

**Documentation of Environmental Indicator Determination
RCRA Corrective Action
Environmental Indicator (EI) RCRAInfo Code (CA725)**

Current Human Exposures under Control

Facility Name: Marisol, Inc.
Facility Address: 125 Factory Lane, Middlesex, Middlesex County, New Jersey
Facility EPA ID#: NJD002454544

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

X	If yes – check here and continue with #2 below
	If no – re-evaluate existing data, or
	If data are not available skip to #6 and enter “IN” (more information needed) status code

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EIs) are measures being used by the Resource Conservation and Recovery Act (RCRA) Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved) 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 “Current Human Exposures under Control” EI

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

Relationship of EI to Final Remedies

While final remedies remain the long-term 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 “Current Human Exposures under Control” EI is for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and does 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 determination status codes should remain in the Resource Conservation Recovery Act Information (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

Site Description

A detailed description of the site and its history is provided in the RFI Phase 1 Workplan for the Marisol, Inc. Facility (Ref. 1). The Marisol, Inc. facility (the site) is located at 125 Factory Lane, in Middlesex, Middlesex County, New Jersey. Figures 3 and 4 of the RFI Phase 1 Workplan show the past and current layout of the site. Following use in the early 20th century as a railroad engine maintenance yard, the site was purchased and developed into its current configuration by Marisol, beginning in 1968. During the 1970s, the western portion of the site was leased to a hazardous waste trucking firm. Marisol's historical and current operations have focused primarily on solvent recycling and blending of fuels for use in cement kilns. Additional activities performed during recent years include sale of virgin solvents and the repackaging and recycling of lab pack wastes.

The property is situated in an industrially-zoned area and the nearest residential properties are located approximately 400 feet to the north (hydraulically up-gradient). The site is bounded to the north by the Conrail (Lehigh Valley) and New Jersey Transit railroad lines and industrial properties further north, to the east by Reagent Chemical (Reagent) and other industrial properties further east, to the south by Factory Lane, the Conrail (Port Reading) railroad line and commercial/industrial properties further south; and to the west by vacant land owned by Reagent.

The site occupies 3.9 acres, all of which is utilized in Marisol's operations. The western one-third of the site is used for material receiving, administrative support, equipment maintenance and non-chemical storage. In this area are located the Office / Maintenance Building, two office trailers, equipment such as empty tank wagons and pallets and maintenance supplies. All operations involving the handling, storage and treatment of chemicals are performed in the eastern two-thirds of the site, in areas specially designed for such operations. Major site features in this area include four aboveground tank farms, drum and tanker wagon storage areas, the Utility and Technical Services Buildings, an office trailer and several trailers used for storage of supplies. In these areas, a specially designed concrete surface containment structure is in place to prevent precipitation runoff and release to the environment of any materials incidentally spilled. The containment slopes to two low areas where precipitation is collected in sumps and treated by air-stripping prior to discharge to the Middlesex County Utilities Authority (MCUA), the area's publicly owned treatment works (POTW). Bordering the production areas to the south is the Laboratory Building, where materials received at the site are tested to confirm waste stream chemical content. The facility parking lot is located west of the Laboratory Building.

Impermeable surfaces cover nearly the entire site; the only unpaved areas are a small landscaped area near the Laboratory Building entrance and a gravel-covered area near the Maintenance Building. The concrete cap, landscape vegetation and gravel function as physical barriers to the

underlying contaminated soil. In addition, any required subsurface work onsite is performed with appropriate health and safety precautions.

Operations by past occupants of the current Reagent Chemical property east of Marisol resulted in widespread contamination of soil, groundwater, surface water and sediment with pesticide compounds, principally arsenic. This property and 30 surrounding properties impacted by the past pesticide production are referred to as the Factory Lane Site (FLS) – Main Site and Peripheral Properties, respectively. The FLS responsible party, Bayer AG, successor to Aventis CropScience and Rhone-Poulenc Inc. (hereinafter, “Bayer”) and their consultants, URS Corporation (URS), S.S. Papadopoulos & Associates, Inc. and Arcadis, has performed extensive environmental investigation and remediation at the FLS since the early 1980s (Ref’s 2 through 8). A map excerpted from Reference 8 shows the industrial and commercial properties surrounding Marisol and the extent of the FLS (Attachment A).

As part of on-going remedial activities, the FLS responsible party has installed and regularly maintains chain link fencing on down-gradient properties where surface water is present. In addition, signs are posted which prohibit access and warn passersby of the presence of FLS related contaminants on the fenced land parcels. Bayer has completed Interim Remedial Measures (IRMs) for intermittent and perennial surface water drainage ditches down-gradient of the FLS Main Site. These IRMs included excavating shallow arsenic contaminated sediment and soil from the ditches and emplacement of engineered ditch liners and rip-rap backfill (Ref. 7). As later indicated, the fencing, signage and ditch IRMs completed to address FLS contaminant exposure concerns serve also to prevent exposure to any contaminants which may migrate to surface water or sediment from the Marisol site.

Site Regulatory History

In the early 1980’s, NJDEP concluded that historical releases during Marisol’s operations were one potential source of the volatile organic compounds (VOCs) impacts to groundwater in the bedrock aquifer and, on October 28, 1980, issued an Administrative Consent Order (ACO), which was later amended on January 29, 1981, September 30, 1983 and January 3, 1984. (A detailed description of Marisol’s regulatory history is included in Attachment J.) The actions required under the amended ACO included:

- Excavation and disposal of contaminated soils followed by installation of a reinforced concrete surface containment structure throughout production areas on-site
- Installation of four monitoring wells in the bedrock aquifer near the four corners of the site, according to NJDEP specifications
- Operation of Marisol’s production well at a pumping rate of at least 50,000 gallons per day, with treatment of the extracted groundwater via air-stripping prior to discharge to the sanitary sewer system, and
- Installation of a perched groundwater collection structure in the northeastern area of the site

On June 4, 2002, USEPA Region 2 issued a Final HSWA Permit for the Marisol facility, with an effective date of July 15, 2002. Module III of the HSWA Permit outlined specific requirements

for Corrective Action at the site, and identified the following Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs):

SWMU-1	RCRA Regulated Above Ground Storage Tanks
SWMU-2	Underground Storage Tanks
SWMU-3	RCRA Regulated Container Storage Areas
SWMU-4	Stormwater Collection System
SWMU-5	Tank Trailer Storage Area
SWMU-6	Railroad Car Staging Area
AOC-1	Drainage Ditches
AOC-2	Area between Tank Farm 100 and Tank Farm 200
AOC-3	Area between Tank Farm 300 and Tank Farm 400

The HSWA Permit required Marisol to perform a RCRA corrective action program, which include Release Assessments at SWMU-1, SWMU-2, SWMU-5 and SWMU-6 and a RFI Phase 1 at SWMU-3, AOC-1, AOC-2 and AOC-3. No further action was required for SWMU-4. Marisol is currently implementing the RCRA corrective action program designed to gather the data necessary to develop an appropriate final remedy to address the site-wide contamination. The final remedy may include any combination of physical/chemical treatment, monitored natural attenuation, and long-term groundwater monitoring.

Corrective Actions Completed to Date

Completed corrective actions relevant to evaluating CA725 include those completed on-site by Marisol pursuant to the ACO, and those completed on surrounding properties as IRMs by Bayer. Corrective actions completed by Marisol have included the emplacement of a concrete cap throughout production areas onsite and the operation of a pump at treat system to contain and remediate bedrock groundwater impacted by VOCs. Though not installed as remedy components, the perimeter fencing and pavement throughout non-production areas of the Marisol site restrict access to the site and prevent exposure to potentially contaminated subsurface soils.

Relevant corrective actions completed by Bayer on adjacent properties include:

- Installed geomembrane and geotextile liners and rip-rap stone caps in Conrail ditches to prevent direct contact with contaminated soil and to contain base flow
- Installed low-permeability liner and subdrain in Northern Boundary Ditch and Factory Lane Ditch adjacent to the FLS Main Site
- Installed an up-gradient cutoff wall, low-permeability cap and horizontal drain to intercept perched groundwater on the FLS Main Site
- Installed secure fencing on the River Road Citgo, Conrail Port Reading, Reagent West Yard, and Elizabethtown Water Company properties

The liners and riprap and fencing currently in place prevent direct contact with contaminated media at the ditch locations. Subdrains installed below the Northern Boundary Ditch and Factory Lane Ditch adjacent to the FLS Main Site, and the horizontal drain on the FLS Main Site will be linked with additional remedy components to be installed during a Phase 2 Perched Groundwater Remedy for the FLS. During Phase 2, subdrains for collection of discharging groundwater will be extended through the lowland areas of the Northern Boundary Ditch and Factory Lane Ditch

and through the Raritan River Ditch, extending to the Raritan River. Perched groundwater collected in this system will be treated for FLS pesticide constituents and for VOCs (Ref. 7).

Pursuant to the RFI Phase 1 Workplan, soil borings were completed at 33 locations across the site, including SWMUs and AOCs identified in the HSWA Permit. Laboratory analysis of soil and groundwater samples collected from these borings has provided a thorough characterization of soil and groundwater conditions on the site. These data, along with results of other RFI Phase 1 sampling by Marisol and information generated during offsite investigations by others, provide the basis for the assessment of CA725 presented in the remainder of this document.

Attachments D through G provide tables and maps which summarize groundwater, soil and surface water concentrations exceeding applicable standards relevant to the CA725 assessment. Marisol evaluated groundwater contaminants using the higher of the New Jersey Groundwater Quality Standards (GWQS) for Class II-A potable aquifers or the Practical Quantitation Levels (PQLs). The groundwater to indoor air pathway was evaluated by comparing groundwater contaminant concentrations to groundwater target levels for risk levels of 1.0×10^{-5} in Table 2b of the OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, dated November 29, 2002. Surface soil (0-2.0' below grade) and subsurface soil contaminants were evaluated using the New Jersey Non-Residential Direct Contact Soil Cleanup Criteria (Non-Residential SCC). Because there is no residential land use on or near the site, only the soil contaminants exceeding the NJDEP Non-Residential SCC are of concern for current site conditions. Surface water quality was compared to the New Jersey Surface Water Quality Standards (SWQS) for FW2 waters.

All of the SWMUs and AOCs are underneath concrete pavement. The RFI Phase 1 site-wide characterization approach has reasonably delineated the soil contamination on-site and contaminated groundwater impacts.

It should be noted that access at the facility is secured. Unauthorized site access is prevented by chain-link fencing which surrounds all areas of the property where production, transport and storage take place. The only areas not enclosed within the fence are the facility parking lot and the landscaped walkway leading to the Laboratory Building. The fence abuts the northwest and southeast corners of the Laboratory Building. All regularly-used entrance points, including the Laboratory Building's southwest entrance, are through electronically controlled gates and doors, monitored and controlled by personnel in Marisol's traffic office on-site. Electronic keycards are issued to Marisol employees to allow them ready access to the facility. Two gates without electronic controls are present in the fence bordering the railroad property to the north, one behind the Maintenance / Office Building in the western third of the property and one that provides access through the railroad siding near the eastern end of the property. These gates are kept locked except when in use and under observation by Marisol personnel.

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

Media	Yes	No	?	Rationale / Key Contaminants
Groundwater	X			VOCs, SVOCs
Air (indoors) ²		X		See below.
Surface Soil (e.g., <2 ft)	X			VOCs
Surface Water	X			VOCs
Sediment		X		
Subsurface Soil (e.g., >2 ft)	X			VOCs
Air (outdoors)		X		

	If no (for all media) skip to #6 and enter “YE” status code after providing or citing appropriate “levels” and referencing sufficient supporting documentation demonstrating that these “levels” are not exceeded.
X	If yes (for all media) – continue after identifying key contaminants in each “contaminated” medium, citing appropriate “levels” (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.
	If unknown (for any media) – skip to #6 and enter “IN” status code.

Rationale:

To understand the contamination at the site, a description of the environmental setting and site hydrogeology is needed.

Environmental Setting

Surface water bodies in the site vicinity include a network of ditches, the Raritan River and Green Brook, as shown on Attachment B. As noted in the December 1997 Remedial Action Workplan for the Factory Lane Site (SSP&A), the ditches were constructed in conjunction with the railroad tracks in the early 1900s, to drain the tracks and to lower water levels in the shallow perched groundwater system. The ditches include:

- North Railroad Ditch north of the New Jersey Transit railroad tracks
- Northern Boundary Ditch between Marisol and the Conrail Lehigh Valley line to the north

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

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

- Central Railroad Ditch north of the Conrail Lehigh Valley line
- Factory Lane Ditch between Factory Lane and the Conrail Port Reading line to the south
- Raritan River Ditch, which connects the latter features to the Raritan River and
- The South Railroad Ditch south of the Conrail Port Reading line

The North Railroad Ditch discharges to Green Brook and the South Railroad Ditch discharges to a storm sewer on the Container Corporation property. The Northern Boundary Ditch, Central Railroad Ditch and Factory Lane Ditch join with the Raritan River Ditch, which discharges to the Raritan River at a point 900 feet downstream of the Marisol site. As noted below, site conditions preclude run-off to the ditches from the Marisol site.

Another feature which influences surface water flow is the Conrail Ballast Underdrain, which discharges to the Raritan River Ditch immediately west of Marisol's northwest property corner. This structure, which is also shown on Attachment B, collects shallow groundwater from beneath the railroad line north of the industrial properties along Factory Lane and may extend as much as a mile up-gradient (eastward) of its discharge point (Ref. 9).

Attachment C shows a conceptual model of geologic, hydrogeologic and contaminant transport conditions in the vicinity of the Marisol site. The site is underlain by unconsolidated overburden and gently dipping, interbedded siltstone, mudstone and shale of the Passaic Formation. The overburden consists of glacial outwash sediments (silty sand with traces of gravel and lenses of clay), localized areas of manmade fill and a zone of weathered, clay-rich material that separates the overburden from the underlying, unweathered bedrock. The thickness of the overburden ranges from about six feet in the eastern part of the Marisol property to about sixteen feet near the western property boundary (Ref. 14).

Hydrogeologic investigations (Refs. 2, 3, 10 and 11) indicate that groundwater in the site vicinity occurs in two separate zones: shallow perched groundwater and bedrock groundwater. The perched groundwater zone occurs within the overburden unit, primarily in the outwash materials. The underlying weathered, clay-rich material is typically moist to dry and therefore marks the lower boundary of the perched zone. The saturated thickness of the perched zone ranges from several feet in the eastern portion of the site to about eight feet near Marisol's western property boundary. The water table in the perched zone occurs at depths between five and ten feet below grade and perched groundwater flows in a westerly direction, toward the Raritan River. As discussed below, water is exchanged between the perched zone and several shallow drainage ditches, toward which perched groundwater flow is locally-directed.

Bedrock groundwater occurs in the underlying competent bedrock, beginning at depths of approximately twenty to thirty feet below grade. In this unit, groundwater flow takes place along bedding plane partings and vertically inclined fractures. Regionally, groundwater flow in the bedrock aquifer is in a westerly direction, toward the Raritan River. However, operation of industrial supply wells on the Marisol and Reagent Office properties has lowered water levels in the bedrock aquifer below surface water levels in the Raritan River and Green Brook. As a result, the natural flow system has been reversed down-gradient of the Marisol site. Surface water now discharges from these water bodies to the bedrock aquifer and is drawn under the influence of pumping toward the industrial supply wells.

This condition has been documented during monitoring performed for the FLS investigations and is the basis for the selected remedy for FLS-related bedrock groundwater contamination: continued pumping of Marisol's production well to maintain a capture zone (Refs. 3 and 4).

Groundwater

As summarized in the tables and maps presented in Attachment D, several volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) have been detected in perched groundwater onsite at concentrations above New Jersey GWQSS for Class IIA aquifers. Highest concentrations were observed at sampling locations in the eastern half of the site, where a number of chlorinated VOCs, plus benzene, toluene, ethylbenzene and xylene (BTEX) significantly exceeded their respective GWQSSs. In samples collected from direct-push borings in the western portion of the site, fewer compounds exceeded GWQSSs and the concentrations observed were lower. SVOCs are not present above GWQSSs at offsite locations down-gradient and it is evident that VOC concentrations attenuate rapidly down-gradient of the site.

Sampling during the FLS investigation identified areas of VOC impacted groundwater in the bedrock aquifer at concentrations in excess of GWQSSs in the site vicinity (Ref. 3). As noted in the response to Question 3, these areas are wholly within the capture zone formed by pumping of Marisol's production well and the bedrock aquifer is not used as a potable supply in the site vicinity.

Air (Indoors)

As indicated in the maps and tables contained in Attachment E, exceedences of groundwater target values for 1.0×10^{-5} risk outlined in Table 2b of the OSWER Draft Vapor Intrusion Guidance were noted at perched groundwater sampling locations. Constituents exceeding the 1.0×10^{-5} risk target values in groundwater samples collected on-site included 16 chlorinated VOCs, plus BTEX. Off-site groundwater sampling identified ten chlorinated VOCs, plus benzene and toluene at concentrations above the target values. With the exception of two samples (P-18 and P-32) collected on undeveloped properties immediately adjacent to the Marisol site, groundwater VOCs concentrations at off-site locations were hundreds to thousands of times lower than on-site concentrations and fewer compounds exceeded the target values. Nonetheless, several minor exceedences of the 1.0×10^{-5} risk target values were noted.

Although comparisons to the target screening criteria suggest the hypothetical possibility of an unacceptable risk to indoor-air, actual sampling of indoor-air indicates no such apparent risk exists. As detailed in Progress Report #5 (Ref. 13), Marisol collected an indoor-air sample using a Summa Canister over a ten-hour period on August 27, 2003, based on a reasonable worst-case scenario. The sample was collected in the lunchroom of the Laboratory Building, which is located immediately down-gradient of the most contaminated area of the site (and where exceedences of the 1.0×10^{-5} risk target values for groundwater concentration are thousands of times greater than observed off-site). Results of the indoor-air quality sampling on the Marisol facility indicated no VOCs above applicable OSHA workplace standards and no vapor intrusion-related impact to indoor-air. (Four compounds, methylene chloride, TCE, PCE and acetone, were detected above the health-based indoor-air screening criteria in the indoor-air sample collected in the Laboratory Building. These compounds appear to be are part of the waste stream and its

detection is likely to be attributed to operations within the laboratory building and not from vapor intrusion. Note that these compounds do not exceed the OSHA standards.)

Off-site properties that can be potentially impacted by VOCs in the shallow groundwater are Bridgewater Disposal and Century Office Products (both are considered commercial/ industrial setting). An off-site vapor intrusion-related indoor-air impact is unlikely because building construction and site usage at the off-site locations are similar to on-site building construction and usage (industrial). None of the four compounds detected above the indoor-air screening criteria (which is health-based) in the indoor-air sample collected in the laboratory building were detected in off-site groundwater samples on the Bridgewater Disposal and Century properties at concentrations exceeding the groundwater vapor intrusion screening criteria. The maximum concentrations of methylene chloride, TCE, PCE and acetone detected in groundwater on these properties were 16 ug/L, 1.3 ug/L, 1.5 ug/L and 15 ug/L, respectively. These concentrations range between **three thousand and fifty thousand times lower** than the concentrations detected on-site near the Laboratory Building at sampling locations MW-5 and B-15GW. (Ref. 18)

Comparison of the on-site indoor-air sampling results with the indoor-air screening criteria provides further support for the conclusion that concentrations of benzene and vinyl chloride in groundwater on the Bridgewater Disposal and Century properties would not result in unacceptable vapor intrusion risk. Neither compound was detected in the on-site indoor-air sample at a concentration above the indoor-air screening criteria (vinyl chloride was not detected), despite the fact that groundwater in this area (where the indoor-air sample was taken) exhibits concentrations of both compounds one thousand times greater than the groundwater vapor intrusion screening criteria. Therefore, the groundwater vapor intrusion screening criteria appears to significantly overestimate the vapor intrusion risk for vinyl chloride and benzene at this site (and site conditions).

The maximum vinyl chloride and benzene concentrations detected in groundwater on the Bridgewater Disposal and Century properties were 850 and 18 times lower, respectively, than concentrations of these compounds detected in groundwater immediately up-gradient of the Laboratory Building on-site at MW-5. The down-gradient attenuation in groundwater concentrations of these compounds and the absence of an on-site indoor-air impact near the source indicate that an unacceptable vapor intrusion risk does not appear to exist at off-site locations. Marisol concludes that site-related subsurface VOCs contamination poses no unacceptable risk via the vapor intrusion pathway (on-site and off-site).

Surface/Subsurface Soil

As shown in the tables presented as Attachment F and on figures attached to Progress Report #2 (Ref. 14), surface soil (< 2 feet bgs) and subsurface soil (> 2 feet bgs) have been impacted at the site by VOCs at concentrations above NJDEP Non-Residential SCC. Constituents detected at concentrations above the Non-Residential SCC included: the VOCs chloroform, 1,1,1-trichloroethane, carbon tetrachloride, trichloroethene, tetrachloroethene and BTEX. Concentrations were generally highest in subsurface soils and most of the above-criteria detections were limited to the eastern one-half of the facility. All of the samples for which exceedances of Non-Residential SCC were noted were collected beneath paved portions of the site.

Note that the term surface soil is somewhat misleading at this facility, because almost all of the property is covered either by concrete or asphalt. Only those contaminants exceeding the Non-Residential SCC are of concern for current site conditions because the facility is an industrial site and all areas surrounding the site are zoned for industrial or commercial use. As noted in the response to Question 3, the surface cover and appropriate work practices at the facility prevent exposure to contaminated soils beneath the site.

Surface Water/Sediment

Surface Water

Marisol obtained data from surface water sampling performed by others on properties downgradient of the Marisol facility. In October 2003, the Edison Wetlands Association (EWA) analyzed for VOCs one surface water sample collected from the Raritan River Ditch at its point of discharge to the Raritan River. This sample was designated “Outfall 1” (Ref. 15). During a pilot treatability study for arsenic in perched groundwater from the FLS, S.S. Papadopoulos & Associates, Inc. analyzed for VOCs a sample of water flowing into the pilot treatment system via a connection to the Conrail Ballast Underdrain, designated “SSP-6” (Ref. 6). As noted in the Environmental Setting description above, the Conrail Ballast Underdrain collects shallow groundwater from beneath the railroad line north of the industrial properties along Factory Lane and discharges to the Raritan River Ditch at its point of origin, west of Marisol’s northwest property corner.

As shown on the table provided in Attachment G, several VOCs were detected during these offsite investigations, including trichloroethene in the ballast underdrain sample at a concentration above its New Jersey Surface Water Quality Standard (SWQS) for FW2 waters. As described in the response to Question 3, site conditions on the downstream properties prevent human exposure to surface water.

Sediment

It is inherently difficult to determine the potential Marisol-related impacts to sediment in the down-gradient drainage areas due to the regional contribution to the drainage system. However, any such impacts would originate through the same mechanisms causing surface water impacts, the area of sediment impact would likely coincide with or be contained within the area of impacted surface water. Based on the relatively low VOC and SVOC concentrations observed in surface water samples, which do not suggest the presence of free product on the water surface (which visual inspections confirm does not exist), sediment impacts above applicable human health based criteria (e.g., NJDEP Soil Cleanup Criteria) are unlikely.

Air (Outdoors)

Results of ambient air monitoring performed for OSHA compliance indicates that there are no impacts to outdoor air at the facility above OSHA Permissible Exposure Limits for the workplace. The concrete and asphalt cover present over almost the entire site, including all of the most-contaminated areas, forms a continuous barrier which prevents volatilization of VOCs from the subsurface. In addition, the concrete and asphalt, along with the grass and crushed stone cover in remaining areas, prevents dust formation and particle bound transport of VOCs or SVOCs to outdoor air.

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

Summary Exposure Pathway Evaluation Table

Potential Human Receptors (Under Current Conditions)							
Contaminated Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food ³
Groundwater	NO	NO	NO	YES			NO
Air (indoors)	NA	NA	NA	NA	NA	NA	NA
Soil (surface, e.g., <2 ft)	NO	NO	NO	NO	NO	NO	NO
Surface Water	NO	NO			NO	NO	NO
Sediment	NA	NA	NA	NA	NA	NA	NA
Soil(subsurface e.g., >2 ft)				YES			No
Air (outdoors)	NA	NA	NA	NA	NA	NA	NA

Instructions for Summary Exposure Pathway Evaluation Table

- Strike out specific Media (including Human Receptors’ spaces for Media which are not “contaminated”) as identified in #2 above.
- Enter “yes” or “no” for potential “completeness” under each “contaminated” Media – Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations, some potential “Contaminated” Media – Human Receptor combinations (Pathways) are shaded gray. While these conditions may not be probable in most situations they may be possible in some settings and should be added as necessary.

	If no (pathways are not complete for any contaminated media-receptor combination) – skip to #6 and enter “YE” status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional <u>Pathway Evaluation Work Sheet</u> to analyze major pathways).
X	If yes (pathways are complete for any “Contaminated” Media – Human Receptor combination) – continue after providing supporting explanation.
	If unknown (for any “Contaminated” Media – Human Receptor combination) – skip to #6 and enter “IN” status code.

Rationale:

Groundwater

As presented in response to Question 2, groundwater impacts potentially related to conditions at the site are limited to an area zoned for industrial and commercial use. The extent of impacts in the perched zone does not extend down-gradient to the Raritan River. Additionally, as documented in Progress Report #3 (Ref. 16), the relatively small size of the plume, the low off-site concentrations, the presence of biodegradation daughter products in groundwater samples collected onsite and offsite and the prevalence of reducing conditions onsite (low dissolved oxygen and oxidation/reduction potential) indicate that natural attenuation processes are functioning to limit down-gradient migration in the perched zone. Groundwater in the perched

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

zone is not used for any purpose and, as described in the response below for surface water, conditions at down-gradient and adjacent properties prevent human exposure to perched groundwater which may discharge to surface water drainage pathways.

Contamination in the bedrock aquifer which may be attributable to conditions at the site is contained within a large capture zone created by ongoing operation of the Marisol production well. Groundwater elevations in the bedrock aquifer are lower than surface water elevations in the Raritan River, indicating a reversal of the natural gradient and confirmation that the capture zone extends radially “down-gradient” at least to the river (Ref. 3).

As documented in Progress Reports #3 and #4 (Refs. 16 and 17), a thorough well search and water supply survey determined that groundwater within one-half mile of the facility is not used for potable purposes. The exposure pathway between groundwater and Residents, Workers, and Day-Care (there is no Day-Care on the site) is considered incomplete. However, the exposure pathway between groundwater and Construction worker is considered complete, where excavation into the subsurface is required.

Surface/Subsurface Soil

As presented in response to Question 2, concentrations of VOCs above New Jersey Non-Residential SCC were noted at several locations onsite. All such exceedences were in areas covered by pavement. The exposure pathway is considered incomplete for surface soil and construction worker. However, the exposure pathway between subsurface soil and construction worker is considered complete, where excavation into the subsurface is required.

Surface Water

As noted in the response to Question 2, site related surface water contamination above New Jersey Surface Water Quality Standards (SWQS) was identified in one of the two samples collected. However, current conditions on the properties where surface water occurs in the site vicinity are such that human exposures cannot be reasonably expected. Photographs documenting current conditions in these areas are included as Attachment H.

The concrete surface containment paving, which covers production areas on the Marisol site, directs all potentially contaminated stormwater to a central location for onsite treatment via air-stripping. Therefore, surface runoff is not a mechanism by which contaminants may be transported from the site and nearby drainage features fed mainly by runoff are not at risk. Conversely, surface water and sediment impacts may occur in areas where contaminated groundwater from the perched zone discharges to surface drainage features.

The site is located in the Raritan River drainage basin. Surface water in the Raritan River is classified in the SWQS as “FW2”. Designated uses for FW2 waters include: Maintenance, migration and propagation of the natural and established biota; primary and secondary contact recreation; industrial and agricultural water supply; public potable water supply after conventional filtration treatment (a series of processes including filtration, flocculation, coagulation, and sedimentation, resulting in substantial particulate removal but no consistent removal of chemical constituents) and disinfection; and any other reasonable uses.

Other surface drainage features in closest proximity to the Marisol site (Attachment B) include:

- The Northern Boundary Ditch between Marisol and the Conrail Lehigh Valley line to the north
- The Central Railroad Ditch north of the Conrail Lehigh Valley line
- The Factory Lane Ditch between Factory Lane and the Conrail Port Reading line to the south
- The Raritan River Ditch, which connects the latter features to the Raritan River (located 900 feet downstream of the Marisol site) and
- The South Railroad Ditch south of the Conrail Port Reading line

Based on surface water and groundwater monitoring performed by Bayer over many years in connection with the Factory Lane Site investigation, the Northern Boundary Ditch, Central Railroad Ditch, Factory Lane Ditch and South Railroad Ditch are generally dry except following storm events. Therefore, flow in these ditches is infrequent and consists mostly of stormwater run-off (Ref. 3). In addition, Bayer performed extensive remediation of these ditches in 1991 and 1992, removing arsenic-contaminated sediment and soil and emplacing liner materials and rip-rap in the remediated areas. The rip-rap provides a contained layer which under current conditions prevents human contact with any baseflow in the ditches (Ref. 7).

Conversely, the Raritan River Ditch exhibits perennial flow and is in part fed by discharge of shallow groundwater in areas down-gradient of the Marisol site (Ref. 3). Another source of flow to the Raritan River Ditch is the Conrail Ballast Underdrain, which discharges to the ditch immediately west of Marisol's northwest property corner. This structure is believed to collect shallow groundwater from beneath the railroad line north of the industrial properties along Factory Lane and may extend as much as a mile up-gradient (eastward) of its discharge point (Ref. 9). Water flowing from the pipe has been previously documented to contain VOCs and arsenic, and a portion of the flow was diverted to the FLS perched groundwater pilot study treatment system (Ref. 6).

Based on the above, the Raritan River Ditch is the main area where discharge of perched zone groundwater might impact surface water. On February 19, 2003, Marisol inspected and photographed the Raritan River Ditch drainage areas to assess potential for human contact with surface water down-gradient of the Marisol site (Attachment H). During the inspection, physical conditions were identified which prevent access to water in the ditch along its entire length. All properties on which the ditch is expressed at grade have been fenced with signs posted by Bayer as part of the Factory Lane Site remediation. The segments of this drainage passing under Factory Lane, the Conrail railroad line and River Road are conveyed via underground piping. Based on these findings, access to the ditch is limited and potential human exposures (including trespassers) to contaminants in the water are under control. The exposure pathways between surface water and Residents, Workers, Trespassers, and Recreation are considered incomplete.

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

X	If no (exposures cannot be reasonably expected to be significant (i.e., potentially “unacceptable”) for any complete exposure pathway) - skip to #6 and enter “YE” status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”
	If yes (exposures could be reasonably expected to be “significant” (i.e., potentially “unacceptable”) for any complete exposure pathway) - continue after providing a description (of each potentially “unacceptable” exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”
	If unknown (for any complete pathway) - skip to #6 and enter “IN” status code.

Rationale:

Groundwater

As documented in Progress Reports #3 and #4 (Refs. 16 and 17), a thorough well search and water supply survey determined that groundwater within one-half mile of the facility is not used for potable purposes.

As documented in Attachment I, Marisol has recently notified owners of property on which perched groundwater contamination was identified during RFI Phase 1 of the contamination, recommending that appropriate Health and Safety precautions be observed during any subsurface construction activities. Inadvertent on-site exposure to contaminated perched groundwater by workers at the Marisol facility is precluded by the depth of the groundwater and the presence of paved surfaces across almost the entire facility. In addition, Marisol workers are familiar with the subsurface conditions and apply appropriate Health and Safety precautions during any on-site subsurface construction activities. In addition, any construction at the site must be approved by Marisol’s Environmental Coordinator, who is familiar with the subsurface conditions. Construction workers must be trained, observe OSHA requirements, and apply appropriate Health and Safety precautions during any on-site subsurface construction activities.

Based on the conditions and controls described, exposure to groundwater contamination by construction worker cannot reasonably be expected (under the current land- and groundwater-use conditions) to be significant.

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

Surface/Subsurface Soil

As presented in response to Question 2, concentrations of VOCs above New Jersey Non-Residential SCC were noted at several locations onsite. However, all such exceedences were in areas covered by pavement, precluding the possibility of inadvertent direct contact exposure to groundwater by workers at the facility. In addition, Marisol workers are familiar with the subsurface conditions and observe OSHA requirements and apply appropriate Health and Safety precautions during any onsite subsurface construction activities.

In addition, any construction at the site must be approved by Marisol's Environmental Coordinator, who is familiar with the subsurface conditions. Construction workers must be trained, observe OSHA requirements, and apply appropriate Health and Safety precautions during any on-site subsurface construction activities.

Based on the conditions and controls described, exposure to subsurface soil contamination by construction worker cannot reasonably be expected (under the current land- and groundwater-use conditions) to be significant.

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

	If yes (all “significant” exposures have been shown to be within acceptable limits) - continue and enter “YE” after summarizing and referencing documentation justifying why all “significant” exposures to “contamination” are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).
	If no (there are current exposures that can be reasonably expected to be “unacceptable”)- continue and enter “NO” status code after providing a description of each potentially “unacceptable” exposure.
	If unknown (for any potentially “unacceptable” exposure) - continue and enter “IN” status code.

Rationale:

This question is not applicable.

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

X	YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI determination, "Current Human Exposures" are expected to be "Under Control" at the Marisol, Inc. Facility, EPA ID# NJD002454544, located at 125 Factory Lane, Middlesex, Middlesex County, New Jersey, under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.
	NO - "Current Human Exposures" are NOT "Under Control."
	IN - More information is needed to make a determination.

References:

1. RCRA Facility Investigation Phase 1 Workplan for the Marisol, Inc. Facility. Prepared by Princeton Geoscience, Inc. November 1, 2002.
2. Remedial Action Workplan – Factory Lane Site. Prepared by S.S. Papadopoulos & Associates, Inc. August 1995.
3. Remedial Action Workplan – Factory Lane Site. Prepared by S.S. Papadopoulos & Associates, Inc. December 1997.
4. Factory Lane Site Status Update – Presented to NJDEP Site Remediation Program. Prepared by URS Corporation. October 28, 2003
5. Remedial Design Proposal, Perched Groundwater Contamination – Supplement to Remedial Action Workplan - Factory Lane Site. Prepared by S.S. Papadopoulos & Associates, Inc. August 5, 1999
6. Groundwater Treatment Pilot Study – Factory Lane Site. Prepared by S.S. Papadopoulos & Associates, Inc. June 26, 2002
7. Remedial Design Proposal Addendum No. 2, Perched Groundwater Contamination – Factory Lane Site. Prepared by Arcadis. September 19, 2003.
8. 2003 Annual Progress Report (Progress Report No. 71) – Factory Lane Site. Prepared by URS Corporation. January 30, 2004.
9. Supplemental Work Plan for Investigation of a Buried Drain Pipe North of Factory Lane Site – Volume II. Prepared by Woodward-Clyde Consultants. August 1987.
10. Remedial Investigation – River Road Landfill Site – Union Carbide. Prepared by Environmental Resources Management, Inc. October 25, 1991.
11. Phase II Remedial Investigation – Polyolefins Plant – Union Carbide. Prepared by Environmental Resources Management, Inc. November 15, 1991.
12. Progress Report #1 – Third Quarter 2002 – Marisol, Inc. RCRA Corrective Action (originally titled “Summary of September 25, 2002 Project Meeting”). Prepared by Princeton Geoscience, Inc. October 1, 2002.
13. Progress Report #5 – Third Quarter 2003 – Marisol, Inc. RCRA Corrective Action. Prepared by Princeton Geoscience, Inc. October 15, 2003.
14. Progress Report #2 – Fourth Quarter 2002 – Marisol, Inc. RCRA Corrective Action. Prepared by Princeton Geoscience, Inc. January 15, 2003.
15. Site Sampling Report – October 16, 2003 Factory Lane Outfall 1 Surface Water Sampling. Prepared by Edison Wetlands Association. October 22, 2003.

16. Progress Report #3 – First Quarter 2003 – Marisol, Inc. RCRA Corrective Action. Prepared by Princeton Geoscience, Inc. April 15, 2003.
17. Progress Report #4 – Second Quarter 2003 – Marisol, Inc. RCRA Corrective Action. Prepared by Princeton Geoscience, Inc. July 15, 2003.
18. Vapor Intrusion Follow-up Assessment – Marisol, Inc. Prepared by Princeton Geoscience, Inc. September 12, 2003.

Attachments:

- A. Industrial and Commercial Properties Surrounding the Marisol Facility and Limits of Factory Lane Site
- B. Surface Water Drainage Pathways in the Vicinity of the Site
- C. Site Conceptual Model
- D. Summary of RFI Phase 1 Perched Zone Groundwater Sampling Results compared to NJDEP Class IIA Groundwater Quality Standards
- E. Summary of RFI Phase 1 Perched Zone Groundwater Sampling Results compared to 10-5 Risk Screening Levels Specified in the OSWER Draft Vapor Intrusion Guidance
- F. Summary of RFI Phase 1 Soil Sampling Results compared to NJDEP Non-Residential Soil Cleanup Criteria
- G. Summary of Off-site Surface Water Sampling Results compared to NJDEP Surface Water Quality Standards for FW2 Classified Waters
- H. Photographs Documenting Current Conditions on the Site and in Adjacent and Downgradient Areas of Surface Water Drainage
- I. Copies of Letters Sent to Nearby Property Owners Providing Notification of Perched Groundwater Contamination
- J. Description of Site Regulatory History

Completed by:

Clifford Ng,
Project Manager
RCRA Programs Branch
EPA Region 2

Signature: _____ Date: _____

Barry Tornick, Section Chief
RCRA Programs Branch
EPA Region 2

Signature: _____ Date: _____

Approved by:

Adolph Everett, P.E., Chief
RCRA Programs Branch
EPA Region 2

Signature: Original signed by:

Date: September 29, 2005

Locations where references may be found:

References reviewed to prepare this EI determination are cited within the text of each response and listed by number after the response to Question 6. Referenced materials are available for review at two separate locations. For access to documents in USEPA files pertaining to the Marisol, Inc. facility (including document Reference Nos. 1, 12, 13, 14, 16 and 17), please contact the USEPA Region 2, RCRA Records Center, located at 290 Broadway, 15th Floor, New York, New York.

Other referenced documents, which pertain to investigation and remediation of the surrounding Factory Lane Site (a.k.a., "Chipman Chemical") by Bayer AG (successor to Aventis CropScience and Rhone-Poulenc Inc.) and to the nearby Dow (formerly Union Carbide) properties, are available for review at 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:

Clifford Ng, EPA RPM
(212) 637-4113
ng.clifford@epamail.epa.gov

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