DECOMMISSIONING PLAN

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

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Appendix 19.9 Environmental Report

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Appendix 19.9 - Environmental Report

Environmental Report for the Newfield Facility

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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 impacts 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 facility 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 chemical 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 licensed radioactive material inventory at the facility 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 facility will be consolidated in the existing Storage Yard in the eastern 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 license 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 listed 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 license termination.

Alternately, 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 recommended the possession-only license for long-term control (LTC license) 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 assessment 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 governments 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 license 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 license at the SMC facility (USNRC, 2004).

A detailed license 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 license. 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 southern 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 western property boundary, where the facility 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 licensed 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-licensed. Areas not impacted by licensed operations include the visitor center and administrative offices, Departments 101, 107, 115, 116/118, 203 and 204. Structures or facilities which were at one time impacted by licensed 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. Structural components and materials that were generated during the demolition were surveyed to determine 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 licensed 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 license 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 authorized 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 decommissioning of the **D-111 Production Department**, the **Flex-Kleen Baghouse** and the **D-102/D-112 Production Department** in July of 2002. Department 111 was used for ferrocolumbium operations, Department 102 was used for the former aluminothermic reduction operation, and Department 112 was the site of crushing operations. All three buildings were decontaminated and dismantled. Those surfaces that could not be readily decontaminated (i.e., surface-contaminated concrete and soils) were placed in the vicinity of Storage Yard. The decontamination and dismantling 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 Manufacturing 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 survey 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-licensed 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 concerns, 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 limited 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 Facility, housed in Building 216 in the southwestern corner 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 southern portion of the property, and includes areas east and west of the Manufacturing Area. No buildings or other significant structures 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 southern portion of the site on Figure 1-5. Over the years, the southern portion of the Haul Road was surfaced with crushed 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 discernible 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) concern that have been evaluated in the undeveloped portion of the site include the Former Material Storage

Area, the Drum 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 eastern 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. Currently, 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 volumes.

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/feasibility 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 alternatives 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 backfilling 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 concern 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 discernible 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 directly 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 (Cumberland 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 facility 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 I-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 facility. It is a 2-lane road with uncontrolled access that links the Philadelphia area to the southern 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 runs 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 I-95 and I-76 corridors to the north, and to Millville and southern New Jersey to the south. It is classified by the state as an urban freeway/expressway and 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 southern 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 facility. The facility is open to the public 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 Atlantic 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 lie at the approximate western 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 underlie much of southern 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 alternating 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 alternating 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 Englishtown 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 Hornerstown Sand function as confining layers.

- The Navesink Formation is overlain unconformably by the Tertiary age Hornerstown Sand. The Hornerstown 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 concern 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, crumpling, 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 concern 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 facility.
- 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, relief 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 concern in the area of the SMC facility.

The SMC facility is located near the source of the Hudson Branch, the small stream which crosses the southeastern corner 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 completed 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 quality at the SMC facility has been defined through extensive remedial investigations. The main contaminants of concern 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 Burnt 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 corner 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 cooling 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 northern 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 some 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 (Burnt Mill Pond) exists at the confluence of the Hudson Branch and Burnt Mill Branch (Manaway Branch), impounded by an eight-foot-high dam. The watershed area for Burnt 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 Burnt Mill Branch (Manaway Branch) continues from Burnt Mill Pond, joining the Maurice River approximately 2,743 meters (9,000 feet) southwest of Burnt Mill Pond.

Non-consumptive water uses for the Hudson Branch and Burnt Mill Pond, such as recreation, are not significant. The Hudson Branch primarily flows through private property, with no publicly-accessible areas. Burnt 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 facility 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 western employee parking lot area is discharged into a ditch near the western boundary of the facility. Stormwater drainage in the eastern 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 western portion of the SMC facility and is used for stormwater discharges from the employee parking lot and other western portions of the SMC facility. Discharges from this outfall are regulated under stormwater discharge general permit NJ0088315. DSN004A is located at the southwest corner 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 internal 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 facility, 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 cooling 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 Burnt 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 Burnt 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 sampling 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 Burnt 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 Burnt 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, Burnt Mill Branch and within Burnt 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 sampling 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 Burnt 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 Burnt 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 directly 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 significantly 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 governed 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 facility, which may have or could potentially discharge pollutants to the Hudson Branch, as described below.

- **Bondy Oil**, located directly northwest of 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 Co. 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 listed as a Leaking Underground Storage Tank site. According 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 pending status as of February 1998. No further information regarding the site was listed. 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 corner 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 facility 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 facility. 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 Burnt 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 correlate to the general topography of the site, which slopes gently 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 alternatives, 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 solids (generally less than 150 milligrams per liter (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 coliform 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 hydraulically 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 corner 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 quality 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 information necessary to establish a CEA beneath and downgradient of the SMC facility 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 established 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, SC11, 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 determine the influence of suspended versus dissolved solids on ground water quality.

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 SC11. 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 duplicate 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 duplicate 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, isotopic 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-11S) and for the background Borough well are slightly 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 susceptibility 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 evaluation for the Newfield or Vineland wells. (ibid.)

As described in Section 3.4.2.5, a CEA will be established for the SMC facility 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 facility, 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 communities 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 unconsolidated soils, flat to gently sloping terrain, and vegetative and wetland types that are similar to the New Jersey Pine Barrens. The Hudson Branch flows along the southern 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 southern border of the site. The Hudson Branch is a tributary to Burnt Mill Pond, from which the Burnt 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 wetlands, 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 northernmost 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 stability, 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 Burnt 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 sampling 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 Burnt 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 corner (referred to as Grassland Area #1) and near the southeast corner (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 southern boundary of the site. These forested habitats typically contain dense understory vegetation consisting of sweet pepperbush (*Clethra alnifolia*), laurel (*Rhododendron maximum*), green-brier (*Smilax sp.*) and poison ivy (*Toxicodendron radicans*). A partial list 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 agriculture). 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 Wetland Habitats

A wetlands delineation was performed along the Hudson Branch at and downstream of the facility in 1994 (Schoor, DePalma & Canger, 1994). A wetland 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 presently 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 wetlands are present until the Hudson Branch reaches Burnt 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 literature 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 list. Wildlife 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 eastern 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 eastern ribbon snake (*Thamnophis sauritus*) and northern 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 eastern 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 community 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/Wetland Receptor Species

A diverse assemblage of amphibians and reptiles may potentially inhabit the upland and wetland 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 wetland 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 wetland and upland cover types found on the site. Snake species are generally carnivorous 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 mourning dove (*Zenaida macroura*) and insectivores such as the killdeer (*Charadrius vociferous*) and northern 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 facility. 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 facility 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 concern (COCs) detected during remedial investigation/feasibility 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 concern, 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 applicable 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 southern 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 southwestern corner of the SMC facility. Potential impacts to ecological receptors foraging within the grassland habitat located in the southeastern 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 the 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 concern 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 International Airport (approximately 40 kilometers (25 miles) north-northwest of the site) was chosen as a climatologically representative site; Philadelphia, like 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 climate 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 climate "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 prevailing westerly wind belt and experiences transitory high and low pressure systems with associated fronts. The LCD describes the local air flow patterns 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, southern 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 tornadoes or funnel clouds, for a frequency of somewhat more than one per year in the surrounding counties. Thunderstorm and tornado/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 difficult 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 airborne sound level may not exceed 65 dBA.

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

- Continuous airborne 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 alternatives.

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 meter 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 intrusive 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 Ia (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 mostly as mills but, following the Revolutionary War, several glassworks were established in the area. The Glassboro and Millville Railroad opened in 1860 and encouraged the settlement 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 archaeologically significant properties in the vicinity of the SMC facility was investigated. Cumberland County maintains a Register of Historic Structures 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 facility 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 Ia 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 Ia 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 structure 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 furnace 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 turn-of-the-century glass stack in southern 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 alternative 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 concerns. 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 facility'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 1.6-kilometer (1-mile) 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 mixed 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 on 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 westernmost 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 visibility 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 enrollment of 10,583 (Vineland Public 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 compliance 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 significantly 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 Concern

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 applicable guidelines 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 currently 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 alternatives 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 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 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 on-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 solid 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 Atlantic County, New Jersey for recycling. 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 facility. 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 slightly 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 licensed 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 line, 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 facility 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 facility

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

4.1.3 LC Alternative

Under the LC alternative, 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 alternative 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 alternatives on the surrounding transportation system.

4.2.1 LTC Alternative

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 public 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 alternative are evaluated within Sections 4.6.2 and 4.7.2.

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

4.2.3 LC Alternative

Under the LC alternative, 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 alternatives on the geologic and soil features (i.e., soil erosion, disruption of natural drainage patterns, etc.), as well as the impacts that the existing geological resources may pose on the proposed action and alternatives considered.

4.3.1 LTC Alternative

Under this alternative, licensed materials would be consolidated within the area in which they are currently 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 alternative 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 patterns, etc.) are not expected to be significantly impacted, due to the presence of the existing piles. Also, the existing piles have demonstrated long-term stability 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 concern. Since the site is not located in an active geologic area, potential seismic or volcanic hazards are also minimal.

4.3.2 LT Alternative

Under this alternative, licensed materials would be removed from the SMC facility. The site surface would be returned to near its natural conditions and original drainage patterns 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 alternative. 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 Alternative

Under this alternative, 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 alternative 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 capability 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 utilized 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 <u>LT Alternative</u>

This alternative 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 materials 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 returned to its original, gently sloping condition. Therefore, erosion is not expected to present a significant problem, especially once vegetation is established over the area.

4.4.3 LC Alternative

Under the LC alternative, 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 alternatives. For each of the alternatives except the LC alternative, 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 Alternative

This alternative 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 potential 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 eastern box turtle (*Terrapene carolina*), a species of special concern 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. Similarly, 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 Storage 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 little 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 eastern box turtle and bald eagle would not be impacted by this alternative.

This alternative 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 Alternative

Under the LC alternative, 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 alternative, 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 alternatives were evaluated based upon the construction and transportation equipment (e.g., trucks, front-end loaders) needed to implement each alternative and the proposed material

handling activities (e.g., consolidation of materials and crushing activities) associated with each alternative. 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 alternative. The concentrations described below are predicted to occur during the active remediation phase of each decommissioning alternative and are compared to National Ambient Air Quality 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 applications 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 alternatives. 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 Alternative. 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 alternatives, 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 eastern 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 modeling SIL distance plus 10 km). Based on modeling results, the significant impact areas

included locations within 791 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 alternative 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 LTÇ alternative 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 $\mu g/m^3$ for annual average impacts, 5 $\mu g/m^3$ 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 naturally 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. Airborne 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. Construction 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 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 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 Alternative

The LT alternative 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. Rehabilitation/expansion of a small rail spur may also be required. The LT alternative 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 alternative, 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 alternative. 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 Alternative

Under the LC alternative, 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 destruction, 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 dismantling 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 unlikely 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 stabilized 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 corner 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 northwestern 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 stabilized 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 line. 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 northern 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 southernmost facility buildings (visible in the left portion of the photo). Along the perimeter tree line, the Newfield water tower and electric transmission poles and lines 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 western 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 facility, 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 Alternative

The socioeconomic impacts associated with this alternative would be comparable to the LTC alternative. The workforce required to implement the LT alternative 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 alternative, 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 future 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 Alternative

Under the LC alternative, 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 facility 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 alternative.

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 public would have a maximum value of 25 millirem TEDE.

4.12.2 LT Alternative

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 alternative, however, more extensive activities would be conducted in a staging area along the northern 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 concern 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 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. 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 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 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 occur 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 Alternative

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 alternative include personal protection equipment wastes (e.g., disposable protective clothing), which would be minimal.

4.13.3 LC Alternative

Under the LC alternative, 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 alternatives are outlined below

5.1 LTC Alternative

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

- 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 airborne 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 licensed 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 facility in Utah.

5.3 LC Alternative

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 compliance 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 alternative. As required in 10 CFR 20.1502, the need for individual monitoring for internal and external 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 the 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 times 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 baseline 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. Quality 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, construction 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 alternative.

6.2 Physicochemical Monitoring

As described in Section 6.1, effluents associated with the proposed action and other alternatives 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 limited 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 constructing 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 visible. 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 limited 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 Limitations (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 consultation 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 Farmlands 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	APPLICABILITY 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 facility.
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 hazardous 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	• Barren 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 currently 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 levels 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 to 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
	Hornerstown 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 Medium, 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," 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)
08/16/1953	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	Northern Salem County, 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 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," 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 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," 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, toatl 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 (ft) (3)	SCREENED INTERVAL ELEVATION (msl) (1) (2)
A	51-142	1970	STEEL/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
IWC5	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-13S	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-16S	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-6S	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-17S	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-19S	31-35224-3	11/15/90	PVC/4"	90.14	92.98	17	2 to 17	88.14 to 73.14
SC-21S	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 | ELEVATION (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 MAXIMUM	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 EXTREME 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 MINIMUM	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 MINIMUM	62	-7	-4	7	19	28	44	51	44	35	25	15	1	-7
	YEAR OF OCCURRENCE		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 DEW 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	10.5	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	0.5
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	75	77	78	81	83	83	78	75	77
	HOUR 13 LST	30	60	55	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
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY≤1/4 MI)	64	2.6	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	5.1	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	30.05	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	28	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
SNOWFALL	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 OCCURRENCE		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 OF 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

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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 $\mu g/m^3$[d]	60 $\mu g/m^3$[d]
					Annual	13.8 $\mu g/m^3$[e]	15 $\mu g/m^3$[e]
PM_{10}[f]	Camden	43	N	2001-03	24-hr	61 $\mu g/m^3$[g]	150 $\mu g/m^3$[g]
					Annual	27 $\mu g/m^3$[b]	50 $\mu g/m^3$[b]
Lead	Pennsauken	48	N	2000-01	Quarter	0.02 $\mu g/m^3$[b]	1.5 $\mu g/m^3$[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 98th percentile 24-hour average observations over three years.
[e] 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	Shieldalloy - 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 Group 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 (µg/m³)	Predicted Project Concentration (µg/m³)	Total Predicted Concentration (µg/m³)	NAAQS (µg/m³)
NO_2	Annual	39.6[a]	4.7[a]	44.3[a]	100[a]
PM_{10}[b]	24-hr	61[c]	86.4[d]	147.4[d]	150[d]
	Annual	27[e]	10.2[e]	37.2[e]	50[e]

[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 (μg/m³)	Predicted Cumulative Concentration (μg/m³)	Total Predicted Concentration (μg/m³)	NAAQS (μg/m³)
NO_2	Annual	39.6[a]	45.5[a]	85.1[a]	100[a]
PM_{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 (μg/m³)	Predicted Project Concentration (μg/m³)	Total Predicted Concentration (μg/m³)	NAAQS (μg/m³)
NO_2	Annual	39.6[a]	62.0[a]	101.6[a]	100[a]
PM_{10}[b]	24-hr	61[c]	244.5[d]	305.5[d]	150[d]
	Annual	27[e]	21.1[e]	48.1[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 4-7

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[a]	63.3[a]	102.9[a]	100[a]
PM_{10}[b]	24-hr	61[c]	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 Metallurgical 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
<u>**CAPITAL COSTS**</u>					
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
<u>**CAPITAL COST GRAND TOTAL**</u>					$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
<u>1000-YEAR SURVEILLANCE & MONITORING COSTS</u>					
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

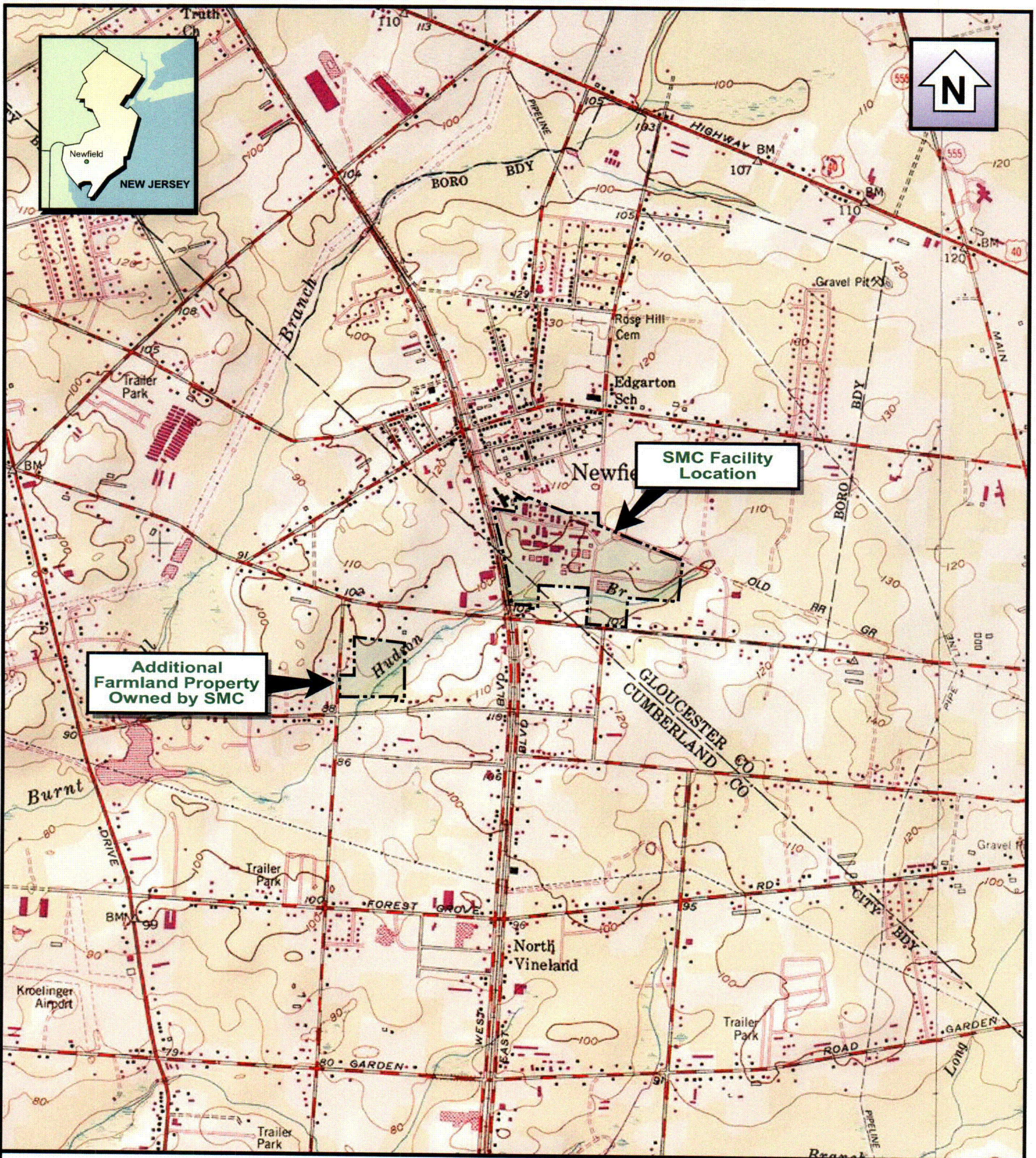
SUBTOTAL: CAPITAL AND 1,000-YEAR SURVEILLANCE & MONITORING COSTS	$4,138,005
CONTINGENGY (25%)	$1,034,501
GRAND TOTAL CAPITAL AND 1,000-YEAR SURVEILLANCE & MONITORING COSTS	$5,172,507

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	
Wheelstops	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



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SCALE FEET

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BASE CREATED WITH TOPO™ © 1996 WILDFLOWERS PRODUCTIONS, www.topo.com
7.5' USGS TOPOGRAPHIC MAP

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SHIELDALLOY METALLURGICAL CORPORATION
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FIGURE 1-1
SITE LOCATION MAP

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

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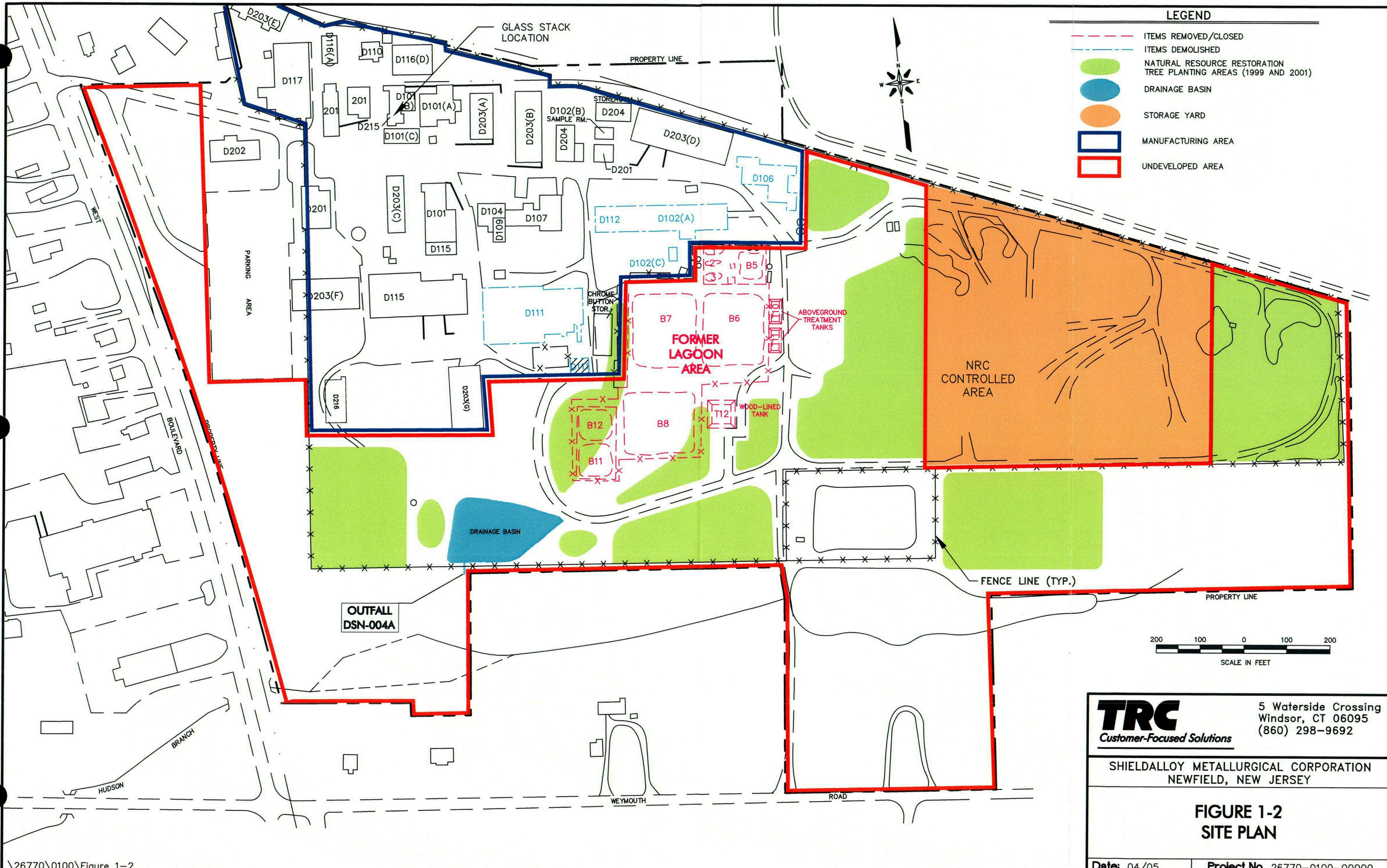

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FIGURE 1-2
SITE PLAN

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

\26770\0100\Figure 1-2

602

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FIGURE 1-3
AERIAL PHOTOGRAPH (2000)

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

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FIGURE 1-4
AERIAL PHOTOGRAPH (2005)

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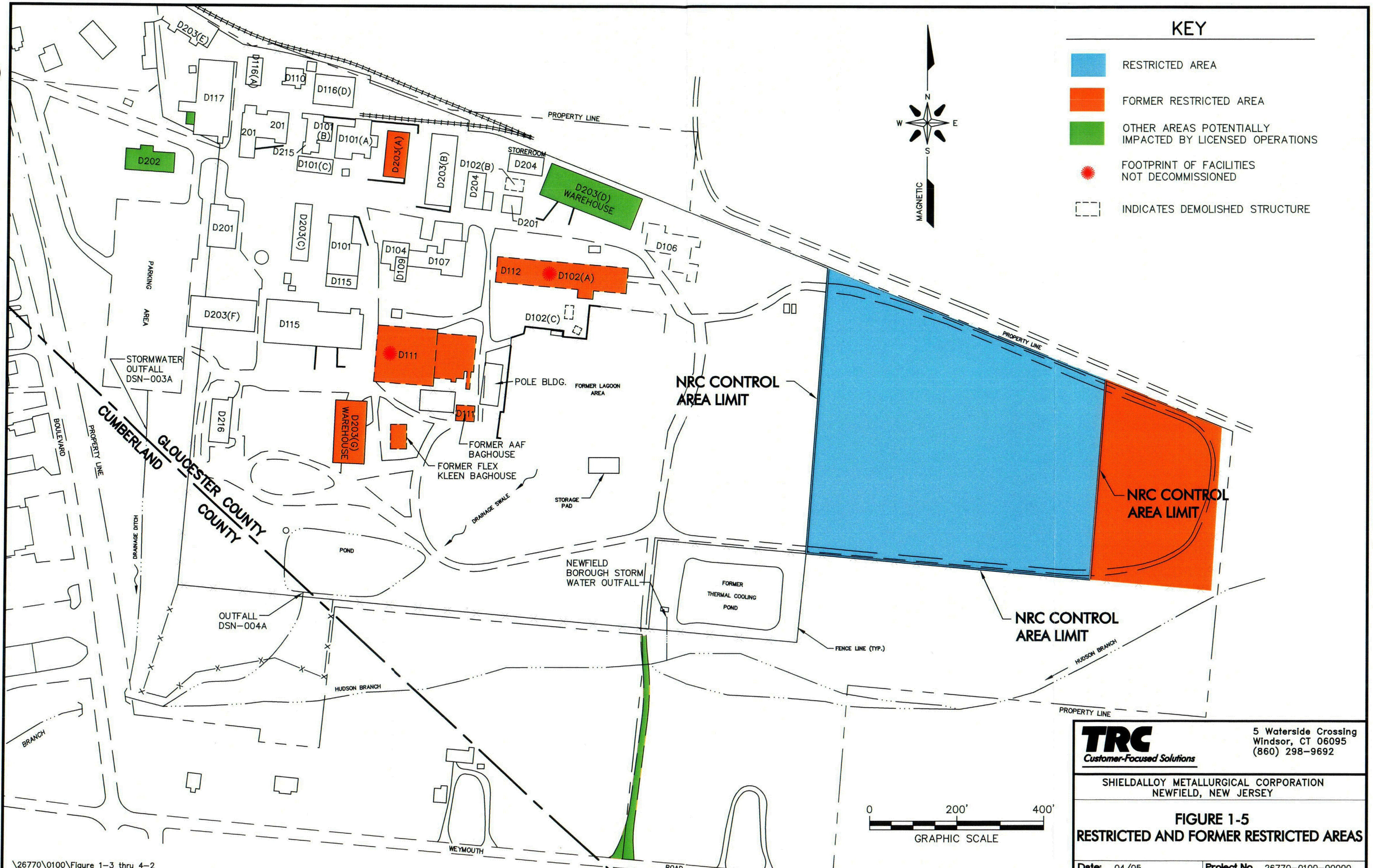

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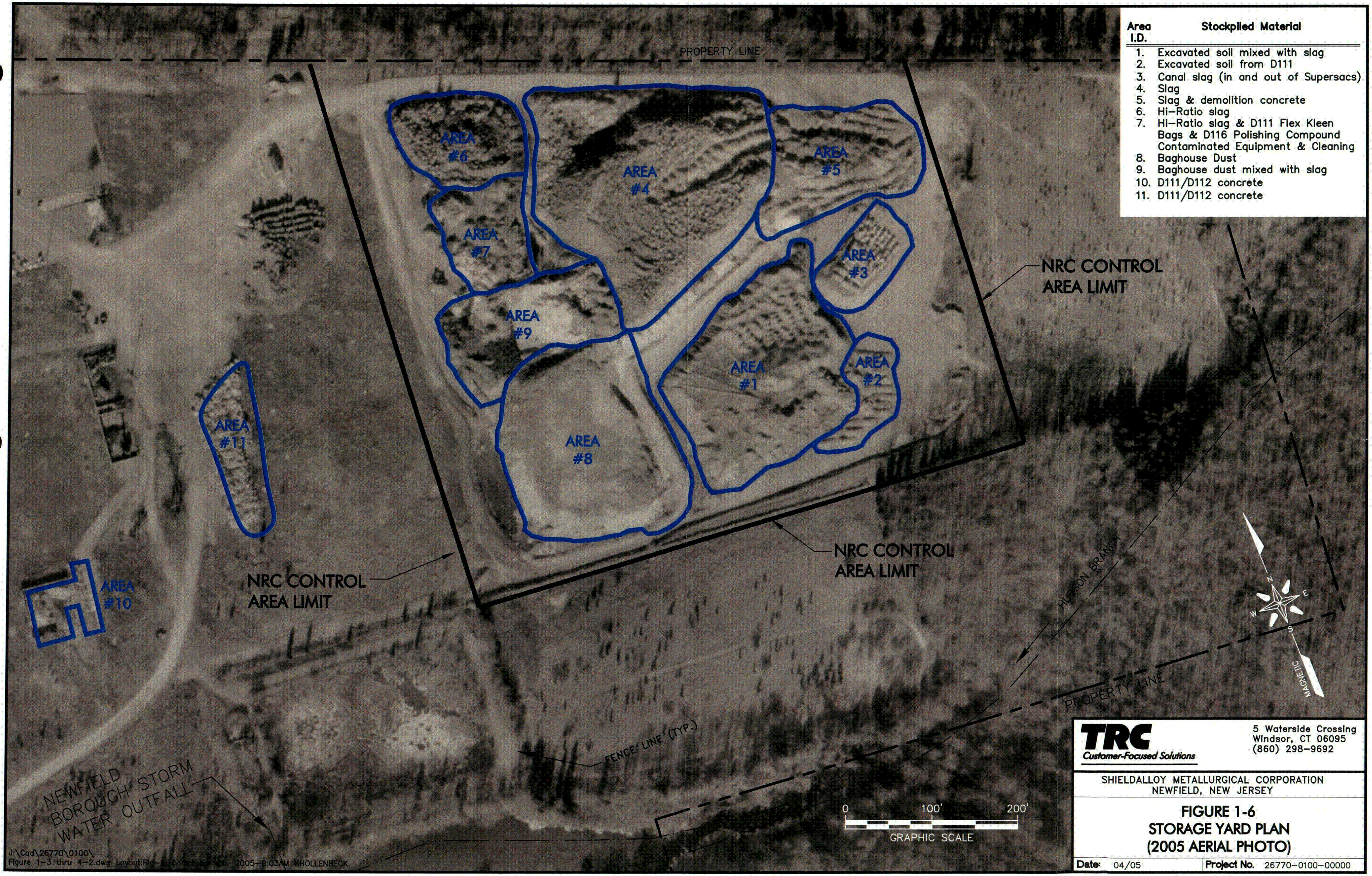

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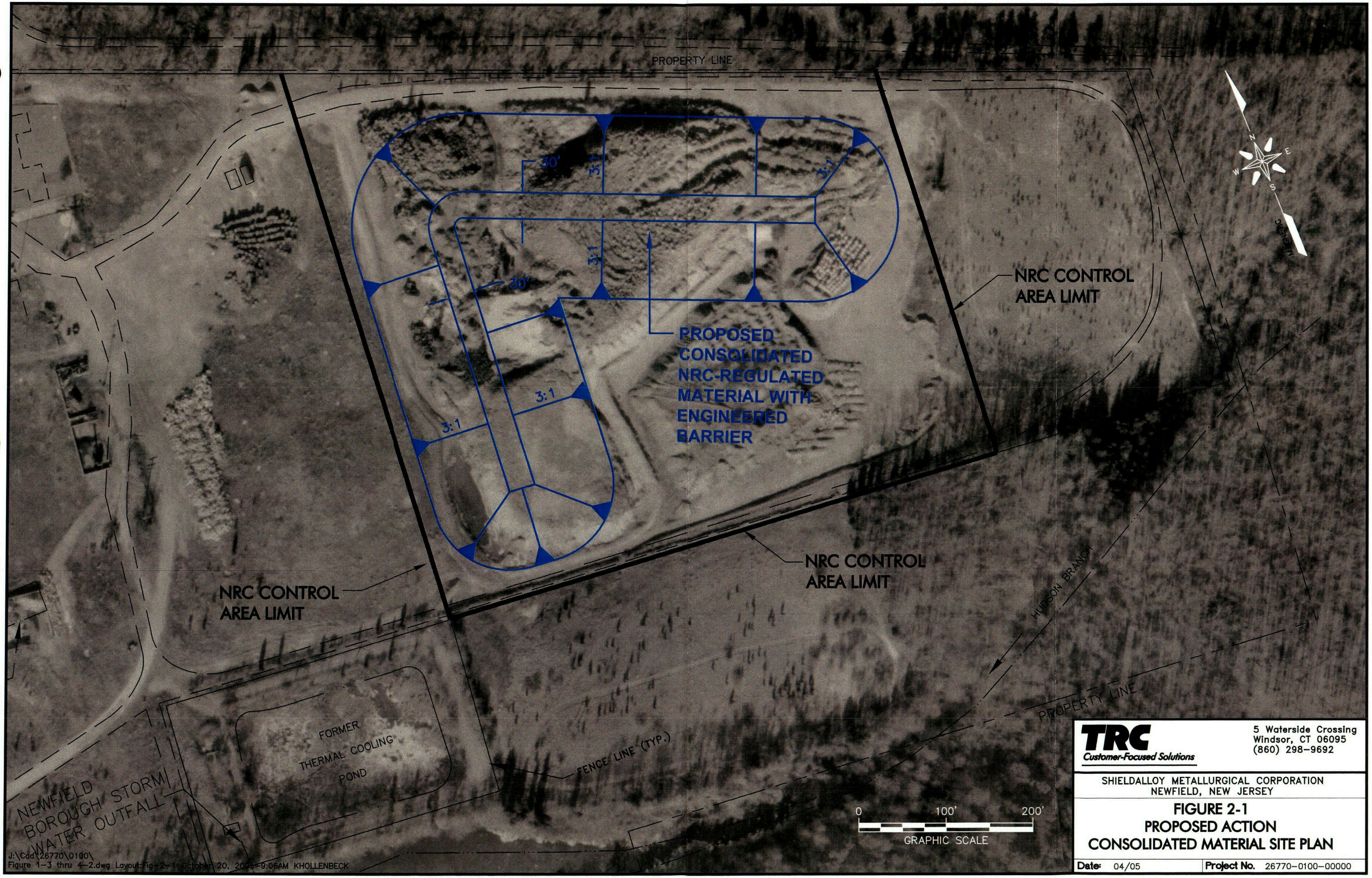

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FIGURE 2-1
PROPOSED ACTION
CONSOLIDATED MATERIAL SITE PLAN

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

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