5DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Facility Name: Bayer, Incorporated
Facility Address: 807 South Shady Avenue, Damascus, VA 24236
Facility EPA ID #: VAD 00 337 9062

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

   ☒ 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.

BACKGROUND

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 "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 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 "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do 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 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).

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

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

	Yes	No	?	Rationale / Key Contaminants
Groundwater		X		All groundwater contaminant concentrations below acceptable risk ranges.
Air (indoors) [2]		X		Facility is vacant; no buildings exist on the property and primary site contaminants are non-volatile compounds.
Surface Soil (e.g., <2 ft)	X			All surficial soil impacts have been removed through Interim Measures, however confirmation samples for PAHs were not collected.
Surface Water		X		Historical surface water sampling indicates no site-related impacts to Bear Creek surface waters.
Sediment		X		Historical sediment sampling indicates no site-related impacts to Bear Creek sediments.
Subsurf. Soil (e.g., >2 ft)	X			All subsurface soil impacts have been removed through Interim Measures, however confirmation samples for PAHs were not collected.
Air (outdoors)		X		Facility is vacant; Primary site contaminants are non-volatile compounds.

☐ 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.

☒ 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:

This Environmental Indicator Report for Current Human Exposures was developed as an update to the original document published on August 21, 2002. Its purpose is to provide additional information and make documentation of the remedial investigations for this site comprehensive for the public. The remedy decision established for the site in the original November 7, 1997, Statement of Basis has not been modified. The investigation results detailed in the following sections represent the results of the RCRA Facility Investigation (RFI) prior to the completion of Interim Measures (IMs).

The Bayer, Incorporated (Bayer) site is a 53-acre property located at 807 South Shady Avenue in Damascus, Virginia (the "site") approximately one-half mile south of the Damascus town center and approximately 12 miles southeast of Abingdon, Virginia. Historical site operations included a sulfur-based textile dye manufacturing plant in a 6-acre parcel at the northern end of the property (the "Northern Process Area"). The remaining 47-acre portion of the site to the south (the "Southern Non-Process Area") operated as a wood processing and wood products manufacturing plant. Historical aerial imagery indicates the wood processing plant was in operation before 1918 and was decommissioned/demolished sometime between 1935 and 1953. The site was first owned by Beaver Chemical Works from 1918 through 1929, American Cyanamid from 1929 through 1981, by Mobay Chemical Corporation (now Bayer) between 1981 and 1986. The 47-acre Southern Non-Process Area of the site was donated by Bayer to the town of Damascus in 1998, however Bayer retained ownership of the 6-acre Northern Process Area. The northern process area facility was demolished starting in 1986 when the dye manufacturing plant was closed following several back-to-back flooding events which damaged site infrastructure. The facility is currently closed, and

the Northern Process Area is vacant. The Southern Non-Process Area has been redeveloped for various recreational uses including a park, baseball fields, and walking paths. A church is also present in the Southern Non-Process Area.

Groundwater

This Environmental Indicator Report for the Migration of Groundwater was developed as an update to the original document published on August 21, 2002. Its purpose is to provide additional information and make documentation of the remedial investigations for this site comprehensive for the public. The remedy decision established for the site in the original November 7, 1997, Statement of Basis has not been modified. The investigation results detailed in the following sections represent the results of the RCRA Facility Investigation (RFI) prior to the completion of Interim Measures (IMs).

A groundwater investigation was conducted to determine the potential impact of various source areas at the site to groundwater. A network of 21 monitoring wells (20 onsite and 1 offsite) was installed and 65 samples were collected across four rounds of sampling events for Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), total metals, cyanide, total phenolics, anions, and cations to evaluate groundwater impacts and flow conditions at the site. Low-flow sampling technique was employed to minimize sediment interference and to procure a more representative sample.

Heavy metals were detected intermittently across the site's monitoring well network. Below are the range of heavy metals detected in groundwater:

Constituents	Total Metals (µg/L)	Dissolved Metals (µg/L)	EPA Drinking Water MCLs (µg/L)
Arsenic	ND – 13.0	ND – 6.8	10
Cadmium	ND – 4.0	ND	5
Chromium	ND – 8.0	ND – 3.0	100
Copper	ND – 84.0	ND – 31.0	1300
Lead	ND – 483.0	ND – 21.7	15*
Nickel	ND – 113.0	ND – 117.0	N/A
Zinc	ND – 52.0	ND	N/A

Note: ND = Non-Detect; N/A = No established EPA-established screening levels, *EPA action level for lead.

Only lead and arsenic were detected above the EPA action level for lead and the Maximum Contaminant Levels (MCLs) for drinking water, respectively. The maximum detected concentration of lead, 483 ug/L, was identified in a sample analyzed for total lead and is anomalously high compared to all other filtered and unfiltered groundwater samples. Dissolved lead was detected above the EPA action level during one sampling event in two monitoring wells at concentrations of 20 µg/L and 21.7 µg/L. No subsequent sampling events detected dissolved lead at concentration above the EPA lead action level.

Similarly, arsenic concentrations were primarily detected in samples analyzed for total metals and were either absent or detected below its drinking water MCL of 10 ug/L in samples analyzed for dissolved metals.

The SVOC bis(2-ethylhexy)phthalate was also detected at a maximum concentration of 11.8 µg/L, which exceeds its associated MCL of 6 µg/L. Exceedances were observed in multiple monitoring wells across the Southern Non-Process Area. Concentrations ranged from non-detect to a maximum of 11.8 µg/L.

Concentrations of bis(2-ethylhexylphthalate) which exceeded the EPA Drinking Water MCL of 6 µg/L were not consistent across sampling events. Most well locations only had one sample which exceeded the MCL, and multiple subsequent sampling events showed either low-level or non-detectable concentrations of bis(2-ethylhexy)phthalate.

A risk assessment was completed for all identified compounds during the RFI to assess the risks posed to current receptors (trespassing adults and children), likely future receptors (recreational adults and children), and unlikely future receptors (residential adults and children) for the property. The risk assessment determined that the summed theoretical excess lifetime cancer risks for cancer-causing compounds identified at the site were within the acceptable risk range of 1e-6 to 1e-4, and the summed hazard index for non-cancer-causing compounds was below the acceptable benchmark of 1, except for potential lead exposure for future residential children.

All other VOCs, SVOCs, and metals were either not detected or were detected at concentrations below their respective MCLs for drinking water.

Neither a source area or distinct plume could be identified for any of the constituents detected above EPA MCLs or lead action level due to the intermittent detections and inconsistent detection locations between sampling events. While detections

of lead above the EPA lead action level of 15 ug/L and arsenic above the EPA MCL of 10 ug/L were identified, the exceedances were only found in samples analyzed for total metals and were generally absent in samples analyzed for dissolved metals. Follow-up sampling also did not identify total or dissolved lead or arsenic concentrations above their respective action levels/MCLs. Based on these observations, the few lead and arsenic exceedances detected during groundwater sampling appear to be bound to subsurface sediments inside the aquifer underlying the site and are not mobile.

Given the lack of identifiable plumes or source areas, inconsistent detections, the immobility of metals and their absence in dissolved samples, and the risk assessment confirming concentrations of all identified compounds fall within acceptable risk ranges, groundwater is not considered to be contaminated above appropriately protective levels and does not pose any unnecessary risk to current or likely future receptors.

In the unlikely event that redevelopment is proposed which includes the use of site groundwater as a potable water source, additional evaluation of the groundwater exposure pathway should be performed.

Surface Water

The nearest surface water body to the site is Beaverdam Creek which runs southward along the western edge of the northern process area and southern non-process area. Additionally, wet gulleys exist on the site which were also evaluated for surface water impacts. Two rounds of surface water and sediment samples were collected concurrently as part of the RCRA Facility Investigation (RFI). In total, 18 surface water samples and 6 sediment samples were collected at the site.

The surface water samples collected at the site did not detect any compounds potentially related to the site except for bis(2-ethylhexyl)phthalate. Concentrations of bis(2-ethylhexyl)phthalate were detected in two surface water samples (8.30 µg/L and 7.50 µg/L) and three pooled surface water samples (8.7 µg/L, 5.8 µg/L, and 5.6 µg/L) above the National Recommended Water Quality Criteria (WQC) for Carcinogenic Risk (organism only; 1e-5 risk level = 3.7 µg/L). However, every sample was flagged with qualifiers stating bis(2-ethylhexy)phthalate was also detected in their associated laboratory blanks. The duplicate samples collected alongside both exceedances did not report detectible concentrations of bis(2-ethylhexyl)phthalate. This indicates the observed concentrations are likely the result of contamination from lab equipment and are not representative of site surface water conditions.

For all other detected constituents, concentrations were both below the WQC for Carcinogenic Risk (organism only; 1e-5 risk level) and generally increased in the upgradient direction. This suggests that the presence of organic compounds and metals detected in the surface water and sediments of Beaverdam Creek are highly unlikely to originate from an onsite source.

No further action regarding surface water at the site is warranted based on the findings of the remedial investigation.

Sediment

Six sediment samples were collected from Beaverdam Creek during the RFI and analyzed for VOCs, SVOCs, metals, cyanide, and total phenols. While several compounds were detected in the sediment samples, only cadmium exceeded its Region III Freshwater Sediment Benchmark (FSB) concentration.

Cadmium was detected in the most upgradient sample at a concentration of 1.49 mg/kg which exceeds its FSB of 0.99 mg/kg. The duplicate sample collected from the same location contained a concentration of cadmium (0.72 mg/kg) which did not exceed the 0.99 mg/kg benchmark.

A human health risk assessment was performed for Beaverdam Creek following the RFI sampling efforts to evaluate the potential risk posed by the detected contaminants to on and offsite receptors. The risk assessment included an evaluation for current property use (trespassing children), likely future use (recreational children), and unlikely future use (residential children) for all detected constituents above their respective screening levels. The calculated summed theoretical excess lifetime cancer risk for all land use scenarios fell below the EPA's acceptable risk range of 1e-6 to 1e-4, and the summed hazard indices of each non-carcinogenic compound fell below the acceptable benchmark of 1. Most identified contaminants were also either inconsistent with those detected onsite or were observed primarily in samples collected upgradient from the site.

An ecological risk assessment was also performed to evaluate the potential risk posed by site contaminants to on and offsite ecological receptors. This assessment included the evaluation of habitat, benthic macroinvertebrates, fish populations, and vegetation for characteristics which were attributable to site-related contaminants at multiple points along Beaverdam Creek.

The ecological risk assessment determined that habitat, benthic macroinvertebrates, and fish did not show signs of site-related impacts. Onsite vegetation patterns differed from downstream survey areas; however, the differences were primarily growth-stage differences associated with mowing and were not related to any site contaminants.

In 2005, EPA published the Contaminated Sediment Remediation Guidance for Hazardous Waste Sites to assist site managers with determining and implementing appropriate remedial actions for contaminated sediments. The 2005 guidance states that human health and ecological risk assessments are "used to provide the basis for determining whether remedial action is necessary". Considering both the human health and ecological risk assessments determined that the sediments of Beaverdam Creek did not pose excessive risk to any potential receptors, no further action regarding freshwater sediments at the site is warranted.

Surface Soils

The site surface soil investigation was completed in two phases. Hundreds of soil samples were collected across the site to assess soil impacts in multiple Areas of Concern. The site investigation locations were grouped in two major areas of the site, the Northern Process Area and Southern Non-Process Area. The results of the RFI efforts in each area before IMs were completed are summarized in the following sections.

Northern Process Area

A total of 53 surficial soil samples were collected within the Northern Process Area during the RFI. 51 of the surficial soil samples were collected across the Northern Process Area and analyzed for priority pollutant VOCs, SVOCs, metals, Polycyclic Aromatic Hydrocarbons (PAHs), and total phenols to characterize the area in its entirety. While various VOCs, SVOCs, and metals were detected, only lead was identified at concentrations above regulatory standards. Lead concentrations ranged from 4.60 mg/kg to 1357.31 mg/kg, while lead's industrial SSL the time was 1000 mg/kg. This is also above both the current Residential and Industrial Lead SSLs of 200 mg/kg and 800 mg/kg, respectively.

The remaining two surficial soil samples were collected from test pits installed to investigate a former settling pond where a band of blue-gray material was identified at approximately 1.5 ft below ground surface (bgs). The first sample was analyzed for priority pollutant VOCs, SVOCs, metals, and cyanide, and the second was analyzed for Full Scan[3]. While various compounds were detected, only lead was identified at a concentration above the current Residential Lead SSL of 200 mg/kg. Lead was detected at concentrations ranging from 27.20 mg/kg to 278.60 mg/kg.

Southern Non-Process Area

Seventeen initial surface soil samples were across the Southern Non-Process Area to investigate potential lead and PAH impacts. The compounds identified in the 17 surface soil samples which exceeded one or more SSL, along with their respective detection ranges, are summarized below:

Compound	Concentration (mg/kg)	Residential SSLs (mg/kg)	Non-Residential SSLs (mg/kg)
Benz(a)anthracene	**ND – 1.471**	**1.1**	**21**
Benzo(a)pyrene	**ND – 1.834**	**0.11**	**2.1**
Benzo(b)fluoranthene	**ND – 1.471**	**1.1**	**21**
Lead	**ND – 3,091.98**	**200**	**800**

Various other PAHs and metals, as well as cyanide and total Phenols, were detected at concentrations below their respective Non-Residential SSLs.

Following the first 17 samples, a sample grid with a spacing of 100 feet square was established around the former wood processing plant/onsite railroad spur where the lead and PAH exceedances were identified. 32 additional grid samples were collected, after which the grid was expanded several times until the lateral extent of surficial lead exceedances were delineated according to the following criteria:

- Soils outside the delineated area possessed a total lead concentration of less than 1000 mg/kg.
- Each quadrant of the Southern Non-Process Area had a 95% UCL of the arithmetic mean of less than 400 mg/kg for lead.

In total, 177 samples were collected across the Southern Sample Grid which covered a total footprint of 600-feet by 320-feet. Lead concentrations in the Southern Grid Area ranged from 2.53 mg/kg to 3024.57 mg/kg, and PAH concentrations (calculated as benzo[a]pyrene equivalents) ranged from non-detect to 16.63 mg/kg.

The results of the sampling grid confirmed that high lead concentrations were associated with the areas around the former wood processing facility footprint. Lead concentrations above the Non-Residential SSL of 800 mg/kg in the Southern Grid Area were determined to be restricted to surficial soils and ranged from non-detect to approximately 53,000 mg/kg.

Elevated PAH concentrations were focused in the eastern portion of the sampling grid and extended approximately 200 feet south of the Drum Storage Area. The footprint of the PAH exceedances corresponded with a former on-site railroad spur running from south to north in the Southern Non-Process Area. An additional 3 samples were collected directly beneath railroad ties in the former railroad spur which all contained high levels of PAHs. These results suggested a strong correlation between the PAH concentrations and the railroad ties that made up the former spur.

Outside the sample grid, 5 surficial soil samples were collected to investigate a Flood Debris Landfill which contained debris created during historical flooding events which impacted the site. The first four samples were collected and analyzed for priority pollutant VOCs, SVOCs, metals, and PAHs to determine the potential for contaminant leaching from the landfill. The remaining sample was collected from discolored blue material identified from 0.5 feet to 5.5 feet bgs in a test pit immediately south of the landfill boundary and analyzed for Full Scan[3]. Only lead was identified with concentrations above the 1000 mg/kg cleanup levels, ranging from 75.93 mg/kg to 2601.43 mg/kg.

Eleven surficial soil samples were collected between two areas of magnetic anomalies identified during a magnetometer survey of the onsite Drum Storage Area (GSA 2 and GSA 3). All eleven samples were analyzed for priority pollutant VOCs, SVOCs, metals, cyanide, and total phenolics. While multiple samples had detections of ethylbenzene, methylene chloride, toluene, several SVOCs, and metals, only lead was detected at concentrations above either the Residential or Non-Residential SSLs. Four samples had lead concentrations between of 457.52 mg/kg and 3,091.98 mg/kg.

Subsurface Soils

The site subsurface soil investigation was completed in two phases concurrently with the surficial soil sampling efforts. Subsurface samples were collected from both soil borings and test-pits installed in the Northern Process Area, Southern Non-Process Area, and three colored soil areas. A summary of the sample results from each area is included below.

Northern Process Area

A total of 41 subsurface soil samples were collected across the Northern Process Area. The first 21 of these samples were collected across multiple soil borings and test pits to characterize subsurface conditions in the area. All 21 samples were analyzed for priority pollutant VOCs, SVOCs, metals, cyanide, and total phenols. Compounds detected above their respective residential and Non-Residential SSLs, as well as the range of concentrations each was detected at, include:

Compound	Concentration (mg/kg)	Residential SSLs (mg/kg)	Non-Residential SSLs (mg/kg)
Lead	**4.342 – 345.776**	**200**	**800**
Arsenic	**ND – 11.710**	**0.68**	**3.6**

Various other VOCs, SVOCs, and metals were detected at concentrations below both their respective Residential and Non-Residential SSLs.

The next 15 samples were collected from an area of black-stained soil identified during surficial soil sampling. The samples were analyzed for constituents including dioxins, PAHs, and Full Scan[3].While multiple constituents including PAHs, acetone, methylene chloride, several SVOCs, and metals were detected in the samples from the black-stained soil test pits, none of the compounds were detected at concentrations above their respective Residential or Non-Residential SSLs.

The 5 remaining subsurface soil samples were collected from an area of anomalous magnetometer readings which was suspected to be a drum disposal area. All 5 samples were analyzed for priority pollutant VOCs, SVOCs, metals, cyanide, and total phenols. Only lead was identified at a concentration above either the Residential or Non-Residential Lead SSLs

(200 mg/kg and 800 mg/kg, respectively). Lead concentrations ranged from 21.899 ng/kg to 342.266 mg/kg, which exceeds the Residential Lead SSL but not the Non-Residential Lead SSL. Debris including metal piping and pipe fittings were encountered during test pitting, however no evidence of buried drums was identified.

Southern Non-Process Area

Flood Debris Landfill Area

Four test pits were installed in June 1990 to assess potential subsurface impacts present in the Flood Debris Landfill. One test pit located immediately south of the landfill discovered a 5-foot-thick layer of dark-blue discolored fine sandy soil from approximately 0.5 feet to 5.5 feet bgs. One sample was collected from the dark-blue material and analyzed for Full Scan[3]. The compounds detected above their respective SSLs are summarized in the table below:

Compound	Concentration (mg/kg)	Residential SSLs (mg/kg)	Non-Residential SSLs (mg/kg)
7,12-Dimethylbenz(a)anthracene	**0.48**	**0.00046**	**0.0084**
Lead	**2,601.43**	**200**	**800**

Several other compounds including acetone, carbon disulfide, PAHs, PCB-1248, and metals were detected at concentrations below their applicable SSLs.

A hand-auger survey was implemented to confirm the boundaries of the Flood Debris Landfill. Locations were chosen around the Flood Debris Landfill and hand augered to a depth of 1.0 ft bgs to observe for the clay landfill cap. If the cap was encountered, the hand auger hole would be repaired and stepped off until the boundary of the cap was identified. The results of the survey indicated the landfill was approximately 100 feet long, approximately 50 feet wide at the south end, approximately 40 feet wide at the north end. The landfill was estimated to extend from between original grade and 0.5 feet bgs to approximately 6 feet bgs based on observations during test pitting. The volume of the landfill was estimated to be approximately 1,000 cubic yards.

Only two test pits encountered the dark-blue discolored soil, one immediately south of the landfill and another over the landfill cap. Dark-blue soil was not noted in any of the hand auger survey holes. The horizontal extent of the dark-blue material was not determined during the remedial investigation; however, it is not believed to be widespread due to the lack of dark-blue soils outside of the two test pits.

Drum Storage Area/LCA

Nineteen subsurface soil samples were collected from GSA 2 to investigate the potential soil impacts associated with the buried drums and drum, fragments, as well as around the magnetic anomalies. The soil collected for the subsurface samples was biased to include material characteristic of substances potentially stored in the drums including gray-green and yellow-brown material from inside a drum, blue-black material from drum fragments, and other colored materials. The samples were analyzed for either Full Scan[3] or for VOCs, SVOCs, metals, and cyanide. Several SVOCs and metals were detected, but the only compound detected above its respective SSL was lead. Lead was identified at a concentration of 540.67 mg/kg in one sample which exceeded the Residential SSL of 200 mg/kg, but not the Non-Residential SSL of 800 mg/kg.

Eleven total subsurface soil samples were collected from GSA 3 assess potential soil impacts from the drums stored in the area as well as the magnetic anomaly identified during initial site investigations. Three initial samples were collected and analyzed for either Full Scan[3] or for priority pollutant VOCs, SVOCs, PAHs, metals, and cyanide. Lead was detected at a maximum concentration of 1,349.61 mg/kg which exceeded both its Residential and Non-Residential SSL. Cadmium was also detected at 15.94 m/kg which is above its Residential SSL (7.1 mg/kg) but below its Non-Residential SSL (100 mg/kg). Other compounds including several VOCs, SVOCs, and metals were also detected at concentrations below their respective SSLs.

Southern Grid Area

The subsurface soil samples collected as part of the investigation of two magnetometer survey areas overlapped with the footprint of the Southern Grid Area. As such, the results of those samples were also used to investigate the potential subsurface impacts in the Southern Grid Area.

The results of the subsurface samples from GSA 2 and GSA 3 indicated that lead and PAH impacts in the Southern Grid Area were generally restricted to surface soils.

Reference: Final RCRA Facility Investigation Report (10/26/1995), Draft Interim Measures Final Report (02/17/1997), Statement of Basis (11/07/1997), Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (12/01/2005)

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 appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

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

[3] "Full Scan" analysis consists of VOCs, SVOCs, PAHs, PCBs, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, tin, vanadium, and sulfide.

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

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

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
~~Groundwater~~	-	-	-	-	-	-	-
~~Air (indoors)~~	-	-	-	-	-	-	-
Soil (surface, e.g., <2 ft)	N/A	No	N/A	No	No	No	N/A
~~Surface Water~~	-	-	-	-	-	-	-
~~Sediment~~	-	-	-	-	-	-	-
Soil (subsurface e.g., >2 ft)	N/A	No	N/A	Yes	No	No	N/A
~~Air (outdoors)~~	-	-	-	-	-	-	-

Instructions 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 ("___"). 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).

☐ 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:

Soil Interim Measures

IMs for both surface and subsurface soils include excavations in the Flood Debris Landfill and Southern Non-Process Area, and a spot excavation in the Northern Process Area. Details regarding the implementation of IMs in each area is summarized below.

Southern Non-Process Area

IMs completed in the Southern Non-Process Area included excavation of lead-impacted soils in the Flood debris landfill and drum storage area/LCA, and the excavation of lead and PAH-impacted soils in the Southern Grid Area. Each excavation was initiated by removing a 10x10-foot area over the lead hot spot identified during the RFI and continued until the following criteria were met:

1. Visual observations confirmed that no further waste material/debris was present
2. Perimeter and base confirmation samples indicated the remaining soils contained less than 1000 mg/kg of lead
3. The area average of lead concentrations in all remaining soils at the 95% upper confidence level (UCL) of the arithmetic mean was less than 400 mg/kg

The Flood debris landfill excavation spanned 50-feet by 170-feet area and went to 4 feet below ground surface. 15 confirmation samples were collected which verified no residual lead above 800 mg/kg remained.

The Drum storage area/LCA excavation spanned 320-feet by 90-feet and was excavated to approximately 1 ft bgs. 35 confirmation samples were collected, and only one detected lead above the current non-Residential Lead SSL of 800 mg/kg.

For the Southern Grid Area, the horizontal extent of the excavation was already identified using the 177 RFI grid samples prior to the excavation began due to the size of the lead-impacted area. Excavation in the Southern Grid Area continued until each of the following criteria were met:

1. Soils outside the removal area possessed a total lead concentration of less than 1000 mg/kg
2. Each quadrant of the Southern Non-Process Area had a 95% UCL of the arithmetic mean of less than 400 mg/kg

The Southern Grid Area excavation spanned across the majority of the Southern Non-Process Area. Approximately 7,500 tons of non-hazardous soil, 1,500 tons of hazardous soil, and 500-tons of concrete debris were removed during the excavations.

Once the analytical results of the confirmatory samples had been reviewed, each excavation in the Southern Non-Process Area was backfilled with clean offsite borrow material, compacted until the fill material was immobile under the compaction equipment, and the ground surface was graded.

Approximately 500 railroad ties were also excavated and removed from the Southern Non-Process Area to address PAH exceedances associated with the former onsite railroad spur. The locations of the ties during an April 1996 field survey and were removed alongside the soils from the Phase 2 excavations in the southern sample grid. However, confirmation samples were not collected for either surface or subsurface soils near the former railroad spur.

Northern Process Area

One lead hot spot identified during the RFI surficial soil sampling was located inside the Northern Process Area (Lead Hot Spot 1). A two-foot buffer zone was tilled on the four perimeter sides of a 10-foot by 10-foot area around the hot spot and one composite sample for lead analysis was collected from each side. Sampling results indicated soil outside the Lead Hot Spot 1 excavation area did not exceed the either the lead cleanup criteria of 1000 mg/kg or the current Non-Residential Lead SSL of 800 mg/kg. Once the sample results had been reviewed and verified, the 10-foot by 10-foot area was excavated to 1-foot bgs. The base of the excavation was tilled to a depth of 6 inches and a confirmation sample was collected which did not detect lead at a concentration above either the lead cleanup criteria of 1000 mg/kg or the current Non-Residential Lead SSL of 800 mg/kg. The excavation was then backfilled with clean offsite borrow material.

Silt fence was installed along the western edge of the Northern Process Area adjacent to Beaverdam Creek. Afterwards, a 1-foot-thick soil cover was installed with an approximate 1% grade sloping toward Beaverdam Creek, and drainage swales were installed to direct surface runoff towards the creek. Vegetation and small pine trees were planted across the Northern Process Area to control erosion and ensure the soil cover remained stable.

Summary

For lead contamination across the entire site, soil excavations were completed which successfully removed all lead-contaminated soils above the current non-residential SSL of 800 mg/kg except for one post-excavation sample with a concentration of 873 mg/kg. The single lead exceedance is surrounded by samples with concentrations of lead well below

800 mg/kg and each quadrant of the Southern Non-Process Area had a 95% UCL of the arithmetic mean of less than 400 mg/kg for lead. The Southern Non-Process Area has been redeveloped for various recreational uses; under this current use, a complete exposure pathway does not exist.

No confirmatory sampling was completed following the removal of surface/subsurface soils and railroad ties associated with PAH detections in the Southern Non-Process Area. However, a risk assessment was completed for all non-lead soil contaminants which included the assessment of potential soil exposures for current land uses (current trespassing children, teenagers, and adults), likely future land uses (future recreational children and adults), and unlikely future land uses (future residential children and adults). For every investigation area, the risk assessment determined that the excess lifetime cancer risk posed by all non-lead contaminants fell either within or below the acceptable range of 1e-4 to 1e-6, and the summed hazard indices of each compound fell below the acceptable benchmark of 1 for all use cases.

Future land use at the site is anticipated to remain as recreational with no groundwater use. Future development of the Northern Process Area should assess the previous interim measures and remedial activities that have been completed on site and determine whether additional remediation would be necessary for the proposed use and updated soil lead guidance. If a future land use is proposed which includes either the development of residential buildings or the use of groundwater, additional assessment would be required to ensure future residents are not exposed to any potential residual impacted soils. If construction is planned in the Northern Process Area which involves excavation to below 1-foot bgs, protective measures should be implemented to protect construction personnel from exposure to residual lead which may be present in dust and soils produced during excavation.

Reference: Final RCRA Facility Investigation Report (10/26/1995), Draft Interim Measures Final Report (02/17/1997), Statement of Basis (11/07/1997), Updated Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (EPA, 2024)

Footnotes:

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

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

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

☐ If no (exposures can not 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:

Reference:

Footnotes:

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

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

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 and Reference(s):

Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)

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 (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 Bayer, Incorporated site (VAD 00 337 9062) located at 807 South Shady Avenue, Damascus, Virginia 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: 6/20/2025
Quinton Ulrich
USEPA Remedial Project Manager

Supervisor KRISTIN KORONCAI Digitally signed by KRISTIN KORONCAI Date: 2025.06.24 09:17:26 -04'00' Date _____
Kristin Koroncai
LCRD South Section Manager
USEPA Region 3

Locations where References may be found:

US EPA Region III
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Office of Remediation Programs
629 East Main Street
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