DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Facility Name: Givaudan Roure Corporation
Facility Address: 125 Delawanna Avenue, Clifton, New Jersey
Facility EPA ID#: NJD002156354

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 and Recovery Information System (RCRIS) national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

Facility Information

The former Givaudan Roure Corporation (Givaudan) facility is currently owned and operated by the Morris Companies, except for a small portion of the site (southern parcel) to which Givaudan retained

ownership. For the purposes of this EI document, the former Givaudan site includes both the northern parcel owned by the Morris Companies and the southern parcel owned by Givaudan. The site is situated on approximately 31 acres in Clifton, Passaic County, New Jersey. It is bordered on the northeast by Delawanna Avenue, to the west by New Jersey Transit commuter and freight rail lines, to the southeast by a small medium-density housing community located on a hill, to the south by small businesses located on River Road, and to the southwest by River Road. The site slopes slightly from west to east. At the central eastern property boundary, the topography rises steeply to the residential property that overlooks the site. Buildings occupied by light industrial/commercial businesses are located across the New Jersey Transit rail line to the west. The Passaic River is located approximately 0.3 miles to the southeast of the site and is tidally influenced at this location. The Third River, a tributary to the Passaic River, is located approximately 0.2 miles southwest of the site.

The property has been in active industrial use since 1905. Givaudan purchased the majority of the original site from Antoine Chiris in 1924. Givaudan purchased two other portions of the site along the southwest side of the property from National Anode Corporation and Capes-Viscose Corporation in 1926 and 1931, respectively. In April 1997, Givaudan announced that the site would be decommissioned, thus triggering Industrial Site Recovery Act (ISRA) requirements and compliance with the March 5, 1987, Administrative Order on Consent (ACO). Givaudan ceased operation of the facility in July 1998.

Givaudan manufactured flavors, fragrances, and specialty chemicals such as pharmaceutical intermediates and pesticides. Operations were conducted in three manufacturing areas: the chemical operations area, the fragrances area, and the flavors area. Givaudan and previous owners of the site used portions of the property for waste disposal in areas including various cesspools, spent acid pits, a chemical landfill, and two chemical effluent pits. A chemical sewer system was installed in the 1960s to collect and discharge process wastewater. Portions of the original sewer were abandoned and replaced in the mid-1980s, while other portions were retrofitted with the new chemical sewer that consisted of fiberglass-reinforced plastic pipe with secondary containment.

As mentioned above, an ACO was executed between Givaudan and the New Jersey Department of Environmental Protection (NJDEP) on March 5, 1987, requiring a Remedial Investigation (RI) and Feasibility Study (FS) for site-wide groundwater. The RI was conducted in a series of phased investigations from approximately 1987 to 1998. Following the closing of the facility at the end of July 1998, the Givaudan infrastructure was razed and the property was redeveloped into commercial/industrial warehousing facilities. Specific activities included the decommissioning of three sewer systems (chemical, sanitary, and storm sewers) and removal of the soil associated with the sewer system. The selected remedy for soils incorporated the installation of a low-permeability asphalt cover over the majority of the site property, construction of warehouses, installation of a fence around the perimeter of the site, and recording of a deed notice to restrict future uses of the property.

Throughout the redevelopment process, Givaudan coordinated with NJDEP and the redeveloper (The Morris Companies) to modify the monitoring well network, which was completed in 2006. This process involved abandoning select wells, installing replacement wells, and protecting and modifying the finished elevation of other wells. Remedial action selection and the establishment of a related long-term monitoring program were deferred until after the redevelopment and monitoring well network modification was complete. The property is currently occupied by three warehouse buildings in active use that are owned and operated by the Morris Companies, plus one vacant building. Despite the change in site ownership, Givaudan retains responsibility for ongoing groundwater remedial action and monitoring at the former Givaudan site.

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 (SWMUs), regulated units (RUs), and areas of concern (AOCs)), been **considered** in this EI determination?

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

   ___ If no - re-evaluate existing data, or

   ___ If data are not available skip to #6 and enter IN (more information needed) status code

Summary of Areas of Concern (AOCs):

The former Givaudan facility has four active areas of concern (AOCs A through D) that are associated primarily with groundwater and are detailed below. See Figure 8 from the Post Development Baseline Ground Water Sampling Report (Ref. 2) for the location of these AOCs. Remaining soil impacts are primarily associated with AOCs A, B, and C, but contaminated soil will be addressed on a site-wide basis in Question 3. Prior to redevelopment of the property, Givaudan performed the following remedial actions to address potential sources for the observed groundwater impacts (Ref. 2):

- The 52 known underground storage tanks (USTs) were closed in accordance with applicable NJDEP requirements at the time of closure
- Over 11,000 feet of chemical sewers (including catch basins and manholes) and storm sewers were excavated, and 15,600 tons of affected soil were removed and disposed off site
- Four cesspools containing high concentrations of chlorinated solvents and associated sewer lines were excavated, and affected soils were removed and disposed off site
- The former on-site stormwater detention pond was dewatered and impacted sediments and soil were removed and disposed off site
- Impacted soils associated with a former foundry operation were excavated and disposed off site.

Additionally, during property redevelopment, a horizontal biosparging well remediation system was installed in 2002 to remediate the free and residual product in soil at AOCs A and B. The system was shut down in August 2004, and data collected during system operation and shutdown are currently being evaluated by Givaudan and NJDEP to determine if the system will need to be restarted.

The following AOC summaries were excerpted from the April 2008 Post Development Baseline Ground Water Sampling Report (Ref. 2).

AOC A: This area is located in the northern portion of the property, adjacent to Delawanna Avenue. Groundwater impacts in AOC A have been attributed to two separate source areas, which are designated AOC-A1 and AOC-A2.

AOC-A1 – Chemical Sewer Ex-filtration Points: This area formerly included a chemical sewer with documented leaks that likely resulted in a localized area of light, non-aqueous phase liquid (LNAPL) that has been removed via operations of the horizontal biosparge well remediation system. The chemical sewer was removed during facility decommissioning.

Proximal monitoring wells include: MW-22S, MW-41, MW-42R, MW-44, MP-01, and MP-02. Primary constituents in groundwater that exceed the New Jersey Ground Water Quality Criteria (NJ GWQC) include metals and the following volatile organic compounds (VOCs): toluene, benzene, trichloroethene (TCE), and 1,2-dichloroethane (DCA).

AOC-A2 – Cesspools: This area includes the four former cesspools that were located southeast of the historical chemical sewer leak associated with AOC-A1. Based on data collected during the removal of the cesspools, it is suspected that they received chlorinated solvent wastes, which migrated into the groundwater through the open bottoms and leaked into related piping laterals. Soil containing VOCs above the New Jersey Non Residential Direct Contact Soil Cleanup Criteria (NJ NRDCSCC) were excavated to an average depth of 12 feet below ground surface (ft bgs) around the former cesspools, and disposed off site.

Proximal monitoring wells include MW-5SR, MW-47, and MW-48. The primary constituents in groundwater that exceed the NJ GWQC include metals and the following VOCs: tetrachchloroethene (PCE), TCE, cis-1,2-dichloroethene (DCE), 1,2-DCA, 1,1-DCE, 1,1,1-trichloroethane (TCA), bromodichloroethane, benzene, chlorobenzene, vinyl chloride, and xylene.

AOC B – Chemical Sewers, Botanical Landfill, Production Buildings: This area is located in the northeastern portion of the property, adjacent to Delawanna Avenue. It formerly contained a chemical sewer, former production buildings, former USTs and aboveground storage tanks (ASTs), and a former botanical landfill. A localized area of toluene-containing LNAPL was identified in this area and was mostly removed via operation of the horizontal biosparge well remediation system (trace detections of LNAPL have been noted since the system was shut down). Soils in AOC B with contaminants detected above the NJ NRDCSCC were removed and disposed off site prior to redevelopment, or contained with an impervious surface cover (warehouse building and adjacent paved surface) as part of the former Givaudan facility redevelopment.

Proximal monitoring wells include MP-03, MW-34, and MW-45. Constituents in groundwater that exceed the NJ GWQC include metals and the following VOCs: toluene, PCE, benzene, and 1,2-DCA.

AOC C – Spent Acid Pit, Chemical Effluent Pit, Storm Water Retention Pond: This area is located in the central portion of the former Givaudan facility, along the eastern property boundary adjacent to Boll Street. AOC C was formerly occupied by a former stormwater retention pond and adjacent spent acid and chemical effluent pits that were used to dispose of production wastes prior to the 1940s. Givaudan discontinued use of this area for waste disposal and installed a chemical sewer collection system in the mid-1940s to convey plant production waste to the Passaic Valley Sewer Commission wastewater treatment works. Givaudan added an on-site wastewater treatment system in the mid-1970s. During facility decommissioning, the pond was dewatered, and impacted sediments and soil were excavated and disposed off site. Vadose-zone impacts related to the former waste disposal pits (e.g., soil with compounds above the NJ NRDCSCC and discontinuous stringers of immobilized separate-phase materials) were left in place. These impacts were contained beneath a warehouse and adjacent paved roadway that were constructed during property redevelopment. A network of groundwater monitoring wells was established around the perimeter of AOC C as part of the NJDEP-approved remedy.

Proximal monitoring wells include MW-10S, MW-11SR, MW-15SR, MW-16S, MW-32R, and MW-53. Constituents in groundwater that exceed the NJ GWQC include metals and the following VOCs: 1,2-DCA, PCE, TCE, benzene, 1,2-dichloropropane, xylene, and chloroform.

AOC D – Railroad Tracks and Former Drum Storage Area: This area is located in the central portion of the property, along the western property boundary. It was previously used as a railcar off-loading and drum storage area. Toluene impacts have been reported in groundwater (MW-9S) since the Phase I RI in 1988, and extensive investigations were performed at this AOC. The extent of toluene-impacted groundwater has been completed, but potential source areas in soil were never identified. NJDEP agreed that the source area investigation was thorough and accepted Givaudan's proposal that no further investigations were necessary for soil in correspondence dated June 21, 2000 (Ref. 1). Results from the most recent groundwater investigation at this AOC (July 2001) indicated a decreasing or stable trend compared to historical toluene concentrations at these locations, and toluene was not detected in any of the off-site downgradient wells.

Proximal monitoring wells include MW-9S, MW-19S, MW-36, and MW-40. Constituents in groundwater that exceed the NJ GWQC include metals, toluene, and benzene (marginally).

References:

1. Letter from Maria Franco-Spera, NJDEP, to Gene Thomas, Givaudan Roure Corporation, re: April 2000 Remedial Action Work Plan for Soils. Dated June 21, 2000.
2. Post Development Baseline Ground Water Sampling Report. Prepared by Environmental Resources Management, Inc. Dated April 2008.

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

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			VOCs, SVOCs, Metals
Air (indoors)[2]		X		
Surface Soil (e.g., <2 ft)	X			VOCs, SVOCs, Metals
Surface Water		X		
Sediment		X		
Subsurface Soil (e.g., >2 ft)	X			VOCs, SVOCs, Metals
Air (Outdoor)		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 any media) - continue after identifying key contaminants in each contaminated medium, citing appropriate levels (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

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

Rationale:

Groundwater

Groundwater in the area of the former Givaudan site exists in two principal aquifer systems: unconfined in the unconsolidated overburden unit, and confined/semi-confined in the consolidated bedrock unit. Significant clay units generally occur in the central portion of the site, and there is a downward component of flow between the overburden and shallow bedrock aquifers. Shallow wells (screened across the water table) and intermediate wells (screened immediately above the bedrock) monitor the overburden aquifer, while deep wells (screened across the upper 10-35 feet of the bedrock) monitor the shallow bedrock aquifer. Depth to groundwater ranges from approximately 15 to 45 feet bgs. Results

[1] "Contamination" and "contaminated" describe 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 Department 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.

from site investigations indicate that shallow overburden groundwater flow tends to mimic site topography, such that water in the overburden flows both to the northeast and to the southwest from the property. Groundwater flow direction in the bedrock aquifer is generally toward the east-southeast (Ref. 7).

Groundwater has been investigated at the former Givaudan site in a phased RI process from approximately the mid 1980s to 1998, at which point site decommissioning and redevelopment commenced. Once redevelopment was complete, Givaudan performed a site-wide groundwater sampling event from October through December 2006 to obtain post-development groundwater flow and quality data in accordance with the Revised Post-Development Baseline Ground Water Sampling Plan, dated September 2006. A total of 67 wells were monitored as part of this event, including 49 overburden aquifer monitoring wells (38 shallow and 11 intermediate) and 19 bedrock aquifer monitoring wells.

VOCs are the main constituents of concern (COCs) at the site, while semi-volatile organic compounds (SVOCs) contamination is very limited and metals contamination is generally localized to the vicinities of the VOC source areas (Ref. 7). Groundwater contamination associated with the source areas identified in the response to Question No. 1 (i.e., in AOCs A through D) is generally localized to the shallow overburden aquifer. 1,2-DCA is the primary COC associated with the deeper overburden aquifer, although other VOCs, metals, and limited exceedances of SVOCs are also present. Exceedances of the NJ GWQC from the 2006 groundwater sampling event are summarized in Table 10 of the Post Development Baseline Ground Water Sampling Report (Ref. 7).

As mentioned above, remedial action selection and the establishment of a related long-term monitoring program at the former Givaudan site were deferred until after the redevelopment and monitoring well network modification was complete.

Air (Indoors)

An indoor air quality monitoring program is already in place for Warehouse Building 2 at the former Givaudan site, as discussed later in this section. The potential for vapor intrusion to indoor air was assessed for the other two warehouses (Buildings 1 and 3) and Former Givaudan Building 102 by comparing maximum VOC detections from the post-development groundwater sampling event in shallow wells located within 100 feet of these structures to the default Target Groundwater Concentrations for 1 x 10^{-5} risk as reported in EPA's Office of Solid Waste and Emergency Response (OSWER) Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (EPA Vapor Intrusion Guidance), dated November 2002 (Ref. 4). No VOCs were detected above applicable Target Groundwater Concentrations within 100 feet of Warehouse Buildings 1 or 3, or Former Givaudan Building 102.

Indoor air quality is assessed both quarterly and monthly within Warehouse Building 2 in accordance with the following documents: the VMP and QAPP, which were both included in the NJDEP-approved *Remedial Action Work Plan – Area A and Area B* (revised July 2002); the Indoor Air Monitoring Plan (IAMP) letter dated July 8, 2002; and the September 3, 2003, response letter to NJDEP comments on the IAMP. These samples are collected as eight-hour composite samples using 6-liter Summa canisters, and they are laboratory analyzed for VOCs using EPA Method TO-15. Currently, ten locations are sampled quarterly (BI-01 to BI-06 and TI-01 to TI-04), while a more focused indoor air sampling event (locations BI-01 to BI-06 and TI-01) is conducted monthly between quarterly events (Ref. 6). The most recent sampling event for which analytical data are available is May 2008 (Ref. 8).

For the purposes of this EI determination, detected concentrations from the May 2008 sampling event were compared to the EPA Target Indoor Air Concentrations for 1 x 10^{-5} risk as reported in EPA Vapor Intrusion Guidance. The laboratory reporting limit for TCE was 0.26 µg/m^3 in all samples, which slightly exceeds the Target Indoor Air Concentration of 0.22 µg/m^3. Only two compounds (TCE and 1,2-DCA) exceeded the Target Indoor Air Concentration for 1 x 10^{-5} risk, in three samples each (BI-06C, TI-02C, and TI-04C). The maximum detections are presented in Table 1 below.

Table 1: Maximum Detections of Compounds in Indoor Air Exceeding the EPA Target Concentrations for 1 x 10^{-5} Risk in May 2008

Compound	Target Concentration For 1 x 10^{-5} risk (µg/m^3)	Target Concentration For 1 x 10^{-4} risk (µg/m^3)	Detection (µg/m^3)	Sample ID
Trichloroethene	0.22	2.2	**2.1**	TI-04C
1,2-Dichloroethane	0.94	9.4	**1.6**	TI-04C

Note: **Bolded** detections exceed the corresponding Target Indoor Air Concentrations for 1 x 10^{-5} risk, but do not exceed the Target Indoor Air Concentrations for 1 x 10^{-4} risk.

As noted in Table 1, the detected concentrations of these two compounds do not exceed the Target Indoor Air Concentrations for 1 x 10^{-4} risk, so they fall within the EPA acceptable cancer risk range of 1 x 10^{-6} to 1 x 10^{-4}. Additionally, these target concentrations were developed for the residential use scenario and are likely to be conservative when applied to an industrial warehouse setting, where human exposures are generally expected to be less intense than those under the residential scenario. Thus, indoor air is not known or reasonably suspected to be contaminated above appropriate risk-based levels via the vapor intrusion pathway at the former Givaudan site.

To assess potential indoor air impacts to off-site receptors, groundwater quality data from the post-development baseline sampling event were compared to the Target Groundwater Concentrations from the EPA Vapor Intrusion Guidance. The furthest downgradient shallow wells (i.e., MW-49, MW-50, MW-6SR, MW-7SR, MW-18S, MW-25S, MW-26S) did not show VOC exceedances; thus, indoor air at potential off-site buildings is not expected to be contaminated via the vapor intrusion pathway from any Givaudan-impacted groundwater that may be migrating off site.

Surface/Subsurface Soil

Givaudan performed the following remedial actions from 1998 to 2004 in an effort to remove contaminated soil, free product, and other potential sources of groundwater contamination prior to property redevelopment (Refs. 1, 3):

- Excavation of 11,251 linear feet of the chemical and stormwater sewer systems
- Excavation and off-site recycling of 15,602 tons of soil impacted by the historical operation of the sewer systems
- Excavation and off-site incineration of 610 tons of soil containing 2,3,7,8-tetrachlorodibenzo-p dioxin (TCDD) above the NJDEP-approved cleanup level of 2 parts per billion (ppb)
- Excavation and off-site recycling of 2,559 tons of asphalt
- Excavation, crushing, characterization, and beneficial reuse of 18,692 tons of concrete
- Removal of approximately 135,000 gallons of water from the stormwater retention pond prior to excavation of impacted bottom sediments and backfilling of the pond

- Removal of five USTs
- Removal of four cesspools.

Portions of the sewer lines that were not excavated due to accessibility problems were investigated using 65 soil borings following the NJDEP Technical Requirements for Site Remediation to determine potential impacts. Approximately 24,000 tons of certified clean fill were used to supplement site soil and concrete that were deemed acceptable for reuse in backfilling following testing (Ref. 1).

Analytical results from delineation sampling for the soil remedy selection, and confirmation sampling following the sewer decommissioning effort, indicate that contaminated soil remains in place across the site with exceedances of the NJ RDCSCC for VOCs, SVOCs, and metals. This residual contaminated soil above NJ RDCSCC is present primarily in the subsurface in AOCs A, B, and C (Ref. 3). VOCs include benzene, carbon tetrachloride, chlorobenzene, 1,2-DCA, cis-1,2-DCE, ethylbenzene, PCE, TCE, toluene, and xylenes. SVOCs include Arochlor-1260, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h) anthracene, 3,3'-dichlorobenzidine, dichloromethane, diethylphthalate, 2,4-dinitrotoluene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, N-nitrosodiphenylamine, 2,4,5-trichlorophenol. Metals include antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, thallium, and zinc (Refs. 1, 2).

Surface Water/Sediment

No surface water features are located on site. The Passaic River is located approximately 0.3 miles to the southeast of the site and is tidally influenced at this location. The Third River, a tributary to the Passaic River, is located approximately 0.2 miles to the southwest of the site. Although no information is available regarding potential discharge of groundwater from the site into either surface water body, an assessment of groundwater quality in the furthest downgradient wells indicates that site-related contamination is unlikely to reach either the Passaic River or the Third River at significant concentrations. For shallow groundwater flowing off-site to the southwest, most of the furthest downgradient wells had no VOC exceedances in the 2006 post-development sampling event. Minor VOC exceedances were detected at MW-07SR (less than two times the NJ GWQC for 1,2-DCA and 1,2-dichloropropane) and MW-18S (less than four times the NJ GWQC for TCE). Considering that these exceedances do not exceed ten times the NJ GQWC, contamination from these shallow wells is unlikely to reach the Third River at significant concentrations.

In the 2006 post-development sampling event, 1,2-DCA was nondetect in MW-26D, which is the furthest downgradient deep well to the east. Exceedances of 1,2-DCA (NJ GWQC = 2 µg/L) were detected in the furthest downgradient deep well to the southeast, MW-25D (44 µg/L at 104 feet bgs, 57 µg/L at 109 feet bgs, 82 µg/L at 114 feet bgs, and 91 µg/L at 119 feet bgs). However, these 2006 concentrations represent a reduction from the highest 1,2-DCA detection in October 2000 (250 µg/L). Given that the groundwater elevations measured during the 2006 sampling event were 6.30 feet above mean sea level (amsl) in MW-25S and 1.97 feet amsl in MW-25D, a downward vertical gradient exists between the shallow overburden unit and the deeper bedrock at this location. Since the Passaic River is located in close proximity to well MW-25D (approximately 0.3 miles downgradient), the downward vertical gradient would suggest that the discharge of groundwater from bedrock to the river is unlikely. Finally, given the processes of dilution and other mitigating factors that have the effect of reducing contaminant concentrations at the point of discharge to surface water, site-related contamination from MW-25D is unlikely to enter the Passaic River at elevated concentrations.

Air (Outdoors)

Outdoor air quality is assessed quarterly at three locations (P-01, P-02, P-03) at the site perimeter in accordance with the following documents: Vapor Monitoring Plan (VMP) and Quality Assurance Project Plan (QAPP), which were both included in the NJDEP-approved *Remedial Action Work Plan – Area A and Area B* (revised July 2002). These samples are collected as eight-hour composite samples using 6-liter Summa canisters, and they are laboratory analyzed for VOCs using EPA Method TO-15. The most recent sampling event for which analytical data are available is June 2007 (Ref. 5). All compounds were detected well below the Occupational Safety and Health Administration (OSHA) 8-hour time weighted average (TWA) and short-term exposure limit (STEL) standards.

Additionally, migration of contaminants bound to airborne particulate matter is expected to be limited at this site based on the complete low-permeability surface cover in the industrial areas (e.g., warehouse buildings, roads, and parking lots) and the fact that most of the soil contamination is located in the subsurface. Furthermore, volatile emissions of detected VOCs from groundwater to outdoor air are not expected to be of concern due to the natural dispersion of these contaminants once they reach the surface. Thus, the migration of particulates entrained on dust and/or volatile emissions is not expected to cause adverse impact to outdoor air at the former Givaudan site.

References:

1. Remedial Action Report for Sewer Decommissioning. Prepared by Environmental Resources Management. Dated February 2000.
2. Remedial Action Work Plan for Soils. Prepared by Environmental Resources Management. Dated April 2000.
3. Letter from Maria Franco-Spera, NJDEP, to Gene Thomas, Givaudan Roure Corporation, re: April 2000 Remedial Action Work Plan for Soils. Dated June 21, 2000.
4. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). Prepared by EPA. Dated November 2002.
5. Horizontal Biosparging System Remedial Action Progress Report, 1 April 2007 through 30 June 2007. Prepared by Environmental Resources Management. Dated December 14, 2007.
6. Summary of August 2007 Vapor Intrusion Assessment. Prepared by Environmental Resources Management. Dated March 19, 2008.
7. Post Development Baseline Ground Water Sampling Report. Prepared by Environmental Resources Management, Inc. Dated April 2008.
8. Table 1: Summary of Air Monitoring Analytical Results – Indoor. Prepared by Environmental Resources Management. Dated February and May 2008.

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	Trespasser	Recreation	Food[3]
Groundwater	No	No	No	Yes	–	–	No
~~Air (indoor)~~				–	–	–	–
Surface Soil (e.g. < 2 ft)	No	No	No	Yes	No	No	No
~~Surface Water~~			–	–			
~~Sediment~~			–	–			
Subsurface Soil (e.g., > 2 ft)	–	–	–	Yes	–	–	No
~~Air (outdoors)~~						–	–

Instruction for Summary Exposure Pathway Evaluation Table:

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

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

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

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

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

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

Rationale:

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

Groundwater

As discussed in response to Question 2, activities at the former Givaudan site have impacted the overburden and shallow bedrock aquifer systems. Seven water supply wells were drilled by Givaudan and other property owners on the former Givaudan site between 1917 and 1948. Two former production wells (numbers 6 and 7), which were located at the south end of the property near current monitoring wells MW-6S and MW-7DR2, provided the majority of the water used by Givaudan until the supply wells were shut down in the late 1980s. From approximately 1950 to 1987, groundwater was continuously extracted for use as non-contact cooling water. Approximately 1 million gallons of water per week were extracted, used, and discharged to the Passaic Valley Sewerage Commission wastewater treatment facilities (a publicly owned treatment works). Givaudan operated an on-site pretreatment system from approximately the 1970s until the facility closed. After the late 1980s, the facility relied solely on public water (Ref. 1).

A well search was conducted in September 2006 for permitted wells located within two miles of the former Givaudan site, and results were obtained in February 2007. A total of 1,312 permitted wells were located within the two-mile radius of the site; however, the results indicated that these wells are primarily monitoring wells, gas vents, injection wells, and other non-potable wells. No potable wells are located within two miles of the site (Ref. 1). Because shallow groundwater is not used for potable purposes at the site or in the surrounding area downgradient of the site, exposure to contaminated groundwater associated with the site is not a concern for on-site workers or nearby residents or day care receptors at this time.

Because shallow groundwater is not encountered at depths less than 10 feet bgs at the former Givaudan site, construction workers would not be expected to come into contact with contaminated groundwater during intrusive activities. However, given that groundwater monitoring and remedial activities are ongoing, there is potential for on-site remedial workers (considered to be construction workers for the purpose of this EI determination) to come into contact with contaminated groundwater during sampling and remedial activities.

Surface/Subsurface Soil

The selected remedy for contaminated soil includes engineering and institutional controls—specifically, the construction of warehouses and a low-permeability asphalt cap, along with a fence around the perimeter of the site and a site-wide deed notice to restrict future property uses. In their proposal, Givaudan stated that long-term inspections and maintenance of the containment system will be performed as necessary (Ref. 1). This remedy was approved by NJDEP in a letter dated June 21, 2000 (Ref. 2), and was subsequently implemented by Givaudan as part of the redevelopment process. See Figure 2 from the Post-Development Baseline Ground Water Sampling Report (Ref. 3) for the current surface features of the site. The deed notice for the northern parcel of the former Givaudan site restricts this entire site to non-residential use and was recorded on June 29, 1999 (Ref. 5). In 2008, the northern parcel was sold to the Morris Company, who made some modifications to the cap (Ref. 4). As a result, the Morris Company was required to modify the deed notice and submit a revised Remedial Action Report to NJDEP. The revised report was submitted to NJDEP in late summer 2008 (Ref. 4), although the current status of the deed notice is unknown.

Additionally, the soil containing 2,3,7,8-TCDD at concentrations less than 2 ppb is managed in an engineered containment cell near the southern end of the site. Givaudan retained ownership of this southern parcel and placed a deed restriction on this site in 1999 (Refs. 1, 4).

Given that contaminated soil is contained underneath the four existing buildings and asphalt cap, and there is a fence surrounding the facility, direct contact with contaminated soil is not a concern for on-site workers, trespassers, or recreators. Contaminated soil does not extend off site, and adjacent site uses are industrial, so exposure to residents or day care receptors is not applicable. However, because groundwater investigative and remedial activities are ongoing, direct contact with on-site contaminated surface and subsurface soil is being considered a potentially complete exposure pathway for on-site remedial workers (i.e., construction workers) at this time.

References:

1. Remedial Action Work Plan for Soils. Prepared by Environmental Resources Management. Dated April 2000.
2. Letter from Maria Franco-Spera, NJDEP, to Gene Thomas, Givaudan Roure Corporation, re: April 2000 Remedial Action Work Plan for Soils. Dated June 21, 2000.
3. Post Development Baseline Ground Water Sampling Report. Prepared by Environmental Resources Management, Inc. Dated April 2008.
4. Email from Lynn Vogel, NJDEP, to Sam Abdellatif, EPA, re: Givaudan Delawanna Avenue, Clifton City, NJ Files. Dated September 25, 2008.
5. NJDEP Sites with a Deed Notice Database. Located at http://datamine2.state.nj.us/DEP_OPRA/OpraMain/get_long_report?. Accessed on September 26, 2008.

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 discussed in response to Question 3, the potential for on-site construction workers (remedial workers) to come in direct contact with contaminated groundwater is being considered a potentially complete exposure pathway at this time. However, any exposures that may occur are not expected to be significant because remedial workers are assumed to wear personal protective equipment (PPE) and adhere to strict Occupational Safety and Health Administration (OSHA) guidelines to minimize exposure to contamination, per the Health and Safety Plan that would be required by Givaudan for any future remedial work (Ref. 1). Thus, direct exposures to on-site contaminated groundwater for construction (e.g., remedial) workers conducting remedial activities are not expected to pose a significant risk.

Surface/Subsurface Soil

As discussed in response to Question 3, the potential for on-site construction workers (remedial workers) to come in direct contact with contaminated surface/subsurface soil is being considered a potentially complete exposure pathway at this time. However, any exposures that may occur are not expected to be significant because remedial workers are assumed to wear PPE and adhere to strict OSHA guidelines to minimize exposure to contamination, per the Health and Safety Plan that would be required by Givaudan for any future remedial work (Ref. 1). Thus, direct exposures to on-site contaminated surface/subsurface soil for construction (e.g., remedial) workers conducting remedial activities are not expected to pose a significant risk.

[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.

References:

1. Remedial Action Work Plan for Soils. Prepared by Environmental Resources Management. Dated April 2000.

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; see the response to Question No. 4.

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 Former Givaudan Roure Corporation site, EPA ID# NJD002156354, located at 125 Delawanna Avenue in Clifton, New Jersey, under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

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

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

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

Reviewed by: _____ Date:_____
Connie Crossley
Environmental Consultant
Booz Allen Hamilton

Also reviewed by: _____ Date:_____
Sameh Abdellatif, RPM
RCRA Programs Branch
EPA Region 2

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

Approved by: Original signed by: _____ Date: September 29, 2008
Adolph Everett, Chief
RCRA Programs Branch
EPA Region 2

Locations where references may be found:

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

Contact telephone and e-mail numbers: Sam Abdellatif
(212) 637-4103
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FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

Attachments

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

- Attachment 1 - Summary of Media Impacts Table

Attachment 1: Summary of Media Impacts Table

AOC	GW	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
AOC A	Y	N	Y	N	N	Y	N	• Operation of the horizontal biosparge well remediation system from 2002 to 2004.	VOCs, LNAPL
AOC B	Y	N	Y	N	N	Y	N	• Operation of the horizontal biosparge well remediation system from 2002 to 2004.	VOCs, LNAPL
AOC C	Y	N	Y	N	N	Y	N	• Dewatering of the former stormwater retention pond, along with removal and off-site disposal of impacted sediments and soil during property redevelopment. • Containment of soil impacts beneath a warehouse and adjacent paved roadway during property redevelopment.	VOCs
AOC D	Y	N	N	N	N	N	N	• No corrective actions have been identified to date.	Toluene
Site-Wide Soil	N	N	Y	N	N	Y	N	• Excavation and off-site recycling of 15,602 tons of soil impacted by the historical operation of the sewer systems. • Excavation and off-site incineration of 610 tons of soil containing 2,3,7,8- TCDD above the NJDEP-approved cleanup level of 2 ppb.	VOCs, SVOCs, Metals, 2,3,7,8-TCDD