

Preliminary Assessment/Site Investigation

Chemours Chambers Works
Deepwater, New Jersey

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Table of Contents

Acronym List iii

Executive Summary v

1.0 Introduction 1

 1.1 Report Purpose 1

 1.2 Report Structure 1

2.0 Site Setting..... 2

 2.1 Location 2

 2.2 Surrounding Land Use..... 2

 2.3 Topography 2

 2.4 Surface-Water Features 2

 2.5 Surficial and Bedrock Geology 3

 2.6 Site Hydrogeology 3

3.0 Facility Description 5

 3.1 Site History 5

 3.2 Current Conditions..... 5

 3.3 Regulatory Status 6

 3.4 Institutional and Engineering Site Controls..... 7

4.0 Preliminary Assessment and Site Investigations 9

 4.1 PA Overview 9

 4.2 Site Investigation Overview 9

 4.2.1 Completed Site Investigations..... 10

 RCRA RFI Documents..... 10

 Investigation and Ecological Evaluation Reports..... 11

 4.3 Individual AOC PA/SI Summaries 11

 4.3.1 RFI AOCs 12

 AOC 1 – Fluoroproducts Area 13

 AOC 2 – Antiknocks Area 14

 AOC 3 – Jackson Lab Area 15

 AOC 4 – Aramids Area 16

 AOC 5 – Historical Basin Footprint and Ditches..... 17

 AOC 6 – Dyes Area 18

 AOC 7 – Elastomers/Isoyanates Area 19

 AOC 8 – Warehouse Transport and Construction Area 20

 AOC 9 – Monastral 21

 AOC 10 – White Products..... 22

 AOC 11 – Former Drainage Ditch..... 23

 4.3.2 PA/SI AOCs..... 24

 Delaware River AOC..... 24

 Salem Canal AOC..... 26

 Carneys Point AOC (CP AOC) 29

 Secure C Landfill (SWMU 13) AOC..... 32

 Cogeneration and Praxair (Cogen-Praxair) AOC 34

 Pharmaceuticals/Pedersen and Miscellaneous AOC 36

 SWMU 40 (Fuel Oil Storage Tanks) AOC 38

SWMU 8 AOC 39
 WWTP (SWMU 18) AOC 42
 Basins AOC 44
 Power & Utilities/Admin (P&U/Admin) AOC 45

5.0 Conclusions and Recommendations 47

6.0 References 49

List of Tables

Table 1 Summary of AOCs

List of Figures

Figure 1 Site Location Map
 Figure 2 AOC Location Map
 Figure 3 Soil and Sediment Sample Location Map
 Figure 4 Groundwater, Surface-Water, and Pore Water Sample Location Map

List of Appendices

Appendix A Reference Documents
 Appendix B Case Inventory Table (CID)

Acronym List

Acronym	Explanation
ACO	Administrative Consent Order
ACOE	Army Corps of Engineers
AOC	Area of Concern
AST	Aboveground Storage Tank
BEE	Baseline Ecological Evaluation
BMS	Bristol Myers Squibb
CEA	Classification Exception Area
CFATS	Chemical Facilities Anti-Terrorism Standards
Chemours	The Chemours Company FC LLC
CID	Case Inventory Document
CMC	Carboxyl Methyl Cellulose
CMS	Corrective Measures Study
COC	Constituent of Concern
COPEC	Constituent of Potential Ecological Concern
COPC	Constituent of Potential Concern
CP	Carneys Point
CRG	Corporate Remediation Group
CSM	Conceptual Site Model
DGW	Discharge to Groundwater
DHS	U.S. Department of Homeland Security
DMA	Dimethylaniline
DNAPL	Dense Non-Aqueous Phase Liquid
DNB	Dinitrobenzene
DNT	Dinitrotoluene
DRBC	Delaware River Basin Commission
DuPont	E.I. du Pont de Nemours and Company
EDD	Electronic Data Deliverable
EI	Environmental Indicator
EIM	Environmental Information Management
EHL	Explosion Hazards Lab
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
FUSRAP	Formerly Utilized Sites Remedial Action Program
GIS	Geographical Information System
GWPP	Groundwater Protection Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
IRA	Interim Remedial Action
ISM	Interim Stabilization Measure
IWS	Interceptor Well System
LAR	Linear Accumulation Rates
LCS	Leachate Collection System
LDS	Leak Detection System
msl	Mean Sea Level
NAPL	Non-Aqueous Phase Liquid
NAVD88	North American Vertical Datum of 1988
NFA	No Further Action
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection

Acronym	Explanation
NJGWIIA	New Jersey Groundwater Quality Class IIA Standards
NJNRSGSL	New Jersey Non-Residential Soil Gas Screening Level
NJPDES	New Jersey Pollutant Discharge Elimination System
NMM	Norris, McLaughlin & Marcus
OSHA	Occupational Safety and Health Administration
OSI	Ocean Surveys, Inc.
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PAR	Preliminary Assessment Report
PCB	Polychlorinated Biphenyl
PEL	Permissible Exposure Limit
PMP	Pollutant Minimization Plan
ppm	Parts per Million
PRM	Potomac-Raritan-Magothy
PWDS	Process Water Ditch System
QC	Quality Control
RASR	Remedial Action Selection Report
RCRA	Resource Conservation and Recovery Act
R&D	Research and Development
RFI	RCRA Facility Investigation
SI	Site Investigation
SET	Secure Environmental Treatment
SVOC	Semi-Volatile Organic Compound
SWMU	Solid Waste Management Unit
TSCA	Toxic Substance Control Act
TEL	Tetraethyl Lead
TML	Tetramethyl Lead
TMEL	Trimethylethyl Lead
USGS	United States Geological Survey
UST	Underground Storage Tank
UTL	Upper Tolerance Limit
VI	Vapor Intrusion
VOC	Volatile Organic Compound
WWTP	Wastewater Treatment Plant

Executive Summary

AECOM, at the request of Norris, McLaughlin & Marcus (NMM), has prepared this Preliminary Assessment/Site Investigation (PA/SI) Report for the Chemours (formerly DuPont) Chambers Works Complex (the site) located in Deepwater, New Jersey (see Figure 1). The Chambers Works site has been in continuous operation for over 120 years producing a multitude of chemical products. Multiple phases of site investigation and remedial actions have been completed over the last 30 years as part of the Resource Conservation and Recovery Act (RCRA) corrective action program under the jurisdiction of the U.S. Environmental Protection Agency (EPA) through the Hazardous and Solid Waste Amendments of 1984 (HSWA) permit no. NJD002385730 (effective on November 7, 1988). In addition, remedial activities at the site have been conducted according to the terms of the amended 1988 (satisfied and closed in 2014) Administrative Consent Order (ACO) between E.I. du Pont de Nemours and Company (DuPont) and the New Jersey Department of Environmental Protection (NJDEP), the New Jersey Pollutant Discharge Elimination System – Discharge to Groundwater (NJPDES-DGW) permits, and investigation work plans and Interim Stabilization Measure (ISM) work plans approved by the NJDEP and EPA.

This PA/SI presents the 22 areas of concern (AOCs) identified at the site (see Figure 2 and Table 1) based on the potential for process-related constituents to have entered environmental media. Eleven of these AOCs were identified in the previous PA [DuPont Corporate Remediation Group (CRG), 2006e], and 11 have been added as a result of this recent evaluation so that all areas of the contiguous site and adjacent areas with potential impacts are included. The additional 11 AOCs were not identified previously as they were subject to ongoing monitoring or remedial investigations being conducted on accelerated schedules beyond the scope of the 2006 PAR and with the approval of EPA and NJDEP. The PA/SI also describes any recent changes to the site conditions. This PA/SI has been completed in general accordance with Sections 3.2 and 3.13 of the New Jersey Administrative Code (N.J.A.C.) 7:26E and the NJDEP Technical Rules for Site Remediation (amended on May 7, 2012 with an expiration date of May 7, 2019).

This PA/SI references multiple phases of site investigation and remedial actions previously completed. It also references the previously reported robust conceptual site model (CSM) that integrates site-specific physical features, nature and extent of site-related constituents released to media, potential migration pathways, and potential receptor information. This CSM previously documented the nature and extent of site-related constituents released from regulated units, solid waste management units (SWMUs) and other source areas at the facility to support development of Corrective Measures Study (CMS) for SWMUs and AOCs.

Based on the site investigation information provided, the Chambers Works AOCs have been sufficiently characterized during numerous investigations conducted under the oversight of EPA and NJDEP. No new information was discovered during this PA/SI to change the approach for impacted media at the site.

Groundwater beneath the Chambers Works Complex is impacted due to releases from SWMUs and AOCs, and the resultant residual and recoverable multi-component dense non-aqueous phase liquid (DNAPL) source zones. Impacts to site-wide groundwater are addressed by a combination of engineering and institutional controls to prevent exposure. The site interceptor well system (IWS) is the primary means for site-wide groundwater control and has been in continuous operation since 1970. The IWS

currently pumps a combined monthly average of at least 1 million gallons per day to create an inward hydraulic gradient to prevent off-site migration of groundwater, and has been augmented by a sheet pile barrier (SPB) along the Salem Canal and the Delaware River where the IWS pumping system was less effective in the shallowest aquifer. Groundwater monitoring is performed under several programs at the site to confirm the effectiveness of the hydraulic containment, monitor groundwater quality, and to meet RCRA post-closure requirements, as reported in semi-annual NJPDES-DGW reports. It is expected that the IWS will continue to be operated in the future as the primary CMS to address groundwater and new technologies will continue to be evaluated to address source zones which are currently technically impracticable to remediate.

Soil at the site has been investigated, remediated in areas, or proposed for further action. Constituent concentrations in soil exceed NJDEP Soil Remediation Standards at some locations throughout the site. Soil in the active manufacturing area is mostly covered with asphalt, concrete, or gravel preventing exposure to constituents in the subsoil. Direct contact with contaminants in the manufacturing area is limited based on these existing engineering controls and site wide institutional controls. Constituent concentrations in soil that may be impacting groundwater are addressed indirectly by the existing IWS.

Ecological investigations have been completed for the entire site. The former Carneys Point Works was addressed as a whole and exposure of ecological receptors was found not to result in unacceptable risk. No receptors or habitats were found within the current Chambers Works manufacturing area. In addition, ecological investigations have been completed in Salem Canal, Delaware River, and on-site surface-water bodies. Further evaluation of ecological exposure for the Delaware River was recommended for after hydraulic control of groundwater is attained by the completion of the AOC 1 SPB.

The Chambers Works AOCs have been investigated; the nature and extent of their impacts have been characterized; and remediation has been performed as recommended and approved by the NJDEP and EPA. Institutional and engineering controls are in place to prevent disturbance of soil (both surface and subsurface) such that on-site workers will not become exposed to contaminants in excess of NJDEP Soil Remediation Standards. Groundwater at the site is part of the site-wide Classification Exception Area (CEA) and not used for any purpose. Containment systems will continue to operate, and groundwater will continue to be monitored per the site-wide monitoring programs that are in-place. The containment and monitoring programs will continue to be documented in the semi-annual NJPDES-DGW reports and submitted to the NJDEP and EPA. New technology will continue to be evaluated to meet site needs.

It is recommended that the newly identified 11 AOCs noted in this PA/SI (all of which have been previously investigated under other programs with subsequent submission and approval by NJDEP and EPA) be incorporated into the HSWA permit in a manner similar to what was done with the previous 11 RFI AOCs. Further remedial actions including corrective measure studies, closure, or operation and maintenance should continue under the HSWA permit and RCRA regulations.

1.0 Introduction

AECOM, at the request of Norris, McLaughlin & Marcus (NMM), has prepared this *Preliminary Assessment/Site Investigation (PA/SI) Report* for the Chemours (formerly DuPont) Chambers Works Complex (the site) located in Deepwater, New Jersey (see Figure 1). This report documents environmental conditions at the site based on a comprehensive evaluation of the 120-year operational history and available environmental data. Multiple phases of site investigation and remedial action have been completed over the last 30 years as part of the Resource Conservation and Recovery Act (RCRA) corrective action program under the jurisdiction of the U.S. Environmental Protection Agency (EPA) through the Hazardous and Solid Waste Amendments of 1984 (HSWA) permit no. NJD002385730 (effective on November 7, 1988). In addition, remedial activities at the site have been conducted according to the terms of the amended 1988 (satisfied and closed in 2014) Administrative Consent Order (ACO) between E.I. du Pont de Nemours and Company (DuPont) and the New Jersey Department of Environmental Protection (NJDEP), the New Jersey Pollutant Discharge Elimination System – Discharge to Groundwater (NJPDES-DGW) permits, and investigation work plans and Interim Stabilization Measure (ISM) work plans approved by the NJDEP and EPA.

This PA/SI identified 22 areas of concern (AOCs) at the site (see Figure 2 and Table 1) based on the potential for process-related constituents to have entered environmental media. Eleven of these AOCs (AOC 1 through 11) were previously identified in the PA Report (PAR) [DuPont Corporate Remediation Group (CRG), 2006e], and 11 AOCs have been added. The additional eleven AOCs were not identified previously as they were either subject to ongoing monitoring or remedial investigations being conducted on accelerated schedules beyond the scope of the 2006 PAR (approved by EPA in 2008).

This PA/SI was created in general accordance with Sections 3.2 and 3.13 of the N.J.A.C. 7:26E and the NJDEP *Technical Rules for Site Remediation* (amended on May 7, 2012 with an expiration date of May 7, 2019).

1.1 Report Purpose

This PA/SI has been developed as a comprehensive stand-alone site-wide summary to document preliminary assessment and site investigation information for the site as requested by NJDEP in a March 31, 2017 Term Sheet.

1.2 Report Structure

The remainder of this report is organized as follows:

- Section 2.0 presents a description of the site setting.
- Section 3.0 presents facility description and site history updates information pertaining to historical and current uses at the Chambers Works Complex.
- Section 4.0 presents the PA/SI portion of the document, which includes any updates to the previous PAR (2006) and individually documents current AOCs and current and on-going site remedial actions.
- Section 5.0 presents conclusions and recommendations.
- Section 6.0 lists the references cited in this report.

2.0 Site Setting

This section presents the site setting information which includes location, the surrounding land use, topography, surface-water features, geology, and hydrogeology.

2.1 Location

The Chemours Chambers Works Complex covers 1,455 acres in Deepwater, Salem County, New Jersey (see Figure 1). The site is located along the eastern shore of the Delaware River in Carneys Point and Pennsville Townships, New Jersey. The site comprises the former Carneys Point Works in the northern area of the site and the Chambers Works manufacturing area in the southern area of the site with Henby Creek generally separating the two areas.

2.2 Surrounding Land Use

The Delaware River and Helms Cove in Carneys Point and Pennsville Townships, Salem County New Jersey form the western and northern boundaries of the site. The Salem Canal, Interstate 295, and the Delaware Memorial Bridge are located due south of the site. Further south are light industrial areas including the Calpine Deepwater Energy Center (formerly Atlantic City Electric). To the north and east of the site are community service and residential neighborhoods. The site is located in a moderately populated area consisting of light to heavy industry, recreational areas, community-service areas, and residential neighborhoods.

2.3 Topography

According to the United States Geological Survey (USGS) "Penns Grove" 7.5 minute topographic quadrangle map (USGS, 2014) the site ranges in elevation from 8 to 15 feet above mean sea level (msl). Historical topographic maps and aerial photographs were provided in the PAR (DuPont CRG, 2006e).

2.4 Surface-Water Features

The primary surface-water features on-site as well as in the vicinity of Chambers Works consist of the following (see Figure 1).

- Delaware River: Tidal brackish environment.
- Salem Canal: Freshwater east of Munson Dam, tidal brackish to the west of dam (Delaware River)
- Bouttown Creek and Henby Creek: Freshwater streams that cross the middle and northern portions of the site and connect to the river through a single sluice gate.
- B Basin: The on-site basin that collects stormwater and non-contact cooling water from the site. The basin elevation is controlled by pumps and is discharged to the Delaware River through permitted outfalls.
- On-site wetlands and ponds

Detailed information is provided in Section 3.0 of the Comprehensive RCRA Facility Investigation (RFI) Report (URS, 2014c) provided in Appendix A.

2.5 Surficial and Bedrock Geology

The Chambers Works site lies in the Delaware River Basin near the northwestern edge of the Atlantic Coastal Plain physiographic province, approximately 3.5 miles southeast of the Piedmont Province (Fall Line). In general, the site is underlain by approximately 500 feet of unconsolidated Coastal Plain sediment deposited during the Holocene epoch (<10,000 years ago), Pleistocene epoch (10,000 to 1.5 million years ago) of the Quaternary period and Cretaceous period (100 million years ago). The sedimentary units thin rapidly to the northwest and thicken rapidly to the southeast. The sediment regionally dips to the southeast. The Holocene and Pleistocene sediments are fluvial (river), estuarine, and marginal marine origin. The ancestral Delaware River cut down into the underlying sand and clay sediments during the Pleistocene, and after sea level rise, the river channel was filled in with silts and mud. Sediments both within the river and on-site are characterized by deposition and erosion features associated with sea-level fluctuations during Quaternary glaciations. Deposits of Holocene or recent age are mostly fine-grained and occur immediately along the Delaware River or its tributaries and overlie the Pleistocene age or older sediments.

The Cretaceous period sedimentary deposits in the site vicinity consist of Potomac, Raritan, and Magothy Formations. Regionally, these non-marine units are grouped together as Potomac-Raritan-Magothy (PRM) aquifer system. This sedimentary section is typically undifferentiated, and the hydrogeological units are often interconnected. The strata were deposited in a series of fining-upward alluvial cycles, resulting in alternating deposits of gravel, sand, silt and clay. Periods of erosion between depositional cycles have resulted in discontinuous units.

Igneous and metamorphic rocks of the Wilmington Complex (likely of Precambrian era) unconformably underlie the Coastal Plain sedimentary deposits.

Additional geology information can be found in the 2013 Interim Update Hydrogeologic Model Refinement (URS, 2013d) document and also in the 2014 Comprehensive RFI Report (URS, 2014c).

2.6 Site Hydrogeology

The Comprehensive RFI Report (URS, 2014c) provides a detailed description of the regional and site-specific geology and hydrogeology.

The site is characterized by a vertically stacked sequence of alternating coarser-grained and finer-grained units that generally act as aquifers and aquitards, respectively. Early in the site investigation history, a system was developed to use letters to designate primary hydrogeological units [DuPont Environmental Remediation Services (DERS), 1993a]. Since then, site-investigation work has led to the on-going update and refinement of the understanding of the site hydrogeology as documented in Interim Update: Hydrogeologic Model Refinement (URS, 2013d), which includes 12 geologic cross-sections. The nomenclature includes a designation of an A zone, aquifers by letters B through F, and intervening aquitards by the letter designations of the bounding aquifers (e.g., the B/C aquitard lies between the B and C aquifers).

The A zone is primarily fill material. The vertical interval from the B through portions of the D aquifers correspond to the Pleistocene Cape May 3 and Cape May 2 Formations and collectively are part of the Pleistocene aquifer system. The vertical interval from portions of the D aquifer and the D/E aquitard to the crystalline basement rock corresponds to the Cretaceous Potomac Raritan Magothy (undifferentiated) Group. The

D/E aquitard is a relatively, thick, hard clay between the D aquifer and the regional PRM aquifer system (DERS, 1993a).

The water bearing zones of the PRM aquifer system have been designated as the E and F aquifers beneath the site. However, there are limited data at this depth beneath the site, and two distinct hydrologic zones have not been confirmed. Bedrock of the Wilmington Complex/Wissahickon Formation was encountered beneath the E and F aquifer interval at an elevation between -415 feet and -505 feet North American Vertical Datum of 1988 (NAVD88).

3.0 Facility Description

Site and regulatory history were presented in the PAR (DuPont CRG, 2006e) and updated in the Comprehensive RFI Report (URS, 2014c). These documents are provided as electronic copies in Appendix A. The site and regulatory history are briefly summarized below including updates to current status.

3.1 Site History

From 1685 to 1891, the area currently identified as the Chambers Works Complex was used for farming or was unused wetlands or tidal marshes. There is no information on the types of agricultural operations that were conducted in the area. On July 19, 1891 the DuPont Powder Company purchased the Thomas Carney farm and constructed the Carney Point Works. DuPont purchased additional parcels of adjacent land as the Carneys Point Works expanded between 1891 and 1915. By 1914, gunpowder manufacturing operations had extended south into what is currently referred to as the Chambers Works manufacturing area. The Carneys Point Works was operational from 1892 to the mid-1970s, producing nitrocellulose, smokeless gunpowder, and other products

The Chambers Works manufacturing area began in 1917 with dye and specialty chemical manufacturing at what was then called the Dye Works (currently the manufacturing area) and gradually expanded as other product lines were added. Refrigerant (Kinetic or Freon[®]) and tetraethyl lead (TEL) production began in the 1920s, followed by aromatic chemical manufacturing in the 1940s. By the 1960s, Chambers Works began elastomers production. By the early 1980s, dye manufacturing was shutdown, leaving only chemical manufacturing and the Secure Environmental Treatment (SET) operations.

From 1927 to 2015, the contiguous property identified as the Chamber Works Complex was owned or operated by DuPont.

In 2014, DuPont initiated a corporate restructuring in which DuPont separated the Performance Chemicals business segment into a new company, The Chemours Company FC LLC (Chemours). Chemours started operating as a wholly-owned subsidiary of DuPont on February 1, 2015 and then, on July 1, 2015, began operating as an independent publicly-traded company on a global basis. As part of this change, Chemours became the owner and operator of the Chambers Works site. DuPont maintains a presence at the site as a tenant.

3.2 Current Conditions

The Chambers Works manufacturing area occupies approximately 700 acres in the southern portion of the site. This area produces specialty intermediate chemicals and fluoropolymer chemicals and products. Two sanitary landfills, A and B, are located in the manufacturing area and permitted through the NJDEP solid waste program. There are several active waste handling areas, including the RCRA permitted secure landfill (Secure C Landfill), and RCRA permitted chemical waste storage area. Secure Environmental Treatment (SET) manages the Secure C Landfill, chemical storage areas, and the WWTP. The Secure C Landfill is located in the northern 720 acres of the site known as Carneys Point. Carneys Point is mostly vacant with areas of broken asphalt, fill, a guardhouse, old foundations, and several unpaved or gravel roads. Surface-water

channels are present throughout Carneys Point. Most of Carneys Point is either overgrown with grass, trees, or consists of wetlands.

Manufacturing and utility tenants include DuPont, the Cogeneration Plant, and Praxair. The Cogeneration Plant is a utility tenant producing steam and electricity for the site and the regional electrical grid. Praxair is a utility tenant producing nitrogen for the site and regionally for other customers.

Since previous reporting, the White Products area manufacturing and Fluoroproducts chemical manufacturing operations have been shut down, and the area buildings are currently either idle or are listed for demolition.

3.3 Regulatory Status

The Chambers Works Complex is subject to a variety of federal and state environmental regulations. The Chambers Works RCRA corrective action program is under the jurisdiction of the EPA as a result of the HSWA permit. A chronological list of major regulatory documents and permits related to the corrective action program are noted below and are summarized in the PAR (DuPont CRG, 2006e):

- NJDEP Administrative Consent Order, NJDEP prepared, signed by DuPont in 1984, and signed by NJDEP in 1988. Modifications to include RFI AOCs were made to the permit in January 2015.
- Hazardous and Solid Waste Amendments Permit, 1988 (updated January 2015)
- Secure C Landfill Permits (Groundwater Protection Plan NJ0105872 dated November 5, 2014 (URS, 2014d)
- NJPDES-DGW Permits (NJ0083429 Renewal October 30, 2014)
- NJPDES-Discharge to Surface Water Permits
- Water Allocation Permits (2122P Activity WAP150001, effective December 5, 2015)
- NJDEP Title V Operating Permit (BOP17003 – December 22, 2010 – December 21, 2020 with minor permit modifications)
- Classification Exception Area (CEA) Biennial Update 2016 – November 28, 2016 SRP PI 008221.

The Chambers Works corrective action process during the Phases I through IV RFI focused on characterization and stabilizing the site with the emphasis on the site perimeter. The RFI process at Chambers Works was phased to evaluate and prioritize solid waste management units (SWMUs) within the site, so that remedial actions could focus on SWMUs that may have potentially presented a greater risk to human health or the environment. The phased approach enabled three overlapping sets of objectives to be addressed:

- Achieve site stabilization.
- Advance the site through the RCRA Corrective Action process.
- Address high priority SWMUs on an accelerated schedule, outside of the phased RFI process.

Overall, the site strategy is to achieve stabilization of the site such that there are no unacceptable risks to human health or the environment. Stabilization will be achieved when potential exposure routes for site constituents are controlled or remediated.

Under the RCRA RFI process, 96 SWMUs and 11 AOCs were identified at the site. The SWMUs are consistent with the SWMUs identified in the HSWA permit and identified in the Comprehensive RFI Report (URS, 2014c). AOCs 1 through 11 were identified in the PAR (DuPont CRG, 2006e), approved by EPA in 2008, and added to the HSWA permit becoming part of the RCRA Corrective Action Program.

3.4 Institutional and Engineering Site Controls

The Chemours Chambers Works maintains various site-wide institutional controls and engineering controls to contain and/or prevent exposure to contamination at the site.

The following institutional controls at the site are being implemented:

- Any person entering the site is subject to security measures as required by the U.S. Department of Homeland Security (DHS) Chemical Facilities Anti-Terrorism Standards (CFATS) regulation, which can include criminal background check and drug screening.
- There are mandatory excavation and work permitting procedures that prohibit excavation activities until a location-specific evaluation of safety, health, and environmental data is completed.
- There is a NJDEP CEA in accordance with N.J.A.C. 7:9C-1.6 for groundwater.
- Deed restrictions and notices document areas of soil contamination.

Engineering controls encompass a variety of engineered and constructed physical barriers and controls to contain and/or prevent exposure and include the following:

- The entire site is contained within a perimeter security fence system including perimeter lighting, video surveillance, and motion detection. This perimeter security fence system and a professional security force are manned 24 hours a day, seven days a week and are designed to prevent unauthorized access to the site.
- The active manufacturing area of the site is fully developed and mostly covered with asphalt, concrete, or gravel preventing exposure to constituents in the sub soil.
- The site interceptor well system (IWS) is the primary means for site-wide groundwater control and has been in continuous operation since 1970. The IWS includes seven pumping wells that currently pump a combined monthly average of at least 1 million gallons per day to create an inward hydraulic gradient to prevent off-site migration of groundwater.
- A sheet pile barrier (SPB) has been installed in areas along the Salem Canal and the Delaware River to augment the IWS by creating a hydraulic barrier in areas of the shallow B aquifer where the IWS pumping system was less effective. Completion of the final segment of the SPB in AOC 1 is expected in 2017.
- The corrective action groundwater recovery program for Cell 1 of the Secure C Landfill (SWMU 13) contains groundwater beneath C Landfill. The remainder

of the cells within C Landfill are doubled lined, which prevents releases to the environment.

- Pumping well J05-W01E contains E aquifer groundwater along the southern boundary of the site.
- Groundwater monitoring is performed under several programs at the site to confirm the effectiveness of the hydraulic containment, monitor groundwater quality, and to meet RCRA post-closure requirements, as reported in semi-annual NJPDES-DGW reports.
- The dense non-aqueous phase liquid (DNAPL) recovery program in which a monthly survey and recovery program to remove any observed non-aqueous phase liquid (NAPL) from monitoring wells will continue as appropriate.
- Various caps and covers previously constructed during closure of RCRA SWMUs in accordance with EPA-approved closure plans are inspected routinely.
- The groundwater containment systems (IWS, C Landfill, J05-W01E) are operated continuously and reported in the semi-annual NJPDES-DGW reports to document system status and effectiveness.

4.0 Preliminary Assessment and Site Investigations

This section presents the preliminary assessment, site investigation summary, and remedial action for each AOC including information on SWMUs located within each AOC.

4.1 PA Overview

According to the NJ Technical Requirements (2012), the purpose of the preliminary assessment is to determine if there are any potentially contaminated areas of concern that require further investigation. Diligent inquiry should include review of historical information, interviews with current and former employees, aerial photograph review, and a site visit. The PAR (DuPont CRG, 2006e) contains detailed review of historical information, aerial photograph site reviews, and interviews with former and current employees (see Appendix A). A comprehensive geographical information system (GIS)-based conceptual site model (CSM) was provided in 2006 (DuPont CRG, 2006e). The GIS-based CSM has extensive information, including site infrastructure, process history, natural physical features, subsurface geology, and hydrogeology, which has been used and maintained since its development to the present time. During the 2006 PAR, analytical data were maintained in a DuPont-developed access database (EnvistaLink). A robust cloud-based database program software from Locus Technologies called Environmental Information Management (EIM) is now being used by Chemours. The environmental data available prior to the 2006 PAR and continuing through the present time are available in the Locus/EIM Chambers Works database. Because data used in this PA/SI have previously been submitted to the NJDEP along with its respective report, no new HazSite Electronic Data Deliverable (EDD) is being submitted with this document.

No new interviews or aerial photograph reviews were completed for this report because AECOM staff has been working continuously at the site since the previous PA was completed in 2006. Any other AOC-specific updates (such as process changes or building demolitions) will be noted in the individual PA/SI AOC sections. Personnel who worked on this report are assigned to the Chambers Works site and visit on a daily or regular basis.

4.2 Site Investigation Overview

The PAR (DuPont CRG, 2006e) identified specific potential sources within the active Chambers Works manufacturing area where particular types of production processes were located. Eleven AOCs were recommended for further investigation. These AOCs are relatively large and cover nearly the entire southeastern portion of the site, thus encompassing previously identified SWMUs. However, the AOCs also included areas outside of the SWMUs that may contain potential sources. The PAR was approved by EPA (EPA, 2008), and AOCs 1 through 11 were added to the HSWA permit becoming part of the RCRA Corrective Action Program. Since the PAR's approval, the primary focus of investigation at the site has been the 11 RFI AOCs in the manufacturing area, specifically on the characterization of sources to groundwater and potential migration pathways. Also, follow-on investigation of SWMUs has been performed as needed. In some cases, additional investigation related to a SWMU that is located within an AOC was incorporated into the AOC investigation. These investigations continued through the 2013-2014 RFI data gap investigation. These data were reported in the Comprehensive

RFI Report (URS, 2014c). A site-specific vapor intrusion (VI) evaluation was implemented in a phased approach to evaluate VI pathways on-site (URS, 2014a). Phase I was implemented in 2014, Phase II was implemented in February and April 2016 and Phase III was completed in November and December 2016 (AECOM, 2016a). Additional site investigations of the Salem Canal and Delaware River were completed in 2016 and reported in 2017 (AECOM, 2017b; AECOM, 2015a and 2015b).

Numerous site investigations or remedial investigations have been completed throughout the complex. These investigations have included sampling of the following media: soil, sediment, groundwater, surface water, pore water, and soil gas. Total sampling at the site includes 2,223 soil sample locations (some with multiple sample depths), 193 sediment, 723 groundwater (some with multiple sample dates or depths), 85 surface-water, and 75 soil gas sample locations. Previously documented sample locations are presented in Figures 3 and 4 for the different media types (soil, soil gas, and sediment; and groundwater, surface water, and pore water, respectively).

4.2.1 Completed Site Investigations

Major site investigation documents are listed below. These reports provide the general sequence of the investigation history of the site SWMUs and AOCs. There are also many additional reports that document supporting or follow-on investigations related to specific SWMUs or AOCs and are referenced in each AOC section as needed. Ecological evaluations have also been performed at the site.

RCRA RFI Documents

- Current Conditions Report (DERS, 1992)
- Phase I RFI Report (DERS, 1995a)
- Phase II RFI Report (DuPont CRG, 1998)
- Phase III RFI Report (DuPont CRG, 2002a)
- Environmental Indicators (EIs) CA725 (DuPont CRG, 2003b) and CA750 (DuPont CRG, 2004b)
- SWMU 8 Remedial Investigation Report (DuPont CRG, 2005a)
- Phase IV RFI Report (DuPont, CRG, 2005b)
- Phase IV RCRA Facility Investigation Work Plan (DuPont CRG, 2004e)
- Phase IV Supplemental RFI Report (DuPont CRG, 2007e)
- Phase IV Comprehensive RFI Report (URS, 2014c) includes SWMU and AOC Fact Sheets
- 2014 Comprehensive RFI Supplemental Information Soil Data Post Maps (AECOM, 2015c)
- 2014 Comprehensive RFI Supplemental Information SWMU Documentation (AECOM, 2016a)
- IWS Optimization Project Data Compendium and Review (URS, 2010b)

Investigation and Ecological Evaluation Reports

- Antiknocks Area Process Water Ditch System Sampling Report (DERS, 1991b)
- Antiknocks Area Ditch System Characterization (DERS, 1991a)
- C Ditch Treatability Study Summary (DERS, 1993c)
- C Ditch Work Plan (DERS, 1995)
- Certification of C Basin Closure (DuPont, 1995)
- "C" Ditch Certification Report (GeoSystems Consultants, Inc., 1996)
- PAR (DuPont CRG, 2006e) and EPA approval (EPA, 2008)
- Baseline Ecological Evaluation (BEE, DuPont CRG, 2006d)
- Delaware River Groundwater to Surface-Water Investigation Report (DuPont CRG, 2008a)
- Ecological Investigation Report (DuPont CRG, 2009)
- Perimeter Investigation Report (URS, 2010c) and EPA approval (July 2014)
- Dyes Area and White Products Area Baseline Ecological Evaluation (DuPont CRG, 2007d)
- Summary of Ecological Investigations in Carneys Point (URS, 2010a)
- Delaware River Remedial Investigation Report (URS, 2011a)
- Perimeter Area (AOCs 1, 2, & 3) Remedial Action Selection Report (RASR) (Geosyntec Consultants, 2012).
- Interior Investigation Technical Memorandum (URS, 2013a)
- A DNAPL Conceptual Model for the Triangle Intermediates Area (URS, 2013d)
- Vapor Intrusion Remedial Investigation Work Plan (URS, 2014a) with data presented in the Comprehensive RFI Report (URS, 2014c) and VI Remedial Investigation Report (AECOM, 2016c).
- RCRA Facility Investigation Data Gap Sampling Plan (URS, 2013c)
- Tidal Study Work Plan for SPB Demonstration (URS, 2014b)
- CEA Biennial Report (Chemours CRG, 2016)
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)

These reports were reviewed and form the basis for the remaining PA/SI sections.

This PA/SI incorporates investigation, RFI, and routine permit reporting documents previously submitted to the NJDEP and EPA. These documents include soil, sediment, surface water, pore water, air, and groundwater data collected in and around the site since 2006. These documents are incorporated herein as an Appendix A supplied on CDs accompanying this document.

4.3 Individual AOC PA/SI Summaries

The following sections provide information for the 22 AOCs located throughout the Chambers Works site. This document meets the requirements of a PA as outlined in

N.J.A.C. 7:26E3-1(c). The following sections present brief descriptions of the past industrial usage of Chambers Works in each AOC, and updates site information from 2006 to the present. Due to the recent submittals of the Comprehensive RFI Report (URS, 2014c) and its associated supplemental information (Soil Data Post Maps and SWMU Documentation) in 2015 and 2016, respectively, RFI AOCs 1 through 11 sections will be brief and focused on information or changes noted from a three-year span of 2014 to 2017.

The following 11 AOCs that were not identified previously because they were subject to ongoing monitoring or remedial investigations being conducted on accelerated schedules beyond the scope of the 2006 PAR (approved by EPA in 2008), are discussed later in this section:

- Delaware River AOC
- Salem Canal AOC
- Carneys Point AOC (CP AOC)
- C Landfill (SWMU 13) AOC
- Cogen/Praxair AOC
- Pharma-Misc AOC
- SWMU 8 AOC
- Basins AOC
- WWTP (SWMU 18) AOC
- Power & Utilities (P&U)/Admin AOC
- SWMU 40 AOC

The 22 PA/SI AOCs are presented in Figure 2 and are summarized in Table 1.

4.3.1 RFI AOCs

The PAR (DuPont CRG, 2006e) identified 11 AOCs that were recommended for further investigation. AOCs 1 through 11 were added to the HSWA permit becoming part of the RCRA Corrective Action Program and were further investigated and reported in the 2014 RFI.

Groundwater to a depth of 200 feet beneath the site including AOCs 1 through 11 is not used for any purpose as defined in the CEA. Groundwater has been characterized as part of numerous investigations including, but not limited to, the RFI investigations. The 2013-14 RFI data gap investigation was reported in the Comprehensive RFI Report (URS, 2014c). Groundwater remedial action is addressed for the entire site as being under control by the pumping of the IWS and SPBs. Groundwater is monitored in the AOCs as part of the on-going NJPDES-DGW permit. Therefore, on-site groundwater will not be discussed in greater detail, except where applicable to recent remedial actions, in the following sections.

AOC 1 – Fluoroproducts Area

Preliminary Assessment

No new historical information has been collected for AOC 1 beyond that presented in the historical documents provided in Appendix A. AOC 1 is approximately 46.6 acres and is located in the northeast section of the manufacturing area. AOC 1 is bounded by the Delaware River to the west, the Basins AOC to the north-northwest, AOC 2 (Antiknocks) to the south, and AOC 4 (Aramids) to the east as shown in Figure 2. AOC 1 is generally flat topography and covered by asphalt parking lots and gravel/grass areas.

Historically, at least six different Freon refrigerants were manufactured in northern portion of AOC 1: Freon-11, Freon-12, Freon-113, Freon-114, Freon-22, and Freon-21. In addition, ethyl chloride and saltcake were also produced in the AOC. Freon production ceased in the early 1980s. From early 1980s to 2015, the production in AOC 1 focused on three classes of chemicals: propellants, electronic gases, and refrigerants (HFC-125, HFC-227ea, and PFC-116). Additional products HFC-23, Zyron 8020, and HFC-236 were purified or transloaded in the area. Hydrofluoric acid was used as a raw material in chemical processes.

The area chemical operations were shut down in 2015, and preparations for building demolition started in 2016. Previously, 21 occupied structures were identified in the Fluoroproducts Area. Of these, two structures (Buildings K-37, and 857) will continue to be occupied. Demolition of the fluoroproducts production buildings and removal of their foundations commenced in 2017 and are currently on-going. Wastewater is currently discharged into collection tanks and pumped to the WWTP via overhead pipeline.

The SWMUs identified as part of the RFI within AOC 1 include SWMU 5A (Landfill I), SWMU 20 (Ethyl Chloride Incinerator), SWMU 26 (Freon Spent Catalyst Storage Area), SWMU 33 (Manhattan Project Area), SWMU 34 (Gypsum Disposal Area), SWMU 35 (Freon Disposal Impoundment), SWMU 39-3 [underground storage tanks (USTs)], SWMU 55-4 (Fill Deposition Area), SWMU 59 (Disposal Area V), and portions of SWMU 56A. Refer to SWMU and AOC 1 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

Site Investigations

AOC 1 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 1. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Sixty-one soil, 80 groundwater, and 27 soil gas locations have been sampled throughout AOC 1. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The Perimeter Area (AOCs 1, 2, & 3) RASR was prepared by Geosyntec Consultants, Inc. and was submitted to the NJDEP in December 2012. An initial pre-design investigation for pumping of the B aquifer at the boundary of the site in AOC 1 was developed. The pump test was conducted from April 2012 through May 2012. Data collected from this test were evaluated to help complete a remedial alternatives analysis and to further refine the conceptual model. The pumping well (D15-R01B) has remained in operation since 2012. The IWS groundwater pumping remains in operation.

Comments on the Perimeter Area RASR were received from NJDEP and EPA in 2013; the corrective measure selected was the installation of SPB to prevent the off-site migration of B aquifer groundwater along the western perimeter (EPA, 2014). Preliminary design and field investigation activities for the expansion of the Salem Canal SPB westward and then northward along the Delaware River to the northern end of AOC 1 were completed in 2014. The remedial action would prevent the discharge of B aquifer groundwater associated with AOCs 1, 2, and 3 to the Salem Canal and Delaware River. The installation of the AOC 2 and 3 sections of the SPB was completed in 2015. Installation of the final AOC 1 section of the SPB is currently planned for the second half of 2017. Additional remedial investigation activities for the Delaware River will be initiated after construction is completed in accordance with the *Tidal Study Work Plan for SPB Demonstration* (URS, 2014b).

AOC 2 – Antiknocks Area

Preliminary Assessment

No new historical information has been collected for AOC 2 beyond that presented in the historical documents provided in Appendix A. AOC 2 is approximately 32.4 acres and located in the northwest section of the manufacturing area. AOC 2 is bounded by the Delaware River to the west, AOC 1 to the north-northeast, AOC 3 (Jackson Lab/PC West) to the south, and AOC 4 (Aramids) and AOC 5 to the east as shown in Figure 2. AOC 2 is generally flat topography and covered by asphalt parking lots, concrete foundations, and gravel areas over foundations, gravel, and grass areas.

The antiknocks area was used to produce anti-knock fuel additives marketed for use in gasoline motor fuel additives (leaded gasoline). Tetra alkyl lead compounds [TEL, tetramethyl lead (TML), trimethylethyl lead (TMEL)] and sodium-lead alloy were the main products produced throughout AOC 2; therefore, the primary component used throughout AOC 2 was lead. EPA began to regulate the lead content of domestic gasoline starting in approximately 1973. This resulted in a gradual decline in the production of antiknocks and ultimately led to the business shut down in 1991.

Seventeen buildings were associated with the production and storage of TEL and similar products. The majority of the buildings were dismantled, decontaminated, and demolished between 1991 and 2001.

Current existing structures within the AOC include Maintenance Building 63 and support structures (sheds), Building 85, an idle former organic air stripper that was operated by WWTP, RCRA 30-day and 60-day storage areas, and a former Compound Bulk storage (not active).

The former organic stripper received off-site waste with high organic content and used a steam stripper to separate the wastewater from the organic non-aqueous phase liquid. The wastewater was conveyed to the WWTP for treatment, and the non-aqueous liquid was drummed and shipped off-site for disposal. The organic stripper was shut down in 2012 when the SET operations stopped accepting outside wastewater.

The SWMUs identified as part of the RFI within AOC 2 include SWMU 6 (Landfill I), SWMUs 17/17A, SWMU 25 (Lead Flue Dust and Lead Furnace Slag Storage Area), SWMU 39-2 (USTs), SWMU 41-8 (Drum Storage Area), portions of SWMU 56A and SWMU 57 (Antiknocks Area). Refer to SWMU and AOC 2 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

No significant changes to the area have been made since 2006, except for the installation of the B aquifer SPB.

Site Investigations

AOC 2 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 2. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). In total, 152 soil, 31 groundwater, and 11 soil gas locations have been sampled throughout AOC 2.

Sub-slab soil gas samples were collected from two buildings (63 and 85) within AOC 2 during the most recent 2014 VI Investigation. Ten soil gas samples were collected during the investigation. One volatile organic compound (VOC), chloroform, was detected in one of the Building 85 soil gas samples above New Jersey Non-Residential Soil Gas Screening Level (NJNRSGSLs). Indoor air industrial hygiene sampling was conducted at Building 85 in March/April 2012. Samples were analyzed using SKC 575-001 Passive Samplers, with analysis using Occupational Safety and Health Administration (OSHA) method 7 to evaluate for benzene, carbon tetrachloride, tetrachloroethene, and trichloroethene. None of the constituents were detected above reporting limits, which were less than occupational exposure limits [e.g., OSHA permissible exposure limit (PELs)].

Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

A RASR was completed in 2012 concerning the discharge of shallow groundwater to the Delaware River. Comments were received from NJDEP and EPA in 2013, and the final selection of the corrective measure is the installation of SPB to prevent the off-site migration of B aquifer groundwater along the western perimeter (EPA, 2014).

Preliminary design and field investigation activities for a proposed expansion of the Salem Canal SPB westward and then northward along the Delaware River to the northern end of AOC 1 were completed in 2014 (Chambers Works Perimeter Remedial Design Package permit issue, October 6, 2014). This remedial action will prevent the discharge of B aquifer groundwater associated with AOCs 1, 2, and 3 to the Salem Canal and Delaware River. The installation of the AOC 2 and 3 sections of the SPB was completed in 2015.

AOC 3 – Jackson Lab Area

Preliminary Assessment

No new historical information has been collected for AOC 3 beyond that presented in the historical documents provided in Appendix A. AOC 3 is approximately 19 acres and located in the southwest section of the manufacturing area. AOC 3 is bounded by the Delaware River to the west, AOC 2 to the north, Salem Canal to the south, and AOC 6 (Dyes and Intermediates) and the P&U/Admin AOC to the east as shown in Figure 2. AOC 3 is generally flat topography and is covered by asphalt parking lots, concrete foundations, buildings, gravel, and some minor areas of grass or landscape near

building entrances. Most of the area is hard surfaces consisting of gravel, concrete, or asphalt along with some minor landscaped areas near building entrances.

Most of the buildings in the Jackson Labs area are idle, and many of the buildings have been abandoned but not demolished including Buildings J-24, J-1, J-5, Technical Laboratory, and Building 1096 and associated support structures.

No significant changes have been made to AOC 3 since the PAR (DuPont CRG, 2006e), except for the idling of the Jackson Lab (J-1) building.

The SWMUs identified as part of the RFI within AOC 3 include SWMUs 17/17A [Process Water Ditch System (PWDS) sections], SWMU 28 (Telomer "A" Waste Container Storage), SWMU 29 (Telomer "A" Waste Treatment Tank), SWMU 33 (Manhattan Project Area), SWMU 31 (Fly Ash Disposal Area), SWMU 39-5 [USTs and aboveground storage tanks (ASTs)], SWMUs 41-6 and 41-7 (Drum Storage Areas 6 and 7), and a portion of SWMU 57. Refer to SWMU and AOC 3 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

Site Investigations

AOC 3 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 3. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Forty-one soil, 30 groundwater, and 14 soil gas locations have been sampled at locations throughout AOC 3. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

A RASR was completed in 2012 concerning the discharge of shallow groundwater to the Delaware River. Comments were received from NJDEP and EPA in 2013, and the final corrective measure selected was the installation of SPB to prevent the off-site migration of B aquifer groundwater along the western perimeter (EPA, 2014). Preliminary design and field investigation activities for the expansion of the Salem Canal SPB westward and then northward along the Delaware River to the northern end of AOC 1 were completed in 2014 (Chambers Works Perimeter Remedial Design Package permit issue, October 6, 2014). This remedial action prevents the discharge of B aquifer groundwater associated with AOCs 1, 2, and 3 to the Salem Canal and Delaware River. The installation of the AOC 2 and 3 sections of the SPB was completed in 2015.

AOC 4 – Aramids Area

Preliminary Assessment

No new historical information has been collected for AOC 4 beyond that presented in the historical documents provided in Appendix A. AOC 4 is approximately 23.4 acres and located near the northwest-central portion of the manufacturing area of the site. AOC 4 is bounded by the AOCs 1 and 2 to the west, AOC 5 to the south, and the Basins AOC to the northwest as shown in Figure 2. AOC 4 is generally flat topography and is covered by asphalt parking lots, concrete foundations, buildings and gravel/grass areas.

One building that was associated with the World War II-era Manhattan Project (SWMU 33) is located in the northwestern part of AOC 4. This area was used by the U.S. government from the 1940s through 1960s for radiological activities. SWMU 33 is being investigated as part of the Army Corp of Engineers (ACOE) Formerly Utilized Sites Remedial Action Program (FUSRAP), which was created to address remaining radiological contamination.

The SWMUs identified as part of the RFI within AOC 4 include SWMU 33 (Manhattan Project Area), SWMU 39-6 (USTs), and SWMU 55-4 (Fill Deposition Area). Refer to SWMU and AOC 4 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

Site Investigations

AOC 4 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 4. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Twenty-seven soil, six groundwater, and four soil gas locations have been sampled at locations throughout AOC 4. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

No significant changes to the areas have been made to AOC 4 except for the remedial activities associated with SWMU 33 (Manhattan Project Area) run by the ACOE, which is currently on-going.

The IWS groundwater pumping system remains in operation.

AOC 5 – Historical Basin Footprint and Ditches

Preliminary Assessment

No new information has been collected for AOC 5 beyond that presented in the historical documents provided in Appendix A. AOC 5 is approximately 32 acres and located in the northwest-central portion of the manufacturing area of the site. AOC 5 is bounded by the AOCs 4 and 2 to the west, AOCs 6 and 7 and AOC SWMU 8 to the south, and the Basins AOC to the north as shown in Figure 2. AOC 5 is generally flat topography and covered by asphalt parking lots, concrete foundations, buildings and gravel/grass areas. Near the basin Spot 321, a wet marshy area with a small pond in the center exists.

The AOC 5 boundary was determined based on an aerial photograph review. The original footprint of the basins extended to the southwest of the remediated basin complex. Beginning in 1951, this area (currently SWMUs 55-1 and 55-3) began to fill in with sediment, and the ditches become clearly defined. Also, portions of the ditches (currently SWMU 17) were enlarged sometime between 1956 and 1974. This was most likely due to dredging activities that occurred in 1952, 1958, and 1962. Currently, AOC 5 has been filled in and is either paved or covered with gravel with sections of SWMUs 56A and 17 also present. SWMU 56 and portions of SWMU 17 that have been remediated and the dinitrobenzene (DNB) storage tank are also located within this AOC.

The Engineering and Bulk Storage Areas served as support areas to the Triangle Intermediates Area as well as the site in general. No products were created at these locations. The Engineering Area contained buildings used to maintain the narrow gauge

railroad used to haul products at the site. This area is still used as a support area to the site. Buildings present today include the Car Repair Shop, Change House, Mechanical Instrument Shop & Office, Scale House, and storage buildings. The Bulk Storage area was identified based on an interview with a site retiree (DuPont CRG, 2006e).

A portion of the Aramids Area is also located within this AOC. This consists of a parking lot from the 1940s until the mid-1970s, when portions of the current Aramids operations slowly expanded from the east toward the west. The building located within the AOC boundary is the packaging area (Building 1182).

The SWMUs identified as part of the RFI within AOC 5 include three areas of fill deposition (SWMUs 55-1, 55-3, and 55-4), SWMU 56 (area of elevated orthodichlorobenzene in B Ditch), SWMU 38 (clean water injection wells – H11-W01F), SWMU 12, SWMUs 17/17A, SWMU 18, SWMU 27, SWMU 56, SWMU 56A (PWDS), and SWMU 58. Refer to SWMU and AOC 5 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

Site Investigation

AOC 5 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 5. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). In total, 149 soil, 24 groundwater, and one soil gas location have been sampled at locations throughout AOC 5. Evaluation of sample results has not led to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

AOC 6 – Dyes Area

Preliminary Assessment

No new historical information has been collected for AOC 6 beyond that presented in the historical documents provided in Appendix A. AOC 6 is approximately 39 acres and located in the central portion of the manufacturing area of the site. AOC 6 is bounded by AOC 5 to the north, AOC 7, 8, and 9 to the east, Salem Canal, AOC 10, P&U/Admin AOC to the south, and AOC 2 and 3 to the west as shown in Figure 2. AOC 6 is generally flat topography and covered by asphalt parking lots, concrete foundations, buildings, gravel, and some minor grass areas.

Currently, there are several active operations within AOC 6. This area contained production buildings, tanks, support areas used for the generation, and/or purification of intermediate compounds used in the creation of dyes and polymer products. The basic chemical building blocks for the dyes manufactured in this area were commonly of benzene, anthracene, naphthalene, toluene, and xylene derivation along with intermediates of alpha-and beta naphthylamine, anthroquinone, benzidine, chlorobenzene, dinitrotoluene (DNT), and nitrobenzene. The Triangle Intermediates Area contained production buildings, tanks, and support areas used for the generation and/or purification of various intermediate compounds used in the creation of dyes, as well as polymer products. Processes included the production of the following compounds: chloroanilines, dimethylaniline (DMA), nitroanilines, nitrobenzenes,

toluidines, and nitrotoluenes. Only the DMA Autoclave building, Capstone intermediates, and DNT production remain in the Triangle Intermediates Area. In addition, several shops and store houses also remain. In general, most of the Triangle Intermediates Area consists of gravel and concrete foundations.

The Engineering Quality Control (QC) Laboratory and Administration area is a small area located within the center of the AOC. No chemical production activities were undertaken in this area although several laboratories, garages, and USTs may have historically been present in this area. The remaining buildings are used for storage, maintenance, change houses, or administrative offices. Building 185 operations, along with several shops and store houses, remain active (1402, 656, 145, and 1114). Building 115, the Ethylene Oxide center, is also located within AOC 6. A former laboratory building, 667, south of the Ethylene Oxide center is actively being used for office space.

The operating buildings associated with the indigo dye production were removed prior to 1974 with the exception of Buildings 1113, 1035, 603/604, 1193, 1197 and 1370, which are currently used as office/storage space for operations at Capstone Intermediates. Capstone Intermediates buildings (1486, 234, 1156, 120, 1476, and 652), and DNT production buildings (1140, 1146, 121, 669, 1278, and 716) remain in this area along with several shops and store houses.

Any wastewater generated in this AOC is pumped to the on-site WWTP.

The SWMUs identified as part of the RFI within AOC 6 include SWMU 9, SWMU 10, portions of SWMUs 17/17A, SWMU 38, SWMU 41-3, SWMU 41-6, SWMU 41-7, SWMU 41-8, portions of SWMU 56A, SWMU 62, and SWMU 63. Refer to SWMU and AOC 6 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

Site Investigation

AOC 6 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 6. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). In total, 527 soil, 71 groundwater, and five soil gas locations have been sampled at locations throughout AOC 6. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

AOC 7 – Elastomers/Isoyanates Area

Preliminary Assessment

No new historical information has been collected for AOC 7 beyond that presented in the historical documents provided in Appendix A. AOC 7 is approximately 18.4 acres and located near the central portion of the manufacturing area of the site. AOC 7 is bounded by the AOC 5 to the north, AOC 6 to the south-southwest, AOC 8 to the south, and SWMU 8 AOC to the east as shown in Figure 2. AOC 7 is generally flat topography and covered by asphalt parking lots, concrete foundations, buildings, and gravel/grass areas.

In general, there were five major businesses (Neoprene, Viton, Adiprene, Hylene, and Hytrel) consisting of over 100 products that were highly specialized and unique to the rubber industry at the site. Most of the production has ceased within the Elastomers area. Hylene was taken out of production around 1980, and the production buildings in that area were dismantled and/or transferred to the production of intermediates for the Aramids fiber business unit located to the north. Several offices and laboratories, such as the old Elastomers Office Building, remain, but are unused for production purposes.

Production of high performance elastomers within the Viton manufacturing area is currently active. Currently, the area consists of existing production Buildings 756, 745, and 1076 and office buildings. AOC 7 is bisected by the interior fence line. Office building 1155, which lies on the outside of the interior fence, was decommissioned and demolished in February 2016.

The SWMUs identified as part of the RFI within AOC 7 include SWMUs 17/17A, SWMU 30, portions of SWMU 56, and SWMU 56A. Refer to SWMU and AOC 7 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

Site Investigation

AOC 7 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 7. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (depths or date). Ninety soil, eleven groundwater, and seven soil gas locations have been sampled at locations throughout AOC 7. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

AOC 8 – Warehouse Transport and Construction Area

Preliminary Assessment

No new historical information has been collected for AOC 8 beyond that presented in the historical documents provided in Appendix A. AOC 8 is approximately 18.8 acres and located near the central portion of the manufacturing area of the site. AOC 8 is bounded by AOC 7 to the north, AOC 6 to the west, AOC 9 and SWMU 8 to the east as shown in Figure 2. AOC 8 is generally flat topography and covered by asphalt parking lots, concrete foundations, buildings and gravel/grass areas

No significant changes have been made to the area since 2006.

The Warehouse and Transport area was historically used for the storage and shipping of intermediate compounds, finished products, and drums. The primary marshalling yard for broad gauge railroad traffic is also located in this area. This switch yard still exists today. The plant narrow gauge railroad is also present in this area feeding into the store buildings. This railroad is operated and maintained by the site for the hauling of materials around the plant site.

The Construction Area has historically been used for the fabrication of machinery, reactors, and buildings. This equipment was used at the site and was also shipped to

other plant sites around the world. No chemical manufacturing processes were undertaken at this area.

Currently, the Building 833 warehouse is being used by plant operations. All other buildings have been removed down to their foundations.

The SWMUs identified as part of the RFI within AOC 8 include SWMU 11 and portions of SWMUs 17/17A and a small portion of SWMU 8. Refer to SWMU and AOC 8 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

Site Investigation

AOC 8 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 8. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Thirty-three soil, four groundwater, and two soil gas locations have been sampled at locations throughout AOC 8. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

AOC 9 – Monastral

Preliminary Assessment

No new historical information has been collected for AOC 9 beyond that presented in the historical documents provided in Appendix A. AOC 9 is approximately 35.2 acres and located in near the southeastern portion of the manufacturing area of the site. AOC 9 is bounded by AOC 6 and AOC 8 to the west, SWMU 8 AOC to the north, Pharma/Misc. AOC to the south and east as shown in Figure 2. AOC 9 is generally flat topography and covered by asphalt parking lots, concrete foundations, buildings, and gravel areas

Before 1940, this AOC was mainly undeveloped land with bunkers associated with the Carneys Point Works scattered throughout. One area located within AOC 9, the East Area, was associated with the Manhattan Project. Construction of the East Area began in 1943. The East Area consisted of 30 buildings on 21 acres between the four blocks to the north of Broadway and three blocks to the south of Broadway. DuPont employees under the supervision of the ACOE were in charge of the East Area production of fluorinated lubricants and solvents. By the end of 1945, East Area operations ceased. In 1946, project activities were turned over to the Atomic Energy Commission. Most of the buildings were quickly dismantled in 1946. One of the former East Area buildings was used as a warehouse by the Ponsol Area to store crude colors and intermediates. Two other buildings were extensively remodeled for the Petroleum Laboratory facilities. Process records indicate that Buildings 886 and 1149 were used for Monastral production from 1978 to 1995.

Currently, AOC 9 consists of the consolidated warehouse, the Medical building and Garage (with associated USTs), a truck scale house and miscellaneous drum, a trailer and roll-off storage areas. No operational process areas are currently located within this AOC. The Consolidated Warehouse Building was constructed in the mid-1950s and was used for shipping and receiving. Various finished products were stored here until

shipped, and it still serves as the warehouse for the site. A railroad spur is located to the south of these buildings and may have been used for loading and unloading of process chemicals.

The SWMUs identified as part of the RFI within AOC 9 include SWMUs 17/17A, SWMU 33 (Manhattan Project Area), SWMU 39-1, SWMUs 41-1, 41-2 and 41-4 (Drum Storage areas), portions of SWMU 55-5, and portions of SWMU 56A. Refer to SWMU and AOC 9 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

Site Investigation

AOC 9 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 9. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (depths or date). Thirty-three soil, 13 groundwater, and four soil gas locations have been sampled at locations throughout AOC 9. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

Manhattan project-related remedial activities led by the ACOE are ongoing. The IWS groundwater pumping system remains in operation.

On June 8, 2004, during work on a spill control project at the site garage, damage to an underground diesel transfer line from the UST to the pump occurred, spilling diesel fuel into the surrounding pea gravel. On June 16, 2004, during integrity testing of the new fuel system, approximately 450 gallons of diesel fuel leaked. The spilled fuel and impacted pea gravel and some native sandy clay were excavated and placed in roll-offs prior to proper disposal. A Remedial Action Report for Chambers Works Garage Area (SWMU 39-1) was submitted to NJDEP in 2005. In 2009, a groundwater remedial investigation and selection report was submitted to the NJDEP (URS, 2009b).

AOC 10 – White Products

Preliminary Assessment

No new historical information has been collected for AOC 10 beyond that presented in the historical documents provided in Appendix A. AOC 10 is approximately 8.7 acres and located in the southern portion of the manufacturing area of the site. AOC 10 is bounded by AOC 6 to the north, Pharma/Misc. AOC to the east, and Salem Canal AOC to the south as shown in Figure 2. AOC 10 is generally flat topography and covered by asphalt parking lots, buildings, and some gravel areas.

White Products area initially consisted of the Synthetic Camphor buildings. Synthetic camphor was manufactured from 1918 to about 1922. The compounds used in the production of camphor included the following: acetone, sulfuric acid, caustic soda (sodium hydroxide), chlorine, hydrochloric acid, sulfur dioxide, sperm oil, peanut oil, cocoa nut oil, anhydrous isopropanol, and bulk ammonia. Starting in 1932, the White Products area made approximately 40 products, including detergents, textile finishing agents, water repellents, rubber chemicals, and petroleum chemicals. Building 788 was the main building for producing protectant chemicals used for treating textiles and nonwoven materials. White Products stopped manufacture and was fully

decommissioned by 2012. This area was also used as the North Bulk Storage area, which includes the former loading and unloading areas to the north of Buildings 149, 152, and 788.

No data are available for camphor waste disposal practices. Based on disposal practices ascertained from the Dyes Area, it can be assumed that any wastewater produced was most likely released to the closest ditch system. Process wastewater from buildings adjacent to the Salem Canal may have discharged directly to the canal prior to 1932, at which time the canal became the primary freshwater water supply for the plant.

The SWMUs identified as part of the RFI within AOC 10 include portions of SWMUs 17/17A and the Process Water Ditch System (A Ditch). Refer to SWMU and AOC 10 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

Currently, there are no active operating areas within White Products. There are no occupied buildings within AOC 10.

Site Investigation

AOC 10 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 10. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Nine soil and fourteen groundwater locations have been sampled throughout AOC 10. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

AOC 11 – Former Drainage Ditch

Preliminary Assessment

No new historical information has been collected for AOC 11 beyond that presented in the historical documents provided in Appendix A. AOC 11 is approximately 5.5 acres and is located along the Delaware River north of the Basin AOC. AOC 11 is bounded by CP AOC to the east and southeast, and the Basins AOC to the south, and the Delaware River AOC to the west as shown in Figure 2. AOC 11 has area that slopes with overgrown with grasses to the shoreline of the Delaware River.

AOC 11, the former drainage ditch area, was identified in the PAR (DuPont CRG, 2006e) based on an aerial photograph review. AOC 11 includes two former drainage ditches and an outfall. The drainage ditch located along the river was used pre-1940 through 1962, after which it was filled in. The second drainage area discharged to Henby Creek from pre-1940 until it was filled in by 1946.

There were no manufacturing activities associated with AOC 11. Existing structures within AOC 11 include a perimeter security fence and River Road. The SWMUs identified as part of the RFI within AOC 11 include portions of SWMU 60 and the Drum Disposal Area. Refer to SWMU and AOC 11 Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

No significant changes to the area have been made from 2006 to the present.

Site Investigation

AOC 11 investigation was deemed complete as presented in the 2014 RFI. No further investigations have been conducted for AOC 11. Figures 3 and 4 show the locations within the AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (depths or date). Thirteen soil and two groundwater locations have been sampled throughout AOC 11. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

4.3.2 PA/SI AOCs

This section of the PA/SI presents the 11 AOCs that were subject to ongoing remedial investigations being conducted on accelerated schedules beyond the scope of the 2006 PAR. The AOCs have been added for discussion in this PA/SI so that all areas of the contiguous site and the Delaware River immediately adjacent to the site with potential impacts are presented. The 11 AOCs are as follows:

- Delaware River AOC
- Salem Canal AOC
- CP AOC
- C Landfill (SWMU 13) AOC
- Cogen/Praxair AOC
- Pharmaceuticals/Pedersen and Miscellaneous (Pharma-Misc) AOC
- SWMU 8 (Landfill 4) AOC
- Basins AOC
- WWTP (SWMU 18)
- Power & Utilities (P&U)/Admin
- SWMU 40

Delaware River AOC

Preliminary Assessment

The Delaware River AOC is approximately 345 acres. The Delaware River forms the western property boundary of the site and the AOC boundary includes the high water tidal area (beach areas or sea wall) to 800 feet offshore of the site property line. Those sections of the site that extend west of the mean low water line of Delaware River are in the State of Delaware. No significant modifications to the Delaware River profile bottom in the vicinity of the site have occurred in the past 60 years (DuPont CRG, 2008). The wooden wharf located just west of SWMU 40 was demolished and removed starting in November 2013 and continuing through April 2014. Some larger concrete piers, which were associated with the wharf, are still in place in the Delaware River just offshore of the AOC SWMU 40.

The Delaware River was excluded from the 2006 PAR as an AOC because investigations were currently on-going in 2006, as discussed below.

In 2002, Chambers Works complex was identified as a facility in New Jersey subject to an Environmental Indicator (EI) CA725 and EI CA750 (migration of contaminated groundwater under control). DuPont conducted several evaluations in 2003 and 2004 in support of a positive determination for EI CA750. The results of the EI CA750 supported the migration of contaminated groundwater was largely under control by the IWS, except for three small areas of the B aquifer not under control. Groundwater discharges from the B aquifer were determined to be currently acceptable based on modifying factors such as the high flow rate in the Delaware River relative to the groundwater discharge (170,000 to 1 ratio), tidal mixing within the discharge area, and the non-potable use of the river water. In September 2004, EPA issued a letter indicating a positive determination on EI CA750 for the Chambers Works complex. As part of the Delaware River Initiative, NJDEP sent a letter to DuPont (April 6, 2005) requesting that two major issues be addressed: long-term remediation of the site and discharge of contaminated groundwater to the Delaware River and its tributaries. As part of this NJDEP request, a Delaware River Groundwater to Surface Water Investigation Work Plan was developed in December 2005 (DuPont CRG, 2005h).

A BEE was completed in 2006, which concluded that further investigation of the Delaware River was necessary based on identification constituents of potential ecological concern (COPECs) and pathways to the river (DuPont CRG, 2006d). Further investigation of the Delaware River sediment and surface water was investigated adjacent to the site in three phases from 2009 to 2010. Results of the ecological investigation and risk assessment were reported in the *Delaware River Remedial Investigation Report (RIR)* in 2011.

The Delaware River was investigated throughout 2006 and 2007 and reported in the *Delaware River Groundwater to Surface Water Investigation* in November 2008 (DuPont CRG, 2008a). Historical process waste outfalls, current stormwater outfalls, and the permitted outfalls were also identified from existing site plans and were potential migration pathways of constituents from the site to the Delaware River. In 2014, outfalls around AOC 2 and AOC 3 have been either removed or sealed as the groundwater SPB wall is installed. Outfalls in AOC 1 were sealed in 2016 as part of construction preparations for installation of the groundwater SPB with construction expected completion in mid-2017.

Site Investigation

Numerous investigations have been completed for areas within the Delaware River AOC for various purposes including RCRA investigations, site investigations, and ecological investigations. The following reports are provided in Appendix A.

- EI CA725 and EI CA750 (2003 and 2004)
- Phase IV RFI (DuPont CRG, 2005b)
- PAR (DuPont CRG, 2006e)
- Hydrographic, Geophysical and Geotechnical Survey Program for DuPont Chambers Works Delaware River [Ocean Surveys, Inc. (OSI), 2007]
- Delaware River Groundwater to Surface-Water Investigation Work Plan (DuPont CRG, 2005h)

- Delaware River Groundwater to Surface-Water Investigation Report (DuPont CRG, 2008a)
- Perimeter Investigation Report (URS, 2010c)
- BEE (DuPont CRG, 2006d)
- Delaware River Remedial Investigation Report (URS, 2011a)
- 2016 Delaware River NAPL Delineation Report (AECOM, 2017b)
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)

Figures 3 and 4 show the locations that have been previously sampled within the Delaware River AOC. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Thirty-four sediment, six soil, and four groundwater locations have been sampled throughout the Delaware River AOC.

In 2008, the Delaware River Groundwater to Surface-Water Investigation was completed. This investigation included collecting samples adjacent to AOCs 1, 2, and 3. Potential NAPL was reported in one river location offshore of the southern portion of AOC 1. Additional activities were completed in 2009 and in 2016 to confirm NAPL presence and to define the nature and extent of the DNAPL. During the 2009 investigation, 16 borings were sampled: 13 from the area where NAPL was observed in 2008 and three samples from the southern portion of AOC 1, where elevated onshore groundwater concentrations were identified.

In 2016, a supplemental phase of delineation investigation was completed offshore of AOC 1 from beneath the Delaware River. Based on the results of the two follow-on investigations, it was concluded that DNAPL is present about 150 feet offshore in the B aquifer beneath the Delaware River offshore of southern portion of AOC 1. No evidence of pooled DNAPL was observed; however, in the area offshore of AOC 1, DNAPL containing constituents consistent with the site are believed to be present at the base of the B aquifer beneath the Delaware River. Shallow sediment samples indicated potential NAPL in small, disconnected patches that may be related to former outfalls and shipping activities.

Remedial Actions

Remedial activities have occurred at two areas in the Delaware River AOC SWMU 5 (Landfill I – IRM was completed in 2002) and SWMU 52 (Debris Disposal Area – ISM was completed in 2006). For SWMU 5, remedial actions completed in the Delaware River were presented in the PAR 2006. For SWMU 52, remedial actions completed in the Delaware River are described in the CP AOC presented later in this section.

Further data gap investigations are proposed prior to selection of remedial actions.

Salem Canal AOC

Preliminary Assessment

The Salem Canal AOC is approximately 49 acres and includes the Salem Canal on both the eastern and western sides of Munson dam and Chemours-owned property to the south of the canal. The Salem Canal traverses the southern boundary of the site from the Railroad Bridge to the confluence of the Delaware River and is approximately 200 feet wide. The PA/SI AOC includes the Salem Canal to the eastern and southern

property boundary. The Salem Canal is a freshwater, manmade canal east of Munson Dam and tidal west of the dam (see Section 2.4.2 for more information). The water level within the Salem Canal is maintained by Munson Dam (constructed in 1933), which maintains a non-tidal, freshwater environment upstream of the dam. Munson Dam gates are opened during periods of high precipitation to allow water to be released downstream to the Delaware River.

In August 2002, during a drought, a magenta-colored water was observed seeping from a 100-foot length of the northern bank of the Salem Canal into the surface water. DuPont notified the NJDEP Hotline. Numerous investigations to characterize the nature and extent of the release to impacted media and evaluate and select potential remedial actions have been completed independently and, therefore, were not included in the PAR (DuPont CRG, 2006e).

Modifications to the Salem Canal area since the PAR (DuPont CRG, 2006e) include the installation of a groundwater SPB in 2008. Natural sediment deposition continues in the Salem Canal.

Site Investigation

- Numerous investigations have been completed for areas within the Salem Canal AOC for various purposes and the following reports are provided in Appendix A:
- Salem Canal Pre-Design Investigation Work Plan (DuPont CRG, 2005e)
- PAR (DuPont CRG, 2006e)
- Dyes Area and White Products Area Baseline Ecological Evaluation (DuPont CRG, 2007d)
- Salem Canal Pre-Design Investigation Report (DuPont CRG, 2007h)
- Salem Canal Remedial Alternative Analysis (DuPont CRG, 2007f)
- Salem Canal Interim Remedial Action Work Plan (DuPont CRG, 2007g)
- Salem Canal Sediment Supplemental Pre-Design Investigation Work Plan (DuPont CRG, 2008b)
- Salem Canal Interim Remedial Measure Selection Report (DuPont CRG, 2005c)
- Perimeter Investigation Report (URS, 2010c)
- Salem Canal Groundwater Remedial Action Progress and Sediment Investigation Status Report (URS, 2013b)
- Bulk Sediment Sampling and Analysis Plan (URS, 2015a)
- Supplemental Groundwater Monitoring Work Plan for Salem Canal Sheet-Pile Barrier (URS 2014e)
- Salem Canal Interim Remedial Action Monitoring Report (URS, 2013b)
- Salem Canal Monitored Natural Recovery Framework Document (AECOM, 2015b).
- Salem Canal Screening Level Ecological Risk Assessment (AECOM, 2015a)
- Salem Canal Investigation Summary Report (AECOM and EHS Support, 2017a)
- Salem Canal Canal-Wide Characterization Sampling Plan (AECOM, 2016b)

- Revised Salem Canal Screening-Level Ecological Risk Assessment (AECOM and EHS Support, 2017b).
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)

Multi-media investigations were conducted in 2015 and 2016 as part of on-going investigation and monitoring activities associated with a remedial action to address a former groundwater discharge to the Salem Canal. The results of the 2015-2016 investigations provide current data to update the results of previous investigation and monitoring activities reported in the *Salem Canal Groundwater Interim Remedial Action Progress and Sediment Investigation Status Report* (URS, 2013b). The 2015 and 2016 sampling further characterized seep area concentrations and evaluated the data both spatially and temporally. The evaluation of bulk sediment data indicated a spatial and temporal reduction in the overall median constituent concentrations measured within the biologically active zone along with a reduction in the area of constituent concentrations exceeding screening ecological benchmarks. The noted decrease in sediment constituent results along with the sediment deposition supported the previous recommendation that natural monitored recovery process is a viable remedial option for the former seep area sediment.

At the request of the agencies, further investigation of the sediment deposition rates were studied. Overall, the sediment surface is relatively flat, and the sediment thickness ranges from 3.5 to 4.5 feet in the middle of the canal and thins at the banks to an approximate thickness of 6 inches. In general, the sediment is gray to black silt that is organic-rich. An evaluation of sedimentation rate in the former seep area just east of the Munson Dam of the Salem Canal was conducted in 2016. Sediment accumulation rates within the Salem Canal were estimated based on the interpretation of radio isotope activity measured in samples collected from high resolution sediment cores. Linear accumulation rates (LAR) estimated for sediments deposited within the last five years in the two radioisotope dating cores ranged from 1.3 cm/year to 1.6 cm/year (*Salem Canal Investigation Summary Report*, AECOM and EHS Support, 2017a).

In addition, a second study objective of the 2016 sampling was to characterize the entire canal along the property line (e.g., canal-wide characterization) and included sampling and evaluation of the sediment and surface water quality at targeted outfalls (potential point sources), transects (including tidal areas and upstream areas for potential non-point sources) and in a reference portion of the canal upstream of the site (*Salem Canal Investigation Summary Report*, AECOM and EHS Support, 2017a). The evaluation of the August 2016 data indicated that surface water quality is not impacted by site-related constituents associated with historical or current pathways. The results of the 2016 sediment canal-wide characterization indicated limited site-related impacts at outfalls by metals, VOCs, semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and pesticides, which were evaluated by comparison to the reference reach samples. Some exceedances of ecological benchmark concentrations by PAHs and metals were generally observed in subsurface intervals at locations adjacent to identified current or former outfalls.

Figures 3 and 4 show the locations within the Salem Canal AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). In total, 87 sediment and porewater, 30 groundwater, one soil and 46 surface-water locations have been sampled throughout the Salem Canal AOC and background surface water and sediment

upgradient of this AOC. Evaluation of sample results has not led to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

In December 2008, a SPB was installed as an Interim Remedial Action (IRA) to prevent the migration of impacted groundwater into and underneath the Salem Canal. Prior to the installation of the SPB, the B aquifer and the Salem Canal were hydraulically connected, principally through the lower portion of the canal sidewall and through the thin layer of sediment near the banks of the canal. The installation of the SPB has effectively eliminated the groundwater pathway [refer to the *Salem Canal Groundwater Remedial Action Progress and Sediment Investigation Status Report*, the *Salem Canal Interim Remedial Action Monitoring Report* (URS 2013b) and the current NJPDES-DGW (2017c)].

Additional remedial actions selected for the impacted sediment within the Salem Canal seep area includes monitored natural recovery for the sediments and monitored natural attenuation for the groundwater south of the SPB. In addition, groundwater will be monitored in the area under the existing and on-going NJPDES-DGW activities.

Carneys Point AOC (CP AOC)

Preliminary Assessment

The CP AOC is located in the northern portion of the Chambers Works Complex as shown in Figure 2. The CP AOC is approximately 720 acres in the northernmost section of the Chambers Works Complex. The Delaware River lies to the west and north of the CP AOC. The CP AOC has approximately 2.3 miles of shoreline with the Delaware River. Those sections of the site that extend west of the mean low water line of Delaware River are in the State of Delaware. The CP AOC is very mildly sloping topography with some characteristic rolling topography resulting from extensive wetlands and discharge ditches.

No new historical information has been collected for CP AOC. The Carneys Point area was bought in 1891 and used from 1892 to about 1978 to manufacture nitrocellulose, smokeless powder, and associated products such as nitrate film (celluloid) carboxyl methyl cellulose (CMC), lacquer, cellulose acetate, and rayon. By 1976, only two manufacturing operations remained: primary powder and nitrocellulose. A smokeless powder area mix house explosion in the spring of 1978 hastened the downturn of the economic viability of the Carneys Point Powder Works (Plant 1) and smokeless powder production stopped immediately. Due to the decommissioning of Carneys Point Powder Works in 1978 and closure in 1979, there are no records available concerning specific releases of hazardous materials from the explosive operations (1898 until 1978). A more detailed summary of the Carneys Point area history and chemical processes can be found in the PAR (DuPont CRG, 2006e).

The Carneys Point Focus Area as noted in the PAR (DuPont CRG, 2006e) was not carried forward in its entirety as an AOC to the RFI because most of Carneys Point area is made up of extensive wetlands which historically only contained dry houses for product storage. In addition, the Formerly Proposed Landfill D is also located in the Carneys Point area. Only individual SWMUs within the Carneys Point area were brought forward into the RFI process. Thirty RCRA SWMUs are located within the CP AOC and

have been investigated since the start of the RFI program. SWMU 52 has undergone interim remedial actions to stabilize the area. SWMU 13 is part of the Secure C Landfill (still operational) and will be discussed as part of the Secure C Landfill AOC. In summary, all but one of the 28 SWMUs located in CP AOC are recommended for no further investigation. SWMU 45-2 was recommended in the Comprehensive RFI Report (URS, 2014c) to be carried forward to the RCRA Corrective Measures Study (CMS) phase.

No major changes to the AOC have occurred since the 2006. The CP AOC is currently made up of mostly vacant with areas of broken asphalt, fill, a guardhouse, old foundations, several unpaved or gravel roads and surface water channels are present throughout the site. Most of the AOC is either overgrown with grass or trees or consists of wetlands. Formerly Proposed Landfill D area consists of flat area with engineered medium sand layer and emergent brush vegetation.

Site Investigation

Numerous investigations have been completed for areas within the CP AOC for various purposes and the following reports are provided in Appendix A

- Results of the Delaware River Corrective Action Program and Evaluation and B Zone Tidal Study (DERS 1993b)
- Addendum to the Phase I RFI Report: SWMU 52 (DERS, 1995)
- Property No. 1 Environmental Site Assessment (ESA) (DuPont, 1994)
- SWMU 52 Investigation Report (DuPont CRG, 2002a)
- Carneys Point 40-Acre Parcel ESA (DuPont, 2004)
- Phase I RCRA RFI Report (DuPont, 1995a)
- Phase II RCRA RFI Report (DuPont CRG, 1998)
- Phase III RCRA RFI Report (DuPont CRG, 2002b)
- Phase IV RCRA RFI Report (DuPont CRG, 2005b)
- Phase IV Supplemental RCRA RFI Report (DuPont CRG, 2007e)
- SWMU 52 Interim Stabilization Measure, Addendum No. 1 (DuPont CRG, 2005f).
- PAR (DuPont CRG, 2006e)
- BEE (DuPont CRG, 2006d)
- SWMU 52 ISM Remedial Action Report (DuPont CRG, 2007a)
- Delaware River Remedial Investigation Work Plan (URS, 2009b)
- Ecological Investigation (EI) Report (DuPont CRG, 2009)
- T29 Area PCB Removal Work Plan (URS, 2009d)
- Perimeter Investigation Report (URS, 2010c)
- Summary of Ecological Investigations in Carneys Point (URS, 2010a)
- Bouttown Creek Ditch Investigation (URS, 2010a)
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)

- Comprehensive RFI Report (URS, 2014c)
- 2014 Comprehensive RFI Supplemental Information Soil Data Post Maps (AECOM, 2015c)
- 2014 Comprehensive RFI Supplemental Information SWMU Documentation (AECOM, 2016a)
- CEA Biennial Report (Chemours CRG, 2016)
- 2016 PCB Pollutant Minimization Plan (PMP) Report (AECOM, 2017a)
- SWMU 52 ISM Work Plan (DuPont CRG, 2006b)
- Additional Selection and Design Evaluation Addendum #1 to SWMU 52 Selection Report (DuPont CRG, 2005d)
- SWMU 52 RASR (DuPont CRG, 2004d)
- SWMU 52 Interim Stabilization Measure, Addendum No. 1 (DuPont CRG, 2005d)
- Addendum #2 to SWMU 52 ISM Selection Report (DuPont CRG, 2005g)
- Salem Canal Interim Remedial Measure Selection Report (DuPont CRG, 2005c)
- Approval for Cleanup and Disposal of PCB Remediation Waste under 40 CFR 761.61(a) and for Characterization and Verification sampling under 40 CFR 761.61(c). T29 Area (EPA, 2009)
- Post-Excavation Sampling Modification Approval. T29 Area (EPA, 2011)
- Environmental Site Assessment Carneys Point Redevelopment Area (URS, 2011b)
- Phase II Site Assessment Carneys Point Redevelopment Area (URS, 2011c)

A limited number of constituents of potential concern (COPCs) has been detected above applicable NJDEP Soil Remediation Standards; mostly metals, primarily arsenic and lead. Figures 3 and 4 show the locations within the CP AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). In total, 964 soil, 68 sediment, 145 groundwater, and 35 surface water locations have been sampled throughout the CP AOC. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

Remedial activities have occurred in three main areas of the CP AOC, the Formerly Proposed Landfill D (completed prior to 2006, see PAR (DuPont CRG, 2006e) and SWMU 52 (Debris Disposal Area ISM was completed in 2006). A voluntary remedial action [completed under Toxic Substance Control Act (TSCA)], which included soil removal, was completed in the T29 Area adjacent to Bouttown Creek in 2013.

SWMU 52 is defined as the area of Carneys Point that was once used for disposal of various waste including but not limited to, building debris, trash, and off-specification nitrocellulose building debris from the former Carneys Point Works. The SWMU currently exists as a small broad point of land along the Delaware River outside the site perimeter fence. SWMU 52 was investigated in 1995, 1997, 2000, 2003, 2004, and 2005 prior to

stabilization efforts. Media sampled during these investigations included groundwater, surface water, soil, sediment, and brown material. The brown material consisting of metal slag and other debris was the most likely source of the metals contamination. Gradual weathering and dissolution of the brown material and other metal debris were believed to be impacting the A zone groundwater and the Delaware River sediment and surface water (*SWMU 52 RASR*, DuPont CRG, 2004d and *Chambers Works SWMU 52 Investigation Report*, DuPont CRG, 2002a). The Delaware River sediments were remediated in 2006. The primary constituents of concern (COCs) detected during the various investigations at SWMU 52 were arsenic, lead, copper, mercury, cadmium, and zinc. These metals, with the exception of copper, were also found in the groundwater in concentrations that exceeded the New Jersey Groundwater Quality Class IIA Standards (NJGWIIA). EPA and the NJDEP approved the SWMU 52 ISM Work Plan with addenda #1 (*Additional Selection and Design Evaluation Addendum #1 to SWMU 52 Selection Report*, DuPont CRG, 2005d) and #2 (*Addendum #2 to SWMU 52 ISM Selection Report*, DuPont CRG, 2005g) in a letter dated March 27, 2006. Starting in July 2006, approximately 2.5 acres (~9,000 cubic yards) of non-native fill were stabilized from depths averaging 4 to 10 feet. Approximately 1,325 cubic yards of stabilized material were disposed of in the on-site A Basin soil vault. The area was covered with a 2-foot cap of clean fill and vegetation.

The T29 Area, an area adjacent to Bouttown Creek within the CP AOC, was where PCB-contaminated soil was discovered in 2007. In July 2007, monitoring well T29-P01A was installed in the T29 Area and non-aqueous phase liquid (NAPL) and visual staining were observed within the soil borings during well installation. Analytical results indicated the NAPL contained elevated PCB concentrations. This discovery prompted subsequent investigations with objectives to delineate and characterize contaminated soil and sediment associated with the discovery, assess the environmental and ecological impact of these media, and evaluate and select potential remedial action(s). The following investigations were completed for the T29 Area: 1) December 2007 Investigation, 2) February 2008 Investigation, 3) March/June 2008 Investigations, and 4) March 2009 Ecological Investigation. These investigations were summarized in the *T29 Area PCB Removal Work Plan and Response to Comments on the T29 Area PCB Removal Work Plan* (URS, 2009d and DuPont, 2009, respectively). In 2013, under the TSCA self-implementing cleanup option pursuant to 40 CFR 761.61(a), voluntary cleanup of the T29 Area soil was completed to a cleanup goal of less than or equal to 25 parts per million (ppm). Soil containing PCBs was removed from a 15 by 10-foot area to a depth of 15 feet. A groundwater well was installed and sampled for PCBs in 2016. A PCB PMP Annual Report (AECOM, 2017a) is submitted to the Delaware River Basin Commission (DRBC) for the Chambers Works Complex on an annual basis, and those documents describe any PCB monitoring or sampling within the T29 Area.

Secure C Landfill (SWMU 13) AOC

Preliminary Assessment

The Secure C Landfill AOC is located in the center of the CP AOC in the northern portion of the Chambers Works Complex as shown on Figure 2. Secure C Landfill has been in operations since 1975 and covers approximately 32 acres and currently consists of seven areas (formerly called cells). C Landfill has very steep sloping topography and is surrounded by some characteristic low to flat topography associated with wetlands.

Since C Landfill is currently operating under an existing RCRA Permit, it was not carried through during the RFI process.

C Landfill currently accepts secondary sludge from the WWTP that is characterized as a RCRA listed waste (F039). C Landfill Area 1 (cell 1) was closed in 1979 and is under RCRA corrective action and designated as SWMU 13. Areas 2, 3, 4, 5A, 5B, and 7 are currently active and are permitted as a RCRA Subtitle C secure landfill. Cell 1 (SWMU 13) has been closed and received a no further action (NFA) and Covenant Not to Sue letter from NJDEP dated October 24, 2002. The entire landfill is lined, and Areas 2, 3, 4, 5A and 5B are double-lined with leak detection systems between the liners to monitor for seepage through the upper liner. A leachate collection system for removing accumulated leachate from the liners is monitored from all five areas. Future areas 5C, 6, and 7 will be added as additional landfill space is required.

Areas 2, 3, 4, 5A, 5B, and 7 of the Secure C Landfill are designed to prevent leachate from entering the environment and are monitored in accordance with the Groundwater Protection Plan (GWPP) of NJPDES-DGW Permit No. NJ0105872. These six areas of the Secure C Landfill are covered under the GWPP and are constructed of double liners. Each liner is constructed with an overlying gravity-fed collection system. This type of construction results in an upper collection/liner system [called the leachate collection system (LCS)] and a lower collection/liner system [called the leak detection system (LDS)]. The LCS removes leachate collected over the primary liner and acts as the primary conveyance for leachate generated in the landfill. The LDS is designed to remove leachate if it collects between the primary and secondary liners. This double-lined system helps to evaluate the primary liner's integrity. The LDS and LCS in each area are gravity-fed to sumps. The LCS sumps and the LDS sump for Area 5A are equipped with totalizers to measure volumetric flow rates.

Site Investigation

Numerous sampling events have been completed within the C Landfill AOC following permit requirements. C Landfill AOC groundwater is monitored and reported as part of the on-going NJPDES-DGW permit. A CEA for groundwater is in place for all of the C Landfill AOC. The following reports are available for review [see Appendix A and the SWMU 13 Fact Sheet (Appendix A of the Comprehensive RFI Report, URS, 2014c)]:

- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)
- CEA Biennial Report (Chemours CRG, 2016)

Figures 3 and 4 show the locations within the C Landfill AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Twenty six groundwater locations have been sampled throughout the C Landfill AOC. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

The Corrective Action Groundwater Recovery Program for the C Landfill was designed and implemented in 1991 to control groundwater flow and recover impacted groundwater associated with Area 1 (SWMU 13). Wells Q20-M02B and R20-M02B are used as groundwater recovery wells. Captured groundwater is pumped to the WWTP for

treatment. Corrective action wells Q20-M02B and R20-M02B are normally operational but may have some interruptions at times when the wells are shut down due to extensive rain so that water can be pumped off the active landfill.

The permit domain for the Secure C Landfill is defined as the uppermost aquifer (B aquifer) in the area within 500 feet of the landfill. Groundwater potentially impacted by the Secure C Landfill within the permit domain is captured by the Corrective Action recovery wells so that groundwater quality outside the permit domain is protected. In addition, the Secure C Landfill is within the boundary of the site CEA. This CEA (Chemours CRG, 2016) identifies constituents that exceed the NJGWIIA for the underlying aquifers. Groundwater control is achieved at the Secure C Landfill while the groundwater recovery wells are operating. A capture zone continues to be demonstrated during the current water-level measurement event. Evaluation of the Detection Monitoring Program and the Leachate Collection Monitoring Program is conducted in accordance with the GWPP.

Groundwater quality data and elevation contour maps are produced semi-annually as part of the semi-annual NJPDES-DGW reporting (AECOM, 2017c) and based on evident contoured capture zone in the groundwater containment system is effective for the C Landfill.

Cogeneration and Praxair (Cogen-Praxair) AOC

Preliminary Assessment

The Cogeneration (Cogen) and Praxair AOC is named as such because it is the current location of the Cogeneration facility and Praxair Corporation facility. The AOC is located on the easternmost section of the Chambers Works Complex and is bounded by railroad right-of-way and Shell Road (Route 130) as shown on Figure 2. The AOC encompasses approximately 58.2 acres. The area is mainly topographically flat. The Explosion Hazard Laboratory is located in the western portion of the AOC.

No new historical information has been collected for Cogen-Praxair AOC. During the PAR in 2006, the Cogen area was not carried forward into the RFI process because there was no potential concern for human health and the environment based on investigation results completed prior to construction of the cogeneration facility.

The current activity in the Praxair facility is converting natural gas to carbon monoxide and hydrogen. The carbon monoxide is supplied to the phosgene operation. The land occupied by Praxair was leased to Union Carbide since November 20, 1989. Union Carbide became Linde and then Praxair. The site provides Praxair with water, sanitary sewage and industrial wastewater (treated at on-site WWTP) and manages the stormwater under the Chemours Discharge Prevention Containment and Countermeasure plan. The site provides water from Salem Canal to Cogen. The Cogen facility is a 262-megawatt pulverized coal-fired plant that began commercial operations in 1994 and produces electricity and also steam for the site. The Explosion Hazards Lab (EHL) performs research and development (R&D), mainly to provide experimental data to define the reactive process hazards associated with new and existing processes or products and is currently leased by DuPont.

No significant changes have been noted in the Cogen, Praxair, or the EHL areas since the PAR (DuPont CRG, 2006e) was completed.

Site Investigation

Numerous investigations have been completed for areas within the Cogen Praxair AOC for various purposes such as construction and site investigations. The following reports are available for review (see Appendix A):

- PAR (DuPont CRG, 2006e)
- Phase I RCRA RFI Report (DuPont, 1995a)
- Phase II RCRA RFI Report (DuPont CRG, 1998)
- Phase III RCRA RFI Report (DuPont CRG, 2002b)
- Phase IV RCRA RFI Report (DuPont CRG, 2005b)
- Phase IV Supplemental RCRA RFI Report (DuPont CRG, 2007e)
- Perimeter Investigation Report (URS, 2010c)
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)
- Comprehensive RFI Report (URS, 2014c)
- CEA Biennial Report (Chemours CRG, 2016)

During the PAR (DuPont CRG, 2006e), no areas of interest were noted for the currently operating Cogen, Praxair, and EHL facilities.

Figures 3 and 4 show the locations within the Cogen-Praxair AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Two soil and 34 groundwater locations have been sampled throughout the Cogen-Praxair AOC. Evaluation of sample results has not lead to recommendations for further investigations.

Carneys Point Plant 2 buildings were removed around 1920 leaving only foundations. The area was inactive from 1920 to 1974. Vegetative cover in the area gradually transitioned from grasses and shrubs to uplands and forest. In 1974, construction began on the Explosion Hazards Laboratory, which is located on a portion of SWMU 32B. SWMU 32A and SWMU 32B were investigated in June 1990 and January 1991 prior to the construction of the Cogen facility, and sample results indicated that constituent concentrations were below the NJDEP non-residential direct contact Soil Remediation Standards and the soil was removed. Results from sampling in the area have not lead to recommendations for further investigations

Remedial Actions

The IWS groundwater pumping system remains in operation.

SWMU 32A was investigated in June 1990 and January 1991 prior to the construction of the Cogen facility to confirm that complete removal of explosive material. The Cogen plant was constructed in 1991 on approximately 27 acres and over a portion of SWMU 32. Soil excavation was necessary in SWMU 32 area so as to prepare for construction of the Cogen facility. During excavation, personnel detected an odor in the soil and sampling results indicated slightly elevated levels of dimethyl phthalate and di-n-butyl phthalate and the soil was removed and disposed of in a landfill.

SWMU 50 contained rubble associated with the demolition of the former Carneys Point Works powder house. The area was discovered during test pit activities as part of the

Cogen facility construction. The open foundation was filled with rubble, including piping and equipment covered with asbestos. Asbestos was the only constituent associated with this area. The debris and asbestos were removed, and in a letter dated March 25, 1993, the EPA agreed to no further action for SWMU 50.

Pharmaceuticals/Pedersen and Miscellaneous AOC

Preliminary Assessment

The Pharmaceutical/Pedersen-Miscellaneous AOC (Pharma-Misc AOC) is located in the southeast corner of the Chambers Works Complex. The AOC is approximately 37.4 acres and is bounded by the Salem Canal to the south, Shinn Road to the west, a rail yard to the north, and a residential community of Deepwater Village to the east as shown in Figure 2.

The Pharmaceutical/Pedersen Focus Area was not carried forward into the RFI process because no additional investigations were determined to be necessary for the area as presented in the PAR (DuPont CRG, 2006e).

No new historical information has been collected for Pharma-Misc AOC. The PAR (DuPont CRG, 2006e) indicates that the Pharma-Misc AOC was a residential community known as Fenton's Beach and was purchased by DuPont sometime before 1915. In 1927, DuPont completed the purchase of Fenton's Beach and consolidated the land into the Dye Works. This area remained vacant until about 1942 when the Caer Building and the Salem Canal guard house were constructed along with three parking lots to support the workforce expansion during WWII. Up until 1970, the only activities in the area were parking and site security.

In 1990, DuPont constructed a pharmaceutical R&D facility in this area, which consisted of eight primary buildings and several supporting structures. This facility, used to investigate pharmaceutical intermediates and perform pilot-scale testing, was operated by DuPont Pharmaceutical Division until 2001 when the division was sold to Bristol Myers Squibb (BMS). DuPont completed a Phase I ESA prior to divestiture; however, BMS leased the facility from DuPont and continued operations until 2003. In 2003, BMS vacated the facility and transferred its operations to another site. In October 2003, Rhodia Inc. leased the facility from DuPont to conduct pharmaceutical R&D. Rhodia conducted a Phase I and II ESAs to document baseline environmental conditions prior to occupying the facility. Rhodia vacated the building when the lease of the facility ended in August 2006. The facility was idle from late 2006 until 2008 when DuPont consolidated office and laboratory buildings and renamed the building the Charles Pedersen Building. The Pedersen building (M-1, M-2, M-8, and M-6) was transferred from DuPont to Chemours in 2015 and currently houses research laboratories and administration offices. Modification to the main entrance at Broadway gate to meet DHS regulations were completed in 2010.

Buildings currently operating in this AOC are as follows:

- CAER Building (823) headquarters for the site security operations
- Salem Canal Road guard house
- Booster Pump House (1400) pumps potable water from Salem Canal intake to the Cogen facility
- Pedersen Building – R&D laboratory and administration offices

- Several supporting structures and Broadway Gate and supporting structures.

There is one SWMU located within the AOC, a section of SWMU 17 (A ditch) runs along Shinn Road from the CAER Building to the north.

Site Investigation

Numerous investigations have been completed for areas within the Pharma-Misc AOC for various purposes such as site investigations and routine monitoring. The following reports are provided in Appendix A:

- PAR (DuPont CRG, 2006e)
- Perimeter Investigation Report (URS, 2010c)
- Comprehensive RFI Report (URS, 2014c)
- CEA Biennial Report (Chemours CRG, 2016)
- 2016 PCB PMP Report (AECOM, 2017a)
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)

Figures 3 and 4 show the locations within the Pharma-Misc AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Two soil and 26 groundwater locations have been sampled throughout the AOC. Evaluation of sample results has not lead to recommendations for further investigations.

A study of potential sources of PCBs entering the site via surface waters by way of the Clean Water Ditch was initiated in 2015 as part of the PCB Pollution Minimization Plan (PMP). The objective of the study was to see if there were any PCB sources not otherwise identified with the potential use to help plan for further PCBs reduction of surface-water discharges to the Delaware River. Samples were collected in and around Broadway Gate and other surface water ditches as they enter the site. No PCBs were observed in the culvert from Deepwater Village, however, PCBs were observed in surface water entering the site from the Route 130 and railroad line culvert. Additional samples were collected in 2016, and the data are still under evaluation and will be reported in future PCB PMP reports.

Remedial Actions

The IWS groundwater pumping system remains in operation.

In late May 2015, a strong noxious odor was noticed in and around the Broadway Gate, and a fish kill was observed. The open water ditch (B-Ditch) in the field just east of A Corral Road and west of Broadway gate was investigated. Initial sampling results for surface water and sediment indicated the presence of aldehyde group of compounds, mainly formaldehyde and propionaldehyde. No known usage of propionaldehyde was found at the site in any of the current or former manufacturing areas. After reviewing the initial sampling results, additional sampling was continued upstream past where the clean water ditch daylighted and within in the large diameter pipe at access or manhole covered locations. The clean water ditch originates in the former White Products Area D Building, which formerly used propylene glycols. It is thought that the sediments within the pipe that contain glycols are in a warm and anoxic (i.e., no oxygen) environment, which allowed for anaerobic bacteria growth. The bacteria used the glycols as a food

source and produced propionaldehyde as a by-product. Propionaldehyde has a very low odor threshold and its odor is considered to be noxious. Additional sampling of sediment and surveys of this covered pipe were conducted between 2015 and 2017. In June 2017, approximately 1,000 feet of pipe was cleaned of sediment, and the sediment was properly disposed.

SWMU 40 (Fuel Oil Storage Tanks) AOC

Preliminary Assessment

SWMU 40 AOC is located in the western side of the Chambers Works Complex along the Delaware River. This AOC is approximately 8.4 acres and is bounded by the Delaware River to the west, River Road to the east, and parking lots and AOC 1 to the north as shown in Figure 2. Formerly just north of the three spill protection berms, was access to the shipping wharf structure. Those sections of the site that extend west of the mean low water line of Delaware River are in the State of Delaware.

SWMU 40 AOC is comprised of three fuel oil storage tanks (TS-1, TS-2, and TS-3). TS-1 and TS-2 were constructed in the 1930s and TS-3 was constructed in the 1970s. The tanks were once used to store No. 6 fuel oil, but have been emptied and cleaned. The tanks are currently idle and are reserved for future service. Fuel oil storage tanks are surrounded by an asphalt-covered dike containment structure and the rest of SWMU 40 is surrounded by asphalt covered gravel berm.

During the PAR in 2006, SWMU 40 was part of the TEL Focus Area. No new historical information has been collected for SWMU 40. SWMU 40 was split from TEL Focus Area and AOC 2 and carried forward under the RFI process as an independent SWMU. No additional investigations were determined to be necessary for the SWMU.

No significant changes to SWMU 40 area were noted from 2006 PAR; however, the wharf was demolished with activities starting in November 2013 and continuing through April 2014. The oleum tank and scrubber located just north of the tank area (near wharf entrance) were removed from the northern side of SWMU 40 (south of Fluoroproducts parking lot) in December 2015 and completed in early 2016. In addition, the wharf entrance shed was removed at that time. The sea wall was reinforced on the Delaware River side of SWMU 40 in 2013.

Site Investigation

Numerous investigations have been completed for areas within the SWMU 40 AOC for various purposes such as RFI site investigations and routine monitoring. The following reports are available for review (Appendix A):

- PAR (DuPont CRG, 2006e)
- Perimeter Investigation Report (URS, 2010c)
- Comprehensive RFI Report (URS, 2014c)
- CEA Biennial Report (Chemours CRG, 2016)
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)

SWMU 40 was investigated in multiple phases. Soil at SWMU 40 has been characterized and evaluation of results from sampling has not lead to further

investigation recommendations, therefore SWMU 40 investigation was deemed complete as presented in the 2014 RFI.

Figures 3 and 4 show the locations within the SWMU 40 AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Two soil and two groundwater locations have been sampled throughout the AOC.

Remedial Actions

The IWS groundwater pumping system remains in operation.

A RCRA CMS was recommended in the Comprehensive RFI Report (URS, 2014c), but further investigations may be necessary prior to remedial action selection and design.

SWMU 8 AOC

Preliminary Assessment

The AOC SWMU 8, also known as former Landfill IV, is an approximately 140-acre area located in the eastern portion of the Chambers Works complex. SWMU 8 AOC is bounded by a railroad yard and the WWTP to the north, the Cogen-Praxair AOC to the northeast, AOC 9 and the Pharma-Misc AOC to the south as shown in Figure 2. SWMU 8 AOC currently includes Landfills A and B, several paved parking lots, roads, and some operating areas around the southern and eastern perimeter. In general, the topography in the operating areas around the landfills is flat; however, the landfills have steep slopes.

Investigation of SWMU 8 began in 1994 during the implementation of Phase I RCRA RFI. At the request of NJDEP and EPA, investigation of SWMU 8 continued in 2003 on an accelerated investigation track, independent of the site RFI process. The goals of the investigation were to verify that the landfill units are stable, evaluate the nature and extent of waste material, and determine concentrations of constituents in soil and water. Investigations were on-going during the development of the PAR in 2006, and the PAR incorporated existing information. SWMU 8 was carried forward under the RFI process as an independent SWMU.

No new historical information has been collected for SWMU 8 AOC since the PAR (DuPont CRG, 2006e). From the 1930s to 1974 Landfill IV was used for the disposal of various wastes generated by the plant operating areas. These wastes included trash and general refuse; soil fill; construction debris and building rubble; discarded machinery and equipment; dredge spoils; bulk sludges and tar; basin and river dredging spoils; spent carbon and catalyst; bottom and fly ash; asbestos; drummed powder; paste; liquid wastes including waste oil and spent solvent chemicals. Site records indicated that the on-site wastewater basin was dredged in 1950 (Basins AOC) and approximately 600,000 cubic yards of dredge spoils were deposited in SWMU 8. During the continued filling of Landfills A and B, the surface-water flow in the area was channeled through two parallel buried concrete pipelines. The rectangular concrete pipeline is used to convey surface water from a small creek and surface-water ditches to the south as part of B Ditch. Further information regarding the SWMU 8 history can be found in the PAR (DuPont CRG, 2006e).

Over time, additional operating areas were constructed on top of waste fill. Landfills A and B, situated within SWMU 8, were permitted in 1975 for the disposal of solid wastes

and construction debris. Several of the disposal activities were distinct enough to be designated as SWMUs. Those SWMUs designated within SWMU 8 are SWMU 30 (Landfills A and B), SWMU 1, 2, 3, and 4 (former incinerator locations), SWMU 7 (Landfill III), SWMU 21 (thermal decontamination incinerator), SWMU 22 (multi-purpose incinerator), SWMUs 23 and 24 (Chemical Waste Tank Area), SWMUs 39-4 and 39-7 (USTs), SWMUs 55-2, 55-5, and 55-6 (fill deposition area), SWMU 17 (PWDS), SWMU 56A (HPWDS), and SWMU 33 (Manhattan Project Area). Refer to Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

No changes have been noted at Landfill A based on the PAR (DuPont CRG, 2006e) to the present. Landfill B is currently (2017) still active and receiving building demolition materials. In 2012, all tank trailers, which were stored in the grass and gravel areas to the north of Landfill A (Hill Road and Sand blast area), were cleaned and removed from site. The Hill Road asphalt parking lot is still being used to store empty semi-tractor trailers. The Chemical Waste RCRA storage pad and surrounding areas are currently active. A new fire water tank was installed in 2012 and is located to the west of Landfill A near Shinn Road. The remaining areas to the west of Landfill A are gravel filled and sometimes used as equipment staging areas. Operations areas to the west of Landfill A are gravel covered and currently active including the following buildings: Fluoroelastomer Market Development Lab (FMDL Buildings 1474 and 1163), Chem Waste (Building 1304 and associated RCRA pad and support structures), trash area (1271A), Contractor Area (Building 1155), Waste Acceptance Laboratory (Buildings 1330, 1331 and 1339) and support structures, and Building 1179.

Site Investigations

SWMU 8 was investigated in multiple phases and included investigations such as RFI remedial and site investigations, treatability, and routine monitoring. The following reports provided in Appendix A:

- Stores and Transport Department Waste Disposal Studies Progress Report. August 1968 through February 1969.
- Phase I RCRA RFI Report (DuPont, 1995a)
- Phase II RCRA RFI Report (DuPont CRG, 1998)
- Phase III RCRA RFI Report (DuPont CRG, 2002b)
- Phase IV RCRA RFI Report (DuPont CRG, 2005b)
- Phase IV Supplemental RCRA RFI Report (DuPont CRG, 2007e)
- SWMU 8 Remedial Investigation Work Plan (DuPont CRG, 2003a)
- EPA Letter to DuPont approving SWMU 8 Investigation Work Plan (EPA, 2003)
- SWMU 8 Preliminary Summary (DuPont CRG, 2004a)
- EPA Letter to DuPont approving SWMU 8 Phase II Work Plan (EPA, 2004b)
- Phase II SWMU 8 Work Plan (DuPont CRG, 2004b)
- EPA Comment Letter requesting that DuPont submit a Phase II Work Plan to collect data at SWMU 8 (EPA, 2004a).
- SWMU 8 (Landfill IV) Remedial Investigation Report (DuPont CRG, 2005a)

- SWMU 8 (Landfill IV) Remedial Investigation Report 2005 Addendum (DuPont CRG, 2006c).
- SWMU 8 (Landfill IV) Remedial Investigation Work Plan for Surface Water (DuPont CRG, 2006a)
- PAR (DuPont CRG, 2006e)
- SWMU 8 (Landfill IV) Remedial Investigation Report –Surface Water Investigation 2007 Addendum (DuPont CRG, 2007c)
- SWMU 8 Interim Corrective Measures Study and Remedial Action Selection Report (DuPont CRG, 2007b)
- SWMU 8 Treatability Study Work Plan (URS, 2009a)
- Treatability Study Remedial Investigation Report (URS, 2010d)
- Perimeter Investigation Report (URS, 2010c)
- Bench Scale Surfactant Treatability Test Report (Surbec Environmental LLC, 2011)
- Comprehensive RFI Report (URS, 2014c)
- CEA Biennial Report (Chemours CRG, 2016)
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)

Figures 3 and 4 show the locations within the SWMU 8 AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). In total, 68 soil, four sediment, 69 groundwater, and four surface water locations have been sampled throughout the AOC. Evaluation of sample results has not lead to recommendations for further investigations.

The investigation reports concluded that the shallow groundwater in the SWMU 8 area has been impacted by historical disposal practices, mainly in the western portion of the SWMU towards the site's interior. Characterization of the surface-water quality prior to entering and exiting SWMU 8 and exiting the concrete pipes under Landfill A was completed during sampling in 2006. The detection of metals in the surface water was not considered a concern for the site-wide stormwater system and Outfall 001 or 002 due to the low concentrations and negligible volumetric flow through the pipe section. Soil at SWMU 8 has been characterized, and evaluation of results from sampling has not lead to further investigation recommendations. Therefore, the SWMU 8 investigation was deemed complete as presented in the 2014 RFI. No additional investigations were determined to be necessary for SWMU 8.

Remedial Actions

The IWS groundwater pumping system remains in operation.

Following the 2007 Phase IV Supplemental RCRA Facility Investigation Report (DuPont CRG, 2006e), remedial measures at SWMU 8 and potential technologies were assessed.

For Landfill A, the potential remedial technologies identified in the SWMU 8 CMS-RASR were a bioreactor for landfill soils and capping or leachate collection. Sampling results indicate that a bioreactor is not viable because the permeability of the targeted material

in the landfill is too low. An aquitard beneath the landfill minimizes impact to the underlying aquifer. No DNAPL was detected in the B aquifer. Hydraulic measurements beneath the landfill confirm earlier assessments that any water entering the B aquifer through the discontinuity in the B/C aquitard is captured and treated by the site IWS. Therefore, a separate collection system is not necessary, and no additional investigations or remedial measures were recommended.

WWTP (SWMU 18) AOC

Preliminary Assessment

The AOC WWTP is located in the central and eastern portion of the Chambers Works Complex and is about 70 acres. The AOC WWTP is bounded by the CP AOC to the north, the Cogeneration/Praxair AOC to the east, AOC SWMU 8 to the south, and the Basins AOC and AOC 5 to west. The WWTP AOC is generally of flat topography except for gravel and asphalt covered berms around tanks within the operating area. The AOC currently includes the WWTP, several paved parking lots, roads, lay down areas, and a rail yard.

The WWTP is exempt under RCRA as an operating wastewater treatment facility and is regulated under a NJPDES permit. Because of its current operational status, it was not carried through the RFI process.

No new historical information has been collected for WWTP AOC since the PAR (DuPont CRG, 2006e). The WWTP AOC was originally part of Carneys Point Works. Activities in this area involved the production of nitrocellulose and smokeless gunpowder. During the peak of World War I production, Carneys Point Plant 3 and a portion of Plant 2 were located in this area, as well as storage bunkers, roads, and narrow-gauge railways. The area was abandoned and most of the buildings were removed, leaving only foundations, shortly after the end of the war.

DuPont began building a wastewater treatment pilot plant to comply with the DRBC implementation of the 1965 Clean Water Act (CWA) in the early 1970s. Wastewater treatment began operations in 1975. During construction, fill was brought in as a construction base to increase ground elevation by roughly 5 feet. Beginning in the 1990s, the WWTP was upgraded to meet more stringent environmental regulations (e.g. a third secondary clarifier and tertiary treatment step were added). On March 31, 2012, SET WWTP stopped accepting outside industrial wastewater; however, the WWTP currently accepts under an NJDEP A 901 approval (November 2, 2016) outside non-hazardous wastewater including individual truck trailer loads from Chemours sites (Repauno and Pompton Lakes) and on-site (DuPont Aramids) wastewater. Other wastewater processes at the WWTP include the following:

- On-site process waste
- Equipment cleaning and decontamination water
- Pollution control systems
- Spent acids and caustics
- Spill control and stormwater control systems
- Condensates
- Groundwater, leachate and remediation systems

- Biosludges
- Discarded and off-specification products.

The operating areas of the WWTP are paved with asphalt or have gravel and pavement. Stormwater in the area is conveyed to the treatment system. The WWTP currently operates under permit NJPDES Permit No. NJ0005100.

Those SWMUs designated within WWTP AOC include SWMU 17 (PWDS), sections within SWMU 18, SWMU 18 (WWTP), SWMU 18A (WWTP Pump Pit), SWMU 39-8 (USTs), SWMU 55-1 (Fill Deposition Areas), and SWMU 12 (WWTP Storage Pad).

Directly to the south of the WWTP operations and included in this AOC, is the Rail Yard area. From 1919 to 1952, there was no activity in this area. In 1952, this area received dredge spoils from the dredging operations in the wastewater basins to the west. The dredge material was primarily deposited in AOC SWMU 8 to the south; however, a portion was placed in the rail yard area. Additional fill placement occurred in the area from 1953 until the mid-1960s. The initial rail yard was constructed in 1968 and expanded between 1969 and 1974. An interceptor well (Q13-R01C and D) was installed in the area about 1970. The southern portion of the area began to be used as a railroad laydown area prior to 1976 and was used for railroad equipment such as ties, spikes, and rails.

No significant changes have been made to the AOC WWTP since the PAR was written in 2006.

Site Investigations

Numerous investigations have been completed for areas within the AOC WWTP for various purposes such as remedial and site investigations, and routine monitoring. The following reports are provided in Appendix A:

- PAR (DuPont CRG, 2006e)
- Interior Investigation Technical Memorandum (URS, 2013a)
- CEA Biennial Report (Chemours CRG, 2016)
- Comprehensive RFI Report (URS, 2014c)
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)

Figures 3 and 4 show the locations within the WWTP AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Twelve soil and 26 groundwater locations have been sampled throughout the AOC. Evaluation of sample results has not lead to recommendations for further investigations.

Remedial Actions

The IWS groundwater pumping system remains in operation.

Basins AOC

Preliminary Assessment

The Basins AOC is located in the northwestern section of the site and is about 56 acres that are bounded by the Delaware River to the north-northwest, AOC 1 (Fluoroproducts) to the west, AOC 5 (Aramids), and the WWTP to the east, and CP AOC to the northeast as shown in Figure 2. The Basins AOC is generally of flat topography except for gravel and asphalt covered berms around the basins/former basins.

The 2006 PAR incorporated all existing information into the Basin Focus Area, but since the Basins have been remediated and are in corrective measures monitoring, the Basins AOC did not proceed through the 2014 RFI process.

No new historical information has been collected for the AOC Basins since the PAR (DuPont CRG, 2006e). Historically, surface water flowed in a stream named Whopping John Creek from the southeastern border of the site, through the SWMU 8 area and then into the Basins and finally out to the Delaware River. Before 1970, the basins were low-lying marsh area. Process water, non-contact cooling water, and stormwater runoff flowed through the PWDS into the basins, and then discharged to the Delaware River. The basins were dredged three times (1952, 1958, and 1965) with the spoils placed in SWMU 8 AOC. In the 1970s the A, B, and C Basins were constructed. The A Basin was constructed as a 17.3-acre basin designed to receive process water and stormwater overflow. Water from the A Basin was sent to the WWTP for treatment. The B Basin was constructed as a 16.6-acre basin designed to provide settling and cooling of noncontact cooling water from the plant prior to discharge to the Delaware River. A three-acre basin (C Basin) was constructed in the western portion of the area to act as a settling basin for process water generated by the Antiknocks production area (AOC 2) and operated from 1970 until 1988.

The B Basin currently receives stormwater and noncontact cooling waters from the B Ditch. The site stormwater system enters the B Basin via two primary locations, sample Spot 321, located at the southwestern corner of the basin and at an undesignated spot located 200 feet to the east of Spot 321. Surface water from the western and southwestern portion of the site enters the basin Spot 321 and surface water from the eastern and southeastern portion of the site enters the basin at the undesignated spot. Water is pumped from the northern end of the basin at internal monitoring point DSN 322A and combined with the treated effluent from the WWTP. The combined effluent from the basin and the WWTP discharges to the Delaware River via permitted Outfall DSN 002 and additionally from Outfall 001 during overflow conditions.

With the exception of installing a new discharge outfall (DSN 002) out in the Delaware River in 2011, no major modifications to the basins have been made to the area since 2006.

Site Investigations

Numerous investigations have been completed for areas within the Basin AOC for various purposes such as RFI remedial, site investigations, and routine monitoring. The following reports are provided in Appendix A:

- PAR (DuPont CRG, 2006e)
- Perimeter Investigation Report (URS, 2010c)

- Comprehensive RFI Report (URS, 2014c)
- CEA Biennial Report (Chemours CRG, 2016)
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)
- 2016 PCB PMP Report (AECOM, 2017a)

Figures 3 and 4 show the locations within the Basins AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Eighteen soil and 66 groundwater locations have been sampled throughout the AOC. Evaluation of sample results has not lead to recommendations for further investigations

A study of potential sources of PCBs entering the site via surface waters by way of the clean water ditch and discharged to the basins was initiated in 2015 as part of the PCB Pollution Minimization Plan (PMP). An objective of the study is to see if there are any PCB sources not otherwise identified with the potential use to help plan for further PCBs reduction of surface-water discharges to the Delaware River. Samples were collected in and around B Basin and other surface water ditches as they enter the site. PCBs were observed in surface water entering the site from the Route 130 and railroad line culvert. Additional samples were collected in 2016, and the data are still under evaluation.

Remedial Actions

The IWS groundwater pumping system remains in operation.

In 1988, the C Basin was named SWMU 16 as part of the HSWA permit. In 1994 as part of the NJDEP approved closure plan, lead-containing sediment from the C Basin was removed, treated, and disposed of as detailed in the Certification of C Basin Closure, dated February 28, 1995 (DuPont, 1995). At the time of the C Basin closure, a 7.3 acre portion of the B Basin was converted to a permanent water management basin. In addition, a 2.8-acre vault was created on the northern portion of A Basin to manage excavated materials from the basin and ditch remediation projects. The A Basin vault was closed in 2006. Details of the basin closure process, post-closure groundwater monitoring program, and maintenance requirements can be found in the *A and B Basin Closure Certification/Remedial Action Report* dated March 19, 1997 (DuPont, 1997). SWMUs 14, 15, and 16 have been closed and received a NFA and Covenant Not to Sue letter from NJDEP dated October 24, 2002.

Power & Utilities/Admin (P&U/Admin) AOC

Preliminary Assessment

The AOC for the Powerhouse & Utilities and the former Administration offices is located in the southwestern section of the site and is approximately 10 acres bounded by the Salem Canal and Munson Dam to the south, AOC 3 (Jackson Labs) to the west, AOC 6 (Dyes and Intermediates) area to the north and east as shown in Figure 2. The P&U/Admin AOC is generally flat topography and covered by asphalt parking lots and gravel/grass areas

During the PAR in 2006, the Power & Utility and former Administration office were part of the Jackson Lab and Dyes Focus Areas. No additional investigations were determined to be necessary for these areas as presented in the PAR (DuPont CRG, 2006e). The two areas were combined into one AOC for this PA/SI evaluation.

No new historical information has been collected for this AOC since the PAR (DuPont CRG, 2006e).

The Power and Utilities and Administration area contains two primary operating buildings, one abandoned building (Administration) and several supporting structures. These buildings (powerhouse, boiler house, substation, icehouse, and filter plant) were constructed to supply electricity, steam, potable water, ice and compressed air to the Dye Works. Water for the site was initially obtained from supply wells located on-site, but in 1933 the Munson Dam was built and a water filtration plant was constructed. The powerhouse was initially designed to burn coal, but was converted to oil prior to 1939. By 1957, the site was obtaining steam and electricity from the Atlantic Electric Deepwater generating station (Calpine) located south of the site. The site has been supplied steam and electricity from the Carneys Point Cogeneration facility since the early 1990s. The current operations at the Powerhouse including distribution of steam and potable water to the site in addition to producing and distributing compressed air.

The Administration building was built in two phases starting in 1929. The Administration building was only used for offices and is currently idle.

Two SWMUs, 31 and 51, have been identified within the P&U /Admin AOC. Refer to SWMU Fact Sheets for more details (see Appendix A of the Comprehensive RFI Report, URS, 2014c).

No major modifications to the P&U/Admin AOC have been made to the area since 2006, with the exception of the installation of the SPB along Canal Road in 2008.

Site Investigations

Numerous investigations have been completed for areas within the P&U/Admin AOC for various purposes such as RFI remedial, site investigations, and routine monitoring. The following reports are provided in Appendix A:

- PAR (DuPont CRG, 2006e)
- Perimeter Investigation Report (URS, 2010c)
- Comprehensive RFI Report (URS, 2014c)
- CEA Biennial Report (Chemours CRG, 2016)
- Semi-Annual NJPDES-DGW Report for Chambers Works Complex 2H16 (AECOM, 2017c)

Figures 3 and 4 show the locations within the P&U/Admin AOC that have been previously sampled. At many locations, multiple samples were collected from the same location (i.e., multiple depth intervals or sample dates). Thirteen soil and nine groundwater locations have been sampled throughout the AOC. Evaluation of sample results has not lead to recommendations for further investigations

Remedial Actions

The IWS groundwater pumping system remains in operation.

5.0 Conclusions and Recommendations

The Chambers Works site has been in continuous operation for over 120 years producing a multitude of chemical products. Multiple phases of site investigation and remedial action have been completed over the last 30 years as part of the RCRA corrective action program under the jurisdiction of the EPA. Remedial activities at the site have also been conducted according to the terms of the amended 1988 (satisfied and closed in 2014) ACO between DuPont and the NJDEP, NJPDES-DGW permits, and investigation work plans and ISM work plans approved by the NJDEP and EPA.

This PA/SI was completed to document environmental conditions at the site and references multiple phases of site investigation and remedial actions previously completed. It also references the previously reported robust CSM that integrates site-specific physical features, nature and extent of site-related constituents released to media, potential migration pathways, and potential receptor information. This CSM previously documented the nature and extent of site-related constituents released from regulated units, SWMUs and other source areas at the facility to support development of CMSs for SWMUs and AOCs.

Twenty-two AOCs were identified at the site (see Figure 2) based on the potential for process-related constituents to have entered environmental media. Eleven of these AOCs were identified in the previous PA, and 11 have been added as a result of this recent evaluation, so that all areas of the contiguous site and the portion of the Delaware River the immediately adjacent to the site, with potential impacts are included. Based on the site investigation information provided, the Chambers Works AOCs have been sufficiently characterized during numerous investigations conducted under the oversight of EPA and NJDEP. No new information was discovered during this PA/SI to change the approach for impacted media at the site.

Groundwater beneath the Chambers Works Complex is impacted due to releases from SWMUs and AOCs, and the resultant residual and recoverable multi-component DNAPL source zones. Impacts to site-wide groundwater are addressed in multiple ways: the site IWS creates an inward hydraulic gradient to prevent off-site migration of groundwater, a SPB was installed in the areas along Salem Canal and the Delaware River to augment the IWS by creating a hydraulic barrier in areas of shallow B aquifer where pumping is less effective, pumping well J05-W01E contains E aquifer groundwater along the southern boundary of the site, and the site has an NJDEP CEA in place. Groundwater monitoring is performed under several programs at the site to confirm the effectiveness of the hydraulic containment, monitor groundwater quality, and meet RCRA post-closure requirements. It is expected that the IWS will continue to be operated in the future as the primary CMS to address groundwater, and new technologies will continue to be evaluated to address source zones which are currently technically impracticable to remediate.

Soil at the site has been investigated, remediated in areas, or proposed for further action. Constituent concentrations in soil exceed the NJDEP Soil Remediation Standards at some locations throughout the site. Soil in the active manufacturing area is mostly covered with asphalt, concrete, or gravel preventing exposure to constituents in the subsurface soil. Direct contact with contaminants in the manufacturing area is limited based on these existing engineering controls and site-wide institutional controls. Constituent concentrations in soil that may be impacting groundwater are addressed by the existing IWS.

Potential ecological exposure has been evaluated for the entire site. Ecological investigations have been completed for Carneys Point, Salem Canal, Delaware River and on-site surface water bodies. Further investigation of the Delaware River for ecological risk will be completed after hydraulic control of groundwater is attained by the completion of the AOC 1 SPB.

The Chambers Works AOCs have been investigated, the nature and extent of impacts have been characterized, and remediation has been performed as approved. Institutional and engineering controls are in place to prevent disturbance of soil (both surface and subsurface) such that on-site workers will not become exposed to contaminants in excess of the NJDEP Soil Remediation Standards. Groundwater at the site is part of the site-wide CEA and not used for any purpose. Containment systems will continue to operate, and groundwater will continue to be monitored per the site-wide monitoring programs that are in-place. The containment and monitoring programs will continue to be documented in the semi-annual NJPDES-DGW reports. New technology will continue to be evaluated to meet site needs.

It is recommended that the newly identified 11 AOCs noted in this PA/SI be incorporated into the HSWA permit in a manner similar to what was completed for the 11 RFI AOCs. Further remedial actions including corrective measure studies, closure, or O&M operation and maintenance should continue under the HSWA permit and RCRA regulations.

6.0 References

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Tables

Table 1
Summary of AOC Status
PA/SI Report
Chemours Chambers Works
Deepwater, New Jersey

AOC	Media of Concern	Where	Proposed Remedial Actions or Engineering Control/Institutional Control In place	Status
Delaware River	Sediment	Off shore AOC 1	Remedial Selection not completed	Investigation not completed
	GW plume	Off shore AOC 1, 2, 3	SPB/MNR	Final SPB portion in AOC 1 being installed
	Aquitard/Aquifer (off shore AOC1)	Off-shore AOC 1	Potentially MNR, RASR Not Completed	Data Gaps - Additional investigation necessary
	B Aquifer under river	Off shore AOC 1, 2,3	Remedial Selection Not Completed	SPB final portion in AOC 1 being installed.
	Surface Water	Outfall 002/001	NA	Data Gaps - Additional investigation necessary - DRBC
Salem Canal	Sediment and Porewater	Seep	MNR	Investigation complete, O&M monitoring on-going
	Sediment	Outfalls	None proposed – no ecological risk	Investigation complete
	Surface water	Canal wide	None	Investigation complete
	Groundwater	Seep area	SPB and MNA downgradient in B Aquifer, IWS and CEA	Investigation complete, SPB installed, DGW permit, O&M monitoring
	Groundwater	Entire Area excluding seep	CEA and IWS	Investigation complete
Carneys Point	Sediment	Henby Creek, Bouttown Creek, Ponds	None	RFI complete, Remedial Action T29 complete
	Surface Water	Henby Creek Bouttown Creek, Ponds	None	PCB Investigation on-going
	Soil	SWMUs, T29 PCB area	CMS to be completed for SWMU 45-2	SWMU 45-2 CMS, SWMU 52 O&M, T29 voluntary cleanup complete, investigation complete in other areas
	Groundwater	Entire Area	CEA and IWS	Investigation complete
Secure C Landfill	Sediment	None	None	None
	Soil	Landfill Cells	Closure Plan under RCRA	Landfill cells will be closed as per RCRA closure plan
	Surface Water/stormwater	Collected and sent to Leachate System	Sent to WWTP for treatment	O&M under RCRA documentation
	Groundwater	Landfill Cells	DGW and CEA, RCRA Post Closure Monitoring, IWS	O&M under existing permits

Table 1
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PA/SI Report
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Deepwater, New Jersey

AOC	Media of Concern	Where	Proposed Remedial Actions or Engineering Control/Institutional Control In place	Status
Cogeneration and Praxair	Sediment	None	None	None
	Soil	SWMUs and misc samples	None	Investigation complete. Most of area covered with operating facilities and asphalt or concrete cover.
	Surface Water	Off-site to on-site stormwater	Under Investigation	Under Investigation
	Groundwater	None	DGW and CEA Permits, IWS	O&M under DGW permits
Pharmaceuticals/Miscellaneous	Soil	SWMUs and misc samples	None	Investigation complete. Most of area covered by parking lots or buildings.
	Surface Water - open drainage	Off-site to on-site stormwater	Under PCB Investigation	Under PCB Investigation with DRBC input
	Surface Water - piped drainage	B Ditch Clean Water from White Products area	Sediment in pipelines being removed and properly disposed	Expected Completion - July 2017
	Groundwater	Entire Area	DGW and CEA Permits, IWS	O&M under DGW permits
SWMU 40	Soil	All	None	Three fuel oil ASTs are idle, O&M maintenance of asphalt cover
	Groundwater	Entire area	DGW and CEA Permits, IWS, Existing slurry walls and sea wall minimizes shallow aquifer discharge to DE River.	O&M under DGW permits
SWMU 8	Soil	SWMUs and misc samples	Landfills A and B - will be closed following RCRA closure procedures. RCRA pad has cover. Existing cap/cover in place to protect workers. Some gravel areas may need additional cover.	Investigation complete
	Surface Water	None	None proposed	Investigation complete
	Groundwater	Entire Area	DGW and CEA Permits and IWS	O&M under DGW/CEA permits
WWTP	Soil	SWMUs and misc samples	Most of area covered by operation structures, concrete, parking lots, railroad, or buildings. Few gravel areas may need additional cover. Area operated under RCRA Part B permit.	No investigation has been conducted for the WWTP due to its status of a RCRA Part B permitted operating unit. Investigation complete for RFI SWMUs.
	Surface Water	Precipitation shallow pond	None proposed	Investigation complete
	Groundwater	Entire Area	DGW and CEA Permits and IWS	O&M under DGW/CEA permits

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Summary of AOC Status
PA/SI Report
Chemours Chambers Works
Deepwater, New Jersey**

AOC	Media of Concern	Where	Proposed Remedial Actions or Engineering Control/Institutional Control In place	Status
Power and Utilities/Administration	Soil	SWMUs and misc samples	Most of area covered by operation structures, concrete, parking lots or buildings. Few gravel areas may need additional cover	Investigation complete
	Groundwater	Entire Area	DGW and CEA Permits and IWS	O&M under DGW/CEA permits
Basins	Sediment	Basins A, B and C	Remediation complete under HSWA Administrative Consent Order	O&M under RCRA closure documentation
	Surface Water	Basin B	Not completed	Under Investigation
	Groundwater	Entire Area	DGW and CEA Permits and IWS	O&M under DGW/CEA permits
Groundwater under all AOCs/Site	Groundwater	Entire site	DGW and CEA Permits, IWS, Existing SPB, slurry walls and sea wall minimizes shallow aquifer discharge to DE River.	O&M under DGW/CEA permits SPB for AOC 1 to be completed 2017
AOCs 1-10	Soil	Entire AOC	Most of area covered by operation structures, concrete, parking lots or buildings. Few gravel areas may need additional cover.	Evaluation if cover is sufficient in process
AOC 11	Soil	Entire AOC	Most of area is covered with fill. Remediated	Remediated

NA- Not applicable

AOC - Area of Concern

DRBC - Delaware River Basin Commission

DGW - Discharge to Groundwater Permit
CEA - Classification Exemption Area

O&M - Operations and Maintenance

IWS - Interceptor Well System

MNR - Monitored Natural Recovery

MNA - Monitored Natural Attenuation

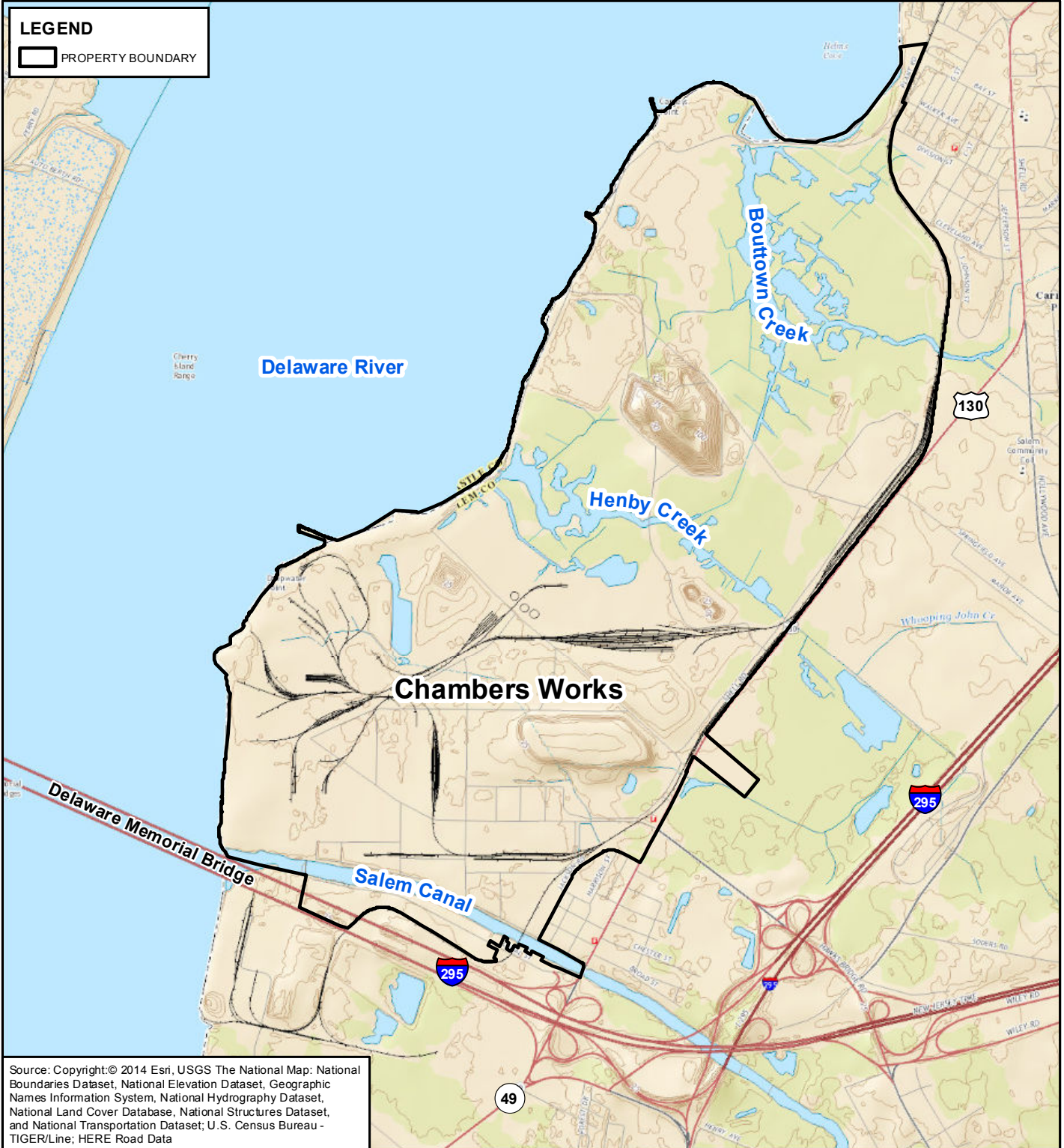
CMS - Corrective Measures Study

RCRA - Resource and Recovery Act

Figures

LEGEND

 PROPERTY BOUNDARY

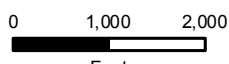
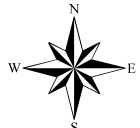


Source: Copyright:© 2014 Esri, USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; U.S. Census Bureau - TIGER/Line; HERE Road Data

M:\Projects\Dupont\Chambers_Works\GIS\Projects\6051718_1\Impervious_Surface\Fig1_Site_Loc_Map.mxd



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1 inch = 2,000 feet
 MAP FORMATTED FOR "A" (8.5" X 11") SIZE SHEET.
 TEXT SCALE NOT VALID FOR DIFFERENT PAGE SIZE.

SITE LOCATION MAP

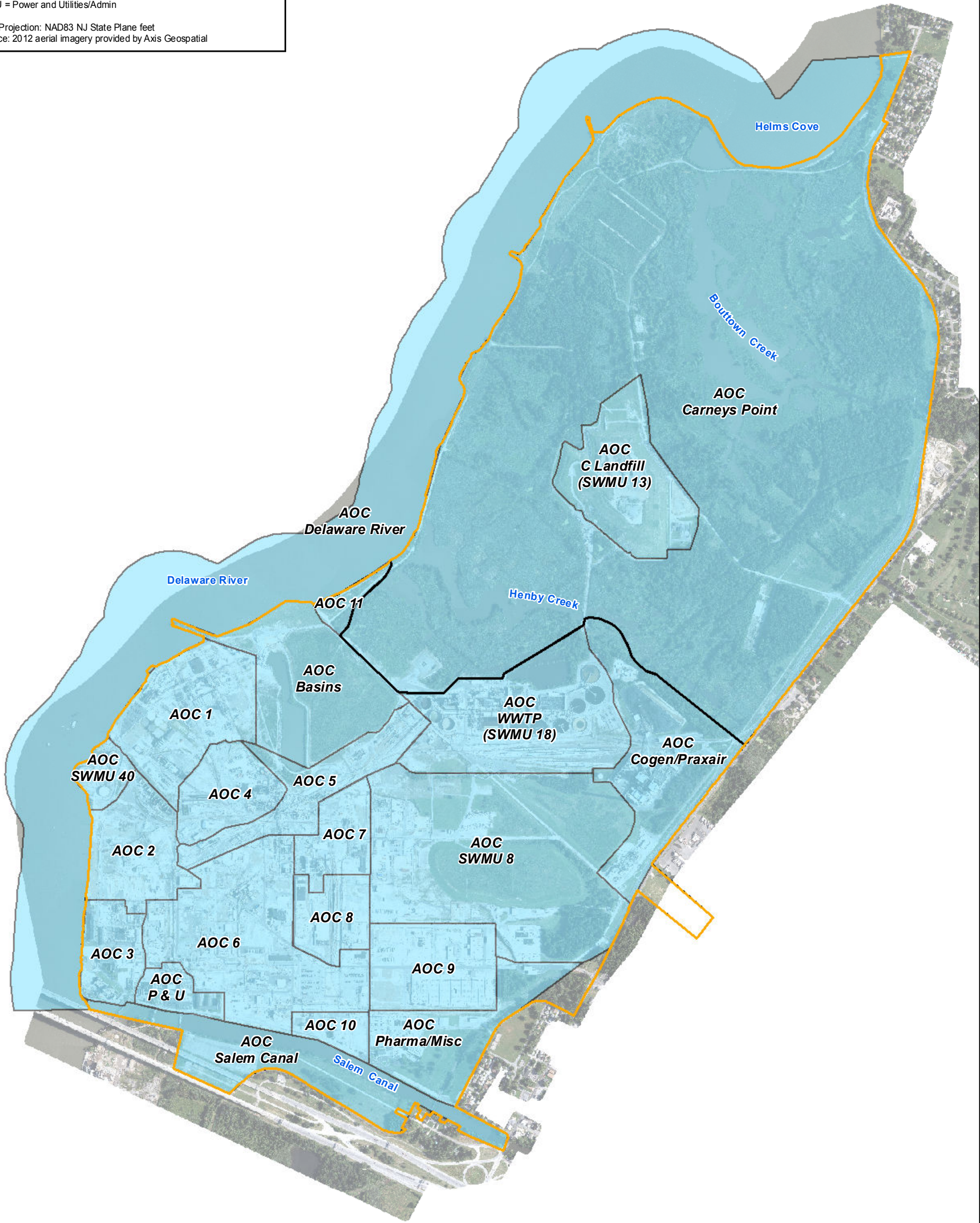
PA/SI
 CHEMOURS CHAMBERS WORKS COMPLEX
 DEEPWATER, NEW JERSEY

FILE NUMBER:	16001	PROJECT NUMBER:	60517181
DESIGNED BY:	M.LAYTON	DATE:	6/23/2017
DRAWN BY:	M.LAYTON	FIGURE NUMBER:	1
DATA QUALITY CHECK BY:	K.WEST		

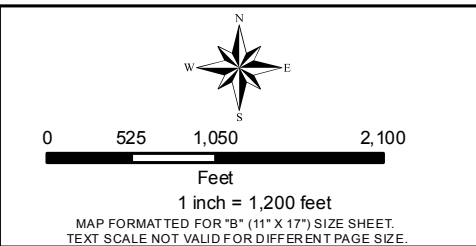
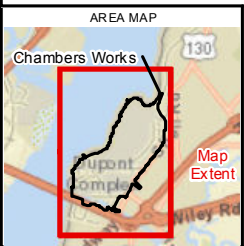
LEGEND

- PROPERTY BOUNDARY
- CARNEYS POINT/MANUFACTURING AREA BOUNDARY
- AOC AREA

Notes:
 CEA 1 - Groundwater Classified Exemption Area is for the whole complex
 Pharma/Misc = Pharmaceutical/Miscellaneous
 P & U = Power and Utilities/Admin
 Map Projection: NAD83 NJ State Plane feet
 Source: 2012 aerial imagery provided by Axis Geospatial



Path: Y:\Projects\Dupont\Chambers_Works\GIS\Projects\60517181_Impervious_Surface\Fig02_AOC_Locations_Site-Wide.mxd



TASK NUMBER:	16001
DESIGNED BY:	K.WEST
DRAWN BY:	M.LAYTON
DATA QUALITY CHECK BY:	S.NORCROSS

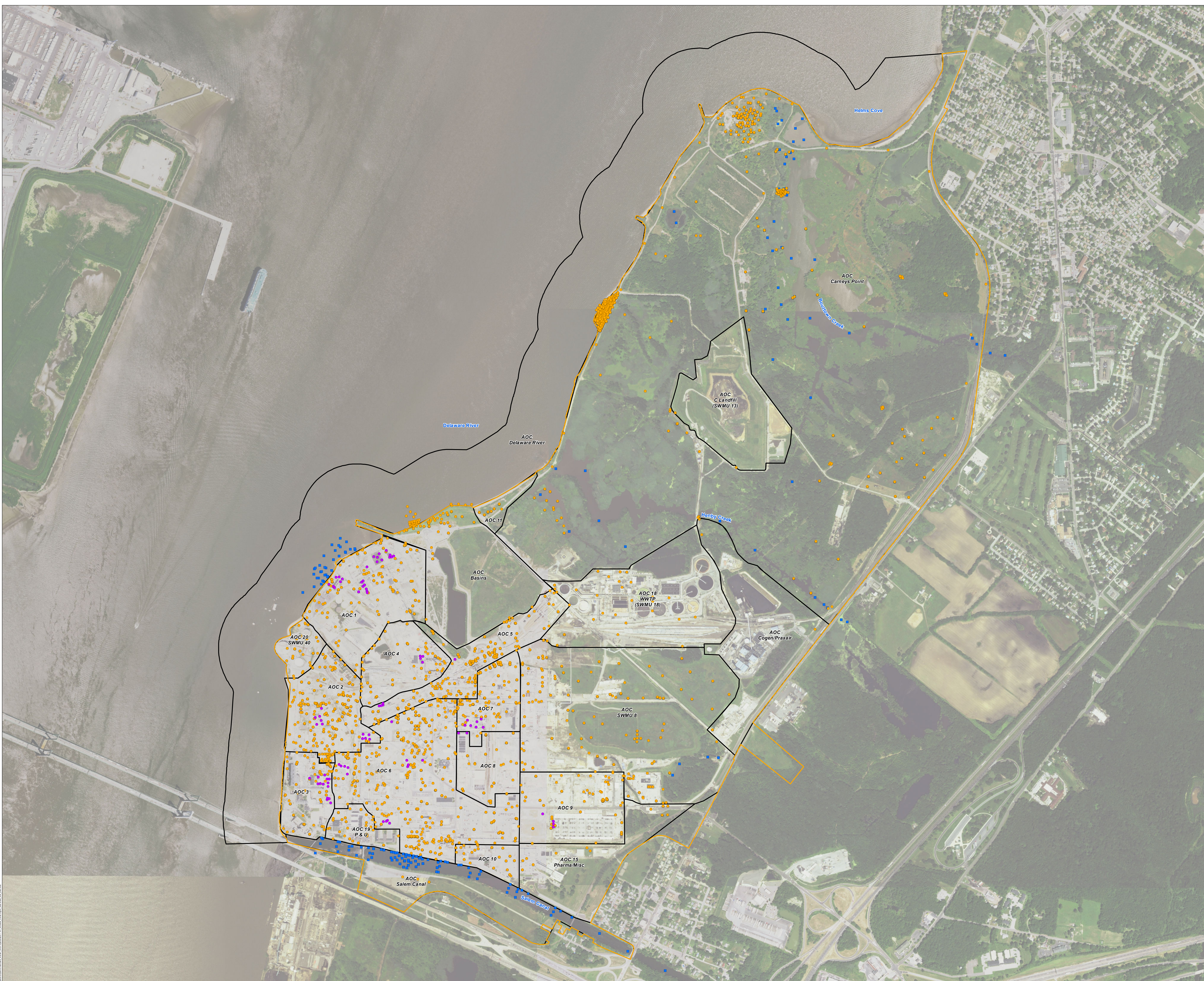
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**PA/SI
 AOC LOCATION MAP**

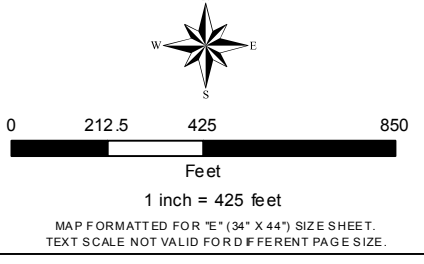
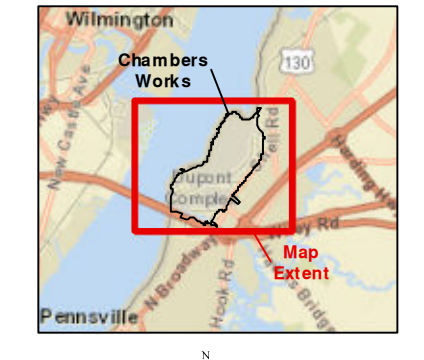
PA/SI
 CHEMOURS CHAMBERS WORKS COMPLEX
 DEEPWATER, NEW JERSEY

PROJECT NUMBER:	60517181
DATE:	6/23/2017
FIGURE NUMBER:	2



- LEGEND**
- SOIL SAMPLE LOCATION
 - SOIL GAS SAMPLE LOCATION
 - SEDIMENT SAMPLE LOCATION
 - ▭ PROPERTY BOUNDARY
 - ▭ AREA OF CONCERN

Note:
 No soil data is shown for the following:
 SWMU 12, 14, 15, 16, 22A, 26 through 29-R, 43,
 50 and any sediment or groundwater data for SWMU 1,
 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17,
 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 44, 45, 46, 47, 48, 49, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.



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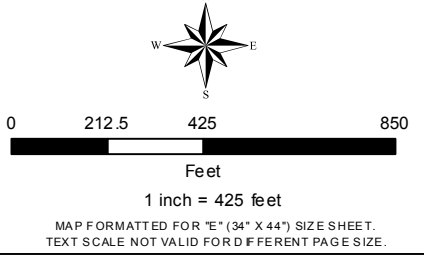
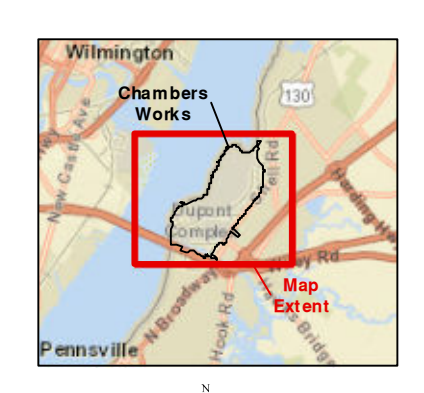
SOIL AND SEDIMENT LOCATION MAP

PMSI CHEMOURS CHAMBERS WORKS COMPLEX DEEPWATER, NEW JERSEY	
DRAW NUMBER: 16001	PROJECT NUMBER: 00517181
DRAWN BY: K.WEST	DATE: 02/27/2017
CHECKED BY: M.LAYTON	PLOTTED BY: S.NORCROSS
3	



- LEGEND**
- ◆ HYDROPUNCH LOCATION
 - ◆ ABANDONED WELL LOCATION
 - ◆ RECOVERY WELL
 - ◆ ACTIVE MONITORING WELL LOCATION
 - ◆ SURFACE WATER LOCATION
 - ▭ AREA OF CONCERN
 - ▭ PROPERTY BOUNDARY
 - AQUIFER DESIGNATION**
 - ◆ UNKNOWN AQUIFER
 - A AQUIFER
 - B AQUIFER
 - C AQUIFER
 - D AQUIFER
 - E AQUIFER
 - F AQUIFER

Note:
 Aerial Source: Esri, DigitalGlobe, GeoEye, Earthstar, GeoEye, IGN, AerGRID, USDA, CNR, ESRI, AEX, GeoEye, AeroGRID, IGN, Esri, Swire, etc.
 Map Projection: New Jersey State Plane Feet NAD83



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GROUNDWATER, SURFACE-WATER, AND POREWATER LOCATION MAP

PROJECT	PM/SI CHEMOURS CHAMBERS WORKS COMPLEX DEEPWATER, NEW JERSEY
DATE	02/26/2017
DESIGNED BY	K.WEST
DRAWN BY	M.LAYTON
CHECKED BY	S.NORCROSS
SCALE	4

Appendices

Appendix A
Reference Documents
on CDs

Appendix B

Case Inventory Table (CID)

Case Name: Chambers Works

PI #: 008221

IMPORTANT: 1) Do not delete or copy and paste across multiple columns because it can disrupt hidden equations.

2) If pasting from a Word document, use the Paste option: **Match Destination Formatting**

3) If the text turns **red** you have exceeded the character limit for that column

Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	AOC Description	Confirmed Contamination	AOC Status	Status Date	Incident #	DEP AOC Number	Contaminated Media	Contaminants of Concern	Additional Contaminants of Concern	Additional Contaminants of Concern
1	Environmental media - Media Soil, including soil vapor pore spaces	Fluoroproducts Area (46.6 acres) initially housed Plant 4 which manufactured picric acid. Upon closure, AOC 1 was divided into the former Alcohol Plant (south) currently vacant and the former Kinetic area (north) which produces fluoroproducts. Includes SWMUs 17/17A, 20, 26, 33, 34, 35, 39-3, 55-4, 56A and 59.	Yes	RI	10/1/2014			Mixed Media	VO + PAHs	Metals + PCBs	Other
2	Environmental media - Media Soil, including soil vapor pore spaces	TEL Area (32.4 acres) manufactured anti-knock fuel additives, mainly tetraethyl lead (TEL), tetramethyl lead (TML), trimethylethyl lead (TMEL), and sodium-lead alloy. Various lead-bearing wastes were managed here. Includes SWMUs 6, 17/17A, 25, 39-2, 56A and 57.	Yes	RI	10/1/2014			Mixed Media	VO + PAHs	Metals	Other
3	Environmental media - Media Soil, including soil vapor pore spaces	Jackson Labs Area (19 acres) consists of the Labs Area (Jackson Laboratory and the Technical Laboratory) and the Semi-Works area. Includes SWMUs 17/17A, 28, 39, 33 and 57.	Yes	RI	10/1/2014			Mixed Media	Metals + PAHs		
4	Environmental media - Media Soil, including soil vapor pore spaces	Aramids Area (23.4 acres) consists of the General Shops/Storage area, the Parking Lot/Aramids area, and one of the Manhattan Project buildings. Also contains bulk storage area where tankers/rail loaded/unloaded. Neoprene manufacture. Hylene production. Includes SWMUs 17/17A, 33, 39-6, 55-4 and 56A.	Yes	RI	10/1/2014			Mixed Media	Metals + PAHs		

Case Name: Chambers Works

PI #: 008221

Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	Applicable Remediation Standard	Exposure Route	Additional Exposure Route	RA Type	Additional RA Type	Additional RA Type	Was an Order of Magnitude Evaluation Conducted?	Activity
1	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ground Water	Ingestion/Dermal	Physical or hydraulic containment (barrier wall, French drain, slurry wall, wells, trenches)	Pump & Treat	Institutional Control		Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area perimeter and interior investigations (2011 and 2013) indicate that the soil investigation for AOC 1 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. AOC 1 remedial actions were completed at SWMUs 17, 39-3, and 56A. Refer to the Comprehensive RFI Report for specific details. Probable and potential DNAPL source zones were identified for the B aquifer, and a relatively small potential DNAPL source zone was identified for the C aquifer. Analyses of two DNAPL samples collected at locations within AOC 1 indicate that the highest mass fraction of the samples consisted of chlorinated fluorocarbons, chlorinated benzenes, and BTEX. Groundwater is discussed in the Sitewide Groundwater AOC section.
2	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ground Water	Ingestion/Dermal	Physical or hydraulic containment (barrier wall, French drain, slurry wall, wells, trenches)	Pump & Treat	Institutional Control		Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area perimeter and interior investigations (2011 and 2013) indicate that the soil investigation for AOC 2 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. AOC 2 remedial actions were completed for the C Ditch Process Water Ditch System and SWMUs 17, 25, 39-2, and 57. Refer to the Comprehensive RFI Report for specific details. Probable and potential DNAPL source zones were identified for the B aquifer. Analyses of two DNAPL samples indicate that the highest mass fraction of the samples consisted of chlorinated benzenes, chlorinated ethanes, organo lead and chlorinated fluorocarbons. No potential DNAPL source zones were identified for the C aquifer. Groundwater is discussed in the Sitewide Groundwater AOC section.
3	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ground Water		Physical or hydraulic containment (barrier wall, French drain, slurry wall, wells, trenches)	Pump & Treat	Institutional Control		Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area perimeter and interior investigations (2011 and 2013) indicate that the soil investigation for AOC 3 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. Remedial actions were completed at SWMU 17. Refer to the Comprehensive RFI Report for specific details. In the northeastern portion of AOC 3, probable and potential DNAPL source zones were identified for the B aquifer. No potential DNAPL source zones were identified for the C aquifer. Groundwater is discussed in the Sitewide Groundwater AOC section.
4	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ground Water	Ingestion/Dermal	Pump & Treat	Institutional Control			Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area interior investigation (2013) indicate that the soil investigation for AOC 4 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. AOC 4 remedial actions were completed at SWMUs 17, 39-6, and 56A. Refer to the Comprehensive RFI Report for specific details. Probable and potential DNAPL source zones were identified for the B aquifer. No potential DNAPL source zones were identified for the C aquifer. Groundwater is discussed in the Sitewide Groundwater AOC section.

Case Name: Chambers Works

PI #: 008221

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3) If the text turns **red** you have exceeded the character limit for that column

Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	AOC Description	Confirmed Contamination	AOC Status	Status Date	Incident #	DEP AOC Number	Contaminated Media	Contaminants of Concern	Additional Contaminants of Concern	Additional Contaminants of Concern
5	Environmental media - Media Soil, including soil vapor pore spaces	Historical Basin Footprint and Ditches (32 acres) including a portion of the Aramids Area parking lot and the Triangle Engineering and Bulk Storage. Includes SWMUs 17/17A, 18, 18A, 27, 55-1, 55-3, 56, 56A and 58	Yes	RI	10/1/2014			Mixed Media	VO + BN	Metals + PAHs	
6	Environmental media - Media Soil, including soil vapor pore spaces	Dyes Area (39 acres) consists of Triangle Intermediates, Engineering QC Laboratory and Offices, Basic Colors and Sulfur Colors Areas, Sulfuric Acid Plant, Former Indigo Heavy Chemicals Area, Naphthalene Intermediate Area, Azo Colors Area, Ponsol Colors Number 1 Area and Ponsol Colors #2 Building . Includes SWMUs 9, 10, 17/17A, 38, 41-3, 41-6, 41-7, 41-8, 56A, 62, and 63.	Yes	RI	10/1/2014			Mixed Media	VO + BN	Metals + PAHs	
7	Environmental media - Media Soil, including soil vapor pore spaces	Elastomers (18.4 acres) produced several different products based on polymer chemistry. Isocyanate chemistry was completed here by use of the reaction of isocyanates with active hydrogen compounds and polymeric materials. Includes SWMUs 17/17A, 30, 56 and 56A.	Yes	RI	10/1/2014			Mixed Media	VO + BN	Metals + PAHs	
8	Environmental media - Media Soil, including soil vapor pore spaces	Warehouse, Transport and Construction (18.8 acres) consists of the former warehouse, storage areas, construction area and railroad spur which historically was an area for storage and shipping of intermediate compounds, finished products, and drums. Includes SWMUs 11 and 17/17A.	Yes	RI	10/1/2014			Mixed Media	VO + PAHs	Metals	

Case Name: Chambers Works

PI #: 008221

Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	Applicable Remediation Standard	Exposure Route	Additional Exposure Route	RA Type	Additional RA Type	Additional RA Type	Was an Order of Magnitude Evaluation Conducted?	Activity
5	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ground Water	Ingestion/Dermal	Hot spot removal	Pump & Treat	Institutional Control		Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area interior investigation (2013) indicate that the soil investigation for AOC 5 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. AOC 5 remedial actions were completed at SWMUs SWMUs 12, 17, 56A, and 56. Refer to the Comprehensive RFI Report for specific details. Probable and potential DNAPL source zones were identified for the B aquifer. Analyses of two DNAPL samples collected at locations within AOC 5 indicate that the highest mass fraction of the samples consisted of chlorinated benzenes, nitroaromatics, BTEX, and organo lead. No potential DNAPL source zones were identified for the C aquifer. Groundwater is discussed in the Sitewide Groundwater AOC section.
6	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ground Water	Ingestion/Dermal	Pump & Treat	Institutional Control			Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area interior and focused triangle area investigations (2013) indicate that the soil investigation for AOC 6 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. AOC 6 remedial actions were completed at SWMUs 17 and 56A. Refer to the Comprehensive RFI Report for specific details. Probable and potential DNAPL source zones were identified for the B aquifer, and two relatively small potential DNAPL source zones were identified for the C aquifer. Analyses of six DNAPL samples collected at locations within AOC 6 indicate that the highest mass fraction of the samples consisted of chlorinated benzenes, nitroaromatics, and PAHs. Groundwater is discussed in the Sitewide Groundwater AOC section.
7	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ground Water	Ingestion/Dermal	Pump & Treat	Institutional Control			Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area interior investigation (2013) indicate that the soil investigation for AOC 7 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. AOC 7 remedial actions were completed at SWMUs 17, 56 and 56A. Refer to the Comprehensive RFI Report for specific details. Probable and potential DNAPL source zones were identified for the B aquifer. No potential DNAPL source zones were identified for the C aquifer. Groundwater is discussed in the Sitewide Groundwater AOC section.
8	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ground Water	Ingestion/Dermal	Pump & Treat	Institutional Control			Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area interior investigation (2013) indicate that the soil investigation for AOC 8 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. AOC 8 remedial actions were completed at SWMUs 11 and 17. Refer to the Comprehensive RFI Report for specific details. Probable and potential DNAPL source zones were identified for the B aquifer, and a relatively small potential DNAPL source zone was identified for the C aquifer. Groundwater is discussed in the Sitewide Groundwater AOC section.

Case Name: Chambers Works

PI #: 008221

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Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	AOC Description	Confirmed Contamination	AOC Status	Status Date	Incident #	DEP AOC Number	Contaminated Media	Contaminants of Concern	Additional Contaminants of Concern	Additional Contaminants of Concern
9	Environmental media - Media Soil, including soil vapor pore spaces	Monastral (35.2 acres) consists of the Manhattan Project-related buildings, the Consolidated Warehouse Building, and the Monastral Area related buildings. Includes SWMUs 17/17A, 33, 39-1, 41-1, 41-2, 41-4, 55-5 and 56A	Yes	RI	10/1/2014			Mixed Media	VO + PAHs		
10	Environmental media - Media Soil, including soil vapor pore spaces	White Products (8.7 acres) was used to produce synthetic camphor beginning in 1917 and continued through 1959. Includes SWMUS 38, 41-5, 17/17A and 56A.	Yes	RI	10/1/2014			Mixed Media	PAHs		
11	Environmental media - Media Soil, including soil vapor pore spaces	Former Drainage Ditch (5.5 acres) is located along the Delaware River north of the Basins. AOC 11 includes two former drainage ditches and an outfall. The drainage ditch located along the river was used pre- 1940 through 1962, after which it was filled in. The second drainage area discharged to Henby Creek from pre-1940 until it was filled in by 1946. There were no manufacturing activities associated with AOC 11. Includes SWMU 60.	Yes	RI	10/1/2014			Mixed Media	PAHs		

Case Name: Chambers Works

PI #: 008221

Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	Applicable Remediation Standard	Exposure Route	Additional Exposure Route	RA Type	Additional RA Type	Additional RA Type	Was an Order of Magnitude Evaluation Conducted?	Activity
9	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ingestion/Dermal	Inhalation	Pump & Treat	Institutional Control			Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area interior investigation (2013) indicate that the soil investigation for AOC 9 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. AOC 9 remedial actions were completed at SWMUs 17, 39-1 and 56A. Refer to the Comprehensive RFI Report for specific details. Probable and potential DNAPL source zones were identified for the B aquifer. Analyses of one DNAPL sample collected at locations within AOC 9 indicate that the highest mass fraction of the sample consisted chlorinated benzenes and nitroaromatics. No potential DNAPL source zones were identified for the C aquifer. Groundwater is discussed in the Sitewide Groundwater AOC section.
10	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ground Water	Ingestion/Dermal	Pump & Treat	Institutional Control			Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area perimeter and interior investigations (2011 and 2013) indicate that the soil investigation for AOC 10 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. A potential DNAPL source zone was identified for the B aquifer. No potential DNAPL source zones were identified for the C aquifer. Groundwater is discussed in the Sitewide Groundwater AOC section.
11	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ingestion/Dermal		Pump & Treat	Institutional Control			Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area perimeter investigation (2011) indicate that the soil investigation for AOC 11 is complete. No further investigation for soil. Institutional controls are in place. No probable or potential DNAPL source zones were identified for the B aquifer. Groundwater is discussed in the Sitewide Groundwater AOC section.

Case Name: Chambers Works

PI #: 008221

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Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	AOC Description	Confirmed Contamination	AOC Status	Status Date	Incident #	DEP AOC Number	Contaminated Media	Contaminants of Concern	Additional Contaminants of Concern	Additional Contaminants of Concern
Sitewide Groundwater	Environmental media - Media Ground water	Five water-bearing units and four intervening aquitards are defined as part of the groundwater conceptual model at the Chambers Works Complex. These units are designated as the A zone and the B, C, D, and E aquifers in order of increasing depth. The aquitards are designated as the A/B, B/C, C/D, and D/E in order of increasing depth.	Yes	RI	10/1/2014			Ground Water	VO + BN	Metals + PAHs	Other
Delaware River	Environmental media - Media Surface water	AOC Delaware River (345 acres) forms the western property boundary of the site and includes the high water tidal area (beach areas or sea wall) to 800 feet off shore of the site property line. The Delaware River is generally an oligohaline environment (transitional zone between the tidal freshwater and estuarine environments) and is classified as Zone 5. The Delaware River has been influenced by historical and current industrialization. Zone 5 is not classified as a drinking water supply.	Yes	RI	4/1/2017			Mixed Media	VO + BN	PAHs	Other

Case Name: Chambers Works

PI #: 008221

Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	Applicable Remediation Standard	Exposure Route	Additional Exposure Route	RA Type	Additional RA Type	Additional RA Type	Was an Order of Magnitude Evaluation Conducted?	Activity
Sitewide Groundwater	Environmental media - Media Ground water	Remediation Standards	Ground Water		Physical or hydraulic containment (barrier wall, French drain, slurry wall, wells, trenches)	Pump & Treat	Institutional Control		Groundwater at Chambers Works is addressed on a site-wide basis (as opposed to SWMU by SWMU or AOC) and is centered around a pump and treat system (average pumping of 1,000,000 gallons/day), referred to as the Interceptor Well System (IWS), a corrective action program for Area 1 of the Secure C landfill, and E aquifer at well J05-W01E. The Interceptor Well System is used to control groundwater from migrating off-site from the B, C, and D aquifers and includes recovery wells designated as K06-R02CD, R09-R02C, M14-R02CD, Q13-R01C, Q13-R01D, G08-R01C, and G08-M01D. Groundwater flow in the E aquifer is influenced by pumping recovery well J05-W01E and well water supply R15-W01E. A semiannual report is generated and sent to the NJDEP that documents the operation, maintenance, system status, and groundwater monitoring data related to the IWS in compliance with NJPDES Permits NJ0083429 and NJ0105872. A NJDEP Classification Exception Area (CEA) in accordance with N.J.A.C.7:9C-1.6 for groundwater has been established to provide public notice that the constituent standards for a given aquifer classification (Class II A drinking water) are not being met due to anthropogenic influences. Chambers Works CEA 1 encompasses the entire site (Pennsville and Carneys Point) from ground surface to 200 feet below surface. A Chambers Works Classification Exception Area Biennial Certification Report was submitted in 2016. A CEA/Well Restriction Area (WRA) Permit Fact Sheet was also submitted. In addition, B aquifer exceedances along the perimeter are being addressed by installation of an SPB. Interior portions of the B aquifer and the C and D aquifers are captured by the IWS. Groundwater in the E aquifer is contained by the E aquifer recovery well system. These systems prevent off-site groundwater migration. Additionally, groundwater containment and quality are monitored by several programs as reported in semi-annual DGW reports. Groundwater will be addressed as part of manufacturing area-wide CMS.
Delaware River	Environmental media - Media Surface water	Remediation Standards	Ingestion/Dermal		Physical or hydraulic containment (barrier wall, French drain, slurry wall, wells, trenches)	Pump & Treat	Institutional Control		Off-shore sediment and surface water was investigated as part of the Delaware River RIR (2011). No further ecological investigations were recommended until the attainment of hydraulic control at the site perimeter was achieved. In 2016, a supplemental phase of delineation investigation was completed off-shore of AOC 1 from beneath the Delaware River. Based on the results of the two follow-on investigations it was concluded that DNAPL is present about 150 feet off-shore in the B Aquifer beneath the Delaware River off-shore of southern portion of AOC1. No evidence of pooled DNAPL was observed, however in the area off-shore of AOC 1 DNAPL containing constituents consistent with the site are believed to be present at the base of the B Aquifer beneath the Delaware River. Shallow sediment samples indicated potential NAPL in small, disconnected patches that maybe related to former outfalls and shipping activities. Further data-gap investigations are proposed prior to selection of remedial actions. 2016 Delaware River NAPL Delineation Report (AECOM 4/11/2017)

Case Name: Chambers Works

PI #: 008221

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Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	AOC Description	Confirmed Contamination	AOC Status	Status Date	Incident #	DEP AOC Number	Contaminated Media	Contaminants of Concern	Additional Contaminants of Concern	Additional Contaminants of Concern
Salem Canal	Drainage system and area - Surface water body	The Salem Canal is a manmade canal which traverses the southern boundary of the site for 2,000 feet (200 feet wide). In August 2002, during a drought, a magenta-colored water was observed seeping from a 100-foot length of the northern bank of the Salem Canal into the surface water. DuPont notified the NJDEP Hotline.	Yes	RI	2/21/2017			Mixed Media	VO + PAHs		
Carneys Point	Environmental media - Media Soil, including soil vapor pore spaces	AOC Carneys Point (720 acres) was the former Carneys Point Works that produced nitrocellulose and smokeless gunpowder from 1892-1979. The materials involved in production included ether, amines, plasticizers, nitrotoluenes, nitroglycerin salts, nitric acid, and sulfuric acid. Off-quality nitrocellulose was the primary waste from the area. Includes SWMUs 19, 37, 42, 44, 53, 45-1 through 45-9, 46, 47, 48-1 through 48-7, 49, 52, 54, 60 and 61.	Yes	RI	10/1/2014			Mixed Media	Metals + PAHs	PCBs	
Secure C Landfill	Discharge and disposal area - Landfill	AOC Secure C Landfill (32 acres currently consisting of seven areas) was designed to accept hazardous chemical and solid wastes generated at the Chambers Works Plant, as well as, some DuPont offsite wastes. Wastes included wastewater treatment plant (WWTP) sludge, contaminated equipment and materials, and bulk chemical wastes.	Yes	RAW	11/15/2014			Ground Water	VO + BN	Metals	
Cogen and Praxair	Environmental media - Media Soil, including soil vapor pore spaces	This AOC (58.2 acres) was used prior to 1919 as the Carneys Point Works Plant 2 producing nitrocellulose and smokeless gunpowder. Area was inactive 1920-1974. In 1974, the Explosion Hazards Lab was built for R&D. In 1990, a 262-MW pulverized coal fired Cogeneration facility was constructed to produce electricity and steam for the site. The Praxair facility converts natural gas to carbon monoxide and hydrogen which is supplied to the phosgene operation. Includes SWMUs 32A, 32B, 42, 50 and 54.	Yes	PA/SI	12/22/2006			Mixed Media	BN	Other	

Case Name: Chambers Works

PI #: 008221

Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	Applicable Remediation Standard	Exposure Route	Additional Exposure Route	RA Type	Additional RA Type	Additional RA Type	Was an Order of Magnitude Evaluation Conducted?	Activity
Salem Canal	Drainage system and area - Surface water body	Remediation Standards	Ingestion/Dermal		Physical or hydraulic containment (barrier wall, French drain, slurry wall, wells, trenches)	Pump & Treat	Other (specify in Activity column)		Numerous investigations to characterize the nature and extent of the release to impacted media and evaluate and select potential remedial actions have been completed. In addition to the IWS and SPB installed as an IRA to prevent the migration of impacted groundwater into and underneath the Salem Canal for Salem Canal, remedial actions selected for the Salem Canal seep area include monitored natural recovery for the sediments and monitored natural attenuation for the groundwater south of the SPB. Groundwater will be monitored in the area under the existing and on-going DGW activities. Salem Canal Investigation Summary Report (AECOM and EHS Support 2/21/2017)
Carneys Point	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards	Ingestion/Dermal	Overland Flow & Surface Water	Ecological Risk Assessment	Institutional Control	Other (specify in Activity column)		Numerous investigations have been completed to characterize Carneys Point as summarized in the PAR and 2014 RFI. Remedial actions have been completed at the proposed D Landfill (completed prior to 2006) and SWMU 52 (Debris Disposal Area – ISRM was completed in 2006). A voluntary remedial action (under TSCA rules) which included soil removal was completed in the T29 area adjacent to Bouttown Creek in 2013. Groundwater will be monitored in the area under the existing and on-going DGW activities.
Secure C Landfill	Discharge and disposal area - Landfill	Remediation Standards	Ground Water		Capping	Pump & Treat	Institutional Control		C Landfill AOC groundwater is monitored and reported as part of the on-going New Jersey Pollution Discharge Elimination System – Discharge to Groundwater (NJPDES-DGW) permit. A Classified Exemption Area (CEA) for groundwater is in place for all of the C Landfill AOC. Evaluation of the Detection Monitoring Program and the Leachate Collection Monitoring Program is conducted in accordance with the Groundwater Protection Plan (GWPP). Groundwater quality data and elevation contour maps are produced semi-annually as part of the semi-annual DGW reporting and based on evident contoured capture zone in the groundwater containment system is effective for the C Landfill. A Deed Notice was recorded for SWMU 13 (Cell 1 of the Secure C Landfill) on 8/15/2002. A No Further Action Approval and Covenant Not to Sue Letter was dated 10/21/2002. Postclosure inspections continue in conjunction with required permit inspections.
Cogen and Praxair	Environmental media - Media Soil, including soil vapor pore spaces	Remediation Standards			Hot spot removal				No areas of interest were noted in the 2006 PAR for these currently operating facilities: Cogen, Praxair and EHL. SWMU 32 A was investigated in June 1990 and January 1991 prior to the construction of the Cogen facility to confirm that complete removal of explosive material had occurred in 1920. Soil excavation was necessary in SWMU 32 area so as to prepare for construction of the Cogen facility. SWMU 50 contained rubble associated with the demolition of the former Carneys Point Works powder house. The area was discovered during test pit activities as part of the Cogen facility construction. The open foundation was filled with rubble, including piping and equipment covered with asbestos. Asbestos was the only constituent associated with this area. The debris and asbestos were removed and a letter dated March 25, 1993 the EPA agreed to no further action for SWMU 50

Case Name: Chambers Works

PI #: 008221

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Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	AOC Description	Confirmed Contamination	AOC Status	Status Date	Incident #	DEP AOC Number	Contaminated Media	Contaminants of Concern	Additional Contaminants of Concern	Additional Contaminants of Concern
Pharma/Peder son/Misc	Other areas of concern - Any area suspected of containing contaminants	AOC Pharma-Misc (37.4 acres) was a residential community (purchased by DuPont prior to 1915) The area remained vacant until 1942 when the Caer Building, the Salem Canal guard house and three parking lots were constructed. Up until 1970, only parking and site security existed. In 1990, DuPont constructed a pharma R&D facility (eight primary buildings/several supporting structures) used to investigate intermediates and perform pilot-scale testing until 2001. Includes SWMU 17/17A.	Yes	PA/SI	12/22/2006			Mixed Media	PCBs	BN	
SWMU 40	Storage tank and appurtenance - Above ground storage tank	AOC SWMU 40 (8.4 acres) is the area where three No. 6 fuel oil aboveground storage tanks are located near the wharf adjacent to the Delaware River. The tanks are designated TS-1, TS-2, and TS-3, and are approximately 2.37 million gallons (MG), 2.15 MG, and 9.17 MG in size, respectively. The tanks were last used to store No. 6 fuel oil for the Atlantic Electric Power Plant.	Yes	RI	10/1/2014			Soil	PAHs	TPHC	
SWMU 8	Discharge and disposal area - Landfill	AOC SWMU 8 is Landfill IV (140 acres) that was the primary disposal site for wastes generated from the various Chambers Works operating areas from 1940 to 1975. Includes SWMUs 1, 2, 3, 4, 7, 17, 20, 21, 22, 23,24, 30, 33, 39-4/39-7, 55-2, 55-5, 55-6 and 56A.	Yes	RI	10/1/2014			Mixed Media	VO + BN	Metals + PAHs	

Case Name: Chambers Works

PI #: 008221

Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	Applicable Remediation Standard	Exposure Route	Additional Exposure Route	RA Type	Additional RA Type	Additional RA Type	Was an Order of Magnitude Evaluation Conducted?	Activity
Pharma/Peder son/Misc	Other areas of concern - Any area suspected of containing contaminants	Remediation Standards	Overland Flow & Surface Water		Pump & Treat	Institutional Control			There were no historical operations in the this AOC. The only operations of significance in the area were related to the Pharmaceuticals R&D facility that was constructed in 1990. Process information for the Pharmaceuticals facility was evaluated in 2001 and again in 2003 to identify potential areas for environmental concern as part of the ASTM ESA process required for property transactions. These recent reports indicate no areas for additional investigation. In compliance with the NJPDES DGW Permit No. NJ0083429, groundwater quality at site perimeter wells is monitored. Groundwater is discussed in the Sitewide Groundwater AOC section. A study of potential sources of PCBs entering the site via surface waters by way of the B Ditch was initiated in 2015 as part of the PCB Pollution Minimization Plan (PMP) with an objective to see if there were any PCB sources not otherwise identified with the potential use to help plan for further PCBs reduction of water discharges to the Delaware River. Additional samples were collected in 2016 and the data is still under evaluation and will be reported in future PCB PMP reports.
SWMU 40	Storage tank and appurtenance - Above ground storage tank	Remediation Standards	Ingestion/Dermal		Physical or hydraulic containment (barrier wall, French drain, slurry wall, wells, trenches)	Pump & Treat	Institutional Control		Tanks TS-1 and TS-2 are surrounded by an asphalt- covered dike containment structure for spill control. Tank TS-3 is surrounded by a separate asphalt-covered dike containment structure. The tanks are currently empty (except for heels) and reserved for future service. The extent of SWMU-related constituents has been delineated by the Phase II RFI samples. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. Groundwater is discussed in the Sitewide Groundwater AOC section.
SWMU 8	Discharge and disposal area - Landfill	Remediation Standards	Ingestion/Dermal	Overland Flow & Surface Water	Pump & Treat	Capping	Other (specify in Activity column)		Soil sampling performed during the RFI phases and RI phases for SWMU 8 as well as soil investigations associated with the manufacturing area interior (2011) indicate that the soil investigation for SWMU 8 is complete. No further investigation for soil. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. Extensive investigations as part of the SWMU 8 RI (CRG, 2005) show that the landfill units are stable and do not contain intact drums. The nature of the fill material in SWMU 8 (including the physical and chemical properties of the fill) and the detected constituents are consistent with past disposal practices. Soil sampling performed below the water table was completed as CMS activities [SWMU 8 Treatability Study (2010)] to characterize sources to groundwater below the water table. Sampling beneath SWMU 8 was included in the Interior and RFI Data Gap Investigations (2013 and 2014). Probable and potential DNAPL source zones were identified for the B aquifer. Analyses of two DNAPL samples collected at locations in the B aquifer within the Northwestern Fill Area of SWMU 8 indicate that the highest mass fraction of the samples consisted of nitroaromatics, chlorinated benzenes, and BTEX. Two relatively small probable and potential DNAPL source zones located in the Northwestern Fill Area of SWMU 8 were also identified in the C aquifer. Groundwater is discussed in the Sitewide Groundwater AOC section.

Case Name: Chambers Works

PI #: 008221

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Case Inventory Document Version 1.4 02/23/17

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WWTP	Discharge and disposal area - Waste water treatment systems/septic/seepage pit/dry well	WWTP AOC (70 acres) consists mainly of the WWTP that has been operating since 1975 accepting a wide range of liquid hazardous and nonhazardous wastes. The wastes accepted generally have low pH and high TDS concentrations. The WWTP is a RCRA Part B permitted operating unit. Includes SWMUs 12, 17/17A, 18, 18A, 39-8, 55-1 and 55-2.	Yes	PA/SI	12/22/2006			Mixed Media	VO + BN	Metals + PAHs	
Basins	Discharge and disposal area - Historic fill material area/other fill area	AOC Basins (56 acres) includes SWMUs 14, 15 and 16. SWMU 14 received process water and storm water overflow and later provided equalization and settling before treatment in the WWTP. SWMU 15 provided settling and cooling of noncontact cooling water prior to discharge into the Delaware River. SWMU 16 operated as a tertiary treatment surface impoundment to separate solids from a dilute wastewater stream generated during TEL production.	Yes	NFA-A DEP Issued (Restricted Use)	10/21/2002			Mixed Media	VO + BN	Metals + PAHs	
Power and Utilities (P&U)/Admin	Other areas of concern - Any area suspected of containing contaminants	The P&U buildings supplied electricity, steam, potable water, ice and compressed air to the Dye Works. In 1933 a water filtration plant was constructed. The current operations at the Powerhouse include distribution of steam and potable water to the site in addition to producing and distributing compressed air. The Administration building built in 1929 is no longer used as of 2009. This AOC covers 10 acres. Includes SWMUs 31 and 51.	Yes	PA/SI	12/22/2006			Ground Water	Metals + PAHs		

Case Name: Chambers Works

PI #: 008221

Case Inventory Document Version 1.4 02/23/17

AOC ID	AOC Type	Applicable Remediation Standard	Exposure Route	Additional Exposure Route	RA Type	Additional RA Type	Additional RA Type	Was an Order of Magnitude Evaluation Conducted?	Activity
WWTP	Discharge and disposal area - Waste water treatment systems/septic/seepage pit/dry well	Remediation Standards	Ground Water		Pump & Treat	Institutional Control			The WWTP is RCRA exempt as a wastewater treatment area, it is regulated under the NJPDES discharge permit. No investigation has been conducted for the WWTP. Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area interior investigation (2013) indicate that the soil investigation for SWMUs is complete. No further investigation for soil for SWMUs. Institutional controls are in place. Existing cover prevents workers from direct contact exposure. Groundwater is discussed in the Sitewide Groundwater AOC section.
Basins	Discharge and disposal area - Historic fill material area/other fill area	Soil Cleanup Criteria (MUST have RAW approved for AOC prior to 12/2/2008)			Stabilization	Capping	Pump & Treat		Remedial action was completed. A Deed Notice was recorded which included SWMUs 14, 15 and 16 on 8/15/2002. A No Further Action Approval and Covenant Not to Sue Letter was dated 10/21/2002. Postclosure quarterly inspections continue. Groundwater quality is monitored by several programs as reported in semi-annual DGW reports. Groundwater is discussed in the Sitewide Groundwater AOC section.
Power and Utilities (P&U)/Admin	Other areas of concern - Any area suspected of containing contaminants	Remediation Standards	Ground Water		Pump & Treat	Institutional Control			Soil sampling performed during the RFI phases for SWMUs as well as soil investigations associated with the manufacturing area perimeter investigation (2011) indicate that the soil investigation for P&U/Admin is complete. No further investigation for soil. Institutional controls are in place. Groundwater is discussed in the Sitewide Groundwater AOC section.