

## **DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION**

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

**Facility Name: Methode Electronics, Inc., East**  
**Facility Address: 10 Industrial Drive, Willingboro, New Jersey 08046**  
**Facility EPA ID#: NJD048608897**

#### **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 Methode Electronics, Inc., East (Methode) facility is a 3.06-acre site located at 10 Industrial Drive in Willingboro Township, Burlington County, New Jersey. The Methode facility manufactured printed wiring boards during the entire operating period from 1970 to 1999. The Site Plan (Figure 2)

presented in the Remedial Investigation Work Plan dated March 8, 2006, shows the site layout, which consists of the main manufacturing and office building (constructed in 1969) and a groundwater treatment building (constructed in 1995). All process operations occurred inside the manufacturing building. The only activities related to operations that occurred outside the building were the storage of wastes (primarily aqueous wastes and sludges) in dumpsters and drums, and the storage of raw materials in drums.

The site is situated in a moderately developed area of Willingboro, approximately two miles east of the Delaware River, one-half mile southeast of Route 130, and one-half mile north of Rancocas Creek. Land use within one-half mile of the site consists of a mixture of industrial, commercial, and residential properties. The property is located in an industrial park and is bounded by Industrial Drive to the south and Beverly-Rancocas Road to the east. Property immediately adjacent to the site includes the following: Hi-Temp Specialty Metals, located south across Industrial Drive; the Willingboro Department of Public Works (DPW), located southwest across Industrial Drive; the Willingboro Board of Education bus maintenance garage and school supplies warehouse, located west of the site; a vacant lot to the north; and the Cathedral of Love Church, located east across Beverly-Rancocas Road.

Volatile organic compounds (VOCs) were initially detected in groundwater in 1988 during a routine investigation associated with closure of a flow-through wastewater tank. Upon discovery of the VOCs, investigations were conducted under a Discharge to Groundwater permit of the National Pollutant Discharge Elimination System (NPDES) program. In 1993, a Memorandum of Agreement between Methode and the New Jersey Department of Environmental Protection (NJDEP) was signed to continue the investigative work. Since closure of the facility in 1999, work has been performed under the NJDEP Industrial Site Recovery Act (ISRA) program.

After Methode ceased operations at this facility in 1999, the building was partially leased to the neighboring Hi-Temp facility for warehouse storage of non-hazardous materials. Hi-Temp continues to lease the warehouse space, according to the Vapor Intrusion Assessment Report Prepared in May 2007. Although no hazardous materials are stored in the building, activities include storage of virgin paints, lubricants, and oils, which may contain constituents of concern. All storage areas are located within the building on floors with good integrity.

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?

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):** Under the ISRA program, 27 Areas of Potential Environmental Concern (i.e., AOCs) were identified. During subsequent investigations, ten additional AOCs were identified, for a total of 37 AOCs at the Methode site. Twenty-seven of the AOCs have received a no further action (NFA) determination from NJDEP. Thus, ten of the 37 AOCs remain under active investigation and are described below (Ref. 6). The remaining ten AOCs have been grouped as follows in current investigation reports:

- Site-wide groundwater (AOC 36)
- Soil beyond the building and former Northern Storage Pad footprints, specifically including potential residual VOC source materials in soils near MW-09R and MW-02A (AOC 37)
- Eight AOCs beneath and around the former Northern Storage Pad
  - Flow-Through Wastewater Tank (AOC 4)
  - Staging Area – Wastes (AOC 6)
  - Staging Area – Virgin Chemicals (AOC 7)
  - Hazardous Waste Dumpster (AOC 9)
  - Staging Area Sump (West) (AOC 16)
  - Staging Area Sump (North-central) (AOC 17)
  - Discharge Lines (AOC 24)
  - Clarifier (AOC 34)

A brief description of the eight AOCs associated with the former Northern Storage Pad is provided below. The remaining two AOCs, site-wide groundwater (AOC 36) and soil in the vicinity of MW-09R and MW-02A (AOC 37), are discussed further in Question No. 2. See Figure B-1 from the Deed Notice (Ref. 4) for the AOC locations.

**AOC 4, Flow-Through Wastewater Tank** – This concrete-lined underground storage tank (UST) was located approximately 10 feet north of the main building. It was installed in 1969, used until July 1986, and abandoned in 1987. The tank was approximately 18,000 gallons in size and was used to contain wastewater treatment sludges from electroplating operations. As part of the abandonment plan for the former UST, soil and groundwater monitoring was performed. The sampling indicated that there were no soil or groundwater impacts resulting from this UST; however, these activities resulted in a facility-wide groundwater monitoring and remediation program that continues today (Refs. 1, 2). This AOC received an NFA letter for soils based on the results of the Remedial Investigation (RI) in 2000 (Ref. 3).

**AOC 6, Staging Area - Wastes** – This AOC was located on the western end of a concrete pad located immediately north and outside of the main building. This unit was constructed in 1969 and was approximately 50 feet long by 20 feet wide with a 12-inch thick concrete base. This AOC was used to store drummed wastewater and sludges including metal-rich spent etchants and waste oil. A dumpster (AOC 9) was also located within this area. Soil sample results indicated that all VOCs were below the

New Jersey Residential Direct Contact Soil Cleanup Criteria (NJ RDCSCC). However, lead was detected in soil up to 8,200 mg/kg (NJ NRDCSCC = 600 mg/kg) and copper was detected up to 7,200 mg/kg (NJ NRDCSCC = 600 mg/kg) (Refs. 1, 2). All residual metals impacts in soil are addressed under the Deed Notice, which was recorded by the Burlington County Clerk on November 16, 2005 (Ref. 4).

AOC 7, Staging Area - Virgin Chemicals – This AOC was located on the eastern end of a concrete pad located immediately north and outside of the main building. This unit was constructed in 1969 and was approximately 50 feet long by 20 feet wide with a 12-inch thick concrete base. One sump was located near the area to manage spills. This AOC was used to store drums of virgin acids (e.g., hydrochloric, sulfuric, fluorboric) and etchants (e.g., ammonia sulfate, sodium sulfate). Soil sample results indicated that all VOCs were below the NJ RDCSCC. Copper was detected at 670 mg/kg, which is slightly above the NJ NRDCSCC of 600 mg/kg (Refs. 1, 2). All residual metal impacts in soil are addressed under the Deed Notice, which was recorded by the Burlington County Clerk on November 16, 2005 (Ref. 4).

AOC 9, Hazardous Waste Dumpster – This AOC was located on the western end of the concrete pad located immediately north and outside of the main building, and within the footprint of AOC 6. The unit was approximately 20 cubic yards and was used from 1988 to store characteristically hazardous wastewater treatment sludges. Soil sampling results are discussed above as part of AOC 6. This AOC received an NFA letter for soils based on the results of the RI in 2000 (Ref. 3).

AOC 16, Staging Area Sump (West) – This AOC was located near the Staging Area (AOC 6) at the western edge of the outdoor concrete pad. The 10-gallon concrete unit was constructed in 1969 and was used to manage storm water from the Staging Area (AOC 6) and other nearby outdoor areas. Soil sample results indicated all that VOCs were below the NJ RDCSCC. Arsenic was detected at 25 mg/kg, slightly above the NJ NRDCSCC of 20 mg/kg (Refs, 1, 2). All residual metals impacts in soil are addressed under the Deed Notice, which was recorded by the Burlington County Clerk on November 16, 2005 (Ref. 4).

AOC 17, Staging Area Sump (North-central) – This AOC was located on the north-central edge of the outdoor concrete pad. The 50-gallon, cylindrical concrete sump was constructed in 1969 and was used to manage storm water from the Staging Areas (AOC 6 and 7) and other nearby outdoor areas. Soil samples were collected during the Site Investigation conducted in 1999, and all results were below the NJ RDCSCC (Refs. 1, 2). This AOC received an NFA letter for soils based on the results of the RI in 2000 (Ref. 3).

AOC 24, Discharge – This AOC is associated with discharge that previously flowed from the north-central portion of the site where treated and untreated process wastewater discharged to the public treatment works (sanitary sewer) system via underground piping. The facility discharged wastewater in this manner from the start of operations in 1970 until Methode ceased operations in 1999. It is estimated that at the height of activities, approximately 50,000 gallons of wastewater were discharged to the public treatment works each day. Discharges included wastewater from operations (40,000 gallons), noncontact cooling water (9,000 gallons), and sanitary waste (1,000 gallons) (Refs. 1, 2). This AOC received an NFA letter for soils based on the results of the RI in 2000 (Ref. 3).

AOC 34, Clarifier – This AOC was located on the eastern end of the outdoor pad immediately north of the main building. This 3,000-gallon metal unit was installed in 1980 and measured 5 feet wide, 5 feet long, and 12 feet high. This AOC was used in the wastewater treatment process to separate sludge from the wastewater used in operations (Refs. 1, 2). This AOC received an NFA letter for soils based on the results of the RI in 2000 (Ref. 3).

**References:**

1. ISRA Preliminary Assessment Report. Prepared by Earth Sciences Consultants, Inc. Dated January 2000.
2. Site Investigation. Prepared by Earth Sciences Consultants, Inc. Dated January 2000.
3. Letter from Andrew Hendricks, Earth Sciences Consultants, Inc., to Ms. Maria Franco-Spera, NJDEP, re: Response to NJDEP Comment Letter, Additional Site Investigation/Remedial Investigation/Remedial Action Work Plan Report. Dated January 29, 2001.
4. Memo from Matthew Gordon, URS, to Bob Hayton, NJDEP, re: County Clerk's Official Confirmation of Methode Deed Notice Recording. Dated November 28, 2005.
5. Letter from Bruce Venner, NJDEP, to Steve Harders, Methode, re: NFA – Soils Letter and Covenant Not to Sue. Dated January 20, 2006.
6. Remedial Investigation Progress Report, No. 2. Prepared by URS. Dated April 5, 2007.

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be “contaminated”<sup>1</sup> 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
Air (indoors) <sup>2</sup>	X			TCE
Surface Soil (e.g., <2 ft)	X			Metals, PCBs
Surface Water		X		
Sediment		X		
Subsurface Soil (e.g., >2 ft)	X			Metals, PCBs
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 impacts were first discovered in 1988 during closure of the concrete-lined, partially in-ground tank (AOC 4). VOCs, primarily trichloroethylene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA) were detected, but reportedly were never associated with AOC 4. VOCs have since been detected above the New Jersey Ground Water Quality Criteria (NJ GWQC) in groundwater throughout much of the shallow groundwater zone across the facility and in deeper saturated zones, as well as in off-site locations (Refs. 8, 9).

<sup>1</sup> “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).

<sup>2</sup> 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.

Investigations at the site and surrounding properties have resulted in the identification of the following six stratigraphic units, depicted in Figure 3 of the April 5, 2007, Remedial Investigation Progress Report No. 2 (Ref. 10):

- Upper Sand Unit, designated as “Upper Sand Aquifer” (USA)
- A clay unit, designated as “Clay A”
- An interbedded unit, designated as “Upper Interbedded Unit” (UIU)
- Second clay unit, designated “Clay B”
- A lower sand unit, designated “Lower Sand Aquifer” (LSA), that includes a second interbedded unit, designated as the “Lower Interbedded Unit” (LIU)
- A third clay unit, designated “Clay C.”

Based on previous site investigations, the depth to the water table beneath the site varies seasonally and ranges from approximately 0.5 to 9 feet below ground surface (bgs). The water table is found within the USA across the site, and where present, the Clay A unit appears to inhibit downward flow from the USA. The Clay A unit is present on site, except in areas breached by drilling or well screens, but is not present or is discontinuous south of the site in the area of MW-12D and MW-28D. Other water-bearing units include the UIU and the LSA (Ref. 10).

The direction of groundwater flow is different within each unit. Within the USA, groundwater flow is generally toward the southwest at a hydraulic gradient of approximately 0.02 foot per foot. Based on previous investigations, groundwater in the UIU has been inferred to be primarily vertically downward. Groundwater flow within the LSA is inward toward pumping well MW-07DR (Ref. 10).

Groundwater sampling is performed via over 40 permanent monitoring wells, installed both on and off site, and 19 temporary groundwater sampling points, also located on and off site. Well locations are depicted on Figure 2, Site Plan in the Remedial Investigation Work Plan (Ref. 8). The most recent available groundwater monitoring data were collected in January 2007 as part of the Remedial Investigation Progress Report No. 2 (April 5, 2007) (Ref. 10). The exceedances are summarized in Table 1.

**Table 1: VOC Analytical Data Detected Above the NJ GWQC (January 2007)**

Contaminant (µg/l)		1,1,1-TCA	1,1- DCA	1,1-DCE	Cis-1,2-DCE	TCE
NJ GWQC (µg/l)		30	50	1	70	1
Sample Location	Monitored Unit					
<b>BUS-1</b>	USA	1,230	237	83.5	3,800	990
<b>MW-2A</b>	USA	356	208	97.4	25	171
<b>MW-3A</b>	USA	801	611	88.3	--	51.2
<b>MW-7A</b>	USA	--	58	19.8	--	50.1
<b>MW-8A</b>	USA	--	--	--	ND	4.09
<b>MW-10A</b>	USA	384	84.3	11.1	1,130	583
<b>MW-13A</b>	USA	--	--	2.2	--	15.7
<b>MW-15A</b>	USA	838	168	42	2,200	1,140
<b>MW-17A</b>	USA	--	--	ND	--	20.4
<b>MW-22A</b>	USA	ND	ND	ND	--	2.55
<b>MW-12D</b>	USA/LSA	--	127	39.6	--	81.1
<b>MW-28D</b>	USA/LSA	--	--	2.03	--	37.3
<b>MW-19D</b>	LSA	ND	3,770	1,120	319	617
<b>MW-20D</b>	LSA	30.5J	3,640	852	--	859
<b>MW-11D</b>	UIU	ND	57.9	1.12	ND	--
<b>MW-2D</b>	UIU	ND	521	29.2	ND	50.5
<b>MW-4D</b>	UIU	ND	--	5.43	--	36.9
<b>MW-7I</b>	UIU	ND	378	496	294	122

-- Detected below NJ GWQC  
 ND Not detected  
 J Estimated value, below laboratory reporting limit

Off-site and Downgradient Sample Results

MW-27 is located just east of the site and reported no contaminants above NJ GWQC in the LSA. MW-22 and MW-23 are the farthest downgradient wells located southwest of the site, immediately upgradient of Crystal Lake. MW-23 reported no contaminant concentrations above NJ GWQC, while MW-22 reported a slight exceedance of the NJ GWQC for TCE, as demonstrated in Table 1 above. MW-8 and MW-28 are located at off-site locations south of the site, and also reported exceedances of the NJ GWQC for TCE (MW-8) and 1,1-dichloroethene (1,1-DCE) and TCE (MW-28). Additional groundwater investigation is planned and is not expected to impact human exposure.

**Air (Indoors)**

According to the Vapor Intrusion Assessment Report (Ref. 11), the buildings of greatest concern for vapor intrusion to indoor air are the site’s main building, the Willingboro Board of Education (WBOE) building, and the Willingboro DPW building. The WBOE building consists of an office, warehouse, and maintenance garage located downgradient of the site to the immediate west. The Willingboro DPW building consists of an office and maintenance garage located downgradient of the site immediately southwest. All three buildings have slab-on-grade construction with no basement.

Initial vapor sampling was conducted in these buildings over a 24-hour period from January 18-19, 2007. Three air samples were collected from each of the three buildings, including one sub-slab soil gas sample and two indoor air samples. Results are outlined below:

**Methode Building** – While several compounds were detected above NJDEP’s non-residential Soil Gas Screening Levels (SGSLs) (i.e., chloroform, tetrachloroethylene [PCE], TCE), none of



these compounds were detected in indoor air above their respective NJDEP non-residential Indoor Air Screening Levels (IASLs) (Ref. 11).

**WBOE Building** – TCE ( $450 \mu\text{g}/\text{m}^3$ ), a known compound of concern at the site, was detected above the NJDEP SGSL ( $27 \mu\text{g}/\text{m}^3$ ) in sample AS-05-011807, which was located beneath the floor slab in the northwestern portion of the WBOE building. Several VOCs (methylene chloride, 1,4-dichlorobenzene, benzene, and TCE) were detected above their corresponding NJ IASL in the two indoor air samples collected. However, only TCE was also detected in the sub-slab vapor samples and is a contaminant of concern at the Methode site (Ref. 11).

**DPW Building** – No contaminants were detected above the NJ SGSL beneath the building. Benzene, MBTE and 1,4 dichlorobenzene were detected above their corresponding NJ IASLs. However, none of these compounds are contaminants of concern at the Methode site and they were not detected in sub-slab samples (Ref. 11).

Due to the exceedences of TCE identified in the WBOE building, NJDEP required a second round of sampling and requested that a permanent sub-slab sampling point (SVP-1) be installed. One sub-slab sample and two indoor air samples were collected over a 24 hour period on April 16-17, 2007. Sample results indicated that TCE was detected at  $2,700 \mu\text{g}/\text{m}^3$ , which exceeds its corresponding NJ SGSL of  $27 \mu\text{g}/\text{m}^3$ . Methylene chloride, 1,4 dichlorobenzene, and TCE ( $730 \mu\text{g}/\text{m}^3$ ,  $12 \mu\text{g}/\text{m}^3$ ,  $4.4 \mu\text{g}/\text{m}^3$ ) were detected above their corresponding NJ IASLs ( $9 \mu\text{g}/\text{m}^3$ ,  $3 \mu\text{g}/\text{m}^3$ ,  $3 \mu\text{g}/\text{m}^3$ ). Again, only TCE was also detected in the sub-slab vapor samples and is a contaminant of concern at the Methode site. Thus, it is suspected that methylene chloride and 1,4 dichlorobenzene originated from a source within the building, as they are not contaminants of concern at the site (Ref. 11).

Based on the fact that TCE was detected above relevant screening criteria in both sub-slab soil gas and indoor air (i.e., underneath and inside the WBOE building), further analysis of indoor air at this location was recommended (Ref. 11).

### **Surface/Subsurface Soil**

The Methode Deed Notice (Ref. 6) includes several of the historical AOCs at the site (AOCs 13, 14, 15, 18, 27, 28[1], and 29), as well as three of the active AOCs described in response to Question No. 1 (AOCs 6, 7, and 16), because soil at these AOCs contains metals concentrations above NJ RDCSCC. These AOCs are as follows:

- AOC 6: Staging Area – Wastes
- AOC 7: Staging Area – New Chemistry
- AOC 13: Former Floor Drains
- AOC 14: Trench
- AOC 15: Sump – Reflow Room
- AOC 16: Sump – Staging Area
- AOC 18: Sump – Process Water Treatment Area
- AOC 27: Plating Room
- AOC 28 (1): Etching Area (1)
- AOC 29: Reflow Room

Methode grouped these AOCs into two main larger areas for purpose of the Deed Notice; see Figure B-1 from the Deed Notice (Ref. 6) for the locations. Area A includes portions of AOCs 6, 7, 14, 16, 18 and 27. Area B includes portions of AOCs 13, 15, 28(1), and 29. Arsenic, copper, lead, and nickel were detected above the NJ RDCSCC in surface and subsurface soil in at least one of the AOCs in Area A.

Copper and lead were detected above their respective NJ RDCSCC in surface and subsurface soil in at least one of the AOCs in Area B. Area C is a third, smaller area that encompasses the location surrounding a single soil sample (located outside the main building footprint), at which polychlorinated biphenyls (PCBs) were detected above NJ RDCSCC (at 12 feet bgs). The Deed Notice was filed by Methode on October 28, 2005, and recorded by the Burlington County Clerk on November 16, 2005 (Ref. 6).

Areas of VOC contamination in subsurface soil also existed at the site. Historical VOC impacts in soil outside of the building footprint were primarily concentrated in the area of MW-09R (AOC 37). Contaminants detected above the NJ RDCSCC included 1,1,1-TCA, TCE, and 1,1-DCE. Historical soil samples were also analyzed for 1,1-DCA, trans-1,2-DCE, PCE, and cis-1,2-DCE, and the results were either nondetect or below the NJ RDCSCC. According to the Remedial Action Report for the Upper Sand Aquifer (Ref. 5), soil remediation took place in the vicinity of MW-09 in February 2003. Approximately 400 tons of contaminated soil were removed, treated on site to reduce VOC concentrations to non-hazardous levels, and disposed off site to accelerate the shallow groundwater remediation (Ref. 10). Post-excavation sample results indicated that all residual concentrations were below the NJ RDCSCC (Ref. 5). Thus, VOC impacts in soil have been removed and are no longer a concern at the Methode site.

### **Surface Water/Sediment**

Site topography is relatively flat, with a gentle slope toward Mill Creek to the south. Mill Creek is the closest surface water body, located about one-eighth of a mile from the Methode site. The site is located within the Rancocas Creek drainage basin, which is 299 square miles in area. Mill Creek discharges to Rancocas Creek approximately 3,000 feet southwest of the site. Crystal Lake is located to the west of the site, and unnamed ponds associated with the local municipal wastewater treatment plant are located to the northwest. Olympia Lake is located 1,000 feet northwest of the site. The Delaware River is located approximately two miles east of the site (Ref. 10).

Crystal Lake has been identified as the surface water body with the highest potential for impacts related to site-related contamination (Ref. 4). In early 2007, staff gauges were installed in Crystal Lake and an unnamed pond north of Crystal Lake. Resulting water level measurement data indicated that Crystal Lake may be a potential receptor for groundwater discharge. Data collected in well MW-22A, directly adjacent to Crystal Lake in the upgradient direction, contained low concentrations of TCE (2.55  $\mu\text{g/l}$ ) in groundwater (Ref. 10). This concentration of TCE is less than ten times the NJ GWQC of 1.0  $\mu\text{g/l}$  (10x the NJ GWQC = 10  $\mu\text{g/l}$ ). Thus, any TCE that may migrate into surface water in Crystal Lake is not expected to impact surface water above relevant New Jersey Surface Water Quality Criteria, given that the concentrations of TCE in groundwater adjacent to the surface water body are less than ten times the NJ GWQC. No other surface water bodies are currently identified as a concern for elevated levels of discharge; thus, surface water is not currently identified as a medium of concern for this site.

Sampling of sediments has not been required at this time. The primary contaminants in groundwater are VOCs, which would not be expected to impact sediments given their volatile nature and relatively low concentration adjacent to potential receiving surface water bodies.

### **Air (Outdoors)**

Migration of contaminants in soil to outdoor air is also not likely to be a concern at the Methode site. All contamination that remains in soil is covered with a concrete or asphalt cap to prevent migration of contaminant particulates into outdoor air. In addition, the concentrations of VOCs detected in groundwater are not expected to volatilize into outdoor air at levels of concern, given the natural

dispersion of these contaminants once they reach the surface. Thus, impacts to outdoor air will not be evaluated further in this EI Determination.

**References:**

1. ISRA Preliminary Assessment Report. Prepared by Earth Sciences Consultants, Inc. Dated January 2000.
2. Site Investigation. Prepared by Earth Sciences Consultants, Inc. Dated January 2000.
3. Letter from Andrew Hendricks, Earth Sciences Consultants, Inc., to Ms. Maria Franco-Spera, NJDEP, re: Response to NJDEP Comment Letter, Additional Site Investigation/Remedial Investigation/Remedial Action Work Plan Report. Dated January 31, 2001.
4. Memo from Mark A. Radcliffe, Walter B. Satterthwaite Associates, Inc., to Matthew Gordon, URS, re: Methode: Baseline Ecological Assessment. Dated January 30, 2002.
5. Remedial Action Report, Upper Sand Aquifer. Former Methode Electronics, Inc. East Facility. Prepared by Walter B. Satterthwaite Associates, Inc. Dated June 20, 2003.
6. Memo from Matthew Gordon, URS, to Bob Hayton, NJDEP, re: County Clerk's Official Confirmation of Methode Deed Notice Recording. Dated November 28, 2005.
7. Letter from Bruce Venner, NJDEP, to Steve Harders, Methode, re: NFA – Soils Letter and Covenant Not to Sue. Dated January 20, 2006.
8. Remedial Investigation Work Plan. Prepared by URS. Dated March 8, 2006.
9. Remedial Investigation Progress Report. Prepared by URS. Dated October 19, 2006.
10. Remedial Investigation Progress Report, No. 2. Prepared by URS. Dated April 5, 2007.
11. Vapor Intrusion Assessment Report. Prepared by URS. Dated May 18, 2007.

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 <sup>3</sup>
Groundwater	No	No	–	Yes	–	–	–
Air (indoor)	No	Yes	–	–	–	–	–
Surface Soil (e.g. < 2 ft)	No	No	–	No	No	–	–
Surface Water			–	–			–
Sediment			–	–		–	–
Subsurface Soil (e.g., > 2 ft)	–	–	–	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:**

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

## **Groundwater**

The site and surrounding area receive potable water from the Willingboro Public Supply system. The Methode site lies within the Willingboro public supply well's zone of influence. The municipal well was sampled by Methode in 2002 and was shown not to have been impacted by the site at that time. The municipal well continues to be sampled as part of the municipality's routine monitoring program, and no problems with site-related compounds have been detected to date (Refs. 2, 3). Thus, there is currently no concern for impacts to receptors through exposure to municipal water from the Willingboro public supply well.

As discussed in the response to Question No. 2, based on previous site investigations, the depth to the water table beneath the site varies seasonally and ranges from approximately 0.5 to 9 feet bgs. The water table is found within the USA unit across the site; where present, the Clay A unit appears to inhibit downward flow from the USA. Clay A is present on site, except in areas breached by drilling or well screens, but is not present or is discontinuous in locations south of the site, across Industrial Drive. Other water-bearing units include the UIU and the LSA (Ref. 4). Given the fact that impacted groundwater in the USA is present at the site at depths of less than 10 feet bgs, there is a potential for on-site remedial workers to contact impacted shallow groundwater during intrusive activities at the site. No other intrusive activities besides remedial activities are expected, given the fact that the site is currently inactive and the building is only being used for industrial storage purposes.

Contact to impacted groundwater is not likely to be a concern for off-site construction workers, however, because there are only minor exceedances for TCE (NJ GWQC = 1 µg/l) in shallow downgradient wells MW-08A (4.09 µg/l) and MW-22 (2.55 µg/l). Given that these exceedances are only four times the NJ GWQC or less, and that the NJ GWQC are conservative standards for assessing direct contact exposures to groundwater, direct contact to impacted groundwater is not considered a potentially complete pathway for off-site construction workers at this time.

## **Air (Indoors)**

As discussed in the response to Question No. 2, several contaminants were detected above NJDEP SGSLs and IASLs. Of the contaminants detected, only TCE has been determined to be site related. All other compounds are either related to sources inside the building or are not associated with activities conducted at the Methode site. Since TCE was detected in both sub-slab soil gas and indoor air samples above the relevant screening criteria, there is an exposure concern for on-site receptors at the WBOE building. The Vapor Intrusion Assessment Report indicates that office workers are present at the WBOE site and work indoors at this building (Ref. 5). For the purposes of this EI determination, these receptors are considered off-site workers and are considered to have a potentially complete exposure pathway to TCE concentrations reported in indoor air at the WBOE facility.

## **Surface/Subsurface Soil**

As discussed in the response to Question No. 2, Areas A, B, and C at the Methode site contain residual metal contamination in soil that is currently covered under a Deed Notice. The Deed Notice was filed on November 16, 2005, and restricts the use of all three areas to non-residential use only. Arsenic, copper, lead, and nickel are present above their respective NJ RDCSCC in surface/subsurface soil in at least one of the AOCs in Area A. PCBs were also present at one AOC in Area A above the NJ RDCSCC. The Deed Notice restricts any disturbance of soil in Area A down to 6.5 feet bgs and indicates that all areas within Area A have been capped with concrete. Copper and lead were detected above NJ RDCSCC in surface/subsurface soil in at least one of the AOCs in Area B. The Deed Notice restricts any disturbance of soil in this area down to 6 feet bgs and indicates that this area has also been capped with concrete.

PCBs were detected in one soil sample, at 12 feet bgs, in Area C. The Deed Notice restrict disturbance of soil in this area down to 14 feet bgs and indicates that this area is covered with asphalt (Ref. 1). Given the fact that a Deed Notice has been filed that restricts any disturbance of soil in impacted areas, and that all impacted areas are covered by asphalt or concrete, exposure to contaminated soil is not a concern for any receptor at the Methode site.

**References:**

1. Memo from Matthew Gordon, URS, to Bob Hayton, NJDEP, re: County Clerk's Official Confirmation of Methode Deed Notice Recording. Dated November 28, 2005.
2. Remedial Investigation Work Plan. Prepared by URS. Dated March 8, 2006.
3. Remedial Investigation Progress Report. Prepared by URS. Dated October 19, 2006.
4. Remedial Investigation Progress Report, No. 2. Prepared by URS. Dated April 5, 2007.
5. Vapor Intrusion Assessment Report. Prepared by URS. Dated May 18, 2007.

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **significant**<sup>4</sup> (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 the response to Question No. 3, there is a potential for on-site remedial workers to come into contact with impacted groundwater in the USA within site boundaries. All remedial activities at the site are likely to be conducted under a Health and Safety Plan and follow Occupation Safety and Health Administration requirements for the use of personal protective equipment to prevent exposure to contamination. Thus, it is not expected that remedial workers would have significant exposure to contamination in shallow groundwater during any intrusive remedial activities that may be conducted on site.

**Air (Indoors)**

A site-specific risk evaluation was conducted to evaluate the TCE concentrations detected in the WBOE building as described in the Vapor Intrusion Assessment Report (Ref. 2). The assessment analyzed the risks posed to off-site workers from site-related TCE in the WBOE building using conservative NJDEP and EPA-recommended exposure parameters. The calculated non-cancer risks for both the January 2007 and April 2007 data sets were below the EPA target Hazard Quotient (HQ) of 1.0 (HQ = 0.14 for January 2007; HQ = 0.03 for April 2007). The excess cancer risks calculated for January and April 2007 were  $2 \times 10^{-4}$  and  $4 \times 10^{-5}$ , respectively. The EPA acceptable risk range is  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ ; thus, the excess cancer risk calculated for the January 2007 indoor air data slightly exceeds the upper bound of the EPA acceptable risk range ( $1 \times 10^{-4}$ ), while the excess cancer risk calculated for the most recent sampling data available (April 2007) falls within this range.

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<sup>4</sup> 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.

In order to mitigate the potential risks associated with TCE in the WBOE building, Methode installed a vapor mitigation system to reduce any potential risks associated with off-site migration of TCE. This system was installed and activated in late September 2008 (Ref. 2). Thus, given the fact that the calculated risks for the most recent indoor air sampling event were within the EPA acceptable risk range using conservative exposure parameters, and a vapor mitigation system was recently installed at the WBOE building, risks to off-site office workers are not expected to be significant. This should be confirmed with a review of the report prepared to document the impacts of the vapor mitigation system to ensure that potential risks to off-site workers associated with exposure to TCE in indoor air at the WBOE building remain acceptable.

**References:**

1. Vapor Intrusion Assessment Report. Prepared by URS. Dated May 18, 2007.
2. Email from Barry Tornick, NJDEP, to Amy Brezin, Booz Allen Hamilton, re: Installation of Vapor Mitigation System. Dated September 18, 2008.



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):

- 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 Methode Electronics, Inc. East site, EPA ID# NJD048608897, located at 10 Industrial Drive in Willingboro, 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: \_\_\_\_\_  
Kristin McKenney  
Environmental Consultant  
Booz Allen Hamilton

**Reviewed by:** \_\_\_\_\_ Date: \_\_\_\_\_  
Amy Brezin  
Environmental Consultant  
Booz Allen Hamilton

**Also reviewed by:** \_\_\_\_\_ Date: \_\_\_\_\_  
Alan Straus, 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 26, 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 the NJDEP.

**Contact telephone and e-mail numbers:** Alan Straus  
212-637-4160  
[straus.alan@epamail.epa.gov](mailto:straus.alan@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.**

## 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 or SWMU	GW	AIR (Indoors)	SURF SOIL	SURF WATER	SED	SUB SURF SOIL	AIR (Outdoors)	CORRECTIVE ACTION MEASURE	KEY CONTAMINANTS
AOC 36. Site-Wide Groundwater	Yes	Yes	NA	No	No	NA	No	<ul style="list-style-type: none"> <li>• Source removal of soil in the area of MW-09R in 2003 and dense, non-aqueous phase liquid recovery from MW-09R with off-site disposal, primarily between 1991 and 1996</li> <li>• Air sparging/soil vapor extraction of USA aquifer to reduce VOC concentrations from July 1995 to February 2003, and initiated again in November 2004</li> <li>• Groundwater recovery and treatment from MW-07DR in 1995, and from MW-09R primarily between 2004 and present</li> <li>• Enhanced natural attenuation via injection of a hydrogen-releasing compound for reductive dechlorination activities in 2003</li> </ul>	• VOCs
AOC 37. Residual VOCs in Soil Near MW-09R and MW-02A	NA	No	Yes	No	No	Yes	No	• Source removal for impacted soils	• VOCs
AOC 4. Flow-Through Wastewater Tank	(AOC 36)	(AOC 36)	No	No	No	No	No	• NFA for soils received from NJDEP following the 2000 RI	None
AOC 6. Staging Area—Wastes	(AOC 36)	(AOC 36)	Yes	No	Yes	No	No	• Deed Notice, concrete cap	• Lead, copper
AOC 7. Staging Area—Virgin Chemicals	(AOC 36)	(AOC 36)	Yes	No	Yes	No	No	• Deed Notice, concrete cap	• Copper
AOC 9. Hazardous Waste Dumpster	(AOC 36)	(AOC 36)	Yes	No	Yes	No	No	• Deed Notice, concrete cap	• Lead, copper
AOC 16. Staging Area Sump (West)	(AOC 36)	(AOC 36)	Yes	No	Yes	No	No	• Deed Notice, concrete cap	• Arsenic
AOC 17. Staging Area Sump (North-central)	(AOC 36)	(AOC 36)	No	No	No	No	No	• NFA for soils received from NJDEP following the 2000 RI	None
AOC 24. Discharge	(AOC 36)	(AOC 36)	No	No	No	No	No	• NFA for soils received from NJDEP following the 2000 RI	None
AOC 34. Clarifier	(AOC 36)	(AOC 36)	No	No	No	No	No	• NFA for soils received from NJDEP following the 2000 RI	None