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: Celanese Acetate, LLC
Facility Address: 3520 Virginia Ave, Narrows, VA 24124
Facility EPA ID #: VAD005007679

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

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

   ☐ If no - re-evaluate existing data, or

   ☐ If data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

The Celanese Plant is located in Giles County east of the town of Narrows, Virginia along U.S. Route 460. The total site encompasses 1332 acres and is divided into two major areas separated by Route 460. The plant area is located adjacent to the New River, and the landfill area is located on the hillside north of the plant area. The site is characterized by a narrow, flat valley floor surrounded by relatively steep mountainous hillsides and ridge tops.

The Celanese Plant has been in operation since late 1939 and manufactures fiber-based products. Raw materials in the formulation of cellulose acetate are cellulose (wood pulp), acetic anhydride, acetic acid, sulfuric acid, and magnesium oxide. In 2015, a new boiler system using natural gas with an oil backup began operation, replacing the coal fired boiler system used since 1939. Solid wastes are managed in onsite landfills, process wastewaters are treated on-site under a VPDES permitted wastewater treatment plant, and some wastes are sent off-site for regeneration/recycling and treatment/disposal.

Definition of Environmental Indicators (for the RCRA Corrective Action)

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

Definition of "Migration of Contaminated Groundwater Under Control" EI

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

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, (GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated 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 Determinations 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).

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

   ☒ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

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

   ☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

The following table shows constituents detected in groundwater above the National Primary Drinking Water Maximum Contaminant Levels (MCLs) published by EPA or the EPA Regional Screening Levels (RSLs) for Tapwater (where no MCL is available).

Table 1. Contaminants of Concern in Groundwater	
Contaminant of Concern (COC)	**Well(s) with Observed Exceedance (Bold indicated well with max conc.)**
Arsenic	MP-066, MP-035R, MP-100, MP-070, **MP-106**, PW008, MP-041R, MP-122, MP-021
Barium	MP-035R, **MP-122**
Benzene	**MP-082**
Cadmium	**MP-119**
Dichlorobiphenyl	MP-035R, **MP-100**
Lead	**MP-020**
Monochlorobiphenyl	**MP-100**
Nitrite-as-Nitrogen	**MP-035R**
Tetrachloroethene	**MP-124,** PW008
Trichlorobiphenyl	**MP-100**
Chromium VI	MP-035R, MP-043R, MP-067, MP-069R, MP-094, **MP-122**
Cobalt	MP-021, MP-042R, MP-100, **MP-106**
Iron	MP-035R, **MP-042R**, MP-043R, MP-066, MP-067, MP-069R, MP-083, MP-100, MP-106
Manganese	MP-019, MP-020, MP-021, MP-035R, MP-041R, MP-042R, MP-043R, MP-044, MP-065, MP-066, MP-067, MP-069R, MP-080, MP-083, MP-093, MP-100, MP-106, **MP-120**
Phosphorus	PW007, **PW008**, PW009
1,4-Dioxane	MP-024, **MP-124**
2-Methylnaphthalene	MP-035R, **MP-100**
2-Naphthylamine	**MP-115**, P008
Naphthalene	**MP-035R**
Chloroform	MP-061R, MP-073, **MP-124**

Footnotes:

[1]"Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

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

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

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

   ☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

In 2005 a site-wide characterization was completed voluntarily by Celanese which evaluated the nature and extent of contamination and the risk posed by constituents of concern to human health and the environment. The 2005 site wide characterization indicated that constituent concentrations in the groundwater were dispersed and were found at relatively low levels.

An environmental investigation was performed under a RCRA Facility Lead Agreement (signed with the USEPA Region III in January 2006). The site-wide comprehensive RCRA Facility Investigation (RFI) was conducted between June 2011 through February 2012 (Phase I RFI) and May 2012 through May 2013 (Phase IB RFI).

The Phase I/IB field program included the installation and development of 12 new groundwater monitoring wells and 4 new piezometers; a site-wide round of water-level measurements; collection of over 78 groundwater samples from monitoring wells, on-site production wells, and off-site municipal wells; collection of 8 surface water and 14 sediment samples from on-site tributaries; detailed reconnaissance of the New River and collection of 37 off-site surface water samples and 17 sediment samples from the river. The results of the Phase I/IB confirmed the previously established data and indicated that the groundwater constituents were dispersed at relatively low levels and no distinct groundwater plumes exist.

In addition, deep groundwater is used for industrial and non-drinking potable supply in the plant area. The plant area production wells, which typically produce about four million gallons per day, creates a relatively large cone of depression that serves to provide hydraulic containment for constituents in the subsurface for part of the plant and significantly limits the migration of constituents within groundwater to the adjacent New River. Furthermore, chlorinated organic constituents were historically detected in the plant area production wells at low levels. Concentrations of chlorinated organic compounds have significantly diminished and have not been detected in production wells PW-7 and PW-9 since 2008 providing further evidence of stabilization.

Reference:

Data Package RCRA Phase I/IB Investigation Data – 2011/2013, Arcadis, July 16, 2013.
SWMU and AOC Discussion and Status Update, Celco Site, Narrows, VA, AECOM, March 28, 2019.

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 sampled/tested in the future

to physically verify that all “contaminated” groundwater remains within this area, and that the further migration of “contaminated” groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

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

☒ If yes - continue after identifying potentially affected surface water bodies.

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

☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

The Celanese site is bounded by the New River to the south and east which serves as the local and regional groundwater discharge boundary. Inferred groundwater contour elevations indicate that the direction of groundwater flow in the vicinity of the facility's landfill area is south toward the New River and the main plant area. Groundwater flow in the plant area is controlled by the geology, the New River, and active plant production wells.

There is currently a relatively large cone of depression that covers much of the plant area resulting from groundwater withdrawal by the deep production wells. Groundwater in the western part of the plant area is not influenced by the production wells and discharges to the New River. Groundwater within the cone of depression and some plant areas outside of the cone of depression are ultimately captured by the production wells. Shallow groundwater is either captured by the production wells when they are pumping or it flows laterally to the New River during non-pumping conditions. All production wells are normally in operation continuously, except for planned maintenance, equipment failure or during unplanned power.

Historical water-level data indicate that seasonal changes in groundwater elevations and their relation to the elevation of the New River can have a significant, but localized effect on flow directions. During normal flow within the New River the direction of groundwater flow is typically from the plant area toward the New River or from the New River into the plant area (due to production well operation) depending on the location. During periods where the New River is elevated (e.g. after significant rainfall events), the direction of groundwater flow for a short period of time can be from the New River toward the plant area within the area immediately adjacent to (i.e. within 75 feet) the New River.

In addition there are three on-site stream channels that convey water perennially; one channel originates as groundwater discharge on the mountain side above the Closed Process Sludge Landfill (CPSL). This perennial flow eventually infiltrates and dries up approximately 1000 feet downgradient of the CPSL and prior to reaching Route 460. The second channel originates offsite and upgradient of the Plant Area and is known as Stillhouse Branch. This stream channel flows west along the north side of Fly Ash Ponds A, B, and C and then turns south and discharges to the New River. Groundwater discharge to Stillhouse Branch is minimal if it even exists. The third channel originates at the Outfall 005 Discharge pipe in the southeastern portion of the landfill area. This channel flows south toward the New River and frequently dries up before reaching the New River. Groundwater discharge to the onsite landfill channel has not been observed and discharge from the landfill outfall pipe has been routed and directly piped to the facility waste water treatment facility.

Reference:

Data Package RCRA Phase I/IB Investigation Data – 2011/2013, Arcadis, July 16, 2013.
SWMU and AOC Discussion and Status Update, Celco Site, Narrows, VA, AECOM, March 28, 2019.

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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)?

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☒ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting:
1) the maximum known or reasonably 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):

The facility production wells create a cone of depression and capture a large portion of plant area groundwater preventing discharge to New River. All production wells are normally in operation continuously, except for planned maintenance, equipment failure or during unplanned power. The western portion of plant area is not affected by the production wells and groundwater in this portion of the site migrates and discharges to the New River.

The RCRA Phase I/IB field program completed from 2011 through 2013 included the collection of 8 surface water and 14 sediment samples from on-site tributaries plus a detailed reconnaissance of the New River including the collection of 37 off-site surface water samples and 17 sediment samples from the river. Very few COCs were identified in the New River surface water. The majority that were identified had low frequency of exceedances or were metals that were also present in sediments and appear to be the result of naturally occurring background concentrations. Some COCs in sediment were detected at concentrations above screening levels in samples collected from the New River including the upstream locations which are considered to be indicative of background conditions or upstream sources. Based on the data collected during the RFI and the known groundwater flow at the site the New River does not appear to be adversely impacted by groundwater migrating from the Celanese facility.

References:
Data Package RCRA Phase I/IB Investigation Data – 2011/2013, Arcadis, July 16, 2013.

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

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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])?

☐ 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, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

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

☐ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):

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

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

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

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

☐ If no - enter "NO" status code in #8.

☐ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

Continued monitoring of the production well water and potable supply is being performed in accordance with the potable water permit (VA1071090) issued by the Virginia Department of Health.

During meetings with VDEQ in 2018 and in subsequent correspondence the requirement for long term groundwater monitoring for the Celanese site was clearly indicated and understood by all parties and will be a component of the upcoming RCRA Corrective Action Final Remedy. The details of the groundwater monitoring including well network, constituents, methods, frequency and reporting will be determined in a future groundwater monitoring plan.

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

☒ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Celanese Acetate, LLC facility, EPA ID # VAD005007679, located at 3520 Virginia Ave, Narrow, VA 24124. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

☐ NO - Unacceptable migration of contaminated groundwater is observed or expected.

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

Completed by  Date 9/24/2020
Ryan J Kelly
Corrective Action Project Manager

Supervisor  Date 9/24/2020
Tara Mason
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Virginia Department of Environmental Quality

Locations where References may be found:

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