

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action

Environmental Indicator (EI) RCRAInfo code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name: American Cyanamid Company Agricultural Research Division
Facility Address: Quakerbridge and Clarksville Roads, West Windsor, New Jersey
Facility EPA ID#: NJD002349009

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 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 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 “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

American Cyanamid Company (ACCo) has operated an agricultural chemical research and development facility at this location since 1957. The site is located on a 640-acre property in a mixed area of commercial, residential, and open land uses. The site and surrounding area are partially developed. The site is bordered to the east by the Pennsylvania Railroad right-of-way, to the west by U.S. Highway 1, to the south by Quakerbridge Road, and to the north by open land and the floodplain of Duck Pond Run.

Historical site operations have included agricultural chemical laboratory research and development, raising of experimental crops and livestock, and chemical and nutrient testing on crops and livestock. Facility infrastructure has included surface impoundments, wastewater treatment operations, underground and aboveground storage tanks, loading/unloading areas, a drum and container storage area, sanitary and storm water sewer systems, and two landfills.

ACCo filed a Part A permit application in 1980 for interim status storage and treatment of hazardous wastes in containers. A revised Part A was filed by the facility in 1985 for container storage of chlorinated and non-chlorinated solvents, reactive compounds, and chemical reagents for chemical experiments and laboratory analyses. ACCo received a Part B Permit for the storage of up to 11,640 gallons of containerized hazardous waste (mainly solvents). In addition, the facility registered two unlined landfills (Landfill No. 1 and Landfill No. 2) under the CERCLA Hazardous Waste Notification Requirements. The facility also held a permit for wastewater discharge to surface water at two outfalls (DSN 001 and DSN 002). These systems are now connected to the on-site waste water treatment plant (WWTP).

A RCRA Facility Assessment (RFA) was performed at the ACCo site in 1985. The RFA identified 4 Solid Waste Management Units (SWMUs) and 16 Areas of Concern (AOCs) that required further evaluation for releases of hazardous wastes or hazardous constituents. SWMUs at the site include two landfills and two discharge ditches for wastewater outfalls. AOCs include a formulation washdown tank, a 10,000-gallon diesel fuel underground storage tank (UST), a detonation area for destruction of reactive chemicals, 2 streams adjacent to the discharge ditches for wastewater outfalls, and 11 petroleum USTs. NJDEP issued an Administrative Consent Order (ACO) in 1990 which required investigation of potential releases from the SWMUs and AOCs. RCRA Facility Investigation (RFI) activities were performed from 1990 through 1992. The results of the RFI indicated that only the landfills required further investigation and cleanup. The Corrective Measures Study (CMS) for corrective action at the landfills was performed in 1992. Based on the CMS findings, wastes were excavated from both landfills for off-site treatment and disposal. Remedial actions were completed in 1995, and documented in the Remedial Action Report (RAR). Since completion of the remedial action, NJDEP has required quarterly groundwater monitoring of five wells at the site to document natural attenuation of groundwater contamination found in the shallow aquifer beneath and downgradient from Landfill No. 2 (SWMU 2).

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?

- 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 Concern (AOCs): The RFI, CMS, and remedial actions at ACCo have been performed with NJDEP oversight. During these studies, soil, surface water, biota, and sediment samples have been collected and 12 wells have been installed and monitored on site. During the course of investigations the following four 4 SWMUs and 16 AOCs have been identified at the property. A SWMU/AOC map is found in Attachment 1.

SWMU 1, Landfill No. 1: This unit was located in the north-central portion of the site and was used until the 1970s for disposal of solid wastes, including vegetative matter and construction debris. Wastes were placed in a mound that covered an area of approximately 1,800 square feet and then covered with soil (Ref. 1). During the RFI, zinc was detected in soil and iron and manganese were detected in groundwater, both above relevant standards (Ref. 1). Background sampling indicated that the elevated iron and manganese concentrations detected in groundwater at the landfill were naturally occurring. Soil in the area of the elevated zinc sample was excavated, stockpiled, and disposed during the remedial action implemented in 1994 and 1995 (Ref. 2). Confirmatory soil sampling did not detect any hazardous constituents above the New Jersey Residential Direct Contact Soil Cleanup Criteria (NJ RDCSCC). A total of 327 tons of contaminated soil, asbestos tiles, and chemical containers were excavated from the landfill, and shipped off site to a commercial disposal facility. In addition, five small containers (1-gallon or smaller) of unknown liquid were excavated from the landfill and overpacked in 5-gallon lab packs. The contents were characterized and labeled as solvents prior to off-site disposal at a commercial hazardous waste facility. The excavated area was regraded and planted with grass seed. The area is currently an open vegetated area. An unconditional no further action determination was granted by NJDEP for the former Landfill No. 1 site on April 28, 1997.

SWMU 2, Landfill No. 2: This unit was located in the south-central portion of the site, immediately north of outfall DSN 001 (SWMU 3). This unit was formerly used for the disposal of laboratory wastes generated at the facility (Ref. 1). The unit consisted of two disposal trenches, excavated and used for disposal of laboratory wastes in various containers from the 1960s until the early 1970s. During landfill operations, wastes including containers of spent non-halogenated solvents (F003 and F005) and pesticides (U060 and U061) were covered with soil to the existing grade. During the RFI, the extent of the landfill was determined through a ground penetrating radar survey and excavation of test pits. Soil sampling indicated the presence of chloroform, 4,4-DDT, and toxaphene above NJ RDCSCC. Groundwater monitoring at this unit detected volatile organic compound (VOC) contamination above the New Jersey Class II

Groundwater Quality Criteria (NJ GWQC) for chloroform, 1,2-dichloroethane, and carbon tetrachloride. Pesticides detected in groundwater above the NJ GWQC included alpha-benzene hexachloride (Alpha-BHC), gamma-benzene hexachloride (Gamma-BHC), and 4,4'-DDE. Corrective measures implemented at this unit include excavation of wastes and contaminated soil and ongoing groundwater monitoring. Approximately 1,600 cubic yards of wastes and soil were excavated from Landfill No. 2 between 1994 and 1995, and shipped off site for disposal (Ref. 2). Confirmatory samples from the excavations indicated that remaining pesticide contamination in soil exceeded the NJ RDCSCC. The facility completed remedial actions at this unit by backfilling the excavation and implementing land-use restrictions (i.e. Declaration of Environmental Restriction [DER]) (Refs. 3, 4). The facility currently performs quarterly groundwater monitoring to evaluate natural attenuation of the existing groundwater contamination, and reports the results to NJDEP. NJDEP has rendered a conditional no further action determination for this unit. The no further action determination is based upon the filing of the DER, which was executed for this area in April, 1996, and the continuation of quarterly groundwater monitoring of the wells surrounding this unit. It should also be noted that ACCo is currently preparing documentation to implement a Classification Exemption Area (CEA) to restrict the use of groundwater that may have been impacted by this unit (Ref. 6).

SWMU 3, Drainage Ditch at Outfall DSN 001: This unit consists of a drainage ditch that receives discharges from the sanitary and laboratory wastewater treatment systems. This unit is located along the southern part of the property. As part of the discharge permit requirements for the facility and during the RFI process, water, sediment and biota samples were collected from the drainage ditch. One sediment sample (SED-3) contained lead (60 mg/kg), mercury (1.3 mg/kg), copper (71 mg/kg), silver (4.4 mg/kg), and zinc (23 mg/kg) above the applicable sediment standards (i.e., NJDEP Guidance for Sediment Quality Evaluations, Final Draft for Internal Use Only, March 1991). No other sediment, water, or biota samples indicated significant contamination. Also, sample SED-3 was located adjacent to the railroad right-of-way and downstream of samples that did not indicate contamination. A qualitative ecological assessment was performed at this unit as part of the RFI. Based on the results of the ecological assessment, no further action was required for this unit by NJDEP.

SWMU 4, Drainage Ditch at Outfall DSN 002: This unit consists of a drainage ditch that receives discharges from storm water and non-contact cooling water. This unit is located at the northwestern part of the site. As part of the discharge permit requirements for the facility and during the RFI process, water, sediment, and biota samples were collected from the drainage ditch. Several sediment samples contained elevated metal concentrations above applicable sediment standards (i.e., NJDEP Guidance for Sediment Quality Evaluations, Final Draft for Internal Use Only, March 1991). Two sediment samples (SED-1, SWS-2) contained lead (110 mg/kg, 83 mg/kg), mercury (0.29 mg/kg, 0.32 mg/kg), copper (130 mg/kg in each), and zinc (170 mg/kg, 150 mg/kg). Sediment sample SWS-1 contained mercury at 180 mg/kg. No other sediment, water or biota samples detected contamination above environmental standards. A qualitative ecological assessment was performed at this unit as part of the RFI. Based on the results of the ecological assessment, no further action was required for this unit by NJDEP.

AOC 1, Formulation Washdown Tank: This unit consisted of a 1,000 gallon UST with a stainless steel liner. The tank was located at the southeastern corner of the laboratory building.

Washdown from the formulation preparation laboratory and scrubber water from the laboratory air pollution control unit were stored in this tank prior to off-site disposal. The steel liner was added to this tank in 1988. The tank was removed in 1991, in conjunction with the RFI (Ref. 1). Removal activities included removal and inspection of the steel liner, excavation of the concrete vault and surrounding soil, sampling the excavated soil and wipe sampling of the tank liner, and collection of confirmation samples. No VOCs or pesticide constituents were detected in the confirmation soil samples, the excavated soil samples, or the wipe samples at concentrations above New Jersey standards. Thus, no further action was required for this tank by the NJDEP Bureau of Underground Storage Tanks (BUST).

AOC 2, 10,000-Gallon Diesel UST: This unit consisted of a 10,000-gallon UST used to store No. 2 fuel oil at the Formulations Building. The tank was removed and closed in 1992 per the requirements of the NJDEP BUST program.

AOC 3, Stream Adjacent to Outfall DSN 001: This AOC received discharges from the sanitary and laboratory wastewater treatment processes from SWMU 3 and the drainage ditch at Outfall DSN 001 (SWMU 3). The stream flows west along the southern boundary of the site, crossing the property line near the southwestern corner of the ACCo site. The site characterization activities and sample results for this AOC are described with SWMU 3. NJDEP has determined that no further action is required at this AOC.

AOC 4, Stream Adjacent to Outfall DSN 002: This AOC received discharges of storm sewers and non-contact cooling water from SWMU 4 and the Drainage Ditch at Outfall DSN 002 (SWMU 4). The stream flows east and northeast across the northern portion of the site, discharging to Duck Pond Run northeast of the ACCo site. The stream receives drainage from the Irrigation Pond and the Fire Pump Pond at the site. The site characterization and sample results for this AOC are described with SWMU 4. NJDEP has determined that no further action is required at this AOC.

AOC 5, Reactive Chemical Detonation Area: This area is located in the northwestern part of the site, southeast of Landfill No. 1. This area was an open field used for disposal of pyrophoric laboratory chemicals by detonation. During the RFI, five soil samples were collected and analyzed for VOCs (Ref. 1). No contaminants were detected in soil at this AOC, thus no further action was required by NJDEP.

AOCs 6 through 16, Petroleum USTs: Eleven USTs were present at the facility and used for the storage of petroleum products. Seven of the tanks contained No. 2 fuel oil, three tanks contained gasoline, and one tank contained No. 6 fuel oil. All of the storage tanks were removed and closed under the NJDEP BUST program. The tanks are summarized in Table 1 below.

Table 1 - AOCs 6 through 16, Petroleum USTs

Tank No.	Location	Capacity (gallons)	Contents	Status
E1	Research and Development	25,000	No. 2 Fuel Oil	Removed 1992
E3	T-6	500	No. 2 Fuel Oil	Removed 6/90
E4	Clinical Building	10,000	No. 2 Fuel Oil	Removed 1992
E5	Greenhouses	15,000	No. 2 Fuel Oil	Removed 1992
E6	Cafeteria	10,000	No. 2 Fuel Oil	Removed 6/90
E7	Poultry House	10,000	No. 2 Fuel Oil	Removed 6/90
E8	Farrowing House	1,000	No. 2 Fuel Oil	Removed 6/90
001	T-8	1,000	Regular Gasoline	Removed 6/90
002	Agronomy	1,000	Unleaded Gasoline	Removed 1992
003	Agronomy	1,000	Regular Gasoline	Removed 1992
C2	Research and Development	25,000	No. 6 Fuel Oil	Closed 1987

In summary, all SWMUs and AOCs require no further action or investigation with the exception of Landfill No. 2 (SWMU 2). Landfill No. 2 (SWMU 2) received a conditional no further action determination for soil on April 28, 1997. The conditional determination was contingent on the implementation of the DER, which was executed on October 2, 1996, and required that quarterly groundwater monitoring continue. According to the NJDEP, ACCo is also currently preparing documentation to implement a CEA which will restrict the use of groundwater in the area contamination associated with Landfill No. 2 (SWMU 2) (Ref. 6).

References:

1. RCRA Facility Investigation, American Cyanamid Company Agricultural Research Center, West Windsor, New Jersey. Prepared by Harding Lawson Associates. Dated June, 1992.
2. Remedial Action Report, American Cyanamid Company Agricultural Research Center. Prepared by Harding Lawson Associates. Dated September, 1995.
3. **Letter from Pamela Baker, American Cyanamid Company, to Robert Marcolina, NJDEP, Re: Declaration of Environmental Restriction. Dated October 11, 1996.**
4. Letter from Roman S. Luzecky, NJDEP, to Pamela Baker, Facility Environmental Engineer, Re: No Further Action for Soils, American Home Products Company. Dated April 28, 1997.
5. Fax from Jeannette Cleary, Bureau of Field Operations, NJDEP, to Agathe Nadai, USEPA, Re: Summary of Former Underground Storage Tanks. Dated February 1, 2001.
6. Telephone communication between Agathe Nadai, USEPA, and Robert Marcolina, NJDEP. February, 2001.

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?

- 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:

Background

Groundwater beneath the ACCo site occurs at approximately 15 feet below ground surface (bgs) across the southern portion of the site, and at approximately 6 feet bgs across the northern part of the site, where ground surface elevations are lower. The uppermost aquifer beneath the site is located in an unconsolidated overburden aquifer (Ref. 1). Water level data indicate that groundwater flow is to the north-northwest, with a horizontal hydraulic gradient of 0.004 to 0.006. A pumping test conducted during the RFI indicated a transmissivity of 6,070 square feet per day. At a depth of approximately 36 to 50 feet, the unconsolidated aquifer is underlain by bedrock. The bedrock beneath the site is comprised of sandstone in the northeastern part of the site, and metamorphic rock to the southwest. The bedrock aquifer is a fractured rock aquifer that occurs at depths of 36 to 59 feet below ground surface across the site (Ref. 1). Attachment 2 displays the overburden aquifer water level contours at the site.

Groundwater contamination was initially detected at the site during groundwater monitoring conducted at Landfill No. 2 (SWMU 2) (Ref. 1). Groundwater contamination was detected at wells MW-5 and MW-6, located north (downgradient) of the landfill. VOCs detected above the NJ GWQC included chloroform, 1,2-dichloroethane and carbon tetrachloride at these two wells. 4,4'-DDE, Alpha-BHC, and Gamma-BHC were detected at MW-7 and MW-8, which are completed in the unconsolidated aquifer immediately upgradient of Landfill No. 2 (SWMU 2). Additional monitoring was conducted to determine the extent of contamination in shallow groundwater during the CMS performed at the facility in 1992 (Ref. 2). Hydropunch borings were installed downgradient of wells MW-5 and MW-6 which delimited the contamination above NJ GWQC to an area approximately 150 feet north of wells MW-5 and MW-6. Quarterly and semi-annual monitoring conducted at the facility detected chloroform above the NJ GWQC

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).

at wells MW-5 and MW-6 beginning in July, 1988. The NJ GWQC for chloroform is 6 µg/l. Chloroform was detected at maximum concentrations in MW-5 at 1,150 µg/l and in MW-6 at 4,560 µg/l in January, 1993. No VOCs or pesticides have been detected above GWQC at the on-site downgradient well MW-12 (Ref. 3).

Observed trends of contaminant concentrations for major constituents detected in groundwater are listed in Table 2 below. It should be noted that the following table contains a selected subset of groundwater data in order to show trends of contaminant concentrations over time.

**Table 2 - Concentrations Trends for Major Contaminants Detected in SWMU 2
Monitoring Wells Between July, 1988 and September, 2000
(µg/L)**

Well	Contaminant	7/88	1/93	4/95	4/98	9/00	NJ GWQC
MW-5	Chloroform	150	1,150	31.8	11.7	10.0	6
	Carbon Tetrachloride	ND	ND	ND	ND	1.39	2
	Alpha-BHC	ND	ND	ND	ND	0.02	0.02
	4,4'DDE	ND	ND	ND	ND	ND	0.1
MW-6	Chloroform	24	4,560	3.61	ND	0.34	6
	Carbon Tetrachloride	ND	ND	ND	ND	ND	2
	Alpha-BHC	ND	ND	ND	0.09	ND	0.02
	Endrin	ND	ND	ND	ND	ND	2
	4,4'DDE	ND	ND	ND	ND	ND	0.1
MW-7	Chloroform	ND	3.82	ND	ND	0.35	2
	Alpha-BHC	ND	ND	0.24	ND	0.02	0.02
	Gamma-BHC	17	ND	19.2	5.22	1.29	0.2
MW-8	Alpha-BHC	ND	ND	0.08	ND	ND	0.02
	Gamma-BHC	0.57	ND	1.16	0.14	0.24	0.2
MW-12	1,1,1-Trichloroethane	NS	NS	NS	NS	1.66	30
	1,1,2-Trichloroethane	NS	NS	NS	NS	ND	3

ND= not detected. NS = not sampled.

Current Groundwater Conditions

Groundwater monitoring conducted at the facility has shown decreasing contaminant concentrations for most of the contaminants of concern (COC) at the facility. Contaminant concentrations have decreased in MW-5 and MW-6, with chloroform at 10 µg/l and 0.343 µg/l, respectively, during September, 2000.

BHC isomers were detected at concentrations just above the NJ GWQC in MW-6, MW-7 and MW-8 during the September, 2000 monitoring event. No other COCs exceeded the NJ GWQC at the site during the most recent monitoring event conducted at the ACCo facility.

References:

1. RCRA Facility Investigation, American Cyanamid Company Agricultural Research Center, West Windsor, New Jersey. Prepared by Harding Lawson Associates. Dated June, 1992.
2. Corrective Measures Study, American Cyanamid Company, Agricultural Research Center, West Windsor, New Jersey. Prepared by Harding Lawson Associates. Dated December, 1992.
3. Letter from C. Doughty, Eckenfelder Inc., to Agathe Nadai, USEPA Region 2, Re: Groundwater Monitoring Data Report. Dated January 12, 2001.

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)?

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:

The latest available groundwater monitoring data (September, 2000) indicate stable conditions at the area impacted by groundwater contamination at Landfill No. 2 (SWMU 2) (Ref. 3). Chloroform concentrations in MW-5 and MW-6 have decreased from concentrations over 1,000 µg/l in January, 1993, to 10 µg/l at MW-5 and 0.34 µg/l at MW-6 in September, 2000. While concentrations of chloroform are still above the NJ GWQC at MW-5 in the most recent sampling event, the concentration has dropped to a value within an order of magnitude of NJ GWQC (6 µg/l). Chloroform has not been detected in downgradient MW-12 during the post-remediation monitoring for Landfill No. 2 (SWMU 2).

Hydropunch and deeper well sampling performed in conjunction with the CMS did not reveal increasing contaminant trends with depth, indicating that the landfill release had primarily impacted the upper portion of the unconsolidated aquifer (Ref. 2). Data from the deeper portion of the unconsolidated aquifer did not indicate downward contaminant migration toward the bedrock aquifer. The vertical distribution of contamination in the shallow aquifer and the absence of hazardous constituents associated with Landfill No. 2 (SWMU 2) in bedrock monitoring or production wells indicate that the vertical extent of contamination at Landfill No. 2 (SWMU 2) has been fully characterized (Ref. 1).

Alpha-BHC and 4,4'-DDE have been detected at concentrations above NJ GWQC in the wells immediately upgradient and downgradient of Landfill No. 2 (SWMU 2), reflecting the impact of pesticide constituents in the shallow aquifer. These constituents have been detected in MW-5 and MW-6 but have not been detected downgradient of MW-5 and MW-6 during corrective action investigations at the site. The pesticide constituents are also expected to migrate very slowly in the shallow aquifer due to their high organic carbon partitioning coefficient, low solubility, and tendency to adsorb to soil. Monitoring data from wells MW-7 and MW-8 have shown that pesticide concentrations are higher upgradient of Landfill No. 2. The RFI report identified pesticide application on adjacent agricultural lands east and southeast of the facility as a potential source of the pesticide concentrations detected in groundwater at Landfill No. 2

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.

(Ref. 1). The monitoring data for the southern portion of the site indicate that VOC concentrations in groundwater have decreased in the area downgradient of Landfill No. 2 (SWMU 2) since the landfill contents were excavated and removed in 1994 and 1995. No VOC or pesticide constituents have been detected above NJ GWQC at the on-site downgradient monitoring well, MW-12. While chloroform and other VOCs are expected to be relatively mobile in groundwater, the high Henry's Law constant for the compound reflects the tendency for chloroform to volatilize to the subsurface vapor phase. Dispersion, adsorption, and biological degradation are also probably contributing to the decline in VOC concentrations observed in the shallow aquifer downgradient of Landfill No. 2 (SWMU 2).

References:

1. RCRA Facility Investigation, American Cyanamid Company Agricultural Research Center, West Windsor, New Jersey. Prepared by Harding Lawson Associates. Dated June, 1992.
2. Corrective Measures Study, American Cyanamid Company Agricultural Research Center, West Windsor, New Jersey. Prepared by Harding Lawson Associates. Dated December, 1992.
3. Letter from C. Doughty, Eckenfelder Inc., to Agathe Nadai, USEPA Region 2, Re: Groundwater Monitoring Data Report. Dated January 12, 2001.

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

___ 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:

The most recent monitoring data for the site indicate that the contamination from Landfill No. 2 (SWMU 2) has not resulted in groundwater contamination exceeding NJ GWQC in the shallow aquifer at MW-12, which is over 1,000 feet upgradient of the nearest surface water body (Fire Pump Pond) that may be potentially affected by shallow groundwater (Ref. 1). Post-remediation monitoring results immediately downgradient of the landfill (i.e., MW-5 and MW-6) have shown that VOC concentrations have decreased by over two orders of magnitude since the landfill material was excavated.

References:

1. Letter from C. Doughty, Eckenfelder Inc., to Agathe Nadai, USEPA Region 2, Re: Groundwater Monitoring Data Report. Dated January 12, 2001.

5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration³ 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 concentration³ 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 judgement/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 concentration³ 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 concentrations³ 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 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 implemented⁴)?

_____ 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-assessment⁵, 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 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 ecosystems.

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?”

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:

The ACCo facility is a permitted hazardous waste storage facility. Under the ACO issued by NJDEP, the facility is required to conduct groundwater monitoring at Landfill No. 2 (SWMU 2) to ensure that the remaining contamination does not migrate and cause unacceptable impacts to groundwater used as a water source, or to environmental receptors (Ref. 1). MW-5 through MW-8 and MW-12 are monitored on a quarterly basis, as required by NJDEP.

References:

1. Remedial Action Report, American Cyanamid Company, Agricultural Research Center. Prepared by Harding Lawson Associates. Dated September, 1995.

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).

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 American Cyanamid Facility, EPA ID# NJD002349009, located at the intersection of Quakerbridge and Clarksville Roads, in West Windsor, 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: _____
Stuart Strum
Hydrogeologist
Booz Allen & Hamilton

Reviewed by: _____ Date: _____
Robert Rau
Hydrogeologist
Booz Allen & Hamilton

Also Reviewed by: _____ Date: _____
Agathe Nadai, RPM
RCRA Programs Branch
EPA Region 2

_____ Date: _____
Barry Tornick, Section Chief
RCRA Programs Branch
EPA Region 2

Approved by: Original signed by: _____ Date: March 30, 2001
Raymond Basso, 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 the USEPA Region 2, RCRA Records Center, located at 290 Broadway, 15th Floor, New York, New York, and the New Jersey Department of Environmental Protection Office located at 401 East State Street, Records Center, 6th Floor, Trenton, New Jersey.

Contact telephone and e-mail numbers: Agathe Nadai, EPA RPM
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Attachments

The following attachments have been provided to support this EI determination.

- ▶ Attachment 1 - SWMU/AOC Map
- ▶ Attachment 2 - Overburden Aquifer Water Level Contours, March 1991
- ▶ Attachment 3 - Media Impacts Summary Table

Attachment 3 - Summary of Media Impacts Table

American Cyanamid (West Windsor)

	GW	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
SWMU 1. Landfill No. 1	No	No	Yes	No	No	Yes	No	▸ Soil Excavation, NFA	Metals
SWMU 2. Landfill No. 2	Yes	No	Yes	No	No	Yes	No	▸ Soil Excavation and Backfill ▸ DER (Conditional NFA for soil) ▸ Natural Attenuation and Groundwater Monitoring	VOCs, Pesticides
SWMU 3. Drainage Ditch at Outfall DSN 001	No	No	Yes	No	Yes	No	No	▸ Ecological Assessment, NFA	Metals
SWMU 4. Drainage Ditch at Outfall DSN 002	No	No	Yes	No	Yes	No	No	▸ Ecological Assessment, NFA	Metals
AOC 1. Formulations Washdown Tank	No	No	No	No	No	No	No	▸ Tank Removal, NFA	NA
AOC 2. 10,000-Gallon Diesel UST	No	No	No	No	No	No	No	▸ Tank Removal, NFA	NA
AOC 3. Stream Adjacent to Outfall DSN 001	No	No	Yes	No	Yes	No	No	▸ Ecological Assessment, NFA	Metals
AOC 4. Stream Adjacent to Outfall DSN 002	No	No	Yes	No	Yes	No	No	▸ Ecological Assessment, NFA	Metals
AOC 5. Reactive Chemical Detonation Area	No	No	No	No	No	No	No	▸ NFA	NA
AOCs 6-16. USTs	No	No	No	No	No	No	No	▸ Tank Closure and Removal under NJDEP BUST Program	NA

NFA - No Further Action

NA - Not applicable