material Description

Parcel #	Material Type	Volume* (cubic yard)	Pile Size (acre)	Bulk Density** (lbs/ft^3)	Bulk Density** (g/cm^3)	Mass (tons)	Silt *** (%)	Moisture*** (%)	AP-42 Material*** Match
1	Excavated Soil Mixed with Slag	15,000	0.9	120	1.92	24,300	9.0	12.0	Cover
2	Excavated Soil from D111	1,000	0.2	105	1.68	1,418	9.0	12.0	Cover
3	Canal Slag (In & Out of Supersacs)	3,000	0.2	165	2.64	6,683	5.3	0.92	Slag
4	Slag	30,000	1.0	140	2.24	56,700	5.3	0.92	Slag
5	Slag & Demolition Concrete	5,000	0.5	140	2.24	9,450	5.3	0.92	Slag
6	Hi-Ratio Slag	2,000	0.3	140	2.24	3,780	5.3	0.92	Slag
7	Hi-Ratio Slag & D111 Flex Kleen Bags & D116 Polishing Compound Contaminated Equipment & Cleaning	1,000	0.3	130	2.08	1,755	5.3	0.92	Slag
8	Baghouse Dust	13,000	0.9	100	1.60	17,550	13.0	7.0	Flue Dust
9	Baghouse Dust Mixed with Slag	4,000	0.4	145	2.32	7,830	5.3	0.92	Slag
10	Cover (final amount of cover for the Off-Site Disposal Alternative)	11,500	7.1	105	1.68	16,301	9.0	12.0	Cover
T12	D111/D112 Concrete	500	0.05	120	1.92	810	3.9	2.10	Limestone Products
E of N-S road; W of Storage Yard	D111/D112 Concrete	1,500	0.1	120	1.92	2,430	3.9	2.10	Limestone Products
11	Staging Area Day Pile (weighted average ot non-cover material)	1,000	0.1	129	2.07	1,746	7.4	4.3	Weighted Average
na	Unpaved Roadway						6.0		
na	Weighted average (includes cover)			126	2.0		7.6	5.3	Weighted Average
na	Total Volume & Mass of Material (excluding cover and staging area piie)	76,000				132,705			
	Total Volume (non-cover)		76,000 cubic yards						

* Assumed pile size for D111/D112 similar by ratio of weight to Pile 5.
** Densities stated are bulk densities not material densities.
*** Moisture and Silt percentages are from EPA's AP-42 Chapter 13.2.4, Table 13.2.4-1

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Off-Site Disposal and License Termination

Table 3
Material Handling - "Drop Emissions"

The "drop emission" factor accounts for the batch dropping of material while loaded or unloaded. Although batch dropping occurs when material is loaded into piles and into/out of the crusher, the drop emissions associated with each activity are included in the emission factor for those processes.

$$E = k(0.0032) \times (U/5)^{1.3} / (M/2)^{1.4}$$

Emission factor equation from AP-42 5th Edition Section 13.2.4, January 1995

Material Type	Parcel#	Pile & Material Type	Material Amounts (tons/day)	Material Amounts (tons/project)	Particulate Size	k Particulate Size Multiplier (dimensionless)	M Material Moisture Content (%)	U Mean Wind Speed (mph)	E Calculated Emission Factor (lb/ton)	Calculated Emissions (lb/day)	Calculated Emissions (ton/year)	Calculated Emissions (ton/project)
Truck Unloading	10	Cover (final amount of cover for the Off-Site Disposal Alternative)	151	16,301	PM10	0.35	12	9.6	2.1E-04	0.03	1.7E-03	0.0017
Truck Loading	1	Excavated Soil Mixed with Slag	632	24,300	PM10	0.35	12	9.6	2.1E-04	0.13	0.001	0.0026
Train Loading			632	24,300	PM10	0.35	12	9.6	2.1E-04	0.13	0.001	0.0026
Truck Loading	2	Excavated Soil from D i l i	632	1,418	PM10	0.35	12	9.6	2.1E-04	0.13	7.5E-05	0.0002
Train Loading			632	1,418	PM10	0.35	12	9.6	2.1E-04	0.13	7.5E-05	0.0002
Truck Loading	3	Canal Slag (In & Out of Supersacs)	632	6,683	PM10	0.35	0.92	9.6	7.8E-03	4.90	0.013	0.0259
Train Loading			632	6,683	PM10	0.35	0.92	9.6	7.8E-03	4.90	0.013	0.0259
Truck Loading	4	Slag	632	56,700	PM10	0.35	0.92	9.6	7.8E-03	4.90	0.110	0.2199
Train Loading			632	56,700	PM10	0.35	0.92	9.6	7.8E-03	4.90	0.110	0.2199
Truck Loading	5	Slag & Demolition Concrete	632	9,450	PM10	0.35	0.92	9.6	7.8E-03	4.90	0.018	0.0356
Train Loading			632	9,450	PM10	0.35	0.92	9.6	7.8E-03	4.90	0.018	0.0366
Truck Loading	6	Hi-Ratio Slag	632	3,780	PM10	0.35	0.92	9.6	7.8E-03	4.90	0.007	0.0147
Train Loading			632	3,780	PM10	0.35	0.92	9.6	7.8E-03	4.90	0.007	0.0147
Truck Loading	7	Hi-Ratio Slag & D111 Flex Kleen	632	1,755	PM10	0.35	1	9.8	7.8E-03	4.90	3.4E-03	0.0068
Train Loading		Bags & D116 Polishing Compound	632	1,755	PM10	0.35	0.92	9.6	7.8E-03	4.90	3.4E-03	0.0058
Truck Loading	8	Baghouse Dust	632	17,550	PM10	0.35	7	9.6	4.5E-04	0.29	2.0E-03	0.0040
Train Loading			632	17,550	PM10	0.35	7	9.6	4.5E-04	0.29	2.0E-03	0.0040
Truck Loading	9	Baghouse Dust Mixed with Slag	632	7,830	PM10	0.35	1	9.6	7.8E-03	4.90	1.5E-02	0.0304
Train Loading			632	7,830	PM10	0.35	0.92	9.6	7.8E-03	4.90	1.5E-02	0.0304
Truck Loading	T12	D111/D112 Concrete	632	810	PM10	0.35	2.10	9.6	2.4E-03	1.54	9.9E-04	0.0010
Train Loading			632	810	PM10	0.35	2.10	9.6	2.4E-03	1.54	9.9E-04	0.0010
Truck Loading	E of N-S road; W of Storage Yard	D111/D112 Concrete	632	2,430	PM10	0.35	2.10	9.6	2.4E-03	1.54	3.0E-03	0.0030
Train Loading			632	2,430	PM10	0.35	2.10	9.6	2.4E-03	1.54	3.0E-03	0.0030
						Total (except for cover amounts)			PM10	4.90	0.349	0.690
						Total (includes cover amounts)			PM10	4.93	0.351	0.592
						Truck Unloading (cover material)	Pri. Control Area		PM10	0.032	1.7E-03	1.7E-03
						Truck Loading	Pri. Control Area		PM10	4.90	0.174	0.345
						Train Loading	Staging Area		PM10	4.90	0.174	0.345
						Truck Loading	Seed. Storage Area		PM10	1.54	4.0E-03	4.0E-03

Estimates based on AP-42 Chapter 13.2.4 - Aggregate Handling and Storage Piles. Material moisture content are mean values of similar materials from AP-42 Table 13.2.4-1 and the mean wind speed is from Local Climatological Data (ISSN 0198-4535) Philadelphia, Pennsylvania.
The annual emission total assumes that all the activity in the Secondary Storage Area occurs in one year.

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Off-Site Disposal and License Termination

Table 4
Material Handling - Crushing Emissions

Emission factor used to estimate emissions is for secondary crushing/screening (no factors for primary crushing are available). The emission estimate assumes wet suppression technology utilized to control emissions. It also assumes that half of each pile is crushed in the first year of operations and the other half in the next year.

Parcel Number	Material Type	Material Amounts (tons/hour)	Material Amounts (tons/day)	Material Amounts (tons)	Particulate Size	Uncontrolled Particulate Size Multiplier (lb/toh)	Controlled Particulate Size Multiplier (lb/ton)	Uncontrolled Emissions (lb/day)	Controlled Emissions (lb/day)	Uncontrolled Emissions Maximum (tons/year)	Controlled Emissions Maximum (tons/year)	Uncontrolled Emissions (tons/project)	Controlled Emissions (ton/project)
4	Slag	158	632	56,700	PM10	8.70E-03	7.40E-04	5.50	0.468	0 123	0.010	0.247	0.021
5	Slag & Demolition Concrete	158	632	9,450	PM10	8.70E-03	7.40E-04	5.50	0.468	0.021	0.002	0.041	3.5E-03
6	Hi-Ratio Slag	158	632	3,780	PM10	8.70E-03	7.40E-04	5.50	0.468	8.2E-03	7.0E-04	0.016	1.4E-03
9	Baghouse Dust Mixed with Slag	168	632	7,830	PM10	8.70E-03	7.40E-04	5.50	0.468	0.017	1.4E-03	0.034	2.9E-03
T12	D111/D112 Concrete	158	632	810	PM10	8.70E-03	7 40E-04	5.50	0.468	0.002	1.5E-04	0.004	3.0E-04
E of N-S road; W of Slorage Yard	D111/D112 Concrete	158	632	2,430	PM10	8.70E-03	7.40E-04	5.50	0.468	0 005	4.5E-04	0 011	9.0E-04
				Total Material 81,000	PM10			5.498	0 468	0.176	0.015	0.352	0.030

Emission factors are from EPA's Factor Information Retrieval (FIRE) Data System 6.25. SCC for the crushing process is 3-05-020-02.

Off-Site Disposal and License Termination

Table 5
Material Handling - Active/Inactive Pile Emissions

The emissions factor includes the emissions from loading material (drop emissions) into the pile, equipment travel associated with the pile, and wind erosion.

Parcel Number	Material Type	Activity	Estimated Pile Size (tons)	Estimated Pile Size (acre)	Annual Days of Operation (days/yr)	Fugitive Particulate Size	Emission Factor (lb/acre/day)	Calculated Emissions (lb/day)	Calculated Emissions (lbs/project)	Calculated Emissions (ton/project)
1	Excavated Soil Mixed with Slag	Active	24,300	0.9	33	PM10	6.3	5.67	218	0.11
		Inactive	24,300	0.9		PM10	1.7	1.53		
2	Excavated Soil from D111	Active	1,418	0.2	2	PM10	6.3	1.01	2.3	1.1E-03
		Inactive	1,418	0.2		PM10	1.7	0.27		
3	Canal Slag (In & Out of Supersacs)	Active	6,683	0.2	11	PM10	6.3	1.20	13	6.3E-03
		Inactive	6,663	0.2		PM10	1.7	0.32		
4	Slag	Active	56,700	1.0	90	PM10	6.3	6.55	588	0.29
		Inactive	56,700	1.0		PM10	1.7	1.77		
5	Slag & Demolition Concrete	Active	9,450	0.5	15	PM10	6.3	2.96	44	0.022
		Inactive	9,450	0.5		PM10	1.7	0.80		
6	Hi-Ratio Slag	Active	3,780	0.3	6	PM10	6.3	2.02	12	6.0E-03
		Inactive	3,780	0.3		PM10	1.7	0.54		
7	Hi-Ratio Slag & D111 Flex Kleeri Bags 5 D116 Polishing Compound Contaminated Equipment & Clearing	Active	1,755	0.3	3	PM10	6.3	1.70	4.7	2.4E-03
		Inactive	1,755	0.3		PM10	1.7	0.46		
8	Baghouse Dust	Active	17,550	0.9	28	PM10	6.3	5.86	163	0.08
		Inactive	17,550	0.9		PM10	1.7	1.58		
9	Baghouse Dust Mixed with Slag	Active	7,830	0.4	12	PM10	6.3	2.77	34	0.017
		Inactive	7,830	0.4		PM10	1.7	0.75		
11	Staging Area Day Pile (weighted average of non-cover material)	Active	1,746	0.1	105	PM10	6.3	0.63	66.2	3.3E-02
		Inactive	1,746	0.1	42	PM10	1.7	0.17	7.1	3.6E-03
T12	D111/D112 Concrete	Active	810	0.05	1	PM10	6.3	0.30	0.38	1.9E-04
		Inactive	810	0.05		PM10	1.7	0.08		
N-S road; W of Storage Yard	D111/D112 Concrete	Active	2,430	0.1	4	PM10	6.3	0.89	3.4	1.7E-03
		Inactive	2,430	0.1		PM10	1.7	0.24		

Annual emissions assume that for the first 5 months, half the pile area will be active and removed, while the other half is inactive. Once a pile is removed there are no inactive pile emissions, only exposed ground area emission. The "Annual Emission" for "Total Area of Piles" includes 42 weekend days and an assumption that during an active day an average pile size will be inactive during the 5 month. The sub-total of the Primary & Secondary Control Area is based on a ratio of the acres.

	Acres	Active Days 10 Months	One Year: Active Days	One Year: Inactive Weekend Days During 5 Months	One Year: Inactive Days During 3.5 Months	Annual Emissions (tons)
Total Area of Piles (no Staging Area)	4.9	210	105	42	109	1.15
Primary Control Area	4.7	205				1.10
Secondary Control Area	0.2	5				0.04
Staging Area	0.1	210	105	42	0	3.7E-02
						1.18

Only maximum emission days are modeled, so weekend emissions with no activity will not be maximum emission days.

	Max Active Day Total Day Worst Pile 24 Hr Day (lbs/day)	Max Inactive Day Worst Pile 24 Hr Day (lbs/day)	Max Active Day Active Hours Worst Pile 8 Hr Day (lbs/day)	Max Active Day Inactive Hours Worst Pile 16 Hr Day (lbs/day)	Max Inactive Day** (weekday) 24 Hr Day (lbs/day)
**Primary Control Area	6.55	1.77	5.37	1.18	1.68
Secondary Control Area	0.89	0.24	0.73	0.16	0.080
Staging Area	0.63	0.17	0.52	0.11	0.17

Emission factor is from Air Pollution Engineering Manual 1992 (AP-40), Chapter 15, Table 1 (page 779) - Uncontrolled Particulate Emission Factors for Sand and Gravel Processing. Emission factor represents the following steps in the storage cycle:

1) loading of aggregate onto storage piles (batch or continuous drop operations),
2) equipment traffic in storage areas,
3) wind erosion of pile (batch or continuous drop operations). The emission factor assumes that the operation occurs during an 8 to 12 hours per day.

** Max Inactive Day represents maximum inactive emissions for the maximum active day that will be used for modeling a "worst case" active weekday. In the Primary Control Area assumes that only 2 piles have been disturbed and that on the maximum active day, one is active (the largest emitting pile used as the "Worst Pile") the other is inactive (the 2nd largest emitting pile).

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Off-Site Disposal and License Termination

Table 6
Heavy Equipment Operation

The emission factor estimates emissions from the handling of material and the emissions from movement and traveling on the material. Some of these emissions estimated are double counted when the equipment is working with a pile or bringing material to the crusher or material from the crusher.

Loader & Dozer Equation

PM10 lbs/hr $= 0.75\ (1.0 \times (s)^{1.5}) / (M)^{1.4}$

Emission factor equations from AP-42 5th Edition Supplement E, Table 11.9.1 July 1998

Heavy Equipment Type	Hours of Operation: Hours per Day (hours)	Hours of Operation: Based on (hours/year)	Vehicle Miles Traveled (miles)	s Site Estimated Material Silt Content (%)	M AP-42 Material Moisture Content (%)	S Average Speed (mph)	Particulate Size	Calculated Emission Factor (lb/hour)	Calculated Emission Factor (lbA/MT)	Calculated Emissions (lb/day)	Calculated Emissions 5 months (lbs/year)	Calculated Emissions 5 months (ton/yr)	Calculated Emissions (ton/project)
Loader(s)	16	1680		7.57	5.33		PM10	1.50		24.0	2,522	1.26	2.52
Dozer	2	210		7.57	5.33		PM10	1.50		3.00	315	0.16	0.32
Totals													
For All Equipment							PM10			27.0	2,837	1.42	2.84
For One Payloader							PM10			12.0	1,261	0.630	1.26
For One Dozer							PM10			3.0	315	0.16	0.32

	Calculated Emissions (lb/day)	Calculated Emissions 5 months (lbs/year)	Calculated Emissions 5 months (ton/yr)	Calculated Emissions (ton/project)
Primary Control Area	15.0	1,515	0.76	1.51
Secondary Storage Area	12.0	61.6	0.031	0.031
Staging Area	12.0	1,261	0.63	1.26

Emissions are based on AP-42 Chapter 11.9 - Western Surface Coal Mining.
The 5 month emission total assumes that the activity in the Secondary Storage Area happens in one year.

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Off-Site Disposal and License Termination

Table 7
UnPaved Roadways - Access Rbad

This equation is utilized to estimate emissions from the movement of vehicles on unpaved roadways. The particulate emissions estimated do not include particulate emissions from the engines.

Predictive Emission Factor Equation 1a from AP-42 5th Edition Section 13.2.2
Industrial Site Unpaved Roads dated December, 2003

$$E = k\,(s/12)^a\,(W/3)^b$$

Adjustment Factor Equation 2

$$Eext = E[(365-p)/365]$$

Given Variables for Estimating PM10 Emissions

1.5	k = base emission factor for pounds of PM-10 particulate per vehicle mile traveled
6.00	s = road surface silt loading (AP-42 Table 13.2.2-1 for Iron & Steel Production)
0.9	a = per Table 13.2.2-2. Constants for Equations 1a and 1b
32.0	W = average weight (tons) of vehicle traveling road
0.45	b = per Table 13.2.2-2. Constants for Equations 1a and 1b
2.33	E = Emission factor from Equation 1a
80%	Percent of control, based on Fig. 13.2.2-5, one month re-application, 0.17 gal/yd^2 petroleum resin
0.47	E = Emission factor, controlled, from Equation 1a
119	P = number of days with at least 0.01 inches of precipitation data from Comparative Climatic Data (NOAA) - Philadelphia, Pennsylvania.
0.31	Eext = annual size specific emission factor for natural mitigation, lb/vmt

Cover Vehicle

1,200	Estimated feet of traveled per vehicle one way, IN
1,200	Estimated feet of traveled per vehicle one way, OUT
2,400	Estimated feet of traveled per vehicle trip
5	Maximum number of vehicles per day
575	Maximum number of trucks making the trip per project
2.4	Maximum vehicle miles traveled per day
262	Maximum vehicle miles traveled per project

PM-10 Emissions Actual

0.8	Pounds per day of operation
82	Pounds per Project
0.04	Tons per Project
0.04	Tons per Year (5 months, 2nd year)

Material Transfer Vehicle & Dust Control Vehicle

1,100	Estimated feet of traveled per vehicle one way, IN
1,100	Estimated feet of traveled per vehicle one way, OUT
2,200	Estimated feet of traveled per vehicle trip
18	Maximum number of vehicles per day
1	Dust control vehicles per day (once per month)
3,810	Maximum number of trucks making the trip per project
8.0	Maximum vehicle miles traveled per day
1,588	Maximum vehicle miles traveled per project

PM-10 Emissions Actual

2.5	Pounds per day of operation
499	Pounds per Project
0.25	Tons per Project
0.12	Tons per Year (5 months)

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Off-Site Disposal and License Termination

Table 8
Paved Roadway Emissions

This equation is utilized to estimate emissions from the movement of vehicles on paved roadways. The particulate emissions estimated do not include particulate emissions from the engines.

Predictive Emission Factor Equation from AP-42 5th Edition Section 13.2 Paved Roads

$$E = (k(sL/2)^{0.65}) \times (W/3)^{1.5}$$

Given Variables

7.3 k = base emission factor for grams of PM-10 particulate per vehicle mile traveled

9.7 sL = road surface silt loading (grams per square meter for Iron & Steel Production))
29.175 W = average weight (tons) of vehicle traveling road
618 E = emission factor, grams of PM-10 particulate per vehicle mile traveled

1.36 E = emission factor, pounds of PM-10 particulate per vehicle mile traveled

Site variables

1,650 Estimated feet of traveled per vehicle one way, IN
1,650 Estimated feet of traveled per vehicle one way, OUT
0.63 Estimated miles of traveled per vehicle trip
5 Number of vehicles per day
575 Number of trucks making the trip per project
3.3 Vehicle miles traveled per day
360 Vehicle miles traveled per project

Estimated Emissions

PM-10 Emissions Actual
4.5 Pounds per day of operation
490 Pounds per Project
0.24 Tons per Project
0.24 Tons per Year (5 months, 2nd year)

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Off-Site Disposal and License Termination

Table 9
Exposed Ground Area Emissions

This table estimates the emissions due to wind erosion to an exposed ground area. Emissions will only occur when the exposed ground is not vegetated.

Material Type	Area	Exposed Ground Area (acre)	Particulate Size	Emission Factor* (ton/acre/year)	Calculated Emissions (ton/yr)	Calculated Emissions (lb/day)	Year 1 May - Dec (ton/yr)	Year 2 Jan - Sept (ton/yr)
Exposed Ground Areas	Stbrage Area	3.57	PM10	0.175	0.62	3.42	0.364	
			PM30 (TSP)	0.350	1.25	6.84	0.728	
Exposed Ground Areas	Storage Area	7.13	PM10	0.175	1.25	6.8		0.94
			PM30 (TSP)	0.350	2.50	13.7		1.87
Exposed Ground Areas	Staging Area	0.10	PM10	0.175	0.02	0.10	0.01	0.01
			PM30 (TSP)	0.350	0.04	0.19	0.02	0.03
Total Acres of Exposed Storage Yard Area		7.13						
			PM10*				0.374	0.949
			PM30 (TSP)				0.749	1.90

Emission factor is from AP-42 Chapter 11.9.1, Table 11.9-4 - Uncontrolled Particulate Emission Factors for Open Dust Sources at Western Surface Coal Mines. Emission rate is an average fpr a year, typically emission rates decay sharply with time. From the time an area is disturbed until the new vegetation emerges, all disturbed areas are subject to wind erosion.

*The PM10 emission factor has been adjusted from the PM30 emission factor, Table 11.9-4 refers to Section 13.2.5 which presents a distribution of particle sizes that are comprable for fugitive dust sources where wind speed is a factor.

Physical properties of the material used for development of the emission factor:
slit range of 5.1 - 21 with a mean of 15
moisture range of 2.8 - 20 with a mean of 6.9

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Off-Site Disposal and License Termination

Table 10
Off-Road Diesel Engine Emissions

These estimates for the operation of heavy equipment only estimate the emissions from the engine of the equipment, which would emitted from the exhaust. This estimate is different to other diesel engines to due regulatory requirements. A portion of the particulate emissions are double counted due to the testing methods when developing the emissions factors associated with the crusher and the piles.

Loaders
145 Estimated HP
16 Hours per Day
1680 Hours per Project
7.61 Estimated Fuel Use, gallons per hour (based on 7.05 lbs/gal)

Dozer
132 Estimated HP
2 Hours per Day
210 Hours per Project
7.08 Estimated Fuel Use, gallons per hour (based on 7.05 lbs/gal)

0.0015 % (15 ppm) Sulfur percentage content in fuel

Pollutant	Emission Factor Units	Loaders			Dozer			Totals	
		Emission Factor	pounds/day	pounds/year	Emission Factor	pounds/day	pounds/year	pounds/day	pounds/year
PM	g/hp-hr	0.100	0.511	54	0.100	0.058	6.1	0.57	60
NOx	g/hp-hr	4.50	23.016	2,417	4.50	2.62	275	25.6	2,692
SOx	b/1,000 gals	0.213	0.026	2.72	0.213	0.003	0.32	0.029	3.04

	PM		NOx		SOx	
	pounds/day	pounds/year	pounds/day	pounds/year	pounds/day	pounds/year
Primary Control Area	0.31	31.7	14.1	1,424	1.6E-02	1.61
Secondary Storage Area	0.26	1.31	11.5	59.0	1.3E-02	6.6E-02
Staging Area	0.26	26.9	11.5	1,208	1.3E-02	1.36

Assumptions: The payloader is a L60E Volvo with a 145 HP engine, and the dozer is a Caterpillar D5H 132 HP engine. Emission factors are from USEPA Report No. NR-009A Exhaust Emission Factors for Nonroad Engine Modeling -- Compression-Ignition, dated February 13, 1998 and revised June 15, 1998. For the emission estimates of NOx and PM it is assumed that the equipment was manufactured between 2003 and 2006 which would be regulated under Tier 2 requirements. The SOx emissions are based on fuel sulfur content.

One loader will be used at the Staging Area and the other will be used at the Primary Control Area and the Secondary Storage Area.

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Off-Site Disposal and License Termination

Table 11
Crusher - Engine Emissions
Internal Combustion Engine, <600 HP

These emission factors estimate particulate emissions from the engine. Particulate emissions from the crushing of material are not included; those emissions are addressed in Table 4.

Potential Operating Hours (or permitted hours)	8,760
Type Fuel	Diesel
Fuel Higher Heating Value, (Btu/gal)	137,000
Gallons per Hour	15.3 estimated
Fuel Input in MMBtu per Hour	2.100 estimated
BHP Rating	300
Operating Hours	
Per Day	4
Per Year (5 months)	315
Actual Fuel Usage (gals/year)	4,828
Sulfur percentage content in fuel	0.0015 %, (15ppm)

Pollutant	CAS#	Emission Factor Source	Emission Factor (lbs/MMBtu)	Actual Emissions (lb/hr)	(lb/day)	(lb/yr)	5 months (ton/yr)	Potential Emissions (lb/hr)	5 months (ton/yr)
PM	na	1	0.31	0.651	2.60	205	0.103	0.651	2.85
PM10	na	1	0.31	0.651	2.60	205	0.103	0.651	2.85
SOx	na	1	1.52E-03	3.18E-03	1.27E-02	1.00	5.01E-04	3.18E-03	1.39E-02
NOx	na	1	4.41	9.261	37.04	2,917	1.46	9.261	40.6

Footnotes:
1 Emission factors are from EPA's AP-42 Table 3.3-1 dated November, 1996. The SCCs for this source are 2-02-001-01 for industrial size equipment and 2-03-001-01 for commercial/institutional size equipment. SOx emission factor is based on sulfur content.

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Off-Site Disposal and License Termination

Table 12
Locomotive - Diesel Powered

Assumes that the locomotive operates only under "switch duty-cycle" as defined by the EPA.

Type Fuel	Diesel
Fuel Higher Heating Value, (Btu/gal)	137,000
Fuel Input in MMBtu per Hour	7.000 estimated
Maximum hourly fuel use (gal/hr)	51 estimated
BHP Rating	1000
Operating Hours	
Day	2
Year (5 months)	210
Sulfur percentage content in fuel	0.0015 %, (15ppm)

Pollutant	CAS#	Emission Factor Source	Emission Factors		Actual Emissions (lb/day)	(lb/yr)	5 months (ton/yr)
PM	na	1	0.54	g/bhp-hr	2.38	250	0.125
PM10	na	1	0.54	g/bhp-hr	2.38	250	0.125
SOx	na	2	1.52E-03	lbs/MMBtu	0.02	2.23	1.1E-03
NOx	na	1	11.00	g/bhp-hr	48.50	5,093	2.55

Footnote
Emission factors are based on Tier I EPA emission limits for engines that were manufactured from 2000 to 2004. This assumes that if the engine was older than 2000 it would have been rebuilt and is required to comply with modern emission standards. The emission limits were published in the EPA's "Emission Standards Reference Guide for Heavy-Duty and Nonroad Engines - Locomotives. Emissions include idling time and assumes that PM=PM10.

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Off-Site Disposal and License Termination

Table 13
On-Road Engine Emissions
EPA Model MOBILE 6.2

EPA Model MOBILE6.2 estimates emission rates for a variety of vehicle classes of on-road vehicles. On-road engines are required to comply with different standards than non-road engines. The emissions estimates are the engine exhaust emissions and emissions form brake and tire wear The emissions below are for two classes of heavy duty diesel vehicles.

Miles per Day	
HDDV8A Miles per Day (loaded)	6.9
HDDV8B Miles per Day (unloaded)	6.9
Miles per Year	
HDDV8A Miles per Year	708
HDDV8B Miles per Year	708
Idling	
Total hours of idling on site per day	1
Total hours of idling on site per year	105

Cover	
Trucks per day	5.3
Trucks for project	575
Trucks per year	575
Miles per truck	1.08
Material	
Trucks per day	18
Trucks for project	3,800
Trucks per year	1900
Miles per truck	0.42

Dust Control Vehicle	
Trucks per day	1
Trucks for project	10
Trucks per year	5
Miles per truck	0.45

Pollutant	Operating Condition	HDDV8A (Heavy Duty Diesel Vehicle - >60,000 GVW)				HDDV8B (Heavy Duty Diesel Vehicle - 33,001 - 60,000 GVW)			
		grams/mile	grams/hour	pounds/day	pounds/year (5 months)	grams/mile	grams/hour	pounds/day	pounds/year (5 months)
PM10	10 mph average	0.254	NA	0.0038	0.40	0.25	NA	0.0038	0.39
	Idling	NA	1.0040	0.0022	0.23	NA	1.0040	0.0022	0.23
				0.0060	0.63			0.0060	0.63
SO2	10 mph average	0.0144	NA	2.2E-04	0.02	0.015	NA	2.3E-04	0.02
NOx	10 mph average	12.3	NA	0.186	19.1	13.9	NA	0.211	21.7

Area	Distributed Emissions	PM10 max pounds/day	PM10 pounds/year	SO2 max pounds/day	SO2 pounds/year	NOx max pounds/day	NOx pounds/year
Primary Control Area	34%	4.1E-03	0.43	1.5E-04	1.6E-02	1.3E-01	13.9
Secondary Storage Area	2%	2.4E-04	0.025	8.9E-06	9.2E-04	7.9E-03	0.82
Staging Area	34%	4.1E-03	0.43	1.5E-04	1.6E-02	1.3E-01	13.9
Roadways	30%	3.6E-03	0.38	1.3E-04	1.4E-02	1.2E-01	12.3

Emissions estimates are based on EPA's MOBILE6.2 Mobile Source Emission Factor Model, input and output files are included in this report. The emission factors include 6.65 starts per day. All particulate matter is 10 micrometers or less.

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Off-Site Disposal and License Termination

Table 14
Modeling Summary
PM-10 Emissions Summary

Source	Area 1 - Primary Controlled Area				Area 2 - Secondary Storage Area				Area 3 - Staging Area				Area 4 - Roadways		
	PM-10 Emissions				PM-10 Emissions				PM-10 Emissions				PM-10 Emissions		
	Active Day			12 month	Active Day			12 month	Active Day			12 month	Active Day	Inactive Day	12 month
	Active Piles	Active Piles (inactive portion)	Inactive Piles		Active Piles	Active Piles (inactive portion)	Inactive Piles		Active Piles	Active Piles (inactive portion)	Inactive Piles				
	lbs/day 8 hours	lbs/day 16 hours	lbs/day 24 hours	lbs/year	lbs/day 8 hours	lbs/day 16 hours	lbs/day 24 hours	lbs/year	lbs/day 8 hours	lbs/day 16 hours	lbs/day 24 hours	lbs/year	lbs/day 8 hours	lbs/day	lbs/year
Material Handling = Cover	0.032			3.47											
= Material Removed	4.90			341	1.54			7.91	4.90			349			
Crushing - Controlled (Table 4)									0.468			30.0			
Active/Inactive Piles (Table 5)	5.37	1.18	1.58	2,203	0.73	0.16	0.080	68	0.52	0.11	0.17	73.3			
Heavy Equipment (Table 6)	15.0			1,515	12.0			61.6	12.0			1,261	0		0
Unpaved Road (Table 7)													3.3		332
Payed Road (Table 8)													4.52		490
Area Erosion (Table 9)			6.8	1872							0.10	26			
Off-Road Diesel Engine (Table 10)	0.31			31.7	0.26			1.31	0.26			26.9	0		0
Crusher Engine Emissions (Table 11)									2.60			205			
Train Engine Emissions (Table 12)									2.38			250			
On-Road Engine Emissions (Table 13)	4.1E-03			0.43	2.4E-04			0.025	4.1E-03			0.43	3.6E-03		0.38
Total	25.6		8.4	5,967	14.5		8.0E-02	159	23.1		2.7E-01	2,222	7.8		822
	SOx Emissions				SOx Emissions				SOx Emissions				SOx Emissions		
Off-Road Diesel Engine (Table 10)	1.6E-02			1.61	1.3E-02			6.6E-02	1.3E-02			1.36	0		0
Crusher Engine Emissions (Table 11)									0.013			1.00			
Train Engine Emissions (Table 12)									0.021			2.23			
On-Road Engine Emissions (Table 13)	1.5E-04			1.6E-02	8.6E-06			9.2E-04	1.5E-04			1.6E-02	1.3E-04		1.4E-02
Total	1.6E-02			1.63	1.3E-02			6.7E-02	0.05			4.6	1.3E-04		1.4E-02
	NOx Emissions				NOx Emissions				NOx Emissions				NOx Emissions		
Off-Road Diesel Engine (Table 10)	14.1			1,424	11.5			59.0	11.5			1,208	0		0
Crusher Engine Emissions (Table 11)									37.04			2,917			
Train Engine Emissions (Table 12)									48.50			5,093			
On-Road Engine Emissions (Table 13)	1.3E-01			13.9	7.9E-03			0.82	1.3E-01			13.9	1.2E-01		12.26
Total	14.3			1,438	11.5			59.8	97.2			9,232	0.119		12.3

Assumptions
One payloader at the staging area at all times, the other payloader is at the primary and secondary storage areas. The D111/D112 piles will be removed in 5 days. On-road engine emission emissions are assumed to bs split as follows: 30% while on the roadways, 34% in the Primary Control Area, 34% in the Staging Area, and 2% in the Secondary Storage Area.

Visual Effects Screening Analysis for
Source: SMC
Class I Area: Brigantine

*** Level-1 Screening ***

Input Emissions for

Particulates	4.59	TON/YR
NOx (as NO2)	5.37	TON/YR
Primary NO2	.00	TON/YR
Soot	.00	TON/YR
Primary SO4	.00	TON/YR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	186.30 km
Source-Observer Distance:	49.00 km
Min. Source-Class I Distance:	49.00 km
Max. Source-Class I Distance:	66.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 6	
Wind Speed: 1.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	141.	66.0	28.	2.00	.067	.05	.001
SKY	140.	141.	66.0	28.	2.00	.017	.05	-.001
TERRAIN	10.	84.	49.0	84.	2.00	.147	.05	.001
TERRAIN	140.	84.	49.0	84.	2.00	.009	.05	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	0.	1.0	169.	2.17	1.009	.05	.015
SKY	140.	0.	1.0	169.	2.00	.195	.05	-.007
TERRAIN	10.	0.	1.0	169.	2.00	1.354	.05	.013
TERRAIN	140.	0.	1.0	169.	2.00	.232	.05	.006

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