DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Facility Name: FMC Corporation
Facility Address: Route 47, North Delsea Drive, Malaga, New Jersey 08328
Facility EPA ID#: NJD009448432

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 EIs 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 Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated 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 objectives of the RCRA Corrective Action program, the EIs are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993 (GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

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

Facility Information

The FMC Corporation (FMC) site is situated on approximately 2.75 acres of land along North Delsea Drive (State Highway Route 47) in Malaga, Franklin Township, Gloucester County, New Jersey. Current land uses in the area are commercial and residential. The facility is bordered by a service station and self-storage warehouse to the northeast, an unoccupied restaurant to the southeast, a Conrail railroad line and

the former Grasso property to the southwest, and the Malaga Villa Apartments and a small shopping center (including a laundromat) to the northwest.

Between 1963 and 1986, this site was used for manufacturing, packaging, and storing agricultural chemicals and products, including insecticides, pesticides, and herbicides. Since 1986, the FMC site has been used solely as a warehouse and distribution point for dry and aqueous agricultural products (fertilizers, herbicides, insecticides, and pesticides) manufactured at other FMC plants around the country. A portion of the on-site warehousing is also leased to United Agri Products, Inc., for distribution and storage of similar agricultural products. In 1996, FMC purchased the former Grasso property southwest of the main plant site to allow access for monitoring of impacted groundwater migrating from on-site contaminant source areas.

In addition to the warehouses, the former facility layout included several aboveground storage tanks, a concrete truck off-loading area, and a reinforced concrete tank without secondary containment. This tank was used until August 1982 for storage and evaporation of floor washwaters, drum rinsate, and pesticide residuals from process operations; consequently, it was classified as an interim status RCRA hazardous waste treatment unit. FMC implemented closure activities for the tank in 1986, following New Jersey Department of Environmental Protection (NJDEP) approval of the RCRA Closure Plan. The results of a 1986 site assessment required under New Jersey's Environmental Cleanup Responsibility Act (ECRA) indicated that residual pesticide contamination remained in soil at the former tank area. As a result, FMC prepared a Supplemental RCRA Closure Plan proposing additional remedial action for this area, which was approved by NJDEP and implemented by FMC in 1987. NJDEP approved closure of the RCRA unit in 1988.

Additional environmental investigations were conducted to assess other impacted areas at the site under both RCRA and ECRA, which was replaced by New Jersey's Industrial Site Recovery Act (ISRA) in 1993. In addition to groundwater, eight areas of environmental concern (AECs) were identified with impacts to surface soil, subsurface soil, and/or sediment. A Memorandum of Agreement (MOA) requiring remediation of impacted soil and groundwater was signed by FMC and NJDEP in May 1995. As documented in the NJDEP-approved April 1999 Soils Remedial Action Report, pesticide-contaminated soil from the FMC site was excavated and disposed off site. An area of pesticide-contaminated soil was also removed from the adjacent Malaga Villa Apartments property, as documented in the NJDEP-approved Off-Site Remedial Action Report dated May 2003.

A semi-annual groundwater monitoring program has been implemented at the site to monitor the extent and changing concentration of contaminants beneath the FMC site and the former Grasso property. Because drinking water for the surrounding area is provided by private wells, several rounds of tap water sampling were also conducted. As outlined in the April 2004 Monitored Natural Attenuation Work Plan, FMC believes that all remaining groundwater contamination can be addressed via monitored natural attenuation (MNA). After completing two years of annual sampling and analysis for natural attenuation indicator parameters and evaluating changes in groundwater contaminant concentration trends, FMC plans to submit an MNA evaluation to NJDEP and EPA in mid 2006. FMC also plans to submit documentation for institutional controls for soil (i.e., a deed notice) and groundwater (i.e., classification exception area [CEA]) to NJDEP and EPA in mid 2006.

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 #8 and enter "IN" (more information needed) status code.

Summary of Solid Waste Management Units (SWMUs) and Areas of Environmental Concern (AECs):

A site assessment conducted by Weston Environmental as part of closure activities in 1986 identified the following AECs at the FMC site:

AEC-1, Soils at Office Septic System
AEC-2, Soils at the Truck Loading Area
AEC-3, Soils at Former Tank Farm
AEC-4, Soils at Closed RCRA Area and NJPDES Investigation
AEC-4A, Soils at Former Railroad Siding
AEC-5/5A, Soils near the Former Liquids Formulation Building
AEC-6, Sediment within the Stormwater Retention Basin
AEC-7, Soils at the Central Parking Area
AEC-8, Soils between Warehouses

See Figure 2-1 from the Remedial Action Selection Report (Ref. 5) for the locations of the AECs and surrounding properties. As shown on this figure, a portion of AEC 4A extends outside of the facility property line towards the Conrail tracks. Information on the RCRA-regulated tank is provided below, along with a discussion of on- and off-site soil impacts associated with the AECs and a brief description of off-site soil impacts at the Malaga Villa Apartments. However, only site-wide groundwater will be considered further in this EI determination.

RCRA-Regulated Tank

The only RCRA-regulated unit identified at the FMC site was a 1,600 gallon, 6-inch reinforced concrete tank used until August 1982 for storage and evaporation of floor washwaters, drum rinsate, and pesticide residuals from process operations (Ref. 1). This unit was not equipped with secondary containment and is believed to be the predominant source of pesticide contamination in groundwater beneath the site. FMC submitted a RCRA Closure Plan for the tank to NJDEP in September 1984, and NJDEP approved it in December 1985 (Ref. 1). In accordance with the approved plan, FMC removed the concrete tank/wastewater tank and approximately 575 cubic yards of associated soil in 1986. An ECRA site assessment conducted in 1986 indicated that elevated pesticide concentrations remained in soil at the former tank. Based on these results, FMC proposed a Supplemental RCRA Closure Plan for the former tank area, which was approved by NJDEP and implemented by FMC in 1987 (Ref. 5). Additional soil excavations were conducted and the area was stabilized via capping with asphalt. Following collection of a final set of soil and groundwater samples from the excavation in July 1988, the excavation was backfilled with clean soil and capped with asphalt with approval from NJDEP (Ref. 2).

Soil Impacts at the AECs

Based on a preliminary exposure assessment and receptor analysis in the Remedial Action Selection Report (Ref. 5), FMC determined that further evaluation and remedial alternative assessment was required for the following AECs: 2, 3, 4, 4A, 5/5A, 7, and 8. The analysis concluded that isolated areas of soil at these AECs containing constituents of concern above New Jersey Non Residential Direct Contact Soil Cleanup Criteria (NJ NRDCSCC) would require active remediation to minimize potential exposures to potential receptors, and to protect groundwater quality beneath and downgradient of the site. Accordingly, FMC implemented a soil excavation program in 1997 at the following areas: AEC 3; AEC 4; AEC 5/5A; and 19 satellite excavation areas spread across the remaining AECs that required remedial action, including some off-site areas associated with AEC 4A. Approximately 1,365 cubic yards of pesticide-impacted soil were excavated from these areas and sent for off-site treatment/disposal at an appropriately regulated RCRA facility. The excavated areas were backfilled and revegetated, and permanent fencing was reinstalled around the active portion of the facility as an institutional control. Confirmation samples collected from the various excavations indicated that, while the majority of soil exceeding NJ NRDCSCC had been removed, residual contaminant concentrations in certain areas remained above NJ NRDCSCC. In the Soils Remedial Action Report (Ref. 7), FMC proposed to delineate soil to New Jersey Residential Direct Contact Soil Cleanup Criteria (NJ RDCSCC) either through the use of concentration gradients or additional sampling and analysis. No further action for soil was proposed beyond delineation to NJ RDCSCC and submittal of a deed notice (Ref. 7). NJDEP approved the Soils Remedial Action Report without exception on June 15, 2001 (Ref. 9).

While further excavation and engineering controls are planned for these discrete areas with residual soil contamination (Ref. 14), the soil excavation activities were successful in removing the source of pesticide contamination that has historically impacted site groundwater (Ref. 7). FMC is currently preparing deed notice documentation, which will limit use of the property to nonresidential purposes, to address residual contamination remaining above the unrestricted NJ RDCSCC. FMC anticipates submitting this documentation to NJDEP and EPA in mid 2006 (Ref. 13).

Soil Impacts at the Malaga Villa Apartments

In the early 1990s, an area of pesticide-impacted soil was identified at the Malaga Villa Apartments and shopping center (Ref. 4). FMC proposed to remediate this area of soil contamination to residential, unrestricted use standards (Ref. 3). In November 1997, pesticide-contaminated soil located immediately adjacent to the southwest side of the septic system for Building 100 of the Malaga Villa Apartment property was excavated to NJ RDCSCC and removed from the property (Ref. 8).

A limited Phase II soil and groundwater investigation was independently conducted at the Malaga Villa Apartments in 1998 as part of a change in property ownership. Residual traces of pesticides were reported in surface soil above the applicable NJ RDCSCC. Additional delineation sampling was completed in May 1999. FMC excavated the impacted soils for off-site disposal in late 2002. Post-excavation soil sampling indicated that cleanup goals had been achieved (i.e., residual pesticide concentrations were below relevant NJ RDCSCC), and the area was backfilled to original grade with clean soil (Ref. 10). NJDEP approved this action with no further requests on August 12, 2003 (Ref. 11).

Groundwater Impacts

Geology at the FMC site is relatively simple and characteristic of the Atlantic Coastal Plain (Ref. 2). The site is directly underlain by the Cohansey Sand Formation, which is approximately 95 feet thick in this area. This formation consists of an upper sandy unit approximately 25 to 30 feet thick, separated from a second sandy unit by a clay unit approximately 1.5 to 5 feet thick. Groundwater occurs in both sand units, with the water table being first encountered at a depth between 2 and 10 feet below ground surface. Flow in the upper sandy unit is generally toward the southwest, but two areas of localized groundwater

mounding have been observed southeast and northwest of the site due to the presence of a stormwater retention basin and Laundromat leachfield in those areas, respectively. Flow in the second sand unit is also southwesterly, with no evidence of mounding. The reported permeability of the clay unit separating the sand layers is between 1.88×10^{-8} to 7.8×10^{-8} centimeters per second (cm/sec). While this layer limits groundwater flow, downward hydraulic gradients have been observed between the two units. According to FMC documentation, it is likely that this gradient is transient and the result of active spring recharge to the upper sand unit at the time of measurement (Ref. 2).

Low levels of pesticides, presumably associated with known soil impact areas (as discussed above), have been reported in groundwater beneath the FMC site. Organochlorine pesticides (OCPs) are the most frequently detected constituents of concern (COCs) in on-site groundwater. Pesticides historically detected above their respective New Jersey Ground Water Quality Criteria (NJ GWQC) for Class IIA groundwaters include: chlordane, lindane, alpha-BHC, endosulfans, dieldrin, aldrin, endrin, 4,4'-DDD, 4,4'-DDT, and 4,4'-DDE (Ref. 6). Based on the results of several Hydropunch investigations (Ref. 5), FMC determined that the area of impacted groundwater extended from the northwestern corner of the FMC property (near well MW-4), downgradient to the southwest for a distance of approximately 500 feet, crossing the original FMC property line and migrating beneath the former Grasso property (which is now owned by FMC). Using clean sidegradient Hydropunch results, FMC estimated the maximum plume width to be approximately 250 to 300 feet. A semi-annual groundwater monitoring program has been implemented at the site to monitor the extent and changing concentration of contaminants in groundwater beneath the FMC site and the former Grasso property. FMC believes that all remaining groundwater contamination can be addressed via MNA (Ref. 12). A final decision on this proposal will be made in mid-2006, after completing two years of annual sampling and analysis for natural attenuation indicator parameters, and after evaluating changes in groundwater contaminant concentration trends.

References:

1. Site Inspection Report for FMC Corporation. Prepared by NUS Corporation. Dated March 8, 1990.
2. Results of ECRA Investigations and Remedial Cleanup Plan for the FMC Corporation Malaga Site. Prepared by Roy F. Weston, Inc. Dated July 1992.
3. Letter from Barbara Ritchie, FMC, to Lois Arbegast, NJDEP, re: FMC Corporation Draft Partial Clean Up Plan and Sampling Plan Approval. Dated February 2, 1993.
4. Letter from Douglas Stuart, NJDEP, to Barbara Ritchie, FMC, re: Response to Draft Partial Cleanup Plan Approval dated February 2, 1993. Dated June 23, 1993.
5. Remedial Action Selection Report for FMC Corporation. Prepared by Blasland, Bouck & Lee, Inc. (BBL). Dated November 1995.
6. Groundwater Quality Monitoring Program Plan. Prepared by BBL. Dated July 1998.
7. Soils Remedial Action Report for FMC Corporation. Prepared by BBL. Dated April 1999.
8. Updated Phase II Environmental Assessment for Malaga Villa Apartments, Volume I of III. Prepared by EcolSciences, Inc. Dated June 2, 1999.
9. Letter from Paul Harvey, NJDEP, to Brian McGinnis, FMC, re: Soils Remedial Action Report. Dated June 15, 2001.
10. Offsite Remedial Action Report for FMC Corporation. Prepared by BBL. Dated May 2003.
11. Letter from Paul Harvey, NJDEP, to John Tang, FMC, re: Offsite Remedial Action Report. Dated August 12, 2003.
12. Letter from John Tang, FMC, to Paul Harvey, FMC, re: Monitored Natural Attenuation Plan. Dated April 16, 2004.
13. Letter from Shawn Tollin, BBL, to Andrew Park, EPA, re: Response to April 24, 2006 Booz Allen Hamilton Memorandum to USEPA. Dated May 25, 2006.
14. Personal communication between Shawn Tollin, BBL, Andrew Park, EPA, and Amy Brezin, Booz Allen Hamilton, June 1, 2006.

2. Is **groundwater** known or reasonably suspected to be "**contaminated**"[1] 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, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

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

Rationale:

Historic Groundwater Investigations

Groundwater beneath and downgradient of the FMC site was evaluated as part of several investigations. The ECRA investigation conducted in 1992 included analysis of on-site groundwater samples for pesticides, PCBs, SVOCs, VOCs, and priority pollutant metals. Constituents reported above then-current NJ GWQC included a variety of OCPs, benzene, and several metals. The latter constituents were reported above screening criteria in upgradient well MW-8. Because this well is located immediately downgradient of an off-site gasoline service station, FMC suggested that these exceedances were associated with an off-site contaminant source and regional background groundwater quality (Ref. 1).

On-site monitoring wells and the on-site production well were sampled quarterly in 1994 for VOCs, SVOCs, metals, and pesticides. Constituents detected above the NJ GWQC during this monitoring period included benzene, methylene chloride, bis(2-ethylhexyl)phthalate, pentachlorophenol, and a variety of metals and OCPs. By the fourth quarter of 1994, concentrations of benzene and methylene chloride were approaching or had reached nondetectable levels. In addition, detected concentrations of bis(2-ethylhexyl)phthalate and pentachlorophenol were at or below their respective NJ GWQCs by the fourth quarter of 1994. For this reason, these constituents were eliminated as COCs for groundwater at FMC and will not be considered further in this EI determination. Metals detected during the 1994 investigation showed the greatest concentrations and number of NJ GWQC exceedances in upgradient, on-site well MW-8. Because it is unlikely that these concentrations are site-related, metals (with the exception of lead) were also eliminated as groundwater COCs and will not be further addressed in this EI determination. Pesticides, however, were retained for ongoing monitoring.

Groundwater Quality Monitoring

The most recent available groundwater quality data for FMC was obtained during the tenth semi-annual groundwater monitoring round conducted in November 2005 (Ref. 2). During this round, groundwater samples were collected from nine shallow and four deep monitoring wells beneath the FMC site and the former Grasso property. Contaminant concentrations reported during this sampling round were compared

[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).

to NJ GWQC values updated in November 2005. A total of 11 NJ GWQC exceedances were reported for three OCPs. The maximum contaminant levels for these OCPs are presented in Table 1.

Table 1: Maximum Concentrations Exceeding NJ GWQC in November 2005

Contaminant	NJ GWQC (µg/L)	Maximum Detected Concentration (µg/L)	Well
Dieldrin	0.03	3.4	MW-1
Endrin	2	3.2	MW-4A
Heptachlor epoxide	0.2	1	MW-2

The highest levels of OCP contamination were reported in the shallow aquifer on the western side of the site, and NJ GWQC exceedances extend to well MW-10 on the former Grasso property. No exceedances were reported in the deep aquifer or in downgradient sentinel wells MW-9, MW-11, and MW-11D.

In addition to sampling for OCPs, groundwater samples were analyzed for lead. However, lead was not reported above its NJ GWQC of 5 µg/L in any well, on site or off site, during this monitoring round. In fact, since initiation of the groundwater monitoring program, lead has been reported above its NJ GWQC only once (at wells MW-2D and MW-4AD during the May 2004 sampling round). Based on the overall lack of NJ GWQC exceedances, lead will not be considered further in this EI determination.

References:

1. Remedial Action Selection Report for FMC Corporation. Prepared by Blasland, Bouck & Lee, Inc. (BBL). Dated November 1995.
2. Letter from James Bodamer, FMC, to Paul Harvey, NJDEP, re: Groundwater Monitoring Report No. 10. Dated May 4, 2006.

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:

Stabilizing Contaminant Concentrations

A review of groundwater quality data collected as part of the semi-annual monitoring program indicates that migration of contaminated groundwater has stabilized at FMC. Table 2 presents maximum OCP concentrations reported during the last four semi-annual sampling rounds. Only detections reported above applicable NJ GWQCs in shallow groundwater are included in the table. No exceedances were reported in deep groundwater during the last four sampling rounds (May 2004 through November 2005).

Table 2: Maximum OCP Concentrations Detected During the Last Four Sampling Rounds

Contaminant	NJ GWQC (µg/L)	May 2004 Max. Conc. (µg/L)	November 2004 Max. Conc. (µg/L)	May 2005 Max. Conc. (µg/L)	November 2005 Max. Conc. (µg/L)
Dieldrin	0.03	12	8.6	6.5	3.4
Endrin	2	5.7	5.3	4.1	3.2
Heptachlor epoxide	0.2	ND	ND	ND	1
Chlordane	0.5	3.3	4.2	4.1	ND
Endosulfan sulfate	40	NE	45	NE	NE

NE: No exceedance; concentration reported below current NJ GWQC standard (as of November 7, 2005)
ND: Contaminant not detected during the round
Data from Refs. 4 through 7

As indicated by the table, OCP concentrations in groundwater beneath FMC are declining or have stabilized. Although heptachlor epoxide was reported above its NJ GWQC in November 2005 after not having been detected for several rounds, the current concentrations is only slightly above the applicable standard and is roughly the same concentration as the last time this OCP was reported in groundwater at FMC (1.1 µg/L in May 2003, according to Ref. 2). Furthermore, as outlined in the Remedial Action

[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.

Selection Report (Ref. 1), FMC believes that this and the remainder of OCP contamination can be addressed via MNA.

Stabilizing Extent of Groundwater Exceedances

As stated previously, groundwater exceedances are present at the highest concentrations the western side of the FMC site and extend downgradient to well MW-10 on the former Grasso property. During the last three sampling rounds, only one OCP was reported above its current NJ GWQC at plume fringe well MW-10. In addition, as shown in Table 3, these concentrations appear to be stable.

Table 3: Maximum OCP Concentrations in Plume Fringe Well MW-10 During the Last Three Sampling Rounds

Contaminant	NJ GWQC (µg/L)	November 2004 Conc. (µg/L)	May 2005 Conc. (µg/L)	November 2005 Conc. (µg/L)
Dieldrin	0.03	ND	0.15	0.16

ND: Contaminant not detected during the round
Data from Refs. 5 through 7

Available groundwater semi-annual monitoring reports from May 2003 through November 2005 (Refs. 2 through 7) also show no detectable OCP contamination in downgradient sentinel wells MW-9, MW-11, and MW-11D. With no new downgradient detections and stabilizing concentrations in well MW-10, migration of contamination in groundwater at FMC appears to have stabilized for purposes of this EI determination.

References:

1. Remedial Action Selection Report for FMC Corporation. Prepared by Blasland, Bouck & Lee, Inc. (BBL). Dated November 1995.
2. Letter from John Tang, FMC, to Paul Harvey, NJDEP, re: Groundwater Monitoring Report No. 5. Dated December 3, 2003.
3. Letter from John Tang, FMC, to Paul Harvey, NJDEP, re: Groundwater Monitoring Report No. 6. Dated April 30, 2004.
4. Letter from Brian McGinnis, FMC, to Paul Harvey, NJDEP, re: Groundwater Monitoring Report No. 7. Dated April 25, 2005.
5. Letter from Brian McGinnis, FMC, to Paul Harvey, NJDEP, re: Groundwater Monitoring Report No. 8. Dated November 18, 2005.
6. Letter from James Bodamer, FMC, to Paul Harvey, NJDEP, re: Groundwater Monitoring Report No. 9. Dated May 4, 2006.
7. Letter from James Bodamer, FMC, to Paul Harvey, NJDEP, re: Groundwater Monitoring Report No. 10. Dated May 4, 2006.

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

___ If yes - continue after identifying potentially affected surface water bodies.

_X_ 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:

As shown on Figure 1 from Groundwater Monitoring Report No. 10 (Ref. 1), the original FMC facility is situated approximately 300 feet northwest of the Malaga Branch Creek. The Malaga Branch Creek also flows along the southeastern boundary of the former Grasso property, which is now owned by FMC.

Shallow groundwater contours shown on the figure indicate that groundwater flows to the southwest from the original FMC facility and beneath the northeast corner of the former Grasso property. Due to its sidegradient location to the original FMC facility, impacted groundwater in this area is not expected to discharge to surface water. Although groundwater may discharge into the Malaga Branch Creek at the southwestern corner of the former Grasso property, site-related groundwater contamination has not yet, and is not expected to, reach the creek at this location before dropping to nondetectable levels.

Reference:

1. Letter from James Bodamer, FMC, to Paul Harvey, NJDEP, re: Groundwater Monitoring Report No. 10. Dated May 4, 2006.

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 ecosystems at these concentrations)?

___ 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 ecosystem.

___ 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 :

This question is not applicable. See the response to Question 4.

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

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or ecosystems 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, sediments, and ecosystems), 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 an ecologist) adequately protective of receiving surface water, sediments, and ecosystems, 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 sample results and comparisons to available and appropriate 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 ecosystem.

___ If unknown - skip to 8 and enter "IN" status code.

Rationale:

This question is not applicable. See the response to Question 4.

[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 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, sediments or eco-systems.

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:

A semi-annual groundwater monitoring program has been implemented at the site to monitor the extent and changing concentration of contaminants in groundwater beneath the FMC site and the former Grasso property. Samples are collected from 14 monitoring wells, including:

- Shallow wells MW-1, MW-2, MW-4, MW-4A, MW-6, MW-6A, MW-8, MW-9, MW-10, and MW-11
- Deep wells MW-2D, MW-4D, MW-8D, and MW-11D.

In accordance with the Groundwater Quality Monitoring Program Plan (Ref. 1), each of these samples is analyzed for OCPs, lead, total dissolved solids, total suspended solids, and total organic carbon. Water level measurements are also collected quarterly to ensure that any changes in groundwater flow direction are identified as rapidly as possible. No date has been established for discontinuation of this monitoring program.

In addition to the groundwater quality monitoring, FMC initiated an MNA evaluation program to obtain data with which to make final corrective action decisions for groundwater (Ref. 2). As part of this program, wells MW-4, MW-6, MW-9, and MW-10 were sampled in May 2004 and November 2005 for natural attenuation indicator parameter analyses. Evaluation of these results is expected to be completed during the second quarter of 2006, and a findings report will subsequently be submitted to NJDEP and EPA for review (Ref. 3).

References:

1. Groundwater Quality Monitoring Program Plan. Prepared by BBL. Dated July 1998.
2. Letter from John Tang, FMC, to Paul Harvey, FMC, re: Monitored Natural Attenuation Plan. Dated April 16, 2004.
3. Letter from Shawn Tollin, BBL, to Andrew Park, EPA, re: Response to April 24, 2006 Booz Allen Hamilton Memorandum to USEPA. Dated May 25, 2006.

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 (attach appropriate supporting documentation as well as a map of the facility).

_X_ 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 FMC Corporation site, EPA ID# NJD009448432, located at Route 47, North Delsea Drive in Malaga, 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 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: _____ Date:_____
Michele Benchouk
Environmental Consultant
Booz Allen Hamilton

Reviewed by: _____ Date:_____
Amy Brezin
Environmental Consultant
Booz Allen Hamilton

Also reviewed by: _____ Date: 7/20/2006
Andrew Park, RPM
RCRA Programs Branch
EPA Region 2

_____ Date: 7/20/2006
Barry Tornick, New Jersey Section Chief
RCRA Programs Branch
EPA Region 2

Approved by: Original signed by: Date: 8/4/2006
Adolph Everett, Chief
RCRA Programs Branch
EPA Region 2

Locations where references may be found:

References reviewed to prepare this EI determination are identified after each response. Reference materials are available at U.S. EPA, Region 2.

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Attachments

The following attachment has been provided to support this EI determination.

.Attachment 1 - Summary of Media Impacts Table

Attachment 1: Summary of Media Impacts Table

AEC or SWMU	GW	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
Groundwater	Yes	No	No	No	No	No	No	Semi-annual monitoring of groundwater quality and natural attenuation parameters Classification Exception Area (CEA) planned Monitored natural attenuation program planned	Organochlorine pesticides (OCPs)