UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION III

STATEMENT OF BASIS

FAREVA RICHMOND INCORPORATED
(FORMERLY: WYETH CONSUMER HEALTHCARE, A WHOLLY OWNED SUBSIDIARY OF PFIZER, INC.)
2248 & 2300 DARBYTOWN ROAD

RICHMOND, VIRGINIA

EPA ID NO. VAD188141626

Prepared by
RCRA Corrective Action #1
Land Chemicals and Redevelopment Division
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List of Acronyms

1122 TCA	1,1,2,2-Tetrachloroethane
AOC	Area of Concern
AR	Administrative Record
Bgs	Below ground surface
CARO	Corrective Action Remedial Objectives
COC	Constituents of Concern
DCE	Dichloroethene
EPA	Environmental Protection Agency
FDRTC	Final Decision & Response to Comments
GPRA	Government Performance and Results Act
MCL	Maximum Contaminant Level
PAH	Polyaromatic Hydrocarbon Compound
PCE	Perchloroethylene or Tetrachloroethylene
RCRA	Resource Conservation and Recovery Act
RFI/CMS	RCRA Facility Investigation/Corrective Measure Study
RSL	Risk-Based Screening Levels in the EPA Regional Screening Level Table
SB	Statement of Basis
SVOC	Semi-Volatile Organic Compound
SWMU	Solid Waste Management Unit
TIC	Tentatively Identified Compound
TCE	Trichlorethylene
UCL	Upper confidence limit
ug/l	Microgram per liter
VADEQ	Virginia Department of Environmental Quality
VOC	Volatile Organic Compound
WWTP	Waste-Water Treatment Plant

Section 1: Introduction

The United States Environmental Protection Agency (EPA) has prepared this Statement of Basis (SB) to solicit public comment on its proposed remedy for the Fareva Richmond Incorporated Facility located in Richmond, Virginia (hereinafter referred to as the Facility or Site). EPA's proposed remedy for the Facility consists of the following five components:

a. Monitored natural attenuation until groundwater remedial objectives are met;
b. Compliance with a plan, approved by EPA and/or the Virginia Department of Environmental Quality (VADEQ), to manage contaminated soil and groundwater to prevent unacceptable risk (Environmental Media Management Plan) within the areas designated by EPA (EPA-designated Areas);
c. Compliance with an EPA and/or VADEQ approved groundwater monitoring program (Groundwater Monitoring Program) until it is shown that the groundwater remedial objectives have been met and will continue to be met and EPA and/or VADEQ approve in writing the termination of the Groundwater Monitoring Program;
d. Compliance with and maintenance of groundwater and land use restrictions to be implemented through institutional controls; and
e. Compliance with notification requirements.

This SB highlights key information relied upon by EPA in proposing its remedy for the Facility.

The Facility is subject to EPA's Corrective Action Program under the Solid Waste Disposal Act, as amended, commonly referred to as the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 et seq. The Corrective Action Program requires that owners and/or operators of facilities subject to certain provisions of RCRA to investigate and address releases of hazardous waste and hazardous constituents, usually in the form of soil or groundwater contamination, that has occurred at or from their property.

EPA is providing a thirty-(30) day public comment period on this SB. EPA may modify its proposed remedy based on comments received during this period. EPA will announce its selection of a final remedy for the Facility in a Final Decision and Response to Comments (FDRTC) after the public comment period has ended.

Information on the Corrective Action program as well as a fact sheet for the Facility can be found by navigating to https://www.epa.gov/hwcorrectiveaction/hazardous-waste-cleanup-fareva-richmond-inc-richmond-va.

The Administrative Record (AR) for the Facility contains all documents, including data and quality assurance information, on which EPA's proposed remedy is

based. See Section 8, Public Participation, below, for information on how you may review the AR.

Section 2: Facility Background

Section 2.1 Introduction:

The Facility is located at 2248 Darbytown Road in Richmond, Virginia. The Facility location is shown in SB Figure 1: "RCRA Facility Investigation/Corrective Measure Study (2019 RFI/CMS Report) Figure 1-1 Site Location Map 2016 Aerial Photograph." The Facility has been in use since 1970, primarily for the manufacture of over-the-counter health care products. From the 1970's to the late 1990's, pet pesticide products were also manufactured at the Facility.

The Facility has geographic coordinates of 37º 29' 11" North, 77º 21' 45" West. The Facility occupies approximately 286.12 acres and is bounded by woods, a rail line, and industrial land use to the north; Cornelius Creek, woods, Laburnum Road, and agricultural land use to the east; woods to the west; and the Henrico County Fire Station #2 (Firehouse), Darbytown Road, and residential land use to the South. Surrounding land use is shown in SB Figure 2: "2019 RFI/CMS Report Figure 1-4 Land Use".

Current use of the Facility is for the manufacture of over-the-counter health care and beauty products, related operations, and a distribution center. The Facility is a large quantity generator of hazardous waste.

There are currently two primary structures, Building 2300 and Plant B, located on the Facility property. Also located on the Facility property are tanks, piping, sewers, a new Facility wastewater treatment plant (WWTP), a Central Utility Building, a hazardous waste storage shed, and paved access roads. Former Plant A and its accompanying WWTP were dismantled and removed in 2001. During multiple site visits, EPA found the Facility property to be unfenced and no guard booth along the entrance drive to Building 2300 or the entrance drive to Plant B. The existing Facility layout is shown in SB Figure 3A: "2019 RFI/CMS Report Figure 1-2 Site Layout." The former Facility layout that more clearly shows the extent of former Plant A is shown in SB Figure 3B: 2006 Revised Draft Voluntary Remediation Report Figure 2-1: Groundwater Sample Locations.

Section 2.2 Hydrogeologic Features and Groundwater Use:

The near surface hydrostratigraphy at the Facility consists of the following:

1. Surficial fine-grained silt and clay: The upper clay unit consists of clayey silt interbedded with clay and is approximately 2 to 21 feet thick in site borings, with an average thickness of approximately 12 feet. This surficial layer extends across the Site, including below Cornelius Creek.

2. Shallow groundwater unit:

   a. The upper confining unit is underlain by a fine-grained saturated layer of sandy silt, ranging in thickness from approximately 1 to 15 feet in Site borings, with an average thickness of approximately 6 feet. Groundwater with relatively little lateral movement is found in this layer.

   b. The primary water-bearing unit, the shallow groundwater unit at the Site, is a sand and gravel aquifer that consists of medium to coarse sand and gravels grading up to silty fine sands. The unit ranges from approximately 4 to 22 feet thick in borings at the Site, with an average thickness of approximately 12 feet. The estimated average groundwater velocity is approximately 160 feet per year, based on 2014 groundwater data.

3. The silt and clay confining unit: The clay confining unit underlying the sand and gravel layer consists of soft clay with a thickness that exceeds 10 feet at the Site.

Shallow groundwater below the Production Area of the Facility, which is on the west side of Cornelius Creek, flows towards the east and southeast towards Cornelius Creek. Shallow groundwater near the Cornelius Creek has been found to in part or fully discharge to Cornelius Creek. Shallow groundwater that is on Facility property on the east side of the creek and beyond the influence of Cornelius Creek was found to be flowing towards the east. In the past, groundwater flow in the northern portion of the Production Area may have temporarily been towards sand and gravel mines to the north.

The nearest drinking water wells in use during the life of the Facility were located across the street from the Facility at residences along the south side of Darbytown Road which were built before 1985. A public water line servicing those residences was installed in 1985 but may not currently provide service to those residents as existing homes were not required to tie into the public water line. Prior to 1985, residents south of Darbytown Road primarily used their private wells for drinking water. Homes built across the street from the Facility since 1985 have been tied into the public water line.

Section 3: Summary of Investigations

The following provides a summary of the investigations conducted at the Facility and contaminants of concern. detected during the investigations. Sampling results were compared to screening levels based on a 1 x 10^{-6} cancer risk and a hazard index (HI) of 1 found in EPA's 2017 Regional Screening Level Tables (RSLs) and EPA's 2018 Vapor Intrusion Screening Level Calculator. For groundwater, results were additionally screened against drinking water standards referred to as maximum contaminant levels (MCLs), codified at 40 C.F.R. Part 141 and promulgated pursuant to the Safe Drinking Water Act, 42 U.S.C. § 300f, et seq.

Section 3.1 Environmental Investigations:

Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) identified in the 2019 RFI/CMS Report are shown on SB Figure 4. Investigations that have been conducted to date are summarized in this section as follows:

Former Plant A and its accompanying WWTP:

The former Plant A Building was located west of the inactive rail spur that is north of Building 2300. The south side of the former Plant A Building was approximately 50 feet north of the north side of Building 2300. The former Plant A building was a two story building with a foot print of approximately 78,000 square feet. The former Plant A WWTP covered approximately 1,500 square feet. The former Plant A WWTP was located to the west of the Building 2300 Rail Spur Loading Dock and between Building 2300 and the former Plant A building. The former Plant A WWTP consisted of two underground vaults/tanks, several underground treatment tanks, as well as miscellaneous pumps and equipment. The former Plant A WWTP processes included settling, neutralization, and activated carbon filtration. Two known releases are reported for the Former Plant A and its accompanying former WWTP: Area of Concern (AOC) 2 is a pesticide release on the west side of the former Plant A which was remediated by soil removal in 1992. AOC 3 is a broken sewer near the former Plant A WWTP that was 16 feet below the ground surface (bgs) and repaired upon discovery in the early 1990's.

In September 2001, Pfizer began investigating the footprint of the former Plant A and its accompanying WWTP when odors were noted during demolition and removal. From September to November 2001, 80 soil samples were collected from the area of the former Plant A and its accompanying WWTP. The soil samples were analyzed for constituents within classes of compounds referred to as volatile organic compounds (VOCs), semi-volatile compounds (SVOCs), total petroleum hydrocarbons (TPH), methanol, organophosphate (OP) pesticides, organochlorine (OC) pesticides, and carbamate pesticides (analytes representative of the known chemical inventory of Plant A). Seventy-three of the soil samples collected in 2001 detected a total of 17 constituents, including three VOCs, three SVOCs, three PAHs, and eight pesticides. Except for one pesticide, detected concentrations were less than residential risk-based screening levels (RSLs). For that one pesticide, a screening level does not exist.

From 2001 through 2012, 25 groundwater monitoring wells were installed, and the results were used to assess groundwater contamination extending from the area of the former Plant A and its associated WWTP. Well locations are shown in SB Figure 5A and were guided by the results from field investigations conducted in 2002 and 2010, where borings were advanced to the depth of groundwater to collect samples from groundwater purged from the borings. Well locations additionally were guided by hydrogeologic studies conducted in 2009 and 2010.

During a Southern Boundary Investigation conducted in March 2010, except at Sample Location #11, the primary contaminant was identified as chloroform and appeared to be fairly well-mixed throughout the saturated unit; however, higher concentrations were typically observed in the silty sand matrix. At Sample Location #11, which was located between Well

MW-2 and Well MW-7, and near the former Plant A WWTP, 290 ug/l, 1.4 ug/l, 89 ug/l, and 25 ug/l were detected in mobile lab results at the following four depth intervals, respectively: 14-18 feet bgs, 22-26 feet bgs, 32-36 feet bgs, and 40-44 feet bgs. The results were later adjusted by a multiplying factor of 2.1 to account for corresponding results for different samples in a fixed lab. The adjusted results are shown on SB Figure 5B: Chloroform Concentrations Adjusted On-Site Lab Results March 2010.

Other constituents included in the analyses during the March 2010 Southern Boundary Investigation were 1,1-Dichloroethene (DCE), Trans-1,2-DCE, cis-1,2-DCE, Perchloroethylene (PCE), and Trichloroethylene (TCE). Of those, the only significant detection was TCE at a concentration of 7.6 ug/L in Sample #11(14-18). The concentrations of chloroform and TCE in nearby Well MW-7 were 23 ug/l and 1.2 ug/l, respectively, in October 2009 and 27 ug/l and 1.2 ug/l, respectively, in October 2010. In April 2010, the maximum detected concentrations of chloroform and TCE in sampled monitoring wells were 120 ug/l chloroform at Well MW-19 and an estimated 0.69 ug/l TCE at Well MW-10.

Overall, groundwater contamination associated with release from the area of the former Plant A and its accompanying WWTP, was found to extend north, south, east, and southeast of Building 2300. Associated contamination extends east of Building 2300 towards Cornelius Creek and southeast of Building 2300 near the Firehouse and along Darbytown Road. The RFI/CMS Report divides associated groundwater contamination into two groups of wells: “East Production Area Wells” and “Wells within 100 feet of the Firehouse.” East Production Area Wells are numbered MW-01 through MW-12, MW-15 to MW-20, and MW-35 to MW-37. Wells within 100 feet of the Firehouse are Wells MW-13, MW-14, MW-38, and MW-39.

Inorganic constituents were analyzed in groundwater samples collected in 2006 from four monitoring wells (Wells MW-8, MW-10, MW-13 and MW-15) and from 19 monitoring wells (wells numbered MW-01 through MW-19) in 2007.

The results for East Production Area Wells detected 14 inorganic constituents. Of these, maximum concentrations of nine inorganic constituents exceeded MCLs or tapwater RSLs and the maximum concentration of one constituent, mercury, exceeded its vapor intrusion screening level.

The results for Wells within 100 feet of the Firehouse detected 12 inorganic constituents. Of these, maximum concentrations of six inorganic constituents exceeded MCLs or tapwater RSLs.

From 2010 to 2014, organic constituents were evaluated at a subset of wells during the spring and at a different subset of wells during the fall. The groundwater samples were analyzed for VOCs, SVOCs, polycyclic aromatic hydrocarbons (PAHs), and OC pesticides each spring and VOCs each Fall.

Results for the East Production Area wells show a total of 80 organic constituents, including 41 VOCs, three SVOCs, 18 PAHs, 13 pesticides, and five TICs, were detected. Of these, maximum concentrations of six VOCs, one SVOC, four PAHs, and seven pesticides exceeded MCLs or tap water RSLs and maximum concentrations of five VOCs exceeded residential vapor intrusion screening levels. Additionally, at minimum, approximately eight "unknown" VOC TICs and seven "unknown" SVOC TICs were detected in groundwater samples collected from East Production Area.

Results from Wells within 100 feet of the Firehouse show a total of 41 organic constituents, including 24 VOCs, two SVOCs, six PAHs, and nine pesticides, were detected. Of these, maximum concentrations of four VOCs, one SVOC, one PAH and one pesticide exceeded MCLs or tapwater RSLs and the maximum concentration of three VOCs exceeded residential vapor intrusion screening levels. Additionally, at minimum, approximately five "unknown" VOC TICs and three "unknown" SVOC TICs were detected.

As noted above, chloroform, a VOC, is identified as the key contaminant in the groundwater. Chloroform in groundwater extends from north of the former Plant A and from the former Plant A WWTP to east and southeast of Building 2300. Throughout groundwater monitoring from 2001 to 2014, the highest detected concentrations of chloroform include 180 ug/l in Well MW-5 in June 2002; 470 ug/l in Well MW-7 in June 2002; 110 ug/l in Well MW-12 in September 2006 and October 2007; and 190 ug/l in Well MW-19 in October 2007. At Well MW-8, 260 ug/l of chloroform was detected in April 2014 and 67 ug/l and 70 ug/l of chloroform were detected in duplicates samples collected from the well when it was last sampled in June 2014. In October 2014, twelve wells were sampled and concentrations of chloroform in all twelve wells were less than 80 ug/l, the MCL for total trihalomethanes, including chloroform.

In August 2013, EPA determined that 80 ug/l, the drinking water Maximum Contaminant Level (MCL), promulgated pursuant to Section 42 U.S.C. § 300f et seq. of the Safe Drinking Water Act and codified at 40 CFR Part 14, for total trihalomethanes, including chloroform, is an appropriate screening level for chloroform in Facility groundwater. Groundwater samples collected from 2001-2014 show that while the concentration of chloroform may exceed the MCL in groundwater within the boundaries of the groundwater monitoring network, the concentration of chloroform did not exceed the MCL at the boundaries of the groundwater monitoring network. Therefore, EPA determined that further investigation of the extent of chloroform in groundwater was unnecessary.

Chlorinated VOCs are identified as secondary contaminants in groundwater. Detections of chlorinated VOCs in groundwater extend from two areas: north of the footprint of the former Plant A and the area of the Former Plant A WWTP that is coincident with the area of the Building 2300 Rail Spur Loading Dock. The detections extend to southeast of Building 2300. Associated detected constituents include but are not limited to 1,1,2,2-Tetrachloroethane (1,1,2,2-TCA), PCE, and TCE.

For 1,1,2,2-TCA, an MCL does not exist and the proposed risk-based groundwater remediation goal of 0.757 ug/l is based on a 1 x 10^{-5} excess lifetime cancer risk. The proposed risk-based groundwater remediation goal was exceeded during eight of 16 sampling events at Well MW-5, north of the footprint of the former Plant A, from June 2002 to October 2014. The highest detected concentration was 1.7 ug/l 1,1,2,2-TCA and was detected in April 2009 at Well MW-5.

For PCE, the MCL of 5 ug/l was not exceeded during any sampling event. The highest detected concentration of PCE was 4.0 ug/l and was detected in June 2002 at Well MW-7, near the Building 2300 Rail Spur Loading Dock and the former Plant A WWTP. However, inputting the eight most recent sampling results from October 2008 to April 2014 into the EPA Groundwater Statistics Tool indicates the concentration of PCE was increasing at Well MW-7 when sampling stopped in 2014. The concentration of PCE at Well MW-7 was 2 ug/l when it was last sampled in April 2014.

For TCE, the MCL of 5 ug/l was not exceeded in reported results for groundwater monitoring from 2011 to 2014. The highest detected concentrations were 13 ug/l TCE in June 2002 at Well MW-7 and 14 ug/l TCE in October 2009 at Well MW-4. Well MW-4 is near the Building 2300 Rail Spur Loading Dock.

With respect to pesticides, lindane is detected in groundwater extending from north of the former Plant A and from the former Plant A WWTP to east of Building 2300. The concentration of lindane exceeded its MCL of 0.2 ug/l during three sampling events at Well MW-19 from April 2009 to April 2010. The highest detected concentration was 0.29 ug/l lindane and was detected at Well MW-19 in October 2009. The concentration of lindane at Well MW-19 did not exceed 0.2 ug/l during five sampling events after April 2010. Well MW-19 was last sampled in April 2014. Well MW-19 is east of the addition to Building 2300, which was added to the north side of Building 2300 in 1999.

Building 2300 Sub-slab Vapor Investigation:

In September 2010, to evaluate release of vapors from groundwater contamination that flows below the structure, eleven sub-slab soil vapor samples were collected from underneath the concrete floor slab of Building 2300 while Building 2300 was operated under positive pressure.

As documented in the 2011 Draft Vapor Intrusion Investigation Report, a total of 37 constituents, including 21 VOCs, one SVOC, and 15 TICs were detected. The detected concentrations of the 21 VOCs and one SVOC were less than residential vapor intrusion screening levels for soil gas. Of the 15 TICs, six were classified as “unknown”. The results indicate exposure risk to Site workers inside Building 2300 is negligible when it is operated under positive pressure.

The key constituent in groundwater, chloroform, was detected in only one sample. The secondary key contaminants in groundwater, chlorinated VOCs, were detected in nine samples.

As stated above, the detected concentrations of chloroform and chlorinated VOCs in the soil gas samples were less than residential vapor intrusion screening levels.

Constituents not previously analyzed in Site soil or groundwater were also detected. Those constituents included, but were not limited to, 1,4-Dioxane, Freon-11 and Freon-12. The constituents Freon-11 and Freon-12 were detected in all eleven samples. The constituent 1,4-Dioxane was detected in six samples. While the detected concentrations of 1,4-Dioxane, Freon-11, and Freon-12 in the soil gas samples were less than residential vapor intrusion screening levels for soil gas, detections of these constituents in soil gas identified the need to further investigate for these constituents in groundwater. As a result, subsequent groundwater monitoring events included analyses for 1,4-Dioxane, Freon-11 and Freon-12.

Building 2300 Rail Spur Loading Dock:

The Building 2300 Rail Spur Loading Dock extends from the north and rear side of Building 2300 and is east of the former Plant A WWTP.

Pfizer initially identified Loading Dock Area Groundwater as AOC 7 for a history of elevated pH in Well MW-4. Well MW-4 is located immediately north of the Building 2300 Rail Spur Loading Dock.

In 2008, Pfizer investigated pH in groundwater at and surrounding Well MW-4. In April 2008, a groundwater sample was collected from Well MW-4. During May 2008, groundwater samples were collected from eight DPTs surrounding Well MW-4. The results found no pH abnormalities in groundwater from Well MW-4 or surrounding Well MW-4.

In January 2014, Pfizer notified EPA that forklift equipment cleaning activities were conducted using degreasers at the Building 2300 Rail Spur Loading Dock until the early 2000's. Pfizer proposed investigation of soil and groundwater but EPA determined that further investigation of groundwater was unnecessary and except for investigation of PCBs in soil, remaining investigation of soil was found to be unnecessary, as unacceptable risk could be addressed by a soil management plan.

In 2016, at three locations near the Building 2300 Rail Spur Loading dock, one discrete soil sample from 0 to 6 inches and one composite soil sample comprised of three aliquots from 6 to 24 inches bgs were collected. The samples were analyzed for PCBs. PCBs were not detected in any of the soil samples.

Plant B:

In June 2008, due to the discovery of potential compromise in 160 feet of sewer line below a mixing room in the southwest corner of Plant B, Pfizer installed four groundwater monitoring wells (MW-21, MW-22, MW-23 and MW-24) south of the southwest corner of Plant B. The wells also serve to monitor releases, if any, from a former underground catch tank that

was subsequently cleaned, filled with flowable concrete, and abandoned to the west of the southwest corner of Plant B. Groundwater samples were collected from the wells until April 2014. Groundwater samples were analyzed one or more times for VOCs, SVOCs, PAHs, OC pesticides, TPH, and methylene blue active substances (MBAS). Inorganic constituents were not analyzed because inorganic constituents were not identified as an analyte of concern for the former Plant B Mixing Room.

During five sampling events from 2010 to 2014 conducted at each of these four wells, a total of 35 constituents, including 14 VOCs, four SVOCs, four PAHs, 11 pesticides, and two tentatively identified compounds (TICs) were detected. Of these, maximum concentrations of one VOC, two SVOCs, one PAH, and four pesticides exceeded MCLs or tap water RSLs and the maximum concentration of one VOC exceeded its residential vapor intrusion screening level. Methylene blue active substances and diesel and gasoline range organics also were detected. Additionally, at minimum, approximately one "unknown" VOC TIC, and four "unknown" SVOC TICs were detected.

In January 2014, Pfizer notified EPA that: (1) a portion of the main sewer below Plant B was replaced in 2001 by over excavation because it was determined to be degraded and (2) floor drains at the former Plant B train shed discharged to the subsurface until the late 1990's, at which time the floor drains were connected to the sewer system. The former Plant B Train Shed contains ports in the wall to Plant B that were used to transfer food grade ingredients to Plant B. The floor drains in the shed were used for wash-down activities when these food-grade materials were dripped or spilled during off-loading. During a Site visit in 2012, EPA observed the ports in the Plant B wall being used to discharge pressurized water from inside of Plant B to the floor drains in the train shed. It was later reported that the water was from a flushing of the plant fire suppression lines and the drains in the shed are part of the fire suppression sprinkler system.

In December 2014, Pfizer notified EPA that most sewers on Site have been replaced within recent years, there were no recent issues with the sewers and when a problem is suspected, the sewer line is scoped so that any problems can be resolved quickly. Additionally, investigation of soil and groundwater was proposed for the area where floor drains from the former Plant B train shed discharged to soil but investigation of groundwater was found to be unnecessary and additional investigation of soil was not necessary, as unacceptable risk from soil disturbance could be addressed in a soil management plan.

<u>New Facility WWTP and former Facility Wastewater Process Sump</u>:

The new Facility WWTP and former Facility Wastewater Process Sump are located northeast of Building 2300, near the west side of Cornelius Creek. The new Facility WWTP was constructed in 2003 to treat effluent from Plant B and Building 2300. The new Facility WWTP consists of a 50,000 gallon above-ground tank where acid and caustic are introduced through a closed system of piping to adjust pH. Adjustments of pH previously were conducted in the former Facility Wastewater Process Sump. The former Facility Wastewater Process Sump was an inground basin constructed with brick-lined walls supported by a concrete pad/base. It was

located at the same area that is currently occupied by the new Facility WWTP and was removed when the new Facility WWTP was built. While no releases from either area are documented, Site staff recalled that the former process sump overflowed at some point prior to removal. In Facility submissions, the new Facility WWTP is identified as SWMU 1, and a potential release from the former Facility Wastewater Process Sump is referred to as AOC 1.

In 2008, Pfizer conducted a field investigation to identify whether a potential release of hazardous materials occurred from the new Facility WWTP and the former Facility Wastewater Process Sump. A total of 19 constituents, including five VOCs, 12 SVOCs, and two pesticides, were detected in 10 DPT groundwater samples. Of these, a screening based on September 2008 RSLs found maximum concentrations of two SVOCs exceeded an MCL or tap water RSL.

Subsequently, Pfizer conducted a two-part soil and groundwater investigation in 2009 and 2010. During Phase I of the 2009 to 2010 investigation, soil and groundwater samples were collected by direct push technology (DPT) methods to determine the area of impact, if any.

In 2009, a total of 36 constituents, including 12 VOCs, one SVOC, 14 PAHs and nine pesticides, were detected in seven DPT groundwater samples. Of these, a screening based on then existing RSLs found maximum concentrations of two VOCs, one SVOC, 2 PAHs, and two pesticides exceeded MCLs or tap water RSLs.

Thirty-eight soil samples collected in 2008 and 2009 in the vicinity of the new Facility WWTP (SWMU 1) and former facility process sump (AOC 1) detected a total of 45 constituents, including seven VOCs, two SVOCs, 18 PAHs, and 18 pesticides. Except for three PAHs, detected concentrations were less than residential RSLs. For three PAHs, maximum detected concentrations exceeded residential RSLs but were less than industrial RSLs.

The results from earlier investigations were then used to determine the locations of monitoring wells to be installed in Phase II of the 2009 to 2010 investigation. Phase II included installation and sampling of monitoring wells MW-35, MW-36, and MW-37 in May 2010. Samples were analyzed for VOCs, SVOCs, PAHs, and pesticides. A total of 14 constituents, including eight VOCs and six PAHs, were detected in samples collected in April 2010. Data screening for Wells MW-35, MW-36 and MW-37 is incorporated into the data screening for the East Production Area Wells, described above with respect to Plant A and its accompanying WWTP.

Following Phase II, additional investigation of soil and groundwater was proposed, but further investigation of groundwater was found to be unnecessary and further investigation of soil was not necessary, as unacceptable risk from soil disturbance could be addressed in a soil management plan.

Main Process Sewer Line East of Cornelius Creek:

In April and May 2008, 15 soil and groundwater samples were collected along the now abandoned process sewer line (AOC 4/5) parallel to Darbytown Road extending from north of Plant B to northeast of the Building 2300 because of a history of compromise. Soil samples were collected near or directly below the line. Groundwater samples were collected using DPT at locations 10 or 20 feet south of corresponding soil sample locations. The soil and groundwater samples were analyzed for VOCs, SVOCs, and pesticides.

The soil samples found a total of nine constituents, including two VOCs, one SVOC, and six pesticides. All detected concentrations were less than residential RSLs.

The groundwater samples found a total of eight constituents, including two SVOCs and six pesticides. Of these, a screening based on September 2008 RSLs found the maximum concentration of one SVOC, bis(2-Ethylhexyl) phthalate, exceeded its MCL.

Facility Property East of Cornelius Creek (Laburnum Field):

The approximately 18-acre field was historically leased for agricultural purposes. In 1998, an active force main sewer was installed through a portion of the Laburnum Field.

In 2008 (subsurface soil) and 2012 (surface soil), a total of 54 soil samples (including four duplicate samples) were collected. A total of 36 constituents, including five VOCs, three SVOCs, 11 PAHs, and 17 pesticides were detected. All detected concentrations were less than residential RSLs.

In October 2008, ten groundwater monitoring wells (wells numbered MW-25 to MW-34) were installed and sampled. Monitoring Wells MW-26, MW-28, MW-31, MW-33, and MW-34 were installed in the assumed downgradient direction from the sewer line (the portion east of Cornelius Creek). In addition, four wells, MW-26, MW-27, MW-29 and MW-30, were installed within 25 to 50 feet of the sewer line. A total of eight organic constituents, including one VOC, four SVOCs and three pesticides, were detected. Of these, the maximum concentration of one pesticide, heptachlor, exceeded its tapwater RSL but was less than its MCL. Groundwater levels were measured, and the direction of groundwater was found to be flowing east and away from Cornelius Creek.

Cornelius Creek:

In 2008, near where a process sewer break occurred, a total of 13 sediment samples (including two duplicate samples) were collected. Samples were analyzed for VOCs, SVOCs, PAHs, and pesticides. A total of 23 constituents, including three VOCs, 10 PAHs, and 10 pesticides were detected.

The results were screened against human and ecological receptor exposure screening levels. For human exposures, except for one PAH, detected concentrations were less than residential RSLs. For one PAH, benzo(a)pyrene, the maximum detected concentration exceeded its residential RSL but was less than its industrial RSL. For ecological exposure, maximum detected concentrations of one VOC and six PAHs exceeded ecological screening levels, and for two VOCs, a screening level did not exist. For all nine constituents, maximum detected concentrations were less than baseline levels of potential ecological concern, which applied an expanded set of screening values, and therefore, it was found that exposures of sediment at Cornelius Creek were unlikely to result in adverse impacts to ecological receptors.

Additionally, to evaluate ecological risk, four benthic samples were collected during the sediment sampling event at the same location as four of the sediment samples (SD-3, SD-4, SD-5, SD-6). A biodiversity study was not conducted as part of the benthic survey, but over 100 benthic organisms were discovered per sample collected, demonstrating the presence of benthic organisms in the sediment.

Rail Spur Soil Investigation:

In 2016, at six locations along the inactive rail spur, one discrete soil sample from 0 to 6 inches and one composite soil sample comprised of three aliquots from 6 to 24 inches bgs were collected. The samples were analyzed for PCBs. PCBs were not detected in any of the soil samples.

Henrico County Facility Wastewater Data:

In accordance with the wastewater discharge permit issued by Henrico County, wastewater samples were historically collected from three locations in the Facility sewer system as part of normal Facility operations (and not specifically to support the RFI). The wastewater samples were collected by a third party. EPA provided the wastewater sample data to Pfizer for use in the RFI Report to evaluate the significance of historical releases. Data from a total of 19 wastewater samples collected in 2004, 2005, 2010, and 2014 from the three locations were used. The samples were analyzed for VOCs, SVOCs, PAHs, pesticides, PCBs, and inorganic constituents.

Section 3.2 Human Health Risk Assessment

Constituents found in sampled soil, soil vapor, groundwater, wastewater, and Cornelius Creek sediment were evaluated in a manner specified by EPA in the Human Health Risk Assessment (HHRA), which was completed as part of the RFI/CMS. More details on the HHRA are described in the 2019 RFI/CMS Report.

Results from all soil samples collected at the Facility from above the water table (typically located approximately 15 feet bgs) were included in the HHRA regardless of when the

sample was collected. Sediment data was collected only in 2008, and all sediment data was included in the HHRA.

Groundwater samples were collected west of Cornelius Creek from 2001 to 2014. Data for VOCs, SVOCs, PAHs and pesticides from 2010 to 2014 were included in the HHRA. Metals data were collected in 2006 and 2007 and were also included in the HHRA. Groundwater samples were collected east of Cornelius Creek in 2008, and associated groundwater data was also included in the HHRA.

For the assessment of the vapor intrusion pathway, the following three well clusters were identified in the East Production Area wells:

1. Monitoring wells clustered around Location MW-4, located near the Building 2300 Rail Spur Loading Dock and the former Plant A WWTP, including Wells MW-2, MW-4 and MW-7;
2. Monitoring wells clustered around Location MW-11, located east and southeast of Building 2300, including Wells MW-8, MW-9, MW-11, MW-12, MW-16 and MW-19; and
3. The monitoring well cluster for Location MW-37, located northeast of Building 2300 near the former Facility Wastewater Process Sump (AOC 1), included only Well MW-37.

At the request of EPA, wastewater data collected between 2004 and 2014 were evaluated in the risk assessment specifically to assess the vapor intrusion pathway.

Although results were initially compared to screening levels based on a 1×10^{-6} cancer risk, to account for the detection of unknown TICs without screening levels, EPA restricted the cancer risk to 1×10^{-5}. A summary of exposure scenarios assessed in the human health risk screening and assessment is attached (See Attachment 1). The results were less than a cancer risk of 1×10^{-5} and an HI of 1, except for the following:

1. Current and potential future Site worker inhalation of vapors in indoor air from East Production Area groundwater near Well MW-4 (groundwater near the Building 2300 Rail Spur Loading Dock and former Plant A WWTP, using maximum constituent detections between 2010 and 2014 from Wells MW-2, MW-4, and MW-7), which had a cancer risk of 2×10^{-5} using one of two calculation methods (driven by the concentration of chloroform and to a lesser extent by TCE); the second calculation method found a cancer risk of 2×10^{-7};

2. Current and potential future Site worker inhalation of vapors in indoor air from East Production Area groundwater near Well MW-11 (groundwater east and southeast of Building 2300, using maximum constituent detections between 2010 and 2014 from Wells MW-8, MW-9, MW-10, MW-11, MW-12, MW-16, and MW-19), which had a cancer risk of 8×10^{-5} using one of two calculation methods (driven by the concentration of chloroform); the second calculation method found a cancer risk of 8×10^{-7};

3. Future construction worker direct contact with East Production Area groundwater near Well MW-4 (groundwater near the Building 2300 Rail Spur Loading Dock and former Plant A

WWTP using maximum constituent detections between 2010 and 2014 from Wells MW-2, MW-4 and MW-7), which had an HI of 2, driven by the concentration of TCE and to a lesser extent by chloroform; and

4. Future construction worker and utility worker direct contact with East Production Area groundwater near Well MW-11 (groundwater east and southeast of Building 2300 using maximum constituent detections between 2010 and 2014 from Wells MW-8, MW-9, MW-10, MW-11, MW-12, MW-16, and MW-19), which have a cancer risk of 2×10^{-5}, driven primarily by concentrations of chloroform, mercury, and TCE.

Additionally, the risk characterization summary in the RFI/CMS Report found the "groundwater data indicate that potable use of shallow groundwater could pose a risk to human health."

Section 3.3 Ecological Risk Assessment

Constituents found in Cornelius Creek sediment in 2008 were evaluated in the Ecological Risk Assessment (ERA) which was completed as part of the RFI/CMS. More details on the ERA are described in the 2019 RFI/CMS Report. As noted in Section 3.1 above, the ERA found adverse impacts to ecological receptors from exposure to constituents in Cornelius Creek are unlikely.

Section 3.4 EPA Findings

With respect to vapor intrusion, while EPA's human health exposure risk goals were exceeded in one of two calculations with respect to potential unacceptable vapor intrusion for (a) groundwater near the Building 2300 Rail Spur Loading Dock coincident with the location of the former Plant A WWTP and (b) groundwater east and southeast of Building 2300, the results of the sub-slab vapor investigation below Building 2300, which was conducted while the building was operated under positive pressure, found exposure risk to Site workers inside Building 2300 is negligible. EPA therefore finds vapor intrusion exposure risk to Site workers in Building 2300 is negligible when it is operated under positive pressure.

Based on a review of available information and documentation, EPA finds no evidence of unacceptable contaminant concentrations for the following areas. However such finding may be revised based on new information. Institutional controls described in the Proposed Remedy below apply to these areas:

- SWMU 2: Former Drum Storage Pad
- SWMU 4: Historical Non-hazardous waste incinerator
- AOC 6: Central Utility Building – Historic Oil Release

Based on a review of available information and documentation, EPA finds areas of uncertain characterization may exist, for which additional characterization is necessary, and include, but may not be limited to, the following:

- Facility areas within the Soil Management Area designated in Figure 6, including the following:
    - The area of the new Facility WWTP (SWMU 1) and a former Brick Lined Facility Wastewater Process Sump (AOC 1);
    - The area of the Former Plant A (including the area of AOC 2, a former pesticide release west of the former Plant A building and the area of Wells MW-3, MW-5 and MW-6 and DPT-GW-23 (Shown on SB Figure 3B), north of the former Plant A building);
    - The area of the Former Plant A WWTP (including the area of AOC 3);
    - The area of abandoned sewer line that runs west to east from north of Plant B to the new Facility WWTP (AOCs 4/5) (because of continuing constituent detections in groundwater north of the former Plant A and south of the main sewer line);
    - The Building 2300 Area, including, but not limited to, the Building 2300 Rail Spur Loading Dock; and
    - The Plant B Area, including, but not limited to, sewers below and in the vicinity of Plant B, the former Plant B Train Shed, and sources to detections of diesel and gasoline range organics in groundwater.
- The area of a past sewer line, if any, at Facility Property East of Cornelius Creek, given the current force main was installed in 1998.

EPA finds that the areas with uncertain characterization may present a risk for human exposure. Additionally, the areas may present a risk to groundwater when impermeable features, such as structures, paving or the confining layer are removed.

EPA finds the existence of uncertain characterization that may present a risk is supported by the detection of 80 organic constituents from 2010 to 2014 and 14 inorganic constituents in 2006 and 2007 in East Production Area Wells, and 35 organic constituents and diesel and gasoline range organics from 2010 to 2014 in wells installed south of the southwest corner Plant B. (Inorganic constituents were not analyzed for in groundwater south of Plant B.) EPA finds this uncertain characterization is associated with detections occuring in groundwater below an upper confining clay layer that averages 12 feet thick across the Site and in many groundwater wells that are downgradient from impermeable features (including structures and paving) that prevent infiltration. EPA understands some releases, including those from compromised sewers, occurred within the upper confining clay layer, and thus, detections in groundwater resulted from infiltration through only a portion of the confining layer.

For groundwater, EPA finds the following:

From north of the footprint of former Plant A to southeast of the Firehouse, defined plumes of contaminants exist in groundwater and are believed primarily to be associated with a

break in a sewer line that was next to the former Plant A WWTP and Building 2300 and was repaired upon discovery in the early 1990's. An additional source possibly is release of maintenance fluids from the Building 2300 Rail Spur Loading Dock. Overall, 80 organic constituents from 2010 to 2014 and 14 inorganic constituents in 2006 and 2007 were found in East Production Area wells, and 41 organic constituents from 2010 to 2014 and 12 inorganic constituents were found in wells within 100 feet of the firehouse. Of these, EPA finds attaining MCLs and/or RSLs as applicable via monitored natural attenuation for 1,1,2,2-Tetrachloroethane at Well MW-5, chloroform at Wells MW-5, MW-7, MW-8 and MW-19, and TCE at Wells MW-4 and MW-7 are components of EPA's proposed remedy.

While results for 1,1,2,2-Tetrachloroethane, chloroform and TCE have fluctuated over time. EPA finds an overall general downward trend exists at upgradient source areas exposed to infiltration. Although an overall downward trend exists at upgradient source areas exposed to infiltration, trend results indicate, that when sampling stopped in 2014, the concentration of chloroform was increasing at Wells MW-8, MW-9, and MW-11, was slightly increasing at Well MW-16, and was "probably" increasing at Wells MW-17 and MW-37. These wells are downgradient from known source areas where the concentration of chloroform has exceeded 80 ug/l in the past and are within the chloroform plume. These wells are east, south, and southeast of Building 2300 and extend in a southwest to northeast diagonal line. The RFI/CMS Report attributes such increase to a mobilized mass of chloroform within the chloroform plume, where the concentration of chloroform is anticipated to increase and then decrease as the chloroform plume mass moves through the well. The maximum concentration of chloroform within the mobilized plume mass is anticipated to reduce over time via natural attenuation. Of the wells where chloroform concentrations are increasing, the concentration of chloroform has exceeded 80 ug/l only at Well MW-8 and as noted above, attaining the MCL for chloroform at Well MW-8 is component of EPA's propose remedy. Attaining the MCL for chloroform at Wells MW-9, MW-11, MW-13, Well MW-36, MW-37 and MW-39 additionally is proposed as a component of EPA's proposed remedy because chloroform concentrations were increasing and/or the wells are downgradient from where the concentration of chloroform exceeded 80 ug/l chloroform in the past. Wells MW-13, MW-36, MW-37 and MW-39 additionally are noted for being downgradient boundary sentinel wells.

It is unclear what caused a mobilized mass of chloroform in a distinct line within the plume and downgradient from Building 2300. Possible reasons may be associated with infiltration of precipitation at upgradient source areas and/or a rise in groundwater levels that contacts remnant groundwater contaminant sources within the plume. A rise in groundwater levels increases the volume of groundwater that contacts contamination that remains in soil sources and causes an increased release of contamination from the sources to groundwater. A rise in groundwater levels may exist for a short period of time following a single precipitation event or may exist for a long period of time following periods of sustained precipitation. Sources below Building 2300 may remain from past release(s). Sources with potential to extend below Building 2300 and remain from past release include:

- Past release from a broken sewer that was 16 feet bgs at the former Plant A WWTP and adjacent to Building 2300. The sewer was repaired upon discovery in the early 1990's; and
- Past release(s) from forklift maintenance fluids at the Building 2300 Rail Spur Loading Dock, that occurred until the early 2000's.

Evaluating the relationship of concentration trends with groundwater levels and precipitation events to project whether the concentration of constituents proposed for attainment will exceed MCLs or RSLs as appropriate in the future is an additional component of EPA's proposed remedy.

With respect to the following findings from the HHRA, which are based on data gathered through 2014, the extent contaminant concentrations remain at indicated well locations and/or have mobilized to downgradient groundwater and present an unacceptable human exposure risk is unknown for the following:

- Construction worker direct contact with TCE and chloroform in groundwater near the Building 2300 Rail Spur Loading Dock and the area of the former Plant A WWTP;
- Construction worker and utility worker direct contact with chloroform, mercury, and TCE in groundwater east and southeast of Building 2300, proximate to Wells MW-8, MW-9, MW-10, MW-11, MW-12, MW-16, and MW-19;

With respect to chloroform and TCE driving risk for construction worker and/or utility worker contact exposure to groundwater, it is not yet demonstrated that chloroform and TCE have attained their respective MCLs. Thus, attaining MCLs for chloroform and TCE in groundwater wells within the monitoring well network via monitored natural attenuation is a component of EPA's proposed remedy.

While Well MW-7 is designated in the RFI/CMS Report as a chloroform source area well because it is located near the former sewer break at the former Plant A WWTP, information in Section 3.1, above, shows concentrations of chloroform at Well MW-7 in October 2009 and October 2010 were an order of magnitude less than concentrations of chloroform detected at depths of 14-18 feet bgs and 32 to 36 feet bgs at DPT Sampling Location #11 in March 2010. Additionally, the concentration of TCE at DPT Sampling Location #11 at a depth of 14-18 feet was more than six times the concentration of TCE detected at Well MW-7 in October 2009 and October 2010. DPT Sampling Location #11 is located near the location of the former Plant A WWTP but is west and north of Well MW-7. Thus, attaining MCLs for chloroform and TCE in groundwater at these depths at DPT Sampling Location #11 is a component of EPA's proposed remedy to verify MCLs for chloroform and TCE are attained throughout site groundwater.

Additionally, as noted in Section 3.1, above, the concentration of PCE was increasing at Well MW-7 when sampling ended in 2014. Inputting results from the eight most recent sampling events for PCE at Well MW-7 into the EPA groundwater statistical tool indicates the concentration of PCE will exceed its MCL of 5 ug/l in 2023. The increasing trend is attributed to past release of maintenance fluids at the nearby Building 2300 Rail Spur Loading Dock and is

anticipated to have reversed since sampling stopped in 2014. Thus, attainment of the MCL for PCE at wells within the monitoring well network via monitored natural attenuation is an additional component of EPA's proposed remedy.

Tables 5-5, 5-6, and 5-7 in the 2019 RFI/CMS Report show maximum detected concentrations for constituents in groundwater for sampling events that occurred between 2010 to 2014. The Tables show that some constituents were detected in groundwater at their maximum concentration during the most recent reporting years, 2013 and 2014. If constituent concentrations were decreasing, it would be expected that maximum detected concentrations would have occurred in 2010 or 2011 and not in 2013 and 2014. While the reporting of maximum detected concentrations during the most recent years of sampling typically indicates concentrations for those constituents are increasing, further review finds some of the reporting of maximum detected concentrations in 2013 or 2014 can be attributed to other factors such as a one-time analysis for a constituent or improvements that were made in laboratory techniques that provide for detecting constituents at lower concentrations.

With respect to the following findings at Well MW-16, which is installed in a parking lot south of Building 2300, monitored natural attenuation was considered as a component of EPA's proposed remedy but closing the well is being proposed because it will stop any associated release. This proposal is acceptable because the noted MCL exceedances are nominal and the shallow groundwater unit will not be used as a drinking water resource:

Benzo(a)pyrene: A detection of 0.22 ug/l benzo(a)pyrene during the most recent monitoring event (April 2014) exceeds its MCL of 0.2 ug/l by 10%. Such detection as well as detections of other PAHs at increasing levels but below respective remedial levels is attributed to the well being installed through an asphalt parking lot. Such release will stop after the well is properly closed.

Beryllium: A detection of 4.2 ug/l beryllium during the only sampling event for beryllium (April 2007) exceeds its MCL of 4 ug/l by 5%. Such detection occurred during the first sampling event at Well MW-16 following installation of the well. Beryllium was detected in all 19 wells which were sampled during the April 2007 sampling event. Well MW-16 was the only well where the MCL of 4 ug/l for beryllium was exceeded.

With respect to the following finding at Well MW-23, which is installed south of the southwest corner of Plant B, a remedy of monitored natural attenuation was considered and found to be unnecessary because associated risk is nominal and the shallow groundwater unit will not be used as a drinking water resource:

Aldrin: An estimated detection of 0.0107 ug/l aldrin during the most recent sampling event (April 2014) exceeds its risk-based remedial goal (set to a 1 x 10^{-5} cancer risk) of 0.00917 ug/l by 17%.

Section 4: Corrective Action Objectives

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

Soil:

The following are EPA's corrective action objectives for soil:

1. Prevent future residential exposure to constituents in soil at concentrations that exceed EPA residential screening levels set to a cancer risk of 1 in 100,000 (1×10^{-5}) or a noncancer hazard quotient of 1.

2. Prevent current and future composite worker exposure to constituents in surface soil at concentrations that exceed EPA composite worker screening levels set to a cancer risk of 1 in 100,000 or a noncancer hazard quotient of 1.

3. Prevent construction worker and utility worker exposure to constituents in surface and subsurface soils at concentrations that exceed a cancer risk of 1 in 100,000 or a noncancer hazard quotient of 1.

4. Prevent current and future composite worker inhalation exposure to soil vapor contaminants at concentrations that exceed a cancer risk of 1 in 100,000 or a noncancer hazard quotient of 1. EPA finds negligible risk for composite worker inhalation in Building 2300 when it is operated under positive pressure.

5. Where impermeable features (such as structures or pavement) or any of the clay layer between the land surface and groundwater are removed, prevent release of constituents to groundwater at concentrations that exceed MCLs or risk-based goals, as applicable.

Groundwater:

Wherever practicable, EPA expects final remedies to return groundwater to its maximum beneficial use within a timeframe that is reasonable given the particular circumstances of the facility. For groundwater remedies at facilities where aquifers are either currently used for water supply or have potential to be used for water supply, EPA will 1) restore groundwater to drinking water standards, or MCLs, or for each contaminant that does not have an MCL, to the relevant risk-based goal (in this case, based on a cancer risk of 1 in 100,000 and a noncancer hazard quotient of 1), and 2) until these drinking water standards are met, control exposure to the hazardous constituents remaining in the groundwater. EPA's proposed groundwater remedial objectives for specific constituents are described in Section 5.3, below.

Therefore, EPA's corrective action objectives for Facility groundwater are to achieve MCLs or risk-based goals, as applicable and until such MCLs or risk-based goals are met, to control exposure to the hazardous constituents remaining in the groundwater by:

1. Preventing future drinking water exposure to Facility-related constituents in the shallow groundwater unit at concentrations that exceed MCLs or risk-based goals, as applicable.

2. Preventing construction worker and utility worker exposure to Facility-related constituents in the shallow groundwater unit at concentrations that exceed respective MCLs or risk-based goals protective for dermal contact and incidental inhalation, as applicable.

3. Preventing current and future onsite and offsite composite worker inhalation of Facility-related constituents in the shallow groundwater unit at concentrations which exceed respective MCLs or risk-based goals, as applicable. While EPA finds it is unlikely that contaminants at concentrations that existed in the shallow groundwater unit as of 2014 pose an unacceptable vapor intrusion exposure risk to on or offsite composite workers, it proposes this objective to account for any unacceptable concentrations detected in the future.

Section 5: Proposed Remedy

Section 5.1 Introduction:

Based on the findings of the investigation and the HHRA, EPA is proposing a remedy that is necessary to prevent potential unacceptable human exposure to the following:

- Construction worker direct contact with TCE and chloroform in groundwater near the Building 2300 Rail Spur Loading Dock and the area of the former Plant A WWTP;
- Construction worker and utility worker direct contact with chloroform, mercury, and TCE in groundwater east and southeast of Building 2300, proximate to Wells MW-8, MW-9, MW-10, MW-11, MW-12, MW-16, and MW-19;
- Exposure to shallow groundwater via tapwater; and
- Exposure to known and suspected releases within the EPA-designated Environmental Media Management Plan Areas, where contaminant characterization remains uncertain.

EPA's proposed remedy consists of the following components: monitored natural attenuation, compliance with an Environmental Media Management Plan, compliance with a Groundwater Monitoring Program, and compliance with and maintenance of groundwater and land use restrictions.

Section 5.2 Environmental Media Management Plan:

EPA's proposed remedy regarding compliance with an Environmental Media Management Plan includes the following:

1. Compliance with an EPA and/or VADEQ-approved Environmental Media Management Plan to prevent unacceptable risk via direct and/or indirect exposure to contaminants in soil and/or groundwater and to prevent unacceptable release of contaminants from soil to groundwater, as described in Section 4: Corrective Action Objectives above, at the following EPA-designated Environmental Media Management Areas at the Facility:

    a. The Soil Management Area proposed in the 2019 RFI/CMS Report and depicted in SB Figure 6;
    b. Land within a minimum of ten lateral feet of existing and past sewers at the Facility; and
    c. Shallow groundwater that does not meet corrective action objectives.

2. Continued operation of Building 2300 under positive pressure as long as it is occupied;

3. The Environmental Media Management Plan shall require completion of sampling and analysis before a planned intrusive or soil management activity that may result in direct and/or indirect exposure to contamination in soil where the individual contaminants, lateral extent and/or maximum concentration of contaminants in soil is uncertain. Where the individual contaminants are uncertain, analyses shall include the following contaminants: VOCs/SVOCs on the Superfund Target Compound List; VOC/SVOC TICs; 1,4-Dioxane; Freon-11; Freon-12; and constituents listed on Facility Hazardous Waste Biennial Reports, including benzene, chloroform, p-cresol, pyridine, cyanides, lindane, tetrahydrofuran, arsenic, barium, chromium, lead, mercury, and silver. Reporting for TICs will include the ten VOC TICs and twenty SVOC TICs with the highest peaks in a chromatogram for which a match is not found in the Superfund Target Compound List.

    Facility areas that require investigation before a planned intrusive or soil management activity are the following:

- Areas within the Soil Management Area designated in Figure 6, including the following:
    - The area of the new Facility WWTP (SWMU 1) and a former Facility Wastewater Process Sump (AOC 1);
    - The area of the Former Plant A (including the area of AOC 2, a former pesticide release west of the former Plant A building and the area of Wells MW-3, MW-5 and MW-6 and DPT-GW-23 (shown on SB Figure 3B), north of the former Plant A Building);
    - The area of the Former Plant A WWTP (including the area of AOC 3);
    - The area of abandoned sewer line that runs west to east from north of Plant B to the new Facility WWTP (AOCs 4/5);
    - The Building 2300 Area, including, but not limited to, the Building 2300 Rail Spur Loading Dock; and
    - The Plant B Area including, but not limited to, sewers below and in the vicinity of Plant B, the former Plant B Train Shed, and sources to detections of diesel and gasoline range organics in groundwater.

- Undisturbed soils near a history of compromise at a past sewer line, if any, at Facility property east of Cornelius Creek, given the current force main was installed in 1998.

Section 5.3 Groundwater Monitoring and Natural Attenuation:

EPA's proposed groundwater remedy consists of the following:

1. Monitored natural attenuation until groundwater remedial objectives are met and continue to be met throughout the volume of Facility-related release. The groundwater remedial objectives are based on MCLs, and where an MCL does not exist, are set to a cancer risk of 1 x 10^{-5} and an HI of 1 based on RSLs published in EPA's current RSL Table. Groundwater remedial objectives for specific constituents based on EPA RSLs published in May 2020 are proposed below:

Constituent	CAS #	Remedial Objective (ug/l)	Basis
1,1,2,2-Tetrachloroethane	79-34-5	0.757	Risk-based
Chloroform	67-66-3	80	MCL
Perchloroethylene PCE)	127-18-4	5.0	MCL
Trichloroethylene (TCE)	79-01-6	5.0	MCL

2. Compliance with an EPA and/or VADEQ-approved Groundwater Monitoring Program until EPA and/or VADEQ approve in writing termination of the Groundwater Monitoring Program to

    a. Monitor groundwater at specific locations for specific constituents to show groundwater remedial objectives are met and will continue to be met throughout the volume of Facility-related release to groundwater;
    b. Monitor groundwater at specific locations as well as at other locations, adjusted as necessary to show the maximum concentration of specific constituents in Facility-related release to groundwater does not exceed groundwater remedial objectives;
    c. Monitor groundwater at specific locations as well as at other locations adjusted as necessary to delineate the extent, if any, that the concentration of specific constituents exceeds groundwater remedial objectives;
    d. Monitor groundwater at sentinel locations to confirm that potential onsite and offsite receptors are protected;
    e. Monitor groundwater levels in the wells to discern flow patterns at the Site and the relationship among groundwater levels, precipitation events, and contaminant concentrations in groundwater;
    f. Remove or relocate wells after written approval of EPA and/or VADEQ; and
    g. Decommission (close) unused wells and piezometers in accordance with applicable state and/or local requirements.

3. At a minimum, EPA proposes wells and constituents described in Attachment 2 shall be part of the initial Groundwater Monitoring Program.

Section 5.4 Institutional Controls:

EPA's proposed remedy includes the following land and groundwater use restrictions:

1. The Facility property shall be restricted to commercial and/or industrial purposes and shall not be used for residential purposes unless it is demonstrated to EPA and/or VADEQ that such use will not pose a threat to human health or the environment or adversely affect or interfere with the final remedy, and the Facility obtains prior written approval from EPA and/or VADEQ for such use. "Residential purposes" include, but are not limited to, all purposes that provide for living accommodations or services (e.g., schools, dormitories, senior citizen housing, any day care facility whether for infants, children, the infirm or the elderly).

2. No removal, disturbance, or alteration shall occur to any monitoring well, impermeable feature (structure or pavement) or any of the clay layer between the land surface and groundwater unless it is demonstrated to EPA and/or VADEQ that such removal, disturbance or alteration will not pose a threat to human health or the environment or adversely affect or interfere with the final remedy, and the Facility obtains prior written approval from EPA and/or VADEQ for such removal, disturbance, or alteration.

3. Compliance with and maintenance of an EPA and/or VADEQ-approved Groundwater Monitoring Program to be implemented until EPA and/or VADEQ approve in writing that groundwater corrective action objectives are met and will continue to be met throughout the volume of Facility-related contaminated groundwater, consistent with EPA's groundwater cleanup policy; and

4. The shallow groundwater unit at the Facility shall not be used for any purpose other than, as approved in advance in writing by EPA and/or VADEQ, to support the groundwater component of the final remedy, unless it is demonstrated to the EPA and/or VADEQ that such use will not pose a threat to human health or the environment or adversely affect or interfere with the final remedy and the Facility obtains prior written approval from the EPA and/or VADEQ for such use.

5. Whenever the then-current owner identifies a newly-discovered SWMU or release of hazardous waste and/or hazardous constituents at or from the Facility not previously identified, or discovers an immediate or potential threat to human health and/or the environment at the Facility, the then-current owner shall notify the EPA and VADEQ orally within forty-eight (48) hours of discovery and notify EPA and VADEQ in writing within three (3) calendar days of such discovery summarizing the potential for the migration or release of hazardous wastes, solid wastes and/or hazardous constituents at and/or from the

Facility and the immediacy and magnitude of the potential threat(s) to human health and/or the environment, as applicable.

6. Within one (1) month after any of the following events, the then current owner of the Property shall submit to EPA and VADEQ written documentation describing the following: noncompliance with the activity and use limitations, transfer of the Facility property, changes in use of the Facility property, or filing of applications for building permits for the Facility property and any proposals for any site work, if such building or proposed site work will affect the contamination on the Facility property.

In addition, the Facility owner shall provide a coordinate survey as well as a metes and bounds survey of the Facility boundary to EPA. Mapping the extent of the land and groundwater use restrictions will allow for presentation in a publicly accessible mapping program such as Google Earth or Google Maps.

Section 6: Evaluation of Proposed Remedy

This section provides a description of the criteria EPA used to evaluate the proposed remedy consistent with EPA guidance. The criteria are applied in two phases. In the first phase, EPA evaluates three decision threshold criteria as general goals. In the second phase, for those remedies which meet the threshold criteria, EPA then evaluates seven balancing criteria.

Threshold Criteria	Evaluation
1. Protect human health and the environment	EPA's proposed remedy for the Facility protects human health and the environment by eliminating, reducing, or controlling potential unacceptable risk through the implementation and maintenance of use restrictions, a Groundwater Monitoring Program, and an Environmental Media Management Plan. Pfizer's human health risk assessment found potential for unacceptable risk exists for potable use and exposure to shallow groundwater. For groundwater, EPA is proposing to meet MCL or RSLs as applicable. EPA also is proposing to restrict the use of shallow groundwater at the Facility and implement compliance with a Groundwater Monitoring Program and an Environmental Media Monitoring Plan to prevent the potential for unacceptable exposure and unacceptable release from soil to groundwater.

	For soil, while Pfizer's human health risk assessment found negligible risk associated with sampled soils for targeted contaminants, EPA finds characterization at some known and suspected Facility-related releases to soil are uncertain. Thus, for soil, EPA is proposing to require discovery notification of all releases of hazardous waste and/or hazardous constituents at or from the Facility not previously identified, and immediate or potential threats to human health and/or the environment at the Facility; land use restrictions; and compliance with an Environmental Media Management Plan to prevent the potential for adverse effects to human health and the environment during intrusive and soil management activities. Pfizer's ERA found adverse impacts are unlikely for ecological receptors potentially exposed to sampled sediment in Cornelius Creek.
2. Achieve media cleanup objectives	EPA's proposed remedy meets the media cleanup objectives based on assumptions regarding current and reasonably anticipated land uses. The remedy proposed in this SB is based on the current and future anticipated land use at the Facility as commercial or industrial. EPA's proposed remedy for groundwater will attain MCLs or risk-based goals as applicable via monitored natural attenuation and closing unused wells. Groundwater monitoring will continue until EPA and/or VADEQ approve in writing that groundwater remedial objectives are met and will continue to be met throughout the volume of Facility-contaminated groundwater, consistent with EPA's groundwater clean-up policy. For soils, as EPA finds characterizations at some known and suspected Facility-related releases to soil are uncertain, EPA is proposing compliance with discovery notification requirements and an Environmental Media Management Plan during intrusive and soil management activities.
3. Remediating the Source of Releases	In all proposed remedies, EPA seeks to eliminate or reduce further releases of hazardous wastes and hazardous constituents that may pose a threat to human health and the environment, and the remedy meets this objective.

	Based on currently available information, EPA believes known sources of most releases to soil have been eliminated through sewer line repair and replacement. Closing Well MW-16 will eliminate release of PAHs to groundwater at the area of Well MW-16.

Balancing Criteria	Evaluation
1. Long-term effectiveness	Long term effectiveness of the remedy will be maintained by implementing discovery notification requirements, land and groundwater use restrictions, a Groundwater Monitoring Program, and an Environmental Media Management Plan.
2. Reduction of toxicity, mobility, or volume of the Hazardous Constituents	The reduction of toxicity, mobility and volume of hazardous constituents in groundwater and soil will continue by attenuation and recharge. EPA finds natural attenuation has occurred in groundwater at known contaminant source areas exposed to infiltration and will continue to occur. Facility-related releases in groundwater will be monitored until EPA and/or VADEQ approve in writing that groundwater corrective action remedial objectives are met and will continue to be met throughout the Facility-contaminated groundwater.
3. Short-term effectiveness	EPA's proposed remedy minimizes exposure risk during activities, such as construction or excavation, that would pose short-term risks to workers or the environment. EPA anticipates that discovery notification requirements, the land and groundwater use restrictions, the Groundwater Monitoring Program, and the Environmental Media Management Plan, will be fully implemented shortly after the issuance of the FDRTC.
4. Implementability	EPA's proposed remedy is readily implementable. EPA proposes to implement the discovery notification requirements, the land and groundwater use restrictions, the Groundwater Monitoring Program, and the Environmental Media Management Plan through an enforceable mechanism such as an environmental covenant, permit or order.
5. Cost	EPA's proposed remedy is cost effective. The ten-year cost estimate submitted by Pfizer is $402,000 but does not include discovery notification or contaminant characterization at areas where contaminant characterization is uncertain and a portion of the proposed groundwater monitoring. The cost estimate includes the cost over ten years to implement 1) land use controls, 2)

	environmental covenants that meet the Virginia Uniform Environmental Covenants Act, 3) Five years of monitoring eleven wells, 4) soil management, and 5) five-year reviews.
6. Community Acceptance	EPA will evaluate community acceptance of the proposed remedy during the public comment period, and it will be described in the FDRTC.
7. State/Support Agency Acceptance	VADEQ has reviewed and concurred with the proposed remedy for the Facility.

Overall, based on the evaluation criteria, EPA has determined the proposed remedy meets the threshold criteria and provides the best balance of tradeoffs with respect to the evaluation criteria.

Section 7: Financial Assurance

EPA has evaluated whether financial assurance for corrective action is necessary to implement EPA's proposed remedy at the Facility. The ten-year cost estimate submitted by Pfizer is $402,200 but does not include a cost estimate for discovery notification or contaminant characterization at areas where contaminant characterization is uncertain and a portion of the proposed groundwater monitoring. The cost estimate for work not included in the cost estimate is not expected to exceed $10 million dollars over a ten-year period. Thus, EPA is not proposing a financial assurance requirement.

Section 8: Public Participation

Interested persons are invited to comment on EPA's proposed remedy. The public comment period will last thirty (30) calendar days from the date a public notice is published in a local newspaper. Comments may be submitted by mail, fax, or electronic mail to Ms. Diane Schott at the contact information listed below.

A public meeting will be held upon request. Requests for a public meeting should be submitted to Ms. Diane Schott in writing at the contact information listed below. A meeting will not be scheduled unless one is requested.

The AR contains all the information considered by EPA for the proposed remedy at this Facility. The AR is available at the following location:

U.S. EPA Region III
1650 Arch Street
Philadelphia, PA 19103
Contact: Ms. Diane Schott
MS: (3LD10)
Phone: (215) 814-3430
E-mail: schott.diane@epa.gov

Attachments:
Attachment 1: Human Health Risk Assessment Exposure Scenario Summary
Attachment 2: Proposed Minimum Initial Remedy Monitoring Network
Attachment 3: Figures

Date: 8/14/20

John A. Armstead, Director
Land, Chemicals, and Redevelopment Division
US EPA, Region III

Section 9: Index to Administrative Record

1968 Overflight Photograph
Facility Part A Applications
February 1986 EPA letter to the Facility requesting information on solid waste management units; letter in EPA file includes handwritten notes from a March 4, 1986 conversation with a Facility representative reporting that laboratory chemicals were burned in the former incinerator.
March 1986 Facility letter responding to EPA's request for information on solid waste management units.
1990 Surrounding groundwater use based on 1990 Census Information
1993 Facility Plant A Soil Remediation and UST Removal Report
1994 VADEQ drum pad closure letter
1996 NCAPS Assessment by VDEQ
1997 Facility certification of incinerator closure
2004 VADEQ central utility building oil spill closure letter
2006 Facility Draft Voluntary Remediation Report
November 22, 2005 Facility letter to the USACE- shows original SWMU/AOC locations
2006 USACE Site Visit Report
March 2008 Facility RFI Workplan
May 2008 Facility Workplan Addendum 1- Plant B Mixing Room
August 2008 Facility Workplan Addendum 2- Mixing Room Catch Tank Abandonment Workplan
July 2008 Facility Workplan Addendum 4- Property East of Cornelius Creek
2009 RCRA Facility Investigation Summary Report
March 2010 Facility Workplan Addendum 5- Additional Groundwater Investigation
April 2010 Pfizer NFA Request
May 2010 Facility Workplan Addendum 6 – Vapor Intrusion Investigation
August 11, 2010 Draft Summary of Field Investigations Draft Technical Memorandum
February 2011 Facility Draft Vapor Intrusion Report
February 2011 EPA comments – Multiple Submittals
March 2011 Pfizer Revised NFA Request
April 2011 EPA Tentative Decision Response Letter
July 2011 Facility Workplan Addendum 7- Supplemental Investigation
July 2012 Facility Draft Groundwater Model
March 2, 2012 Pfizer Status Report with tap water data
August 2012- Facility Water Line Repair Figure
August 2012 EPA comments on the Groundwater Model
October 2012 EPA workplan comments
February 2013 Facility groundwater analyses reports with TIC analyses
August 23, 2013 EPA Letter to Pfizer w memo attachment, Chloroform Screening Level
January 2014 Pfizer Response to Comments
February 2014 Pfizer Addendum 8 Workplan
February 2014 EPA Review Comments- Multiple Submittals

March 2014 Pfizer Response to Comments
June 2014 Pfizer Minutes from a May 29, 2014 Conference Call
August 2014 EPA comments on Pfizer's minutes on the May 29, 2014 Conference Call
August 2014 Pfizer Progress Report with Groundwater Levels and Contours
December 23, 2014 Pfizer letter with attached response to comments including proposed additions to the Addendum 8 Workplan
December 2014 Henrico County FOIA Response
April 2015 EPA Comprehensive Comments
May 27, 2016 Pfizer Notes from an April 14, 2016 Meeting
May 27, 2016 Pfizer Withdrawal of Addendum 8 Workplan
June 2016 Pfizer Sampling Tech Memo with PCB Soil Investigation Plans
2016 Pfizer PCB Soil Data and associated documentation (submitted in February 2017)
2017-01 Draft RFI/CMS Report
2017-07 EPA Comments on RFI/CMS Report
2017-08 Pfizer HHRA discussion submittals
2017-09-12 EPA comments on Pfizer HHRA discussion submittals
2018-06 RFI/CMS Report
2018-11-09 EPA comments on revised RFI/CMS Report
2019 Pfizer revised RFI/CMS Report and response to HHRA comments – (Appendix D Groundwater Trend Assessments in the electronic version of the 2019 RFI/CMS Report are unreadable)
2020-03-23 Pfizer comments on EPA SB Facts
2020-04-23 Pfizer submission of analytical reports and data validation reports
2020-08-10 Pfizer submission of analytical reports and data validation reports
September 2014 Human Health Exposures Under Control Environmental Indicator (HHEI)
April 2016 Migration of Contaminants in Groundwater Under Control Environmental Indicator (GWEI)
EPA Envirofacts RCRA Info Data Base Report
Henrico County FOIA Response- includes chemicals, facility drawings, permits and sampling data
Summary Groundwater Data:

- Historical through February 2013
- October 2013
- Spring 2014
- October 2014

Attachments

Attachment 1: Human Health Risk Assessment Exposure Scenario Summary

A human health risk assessment using existing data is in Section 5 of the RFI/CMS Report 2019 and is summarized in Table 5-59.

The results found detected concentrations of constituents at some areas were less than residential human health screening criteria. Thus human exposure risk was found to be negligible and a risk calculation was unnecessary for the following:

1. Soil at the area of the former Plant A and its accompanying WWTP;
2. Soil along the now abandoned west to east sewer line north of Plant B extending to Cornelius Creek;
3. Soil throughout Facility property east of Cornelius Creek (Laburnum Farm Field); and
4. Soil vapor below Building 2300.

Human exposure risks were calculated for the following exposure scenarios, where levels of individual contaminants exceeded screening levels:

1. Current and future site worker exposure to surface soil at the area of the former Facility wastewater sump northeast of the Building 2300 Warehouse Addition and near Cornelius Creek;

2. Future worker exposure to surface and subsurface soil up to 15 feet bgs at the area of the former Facility wastewater sump northeast of the Building 2300 Warehouse Addition and near Cornelius Creek;

3. Worker indoor air exposure to vapors from East Production Area groundwater near Well MW-4 (using data from Wells MW-2, MW-4 and MW-7);

4. Worker indoor air exposure to vapors from East Production Area groundwater near Well MW-11 (using data from Wells MW-8, MW-9, MW-10, MW-11, MW-12, MW-16 and MW-19);

5. Worker indoor air exposure to vapors from East Production Area groundwater near Well MW-37 (using data from Well MW-37);

6. Worker indoor air exposure to vapors from groundwater south of the southwest corner of Plant B (using data from Wells MW-21, MW-22, MW-23 and MW-24);

7. Worker indoor air exposure to vapors from Plant B wastewater;

8. Worker indoor air exposure to vapors from groundwater within 100 feet of the Firehouse (using data from Wells MW-13, MW-14, MW-38 and MW-39);

9. Construction worker exposure to surface and subsurface soil at the area of the former Facility wastewater sump northeast of the Building 2300 Warehouse Addition and near Cornelius Creek;

10. Construction worker exposure to East Production Area groundwater near Well MW-4 (using data from Wells MW-2, MW-4 and MW-7);

11. Construction worker exposure to East Production Area groundwater near Well MW-11 (using data from Wells MW-8, MW-9, MW-10, MW-11, MW-12, MW-16 and MW-19);

12. Construction worker exposure to East Production Area groundwater near Well MW-37 (using data from Well MW-37);

13. Construction worker exposure to groundwater south of the southwest corner of Plant B;

14. Construction worker exposure to groundwater within 100 feet of the Firehouse;

15. Utility worker in a trench exposure to surface and subsurface soil at the area of the former Facility wastewater sump northeast of the Building 2300 Warehouse Addition Location and near Cornelius Creek;

16. Utility worker in a trench exposure to East Production Area groundwater near Well MW-4 (using data from Wells MW-2, MW-4 and MW-7);

17. Utility worker in a trench exposure to East Production Area groundwater near Well MW-11 (using data from Wells MW-8, MW-9, MW-10, MW-11, MW-12, MW-16 and MW-19);

18. Utility worker in a trench exposure to East Production Area groundwater near Well MW-37 (using data from Well MW-37);

19. Utility worker in a trench exposure to groundwater south of the southwest corner of Plant B;

20. Utility worker in a trench exposure to groundwater within 100 feet of the Firehouse;

21. Adolescent trespasser exposure to surface soil (0-2 feet) at the area of the former Facility wastewater sump northeast of the Building 2300 Warehouse Addition and near Cornelius Creek;

22. Future adolescent trespasser exposure to surface and subsurface soil (0-15 feet) at area of the former Facility wastewater sump northeast of the Building 2300 Warehouse Addition and near Cornelius Creek;

23. Adolescent trespasser exposure to Cornelius Creek sediment (wading);

24. Hypothetical future residential exposure to surface soil (0-2 feet) at the area of the former Facility wastewater sump northeast of the Building 2300 Warehouse Addition and near Cornelius Creek; and

25. Hypothetical future adult and child residential exposure to surface and subsurface soil (0-15 feet) at the area of the former Facility wastewater sump northeast of the Building 2300 Warehouse Addition and near Cornelius Creek.

Attachment 2: Proposed Minimum Initial Remedy Monitoring Network

Sample Location or Well	Constituent (Proposed Groundwater Remedial Objective (ug/l))	Rationale	Detection Summary
March 2010 Sample Location #11 14-18 feet bgs	Chloroform (80 ug/l)	Near the former sewer break of the former Plant A WWTP. Measured concentration was an order of magnitude greater than the concentration measured at the Pfizer designated source area Well MW-7 during the same time period.	The concentration of chloroform collected via DPT and measured in a mobile laboratory was 290 ug/l and later was adjusted to 580 ug/l.
March 2010 Sample Location #11 14-18 feet bgs	TCE (5 ug/l)	Near the former sewer break of the former Plant A WWTP. Measured concentration was more than 6 times the concentration measured at the Pfizer designated source area Well MW-7 during the same time period.	The concentration of TCE collected via DPT and measured in a mobile laboratory was 7.6 ug/l.
March 2010 Sample Location #11 32-36 feet bgs	Chloroform (80 ug/l)	Near the former sewer break of the former Plant A WWTP Measured concentration was more than 3 times the concentration measured at the Pfizer designated source area Well MW-7, and the sample was collected from the primary water bearing unit- the sand and gravel aquifer.	The concentration of chloroform collected via DPT and measured in a mobile laboratory was 89 ug/l and later was adjusted to 178 ug/l.

Well MW-4	TCE (5 ug/l)	The 95% upper confidence limit (UCL) for TCE exceeds 5 ug/l by 170% when it is calculated using data from all sampling events and by 126% when it is calculated using data from the eight most recent sampling events.	The concentration of TCE was less than 1 ug/l in November 2001, increased to 14 ug/l in October 2009, and was estimated as 0.12 ug/l in April 2014.
Well MW-5	1,1,2,2-Tetrachloroethane (0.757 ug/l)	The most recent measurement and the 95% UCL for the concentration of 1,1,2,2-Tetrachloroethane using results from all sampling events exceed 0.757 ug/l by 15% and 74%, respectively.	The concentration of 1,1,2,2-Tetrachloroethane was measured from June 2002 to October 2014 and was a mix of low concentration detections and non-detections, with a detection limit of 1 ug/l. The maximum detected concentration was 1.7 ug/l in April 2009. The most recent measurement was 0.87 ug/l in October 2014.
Well MW-5	Chloroform (80 ug/l)	The 95% UCL for the concentration of chloroform exceeds 80 ug/l by 20% when it is calculated using data from all sampling events but does not exceed 80 ug/l when it is calculated using data from the eight most recent sampling events.	The concentration of chloroform was 180 ug/l in June 2002, reduced to 9 ug/l in April and October 2007, increased to 85 ug/l in April 2009 and was 33 ug/l in October 2014.
Well MW-7	Chloroform (80 ug/l)	Near source area and historic exceedance of groundwater objective.	The concentration of chloroform was 470 ug/l in June 2002, reduced to 48 ug/l in June 2005, further reduced to 16 ug/l in October 2007, increased to 56 ug/l in February 2013, and was 28 ug/l in April 2014.
Well MW-7	PCE (5 ug/l)	Data from the eight most recent sampling events indicate an increasing trend exists and, if the trend continues, the concentration	The concentration of PCE was an estimated 4 ug/l in June 2002, reduced to less than 0.8 ug/l in October 2008, increased to 2.4 ug/l in

		of PCE will exceed its groundwater objective of 5 ug/l in 2023. The increasing trend for the concentration of PCE is attributed to past release of maintenance fluids at the nearby Building 2300 Rail Spur Loading Dock and is anticipated to have reversed since sampling stopped in April 2014.	October 2011, and was 2 ug/l in April 2014.
Well MW-7	TCE (5 ug/l)	Near source area and historic exceedance of groundwater objective	The concentration of TCE was 13 ug/l in June 2002, reduced to an estimated 2 ug/l in June 2005, further reduced to less than 1 ug/l in October 2007, increased to 2 ug/l in October 2011, and was 1 ug/l in April 2014.
Well MW-8	Chloroform (80 ug/l)	The 95% UCL for the concentration of chloroform exceeds 80 ug/l by 135% when it is calculated using data from the eight most recent sampling events but does not exceed 80 ug/l when it is calculated using data from all sampling events. Data from the eight most recent sampling events indicates the concentration of chloroform was increasing when sampling stopped in 2014. The increasing trend is attributed to a mobilized chloroform plume mass where the concentration of chloroform is anticipated to increase and then decrease as the mass of chloroform moves through the well. Well MW-8 is downgradient from the area where the mobilized mass of	The concentration of chloroform was 51 ug/l in June 2005, reduced to 26 ug/l in April 2008, increased to 260 ug/l in April 2014, and was 67 ug/l and 70 ug/l when it was resampled in June 2014.

		chloroform exceeding 80 ug/l originated near the former Plant A WWTP.	
Well MW-9	Chloroform (80 ug/l)	Trend results indicate the concentration of chloroform was increasing when sampling stopped in 2014. The increasing trend is attributed to a mobilized chloroform plume mass where the concentration of chloroform is anticipated to increase and then decrease as the mass of chloroform moves through the well. Well MW-9 is downgradient from the southern tip of the mobilized mass of chloroform exceeding 80 ug/l that was at Well MW-19.	The concentration of chloroform was 10 ug/l in June 2005, increased to 53.9 ug/l in October 2011, reduced to 22 ug/l in February 2013, and was 42 ug/l in October 2014.
Well MW-11	Chloroform (80 ug/l)	Trend results indicate the concentration of chloroform was increasing when sampling stopped in 2014. The increasing trend is attributed to a mobilized chloroform plume mass where the concentration of chloroform is anticipated to increase and then decrease as the mass of chloroform moves through the well. Well MW-11 is downgradient from the mobilized mass of chloroform exceeding 80 ug/l that originated near the former Plant A WWTP.	The concentration of chloroform was 7 ug/l in September 2005, increased to 14 ug/l in October 2010, reduced to 10 ug/l in February 2013, and was 25 ug/l in April 2014.
Well MW-13	Chloroform (80 ug/l)	Well MW-13 is or has been downgradient from the mobilized mass of chloroform exceeding 80 ug/l that originated near the	The concentration of chloroform was 41 ug/l in July 2006, reduced to 25 ug/l in October 2009, increased to 40 ug/l in October 2010,

		Former Plant A WWTP and was near Well MW-8 in 2014. Well MW-13 is upgradient from and within 100 feet of the Firehouse.	reduced to 26.8 ug/l in October 2011, increased to 42 ug/l in April 2014 and was 25 ug/l in October 2014.
Well MW-19	Chloroform (80 ug/l)	Well MW-19 is downgradient from historic release source areas that originate near the areas of the former Plant A WWTP and north of the former Plant A. The 95% UCL for the concentration of chloroform at Well MW-19 exceeds 80 ug/l by 49% when it is calculated using data from all sampling events and by 71% when it is calculated using data from the eight most recent sampling events.	The concentration of chloroform was 140 ug/l in April 2007, increased to 190 ug/l in October 2007, exceeded 80 ug/l through October 2011, and was 35 ug/l in October 2014.
Well MW-36	Chloroform (80 ug/l)	Well MW-36 is or has been directly downgradient from the mobilized mass of chloroform exceeding 80 ug/l that was at Well MW-19 and it is upgradient to and near Cornelius Creek.	The concentration of chloroform was 14 ug/l in May 2010, reduced to 2.43 ug/l in October 2011, increased to 8.1 ug/l in February 2013, and was 1.7 ug/l in October 2014.
Well MW-37	Chloroform (80 ug/l)	Trend results indicate the concentration of chloroform was “probably” increasing when sampling stopped in 2014. Well MW-37 is or has been downgradient from the mobilized mass of chloroform exceeding 80 ug/l that was at Well MW-5 and DPT-GW-23. The concentration of chloroform at DPT-GW-23 was 170 ug/l in September 2002. Well MW-37 is also downgradient from the northern tip of the mobilized mass of chloroform exceeding 80	The concentration of chloroform was an estimated 0.25 ug/l in May 2010 and was 2.5 ug/l in October 2014.

		ug/l that was at Well MW-19. Well MW-37 is upgradient to and near Cornelius Creek.	
Well MW-39	Chloroform (80 ug/l)	Well MW-39 is or has been downgradient from the mobilized mass of chloroform exceeding 80 ug/l that originated near the former Plant A WWTP and that was near Well MW-8 in 2014. Well MW-39 is downgradient from the Firehouse and upgradient to and near Darbytown Road and Cornelius Creek.	The concentration of chloroform at Well MW-39 was 21 ug/l in January 2012, reduced to 12 ug/l in October 2013, and was 37 ug/l in October 2014.

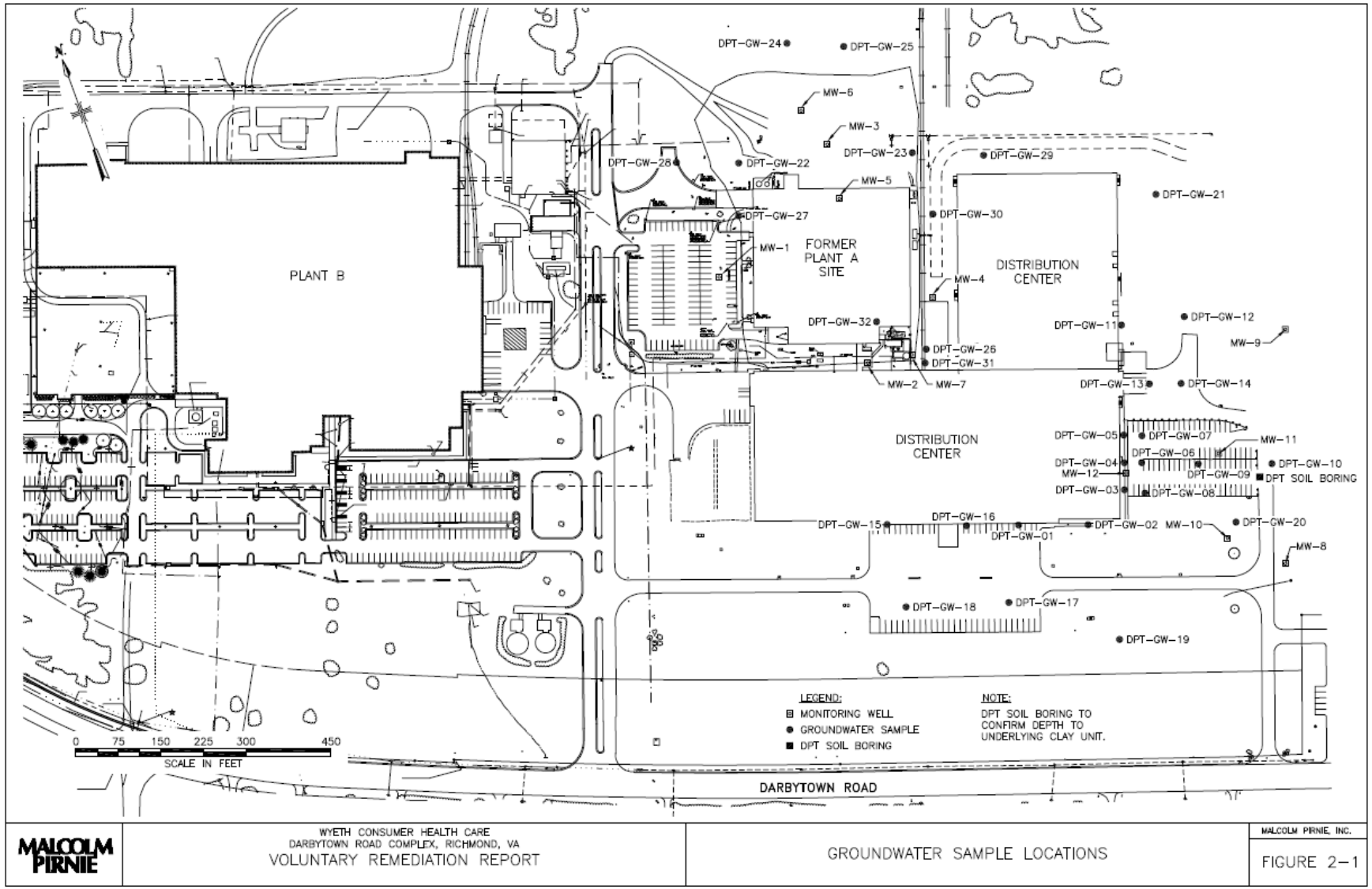
Attachment 3: Figures

SB Figure 1: 2019 RFI/CMS Report Figure 1-1 Site Location Map 2016 Aerial Photograph

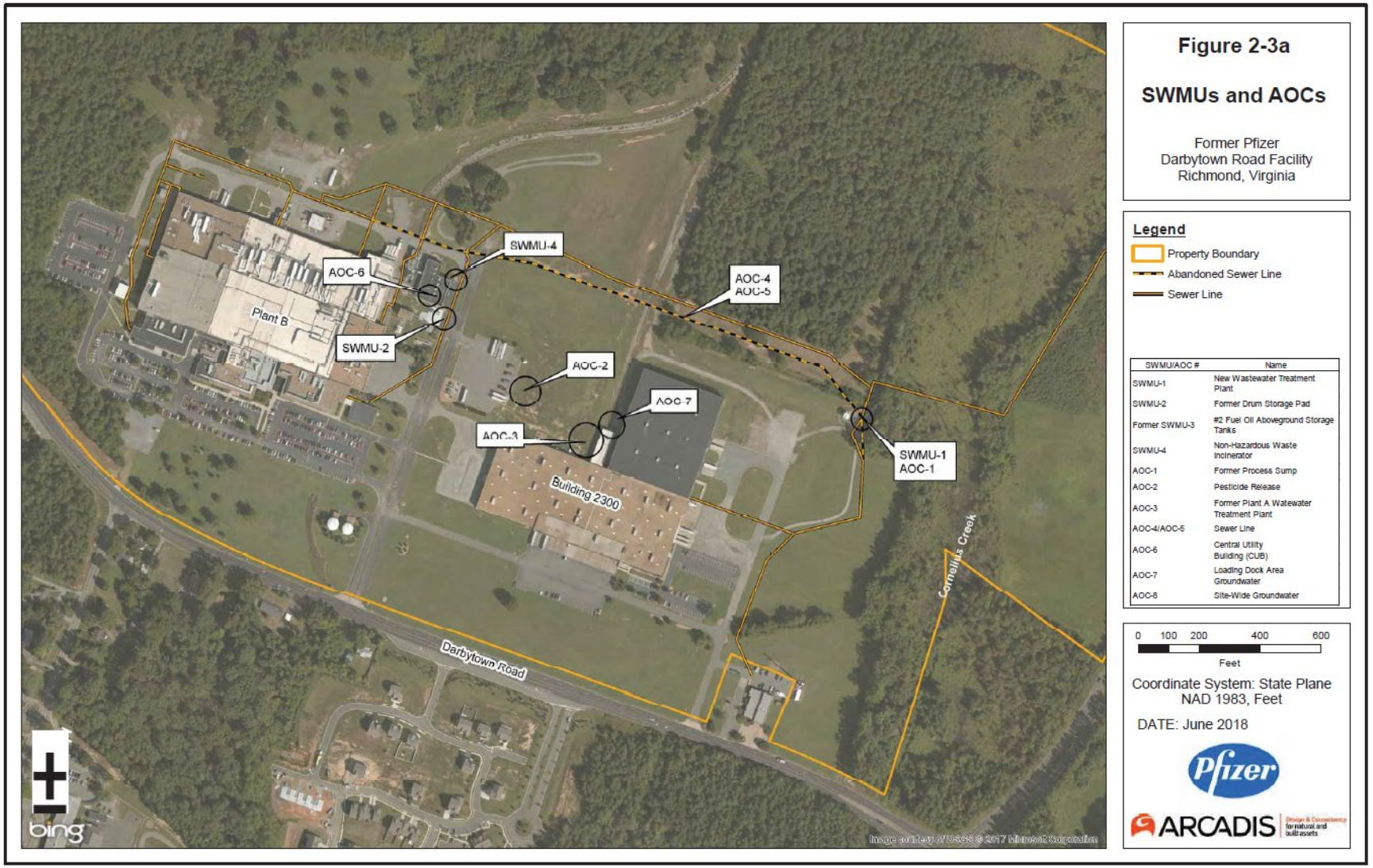
SB Figure 2: 2019 RFI/CMS Report Figure 1-4 Land Use

SB Figure 3A: 2019 RFI/CMS Report Figure 1-2 Site Layout

SB Figure 3B: 2006 Revised Draft Voluntary Remediation Report Figure 2-1: Groundwater Sample Locations

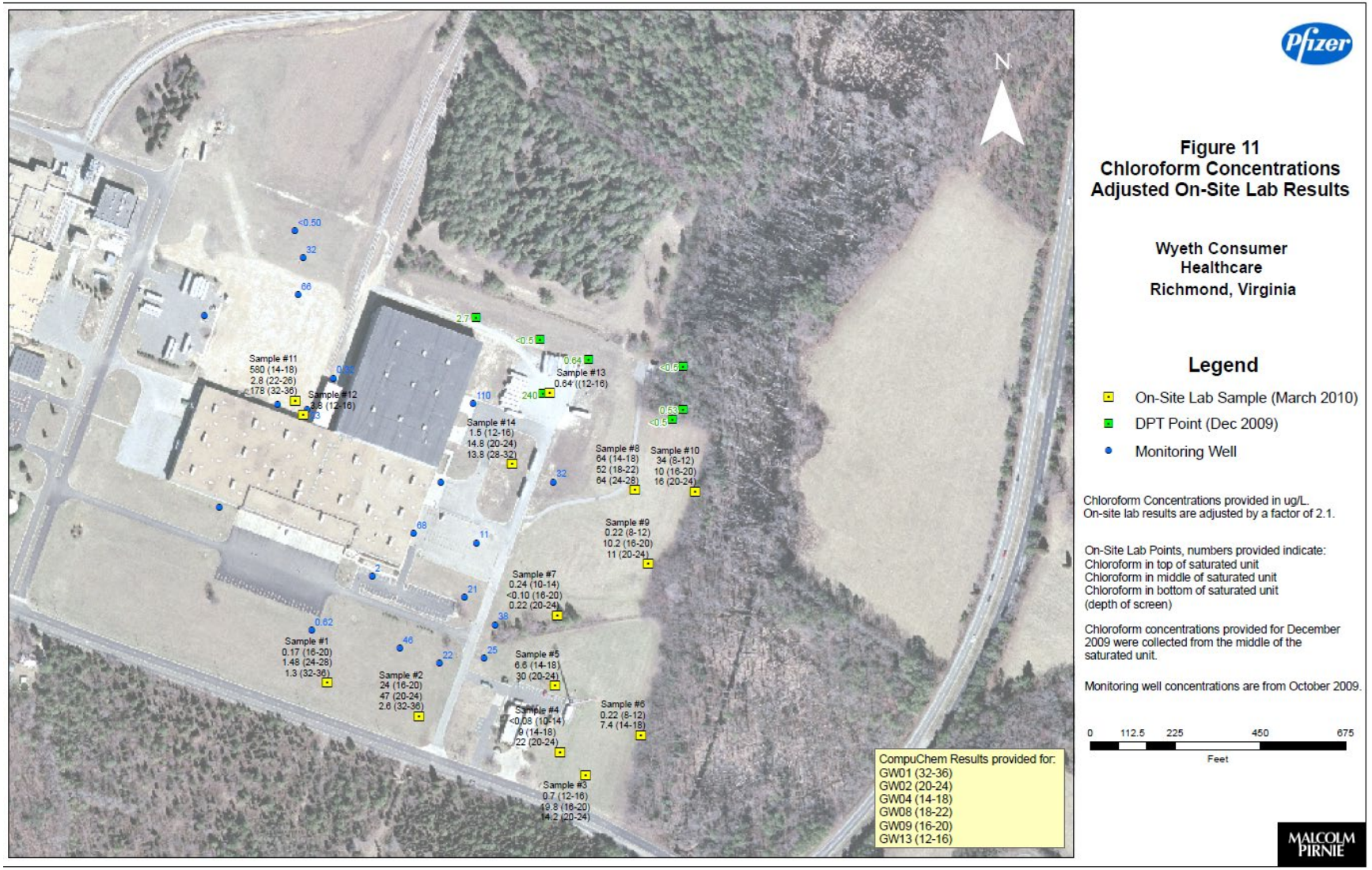


SB Figure 4: 2019 RFI/CMS Report Figure 2-3a SWMUs and AOCs



SB Figure 5A: 2019 RFI/CMS Report Figure 2-4 Groundwater Monitoring Well Locations

SB Figure 5B: Chloroform Concentrations Adjusted On-Site Lab Results March 2010



SB Figure 6: 2019 RFI/CMS Report Figure 6-1 Pfizer's Proposed Soil Management Area