DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)
Current Human Exposures Under Control

Facility Name: _Mannington Mills, Inc. _____________________________________
Facility Address: __75 Mannington Mills Road, Salem, New Jersey 08079-0030___
Facility EPA ID #: _NJD002349256____

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

FACILITY INFORMATION

<u>Site Description, History and Location</u>

The Mannington Mills (Mannington) facility manufactures vinyl based flooring for residential and commercial use. The facility is located on Mannington Mills Road in Mannington Township, Salem County, New Jersey (**Figure 1**). The historic and current manufacturing facility acreage is less than 200 acres. The current manufacturing facility contains the Mannington Resilient Floor facility and the corporate headquarters.

Mannington purchased 168 acres of farmland in Mannington Township during January 1924 from Benjamin Carpenter. Work commenced on the construction of a floor covering plant on this property soon after purchase and the facility began operation in August 1924. In January 1930, a plant expansion took place which increased production by 2-1/2 times and provided for the yearly production of 13,125,000 square yards of floor covering. Following World War II and the resulting consumer explosion, Mannington started plans for another expansion. By August 1946, new facilities were constructed that increased the capacity of the plant by 50%. By 1950, the facility consisted of 28 buildings on 15 acres and employed 325 people. In 1957, a major plant expansion took place and 12 foot wide rotogravure vinyl was produced for the first time. Plant acreage increased to 25 acres including a parking lot and new administration building. Subsequent expansions in 1974, 1978, 1981, 1985 and 1992 resulted in the physical plant appearing essentially as it exists today and employing approximately 800 employees.

The site is located in a transition area between “urban” areas to the southwest (the City of Salem, NJ is approximately 400 feet to the southwest) and agricultural areas located to the north, east and south. The Southern Railroad Company of New Jersey bisects the northern most portion of the site before terminating in the City of Salem. New Jersey State Route 45 passes diagonally within 600 feet of the site. This artery between Salem and Woodstown, New Jersey forms a lightly populated corridor with residential and light commercial development.

Other industrial and commercial properties are located in the site vicinity. The Salem County Hospital is located approximately three quarters of a mile from the operating facility. An inactive (since May 1979) Mannington Township municipal landfill is located west across Pledger Creek from the Mannington Mills Inactive Industrial Landfill. Residential and commercial wastes were placed at the municipal landfill at one time and limited groundwater sampling data reviewed by Langan indicated groundwater concentrations above the NJDEP groundwater quality standards (GWQS). In addition, seeps were noted at the municipal landfill during an NJDEP inspection in 1979. The closest heavy industrial plant is the Anchor Glass Bottling Plant located over three quarters of a mile to the southwest of the site along the Salem River. A former manufactured gas plant facility is also located approximately a quarter of a mile southwest of the site along the Salem River.

Mannington has developed a written security plan and has performed a site vulnerability analysis that has been reviewed and approved by the New Jersey Department of Environmental Protection (NJDEP). Entrance to the facility is controlled by a security staff and a guard house. Card access is required to enter the facility at designated locations outside of the guard house. The process area is restricted by a security fence, which surrounds all sides of the operational portion of the facility that are not adjacent to the creek systems. In addition, the operational portion of the site is monitored at the guard house by surveillance cameras to ensure unauthorized personnel are not trespassing onto the site and that workers are not entering prohibited areas of the site.

New Jersey Pollution Discharge Elimination System – Discharge to Groundwater Permit
The NJDEP Bureau of Groundwater Discharge Permits issued a New Jersey Pollutant Discharge Elimination System (NJPDES) Permit No. NJ0005614 to Mannington in September 1984 for the Active Lagoons, the Inactive Surface Impoundment, the Former Sediment Placement Area, and the Inactive Industrial Landfill. The facility began operating under a New Jersey Pollutant Discharge to Groundwater (DGW) Permit (#NJ0102156-DGW) in October 1984. The NJPDES permit was reissued as a combination DGW/Discharge to Surface Water (DSW) permit (#NJ0005614-DSW) in September 1988. In 1999, a Groundwater Protection Program (GWPP) Plan was developed for the lagoons to take the place of the technical requirements for the DGW permit. A revised GWPP Plan was prepared in 2001 and included the Inactive Industrial Landfill. The lagoons were eliminated from the GWPP Plan Revision based on approval of the NJPDES-Significant Industrial User (SIU) permit by NJDEP in September 2001. The scope of each of the permits (sampling parameters, locations, analytical methodologies and frequency) can be found on **Tables 1 through 5**.

Remedial Investigation under the Memorandum of Agreement (MOA)
Mannington has completed multiple phases of remedial investigation since entering an MOA with NJDEP in 1996. The remedial investigation (RI) activities were conducted in three primary phases between 1997 and the present at the Lagoons, Former Lagoon Sediment Placement Area and Inactive Surface Impoundment. The RI activities primarily included the identification and assessment of potential environmental impacts to soil and groundwater at these locations. Remedial investigation of the Inactive Industrial Landfill was initiated in 2001 and completed in 2004. The landfill investigation was performed to determine the limit of solid waste and assess potential environmental impacts to soil, groundwater, surface water, and sediment. Historic RI sampling results are included as **Tables 6 through 9, and Tables 11 and 12**.

Baseline Ecological Evaluations (BEEs) were completed as part of the Phase I and II RIs and the Landfill RI. The Phase I and II RI BEEs focused on the Lagoons, Sediment Placement Area and Inactive Surface Impoundment areas. The Landfill RI BEE focused on the Inactive Industrial Landfill area. The BEEs were completed to determine if the AOCs contained contaminants, contaminant migration pathways and sensitive environmental areas. Initial surface water and sediment sampling completed to address recommendations from the BEEs indicated concentrations of targeted parameters above ecological screening benchmarks. Historic BEE sediment and surface water sampling results are included in **Tables 9 and 11**. Additional surface water and sediment sampling was recommended as a result of the initial sampling effort.

An ecological investigation was completed in June and December 2005 to address recommendations from the BEEs. The investigation included the collection of approximately 40 sediment samples and surface water samples from Pledger, Fenwick, and Keasby Creeks. In addition, over 60 sediment cores were collected from Pledger Creek for visual delineation of identified oil and latex impacted sediment. The objectives of the ecological investigation were to further characterize the off-site extent and distribution of identified contaminants of potential ecological concern (COPECs) in the aquatic system and to address the presence and potential contribution of background and/or non-site related contaminant sources. Ecological investigation results are included in **Tables 9 and 11**.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

__x__ If yes - check here and continue with #2 below.

_____ If no - re-evaluate existing data, or

_____ if data are not available skip to #6 and enter"IN" (more information needed) status code.

SUMMARY OF SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

In 1992 Camp Dresser and McKee, Inc. (CDM) – Federal Programs Corporation completed an Environmental Priority Initiative Preliminary Assessment at the Salem facility under the USEPA Technical Enforcement Support Contract for Region II. Eight USEPA SWMUs and five USEPA AOCs were identified at the site through this investigation and are the subject of the RCRA EI determination. The SWMUs and AOCs are as follows.

USEPA Solid Waste Management Units:

1. Print 3 Waste Tank
2. Inactive Industrial Landfill
3. Surface Impoundment (Inactive)
4. Active and Inactive Lagoons
5. Former Wastewater Treatment Plant
6. Drum Storage Area
7. Waste Solvent Tanks
8. Oil/Water Separator

USEPA Areas of Concern:

1. Thermal Oil Contamination of an Off-Site Meadow
2. 4 Meter Drum Area
3. Print 3 Drum Area
4. Laboratory Drum Area
5. Parts Washer

Four of the USEPA SWMUs have been identified as AOCs and have undergone extensive environmental investigation under a Memorandum of Agreement (MOA) signed with the NJDEP in 1996. These AOCs include the Active and Inactive Lagoons, Surface Impoundment and Inactive Industrial Landfill.

In addition, one other AOC, the Former n-Butyl Acetate Tank Release was identified after the CDM investigation and is discussed further below.

A site plan indicating the locations of the USEPA SWMUs and the AOCs is provided as **Figure 2**. In addition, photos of several of the site SWMUs and AOCs are provided in **Attachment A.**

Active SWMUs and AOCs

Active SWMUs or AOCs at the facility consist of: 1) the active lagoons, 2) hazardous waste drum storage area and associated satellite drum storage areas, 3) parts washer and 4) oil water separator.

Active Lagoons (currently defined as an AOC under the MOA with the NJDEP)
The Active Lagoons are located along the west-central boundary of the site adjacent to the Inlaid Flooring Building. The lagoon system dates back to approximately 1969, when the initial lagoons were constructed. Additional lagoons were constructed during the first few years as the facility and system were expanded to accept higher flow rates. The system was originally permitted as an industrial discharge under NPDES-Discharge to Surface Water (DSW) Permit No. NJ0005614, which became effective 30 November 1975. The permit was required for the discharge of industrial wastewater to the lagoons for latex paint sludge settling, prior to discharge to Pledger Creek. The wastewater generally consisted of wash-ups from a latex paint coating operation used as part of the manufacturing process for flooring products.

Solids that accumulated within the lagoons between 1969 and 1979, were periodically removed and placed within the adjacent Former Lagoon Sediment Placement Areas. The latex paint sludge consisted primarily of two paint pigments, including a white casein emulsion derived from milk, and red iron oxide solids. Mannington constructed the wastewater treatment plant in 1979 as an upgrade to the system, and as a means to recycle the pigment material and reduce sludge production. Latex paint settling activities at the lagoons ceased at this time. In April 1985, the latex paint operation was discontinued and the treatment plant became inactive.

A significant amount of data documenting historic impacts has been generated for the lagoon sludge through Mannington's compliance with the NJDEP Sludge Quality Assurance (SQAR) Regulations. The initial submittal under the SQAR regulations was made to NJDEP on 8 August 1988. This included a report describing the "Effluent Lagoons" and Inactive Surface Impoundment. From 1988 to 1997, ongoing sampling of the lagoon sludge was completed and submitted to NJDEP in accordance with the SQAR regulations. A full U.S. EPA Priority Pollutant scan of the sludge performed in April 1990 as part of the initial SQAR requirements was used as the basis for the subsequent sampling requirements. The results of the Priority Pollutant scan indicated that no pesticides, herbicides, polychlorinated biphenyls (PCBs) or acid extractable organic compounds were detected. In February 1997, the NJDEP Bureau of Pretreatment and Residuals granted that Mannington should only do SQAR reporting at an "as removed" frequency. No sludge has been removed since that time.

Currently, there are seven stormwater lagoons at the facility, referred to as the Active Lagoons. All lagoons are unlined and are arranged in series. The lagoons receive stormwater run-off prior to permitted discharge of these waters to Pledger Creek. The discharge is stormwater runoff from roofs and paved areas throughout the north and central portions of the plant facility. Mannington manages the facility stormwater under its general stormwater permit.

All of the water discharged to the lagoons is initially treated in an oil/water separator before entering the system. This provides a contingency in the case of a spill or discharge being washed by runoff to the lagoons. The first lagoon is equipped with an oil skimmer if needed. Each of the seven lagoons provides settling as well as biological treatment prior to discharge. The central lagoon, number 4, is equipped with aerators to aid in removal of soluble chemical oxygen demand (COD).

Until 2001, the Active Lagoons received non-contact cooling water and boiler blowdown water. This water is now discharged through a sanitary sewer connection to the City of Salem Water and Sewer Department in accordance with the NJDPES-Significant Indirect User (SIU) permit No. NJ0136361. Because the Active Lagoons currently only accept stormwater, the NJDEP accepted Mannington's Application of Revocation for the NJPDES Discharge to Surface Water (DSW) Permit No. NJ0005614-DSW and terminated the permit in 2001. Mannington has also eliminated the lagoons from the NJPDES Discharge to Groundwater (DGW) Permit, as part of the GWPP Revision submitted to NJDEP on 2 August 2001. The permits are discussed in greater detail under Site Regulatory History.

Access to the Active Lagoons is limited due to existing measures, including fencing, heavy vegetation, gravel cover, signs and site security. A security fence and dense vegetation primarily *Phragmites australis* (common reed) and other understory brush are situated on the northern and western borders of the area. The eastern and western sides of the Active Lagoons are not fenced but they are located within a larger fenceline that borders the entire facility. Gravel cover has been placed over the ground surface near the lagoons and a sign is in place indicating that the Lagoons are an environmentally sensitive area. Site security also monitors activity in this area.

The NJDEP has verbally approved a proposed remedial approach for the Active Lagoons. The proposed remedial approach involves the removal and placement of the impacted soil and sludge materials at the Inactive Surface Impoundment under a vegetative cap.

Hazardous Waste Drum Storage Area and associated Satellite Drum Storage Areas

The drum storage area is located in the northwestern portion of the facility, north of the warehouse. The drum storage area was used to store 55-gallon drums containing waste solvents and plastisols collected from vinyl wash-ups and cleanup rags. The total inventory at maximum capacity was 220,000 gallons (i.e., approximately 400 drums) in 1984. Mannington reduced the number of stored drums at the facility in 1984 (i.e., maximum of 250 drums or 13,750 gallons), thus limiting hazardous waste storage at the drum storage area to less than 90 days. The NJDEP Bureau of Hazardous Waste Engineering was subsequently informed of this reduction in drum storage.

Drums were moved from satellite drum storage locations at production areas, including the 4-Meter Building, Vinyl I and II Building, Vinyl Batch Room, Print 3 Drum Storage, and the Laboratory Drum Area to the hazardous waste drum storage area. The hazardous waste drum storage area consisted of a concrete slab 22 feet, 3 inches wide by 121 feet, 19 inches long.

The reduction in storage capacity was later followed by reconstruction of the storage pad and remediation of soils surrounding the drum storage area. The hazardous waste drum storage area was delisted as a treatment, storage and disposal (TSD) facility in 1994 based on reduced capacity, a constructed design that included a rooftop and a sloped, bermed impermeable slab, and remediation of impacted soils.

Four satellite drum storage areas were identified by CDM in their Environmental Priority Initiative Preliminary Assessment dated 1992. These four storage areas consisted of the Print 3 Building, Vinyl I/Print 2 Building, the Quality Control and Research and Development (QC and R&D) laboratory, and the 4-Meter Building. The Print 3 storage area consists of a bermed impervious pad contained under a roof that is located against the east side of the Print 3 Building. Hazardous waste was previously stored there. The area is now used for non-hazardous drum storage. The Vinyl I/Print 2 Building consists of a bermed pad with a roof and is located against the north side of the building. Non-hazardous drums are currently stored there. The drum storage area at the QC and R&D laboratory consists of an impervious pad along the northeast side of the building. A bermed pad with a roof was placed there in 1993. Hazardous waste was stored there until 2001. Non-hazardous storage has occurred there since 2001. The fourth satellite drum storage area was located west of the 4-Meter Building. This storage area was referred to as the 4M Drum Storage location has not operated since 1993. Storage associated with processes conducted in the 4-Meter Building is now maintained inside the building.

Multiple outdoor drum and container areas for storage of hazardous materials are located at the facility. These drum storage areas are regulated under NJAC 7:1E - 2.2(h). They are all provided with impervious secondary containment that meets the requirements of NJAC 7:1E - 2.6(c)2.i. All but one storage area is covered by a roof to eliminate rainwater from filling the containment unit and to prevent stormwater pollution. Furthermore, Mannington has approved Discharge Prevention, Containment and Countermeasures (DPCC)/Discharge Cleanup and Removal (DCR) and Spill Prevention, Control and Countermeasures (SPCC) Plans, and an approved Stormwater Pollution Prevention Plan (SPPP). No releases are documented to have occurred at the former and current satellite drum storage areas. All former and current satellite drum storage areas are shown on **Figure 2.**

Parts Washer

Five Safety Kleen parts washers are located inside maintenance buildings on concrete floors. The parts washers initially contained hazardous solvents. Mannington maintained a service contract with Safety Kleen requiring Safety Kleen to switch out the solvent/degreaser on a routine schedule. Safety Kleen transported the waste off-site upon each routine service. The parts washer fluids were eventually replaced with non-hazardous parts washer fluids in the mid 1990's and the parts washers are still in use today. No releases are documented to have occurred in relation to the parts washer.

Oil/Water Separator

An oil/water separator is located on a bermed pad immediately adjacent to the first of the series of Active Lagoons. The oil/water separator was used for non-contact cooling water and boiler blow-down and stormwater from 1984 to 2001. Since 2001, the oil/water separator has been used to process effluent from storm sewers and surface water runoff as part of Mannington's general stormwater permit. This area is fenced and is only accessible from within the plant. Mannington security monitors activity in this area. No releases are documented to have occurred at the oil/water separator.

Inactive SWMUS and AOCs

Inactive SWMUs and AOCs formerly used by or occurring at the facility consist of: 1) Thermal Oil Contamination of an Off-Site Meadow, 2) Waste Solvent Tanks, 3) Former Print 3 Waste Tank, 4) Inactive Industrial Landfill, 5) Former Lagoon Sediment Placement Areas, 6) Inactive Surface Impoundment and 7) Former Wastewater Treatment Plant.

Thermal Oil Contamination of an Off-Site Meadow
On 19 December 1989 a fire occurred in the 4-Meter Coating Line Thermal Oil Heater. The Mannington Township Fire Company responded and extinguished the fire with water resulting in an oily runoff, some of which reached adjacent wetlands via a storm drain. Mannington immediately notified the NJDEP of the situation and placed absorbent pads on the affected wetlands to clean up floating oil. The affected marshland was small at approximately 150 ft^2. Consistent with NJDEP regulations, Mannington excavated contaminated marshland in 1989 and disposed of the soil off-site. In 1990, the NJDEP informed Mannington that no further action was required related to the meadow contamination.

Waste Solvent Tanks
Two solvent aboveground storage tanks (ASTs) were located north of the Vinyl 2/Print 2 Building on a concrete spill control basin. One of the ASTs was used to store waste solvents from print operations and had a 9,000-gallon capacity. The second AST had a 10,000-gallon capacity and was used to store reclaimed solvents that were not classified as hazardous waste. The 9,000-gallon tank was filled by an enclosed pump-pipe system. A tank trailer load (approximately 5,000-gallons) was sent to qualified solvent recovery firms approximately twice a month. The 10,000-gallon AST was cleaned out and became inactive in 1987.

The 9,000-gallon waste solvent AST was decommissioned (i.e., liquid fraction emptied and underground piping disconnected and capped) in 1986. Underground piping from a pump at Process Building No. 100, which fed this tank, was diverted to an 8,500-gallon mobile tank trailer in March 1986. The waste solvent was transferred weekly to a certified waste hauler's tank truck for off-site treatment at a permitted TSD facility, easily meeting the specified 90-day limit for on-site storage. The NJDEP deregulated this part of the operation when the TSDF delisting became effective because of the mobility of the 8,500-gallon waste solvent tank trailer and our compliance with the 90 day storage limit.

The 9,000-gallon waste solvent tank and the 10,000-gallon reclaimed solvent tank were located within containment areas and the mobile tank trailer was located on a paved pad. The ASTs and the tank trailer were permanently removed in 1995 when the facility replaced solvent inks with water-based inks. These areas are presently paved and serve as containment areas for miscellaneous parts and equipment. There were no known releases and no visible impacts noted in this area.

Former Print 3 Waste Tank
The Print 3 Waste Tank was actually an 8,500 gallon mobile tank trailer located to the east of the Print 3 Building on a paved surface. The tank trailer was used for disposal of print operation waste solvents beginning in approximately 1984. Approximately 5,000-gallons of waste solvents were transferred to a certified waste hauler's tank truck on a weekly basis for off-site treatment at a permitted TSD facility. The Print 3 Waste Tank became obsolete in 1995 when the facility replaced hazardous, solvent inks with water based inks. The tank trailer was removed from the site at that time and the tank area is currently paved. There were no known releases and no visible impacts noted in this area.

Inactive Industrial Landfill (currently defined as an AOC under the MOA with the NJDEP)
The Inactive Industrial Landfill forms a peninsula in the southwest corner of the facility. The landfill is bordered on the west by Pledger Creek and to the south and east by Fenwick Creek. The north side of the Inactive Industrial Landfill is bordered by Mannington Mills Road. In 1974, Mannington submitted an application to the NJDEP for a permit to operate an on-site landfill for the disposal of solid waste resulting from its vinyl floor manufacturing. In 1978, the site was granted a landfill permit (Facility No. 1705B) from the NJDEP. The permit allowed for the disposal of inert flooring material (i.e., ID 27 waste) resulting from the manufacturing process and construction debris. Mannington operated the landfill until 1982, at which time the permitted capacity was nearly depleted. Mannington then initiated the process of obtaining approval to construct a second lift on the footprint of the landfill.

Feasibility studies were completed by Killam Associates Inc. of Millburn, New Jersey (Killam) regarding continued operation of a second lift. Significant engineering, design and permitting efforts were conducted from 1983 through 1985 for the revised landfill expansion. All the necessary approvals for the landfill expansion were secured in 1986 from the NJDEP and Salem County, and operations began on the second lift in early 1987. In April 1988, Salem County began operation of a new sanitary landfill facility and required the disposal of all county-generated solid waste at the county landfill. Consequently, operation of the second lift of the Mannington Mills landfill ceased.

Mannington maintained efforts to request the necessary extensions and approvals for continued operation and completion of the second lift. Extended negotiations with county officials continued until late 1989, at which time Mannington decided not to complete the second lift of material. At that time, the second lift was approximately one-half to one-third completed and was topped with daily cover material. The landfill has been inactive since that time.

Currently, topography at the landfill is indicative of the partially completed second lift. The northern portion of the landfill consists of the completed second lift, ranging in elevation from approximately 16 to 23 feet above msl. This area is covered with a thin layer of sand and gravel cover soil and vegetation consisting of low shrubs/grasses. The southern portion of the landfill consists of the original first lift, ranging in elevation from approximately 2 to 14 feet above msl. This area is presently covered with relatively dense vegetation including shrubs and new growth trees. Inspection of the banks of the landfill along Pledger and Fenwick Creeks have not revealed groundwater seepage, however, solid waste is observed in several locations on the sloped banks along the perimeter of the landfill. The landfill has been investigated between December 2001 and February 2004 under the MOA as part of the Landfill RI and Supplemental RI. Groundwater is monitored semi-annually at the landfill under the existing GWPP Plan. A vinyl sheet pile wall (820 feet) was installed along the southern boundary in summer 2005 as a structural tie-in for the final landfill cap.

Verbal approvals have been received by NJDEP to close the landfill in accordance with NJDEP requirements. In addition, NJDEP approved capping the landfill with low permeability soil in letter dated August 2006. We assume a Landfill Closure Plan will be submitted to the NJDEP to facilitate landfill closure in 2007 or 2008.

Access to the landfill is limited. Three sides of the landfill are surrounded by water. The north side has a locked, gated entry that can only be accessed by authorized personnel with permission from Mannington Mills Security. In addition, the north side of the Inactive Industrial Landfill, along Mannington Mills Road, is monitored by Mannington Mills' security.

Former Lagoon Sediment Placement Areas (also know as the Inactive Lagoons, currently defined as an AOC under the MOA with the NJDEP)

Three former Lagoon Sediment Placement Areas are located in the western portion of the facility, immediately south of the lagoons. The sediment placement areas received the latex paint sludge generated from maintaining the settling lagoons. These areas were used from the early to mid 1970's until 1979, when operations were moved to the Wastewater Treatment Plant.

Currently, the Former Lagoon Sediment Placement Areas have little, if any, standing surface water and are heavily vegetated with mature trees and underbrush. Presently, the limits of the disposal areas appear unchanged and relatively well defined by perimeter earthen berms. Depressions are evident in the ground where contaminated sediment from the lagoon was once placed. No stressed vegetation has been observed.

Access to the Former Sediment Placement Area is limited. A security fence is situated on the south side and a portion of the western side of the area. The north and eastern sides of the former Sediment Placement Area are not fenced but is included within a larger fenceline that borders the entire facility. Dense vegetation primarily *Phragmites australis* (common reed) and other understory brush is present along the west, north and east sides of the sediment placement area that restricts access. In addition, the area is monitored by site security.

The NJDEP has verbally approved the remedial plan for the Former Lagoon Sediment Placement Areas. This plan includes removal and placement of impacted soil and sludge materials at the Inactive Surface Impoundment under a vegetative cap.

Inactive Surface Impoundment (currently defined as an AOC under the MOA with the NJDEP)

The Inactive Surface Impoundment is a peninsula located in the north central portion of the site. This area is surrounded on three sides (north, east, and west) by Pledger Creek and by an active rail line (Southern New Jersey Railroad Company) to the south. The Inactive Surface Impoundment was constructed in 1979 and was utilized through 1985 to receive the reduced volume of sludges generated from the Wastewater Treatment Plant. Reportedly, small volumes of plasticizer residuals were also discharged to the impoundment periodically until 1983. The Wastewater Treatment Plant and impoundment were listed on the original facility EPA hazardous waste permit application, dated 2 January 1981. The listing was based on the former EPA listed waste category K079, (Cleanups from Latex Paint Operations). This category was terminated by the EPA in January 1981. In May 1985 and again in October 1986, Mannington corresponded with the NJDEP Bureau of Hazardous Waste Engineering to clarify that the treatment plant and impoundment were inactive, and should not be considered hazardous waste activities. Due to the inactivity of the impoundment and suspension of the hazardous status of the contents, accumulated sludge was not removed. In a NJDEP letter dated 11 September 1985, the Department classified the material as ID-27 non-hazardous industrial waste.

The impoundment was formerly permitted under the facility's NJPDES-DGW permit. However, this AOC was later removed from the NJPDES-DGW permit in 1999 as part of the Groundwater Protection Program (GWPP) Plan. The impoundment was investigated under the MOA as part of the Phase I, II, III and Supplemental Phase III RI between 1997 and 2002. Verbal approval has been received from the NJDEP for proposed remedial actions at this AOC that include consolidating waste at the impoundment and other site AOCs under a vegetative cap.

The Inactive Surface Impoundment consists of an oval/rectangular shaped area, approximately 70 feet long by 110 feet wide, 2 to 4 feet deep from the top of the berm, and bounded by 6 to 7 foot high earthen slopes on a 3:1 (horizontal/vertical) grade. The design volume of the impoundment is approximately 100,000 gallons. The Inactive Surface Impoundment is lined with a 30 mil polyester reinforced Hypalon liner constructed below a surface soil cover. In the mid-1990's, the surface soil cover of the impoundment was capped with a 15 mil reinforced high-density polyethylene liner to prevent infiltration. Currently, clean rainwater that accumulates within the Inactive Surface Impoundment is pumped via a sump pump into a stormwater open box channel that extends along the northern portion of the plant facility and leads to the pump station. This pump station feeds the oil/water separator and lagoon system.

Access to the Inactive Surface Impoundment is limited by the shallow waters and dense vegetation that surround the perimeter of the area. The location of the Inactive Surface Impoundment and the presence of a chain linked fence along the railroad limit access to this area by workers during business hours. The area is further monitored by security.

Former Wastewater Treatment Plant

The Former Wastewater Treatment Plant is located in the northwestern portion of the facility, west of the impoundment. The Former Wastewater Treatment Plant was built between 1979 and 1980 and was used until 1985. The Wastewater Treatment Plant is contained in a fabricated steel building with a concrete slab floor. The Wastewater Treatment Plant formerly treated process water from the latex paint production area. The pH of the process water was adjusted and then the water was flocculated in a tank within the building. The waste water was subsequently discharged to the Salem City Sewer System. Sludge generated during the flocculation process was disposed in the surface impoundment. Although no longer used to process wastewater, the Former Wastewater Treatment Plant receives small amounts of water generated at the facility that then discharged to Salem City Sewer per Mannington's NJDPES-

Significant Indirect User (SIU) permit. No documented releases to groundwater, surface water, or soil are noted in relation to this unit.

Other AOCs

Former n-Butyl Acetate Tank Release
The n-butyl acetate tank was located in the north central portion of the facility along the current Southern Railroad Company of New Jersey rail line that runs east-west through the property. The tank was located within a concrete containment structure along with two other tanks. A limited release of n-butyl acetate occurred in August 1995 from a below grade pipe elbow connected to an 8,000-gallon AST (Tank No. 9) that stored virgin material. Subsequent soil and groundwater investigations demonstrated that natural attenuation resulting from hydrolysis of the n-butyl acetate to n-butanol and acetic acid was effective as a remedial approach. The results of the investigations were presented in a Remedial Action Report to NJDEP dated July 1997. The NJDEP granted a no further action (NFA) designation for this AOC in September 1997.

References:
Draft Report Environmental Priority Initiative Preliminary Assessment prepared by Camp Dresser and McKee Federal Programs Corporation, dated September 1992

Phase I Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 17 November 1997.

Phase II Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 19 February 1999.

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Supplemental Groundwater Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 6 December 2000.

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DRAFT Ecological Investigation Report – Mannington Mills, Inc., Salem, New Jersey, Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. (Report submission pending results of current investigation).

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	_x_	___	___	Benzene, methylene chloride, total phenols, bis(2-ethylhexyl) phthalate, aluminum, arsenic, iron, lead, manganese, sodium, ammonia, total dissolved solids, and chloride (Table 6)
Air (indoors) [2]	___	_x_	___	Volatile organic compounds impacts in groundwater and soil are beyond 100 feet from the building(s) (Table 7)
Surface Soil (<2 ft)	_x_	___	___	Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, butyl benzyl phthalate, bis (2-ethylhexyl)phthalate, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, antimony, beryllium, chromium, zinc, total polychlorinated biphenyls (Table 8)
Surface Water	_x_	___	___	Benzo(b)fluoranthene, benzo(k)anthracene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, arsenic, lead, manganese, mercury, and pH (Tables 9 and 10)
Sediment	_x_	___	___	Chlorobenzene, total xylenes, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, bis (2-ethylhexyl) phthalate, mercury, arsenic, lead, and zinc (Table 11)
Subsurface Soil (>2 ft)	_x_	___	___	Xylene, total VOCs, phenol, naphthalene, di-n-butyl phthalate, bis (2-ethylhexyl) phthalate, butyl benzyl phthalate, di-n-octyl phthalate, total organic carbon, beryllium, cadmium, chromium, lead mercury, zinc,and total petroleum hydrocarbons (Table 12)
Air (outdoors)	___	_x_	___	See below.

If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

__x__ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

GROUNDWATER

Regional Geology

Salem County is underlain by unconsolidated and semi-consolidated sediments of the Coastal Plain Physiographic Province, which consist of thick sequences of alternating sand, silt and clay marine formations, generally ranging in age from the Cretaceous to the Quaternary Period. The older Pleistocene Period Van Sciver and Spring Lake Beds (formerly Cape May Formation) and Upper Miocene Pennsauken Formation deposits are gravel, sand, clay and silt. These deposits overlie the Paleocene Hornerstown Formation and the Upper Cretaceous Navesink Formation, which are confining units consisting of green-black, glauconitic, fine to coarse grained sand, silt and clay. The Upper Cretaceous Wenonah-Mount Laurel Formation Aquifer underlies the Hornerstown and Navesink Formations and consists of brown-gray slightly glauconitic fine to coarse-grained sand. Overlying the Coastal Plain marine formations is a discontinuous veneer of Quaternary alluvial sands and Recent alluvium and tidal marsh deposits.

Site Geology and Hydrogeology

Subsurface stratigraphy encountered during the facility remedial investigations consisted of five distinct units within the Inactive Surface Impoundment (impoundment), the Active Lagoons (lagoons), and the Former Lagoon Sediment Placement Areas (sediment placement area). These units included fill, sludge, meadow mat, Hornerstown Sand and Wenonah-Mt. Laurel Aquifer. Grayish brown reworked native materials (fill) consisting of varying amounts of sand, silt and clay with trace amounts of gravel were generally encountered from the surface to 12 feet below grade. "Latex sludge" deposits (paint and paint pigments associated with former manufacturing operations) were encountered to depths up to 10 feet and consisted of reddish pink sludge materials. At the Inactive Surface Impoundment, limited deposits of miscellaneous fill soil with scrap flooring, sheets/debris and black/white/reddish silty clayey material were also encountered at depths of 7 to 13 feet. A dark brown fibrous organic peat layer, referred to as a meadow mat, was encountered between six and 12 feet below grade in some of the borings completed adjacent to Pledger Creek. In general, sludge material was encountered within the AOCs. Encountered below the fill, sludge and organic silt and clay (from approximately 10 to 35 feet bgs) was the Hornerstown Formation, which generally consists of dark green, glauconitic fine to medium grained sand with some silt and little clay. The Wenonah-Mount Laurel Formation, consisting of grayish-green glauconitic fine to medium-grained sand with traces of silt, was encountered from approximately 35 to 75 feet bgs.

Based on review of data obtained from previous investigations performed at the Inactive Industrial Landfill (landfill), subsurface stratigraphy generally consists of surficial cover material underlain by alternating variable fill layers (soil fill and solid waste material) to maximum depths of approximately 30 feet below ground surface (bgs). The variable fill is underlain by organic silt and clay deposits present at depths ranging from approximately 5 to 38 feet bgs. At a few locations, no organic silt and clay was observed, and the variable fill was underlain by the Hornerstown Formation from 8 to 39 feet bgs. The horizontal extent of the solid waste material is defined, and extends from Mannington Mills Road (north) to the borders of Pledger Creek. Solid waste was encountered beyond the original landfill footprint only to the north and northeast based on Remedial Investigation (RI) activities. Supplemental hand auger borings performed across Mannington Mills Road to the north and along the western boundary of the facility parking area to the northeast of the landfill delineated the horizontal extent of solid waste in these locations. Sediment cores advanced in Fenwick and Pledger Creeks to the south, east and west of the landfill indicate the presence of brown, dark gray or black organic silt and clay overlying the Hornerstown Formation and no solid waste material was encountered.

Shallow groundwater in the area of the Inactive Surface Impoundment, the Former Sediment Placement Area and the Active Lagoons generally occurs between 1 and 7 feet below grade. Groundwater at the impoundment generally occurs under mounding conditions and flows towards Pledger Creek to the north, east and west. Groundwater at the sediment placement area and the lagoons generally flows laterally toward Pledger Creek to the north and west. A limited confining unit was identified in the upper 75 feet at the site. Due to the site's location within a regional discharge zone, an upward component to groundwater flow is expected. In addition, any downward vertical migration of groundwater due to localized mounding in these AOCs is expected to be limited by finer grained clay and silt layers of the Hornerstown Formation that occurs in the uppermost 35 feet beneath the site.

Shallow groundwater at the landfill generally occurs at depths ranging between 1.5 and 10.5 feet bgs and forms a distinct mounding condition. Groundwater flow occurs in a radial pattern from the landfill outward primarily towards Pledger and Fenwick Creeks with a portion of the flow moving in a northeast direction towards the employee parking area. Limited tidal effects are observed in several of the wells within the landfill area. **Figure 3** illustrates the most current groundwater flow conditions at the site.

Groundwater flow has been generally consistent at each of the AOCs over the course of the GWPP Plan sampling. Shallow groundwater in the area of the Inactive Surface Impoundment, the Former Sediment Placement Area and the lagoons generally occurs between 1 and 7 feet below grade. Groundwater at the impoundment generally occurs under mounding conditions and flows towards Pledger Creek to the north, east and west. Groundwater at the sediment placement area and the lagoons generally flows laterally toward Pledger Creek to the north and west. A limited confining unit was identified in the upper 75 feet at the site. Due to the site's location within a regional discharge zone, an upward component to groundwater flow is expected. In addition, any downward vertical migration of groundwater due to localized mounding in these AOCs is expected to be limited by finer grained clay and silt layers of the Hornerstown Formation that occurs in the uppermost 35 feet beneath the site.

Key Contaminants

Several VOCs, SVOCs, and metals have been detected in groundwater onsite at concentrations above the NJDEP Groundwater Quality Standards (GWQS). The current GWPP Plan Program requires sampling for a limited list of parameters (benzene, toluene, ethylbenzene, total xylenes, arsenic and iron) at MW-1, MW-3 through MW-6 and MW-16. The current groundwater sampling targeted parameters have been established with NJDEP approval based on many years of sampling data. Current and historic GWPP Plan parameters are noted in **Tables 1 through 5**.

Based on a review of historical written correspondence (June 4, 1986, March 7, 1988, July 21, 1989, December 20, 1991, June 30, 1997 and March 7, 2000) from the NJDEP-Southern Bureau of Water Compliance and Enforcement to Mannington regarding Compliance Evaluation Inspections at the facility and June 20, 2002 correspondence from NJDEP – Bureau of Nonpoint Pollution Control, several compounds analyzed as part of the existing NJPDES-DGW permit have been formally acknowledged as being related to natural conditions (brackish water) or to the subsurface geology. These natural parameters include sodium, total dissolved solids (TDS), manganese and ammonia. Based on the NJDEP's interpretation of these parameters as being related to natural conditions, groundwater samples collected under the NJPDES-DGW permit for the landfill are not currently analyzed for these parameters.

A summary of historic groundwater sampling results from 1995 to the present compared against the current NJDEP GWQS is included as **Table 6**. The location of the site monitoring wells and a recent site-wide groundwater contour map is presented as **Figure 3.**

The facility currently has an established Classification Exemption Area (CEA) with NJDEP for groundwater at the landfill area. The CEA has been established for benzene, iron and arsenic, based on these compounds being detected above NJDEP GWQS. The CEA establishes an area of restricted groundwater use and prevents use of groundwater in the defined area for potable, agricultural or industrial purposes.

Identified shallow groundwater impacts are not likely affecting potable water in the vicinity of the site based on several factors. Groundwater at the site discharges to surface water in the creek systems immediately surrounding the plant. Identified groundwater contaminants are generally of low mobility or have been detected at low levels. Additionally, the nearest potable wells are either located at a distance greater than 2,000 feet from site AOCs or are located across waterbodies that would halt groundwater flow. Also, potable wells in the site vicinity are screened at deeper intervals than noted shallow groundwater impacts. Groundwater conditions and/or quality will continue to be monitored at the site under the Revised GWPP Plan to assess the potential for off-site migration.

The GWPP Plan sampling for the year 2005 indicates that site groundwater is not impacting surface water. Contravention surface water sampling to support the GWPP Plan has been conducted periodically at landfill surface water sampling locations LSW-1, LSW-6 and background surface water locations BSW-1 and BSW-2. Based on the contravention sampling, target groundwater impacts have not been detected in surface water. Recent surface water sampling for benzene as a result of both the April and October 2005 groundwater sampling events indicates compliance with the GWPP Plan. Therefore, no further contravention analysis was necessary to address surface water quality.

AIR (Indoors)

In accordance with the NJDEP Vapor Intrusion Guidance (October 2005), Mannington utilized groundwater sampling results (from wells MW-1, MW-3 through MW-6 and MW-16) from the Annual GWPP Plan Status Report – Years 2002 and 2005 to complete a screening for potential vapor intrusion issues (**Table 7).** The concentrations of VOCs in groundwater at all wells were below NJDEP Groundwater to Indoor Air Screening Levels (GWIASL) based on a comparison of the recent data. This indicates no potential risk to indoor air quality. In addition, Mannington reviewed the proximity of wells not sampled as part of the GWPP Plan (i.e., MW-7 through MW-15 and MW-17) relative to occupied buildings to determine if the historic data from these wells should be included in the screening. The review indicated that the wells and piezometers not sampled as part of the GWPP Plan are at distances greater than 100 feet from an occupied building, with the exception of MW-12, MW-14, MW-15, MW-16 and P-6. The two most recent rounds of groundwater sampling data for MW-12, MW-16, and P-6 were screened against the NJDEP GWIASL as a conservative measure. MW-14 and MW-15 are not included in the screening because they have not been sampled as part of the site remedial investigation activities or the GWPP Plan. The screening indicates that the concentrations of VOCs at MW-12, MW-16, and P-6 are below the levels indicating no potential risk to indoor air quality.

Subsurface soil data at the Inactive Surface Impoundment was reviewed to determine if a soil vapor to indoor air pathway was present. The Inactive Surface Impoundment was the only NJDEP AOC considered for this pathway evaluation because of its close proximity of the Wastewater Treatment Plant Building. The review determined that the closest subsurface soil sample with VOC impacts (B-3, 9.75 to 10.25 feet bgs) was over 150 feet from the Former Wastewater Treatment Building. In addition, B-3 was collected from within the lined and capped portion of the Inactive Surface Impoundment that serves as a barrier to prevent horizontal and vertical migration of soil vapors in this area. Volatile organic compounds were also not detected in multiple samples collected between B-3 and the Wastewater Treatment Plant Building, which supports the conclusion that subsurface soil concentrations do not pose a threat to indoor air quality.

SURFACE SOIL (i.e., < 2 feet below grade)

Key Contaminants

Over 65 surface soil samples have been collected and analyzed during multiple environmental remedial investigations at the site from 1997 to the present. Contaminants of concern in site surface soil (<2 feet below ground surface (bgs)) are polynuclear aromatic hydrocarbons (PAHs), phthtalates, metals and PCBs when compared against the Direct Contact NJDEP Soil Cleanup Criteria (SCC). The Direct Contact SCC were used for the CA725 form because they are the most applicable criteria for evaluating risk to humans from soil impacts. The IGWSCC were determined to be inappropriate for the soil screening because these criteria were not intended to address direct contact human exposure.

Surface samples were collected at the Inactive Surface Impoundment, the Active Lagoons and the Former Lagoon Sediment Placement Area during the Phase I RI (1997) to determine sludge quality and characterize potential soil impacts at these AOCs. The samples identified as "sludge" are considered to be samples of latex source materials from historic operations conducted at these AOCs as described in our response to Question No. 1. Six of the surface soil samples collected at these AOCs as part of this investigation had concentrations of chromium above the Non-Residential Direct Contact Soil Cleanup Criteria (NRDCSCC). In addition, the concentration of bis(2-ethylhexyl)phthalate exceeded the Residential Direct Contact Soil Cleanup Criteria (RDCSCC) at one sample location.

The Phase II RI was conducted in 1998 and included the collection of surface soil samples to evaluate the potential exposure pathway between soil in Pledger Creek and adjacent wetlands. The Active Lagoons, the Former Lagoon Sediment Placement Area and the Inactive Surface Impoundment were further addressed by an additional investigation to complete vertical and horizontal delineation of sludge and soil impacts at these three AOCs. Nine surface sludge/soil samples were collected during the Phase II RI. No compounds were detected above the NJDEP SCC.

A remedial investigation was conducted at the Inactive Industrial Landfill in 2001. The investigation included the collection of 12 surface soil samples. Multiple SVOCs including PAHs and phthalates were detected at a concentration above the NRDCSCC and the RDCSCC at the landfill. Metals including antimony, beryllium, chromium, and zinc were detected at one or more surface soil sample locations above the NJDEP SCC. Total PCBs were also detected at concentrations above the RDCSCC at two sample locations in the northeast wooded wetland area.

Supplemental RI activities were conducted at the landfill between February and May 2004. The activities were performed in multiple phases and involved additional horizontal and vertical delineation of surficial PCB soil impacts within the wooded wetland located northeast of the landfill footprint, and additional delineation of solid waste along the eastern margin of the landfill.

Based on the results of the supplemental RI activities, PCB soil impacts were delineated in the wooded wetland to the north, east and south. Surface soil contaminants, however, were detected above their NJDEP RDCSCC at 12 surface sample locations which included soil, solid waste material and fill. These impacts encompassed a majority of the wooded wetland area. The extent of solid waste at the landfill was also delineated and was consistent with previous findings. The waste material was contained within the landfill footprint and the wooded wetland area.

A preliminary landfill closure strategy was described in the Supplemental Landfill RI. A low permeability, vegetative soil cap was recommended for the landfill footprint and wooded wetland area. A sheet-pile wall was proposed as a barrier and structural tie-in for the landfill cap along the southern boundary with Fenwick Creek. The sheet-pile wall was installed between June and September 2005. A detailed Landfill Closure Plan further documenting the landfill closure concepts is scheduled to be prepared and submitted to the NJDEP Bureau of Landfill Compliance and Recycling Management once the landfill cap design is complete. Implementation of the landfill remedial design will eliminate any potential exposure risks to human receptors related to surface soil impacts.

A Supplemental Phase III RI was conducted at the Inactive Surface Impoundment in 2002 and included characterization of surface soil at this AOC. Previously identified surface soil impacts at the impoundment were delineated as part of this effort. Nine surface soil samples were collected at this AOC during the Supplemental Phase III RI. Two PAHs were detected at concentrations above their respective RDCSCC at one sample location. The lack of impacts noted in surficial soil at the impoundment indicates that surface soil in this area is of minimal risk to human health.

A summary of surface soil sampling results is provided on **Table 8**.

SURFACE WATER

Surface Water Characteristics

Both Fenwick and Pledger Creeks are freshwater, tidal waterways based upon their classification in the NJDEP Surface Water Quality Standards (NJAC 7:9B). Historic tidal fluctuation monitoring within Pledger Creek indicates minor tidal influence. The tide has fluctuated approximately two inches within Pledger Creek near the site.

A total of eight tide gates exist on Pledger and Fenwick Creeks between the site and the downstream confluence of Fenwick Creek and the Salem River. The purpose of the tide gates is to regulate water levels in tidal marshes located to the north and south of the facility and prevent flooding of adjacent upland areas. These tide gates are maintained by Salem County. The most upstream tide gate on Pledger Creek is located at Mannington Mills Road adjacent to the northwestern, upstream corner of the landfill. Seven tide gates are located on Fenwick Creek. The closest tide gate to the facility is at the railroad bridge, approximately 450 feet southwest and downstream of the landfill and the confluence of Pledger and Fenwick Creeks.

Key Contaminants

Surface water samples have been collected from Pledger and Fenwick Creeks as part of the Phase II RI (1998), the Inactive Industrial Landfill RI (2002), the GWPP Plan Contravention Sampling (January 2001 through October 2005), and the Ecological Investigation (2005). Five surface water samples were collected as part of the Phase II RI near the Inactive Surface Impoundment, in the ditch north of the Active Lagoons, and in Pledger Creek north of the tide gate along Mannington Mills Road. Five surface water samples were also collected at locations around the landfill as part of the Landfill RI. Surface water samples have also been collected as a contravention analysis step for the GWPP Plan from Pledger and Fenwick Creeks. Thirty-eight surface water samples were collected during the Ecological Investigation of the surrounding creek systems. The surface water sampling results were compared to the NJDEP Freshwater Surface Water Quality Standards (SWQS) (August 2004) based on salinity concentrations in the creek system measuring less than three parts per thousand, which is the NJDEP criteria defining saline waters.

Four PAHs, benzo(b)fluroanthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, and dibenzo(a,h)anthracene, were detected in surface water above the SWQS during the ecological investigation. The PAHs that exceeded the NJDEP SWQS were located both on and off-site, which indicates potential background contributions.

Metals concentrations, including arsenic, manganese, lead and mercury, exceeded the SWQS at multiple sampling locations during the remedial investigations, ecological investigation and the GWPP contravention sampling. Arsenic was detected at concentrations above the NJDEP Freshwater SWQS along the western boundary of the Inactive Industrial Landfill during the Landfill RI. In addition, arsenic was also detected along the same side of the landfill as part of the GWPP contravention sampling conducted in May 2004. However, two surface water samples were collected from background locations during the same sampling event, and arsenic was detected at higher concentrations at these locations than at the landfill. The 2004

Annual GWPP Report indicated that the detected arsenic concentrations in surface water were natural/background related. In addition, arsenic was detected at multiple surface water sampling locations during the ecological investigation, including both background and site sample locations, which further supports the conclusion of natural/background contributions.

Manganese was detected at concentrations above the NJDEP Freshwater SWQS at three GWPP Plan surface water contravention sampling locations. In addition, this compound was detected at all five surface water sampling locations around the landfill during the Landfill RI. Correspondence from the NJDEP Southern Bureau of Water Compliance and Enforcement regarding Compliance Evaluation Inspections of the facility has lead to the determination that this compound is related to natural/background conditions (brackish water) or to the subsurface geology. As a result, the NJDEP has agreed to eliminate sampling for manganese under the Revised GWPP Plan.

Lead and mercury were detected in the northern and central reaches of Pledger Creek at concentrations greater than the NJDEP Freshwater SWQS during the Phase II RI. Lead and mercury were also detected at concentrations greater than the NJDEP Freshwater SWQS at two sampling locations around the Inactive Industrial Landfill during the Landfill RI. The 2005 ecological investigation also noted concentrations of lead and mercury above the NJDEP Freshwater SWQS at multiple locations. Lead was detected in Pledger and Fenwick Creeks near the site and at background locations, including in Keasby Creek. Mercury was detected in Pledger Creek and in Fenwick Creek in the vicinity of the site but not at background sample locations.

Summaries of the surface water sampling results are provided in **Tables 9 and 10,** and the locations of the surface water samples are provided on **Figures 4 and 5**.

SEDIMENT

Sediment samples were collected from Fenwick and Pledger Creeks and the surface water ditch as part of the Phase II RI (1998), Phase III RI (2001), the Landfill RI (2002), and the Ecological Investigation (2005). The sediment sampling results have been separated into two categories – surface sediment (0 to 2 feet bgs) and subsurface sediment (>2 feet bgs) to assist with the evaluation of potential routes of human exposure (i.e., recreational and trespasser scenarios). Sediment sampling results were compared to NJDEP Direct Contact SCC (RDCSCC and NRDCSCC). The IGWSCC was not included in the sediment screening because the IGWSCC does not account for direct exposure.

Key Contaminants - Surface Sediment (i.e., <2 feet below grade)
PAHs, bis(2-ethylhexyl)phthalate, arsenic, lead, mercury, and zinc concentrations exceeded one or more of the NJDEP SCC at one or more surface sediment sampling locations. Concentrations of bis(2-ethylhexyl)phthalate exceeded the RDCSCC at four surface sediment sampling locations collected in the ditch during the Phase II and Phase III RIs. Polynuclear aromatic hydrocarbons including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd) pyrene were detected at concentrations in surface sediment that exceeded the RDCSCC at the tide gate along the railroad bridge and near the

southwest corner of the landfill during the ecological investigation conducted during June 2005. Concentrations of benzo(a)anthracene and benzo(a)pyrene in sediment at the southwest corner of the Inactive Industrial Landfill exceeded the NRDCSCC during the ecological investigation.

Metals including arsenic, mercury, lead, and zinc were detected in surface sediment above the NJDEP SCC during the Phase II, Phase III and Landfill RIs, and the Ecological Investigation. Arsenic was detected at concentrations above the NRDCSCC and the RDCSCC at the tide gate along the railroad bridge and at the southwest corner of the landfill. Mercury was detected above the RDCSCC at six surface sediment sample locations in the ditch and Pledger Creek during the Phase II, Phase III and Landfill RIs, and the Ecological Investigation. Mercury exceeded the NRDCSCC in the ditch and at the tide gate along the railroad. Lead and zinc were also detected at the tide gate at a concentration above the NRDCSCC and RDCSCC during the Ecological Investigation.

Key Contaminants - Subsurface Sediment (i.e., >2 feet below grade)

Subsurface sediment samples were collected from Pledger Creek during the Phase III RI, the Landfill RI and the Ecological Investigation. Chlorobenzene, total xylenes, and bis(2-ethylhexyl)phthalate were detected above their respective RDCSCC during the Phase III RI. Arsenic, lead, and zinc were detected at concentrations above their respective NRDCSCC and RDCSCC along the western side of the Inactive Industrial Landfill during the Landfill RI. Mercury and zinc were detected in subsurface sediments above their respective NRDCSCC and RDCSCC west of the Active Lagoons and Former Lagoons Sediment Placement Area.

Visual Impacts in Sediment

Sediment recovered during the Phase II RI generally consisted of dark brown to black organic silt. Pink latex sludge and varying amounts of sheen and odor were observed in the surface water after disturbance of sediments collected during the Phase II RI.

The visual impacts identified in the surface water ditch north of the lagoons were delineated as part of the Phase III RI. Latex sludge or contaminant impacts were noted in several sediment cores during the Phase III RI. The latex sludge varied between two and four inches in thickness. Pink sludge was encountered at various depths as shallow as 3.5 feet below the sediment surface and as deep as nine feet below the sediment surface. Pink staining was sporadically noted as shallow as 1.5 feet below the sediment surface and as deep as 6.5 feet below the sediment surface. Oily staining was noted in dark brown soft clay from the sediment surface to 2.5 feet below the surface.

Further investigation of sediment occurred during the Landfill RI. Trace amounts of pink staining were noted in sediment cores collected along the western side of the landfill during this investigation. The extent of these localized impacts was delineated during the RI activities.

The visual sludge and sediment chemical impacts were further evaluated as part a June 2005 Ecological Investigation. The investigation identified pink sludge and staining in the northern, central and southern reaches of Pledger Creek. The visual impacts were noted between zero and five feet below the sediment surface. Visual sludge ranged from approximately six inches to two feet in thickness in Pledger Creek. Black staining was also noted in Pledger Creek and at the tide gate at the railroad in Fenwick Creek.

A summary of the sediment sampling results is provided on **Table 11**. The locations and a summary of the screening results are provided on **Figures 6 and 7**.

SUBSURFACE SOIL (i.e., >2 feet below grade)

Key Contaminants

From 1997 to the present, over 125 subsurface soil samples have been collected and analyzed during environmental investigations at the site. Site subsurface soil has been impacted at the site by VOCs, PAHs, phenols, phthalates, and metals when compared to the NJDEP Direct Contact SCC (RDCSCC and NRDCSCC).

Subsurface samples were collected at the Inactive Surface Impoundment, the Active Lagoons and the Former Lagoon Sediment Placement Area during the Phase I RI (1997) to determine sludge quality and characterize potential impacts to soil at these AOCs. A screening of the subsurface sample data collected during the Phase I RI resulted in multiple exceedances of the NJDEP SCC for ethylbenzene, xylene, beryllium, chromium, and lead. Beryllium and lead concentrations in subsurface soil exceeded their respective RDCSCC and NRDCSCC. In addition, chromium was detected in subsurface sludge at concentrations greater than the NRDCSCC.

A comparison of sludge and subsurface soil sample results noted more impacts in sludge than in soil. Xylene was detected above the RDCSCC. Bis(2-ethylhexyl)phthalate, naphthalene, and benzo(a)anthracene were detected in sludge above their respective RDCSCC. Cadmium, chromium, lead, and zinc were also detected in subsurface sludge samples during the Phase I RI. All four compounds exceeded their respective NRDCSCC and the RDCSCC.

The Phase II RI was conducted in 1998 and included the collection of over 150 subsurface samples from the Active Lagoons, the Former Lagoon Sediment Placement Area, and the Inactive Surface Impoundment to further evaluate the vertical and horizontal extent of sludge and soil impacts at these three AOCs. Benzo(a)anthracene, beryllium, lead and mercury were detected in subsurface sludge samples at concentrations above their respective RDCSCC. Beryllium was detected in subsurface sludge above the NRDCSCC.

During the Phase III RI, xylene, naphthalene, butylbenzyl phthalate, bis(2-ethylhexyl)phthalate, benzo(b)flouranthene, benzo(k)fluoranthene, benzo(a)pyrene, cadmium, lead, thallium, and zinc were detected in subsurface soil samples at concentrations above the NJDEP SCC. Xylene exceeded the NRDCSCC and the RDCSCC. Naphthalene exceeded the RDCSCC. Bis(2-ethylhexyl)phthalate, benzo(b)fluoranthene, and benzo(a)pyrene exceeded their respective NRDCSCC and RDCSCC. Lead, thallium and zinc concentrations in subsurface soil exceeded both their respective RDCSCC and NRDCSCC. Cadmium exceeded the RDCSCC.

A summary of the subsurface soil sampling results is provided on **Table 12.**

AIR (Outdoors)
No reasonable expectation of outdoor air concentrations to be above risk-based levels is assumed based on the results of our soil and groundwater to indoor air pathway evaluation presented above. Surficial soil impacts are limited to the Inactive Industrial Landfill, the Active Lagoons, the Former Sediment Placement Area, and the Inactive Surface Impoundment. These areas are either densely vegetated, grass-covered or gravel covered. The presence of the vegetation and gravel helps to prevent the generation of dust and the migration of volatile impacted soils from entering the outdoor air. In addition, the frequency of plant worker entry into these areas is minimal because the process areas are not located near the AOCs with surficial soil impacts.

All work that has been conducted at these AOCs has been related to remedial investigations or interim remedial action activities. In both cases, remedial and construction workers are OSHA-trained and are continually informed by the site Health and Safety Officer of the potential hazards associated with the soils and are required to monitor air vapors when conducting activities involving the disturbance of soil. As outlined in all health and safety plans for remedial activities, remedial and construction workers are required to don respirators if air monitoring readings are detected above human health permissible exposure limits (PELs). Remedial action alternatives for the AOCs have been developed to address all soil impacts which will eliminate all potential occurrences of exposures. Development plans are not projected for the land associated with the AOCs other than remedial improvement plans. The topography, the use of interim health and safety measures and future remediation render the outdoor air migration pathway incomplete for human exposure to volatiles in surface soil.

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Phase III Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 8 April 2002.

Inactive Industrial Landfill Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 31 May 2002.

Supplemental Phase III Remedial Investigation Report - Inactive Surface Impoundment - Mannington Mills, Inc., Salem, New Jersey, Volume I of II. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 18 February 2003.

DRAFT Ecological Investigation Report – Mannington Mills, Inc., Salem, New Jersey, Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. (Report submission pending results of current investigation.)

Vapor Intrusion Guidance. New Jersey Department of Environmental Protection. October 2005.

Footnotes:

1) "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

2) Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above and adjacent to groundwater with volatile contaminants) does not present unacceptable risks.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

Contaminated Media	Residents	Workers	Day Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	No	No	N/A	No	No	No	No
Air (indoors)	-	-	-	-	-	-	-
Soil (surface, e.g., <2 ft)	No	No	N/A	No	No	No	No
Surface Water	No	No	N/A	No	Yes	Yes	Yes
Sediment	No	No	N/A	No	Yes	Yes	Yes
Soil (subsurface e.g., >2 ft)	No	No	N/A	No	No	No	No
Air (outdoors)	-	-	-	-	-	-	-

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated") as identified in #2 above.

2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

__X___ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

GROUNDWATER

Although groundwater contaminants of concern including, benzene, methylene chloride, total phenols, bis(2-ethylhexyl)phthalate, aluminum, arsenic, iron, lead, manganese, sodium, ammonia, total dissolved solids, and chloride have been detected above NJDEP GWQS, human exposure to this media is under control. The detection of these compounds, with the exception of total phenols, bis(2-ethylhexyl)phthalate, aluminum and lead, are potentially related to natural/background groundwater quality (see response to Question #2) or are laboratory artifacts. These parameter concentrations may be influenced by the site location within a regional groundwater discharge zone, interaction with brackish water in Pledger Creek, and the presence of an organic meadow mat and arsenic bearing glauconitic sands in subsurface soils.

Identified shallow groundwater impacts are not likely affecting potable water in the vicinity of the site based on several factors. Groundwater at the site discharges to surface water in the creek systems immediately surrounding the plant. Identified groundwater contaminants are generally of low mobility or have generally been detected at low levels. Additionally, the nearest potable wells are either located at a distance greater than 2,000 feet from site AOCs or are located across waterbodies that would halt groundwater flow. Also, potable wells in the site vicinity are screened at deeper intervals than noted shallow groundwater impacts. Groundwater conditions and/or quality will continue to be monitored at the site under the Revised GWPP Plan to assess the potential for off-site migration.

Furthermore, the facility currently has an established Classification Exemption Area (CEA) with NJDEP for groundwater at the landfill area. The CEA has been established for benzene, iron and arsenic based on these compounds being detected above NJDEP GWQS. The CEA establishes an area of restricted groundwater use and prevents use of groundwater in the defined area for potable, agricultural or industrial purposes. Semi-annual groundwater monitoring with conditional surface water monitoring is conducted under the CEA. The monitoring requirements are consistent with the existing GWPP Plan.

The groundwater to surface water pathway is also not considered a likely human health exposure route, based on periodic surface water contravention sampling results. Groundwater from the site flows in a north, west and southern direction towards the creek systems that surround the majority of the site. Off-site migration of groundwater is under control and thus not impacting surface water based on continued monitored under the Revised GWPP Plan and Landfill CEA.

The only direct human exposure to groundwater at the site is through groundwater sampling under the GWPP Plan and CEA. However, the groundwater sampling activities are conducted consistent with a written Groundwater Sampling Plan that includes a Health and Safety Plan specifying personal protective equipment (PPE) requirements and proper decontamination procedures. In addition, exposure to site groundwater is limited because these activities are conducted by OSHA HAZWOPER-trained personnel. All contractors working at the facility are also required by Mannington to complete a contractor Safety, Health and Environment Agreement and attend a contractor safety and site orientation training program upon initial entry to the facility. A complete exposure pathway for site groundwater to human receptors is further controlled by these protocols.

SURFACE SOIL AND SUBSURFACE SOIL

Surface and subsurface soil do not pose a risk to human health based on site conditions, multiple engineering controls and site security measures that are in place at the facility. Surface and subsurface soil contaminants of concern (COCs) include multiple PAHs, phthalates, metals and PCBs. The impacts are limited to the site AOCs identified in the MOA established with NJDEP and include the Inactive Industrial Landfill, the Inactive Surface Impoundment, the Former Lagoon Sediment Placement Area, and the Active Lagoons. Other AOCs and SWMUs identified in the 1992 CDM report are under control due to discontinuation of processes, decommissioning of equipment, operational changes, or addition of containment structures and paving that limit exposures. Off-site soil contamination is not occurring and a complete pathway does not exist because no processes have occurred off-site.

Worker exposure to the soils at the AOCs is limited due to site security and restricted access on the active portion of the site. In addition, all plant employees and contractors undergo a health and safety training program prior to the initiation of employment and work, respectively, which further promotes awareness and prevention of exposures to impacted soil. Site security monitors most of the AOCs from a guard house at the facility entrance to ensure only authorized personnel are entering these areas. In addition, access to the AOCs is further restricted by engineering controls (i.e., fencing, gravel cover, liner and signage), dense vegetation and waterways that help to prevent worker and trespasser exposure. Specifically, access to the landfill can only be obtained through site security because a secured fence is in place at the entrance to this AOC and Mannington Mills Road is patrolled by site security. In addition, access to the Inactive Surface Impoundment is limited by a chain-linked fence and security surveillance. The Inactive Surface Impoundment is also covered by a tarp liner. Due to the site security and operational procedures, as well as through implementation of engineering controls, a complete exposure pathway for soils to site workers does not exist.

Trespasser access to the facility is also unlikely to occur at the existing AOCs based on dense vegetation, shallow water, security, surveillance cameras, and fencing. Access to the landfill is limited by shallow water to the east and west, fencing along Mannington Mills Road and marsh conditions to the northeast. In addition, the shorelines of the Former Lagoon Sediment Placement Area, the Active Lagoons, and the Inactive Surface Impoundment shorelines are densely vegetated. In addition, Mannington security monitors all four AOCs. Attempts at trespassing have been limited to adolescents traversing the railroad tracks that lead to the facility. Surveillance cameras have been successful at alerting security to these occurrences and the situations have been addressed immediately to prevent penetration of the facility.

Construction activities and soil disturbance are not scheduled to occur at the site AOCs with the exception of the proposed remediation to be completed in accordance with the MOA. As noted in Question #1, preliminary remedial alternatives for the site AOCs have been verbally approved by the NJDEP. The proposed AOC remedies were determined based on development of a remedial alternatives evaluation and feasibility studies. The selected AOC remedies will prevent potential future human exposures. Interim measures (e.g., sheet pile wall) have already been completed at the landfill to prepare for capping and permanent closure.

Likely remedial alternatives include capping the Inactive Industrial Landfill, and removal of sludge and impacted soils at the Active Lagoons and Former Sediment Placement Area and placement at the Inactive Surface Impoundment under a vegetative cap. Preparation of Remedial Action Workplans for the site AOCs and initiation of remedial activities is proposed in 2007 and 2008. The Remedial Action Workplans will be submitted for NJDEP approval and will include health and safety provisions to minimize human exposure. One of the health and safety provisions will be that all field staff are OSHA HAZWOPER-trained. In addition, efforts will be made to minimize and control the generation of dust particulates and monitor the breathing space during earthwork activities at the AOCs.

SURFACE WATER AND SEDIMENT

Surface water and sediment in the surrounding creek systems may cause a potential risk to human health based on the concentrations of contaminants and the potential human health exposure pathways associated with Pledger and Fenwick Creeks. As discussed above, surface water and sediment impacts were identified in the on-site surface water ditch north of the Active Lagoons and off-site in Fenwick and Pledger Creeks during the Phase III RI, the Landfill RI, and the Ecological Investigation. The results of these investigations indicate that sediments in Pledger Creek are both visually and contaminant impacted as a result of historic site operations. Contaminant impacts in sediment, including PAHs and metals, have also been identified in Fenwick Creek that may relate to the site. Surface water impacts in Pledger and Fenwick Creeks near the site included metals and pH. Several of the metals were also detected in surface water at off-site locations within Fenwick and Keasby Creeks.

The surface water and sediment to human receptor exposure pathway for site workers is not complete. Facility worker access to the banks of Pledger and Fenwick Creeks is generally limited. Dense vegetation and fencing border the creek banks to the north, west, and south of the Active Lagoons and portions of the Former Lagoon Sediment Placement Area restrict worker access. In addition, access to the Inactive Industrial Landfill can only be obtained through permission granted by site security, because a secured gate is in place at the entrance to this AOC. Access to the Inactive Surface Impoundment is limited by a chain-linked fence and security surveillance. In addition, all plant employees and contractors undergo a health and safety training program prior to the initiation of employment and work, respectively, which further promotes safety awareness and prevents exposures.

All field personnel involved in investigation activities are required to be OSHA HAZWOPER-trained. In addition to that certification, field personnel are required to wear proper personnel protection equipment to prevent undue exposures to impacted surface water and sediment.

A complete recreation and trespasser exposure pathway potentially exists for surface water and sediment in off-site locations. Both creek systems contain fish populations that are potentially exposed to sediment and surface water impacts. Recreational fishing is known to occur in Fenwick Creek along the railroad tracks above the tide gate located approximately 450 feet southwest of the facility. The fishing activities only occur from the railroad tracks and not within the creek system. Swimming and boating does not occur within the creek based on the shallow water conditions. The potential pathway scenarios for exposure are further evaluated and discussed in response to Question 4 below.

References:

Phase I Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 17 November 1997.

Phase II Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 19 February 1999.

Inactive Industrial Landfill Remedial Investigation Workplan – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc. Doylestown, Pennsylvania. 31 January 2001.

Groundwater Protection Program Plan Revision – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 2 August 2001.

Phase III Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 8 April 2002.

Inactive Industrial Landfill Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 31 May 2002.

Supplemental Phase III Remedial Investigation Report - Inactive Surface Impoundment - Mannington Mills, Inc., Salem, New Jersey, Volume I of II. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 18 February 2003.

Groundwater Sampling Plan – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 30 September 2003.

Inactive Industrial Landfill Groundwater Remedial Action Workplan – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 23 November 2005.

DRAFT Ecological Investigation Report – Mannington Mills, Inc., Salem, New Jersey, Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. (Report submission pending results of current investigation.)

Footnotes:

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

__X__ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

The only identified potentially complete human health exposure scenario include recreational fishing and trespasser exposure (i.e., accidental entry into the creek) to off-site surface water and sediment and consumption of fish caught in the creek. Entry into the water by a recreational fisherman is unlikely to occur because recreational fishing has only been observed from upland areas along the banks of Fenwick Creek and from atop the railroad tracks that cross over the tide gate along Fenwick Creek. In addition, entry into the creek as a result of fishing is more likely to involve the use of waterproof waders or footwear to prevent direct contact with the surface water and creek sediments. Direct contact with these media is considered more likely to occur under a trespasser scenario. However, the exposure is limited because direct contact with the sediment would be the result of accidental entry and would be short in duration. There would also be a human exposure potential from consuming fish caught in the creek.

A quantitative evaluation was completed for the potential exposure scenario and compounds that exceeded relevant risk based criteria. These activities were completed to support our determination that exposures to sediment, surface water and the consumption of fish from Fenwick Creek are not significant and can be reasonably expected to be within acceptable limits. The quantitative assessment is presented below.

QUANTITATIVE EXPOSURE PATHWAY ELIMINATION

The only identified potentially complete exposure pathways present are associated with off-site surface water and sediment within Pledger and Fenwick Creeks. Based on our knowledge of the activities occurring within the creek systems, the only anticipated exposure to these media would be through recreational use of the creeks that surround the site. Based on Mannington's knowledge of the creek systems, recreational use of the creeks is limited to fishing. However, to further evaluate the recreational scenario, a direct quantitative analysis was conducted to support a weight of evidence approach and demonstrate insignificant risk from off-site surface water and sediment.

Recreational Exposure Assessment tables were organized (**Attachment B, Tables B-1 and B-2**) to assess potential recreational exposure to the creek systems. These tables identify target compounds detected during surface water and sediment investigation activities in the creek system since 1998. The screening tables further include the maximum off-site exposure concentration (e.g., the maximum detected concentration or the maximum detection limit for constituents not reported), the constituent specific reference screening value and the constituent-specific, site-specific screening level (SSSL). If the maximum off-site exposure concentration was detected by the analytical laboratory, the concentration is underlined. The value is italized if it represents the maximum laboratory detection limit (MDL), which is a conservative approach, per USEPA recommendation.

Prior to calculating the SSSL, the maximum off-site exposure concentration was compared against the reference screening values established by the NJDEP and/or USEPA Region 3. For sediment, the maximum exposure concentration detected in the surface sediment (i.e., 0 to 2 feet below grade) was compared against the most conservative of the NJDEP Residential Soil Cleanup Criteria and USEPA Region 3's Residential Risk Based Criteria. This specified depth of sediment considered in this screening analysis was selected because direct contact with sediment is most likely to occur within the top two feet. The maximum surface water exposure concentration was compared against the NJDEP's Surface Water Quality Standards. The sediment and surface water values that exceeded the referenced standard are highlighted in green on **Attachment B, Tables B-1 and B-2**.

Site-Specific Screening Level Development

A SSSL was developed using the standardized equations in **Attachment B, Table B-3** if the highlighted value (the maximum off-site exposure concentration) was detected by the laboratory. Highlighted constituent concentrations were not evaluated if the maximum off-site concentration was a laboratory detection limit, because the constituents were not detected in the medium. Constituents in excess of the referenced screening levels that were carried forward for additional evaluation, included the following:

Sediment

- Benzo(a)anthracene
- Bis(2-ethylhexyl)phthalate
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)pyrene
- Arsenic
- Lead
- Mercury
- Zinc

Surface Water

Arsenic
Lead
Manganese
Mercury

To assess recreational exposure in sediment and surface water, SSSLs were developed based on exposure parameters recommended by the USEPA contractor, Booz Allen Hamilton. As summarized in **Attachment B, Table B-4**, Booz Allen recommended:

An exposure frequency of 52 days a year.
Exposure durations of 12 and 30 years (based on a youth fishing between the ages of 6 and 18 and an adult fisherman, respectively).
Body weights of 43 kilograms (kgs) and 70 kgs (based on an adolescent and adult).
An exposure time of 2 hours a day (based upon Booz Allen Hamilton's best professional judgment).

Attachment B, Table B-3 presents the standardized risk based equations used to calculate the SSSLs. **Attachment B, Tables B-4 and B-5** summarize the generic input parameters and chemical specific input parameters, respectively.

The direct inhalation, dermal contact, and ingestion pathways were incorporated into standardized risk based equations to support development of SSSLs (**Attachment B, Table B-3**). This approach is considered highly conservative based on the qualitative assessment presented above. The standardized equations used for calculating the risk-based criterion for the above compounds were based on USEPA's Risk Assessment Guidance for Superfund: Volume 1, Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals) (RAGS, Part B), USEPA Region 9's Preliminary Remediation Goals (PRGs) Background Technical Document, and USEPA Region 3's Risk Based Concentration (RBCs) Technical Background Document. Default input parameters were based on values from the EPA Exposure Factors Handbook, U.S. EPA's RAGS, Part S, USEPA's 1996 Soil Screening Guidance, and USEPA's 2004 Dermal Assessment.

Additional steps were conducted to assess the acceptable risk level for lead in both surface water and sediment because the lead risk value is calculated based on blood level. Two models, the Integrated Exposure Uptake Biokinetic (IEUBK) and the Society of Environmental Geochemistry and Health (SEGH) models were evaluated for use with the recreation exposure scenario for sediment. The IEUBK model is based on a residential scenario for a child age 6 months to 7 years, which is not appropriate for the recreational exposure scenario, to develop a site-specific, lead-based, risk value. The SEGH model was, therefore, selected to evaluate recreational exposure to lead in sediment. This model is also used by the Pennsylvania Department of Environmental Protection (PADEP) to develop their non-residential soil remediation standards and has been accepted for previous USEPA Region 2 EI form submittals.

The SEGH model was used to calculate a site-specific risk based criterion for sediment. This model considers the target blood lead concentration and the slope of the empirical relationship between blood lead and soil lead concentrations (δ). PADEP assumes that the target blood level (T) is 20 micrograms per deciliter (ug/dL) of blood and the slope of blood lead to soil lead (δ) is 7.5 ug/dL. SEGH considers that a reasonable range of δ values as 2 to 5 ug/dL per 1,000 micrograms per gram (ug/g). The δ should be selected based on site-specific information. As stated by the U.K. Environmental Agency, low values of δ relate primarily to groups of older children, people with good personal grooming habits, well maintained (dense) vegetative cover, low bioavailability and heavier textured soils. Higher values of δ tend to be found in groups of children between the ages of 18 and 24 months, people with poor personal grooming habits, areas with sparse vegetation, soluble lead salts, and light textured or soils with low organic matter.

Based on our experience, and the lack of generic screening criteria provided in references from USEPA Region 3 or Region 9, no SSSL models were found to accurately assess exposure to lead from surface water. We, therefore, assessed both the total and dissolved lead fractions. A description of our assessment is provided below under the quantitative risk assessment section.

Quantitative Risk Assessment – Direct Exposure Pathway

The direct exposure pathway was evaluated for the compounds in sediment that exceeded the more conservative of the NJDEP Residential Direct Contact SCC or the USEPA Residential Risk Based Criteria (RBCs) using the equations presented on **Attachment B, Table B-3.** The SEGH model was used with one modification to develop a SSSL for lead in sediment. The PADEP default blood lead to soil lead slope (δ) was adjusted from 7.5 ug/dL to 5.0 ug/dL because the creek system at Mannington is characterized as a freshwater system with emergent wetlands, saturated and highly organic soils, which is more likely to be encountered by an older child or adult than a young child. We believe the δ value used is highly conservative. As presented in **Attachment B, Table B-1**, the SSSL for lead in sediment based on the above outlined parameters is 1,500 milligrams per kilogram (mg/kg). The maximum off-site exposure concentration of lead is 620 mg/kg; well below the SSSL for this compound.

The maximum concentration of lead in surface water listed on **Attachment B, Table B-2** exceeds the NJDEP SWQS. Please note, however, that the exceeding lead surface water concentration is a total lead value. Dissolved fractions are generally the more appropriate values to consider for risk assessments. A review of the dissolved fractions of lead indicates that dissolved lead was not detected above the NJDEP SWQS. Therefore, no significant exposure to lead in surface water under the recreational scenario is expected.

A quantitative human health exposure assessment of the direct exposure pathway was conducted using the SSSLs. As summarized in **Attachment B, Tables B-1 and B-2**, the maximum exposure concentrations and SSSLs in bold represent compounds where the SSSL was exceeded. Based on the screening of SSSLs versus the maximum sediment and surface water concentrations, arsenic in sediment and arsenic and manganese in surface water exceeded the SSSL. Manganese in surface water is not considered a human health risk because manganese has been approved by the NJDEP as a natural/background constituent in groundwater as discussed in our response to Question 3. The maximum arsenic concentration, detected at sediment sample SED-107, was used for comparison with the carcinogenic SSSLs. In addition, the maximum and only detection of dissolved arsenic concentration in the surface water dataset was used for comparison with the carcinogenic SSSL. The carcinogenic SSSLs for arsenic and the maximum sediment and surface water concentrations of arsenic were used for the direct exposure pathway assessment because they represent a worst-case scenario.

Because arsenic exceeded the SSSL, risks were quantified for the most probable direct exposure pathways given the site specific conditions (e.g., incidental ingestion and direct contact). In addition, arsenic was also examined as part of an indirect exposure risk analysis (**Attachment C**) as a conservative measure to assess the potential health risks to recreational fisherman (youth and adult) associated with fish consumption (i.e., due to potential bioconcentration of arsenic in the fish population). Because arsenic is considered both a carcinogen and noncarcinogen, the supplemental direct exposure assessment considered both health endpoints. The resulting risks from the direct and indirect risk exposure assessment were combined to derive a total cancer risk and hazard index for arsenic. The development of the risk calculations for the individual direct exposure pathways, the fish consumption equations and calculations, and the total cancer risk and hazard index for arsenic, are described in more detail in the indirect exposure pathway analysis section presented below and all calculations are presented in **Attachment C, Tables C-1 and C-2.**

<u>Quantitative Risk Assessment – Indirect Exposure Pathway</u>
A quantitative risk assessment of fish consumption (indirect exposure pathway) was further performed using the sediment and surface water data to determine the actual risk related to fish consumption as a result of recreational fishing in Fenwick Creek. The indirect exposure scenario involving fish consumption was completed at the request of Booz Allen Hamilton following initial discussion regarding the site and surrounding land use. Booz Allen Hamilton expressed a specific interest with regards to bioaccumulation of mercury in the creek system, although the maximum sediment and surface water concentration of mercury did not exceed the SSSL.

The fish consumption risk calculations were completed to address mercury as requested by Booz Allen Hamilton and also included an analysis of arsenic because it was detected above the SSSLs for sediment.

The fish consumption pathway was addressed using the dissolved phase surface water concentration and bioconcentration factors as defined in Table B-4-26 of the USEPA Office of Solid Waste - Human Health Risk Assessment Protocol (HHRAP) for Hazardous Waste Combustion Facilities, EPA530-R-05-006, dated September 2005. This equation calculates fish tissue concentrations based on the dissolved concentration of contaminants by using a bioconcentration factor. Bioconcentration factors are the ratio of the contaminant concentration in fish to the contaminant concentration in the water column where the fish is exposed. The factor accounts for uptake of contaminants by fish from water passing across the gills.

Surface water concentrations were evaluated for the purposes of the fish consumption (indirect exposure pathway) calculations because the datasets do not suggest that sediment impacts are mobilizing into the water column, which is the primary pathway for transport of constituents into the aquatic biota. Therefore, concentrations of the dissolved fraction of arsenic in surface water were evaluated to determine the maximum surface water concentration to be used in the assessment of fish consumption. We assumed for the purposes of the fish consumption (indirect exposure pathway) calculations that fish concentrations in the site creek system only relate to the concentration of contaminants in the water column, and therefore, contaminants in sediment have not significantly bioaccumulated. Therefore, the maximum surface water concentration in the creeks was used to calculate the fish tissue concentrations of arsenic and mercury for purposes of assessing human exposure related to fish consumption. This assumption was based on the fact that the surface water concentrations were significantly lower than suspended sediment contaminant concentrations. The compounds of interest, arsenic and mercury, both have low log octanol water partitioning coefficients (log K_{ow}) values, which further indicates that these contaminants are associated with the dissolved phase of the water column and negligible amounts of the contaminants are associated with the suspended sediment phase in the water column.

Dissolved concentrations of arsenic and mercury were incorporated into the fish concentration equation to further develop a daily intake of these two metals from fish consumption. According to the HHRAP, elemental mercury does not adsorb onto sediments or transfer to aboveground plant parts. Therefore, there is no potential for transfer of elemental mercury into animal tissue. For mercury modeling, the concentration of mercury in fish was calculated for both divalent mercury (Hg^{2+}) and methyl mercury (MHg) based on the assumed speciation split in a water body as described in the HHRAP. Eighty-five percent was apportioned into the divalent mercury and fifteen percent into methyl mercury forms. The derived concentrations of arsenic and mercury in fish, the resulting cancer risk and hazard quotient related to fish consumption, and the equations used to derive the cancer risk and hazard quotients are provided on **Attachment C, Tables C-1 and C-2**.

The individual cancer risks and hazard quotients assume the same recreational exposure scenario as defined by Booz Allen Hamilton for the direct exposure pathway. These exposure assumptions are provided on **Attachment C, Table C-3**. In addition, chemical-specific slope factors, reference doses, and input parameters for arsenic and mercury are provided on **Attachment C, Table C-4,** as necessary. The maximum surface water sample concentration for recreational exposure scenario was selected from the entire dataset including locations in both Pledger and Fenwick Creek. This approach was selected as a conservative measure because the recreational scenario relates to fish consumption and the fish populations known to occur in these creek systems are transient and likely to occupy both creek systems. Therefore, the indirect exposure scenario considered all creek surface water sample locations.

A total cancer risk and a total hazard index were calculated for arsenic; a total hazard index was calculated for mercury; and a total hazard index was calculated for adolescent and adult exposures (i.e., summation of arsenic and mercury total hazard indices). The total cancer risk and total hazard indices incorporate fish consumption (indirect exposure pathway) with the two most likely direct exposure pathways (direct contact and ingestion of sediment). These results and calculations are provided on **Attachment C, Tables C-1 and C-2**. The individual cancer risks and hazard quotients for direct contact and ingestion were calculated using a trespasser scenario because the likelihood of these exposures is minimal given that recreational fishing is known to occur from upland areas. Entry into the creeks is most likely to be a consequence of trespassing that results in accidental entry into Fenwick Creek. Based on restricted access to the site-side of the creek, creek entry is likely to occur only on the south side of Fenwick Creek near Salem or along the railroad bridge at the tide gates. Given this knowledge, the direct contact and ingestion exposure pathways are considered under a trespasser scenario using the following conservative exposure parameters:

- An exposure frequency of 32 days a year.
- Exposure durations of 12 and 30 years (based on a youth fishing between the ages of 6 and 18 and an adult fisherman, respectively).
- Body weights of 43 kilograms (kgs) and 70 kgs (based on an adolescent and adult).
- An exposure time of 2 hours a day.

The concentrations of arsenic and mercury detected in a sediment sample collected at the railroad track tide gate were used to calculate the direct contact and ingestion pathways used to derive the total hazard index shown on **Attachment C, Table C-1**. This sample was the most representative sample within the vicinity of this potential exposure target area.

Based on the results of the indirect pathway analysis, arsenic and mercury are not a human health exposure risk with respect to the noncarcinogenic health endpoint. As presented in **Attachment C, Table C-1**, the total hazard indices for the individual constituents and the total hazard indices for an adolescent and adult for both metals, which is conservative summation step, were below the USEPA noncarcinogenic target hazard of one. However, arsenic is considered to have potentially unacceptable human health risks for the carcinogenic health endpoint. The individual cancer risks related to fish consumption, incidental sediment ingestion, and direct contact for arsenic are all above the USEPA established target cancer risk factor of 1×10^{-6} for both adolescents and adults. However, the individual cancer risks derived for arsenic are generally within the USEPA established "acceptable" cancer risk range of 1×10^{-6} to 1×10^{-4}.

However, the sediment sample (SED-107) used to derive the arsenic and mercury incidental ingestion and direct contact values represent a conservative, worst-case scenario because it is the maximum arsenic sediment concentration in the dataset and the maximum mercury sediment concentration in the target area (Fenwick Creek). In addition, the incidental ingestion and direct contact exposure pathways can be reasonably expected to be within acceptable limits because the exposure target area in Fenwick Creek is located along the railroad crossing at the downstream tide gate along Fenwick Creek. The depth of the water column in this section of Fenwick Creek is on average between 5 and 8 feet deep. Therefore, the frequency of exposure through incidental sediment ingestion and direct contact with the sediments in this area is much less than that of a trespasser scenario.

Trespassing and fishing are further limited along the railroad bridge at the tide gate because the upland area supports an active railroad line. Trains pass through this area several times a day and periodically stop along this section of the tracks until signaled to proceed into the city of Salem. The presence of the trains along this section of the tracks hinders the amount of time the bridge is accessible for fishing or other use. The overall frequency of detections of arsenic and mercury in sediment at similar concentrations to those noted near the tide gate are low within the upstream sections of Fenwick Creek, where incidental ingestion and direct contact are more likely to occur, although in a short duration.

Additionally, the surface water sample (SED-120) used to derive the arsenic fish consumption intake values represents a worst-case location (i.e., maximum dissolved concentration) and the only dissolved concentration of arsenic detected in surface within both creek systems. The likelihood of fish tissue concentrations in the general population reaching the arsenic level derived in this exercise is unlikely to occur. The dissolved concentration of arsenic in surface water used to derive the concentration of arsenic ingested from fish consumption was from surface water sample location SW-120. Dissolved arsenic at this surface water sample location is an isolated occurrence. Fish populations located in Pledger and Fenwick Creeks are not limited to foraging and swimming in this general area. The equations used to derive the fish tissue concentrations are highly conservative and do not reflect the home range and seasonal use factors of the fish populations that would likely reduce the actual fish tissue concentrations. The creek systems are tidally influenced and the tide gates allow for the migration of fish populations between the creek systems and the Salem River. Therefore, it is unlikely that arsenic concentrations in fish tissue will present a human exposure risk due to fish consumption.

Quantitative Risk Assessment Summary

In summary, the direct exposure assessment was completed using a recreation scenario. The results of this assessment indicate that the maximum concentrations of manganese and arsenic in surface water are above the SSSLs. In addition, the results of the assessment also indicate that the maximum concentration of arsenic in sediment exceeded the carcinogenic SSSL.

An indirect exposure assessment was completed at the request of Booz Allen Hamilton to evaluate the risk related to fish consumption. Booz Allen Hamilton specifically requested the exposure assessment for fish consumption because of the presence of mercury in surface water and sediment in the creek systems. The indirect exposure assessment was completed for arsenic (because of the SSSL exceedances) and for mercury. The manganese exceedance of its SSSL for sediment was not carried forward to the indirect exposure assessment because manganese has been approved by the NJDEP as a natural/background constituent.

Individual cancer risks and hazard quotients for fish consumption, direct contact and sediment ingestion were derived. Recreation exposure parameters were used for the fish consumption calculation and trespasser exposure parameters were used for direct contact and sediment ingestion. Based on the results of our quantitative risk assessment calculations, mercury does not represent a potential human health exposure risk because the total hazard index and the hazard quotient for the fish consumption, incidental ingestion, and direct contact exposure pathways were below one. In addition, the total hazard indices for an adolescent and an adult for arsenic and mercury combined were below one. Adolescent and adult exposures to arsenic in surface water through fish consumption and sediment through incidental ingestion and direct contact result in a potentially unacceptable exposure risk with respect to the carcinogenic health endpoint, but not for the noncarcinogenic health endpoint. However, as described under the Quantitative Risk Assessment – Indirect Exposure Pathway section of the response to question No. 4 , the risks related to this compound can be reasonably expected to be within acceptable limits and, therefore, human health exposure is considered to be under control.

References:

1. New Jersey Department of Environmental Protection and Energy's February 3, 1992 Cleanup Standards for Contaminated Sites, NJAC 7:26D, Soil Cleanup Criteria (http://www.nj.gov/dep/srp/regs/scc/). Revised May 12, 1999.
2. EPA Region III RBC Table, (http://www.epa.gov/reg3hwmd/risk/human/rbc/rbc0405.pdf), Dated 7 April 2006.
3. Surface Water Quality Standards (NJAC 7:9B), New Jersey Department of Environmental Protection. Dated June 2005.
4. U.S. EPA 1989. Risk Assessment Guidance for Superfund. Human Health Evaluation Manual: Part A. Interim Final. Office of Solid Waste and Emergency Response, Washington, DC (EPA/540/1-89/002).
5. U.S. EPA. 1991a. Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals). Publication 9285.7-01B. Office of Emergency and Remedial Response, Washington, DC. NTIS PB92-963333.
6. EPA Region 9. User's Guide and Background Technical Document for USEPA's Region 9's Preliminary Remediation Goals (PRGs) Table, Dated October 2004.
7. EPA Region 3 Risk-Based Concentration Table: Technical Background Information originally developed by Roy L. Smith, Ph.D., Toxicologist; revised 4/16/2003 by Jennifer Hubbard, Toxicologist. (http://www.epa.gov/reg3hwmd/risk/human/info/tech.htm)
8. U.S. EPA. 1991b. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Publication 9285.6-03. Office of Emergency and Remedial Response, Washington, DC. NTIS PB91-921314.
9. U.S. EPA. 1997a. Exposure Factors Handbook. Office of Research and Development, Washington, D.C. EPA/600/P-95/002Fa.
10. U.S. EPA 1989. Risk Assessment Guidance for Superfund. Human Health Evaluation Manual: Part A. Interim Final. Office of Solid Waste and Emergency Response, Washington, DC (EPA/540/1-89/002).
11. U.S. EPA. 1996a. Soil Screening Guidance: Technical Background Document. EPA/540/R-95/128. Office of Emergency and Remedial Response, Washington, DC. PB96-963502.
12. U.S. EPA. 1996b. Soil Screening Guidance: User's Guide. EPA/540/R-96/018. Office of Emergency and Remedial Response, Washington, DC. PB96-963505.
13. U.S. EPA. 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final. EPA/540/R/99/005. Office of Solid Waste and Emergency Response, Washington, DC. PB99-963312.
14.P.A. State Code, Title 25, Chapter 250.306 <<http://www.pacode.com/secure/data/025/chapter250/chap250toc.html>>
15. P.A. State Code, Title 25, Chapter 250, Appendix A, Table 7 <<http://www.dep.state.pa.us/dep/subject/eqb/1997/Table_7.htm>>
16. UKEA 2002. Soil Guideline Values for Lead Contamination, Department for Environment, Food, and Rural Affairs. The Environment Agency, March 2002.

Footnote:

[4] If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a human health Risk Assessment specialist with appropriate education, training and experience.

5 Can the “significant” **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all “significant” exposures have been shown to be within acceptable limits) - continue and enter “YE” after summarizing and referencing documentation justifying why all “significant” exposures to “contamination” are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be “unacceptable”)- continue and enter “NO” status code after providing a description of each potentially “unacceptable” exposure.

_____ If unknown (for any potentially “unacceptable” exposure) - continue and enter “IN” status code

Rationale and Reference(s):

No response needed. See our response to Question #4 above.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

_YE_ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Mannington Mills facility, EPA ID #NJD002349256, located at 75 Mannington Mills Road in Salem, New Jersey under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control."

____ IN - More information is needed to make a determination.

Completed by (signature)________________________ Date ____________
Steven Ueland, P.E.
Senior Associate
Langan Engineering and Environmental Services, Inc.

Reviewed by (signature)________________________ Date ____________
David Kitts
Mannington Mills, Inc.
Vice President - Environment

Also Reviewed by
(signature)________________________ Date ____________
Kathy Rogovin, Senior Risk Assessor
Booz Allen Hamilton (for EPA Region 2)

(signature)________________________ Date ____________
Alan Straus, Project Manager
RCRA Programs Branch
EPA Region 2

(signature)________________________ Date ____________
Barry Tornick, Section Chief
RCRA Programs Branch
EPA Region 2

Approved by (signature)________________________ Date ____________
Adolph Everett, Branch Chief
RCRA Programs Branch
EPA Region 2

Locations where References may be found:

References reviewed to prepare this EI form are identified after each response. Reference materials are available at Mannington Mills, Inc., 75 Mannington Mills Road, Salem, NJ, Langan Engineering and Environmental Services, Inc., 2700 Kelly Road, Suite 200, Warrington, PA, USEPA Region 2 Offices, 290 Broadway, New York, New York, and NJDEP Offices, 401 East State Street in Trenton, New Jersey.

Contact telephone and e-mail numbers

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FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.