DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: _Mannington Mills, Inc._____
Facility Address: __P.O. Box 30, 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 "Migration of Groundwater Under Control" EI

A positive "Migration of Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "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

Site Description, History and Location

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, NJ (**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 people.

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 rail line 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, NJ forms a lightly populated corridor with residential and light commercial development.

Other industrial and commercial properties are located in the site vicinity **(Figure 4)**. The Salem County Hospital is located approximately three quarters of a mile north from the operating facility. An inactive (since May 1979) Mannington Township Landfill is located west across Pledger Creek from the Mannington Mills Inactive Industrial Landfill (landfill). Residential and commercial wastes were placed at the township landfill at one time and limited groundwater sampling data reviewed by Langan indicated groundwater concentrations above the New Jersey Department of Environmental Protection (NJDEP) groundwater quality standards (GWQS). In addition, seeps were noted at the township 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 Fenwick Creek. A former manufactured gas plant facility is also located approximately a quarter of a mile southwest of the site along Fenwick Creek.

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 (lagoons), the Inactive Surface Impoundment (impoundment), the Former Sediment Placement Area (SPA), and the landfill. The facility began operating under a NJPDES 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 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 3**.

Remedial Investigation under the Memorandum of Agreement (MOA)

Mannington has completed multiple phases of remedial investigation (RI) since entering into an MOA with NJDEP in 1996. The RI activities were conducted in three primary phases between 1997 and the present at the lagoons, SPA and impoundment. The RI activities primarily included the identification and assessment of potential environmental impacts to soil and groundwater at these locations. RI of the 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 groundwater results are included as **Table 4.** Historic RI soil, sediment, and surface water data are presented in the RCRA EI for Human Health Exposures under Control (CA 725).

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, SPA and impoundment. 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 was completed to address recommendations from the BEEs indicating concentrations of targeted parameters above ecological screening benchmarks. Additional surface water and sediment sampling was recommended as a result of the initial sampling efforts as part of a comprehensive ecological investigation.

The ecological investigation was completed in June through December 2005 to address recommendations from the BEEs. The investigation included the collection of approximately 40 sediment 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 sludge 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 presented in the RCRA EI for Human Health under Control (CA 725).

Migration of Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, 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 United States Environmental Protection Agency (EPA) Technical Enforcement Support Contract for Region II. Eight EPA 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.

EPA SWMUs:

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

EPA AOCs:

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 EPA SWMUs have been identified as AOCs and have undergone extensive environmental investigation under the MOA signed with the NJDEP in 1996. These AOCs include the lagoons and SPA (EPA SWMU No. 4), impoundment (EPA SWMU No. 3) and landfill (EPA SWMU No. 2).

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 EPA 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 lagoons, 2) hazardous waste drum storage area and associated satellite drum storage areas, 3) parts washer and 4) oil water separator.

Lagoons (currently defined as an AOC under the MOA with the NJDEP)
The 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-DSW Permit No. NJ0005614, which became effective 30 November 1975. The permit was required for the discharge of industrial wastewater to the lagoons for 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 SPA. The 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 SPA. From 1988 to 1997, ongoing sampling of the lagoon sludge was completed and submitted to NJDEP in accordance with the SQAR regulations. A full 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 (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 treated before discharge to the adjacent creek system. The water 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 further equipped with an oil skimmer if needed. Each of the seven lagoons also 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.

Until 2001 the 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-SIU permit No. NJ0136361. Because the lagoons currently only accept stormwater, the NJDEP accepted Mannington's Application of Revocation for the NJPDES DSW Permit No. NJ0005614-DSW and terminated the permit in 2001. Mannington has also eliminated the lagoons from the NJPDES 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.

The NJDEP has verbally approved a proposed remedial approach for the lagoons. The proposed remedial approach involves the removal and placement of the impacted soil and sludge materials at the impoundment under a vegetative cap. A natural attenuation approach is proposed to address groundwater impacts.

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 allowing for the facility to be delisted as a treatment storage and disposal facility (TSD). 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 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/Vinyl 2/Print 2 Building, the Quality Control and Research and Development 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/Vinyl 2/Print 2 Building storage area 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 Quality Control and Research and Development 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, and 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 storage areas for 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 are covered by roofs to eliminate rainwater from filling the containment units and to prevent stormwater pollution. Furthermore, Mannington has approved Discharge Prevention, Containment and Countermeasures/Discharge Cleanup and Removal and Spill Prevention, Control and Countermeasures Plans, and an approved Stormwater Pollution Prevention Plan. 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 Washers

Five Safety Kleen parts washers are located inside maintenance buildings on concrete floors. The parts washers formerly contained hazardous solvents; however, the specific timeframe of solvent use is unknown. Mannington maintained a service contract with Safety Kleen requiring Safety Kleen to remove and replace 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 washers.

Oil/Water Separator

An oil/water separator is located on a bermed pad immediately adjacent to the first of the series of lagoons. The oil/water separator was used to process non-contact cooling water, 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 square feet. 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, meeting the specified 90-day limit for on-site storage. The NJDEP de-regulated this part of the operation when the TSD facility delisting became effective because of the mobility of the 8,500-gallon waste solvent tank trailer and Mannington's 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 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 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, NJ (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 facility 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 mean sea level (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 a letter dated August 2006. A natural attenuation remediation approach was proposed for groundwater at the landfill as part of the Groundwater Remedial Action Work Plan (RAWP) for this AOC dated 23 November 2005. The RAWP established a classification exception area (CEA) for groundwater associated with the facility landfill that was also approved by NJDEP in August 2006. Landfill Closure Plan is anticipated to be submitted to the NJDEP to facilitate landfill closure in the future.

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

The SPA is located in the western portion of the facility, immediately south of the lagoons. The SPA received the 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 SPA have little, if any, standing surface water and are heavily vegetated with mature trees and underbrush. 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.

The NJDEP has verbally approved the remedial plan for the SPA. This plan includes removal and placement of impacted soil and sludge materials at the impoundment under a vegetative cap. A natural attenuation approach is proposed for groundwater.

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

The 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 impoundment structure, located in the central part of the peninsula 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 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 the proposed remedial plan at this AOC that includes consolidating waste at the impoundment from the other site AOCs under a vegetative cap. A natural attenuation approach is proposed for groundwater at the impoundment.

The impoundment currently 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 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 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.

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 Former Wastewater Treatment Plant is contained in a fabricated steel building with a concrete slab floor. The 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 discharge to the Salem City Sewer per Mannington's NJDPES-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 former 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 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.

Groundwater Protection Program Plan – Mannington Mills, Inc., Salem New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 11 March 1999.

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

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.

Supplemental Inactive Industrial Landfill Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 7 June 2004.

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

2. Is **groundwater** known or reasonably suspected to be "contaminated" above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

__X__ If yes - continue after identifying key contaminants, citing appropriate "levels" and referencing supporting documentation.

_____ If no - skip to #8, and enter "YE," status code, citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that this groundwater is not "contaminated."

_____ If unknown (for any media) - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Historic Groundwater Monitoring (1988-1998)

Prior to the GWPP Plan, from 1988 to 1998, the NJPDES DGW Sampling Requirements included the following list of target parameters: volatiles, phenols, total organic carbon (TOC), total dissolved solids (TDS), cyanide, nitrate, ammonia, sulfate, arsenic, hexavalent chromium, iron, manganese, sodium, lead and chloride. Wells MW-1 through MW-6 were sampled at the landfill, wells MW-7 and MW-8 were sampled at the SPA, wells MW-9 and MW-10 were sampled at the lagoons, and wells MW-11 through MW-13 were sampled at the impoundment. Most parameters were analyzed annually or quarterly, except for volatile organic compounds (VOCs), which were monitored semi-annually (**Table 1**). During this timeframe, benzene, TDS, ammonia, arsenic, iron, manganese and sodium generally exceeded the GWQS in groundwater samples collected at the landfill. Samples from the SPA had GWQS exceedances for TDS, arsenic, iron, manganese and sodium. Concentrations of TDS, ammonia, arsenic, iron and manganese generally exceeded the GWQS at the lagoons, and the impoundment generally had exceedances of the GWQS for benzene, TDS, ammonia, iron and manganese. The analytical results for the last three years (1995 though 1998) of the groundwater sampling conducted prior to the GWPP are summarized on **Table 4.**

In 1999 the first GWPP plan was established, operating under the NJPDES DGW Permit No. NJ0102156. The GWPP plan provided groundwater monitoring of MW-1 and MW-3 through MW-6 at the landfill, MW-9 and MW-10 at the lagoons and background location, MW-16. The background well and the lagoons were monitored for phenols, TOC, TDS, nitrate, ammonia, sulfate, arsenic, iron, manganese, sodium and chloride semi-annually. Wells at the landfill were analyzed for the same parameters, with the addition of VOCs, hexavalent chromium, lead and cyanide (**Table 2**). The landfill targeted parameters were monitored annually or quarterly, with volatiles being monitored semi-annually. During this timeframe, generally TDS, iron, manganese and sodium concentrations exceeded the GWQS in samples taken from the lagoons. Concentrations of benzene, TDS, ammonia, arsenic, iron, manganese and sodium generally exceeded the GWQS at the landfill. The background well MW-16 noted exceedances

of the GWQS for TDS, iron, manganese and sodium. A summary of the groundwater sampling results is provided on **Table 4.**

Current Groundwater Monitoring (2001-Present)

The current GWPP Plan was submitted and was approved by the NJDEP as a GWPP Plan Revision in June 2002. This GWPP Plan refined the groundwater monitoring program by reducing the number of well locations and analytical parameters. The GWPP Plan requires sampling for a limited list of parameters (benzene, toluene, ethylbenzene, total xylenes, arsenic and iron) at landfill wells MW-1, MW-3 through MW-6 and at established background location MW-16 (**Table 3**). The current groundwater sampling targeted parameters have been established with NJDEP approval based on the results of many years of sampling. Groundwater monitoring at the lagoons was terminated based on the elimination of all regulated discharges to the lagoons except stormwater and no groundwater sampling is currently conducted at the other site AOCs. The landfill wells and the background well are analyzed for the select list of parameters on a semi-annual schedule. From 2001 to the present, there have been exceedances of the NJDEP GWQS for benzene, arsenic and iron for the landfill wells, and exceedances for arsenic and iron at background well MW-16 (**Table 4**).

Background Groundwater Parameters

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, 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.

Key Groundwater Contaminants

A combination of the following parameters, VOCs (benzene and methylene chloride), semi-VOCs, (total phenols and bis(2-ethylhexyl) phthalate) and metals (aluminum, arsenic, iron, and lead) have been detected in groundwater at the site AOCs at concentrations above the GWQS based on historic groundwater sampling results. Based on EPA Guidance (RCRA Subtitle C (Hazardous Waste) Program) and discussions with EPA, we understand that the requirements for CA 750 are that only the list of hazardous constituents identified in 40 CFR 261, Appendix VIII require assessment. Therefore, based on our review of historic groundwater contaminants, only arsenic, benzene and lead were further evaluated as part of this Migration of Contaminated Groundwater Under Control EI.

Arsenic in Groundwater

The NJDEP has acknowledged that the presence of arsenic in groundwater is not related to site operations. The NJDEP verbally-approved this determination during a conference call held on 28 August 2007 between the EPA, NJDEP and Langan, based on their review of Mannington's Arsenic Groundwater Evaluation Report dated 15 May 2007 and the Report Addendum dated 2 July 2007. Based on the NJDEP's review of these documents, they are not requiring

remediation at the site for arsenic impacts in groundwater. According to the NJDEP, the concentrations of arsenic are related to historic agricultural practices (i.e. pesticide applications) in Salem County, NJ. The amount of agricultural land use in the site vicinity is estimated to be approximately 60% as defined by the NJDEP, Office of Information Resources Management Bureau of Geographic Information and Analysis digital georeference data set (**Figure 4)**. This information supports the NJDEP's determination that the presence of arsenic in groundwater at the site is related to historic agricultural practices.

In addition, Mannington has historically considered the occurrence of arsenic in groundwater to be related to the dissolution of naturally occurring arsenic in soil under a reducing geochemical environment. The Vincentown and Hornerstown Formations, as well as sections of the Mount Laurel, Van Sciver and Spring Lake Bed Formations that underlie the facility consist of glauconitic sands. The NJDEP has evaluated the concentrations of arsenic in glauconitic soils (29.5 mg/kg average) and determined that it is 4 to 5 times the median for the United States, and is above the NJDEP Soil Cleanup Criteria (20 mg/kg) (Dooley, 2001). Reducing conditions have further been demonstrated to mobilize arsenic by causing the release of arsenic that is adsorbed onto iron oxides (Welch, 2001). Elevated iron and manganese concentrations detected in groundwater at the facility support the conclusion that these compounds are being dissolved by reducing conditions (Table 4). Mobilization of arsenic due to the reduction or iron oxides has been noted in the Northern Coastal Plain of New Jersey (Barringer et al., 2001) and in the Williamette Basin of Oregon (Hinkle and Polette, 1999).

A summary of the groundwater sampling results for each active well (MW-1, MW-3 through MW-13, MW-16, MW-17, P-3, P-4 and P-6) identified within the dataset representative of groundwater data collected between 1995 to the present compared against the current NJDEP GWQS is included as **Table 4**.

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.

Groundwater Protection Program Plan – Mannington Mills, Inc., Salem New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 11 March 1999.

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.

Supplemental Inactive Industrial Landfill Remedial Investigation Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 7 June 2004.

Barringer, J.L., Szabo, Z., Barringer, T.H., and C.W. Holmes. February 2001. "Mobility of Arsenic in Agricultural and Wetlands Soils and Sediments, Northern Coastal Plain of New Jersey." USGS Workshop on Arsenic in the Environment. World Wide Web: http://wwwbrr.cr.usgs.gov/Arsenic/finalabstracts.htm

Dooley, John H. 2001. Baseline Concentrations of Arsenic, Beryllium and Associated Elements in Glauconite and Glauconitic Soils in the New Jersey Coastal Plain. The New Jersey Geological Survey Investigation Report.

Hinkle, S.R. and D. J. Polette. 1999. Arsenic in Ground Water of the Willamette Basin, Oregon. USGS Water Resources Investigation Report 98-4205.

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 appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

3. Has the migration of contaminated groundwater stabilized (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

__X__ If yes – continue, after presenting or referencing the physical evidence (e.g. groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the existing area of groundwater contamination"[2].

_____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) – skip to #8 and enter "NO" status code, after providing an explanation.

_____ If unknown - skip to #8 and enter "IN" status code

Rationale and Reference(s):

The existing site well network provides adequate monitoring of the AOCs. Sixteen wells of the entire well network are frequently monitored at the site AOCs. Five of the wells are located at the landfill; four wells are located at the lagoon and SPA; four wells and three piezometers are located at the impoundment; and one well is identified at a background well. Water levels from all of these wells are collected on a semi-annual basis in conjunction with the current GWPP Plan. The groundwater monitoring occurs during April and October. The results of the groundwater monitoring at the site AOCs are provided below.

Lagoons, SPA and Impoundment

Shallow groundwater in the area of the impoundment, the SPA and the lagoons generally occurs between 1 and 7 feet below grade. Groundwater at the impoundment generally occurs under mounding conditions and flows outwards towards Pledger Creek to the north, east and west. Groundwater at the SPA 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 the finer grained clay and silt layers of the Hornerstown Formation that occurs in the uppermost 35 feet beneath the site.

Landfill

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.

The migration of contaminated groundwater appears to be stabilized at the Mannington facility primarily based on the following two conditions:

1.) Lateral migration of groundwater impacts are limited by the bordering surface water bodies (Pledger and Fenwick creeks).

2.) Downward migration of groundwater impacts are by a semi-confining unit (Hornerstown Formation) in the upper 35 feet beneath the site and an upward component to groundwater flow due to the site's location within a regional discharge zone.

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.

Groundwater Protection Program Plan – Mannington Mills, Inc., Salem New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 11 March 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.

Footnotes:

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e. including public participation) allowing a limited area for natural attenuation.

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

__X__ If yes – continue after identifying potentially affected surface water bodies.

_____ If no – skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code

Rationale and Reference(s):

A review of historic groundwater sampling results determined that benzene and lead are constituents of concern (COC) in groundwater at the site. These parameters have been detected at isolated wells at limited concentrations historically **(Table 4)** The COC list was made based on a comparison of constituents historically and currently monitored in groundwater against the list of hazardous constituents as identified in 40 CFR 261 Appendix VIII. In addition, screening of their respective historic groundwater concentrations against their respective NJDEP GWQS was performed.

As previously stated in question No. 3, the Mannington facility is bounded on three sides by surface water, and groundwater flows outward from site AOCs towards the surrounding surface water bodies **(Figure 3)**. Groundwater flow at the site, and its discharge to surface water have been confirmed using the existing well network and through use of former surface water staff gauges located in both adjacent creeks. A review of recent and historic groundwater monitoring data suggests that groundwater discharges to the surrounding creek system at all AOCs.

Benzene and lead in groundwater at the landfill are not expected to discharge to surface water based on fate and transport calculations performed to support the CEA at this location. Surface water analytical data collected as part of previous creek sampling efforts demonstrate that the detected benzene and lead concentrations in groundwater at other AOCS are insignificant and do not negatively impact surface water quality. Further discussion of the significance of groundwater discharge to surface water is provided in question #5.

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.

Ecological Investigation Report and Ecological Risk Assessment Work Plan– Mannington Mills, Inc., Salem, New Jersey, Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 28 August 2007.

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

5. Is the discharge of "contaminated" groundwater into surface water likely to be "insignificant" (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level", and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

__X__ If yes – skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level", the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2)provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments or eco-system.

_____ If no – (the discharge of "contaminated" groundwater into surface water is potentially significant) – continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)", and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels", the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter "IN"status code in #8.

Rationale and Reference(s):

The discharge of "contaminated" groundwater into surface water at the Mannington facility is likely to be "insignificant". The maximum concentrations of the two key constituents requiring assessment per the list of hazardous constituents identified in 40 CFR 261, Appendix VIII (i.e., benzene and lead) were evaluated against ten times the NJDEP GWQS (**Table 6**). The maximum groundwater concentrations of both benzene and lead do not exceed ten times the NJDEP GWQS at any well location. In addition, the discharge of these compounds into surface water is not anticipated to have an unacceptable impact based on obtained surface water data and our professional judgment. A summary of the surface water sampling results for these parameters is provided below.

Surface water samples have been collected from Pledger and Fenwick creeks as part of the Phase II RI (1998), Landfill RI (2002), Revised GWPP Plan Contravention Sampling (January 2001 through October 2006), and Ecological Investigation (2005). Five surface water samples were collected as part of the Phase II RI near the impoundment, in the ditch north of the 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 around the landfill and from two background locations. Thirty-six surface water sample locations were evaluated during the Ecological Investigation of the surrounding creek systems. Surface water sampling analytical results have been compared to the NJDEP Surface Water Quality Standards (SWQS) for freshwater based on salinity concentrations in the creek system measuring less than three parts per thousand, which is the NJDEP criteria defining saline waters. Benzene and lead have been identified as key contaminants to be assessed in surface water as part of this form, based on the previous groundwater analytical data screening and the list of hazardous constituents identified in 40 CFR 261 Appendix VIII. Historic surface water sampling results for benzene and lead are summarized on **Table 5**.

Benzene has not been detected in surface water samples collected as part of the Ecological Investigation or remedial investigations. In addition, based on the GWPP surface water contravention sampling, benzene has not been detected in surface water above its NJDEP SWQS for freshwater, with the exception of two surface water contravention sampling events conducted during November 2002 and November 2006. The benzene concentration detected at one surface water sampling location during the November 2002 sampling event was determined to be slightly above its NJDEP SWQS at that time. Benzene was also detected at one surface water sampling location during the November 2006 sampling event; however, at concentrations below its SWQS and background levels. Benzene concentrations based on recent surface water sampling events (May and November 2006) demonstrated compliance with the GWPP Plan (**Table 5)**.

Samples to determine the total and dissolved concentrations of lead in surface water were analyzed as part of ecological and remedial investigations of the creek system, including areas near isolated monitoring wells with NJDEP GWQS exceedances. This data has been screened against NJDEP SWQS for freshwater (**Table 5**). Total lead concentrations in surface water have exceeded the NJDEP SWQS for freshwater during the ecological and remedial investigations at multiple sample locations. However, total lead concentrations at six of seven background sample locations also exceeded the NJDEP SWQS for freshwater, which suggests a background source contribution to the creek system. Detections of dissolved concentrations of lead are limited to 5 of 36 sample locations. The dissolved concentrations of lead in surface water do not exceed the NJDEP SWQS derived for freshwater for human health or aquatic organisms. The limited detections of dissolved lead in surface water also provides a good indication that the aquatic system is not impacted by the presence of lead in surface water (i.e., is generally not available for biological uptake).

References:

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

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

Annual GWPP Status Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 29 August 2001.

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

Ecological Investigation Workplan – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 1 August 2003.

Annual GWPP Status Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 24 January 2003.

Annual GWPP Status Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 22 December 2003.

Annual GWPP Status Report Year 2004 – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 22 December 2004.

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

Annual GWPP Plan Status Report Year 2005 - Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 15 December 2005.

Annual GWPP Status Report Year 2006 – Mannington Mills, Inc. Salem, New Jersey. Langan Engineering & Environmental Services. Doylestown, Pennsylvania. 21 December 2006.

NJDEP Technical Review of Arsenic Groundwater Evaluation Report for USEPA RCRA EI Migration of Groundwater Under Control Form (CA 750) – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering & Environmental Services. Doylestown, Pennsylvania. 14 June 2007.

Arsenic Groundwater Evaluation Report Addendum – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering & Environmental Services. Doylestown, Pennsylvania. 2 July 2007.

Footnotes:
3 – As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic zone).

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

6. Is the discharge of "contaminated" groundwater into surface water shown to be "**currently acceptable**" (i.e. not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

_____ If yes – continue after either: 1)identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediment, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialist, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment "levels", as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological risk assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

_____ If no – (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") – skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

_____ If unknown – skip to 8 and enter "IN"status code.

Rationale and Reference(s):

Not Applicable – see question #5.

Footnotes:
[4] – Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] – The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest groundwater guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediment or eco-systems.

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

7. Will groundwater monitoring/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

__**X**__ If yes – continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

_____ If no – enter "NO" status code in #8.

_____ If unknown - enter "IN"status code in #8.

Rationale and Reference(s):

The levels of benzene and lead detected in surface water in the creek system are "insignificant" with respect to current and historic operations at the facility. However, groundwater monitoring will continue at the upland AOCs as part of existing program and post-remedial efforts to demonstrate that significant levels of these compounds in groundwater are not migrating beyond the existing area of groundwater contamination. The monitoring and sampling of on-site wells associated with the CEA and the current GWPP Plan at the landfill includes benzene. These monitoring and sampling provisions will continue to be performed until landfill closure is complete. In addition, post-remedial action monitoring at the other upland AOCs (lagoons, SPA and impoundment) under the MOA will also occur following remediation of these areas.

Furthermore, a comprehensive ecological investigation has been performed in the surrounding creek system which included analysis for both benzene and lead in surface water and sediment. Overall, no potential COPECs in surface water were determined to cause an ecological risk. Volatiles, including benzene, were determined not to be a risk in surface water or sediment. An ecological risk assessment (ERA) is proposed for the creek system to evaluate the ecological risk to the aquatic community based on ecological investigation findings outlined in the Ecological Investigation Report and Ecological Risk Assessment Work Plan dated 28 August 2007. Additional ecological data, including sediment toxicity tests and additional sediment analysis is proposed as part of the ERA of the creek. The ERA sediment sampling will contain a comprehensive list of COPECs, including lead, to determine the health of the aquatic system surrounding the site.

References:

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

Annual GWPP Status Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 29 August 2001.

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

Ecological Investigation Workplan – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 1 August 2003.

Annual GWPP Status Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 24 January 2003.

Annual GWPP Status Report – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 22 December 2003.

Annual GWPP Status Report Year 2004 – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 22 December 2004.

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

Annual GWPP Plan Status Report Year 2005 - Mannington Mills, Inc., Salem, New Jersey. Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 15 December 2005.

Annual GWPP Status Report Year 2006 – Mannington Mills, Inc. Salem, New Jersey. Langan Engineering & Environmental Services. Doylestown, Pennsylvania. 21 December 2006.

NJDEP Technical Review of Arsenic Groundwater Evaluation Report for USEPA RCRA EI Migration of Groundwater Under Control Form (CA 750) – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering & Environmental Services. Doylestown, Pennsylvania. 14 June 2007.

Arsenic Groundwater Evaluation Report Addendum – Mannington Mills, Inc., Salem, New Jersey. Langan Engineering & Environmental Services. Doylestown, Pennsylvania. 2 July 2007.

Ecological Investigation Report and Ecological Risk Assessment Work Plan– Mannington Mills, Inc., Salem, New Jersey, Langan Engineering and Environmental Services, Inc., Doylestown, Pennsylvania. 28 August 2007.

Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI event code (CA750), 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, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI Determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Mannington Mills facility, EPA ID #NJD002349256, located at 75 Mannington Mills Road in Salem, New Jersey. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater". This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

____ 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 _____
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: September 28, 2007
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, 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

David Kitts
Vice President – Environment
Mannington Mills, Inc.
(856) 339-5871
dave_kitts@mannington.com