VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

STATEMENT OF BASIS

AdvanSix Resins & Chemicals LLC
Hopewell, Virginia

EPA ID NO. VAD065385296

March 2021

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ATTACHMENTS

1 INTRODUCTION

The Virginia Department of Environmental Quality (DEQ) has prepared this Statement of Basis (SB) to solicit public comment on its proposed decision for the AdvanSix Resins & Chemical LLC facility located at 905 East Randolph Road, Hopewell, Virginia 23860 (Facility). DEQ's proposed decision consists of following components: 1) conduct site wide ground water monitoring to verify conditions are static and verify that natural attenuation is occurring in accordance with an approved Corrective Measures Implementation Work Plan; and 2) implement and maintain compliance with land use controls in the form of institutional and engineering controls. This SB highlights key information relied upon by DEQ in making its proposed decision.

The Facility is subject to the United States Environmental Protection Agency's (EPA) Corrective Action Program under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, and the Hazardous and Solid Waste Amendments (HSWA) of 1984, 42 U.S.C. § 6901 et seq. (Corrective Action Program). The Corrective Action Program is designed to ensure that certain facilities subject to RCRA have investigated and remediated any releases of hazardous waste and hazardous constituents that have occurred at their property.

The Administrative Record (AR) for the Facility contains all documents, including data and quality assurance information, on which DEQ's proposed decision is based. See Section 9, Public Participation, for information on how you may review the AR.

2 FACILITY BACKGROUND

The Facility is an active caprolactam manufacturing plant and is one of the world's largest single-site producers. Caprolactam is a principle ingredient in the manufacturing of Nylon 6. Past research and manufacturing processes conducted at the Facility produced various nitrogen products such as high nitrogen fertilizer, ammonia, ammonium nitrate, nitric acid, nitrogen tetroxide, Kepone, THAIC, and TEIC. The Facility is currently owned and operated by AdvanSix, formerly known as Honeywell Resins & Chemicals LLC (Honeywell). The plant has operated continuously since Allied Chemical, a predecessor company to Honeywell, built it in 1928. During the early 20th century, prior to the end of World War 1, the Facility was operated by DuPont for munitions and gunpowder manufacturing.

The Facility property consists of approximately 482 acres and is bordered by the James River on the east, Poythress Run on the north, Gravelly Run on the south, and industrial properties on the west. The property is approximately 1.25 miles south of the confluence of the James and Appomattox Rivers on the south side of a peninsula known as City Point. A location map is attached as Figure 1.

In June 1985, Allied-Signal, Inc. submitted information to the USEPA on 37 Solid Waste Management Units (SWMU) within the Facility boundary. In 1988, as part of the RCRA Facility Assessment (RFA), the USEPA identified 14 of the 37 SWMUs (SWMU 1, 2, 3, 8, 14, 16, 18, 19, 22, 23, 24, 27, and 29) from which releases were possible. The 14 SWMUs were grouped into discrete study areas based on their

geographic locations and potential for groundwater impact (Figure 2). These included Study Areas 1, 2, 3, and 4. The SWMUs and Groundwater Study Areas are described below:

Study Area 1 - Study Area 1 contains only SWMU 1.

- **SWMU 1 -** SWMU 1 consists of a dredging material impoundment in the northeastern corner of the facility near the confluence of the James River and Poythress Run. It consists of an unlined, diked impoundment, utilized for the dewatering and disposal of dredged material from the James River, which were potentially impacted by kepone. The impoundment was operated from 1973 to 1976. The impoundment consists of three cells, which are separated by five to eight foot tall dikes, constructed of clay and soil. After the cells were filled with dredged material, they were covered with clay and soil, and then seeded. Rip-rap stone was placed along the embankment adjacent to the James River for stabilization. Date of operation: 1973 - 1976

Study Area 2 - Study Area 2 includes SWMUs 2-Area 3, 14, 18, 19, 22, 23, 24 and 26. These SWMUs are located within the active operations area of the Facility.

- **SWMU 2-Area 3 -** SWMU 2 is separated into three areas. Areas 1 and 2 were not included in the 1989 Consent Order list of 14 SWMUs needing investigation. Area 3 was an area in the central portion of the facility, adjacent to the wastewater impoundments, where treated raney nickel catalyst filters were disposed. The filters were placed in a molten depolymerization residue and allowed to solidify. Spent filters were removed and disposed of at industrial waste landfills. The area was backfilled with soil, stone and construction material, and then covered with fly ash and gravel. Date of operation: 1967 - 1979
- **SWMU 14** - SWMU 14 was an unlined impoundment used to treat and ultimately dispose of waste nitric acid solution between 1954 and 1976. The impoundment was a triangular area, 250 feet by 160 feet with a depth of 8 to 10 feet. Approximately 1,583 tons of waste nitric acid solution was disposed in this area. The impoundment was closed by filling with construction rubble, stone, clay and soil, and a clay cap was placed over the impoundment and covered with gravel. Date of operation: 1954 - 1976
- **SWMU 18 -** SWMU 18 is comprised of two operating lined wastewater impoundments that are used to retain neutralized process wastewater prior to discharge to the Hopewell Regional Wastewater Treatment Facility (HRWTF) (currently called Hopewell Water Renewal). Both the impoundments were constructed in 1976. The impoundments were subsequently retrofitted with a triple liner and a leachate collection system during 1984 and 1985. They have received routine maintenance to present day. Date of operation: 1976 - present
- **SWMU 19 -** SWMU 19 consisted of two impoundments used to solidify non-hazardous depolymerization residue prior to transportation to an offsite landfill. The impoundments were approximately 200 feet by 200 feet and operated between 1972 and 1986. These impoundments were closed by excavating approximately ten feet below grade and the removed material was transported to an off-site landfill for disposal. Following excavation, the area was filled with clean fill and fly ash and covered with gravel. Date of operation: 1972 - 1986

- **SWMU 22 -** SWMU 22 was a diked, unlined wastewater pit used to dispose of process wastewater via evaporation and percolation, located north of the two depolymerization residue impoundments (SWMU 19). The pit was approximately 30 feet wide by 200 feet long and 5 feet deep. SWMU 22 operated from 1962 to 1976. The pit was closed by excavating approximately six feet below grade and backfilling with clean fill. Date of operation: 1962 - 1976
- **SWMU 23 -** SWMU 23 operated as an area to settle coal fly ash and discontinued in 1972. The settling area covered a horse-shoe-shaped area approximately 600 feet by 400 feet. There are currently lined wastewater impoundments at this location. Date of operation: 1900's - 1972
- **SWMU 24 -** SWMU 24 consisted of two unlined fill areas used for the disposal of depolymerization residue and construction rubble, located between Gravelly Run and Route 10. The northern area was 250 feet by 400 feet and was 5 feet deep. The northern area was covered with asphalt and converted into a parking lot and the southern area was covered and seeded. Date of operation: 1954 - 1970
- **SWMU 26 -** SWMU 26 consisted of a drum disposal area that operated for approximately one year (1973). The area is approximately 60 feet by 20 feet and was used to dispose of empty drums of various de minimis laboratory wastes (undocumented material). The drums were reportedly placed on a bed of fly ash and covered with topsoil generated from the excavation. Date of operation: 1973

Study Area 3 - Study Area 3 is located west of Study Area 2 and contains SWMUs 8 and 16.

- **SWMU 8 -** SWMU 8 was a leach field used between 1965 and 1975. The field covered an area of 48 feet by 60 feet and was in Area 16 of the Plant. The drainage field consisted of a series of perforated six-inch clay pipes, which were placed horizontally at a depth of 5 feet. In order to limit exposure, the pipes were covered with two layers of polyethylene liner and covered with clay. The drainage system was abandoned and the pipes have since been plugged. Date of operation: 1965 - 1975
- **SWMU 16 -** SWMU 16 operated as an unlined percolation basin for the disposal of phenolic wastewater from 1954 to 1959. The basin, approximately 50 feet by 50 feet with a depth of two feet, was in the phenol purification area. The area was closed in 1959, filled with soil and replaced by a concrete basin. The basin was replaced by an aboveground tank in 1986. The concrete basin now provides secondary containment for the AST. Date of operation: 1954 - 1959

Study Area 4 - Study Area 4 includes SWMUs 3, 27 and 29 and is located outside of the main operating facility area.

- **SWMU 3 -** SWMU 3 is located outside of the process area, south of Route 10. SWMU 3 was a coal fly ash disposal area that was used for the surface application of treated de-keponized wastewater from the Life Sciences demolition operations. The wastewater from contractor decontamination activities was treated through a Kepone bowl centrifuge, filtered, passed through carbon absorption prior to being held, tested, and then applied to the field with a manifold and spray hose. Date of operation: 1976 - 1978.

- **SWMU 27 -** SWMU 27 is a landfill that was created for the disposal of washed construction rubble generated during the demolition of the Kepone production area. The landfill is approximately 300 feet long, 200 feet wide and 17 feet deep, with a capacity of 16,500 cubic yards. The landfill is lined with clay and a synthetic liner with a leak detection system and is capped with a synthetic membrane. The area was seeded and fenced to control access to the landfill. Date of operation: 1978
- **SWMU 29 -** SWMU 29 consisted of four earthen-diked clay basins used to hold phenolic process wastewater. The sludge and liquids were removed in 1979 and disposed offsite at the Hopewell Regional Wastewater Treatment Facility. The dikes were bulldozed and the impoundments were filled with rock, gravel, and construction debris, covered with soil and seeded. The area is now heavily vegetated with grasses and trees. Date of operation: 1960 - 1979

3 SUMMARY OF ENVIRONMENTAL INVESTIGATIONS AND CLEANUP ACTIVITIES

3.1 Environmental Investigations

Multiple phases of environmental investigations have been completed at the Facility for the 14 SWMUs. For all environmental investigations conducted at the Facility, groundwater concentrations were screened against federal Maximum Contaminant Levels (MCLs) promulgated pursuant to Section 42 U.S.C. § 300f et seq. of the Safe Drinking Water Act and codified at 40 CFR Part 141, or if there was no MCL, EPA Region III Regional Screening Levels (RSL) for tap water for chemicals. Soil concentrations were screened against EPA Region III Screening Levels (RSLs) for residential soil and industrial soil as well as RSLs for the protection of groundwater.

The Phase I RFI objective, completed May 1993, was to determine the nature and extent of releases of hazardous waste or constituents from the four study areas identified in the Consent Order. The Phase II RFI objective, completed April 1996, was to further characterize the extent of impacted soil and groundwater in the four study areas that the Phase I RFI was not able to characterize. Comprehensive groundwater sampling was conducted in 2004 and 2016. The findings are summarized below:

3.1.1.1 Study Area 1

SWMU 1 – Soil and sediment were not part of the historical investigations at SWMU 1. The RFI Phases I and II identified minimal groundwater impacts from kepone associated with the Dredging Material Impoundment. Risk-based data presented in the RFI Phase II determined that SWMU 1 is not a source of groundwater contamination for the purposes of remedy selection.

3.1.1.2 Study Area 2

SWMU 2 – Area 3

Soil: Soil impacts at low concentrations were identified including caprolactam (an organic) and inorganics arsenic, barium, and lead. These constituents exceeded the USEPA SSLs and site-specific groundwater protection levels. The RFI Phase I and II soil results indicate that the constituents in soil do

not exceed USEPA RSLs. Asphalt surfaces in the operational area of the Facility prevent a direct contact exposure pathway.

SWMU 2 – Area 3, SWMU 14,SWMU 19, SWMU 22, SWMU 24 and SWMU 26 Groundwater, Seeps, Surface water, and Sediment

Groundwater: The RFI Phases I and II identified 29 organic and inorganic constituents within perched and shallow groundwater within Area 2. Groundwater impact of a COPC (arsenic) has been identified exceeding the USEPA RSLs in Area 2 monitoring well locations. For the deep aquifer groundwater results, RFI Phases I and II identified benzene, chloroform, caprolactam, and lead within the deep aquifer within Area 2 groundwater. Groundwater impact of a COPC (chloroform) has been identified exceeding the USEPA Region III RSL in Area 2 monitoring well locations.

Seeps and Surface Water: The RFI Phase I results of samples taken from seeps along Gravelly Run did not identify any constituents exceeding guidelines in place at the time. The RFI Phase II sample results from three seeps within Area 2 identified organic and inorganic constituents that exceeded guidelines in place at the time. The RFI Phase II identified five organic and six inorganic constituents within the surface water of Gravely Run in the Area 2 groundwater footprint. The results of the surface water sampling indicated that copper, lead, mercury, and zinc exceeded either federal or the Commonwealth of Virginia chronic Ambient Water Quality Criteria (AWQC). Mass loading calculations prepared for the USEPA-approved GWEI Determination indicated that concentrations in surface water would remain below risk-based chronic water quality values.

Sediment: The RFI Phase II identified two organic and 10 inorganic constituents within the sediment of Gravelly Run in the Area 2 groundwater footprint. The results of the sediment sampling indicated that arsenic exceeded USEPA RSLs but risk benchmarks for hazard index were not exceeded.

SWMU 14

Soil: Soil impact was identified and includes organics (benzene, caprolactam, and 2,4-dinitrophenol and inorganics (arsenic, barium, and lead). These constituents exceeded the USEPA SSLs which were applicable at that time. There is no direct exposure pathway to the soil due to clay and gravel cover.

SWMU 18

Soil: There have been no releases from SWMU 18 to soil.

Groundwater: The RFI Phases I and II identified benzene and several inorganics within Area 2 groundwater. Groundwater impacts of COCPs have been identified exceeding USEPA RSLs and MCLs in monitoring well locations within the overall footprint of Area 2.

SWMU 19

Soil: Low concentration soil impact was identified, including caprolactam (an organic) and inorganics arsenic, barium, and lead. These constituents exceeded the USEPA SSLs and site-specific groundwater protection levels. The RFI Phase I and II soil results indicate that the constituents in soil do not exceed USEPA RSLs and because there is no complete direct contact exposure pathway due to the gravel cover layer in an operational area of the Facility.

SWMU 22

Soil: Soil impacts in SWMU 22 were identified, including caprolactam, arsenic, barium, and lead. These constituents exceeded the USEPA RSLs and site-specific groundwater protection levels. The RFI Phase I and II soil results indicate that the constituents in soil do not exceed USEPA RSLs and because there is no complete direct contact exposure pathway due to the gravel cover layer and structures in an operational area of the Facility.

SWMU 23

Groundwater: The RFI Phases I and II identified benzene and several inorganics within Area 2 groundwater. Groundwater impacts of COCPs have been identified exceeding USEPA RSLs and MCLs in monitoring well locations within the overall footprint of Area 2.

SWMU 24

Soil: Soil impact was not detected in SWMU 24 samples exceeding USEPA RSLs. There is no complete direct contact exposure pathway due to the asphalt and topsoil cover layers in an operational area of the Facility.

SWMU 26

Soil: Soil impacts in SWMU 26 were identified including cyclohexanol, 2-butanone, acetone, methylene chloride, phenol, arsenic, barium, chromium, and lead. Of these constituents, only methylene chloride and the metals exceed the USEPA SSLs. The RFI Phase I and II soil results indicate that the constituents in soil do not exceed USEPA RSLs.

3.1.1.3 Study Area 3

SWMU 8

Soil: Soil impact in SWMU 8 identified eight organics and ten inorganics. Of these constituents, only arsenic exceeds USEPA Region III RBCs, and there is no complete, direct-contact exposure pathway due to the gravel cover layer and in-use structures in this operational area of the Facility.

SWMU 8 and SWMU 16 Groundwater, Seeps, Surface Water, and Sediments

Groundwater: The RFI Phases I and II identified 13 organic and inorganic constituents within shallow groundwater within Area 3 groundwater. Groundwater impacts of a COPC (arsenic) have been identified exceeding the USEPA Region III RBC in Area 2 monitoring well locations. For the deep aquifer

groundwater results, RFI Phases I and II identified benzene, exceeding the USEPA Region III RBC in Area 3 monitoring well locations.

Seeps and Surface Water: The RFI Phase II sample results from three seeps within Area 3 identified organic and inorganic constituents that exceeded guidelines in place at the time. The RFI Phase II identified five inorganic constituents within the surface water of Gravelly Run in the Area 3 groundwater footprint. The analytical results of the surface water sampling indicated that barium, copper, lead, mercury, and zinc exceeded either federal or the Commonwealth of Virginia ambient water quality criteria. Mass loading calculations made for the Groundwater Environmental Indicator Determination indicate resulting surface water concentrations would be below risk-based chronic water quality values.

Sediment: The RFI Phase II identified eight inorganic constituents within the sediment of Gravelly Run in the Area 3 groundwater footprint. The results of the sediment sampling indicated that arsenic exceeded USEPA RSLs for residential soil but benchmarks for the hazard index were not exceeded.

SWMU 16

Soil: Soil impact in SWMU 16 identified five organics and eleven inorganics. Of these constituents, only arsenic exceeded USEPA RSLs. There is no complete direct contact exposure pathway due to the gravel cover layer and structures in an operational area of the Facility.

3.1.1.4 Study Area 4

SWMU 3

Soil: Soil samples were collected within SWMU 3 as part of the RFI activities. Samples of fly ash within SWMU 3 were obtained as part of the 2016 Comprehensive Groundwater Sampling Event and SWMU 3 Delineation Report. Toxicity characteristic leaching procedure (TCLP) was utilized to evaluate the potential for metals to leach from the fly ash samples. The TCLP results for the fly ash indicate the material would not be considered RCRA Characteristic Hazardous Waste. To eliminate the direct contact exposure pathway, the delineated area of SWMU 3 where fly ash was unvegetated and exposed, was covered by a multi-layer cover to minimize direct contact threats to human health and environmental receptors under Interim Measures.

SWMU 3, SWMU 27 and SWMU 29 Groundwater

Groundwater: RFI Phase II groundwater samples identified seven organic and twelve inorganic constituents in shallow groundwater within Area 4. Groundwater impact of COPCs have been identified as exceeding the USEPA Region III SSLs which were applicable at the time the Area 4 wells were sampled as part of the RFI Phase II and the 2016 Comprehensive Groundwater Sampling. However, there is no groundwater impact associated with SWMU 3.

SWMU 27

Soil: Soil samples were not obtained during the RFI Phase I and II. There is no complete direct exposure pathway due to the engineered cap barrier.

SWMU 27 and SWMU 29 Surface Water and Sediment

Surface Water: The RFI Phase II identified one organic and four inorganic constituents within surface water in the Area 4 groundwater footprint. The results of the surface water sampling indicated that lead exceeded either Federal and/or Commonwealth of Virginia chronic AWQC. Mass loading calculations prepared for the USEPA-approved GWEI Determination indicated that concentrations in surface water would remain below risk-based chronic water quality values.

Sediment: The RFI Phase II identified two organic and eight inorganic constituents within the sediment in the Area 4 groundwater footprint. The results of the sediment sampling indicated that arsenic exceeded USEPA RSLs but risk benchmarks for hazard index were not exceeded.

SWMU 29

Soil: The RFI Phase II identified seven organic and 14 inorganic constituents within the soil samples of SWMU 29 in the Area 4 groundwater footprint. The results of the soil sampling indicate that arsenic exceeded USEPA Region III RBCs or SSLs, but risk benchmarks for hazard index were not exceeded.

3.1.1.5 Soil Vapor Intrusion Screening

Screening of the 2004 groundwater sampling results against the target groundwater concentrations for an industrial scenario indicated that the following VOCs were of potential concern: Benzene, chloroform, cis-1,2-dichloroethene, tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride. Based on initial screening, most of the Facility buildings were screened out from potential vapor intrusion concerns except for the Administration Building (B-1) because groundwater impacted by VOCs was less than 100 feet of B-1. An assessment performed in 2004, focusing on Building B-1, determined that risk levels for on-site workers within Building B-1 were within the USEPA's acceptable total cancer risk range of 10^{-4} to 10^{-6} and hazards were < 1.0. USEPA requested a vapor intrusion (VI) investigation to assess the vapor intrusion exposure pathway for Building B-1 on October 21, 2008. The VI investigation was conducted in 2009 and demonstrated that the risk evaluation predicted no unacceptable risks for site related VOCs with respect to VI into Buildings B-1 from constituents in soil and/or groundwater. USEPA approved the report by letter dated February 2, 2010.

3.2 Summary of Remedial Activities Completed

The following is a summary of remedial activities that occurred before the Facility was under Corrective Action and as Interim Measures.

SWMU 1 - The impoundment consists of three cells, which are separated by five to eight foot tall dikes, constructed of clay and soil. After the cells were filled with dredged material, they were covered with clay and soil, and then seeded. Rip-rap stone was placed along the embankment adjacent to the James River for stabilization. Date of remedial activity: 1976

SWMU 2- Area 3 - Spent filters were removed and disposed of at industrial waste landfills. The area was backfilled with soil, stone and construction material, and then covered with fly ash and gravel. Date of remedial activity: 1979

SWMU 3 – As an Interim Measure, SWMU 3 was capped using a multi-layer soil cover including a geofabric marker. The aerial extent of the layer is approximately 58,000 square feet and is designed to eliminate the direct-contact exposure pathway with the portion of the SWMU that was not covered by vegetation. The cover is intended to facilitate stabilizing vegetative growth and minimize the potential to contact fly ash. Date of remedial activity: 2020

SWMU 8 - In order to limit exposure, the pipes were covered with two layers of polyethylene liner and covered with clay. The drainage system was abandoned and the pipes have since been plugged. Date of remedial activity: 1975

SWMU 14 - The impoundment was closed by filling with construction rubble, stone, clay and soil, and a clay cap was placed over the impoundment and covered with gravel. Date of remedial activities: 1976

SWMU 16 - The area was filled with soil and replaced by a concrete basin. The basin was replaced by an aboveground tank in 1986. The concrete basin now provides secondary containment for the AST. Date of remedial activity: 1959

SWMU 18 - The impoundments were retrofitted with a triple liner and a leachate collection system. They have received routine maintenance to present day. Date of remedial activity: 1984-1985

SWMU 19 - These impoundments were closed by excavating approximately ten feet below grade and the removed material was transported to an off-site landfill for disposal. Following excavation, the area was filled with clean fill and fly ash and covered with gravel. Date of remedial activity: 1986

SWMU 22 - The pit was closed by excavating approximately six feet below grade and backfilling with clean fill. Date of remedial activity: 1976

SWMU 23 - There are currently lined wastewater impoundments (SWMU 18) at this location. Date of remedial activity: 1984-1985

SWMU 24 - The northern area was covered with asphalt and converted into a parking lot and the southern area was covered and seeded. Date of remedial activity: 1970

SWMU 27 - The landfill is lined with clay and a synthetic liner with a leak detection system and is capped with a synthetic membrane. The area was seeded and fenced to control access to the landfill. Date of remedial activity: 1978

SWMU 29 - Sludge and liquids were removed and disposed offsite at the Hopewell Regional Wastewater Treatment Facility. The dikes were bulldozed and the impoundments were filled with rock, gravel, and construction debris, covered with soil and seeded. The area is now heavily vegetated with grasses and trees. Date of remedial activity: 1979

4 CORRECTIVE MEASURES STUDY AND REMEDY SELECTION PROCESS

Based on the results of numerous investigations that occurred from 1989 to the present, a streamlined Corrective Measures Study (CMS) was prepared evaluating potential corrective measures to address the 14 SWMUs, Building B-1 Area, and site-wide groundwater. This streamlined CMS is based on the tenets of the USEPA Corrective Action Lean Project, which is intended to eliminate redundancy, focus resources, and lead to commitment to actions as early as they can be defined. Consistent with these objectives the CMS consolidates the relevant RCRA Facility Investigation (RFI) data and information with identification of the most appropriate corrective measures for these units.

4.1 Corrective Action Objectives

EPA's Corrective Action Objectives for the Facility are the following:

4.1.1 Soils

DEQ has determined that industrial risk based levels are protective of human health and the environment for individual contaminants at this Facility provided that the Facility is not used for residential purposes. Therefore, DEQ's Corrective Action Objective for Facility soils is to control exposure to the hazardous constituents remaining in soils by requiring compliance with and maintenance of land use restrictions including institutional and engineering controls at the Facility. The requirement for land use restrictions and site specific controls will be imposed by UECA.

Table 1. Soil Constituents and Standards

Parameter Group	COPC	Direct Contact Industrial Soil RSL (mg/kg)	Protection of GW SSL	
			Risk Based Soil Screening Level (SSL) (mg/kg)	MCL Based Soil Screening Level (SSL) (mg/kg)
Metals	arsenic	3	1.5E-3	0.29
	barium	220,000	160	82
	chromium	No standard	No standard	180,000
	cobalt	350	0.27	No standard
	manganese	26,000	28	No standard
	nickel	1,500	26	No standard
	selenium	5,800	0.52	0.26
	thallium	12	1.4E-2	0.14
	vanadium	5,800	86	No standard

(mg/kg) milligram per kilogram

The COPCs listed were identified primarily at SWMU 3 as part of the SLERA process, although arsenic is found across the Facility.

4.1.2 Groundwater

DEQ has determined that drinking water standards, namely MCLs or tap water RSLs for constituents that do not have an MCL, are protective of human health and the environment for individual contaminants at this Facility. DEQ's Corrective Action Objectives for Facility groundwater are the following:

1. To control exposure to the hazardous constituents in the groundwater by requiring the compliance with and maintenance of a groundwater use restriction at the Facility as long as drinking water standards and/or groundwater protection standards are exceeded. This restriction will be imposed by the UECA Covenant.
2. To monitor groundwater at the designated monitoring well(s) to demonstrate attenuation of concentrations of the following hazardous constituents in groundwater until standards are met.

Table 2. Groundwater Constituents and Standards

Parameter Group	COPC	November 2020 USEPA MCL or Tap Water RSL (ug/L)
VOCs	benzene	5
	chloroform	80
	1,1-dichloroethane	2.8*
	1,2-dichloroethene	100
	cis-1,2-dichloroethene	70
	ethylbenzene	700
	methylene chloride	5
	tetrachloroethene	5
	trichloroethene	5
	vinyl chloride	2
SVOCs	1,1-biphenyl	0.83*
	benzo(a)anthracene	0.03*
	benzo(a)pyrene	0.2
	benzo(b)fluoranthene	0.25*
	caprolactam	9,900*
	indeno[1,2,3-cd]pyrene	0.25*
	naphthalene	0.17*
Metals	antimony	6
	arsenic	10
	beryllium	4
	cadmium	5
	chromium	100
	cobalt	6*
	iron	14,000*
	lead	15
	manganese	430*
	nickel	610**
	thallium	2

* - November 2020 USEPA Tap Water RSL
** - Virginia Human Health Public Water Supply Value (9VAC25-260-140)

5 SUMMARY OF PROPOSED REMEDY

5.1 Introduction

DEQ's proposed remedy for the Facility is a combination of Engineering and Institutional Controls. Under this proposed remedy, some contaminants remain in the soil and groundwater at the Facility above levels appropriate for residential uses. Because some contaminants will remain in the soil and groundwater at the Facility at levels that exceed residential use, DEQ's proposed remedy requires the compliance with and maintenance of soil and groundwater use restrictions. DEQ proposes to implement the land and groundwater restrictions necessary to prevent human exposure to contaminants at the Facility through an enforceable institutional control(s), such as permit, order, and/or environmental covenant.

5.2 Engineering Controls

5.2.1 Groundwater

Monitoring and site characterization have identified groundwater contamination within the Facility boundaries. Sources of contamination have been removed or controlled and remaining contamination in groundwater will naturally attenuate and will ultimately achieve DEQ's groundwater cleanup levels (drinking water standards) without further treatment. Therefore, the proposed remedy for Facility groundwater consists of monitored natural attenuation pursuant to a DEQ approved Long-Term Groundwater Monitoring Plan until drinking water standards are met, and compliance with and maintenance of groundwater restrictions, to be implemented through institutional controls, to prevent exposure to contaminants while levels remain above drinking water standards. The point of compliance shall be within the Facility boundaries.

5.2.2 Soils

DEQ has determined that inspection and maintenance of engineering controls in areas identified in Figure 3 where contamination remains in the subsurface soils above the soil CAOs in accordance with a DEQ approved Cap Management Plan and/or Materials Management Plan is protective of human health.

Table 3. Soil Controls

SWMU	Control
SWMU-18 SWMU-23	Inspection and Maintenance (Wastewater Impoundment Areas)
SWMU 1 SWMU-3 SWMU-27	Inspection and Maintenance of engineered cap, pursuant to DEQ Approved Cap Management Plan
SWMU 2 Area 3 SWMU-14 SWMU-19 SWMU-22 SWMU-24 SWMU-8 SWMU-16 SWMU-29	Inspection and Maintenance of existing soil, gravel, or asphalt covers, pursuant to DEQ approved Cap Management Plan.
SWMU-26	Inspection and maintenance of existing soil cover and bank integrity, pursuant to a DEQ approved Cap Management Plan.

DEQ is proposing to require the following plans as part of the final remedy:

- A Cap Management Plan (CMP) specific to engineered caps at SWMUs 1, 3 and 27 and soil, gravel, and asphalt covers at SWMUs 2 Area 3, 14, 19, 22, 24, 8, 16, 26 and 29 shall be submitted for DEQ review and approval. CMP shall provide the framework including required maintenance activities and inspections to ensure the installed caps are providing the necessary source control to achieve the CAOs. The CMP, at minimum, must include the following: the procedures to maintain the cap over the contaminated soil; a schedule for inspections to be performed as part of the cap maintenance, no less frequent than once a year; and physical maintenance requirements of the capped areas to prevent degradation of the cap and unacceptable exposure to the underlying soil.
- A Materials Management Plan (MMP) for all earth moving activities, including excavation, drilling and construction activities in the Facility where any contaminants remain in soils above EPA Region III's Screening Levels for Industrial Soils or in groundwater above their MCLs or EPA Region III's Tap Water Risk Screening Levels shall be submitted for DEQ review and approval. At a minimum, the MMP must specify the following: the protocols for soil and groundwater handling and management and the appropriate Personal Protective Equipment requirements sufficient to meet DEQ acceptable risk and complies with all applicable OSHA requirements in a manner such that the activity will not pose an unacceptable threat to human health and the environment or adversely affect or interfere with the integrity of the final remedy.

5.2.3 Sediment and Seeps

Corrective action objectives have been met for sediment and seep exposure pathway.

5.2.4 Indoor Air

Corrective action objectives have been met with respect to the indoor air migration pathway.

5.3 Institutional Controls

Because contaminants remain in soil and groundwater at the Facility above levels appropriate for residential use, DEQ's proposed remedy requires land and groundwater use restrictions to restrict activities that may result in exposure to those contaminants. DEQ proposes that the restrictions be implemented and maintained through institutional controls (ICs). ICs are non-engineered instruments such as administrative and/or legal controls that minimize the potential for human exposure to contaminant and/or protect the integrity of the remedy by limiting land or resource use.

DEQ is proposing the following land and groundwater use restrictions be implemented at the Facility:

1. The Facility property shall be restricted to commercial and/or industrial purposes and shall not be used for residential purposes unless it is demonstrated to DEQ that such use will not pose a threat to human health or the environment and DEQ provides prior written approval for such use. "Residential purposes" includes, but is not limited to, all purposes that provide for living accommodations or services (e.g. dormitories, senior citizen housing, any day care facility whether for infants, children, the infirm, or the elderly).
2. Any earth moving activities, including excavation, drilling and construction activities, in the areas at the Facility where any contaminants remain in soils above EPA's Screening levels for non-residential use or groundwater above CAOs, shall be conducted in accordance with the DEQ-approved Material Management Plan (MMP).
3. Groundwater at the Facility shall not be used for any purpose other than the operation, maintenance, and monitoring activities currently being conducted by the Facility and required by DEQ, unless it is demonstrated to EPA that such use will not pose a threat to human health or the environment or adversely affect or interfere with the final remedy and the Facility obtains prior written approval from DEQ for such use.
4. No new wells shall be installed on Facility property unless it is demonstrated to DEQ that such wells are necessary to implement the Final Remedy selected by DEQ and the Facility obtains prior written approval from DEQ for such use.
5. On a periodic basis and whenever requested by DEQ, the then current owner shall submit to DEQ a written certification stating whether or not the groundwater and land use restrictions are in place and being complied with.

5.3.1 Implementation

The proposed components of the Final Remedy for the Facility shall be implemented through an enforceable mechanism such as an order and/or an environmental covenant pursuant to the Virginia Uniform Environmental Covenants Act, Title 10.1, Chapter 12.2, Sections 10.1-1238-10.1-1250 of the Code of Virginia (Environmental Covenant). If an Environmental Covenant is to be the institutional control mechanism, it will be recorded in the chain of title for the Facility property and will be recorded with the Clerk's Office of the Circuit Court of the City of Hopewell. A clerk-stamped copy of the Environmental Covenant will be sent to EPA and DEQ within sixty (60) calendar days of recordation.

Under the proposed remedy, AdvanSix will be required to provide a coordinate survey, as well as a metes and bounds survey of the Engineering and Institutional controls, and Facility boundaries as follows:

1. The boundary of each engineering control, land and groundwater use restriction shall be defined as a polygon; and
2. The longitude and latitude of each polygon vertex shall be established as follows:
    a. Decimal degrees format;
    b. At least seven decimal places;
    c. Negative sign for west longitude; and
    d. World Geodetic System (WGS) 1984 datum.

Mapping the extent of the engineering controls land and groundwater use restrictions will allow for presentation in a publicly accessible mapping program such as Google Earth or Google Maps.

If AdvanSix or any subsequent owner fails to meet its obligations under the enforceable mechanism selected or if DEQ, in its sole discretion deems that additional corrective measures and/or land use restrictions are necessary to protect human health or the environment, DEQ has the authority after public comment, to require and enforce such additional corrective measures and use restrictions, provided any necessary public participation requirements are met.

6 EVALUATION OF DEQ'S PROPOSED DECISION

6.1 Threshold Criteria

This section provides a description of the criteria DEQ used to evaluate the proposed remedy consistent with EPA guidance. DEQ evaluated three remedy threshold criteria as general goals.

6.1.1 Protect Human Health and the Environment

The proposed remedy will prohibit use of the entire Facility property for residential purposes. The proposed residential use restriction for the entire Facility is due to the past industrial use of the property. ICs will be imposed to prevent or minimize exposure to residual contamination.

6.1.2 Achieve Media Cleanup Objectives

The proposed remedy will achieve the media cleanup objectives. Land use restrictions, as required by the proposed remedy, will control exposure to any hazardous constituents remaining in surface soils and groundwater.

6.1.3 Remediating the Source of Releases

In all proposed decisions, EPA seeks to eliminate or reduce further releases of hazardous wastes or hazardous constituents that may pose a threat to human health and the environment. There are no known, unaddressed releases. Previous releases were identified and addressed under EPA and DEQ oversight.

6.2 Balancing/Evaluation Criteria

6.2.1 Long-Term Effectiveness

The proposed remedy will maintain protection of human health and the environment over time by controlling exposure to the hazardous constituents remaining in soils and groundwater. DEQ's proposed decision requires the compliance with and maintenance of land and groundwater use restrictions at the Facility. DEQ anticipates that the land use and groundwater use restrictions will be implemented through modification of the Facilities Hazardous Waste Management Permit or an environmental covenant to be recorded in the chain of title for the Facility property. The environmental covenant will run with the land and as such, will be enforceable by DEQ against future landowners.

6.2.2 Reduction of Toxicity, Mobility, or Volume of the Hazardous Constituents

The reduction of toxicity, mobility and volume of hazardous constituents at the Facility has already been achieved by removal of source material and capping of contaminated soils. Contaminated media that remain do not pose unacceptable risk to the industrial worker. There has been a reduction in concentration of contaminants in groundwater, contaminants do not appear to be migrating offsite and there is evidence of natural attenuation occurring. The quantitative risk assessment demonstrates that these areas are best managed through the use of ICs. Accordingly, the proposed remedy does not include treatment to reduce the toxicity, mobility or volume of hazardous constituents.

6.2.3 Short-Term Effectiveness

DEQ's proposed decision does not involve any activities, such as construction or excavation that would pose short-term risks to workers, residents, and the environment. In addition, DEQ anticipates that the land and groundwater use restrictions will be fully implemented shortly after the issuance of the Final Decision and Response to Comments.

6.2.4 Implementability

DEQ's proposed remedy is readily implementable. With respect to the implementation of the ICs and as part of the proposed remedy, the Facility will pursue an environmental covenant under the Virginia Uniform Environmental Covenants Act, Title 10.1, Chapter 12.2, Sections 10.1-1238-10.1-1250 of the Code of Virginia. Therefore, DEQ does not anticipate any regulatory constraints in implementing its proposed remedy.

6.2.5 Cost

DEQ's proposed remedy is cost effective since the only remaining corrective action (CA) activities include the recordation of the UECA covenant and ongoing inspection and maintenance of the institutional controls.

6.2.6 Community Acceptance

DEQ will evaluate community acceptance of the proposed remedy during the public comment period, which will last forty-five (45) days. DEQ's final decision and comments accepted during the public comment period will be addressed in the Final Decision and Response to Comments (FDRTC).

6.2.7 Federal Agency Acceptance

DEQ and EPA coordinated on the proposed remedy. If EPA provides comments during the public comment period, DEQ will address them in the FDRTC.

7 ENVIRONMENTAL INDICATORS

Under the Government Performance and Results Act, EPA set national objectives to measure progress toward meeting the nation's major environmental goals. For Corrective Action, EPA evaluates two key environmental indicators for each facility: 1) current human exposures under control and 2) migration of contaminated groundwater under control. The Facility met these indicators on September 28, 2004 and January 11, 2017, respectively.

8 FINANCIAL ASSURANCE

DEQ has evaluated whether financial assurance for corrective action is necessary to implement DEQ's proposed decision at the Facility. Given that DEQ's proposed decision does not require any further engineering actions to remediate soil, groundwater or indoor air contamination at this time and given that the costs of implementing institutional controls at the Facility will be de minimis, DEQ is proposing that no financial assurance be required

9 PUBLIC PARTICIPATION

Before DEQ makes a final decision on its proposed remedy for the Facility, the public may participate in the decision process by reviewing this SB and documents contained in the Administrative Record for the Facility. The Administrative Record contains all information considered by DEQ in reaching this proposed decision. Interested parties are encouraged to review the Administrative Record and comment on DEQ's proposed decision. For additional information regarding the proposed remedy, please contact Calvin Jordan at (540) 574-7802 or William.jordan@deq.virginia.gov.

The public comment period will last forty-five (45) calendar days from the date the notice is published in a local newspaper. Comments may be submitted by mail, fax, e-mail, or phone to Calvin Jordan at the address listed below.

Virginia Department of Environmental Quality
1111 East Main St., Suite 1400
P.O. Box 1105
Richmond, VA 23219
Contact: **Calvin Jordan**
Phone: (540) 574-7802
Email: William.jordan@deq.virginia.gov

DEQ will make a final decision after considering all comments, consistent with the applicable RCRA requirements and regulations. If the decision is substantially unchanged from the one in this Statement of Basis, DEQ will issue a final decision and inform all persons who submitted written comments or requested notice of DEQ's final determination. If the final decision is significantly different from the one proposed, DEQ will issue a public notice explaining the new decision and will reopen the comment period.

10 ADMINISTRATIVE RECORD INDEX

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2. CDM, 1988. Draft RCRA Facility Assessment Report. August 8.
3. EPA, 1989. Administrative Order of Consent. August 1.
4. NUS, 1990. RFI Task I Report - Description of Current Conditions. May.
5. NUS, 1990. RFI Task II Report – Pre-Investigation Evaluation of Corrective Measure Technologies. May.
6. NUS, 1990. RFI Task III Report – Work Plan Volume 1 of 2 – Data Collection Quality Assurance Plan. May.
7. NUS, 1990. RFI Task III Report – Work Plan Volume 2 of 2 – Project Management Plan, Data Management Plan, Health and Safety Plan, Community Relations Plan. May
8. Brown & Root, 1993. Phase I RFI Report. May.
9. Brown & Root, 1996. Phase II RFI Report. April.
10. Honeywell, 2001. Request for SWMU No Further Action Designation. October 11.
11. MHW, 2003. Supplemental Information Package for SWMU 1 No Further Action. October 20.
12. MHW, 2003. Supplemental Information Package for SWMU 3 No Further Action. October 21.
13. MHW, 2003. Supplemental Information Package for SWMU 27 No Further Action. October 24.
14. MHW, 2003. Supplemental Information Package for SWMU 29 No Further Action. October 29.
15. EPA, 2004. Human Health Indicator Form. September 28.
16. MWH, 2004. 2004 Groundwater Sampling Event Report. October.
17. EPA, 2006. Letter RE: SWMU 1, 3, 27, and 29. January 18.
18. MACTEC, 2007. Results of Supplemental Soil & Groundwater Investigation. February.
19. MACTEC, 2008. Response to USEPA March 6, 2008 Comments. March 20.
20. AMEC, 2012. Environmental Borings Drilled Pile Installation for NOx Emission Controls. August 8.
21. MACTEC, 2012. Final Vapor Intrusion Investigation Report Building B-1. November 16.
22. AMEC Foster Wheeler, 2016. Comprehensive Groundwater Sampling Event and SWMU 3 Delineation Report. September 2016.

23. EPA, 2017. Documentation of Environmental Indicator Determination – Migration of Contaminated Groundwater Under Control. January 11.
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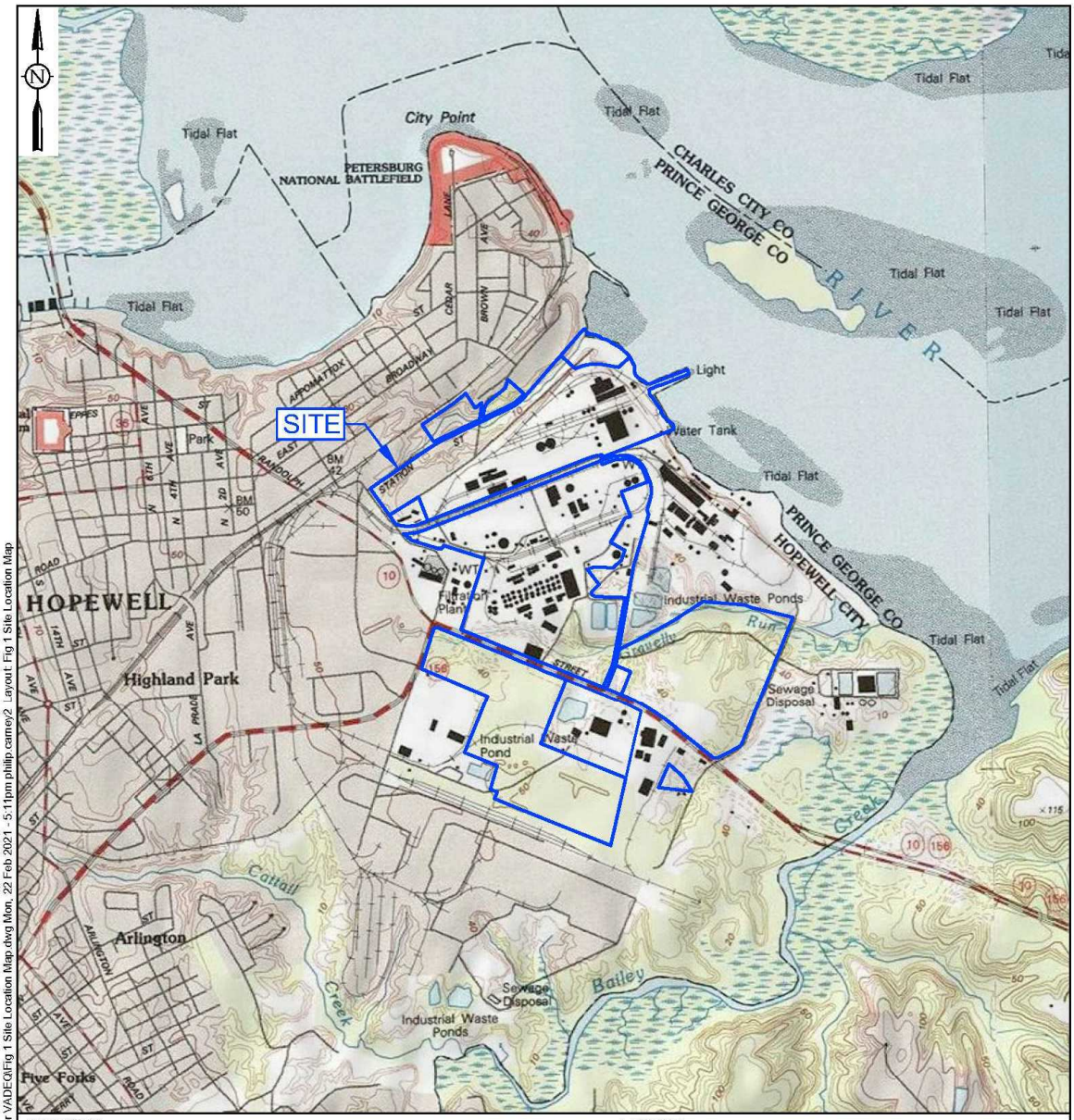
25. AdvanSix, 2019. Final CMS: Request to Rescind Document for Revision. August 20.
26. Wood, 2020. SWMU 3 Interim Measures Implementation Work Plan. April 1.
27. Wood, 2020. 90% SWMU-3 Interim Measure Design Narrative. April.
28. Wood, 2020. Construction Completion Report SWMU 3 Interim Measures. November 20.
29. Wood, 2020. Corrective Measures Study. July 2020



SOURCES
- ESRI USA TOPO MAPS.
- PARCEL BOUNDARIES FROM qpublic.schneidercorp.com SEARCH, APRIL 2020.

LEGEND
PARCEL BOUNDARY

P:\Honeywell - Hopewell\Statement of Basis\Figures for VADEQ\Fig 1 Site Location Map.dwg Mon, 22 Feb 2021 - 5:11pm philip.carney2 Layout: Fig 1 Site Location Map

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CLIENT: AdvanSix RESINS & CHEMICALS LLC, 905 EAST RANDOLPH RD, HOPEWELL, VA

PROJECT: HOPEWELL FACILITY, HOPEWELL, VA

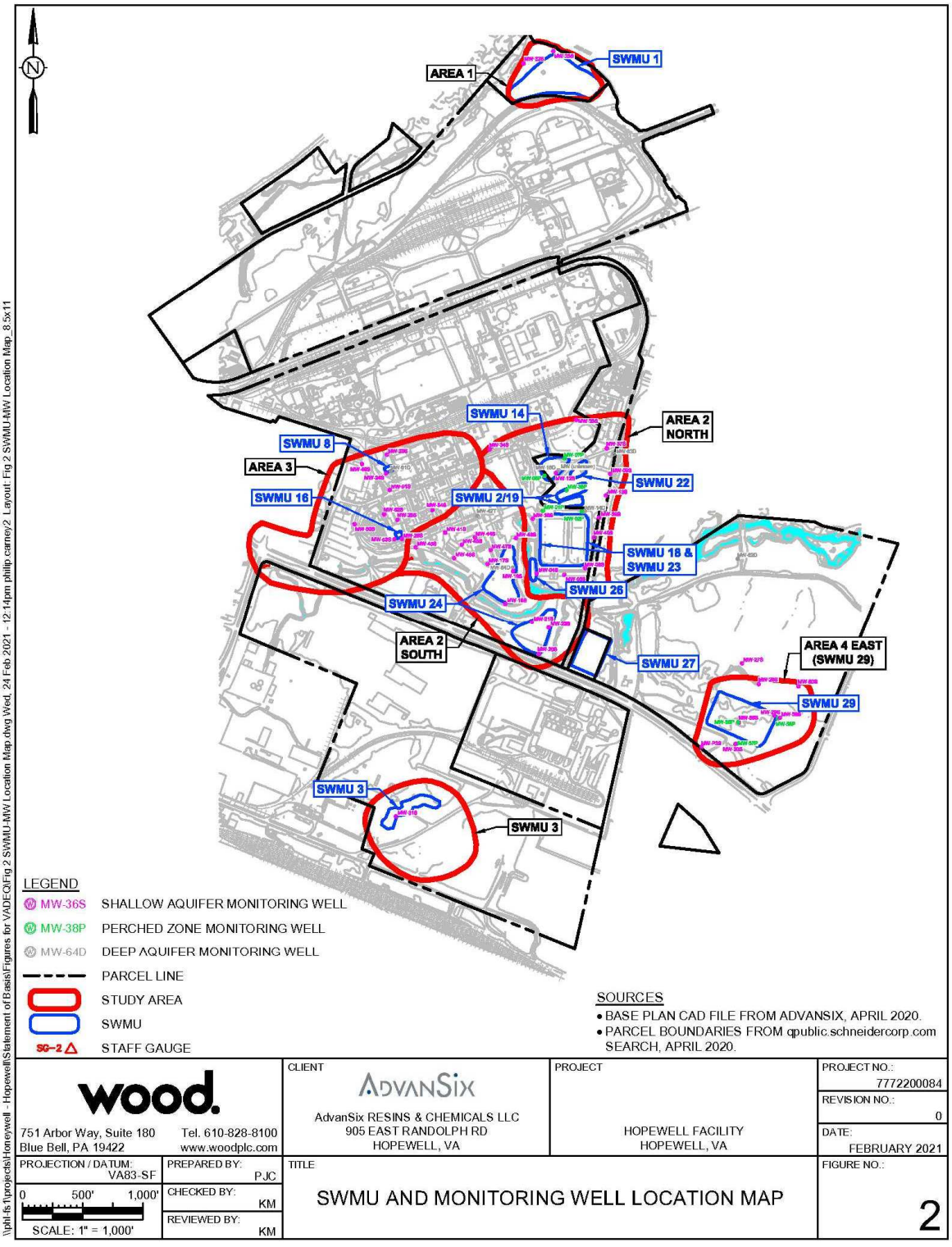
PROJECT NO.: 7772200084
REVISION NO.: 0
DATE: FEBRUARY 2021

PROJECTION / DATUM: VA83-SF
0 1,000' 2,000'
SCALE: 1" = 2,000'

PREPARED BY: PJC
CHECKED BY: KM
REVIEWED BY: KM

TITLE: SITE LOCATION MAP

FIGURE NO.: 1


AREA 1
SWMU 1
SWMU 14
AREA 2 NORTH
SWMU 8
AREA 3
SWMU 22
SWMU 16
SWMU 2/19
SWMU 18 & SWMU 23
SWMU 26
SWMU 24
AREA 2 SOUTH
SWMU 27
AREA 4 EAST (SWMU 29)
SWMU 29
SWMU 3
SWMU 3
LEGEND
MW-36S SHALLOW AQUIFER MONITORING WELL
MW-38P PERCHED ZONE MONITORING WELL
MW-64D DEEP AQUIFER MONITORING WELL
PARCEL LINE
STUDY AREA
SWMU
SG-2 STAFF GAUGE
SOURCES
• BASE PLAN CAD FILE FROM ADVANSIX, APRIL 2020.
• PARCEL BOUNDARIES FROM qpublic.schneidercorp.com SEARCH, APRIL 2020.
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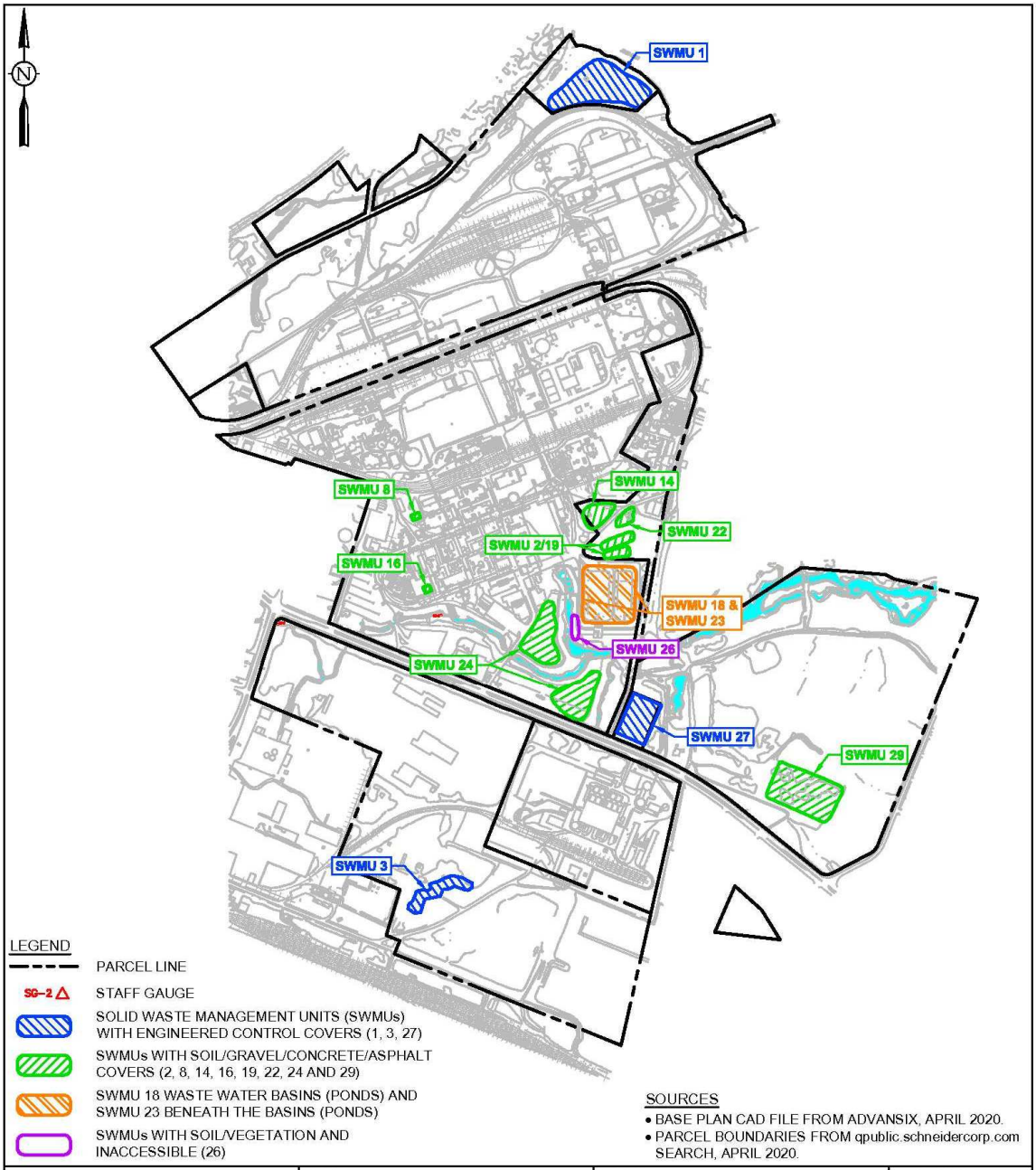
PREPARED BY: PJC
CHECKED BY: KM
REVIEWED BY: KM
0 500' 1,000'
SCALE: 1" = 1,000'
TITLE
SWMU AND MONITORING WELL LOCATION MAP
FIGURE NO.: 2
\\phl-fs1\projects\Honeywell - Hopewell\Statement of Basis\Figures for VADEQ\Fig 2 SWMU-MW Location Map.dwg Wed, 24 Feb 2021 - 12:14pm philip.carney2 Layout: Fig 2 SWMU-MW Location Map_8.5x11


SWMU 1
SWMU 8
SWMU 14
SWMU 22
SWMU 2/19
SWMU 16
SWMU 18 &
SWMU 23
SWMU 26
SWMU 24
SWMU 27
SWMU 29
SWMU 3
LEGEND
PARCEL LINE
SG-2
STAFF GAUGE
SOLID WASTE MANAGEMENT UNITS (SWMUs) WITH ENGINEERED CONTROL COVERS (1, 3, 27)
SWMUs WITH SOIL/GRAVEL/CONCRETE/ASPHALT COVERS (2, 8, 14, 16, 19, 22, 24 AND 29)
SWMU 18 WASTE WATER BASINS (PONDS) AND SWMU 23 BENEATH THE BASINS (PONDS)
SWMUs WITH SOIL/VEGETATION AND INACCESSIBLE (26)
SOURCES
• BASE PLAN CAD FILE FROM ADVANSIX, APRIL 2020.
• PARCEL BOUNDARIES FROM qpublic.schneidercorp.com SEARCH, APRIL 2020.
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CHECKED BY: KM
REVIEWED BY: KM
0 500' 1,000'
SCALE: 1" = 1,000'
TITLE
ENGINEERED CONTROL AREAS
(SWMU COVER TYPES)
FIGURE NO.: 3