DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name:	Union Carbide Corporation - South Charleston Facility
Facility Address :	437 MacCorkle Avenue, SW South Charleston, WV 25303
Facility EPA ID#:	WVD005005483

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

   _X__ If yes – check here and continue with #2 below.

   _____ If no – re-evaluate existing data, or

   _____ If data are not available skip to #8 and enter "IN" (more information needed) status

The following discussion provides a brief background and overview of information collected to date regarding known or reasonably suspected releases to groundwater.

The Union Carbide Corporation (UCC) South Charleston Facility, hereafter referred to as the Facility, is located in South Charleston, West Virginia, adjacent to the Kanawha River (Figure 1). The property encompasses approximately 200 acres, comprising two major sections, the Mainland and Blaine Island. The property is surrounded by mixed residential, commercial, and industrial areas. Several private and corporate chemical production facilities and other private operations have occupied the property currently encompassed within the Facility boundaries. Chemical production facilities located on Blaine Island were developed after UCC's acquisition of the property. A barium reduction facility and a glass manufacturing facility occupied a portion of the Mainland Complex prior to UCC's acquisition of the property. Also prior to UCC's acquisition, a chlorobenzene/dichlorobenzene production plant existed in the vicinity of the property boundary between UCC and FMC near the Kanawha River. Facility operations since the 1920s have included the aforementioned barium reduction and glass manufacturing facilities and the production of various specialty chemicals, including vinyl acetates and petroleum compounds.

Potable water for the cities of Charleston and South Charleston is provided by the West Virginia-American Water Company, via a surface water intake on the Elk River, which has its confluence with the Kanawha River approximately 1.75 miles upstream of the Facility. Process water for the Facility is taken directly from the Kanawha River through an intake on the north side of Blaine Island.

RCRA Corrective Action activities are currently being performed as part of a Facility Lead Agreement with EPA Region III, which was signed on December 15, 1999. Several investigations have been conducted at the Facility as summarized in the paragraphs below. A detailed history of Facility operations and previous investigations is presented in the RFI Workplan, South Charleston Facility, South Charleston, West Virginia (Key Environmental Inc. and Kemron Environmental Services, June, 2002).

Previous Investigations

A pre-RCRA Facility Investigation (RFI) Site Assessment was conducted at the Facility in order to identify Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) that represent potential sources of contamination. The

pre-RFI Site Assessment included employee interviews, historical publication review, and an aerial photograph compilation. Based on information gathered during the pre-RFI Site Assessment, 34 SWMUs/AOCs were identified.

An RFI was conducted between October 2002 and June 2003. The RFI activities included a site reconnaissance, surface soil sampling, subsurface soil sampling, direct-push groundwater sampling, installation of piezometers, and a comprehensive groundwater sampling event. The results of this investigation are provided in the RFI Report, South Charleston Facility, South Charleston, West Virginia (CH2M HILL, November, 2003).

A Follow-Up RFI was conducted in 2004. Objectives of the Follow-Up RFI included determining if migration of contaminated groundwater at the Facility is under control, and characterizing the horizontal and vertical distribution of constituents in groundwater. The results are provided in the Draft Follow-Up RFI Report, South Charleston Facility, South Charleston, West Virginia (CH2M HILL, April, 2005).

A list of references, which includes the previous investigation reports for the Facility, is provided as Attachment I of this Groundwater Environmental Indicator (EI) Determination.

Definition of Environmental Indicators (for the RCRA Corrective Action)

EIs are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination: subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

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

Duration / Applicability of EI Determinations

EI Determination status codes should remain in 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).

2. Is **groundwater** known or reasonably suspected to be "**contaminated**"[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

X If yes – continue after identifying key contaminants citing appropriate "levels" and referencing supporting documentation.

____ If no – skip to #8, and enter "YE," status code after providing or citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

____ If unknown – skip to #8 and enter "IN" status code.

Rationale and Reference(s)

Groundwater analytical results from groundwater sampling events conducted during July and November 2004 as part of the Follow-Up RFI were compared to the Drinking Water Maximum Contaminant Level (MCL), or the Region III Risk-Based Concentration (RBC) for tap water where no MCL exists, for each constituent.

Groundwater at the Mainland and Blaine Island is contaminated with Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), and metals at concentrations that exceed applicable groundwater criteria (MCLs or RBCs). Figure 2 shows the approximate area of contaminated groundwater at the Facility. Figure 2 also shows the groundwater sampling locations at Blaine Island and the Mainland. Tables 1 through 3 below, show the maximum concentration detected for each constituent during the 2004 sampling events, the sample location, and the MCL or RBC, as appropriate.

The highest concentrations of VOCs were detected in groundwater samples collected at Blaine Island. The VOC detected most frequently above the MCL at the Mainland and Blaine Island is benzene. The maximum concentration of each VOC that exceeds an MCL or RBC is shown in Table 1 below. Other VOCs present above applicable groundwater criteria on the Mainland and Blaine Island include chlorinated VOCs and toluene, ethylbenzene, and xylene.

SVOCs detected most frequently include bis(2-chloroethyl)ether and bis(2-chloroisopropyl)ether Bis(2-ethylhexyl)phthalate is found in groundwater at the Facility, with the highest concentration detected at DP079, as shown in Table 2. The lower concentrations of Bis(2-ethylhexyl)phthalate may be attributable to plastics used throughout the manufacturing operations. The maximum concentration of each SVOC that exceeds an MCL or RBC is shown in Table 2 below.

Metals, including barium and arsenic, were detected across much of Blaine Island and the Mainland. The presence of certain metals, such as arsenic, is considered to be attributable to background concentrations in groundwater, based on comparison to industrial screening criteria and the West Virginia natural background concentrations, The maximum concentration for each metal that exceeds an MCL or RBC is shown in Table 3below.

Based on the current understanding of the extent of groundwater contamination associated with the Facility, there are no drinking water or production wells affected, or with the potential to become affected, by contaminated groundwater at the Facility. The closest production well is located over 1 mile from the Facility on the opposite side of the Kanawha River. Potable water for Charleston and South Charleston comes from a surface water intake located on the Elk River, upstream of the Facility.

Table 1
VOC - Constituents of Concern
Maximum Groundwater Concentrations Compared to Screening Criteria

Volatile Organic Compounds	Maximum Concentration (ug/L)	Sample Location	MCL (ug/L)	
1,1,2,2-Tetrachloroethane	339	Mainland - MP29	0.053	RBC

Table 1
VOC - Constituents of Concern
Maximum Groundwater Concentrations Compared to Screening Criteria

Volatile Organic Compounds	Maximum Concentration (ug/L)	Sample Location	MCL (ug/L)	
1,1,2-Trichloroethane	729	Mainland - PZ034	5	MCL
1,1-Dichloroethene	88.4	Mainland - PZ034	7	MCL
1,2-Dichloroethane	6,200	Mainland - PZ031	5	MCL
1,2-Dichloroethene (total)	500	Mainland - PZ031	70	MCL
1,2-Dichloropropane	1,320	Mainland - MW006	5	MCL
1,4-Dioxane (P-Dioxane)	4,270	Mainland - PZ038	6.1	RBC
Acetone	2,390	Mainland-DP063	610	RBC
Benzene	32,300	Blaine Island-MW005	5	MCL
Carbon tetrachloride	736	Mainland-MW006	5	MCL
Chlorobenzene	71,900	Mainland-PZ038	100	MCL
Chloroform	1,720	Mainland-MP29	80	MCL
Ethylbenzene	7,960	Blaine Island – PZ004	700	MCL
Methylene Chloride	26	Mainland – MP29	5	MCL
Tetrachloroethene	1,060	Mainland-PZ038	5	MCL
Toluene	3,100	Blaine-MP14	1,000	MCL
Trichloroethene	3,460	Mainland-MP29	5	MCL
Styrene	125	Mainland-PZ038	100	MCL
Vinyl Chloride	26,300	Mainland-MP05	2	MCL

Table 2
SVOC- Constituents of Concern
Maximum Groundwater Concentrations Compared to Criteria

Semivolatile Organic Compounds (ug/L)	Maximum Detection (ug/L)	Sample Location	MCL (ug/L)	
1,2,4-Trichlorobenzene	1,990	Mainland-PZ038	70	MCL
1,2-Dichlorobenzene	26,700	Mainland-PZ038	600	MCL
1,3-Dichlorobenzene	118	Mainland-PZ038	18	RBC
1,4-Dichlorobenzene	39,400	Mainland-PZ038	75	MCL
2,4-Dimethylphenol	913	Blaine Island-PZ003	730	RBC
2-Chlorophenol	47.8	Mainland-PZ038	30	RBC
2-Methylnaphthalene	3,790	Blaine Island-MP14	120	RBC
Acenaphthene	557	Blaine Island-MP14	370	RBC
Anthracene	2,000	Blaine Island-MP14	1,800	RBC

Table 2
SVOC- Constituents of Concern
Maximum Groundwater Concentrations Compared to Criteria

Benzo (a) anthracene	932	Blaine Island-MP14	0.092	RBC
Benzo (a) pyrene	293	Blaine Island-MP14	0.2	MCL
Benzo (b) fluoranthene	738	Blaine Island-MP14	0.092	RBC
Benzo(k)fluoranthene	130	Blaine Island-MP14	0.92	RBC
Bis(2-chloroethyl)ether	14,000	Blaine Island-MP05	0.0096	RBC
Bis(2-chloroisopropyl)ether	25,200	Blaine Island-DP017	0.26	MCL
Bis(2-ethylhexyl)phthalate	2,460	Blaine Island-DP079	6	MCL
Chrysene	1,290	Blaine Island-MP14	9.2	RBC
Fluorene	3,460	Blaine Island-MP14	240	RBC
Indeno(1,2,3-c,d)pyrene	58	Mainland-DP090	0.092	RBC
Naphthalene	7,540	Blaine Island-MP14	6.5	RBC
Pyrene	412	Blaine Island-MP14	180	RBC

Table 3
Metals – Constituents of Concern
Maximum Groundwater Concentrations Compared to Criteria

Metals (ug/L)	**Maximum Detection (ug/L)**	**Sample Location**	**MCL (ug/L)**	
Arsenic	333	Blaine Island-DP017	10	MCL
Barium	57,300	Blaine Island-DP017	2000	MCL
Cadmium	78.2	Mainland-PZ032	5	MCL
Chromium	1,150	Blaine Island-DP017	1000	MCL
Lead	991	Blaine Island-DP017	15	(1)
Mercury	5.6	Blaine Island-DP017	2	MCL
Nickel	1,140	Blaine Island-DP017	730	RBC

Footnotes:
[1] EPA Safe Drinking Water Act Lead Action Level

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination?

    _X_ If yes – continue after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

    ____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) – skip to #8 and enter "NO" status code, after providing an explanation.

    ____ If unknown – skip to #8 and enter "IN" status code

Rationale and Reference(s):

Based on the available information, obtained during the RFI and Follow-Up RFI, about site geologic, hydrogeologic, and hydrologic conditions, the area of contaminated groundwater at the Facility is considered to be stabilized. This determination was made based on the following:

- *The Kanawha River prevents further groundwater plume migration*
- *Site geologic conditions and groundwater flow patterns are characterized*
- *Interim Measures have been taken to address prominent sources of contamination*

The Kanawha River Prevents Further Groundwater Plume Migration:

As shown in Figure 3, groundwater at Blaine Island and the Mainland flows generally to the Kanawha River. As a result, the Kanawha River acts as a barrier for the migration of contamination through the groundwater. Surface water was sampled, and a groundwater to surface water mass loading calculation was performed, in order to assess the affects of groundwater discharge to the Kanawha River. The results of the surface water sampling and the mass loading calculation are provided in response to Question 5 below.

Site Geologic Conditions and Groundwater Flow Patterns are Characterized:

Information obtained during the RFI and Follow-Up RFI was used to evaluate site geologic conditions and determine groundwater flow patterns. A summary of the site geologic conditions and groundwater flow in the unconsolidated zone, and the geologic conditions in the bedrock aquifer at the Facility is provided below:

Unconsolidated Zone

- *The unconsolidated materials underlying the surface cover at Blaine Island and the Mainland are divided into two horizons: fill and underlying native material. Geologic media (native material) have been grouped based on their lithologic characteristics and likely ability to transmit water.*

- *Fill material overlies the native material across most of the facility and ranges from about 10- to over 30-feet thick. Underlying the native material is bedrock. The unconsolidated native material consists of alluvial deposits of gravel, sand, silt and clay.*

- *In most areas, especially on Blaine Island, the fill material extends from the ground surface to a depth at or slightly below the mean Kanawha River stage. This is supported by the known history of Blaine Island and the Mainland, which suggests both were, in part, built up from the river level to accommodate facility operations and protect them from flooding.*

- *The water table in the unconsolidated material at the Facility is between 10- and 40-feet below ground surface (bgs). There are notable features in the groundwater surface at Blaine Island, including apparent mounding, depression, radial flow, and horizontal variability in elevation. However, in general, groundwater along the northern half of Blaine Island discharges to the main channel of the Kanawha River and groundwater along the southern half of Blaine Island discharges to the back channel. Groundwater at the Mainland generally flows from the south to the Kanawha River.*

- *More than a hundred direct-push and piezometer borings, and monitoring wells were installed at Blaine Island and the Mainland during the RFI and Follow-Up RFI to evaluate groundwater quality. All of the groundwater sampling locations are shown on Figure 3-1 of the Follow-Up RFI Report and Figure 3-2 of the RFI Report. Groundwater data from the RFI and Follow-Up RFI were reviewed as part of this EI. The most recent groundwater data, collected during the 2004 Follow-Up RFI sampling event, were used to prepare the response to Question 2 above.*

Bedrock

- *Underlying the native material at the Facility is bedrock at depths between 50 and 60 feet bgs.*

- *Data collected from monitoring wells completed to bedrock in the area of the former Gyro unit indicate that bedrock is gray fine to medium grained, thinly bedded, micaceous sandstone. Wells installed to bedrock have been monitored to evaluate the vertical distribution of contaminants in groundwater at the Facility. The vertical extent of groundwater contamination was determined in most locations to occur from the water table to approximately 40 feet bgs. However, contamination is observed to bedrock in the vicinity of SWMU 3 and SWMU 11.*

- *Theoretically, possible transport mechanisms for the observed contamination to move down into the bedrock are groundwater flow and Dense Non-Aqueous Phase Liquid (DNAPL) movement through the subsurface to the bedrock. As discussed above, the river is the main discharge point for groundwater in the area so it is unlikely that groundwater flow would have a strong downward component. At these well locations , an oil/water interface probe was used to determine no Non-Aqueous Phase Liquid (NAPL) was present.*

- *Permeability of bedrock is expected to be much lower than permeability of the overlying alluvium, which would limit vertical migration of groundwater constituents.*

Interim Measures Have Been Taken To Address Prominent Sources of Contamination:

The pre-RFI Site Assessment identified 34 SWMUs and AOCs that represent potential sources of contamination at the Facility. Interim measures taken to eliminate, reduce, or control releases of contamination at the Facility are the following;

- *Installation of an interceptor trench at the upper portion of Blaine Island in 1989*
- *Installation of an interceptor trench at the former Gyro unit in 1996*
- *Installation of an air sparging/soil vapor extraction system at a former Underground Storage Tank (UST) in 1993*

Other sources of groundwater contamination are present at the Facility, as identified during the RFIs. However, the above interim measures were taken to prevent further releases from prominent sources of contamination at the Facility.

Footnotes:
[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be samples/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring location are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

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

_X__ If yes – continue after identifying potentially affected surface water bodies.

____ If no – skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

____ If unknown – skip to #8 and enter "IN" status code.

Rationale and Reference(s):

As shown on Figure 3, the Mainland portion of the Facility extends northeast to the Kanawha River, and Blaine Island is surrounded by the Kanawha River. The groundwater beneath the Mainland has a dominant flow direction to the north toward the Kanawha River. The groundwater beneath Blaine Island generally exhibits radial flow toward the main and back channels of the Kanawha River.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

_X_ If yes – skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonable suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) – continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

____ If unknown – enter "IN" status code in #8.

Rationale and Reference(s):

Water-level data suggest groundwater from the Mainland and Blaine Island flows into the Kanawha River. Therefore, the focus of the Facility Groundwater EI determination is whether or not contaminated groundwater is significantly impairing the quality of the Kanawha River near the Facility. Based on EPA's EI guidance found at http://www.epa.gov/epaoswer/hazwaste/ca/eis/faqs.htm, a positive EI determination would generally be appropriate where the groundwater is not significantly affecting the surface water body in a way that leads it to fail basic water quality criteria.

A groundwater-to-surface water mass loading calculation was performed in order to estimate surface water concentrations from the discharge of constituents identified in groundwater at the facility. This calculation was performed as part of the Follow-up RFI. Discharge of the highest concentrations of groundwater constituents measured at the Facility was simulated through the entire saturated thickness of the alluvial aquifer along the entire river boundary at both Blaine Island and the Mainland. This conservative simulation indicated that concentrations of facility-related constituents below reporting limits would result from groundwater discharge to the Kanawha River surface water. The mass loading calculations and surface water sampling results are provided in the Draft Follow-Up RFI Report (CH2M HILL, April 2005).

To evaluate the model results, 20 surface water samples were collected from the Kanawha River during the Follow-Up RFI in December 2004, as shown in Figure 4. Nine samples were collected from the back channel between Blaine Island and the Mainland, four samples from the main channel adjacent to Blaine Island, five from upstream locations, and two from downstream locations. During the December 2004 surface water sampling, there were no detections of any VOCs, SVOCs, or metals in any of the surface water samples collected. A subsequent surface water sampling event was conducted in May 2005 to obtain data during low river flow conditions. During this sampling event, there were detections of bis(2-ethylhexyl)phthalate at sample location SW-12, benzene at sample location SW-19, and di-n-octylphthalate at sample location SW-5, which is an up-stream sample.. Di-n-octylphthalate was also detected in the

SW-20 field duplicate sample, but not the original sample. Bis(2-ethylhexyl-phthalate and benzene were present at concentrations significantly less than ten times the MCL or Aquatic Water Quality Criteria (AWQC). Futher, neither constituent was detected in the next downgradient sample location, or any other surface water sample locations around the South Charleston Facility. Because benzene was not detected at any of the other 19 sample locations, this detection is more likely attributable to other sources not associated with the South Charleston Facility.

While there is no MCL or AWQC available for di-n-octylphthalate, this constituent was detected in one of the upstream samples at a similar concentration to that detected at SW-20. Further, the constituent was not detected in the sample collected just upstream of SW-20 (i.e. SW-19 which is the first downstream sample from the lower end of Blaine Island), therefore it is concluded that the di-n-octylphthalate in the Kanwaha River surface water samples is not associated with the South Charleston Facility.

TABLE 4
Summary of Constituent Concentrations in the Kanawha River

Constituent	MCL	AWQC	10 x MCL	10 x AWQC	Maximum Conc. (ug/L)
Bis(2-ethylhexyl)phlalate (BEHP)	**5**	**2.2**	**50**	**22**	**5.85**
Benzene	**5**	**51**	**50**	**510**	**1.30**
Di-n-octylphthalate	**NC**	**NC**	**---**	**---**	**6.24**

MCL - Maximum Contaminant Level
AWQC - Ambient Water Quality Criteria
(USEPA, National Recommended Water Quality Criteria: 2002)

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

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

_X_ If yes – continue after either:1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR
2) providing or referencing an interim-assessment[5], appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, us/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

___ If no – (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") – skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

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

Rationale and Reference(s):

As indicated above, there were no significant detections of VOCs, SVOCs, or metals in the surface water samples collected in the Kanawha River adjacent to the Facility that would indicate unacceptable impacts to the river. Therefore, discharge of contaminated groundwater from the Facility is not currently causing unacceptable affects on the Kanawha River.

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts tot he surface waters, sediments or eco-systems.

7. Will groundwater **monitoring**/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

_X__ If yes – continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

____ If no – enter "NO" status code in #8.

____ If unknown – enter "IN" status code in #8.

Rationale and Reference(s):

Groundwater contamination will be part of ongoing evaluation at the facility and, if necessary, future corrective action.

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

_X__ YE – Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at *Union Carbide Corporation* facility, EPA ID *WVD005005483*, located at *437 MacCorkle Avenue SW, South Charleston, West Virginia 25303*. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater". This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

____ NO – Unacceptable migration of contaminated groundwater is observed or expected.

____ IN – More information is needed to make a determination.

Completed by (signature) /s/ Date 8/25/05

(print) _____

(title) _____

Supervisor (signature) /s/ Date 8/25/05

(print) _____

(title) _____

(EPA Region or State) _____

Locations where References may be found:
USEPA
1650 Arch Street
Philadelphia, PA 19103

Contact telephone and e-mail numbers
(name) Denis Zielinski
(phone #) 215-814-3431
(e-mail) zielinski.denis@epa.gov

Attachment I
Draft Groundwater Environmental Indicator Determination
South Charleston Facility

References

List of Previous Investigations

CH2M HILL Inc., April 2005. Follow-Up RCRA Facility Investigation Report, South Charleston Facility, South Charleston, West Virginia. Prepared for Union Carbide Corporation, A Subsidiary of the Dow Chemical Company.

CH2M HILL, Inc., November 2003. *RCRA Facility Investigation Report, South Charleston Facility, South Charleston, West Virginia. Prepared for Union Carbide Corporation, A Subsidiary of the Dow Chemical Company.*

Key Environmental, Inc. (Key) and Kemron Environmental Services (Kemron), June 2002. *RCRA Facility Investigation Workplan, Union Carbide Corporation, A subsidiary of the Dow Chemical Company, South Charleston Facility, South Charleston., West Virginia.*