



UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

REGION III

STATEMENT OF BASIS

DUPONT TELJIN FACILITY

HOPEWELL, VIRGINIA

EPA ID NO. VAD 000 019 273

I. Introduction

The United States Environmental Protection Agency (EPA) has prepared this Statement of Basis (SB) to solicit public comment on its proposed decision for the DuPont Teijin Facility located at Hopewell, Va (Facility). EPA's proposed decision consists of requiring the Facility to maintain a groundwater monitoring program and to develop and maintain property restrictions known as Institutional Controls (ICs). This SB highlights key information relied upon by EPA in making its proposed decision.

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

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

II. Facility Background

The Facility property consists of approximately 147 acres and is surrounded by water on three sides. The property is relatively flat with a slight rise in topography from west to east. The James River lies to the north, the Appomattox River, a major tributary of the James River, lies about one mile to the east, and some undeveloped land including a wildlife refuge with a 30-acre pond lies to the west with sporadic wetlands on the northern and western perimeters. A location map is attached as Figure 1.

The Facility was constructed by ICI Polyester in the early 1970s and was purchased by E.I. du Pont de Nemours and Company (DuPont) in 1998. DuPont entered into a joint venture with Teijin Films in 2000. Manufacturing activities have consisted of various polymer film materials with over 50 polyester film types and 8,000 products. The primary chemicals used in the manufacturing process include ethylene glycol, dimethyl terephthalate, and terephthalic acid, and historically phenolic compounds. The Facility manufactures methanol as a byproduct of the polyester process.

III. Summary of Environmental Investigation

ICI Polyester previously applied for a RCRA Permit in 1980 for greater than 90-day waste storage and, in 1983, withdrew its application.

Investigations conducted at the Facility included the 1993 fate and transport assessment, a 1997 Solid Waste Management Unit (SWMU) geophysical survey and investigation, and 1998 environmental site assessments. Data have also been gathered from routine Facility-wide groundwater monitoring.

In December of 2006, the Facility entered EPA's Region 3 Facility Lead Program in order to conduct RCRA Corrective Action activities.

A. Phase I RCRA Facility Investigation (RFI)

Under a 2006 Facility Lead Agreement between EPA and DuPont pursuant to the Facility Lead Program, DuPont conducted a Phase I RCRA Facility Investigation (Phase I RFI). Field activities associated with the Phase I RFI were initiated in March 2008 and completed in May 2008. The findings from the investigation were presented in the Phase I RCRA Facility Investigation Report submitted to EPA in October 2008. The specific objectives of the Phase I RFI implemented at the Facility were as follows:

- Characterization of corrective action units where historical releases are known or suspected to have occurred.
- Update of the current understanding of Facility-wide hydrogeologic conditions within the upper and lower aquifers relating to physical and chemical characteristics of the aquifers.
- Evaluation of the integrity and usefulness of the 16 existing shallow, two water supply, and six deep groundwater monitoring wells.
- Collection of data necessary to evaluate and meet Environmental Indicators (EIs) which conforms with Corrective Action program goals (see Section III. C.).

Activities completed to meet these objectives included the following: (1) a geophysical survey; (2) monitoring well development; (3) measurement of groundwater elevations; (4) collection of groundwater samples from four groundwater monitoring points, 17 newly installed and 22 existing monitoring wells and two production wells; and (5) collection of 55 surface and subsurface soil samples from the following six SWMUs and six Areas of Concern (AOCs). AOC A consists of two parts which are the perimeter area and the manufacturing area. (See Figure 2 for SWMU and AOC locations):

- SWMUs 1, 2, 3, 4, 5, and 8
- AOCs A, B, C, D, G, and H.

Soil and groundwater samples were analyzed for Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), metals, 1,1 biphenyl, diphenyl ether, acetaldehyde, and glycols.

Water concentrations were screened against Drinking Water Standards (Federal Maximum Contaminant Level (Federal MCLs) promulgated pursuant to Section 42 U.S.C. §§ 300f et seq. of the Safe Drinking Water Act and codified at 40 CFR Part 141), or EPA Region III Risk-Based Concentration (RBCs) for tap water (designated as Screening Levels for tap water (SLs)) for chemicals for which there are no applicable Federal MCLs.

Soil concentrations were screened against EPA RBCs for residential soil and industrial soil (designated as soil SLs). EPA also has Soil Screening Levels to protect groundwater (SSLs) and soil concentrations were also screened against these levels.

DuPont proposed, and EPA approved, risk-based screening levels for diphenyl ether since EPA had not calculated screening levels for this contaminant.

The following SWMUs and AOC were investigated in the Phase I RFI:

1. AOC A – Manufacturing Area Groundwater Characterization

Ten existing shallow monitoring wells (MW-2 thru MW-9, MWS-01 and MWS-02), North production well, and six wells (MW-104A, MW-105A, MW-106A, MW-107A, MW-107B and MW-107C) were installed by DuPont's contractor and used in the evaluation (see Figure 3 for well locations).

a. Groundwater

VOCs, six SVOCs, one glycol, 15 metals, 1,1-biphenyl and diphenyl ether were detected above Method Detection Limits (MDLs) in the groundwater samples collected. MDLs are the lowest quantity of a substance that can be accurately reported.

Of the organic constituents detected, three VOCs (chloroform, tetrachloroethylene, and trichloroethene), three SVOCs (1,4-dioxane, diallate, and naphthalene), one glycol (ethylene glycol), 1,1-biphenyl and diphenyl ether exceeded screening criteria.

Chloroform, 1,4-dioxane, and diphenyl ether most frequently exceeded screening criteria. Chloroform was detected above the tap water SL (0.19 micrograms/liter (ug/L)) in seven locations. Concentrations for chloroform ranged from 0.2 ug/L to 1.7 ug/L, which are below the Federal MCL (80 ug/L). 1,4-Dioxane was detected above the tap water SL (6.1 ug/L) in seven locations. Concentrations ranged from 9 ug/L to 89 ug/L. The highest concentration (89 ug/L) was observed in monitoring well location MW-04 located downgradient of SWMU 1.

Diphenyl ether was detected above the screening criterion in six locations. The highest concentration (9,000 ug/L) was observed in monitoring well location MW-04 located near the Dowtherm heaters of SWMU 1.

Of the inorganic constituents detected, antimony, arsenic, cadmium, cobalt, lead, mercury, thallium and vanadium exceeded screening criteria. Of these, arsenic exceeded the tap water SL in 14 locations. Concentrations ranged from 0.81 ug/L to 10.9 ug/L. The highest concentration (10.9 ug/L), which was slightly above the Federal MCL (10 ug/L), was observed at monitoring well location MW-4. Cobalt exceeded the tap water SL in 15 locations. Concentrations ranged from 2.2 ug/L to 171 ug/L. The highest concentration was observed at monitoring well location MWS-01 located west of SWMU 8.

Ethylene glycol was detected in MWs-100A, B and C at concentrations of 15,000 ug/L, 15,000 ug/L and 19,000ug/L, respectively. Additionally, tetrachloroethylene was detected in well pair MW-101A and DMW-4 at concentrations of 30 ug/L and 23 ug/L, respectively.

2. AOC A - Perimeter Area Groundwater Characterizations

Six existing shallow wells (MW-1, MW-10, MW-11, SMW-1, SMW-2, and SMW-3), six existing deep wells (DMW-1 through DMW-6), South production well, and 11 installed wells (MW-100A/B/C, MW-101A, MW-102A/B, MW-103A/B, MW-108A, MW-109A and MW-110A) were used in the evaluation.

a. Groundwater

Nineteen VOCs, two SVOCs, diphenyl ether, three glycols and 14 metals were detected above MDLs in the groundwater samples collected.

Of the organic constituents detected, eight VOCs (1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, chloroform, cis-1,2 dichloroethene, tetrachloroethylene, trichloroethene, and vinyl chloride), three glycols (ethylene glycol, diethylene glycol, and triethylene glycol), and two SVOCs (1,4-dioxane and diallate) exceeded screening criteria. The glycols were concentrated around the western and northern perimeters of the Facility, while the chlorinated constituents were concentrated around the eastern portion of the Facility.

The highest concentration of ethylene glycol (26,000 ug/L) along the perimeter of the Facility was observed at monitoring well location MW-100A located near SWMU 5.

The highest concentrations of total chlorinated constituents in the shallow aquifer are located at MW-101A adjacent to a cemetery, while the highest concentration in the deep aquifer is located in DMW-6 near the southeastern fence line.

Of the inorganic constituents, 10 metals exceeded screening criteria. Arsenic concentrations exceeded criteria in 11 of the 23 wells. Concentrations ranged from 0.79 ug/l to 6.2 ug/l, which are below the Federal MCL (10 ug/L). Cobalt exceeded criteria in 13 of 23 wells, with concentrations ranging from 4.2 ug/L to 61.8 ug/L. The highest concentration for both constituents was observed at upgradient location SWM-3.

3. SWMU 1 and AOC B (Tank Farm and Glycol Hot Well)

A total of 18 soil samples (surface and subsurface) were collected from nine boring locations installed at SWMU 1. Groundwater was sampled from six existing groundwater monitoring wells (MW-1, MW-2, MW-3, MW-4, MW-5 and MW-6).

a. Soil

No constituents were detected in soil above screening criteria (Screening Levels (SLs), Soil Screening Levels (SSLs)) or Facility specific soil background concentrations for inorganics.

b. Groundwater

In groundwater, 1,1 biphenyl and diphenyl ether exceeded the screening criteria (tap water SLs) in three locations. Three SVOCs (diallate, naphthalene, and 1,4-dioxane) were also detected above screening criteria.

Antimony, arsenic, cadmium and cobalt were also detected above the screening criteria in groundwater. Arsenic and cobalt exceeded the screening criteria in five of the six locations sampled. Arsenic was detected above the tap water SL and the Federal MCL in one location.

4. SWMU 2 (Wastewater Incinerator)

A total of four soil samples (surface and subsurface) were collected from two boring locations installed at the SWMU. One groundwater monitoring well (MW-105A) was installed in the upper aquifer at the SWMU. Groundwater samples were collected from three groundwater monitoring wells (MW-105A, MW-7 and MW-8).

a. Soil

In the soil samples, no organic constituents were detected above screening criteria. Of the inorganic constituents detected, only antimony was detected above SLs or SSLs and Facility-specific soil background concentrations. Antimony was detected in surface soil at a boring location above the SL for residential soil but below the SL for industrial soil.

b. Groundwater

In groundwater, one VOC (chloroform), one SVOC (1,4-dioxane), and diphenyl ether exceeded the screening criteria at one well. Arsenic was detected above the tap water SL but below the Federal MCL in two locations. Cobalt exceeded the tap water SL in all three locations. Arsenic and cobalt concentrations at the SWMU were less than those observed at an upgradient well location.

5. SWMU 3 (Former Construction Landfill)

A total of eight soil samples were taken from four soil borings installed at SWMU 3. Groundwater was sampled from two existing groundwater monitoring wells (MW-10 and MW-11).

a. Soil

Nine VOCs, 18 SVOCs, two glycols, 1,1 biphenyl and diphenyl ether were detected in the eight soil samples collected from SWMU 3. In addition, 16 metals were detected. Of the organic constituents detected, the following four exceeded SLs for residential soil: acetaldehyde, and three polynuclear aromatic hydrocarbons (PAHs) [benzo(a)anthracene, benzo(b)fluoranthene, and benzo(a)pyrene]. The three PAH exceedances were noted in the surface soil sample interval at one location. The acetaldehyde exceedance was noted at a depth of 16 feet below grade surface (bgs), where direct contact is unlikely to occur. None of the constituents exceeded SLs for industrial soil.

Acetaldehyde, tetrachloroethylene, 1,4 dioxane, benzo(a)pyrene, pentachlorophenol, diethylene glycol and ethylene glycol exceeded SSLs. With the exception of benzo(a)pyrene, exceedances were noted in sample intervals directly above the water table. However, as noted in the discussion below, only tetrachloroethylene and diethylene glycol were detected in groundwater above screening criteria.

Four inorganic constituents (antimony, arsenic, cobalt, and thallium) exceeded the SLs for residential soil. However, only arsenic exceeded the SL for industrial soil (1.6 milligrams/liter (mg/kg)), ranging in concentration from 1.97 mg/kg to 8.82 mg/kg.

Arsenic exceeded the SSL (0.026 mg/kg) in all four boring locations. Cobalt exceeded the SSL (9.8 mg/kg) in one boring location (SWMU3-SB1) at a concentration of 11.7 mg/kg. Similar to other units, arsenic and cobalt concentrations are considered consistent with background.

b. Groundwater

Three VOCs (chloroform, tetrachloroethylene, and trichlorofluoromethane), one SVOC (1,4-dioxane) and one glycol (diethylene glycol) were detected above the MDLs. Six metals were also detected.

Of the organic constituents detected, chloroform and tetrachloroethylene exceeded the screening criteria in both MW-10 and MW-11. Diethylene glycol exceeded the criteria in MW-11 only.

Of the inorganic constituents detected, arsenic exceeded the screening criteria in both monitoring locations. Antimony exceeded screening criteria in MW-11 only; however, concentrations of both constituents were below Federal MCLs.

6. SWMU 4 (Former Hazardous Waste Storage Pad)

One soil boring was installed at each side of the SWMU. Surface soil samples (from a depth of 0 to 1 foot bgs) were collected from each location.

a. Soil

No constituents were detected in soil above screening criteria and Facility-specific soil background concentrations for inorganics.

7. SWMU 5 (Wastewater Treatment Plant)

Soil samples (surface and subsurface) were collected from three soil borings installed at the SWMU. Groundwater samples were collected from three monitoring wells: one in the upper aquifer, one in the intermediate zone, and one in the lower aquifer, installed within the general area of the unit (MW-100A, MW-100B and MW-100C).

c. Soil

In the soil samples, two polynuclear aromatic hydrocarbons (PAHs) [benzo(b)fluoranthene and benzo(a)pyrene] were detected above the SL for residential soil. Neither constituent was detected above the SL for industrial soil. Benzo(a)pyrene was detected above the SSL in surface soil but was not detected at the subsurface soil sample collected directly above the water table. None of the inorganic constituents were detected above screening criteria (SLs or SSLs) and Facility specific soil background concentrations.

d. Groundwater

In groundwater, two VOCs (chloroform and tetrachloroethylene), three glycols (ethylene glycol, diethylene glycol and triethylene glycol) and two metals (arsenic and cobalt) exceeded the screening criteria. Chloroform, ethylene glycol, and diethylene glycol exceeded screening criteria in all three wells that were installed at the SWMU. Arsenic was detected above the tap water SL but below the Federal MCL at one well. Cobalt exceeded the tap water SL in two wells. Concentrations at the SWMU were less than those observed in an upgradient well.

8. SWMU 8 (Pack Shop Pump)

Groundwater samples were collected from two existing groundwater monitoring wells (MWS-01 and MWS-02).

a. Groundwater

One SVOC (1,4-dioxane) and four metals (antimony, arsenic, cadmium, and cobalt) were detected in groundwater above screening criteria. Of the metals detected, only cadmium was detected above the tap water SL and Federal MCL.

9. AOC C (Wastewater Collection Sump)

Two soil borings and one monitoring well (MW-104A) were installed at the AOC. A total of four soil samples (surface and subsurface) were collected from the two boring locations. Groundwater samples were collected from the monitoring well.

a. Soil

In soil, no organic constituents were detected above residential SLs for soil. One SVOC (diallate) exceeded the SSL in one location at the surface soil sample interval (0.5 to 1.5 feet below grade surface (bgs)). However, the constituent was not detected in the subsurface soil sample interval collected from 8 to 10 feet bgs.

Of the inorganic constituents detected, only cobalt was detected above the SSL and Facility-specific soil background concentrations in the shallow soil sample collected at a depth of 1.75 to 3 feet bgs. However, cobalt was detected below the screening criterion in the deeper soil interval collected from 7 to 10 feet bgs at the location.

b. Groundwater

In groundwater, one VOC (chloroform) was detected above the tap water SL but was less than the Federal MCL. Arsenic and cobalt were also detected above screening criteria. Arsenic was detected above the tap water SL but was less than the Federal MCL. Cobalt was detected above the tap water SL but less than concentrations observed in upgradient location SMW-03.

10. AOC D (Former Underground Storage Tank (UST) Locations)

Two soil borings and one monitoring well (MW-106A) were installed at the AOC. A total of four soil samples (surface and subsurface) were collected from the two soil borings. Groundwater was also collected from each of the soil boring locations. Groundwater was

sampled from three groundwater monitoring wells: (MW-106A, MWS-02 and MW-08).

a. Soil

In the soil samples, three PAHs [benzo(a)anthracene, benzo(b)fluoranthene and benzo(a)pyrene] exceeded the residential SL for soil. None of the constituents exceeded the industrial SL for soil. One PAH [benzo(a)pyrene] exceeded the SSL in the surface soil sample interval but was non-detect in the deeper soil sample collected from a depth of 8 to 12 feet bgs. No inorganic constituents were detected in soil above screening criteria or in Facility-specific soil background concentrations.

b. Groundwater

In groundwater, one SVOC (1,4-dioxane) and two metals (arsenic and cobalt) exceeded screening criteria. 1,4-Dioxane was also detected above the screening criterion in the groundwater samples collected from the three monitoring well locations. In addition, one VOC (chloroform), one glycol (ethylene glycol), and diphenyl ether exceeded screening criteria in the groundwater samples collected. Most of these exceedances were detected in one well.

Of the inorganic constituents detected, arsenic and cobalt exceeded screening criteria. Arsenic was detected above the tap water SL, but less than the Federal MCL. Cobalt exceeded the tap water SL in all three locations but was less than concentrations observed at an upgradient location.

11. AOC G (Underground Wastewater Line)

Two soil borings were installed within the AOC. A total of four soil samples (surface and subsurface) were collected from the two boring locations. Groundwater was also sampled from each boring.

a. Soil

In soil, no constituents were detected above screening criteria and Facility-specific soil background concentrations for inorganics.

b. Groundwater

No organic constituents were detected in groundwater. Of the metals detected, only cobalt was detected above the tap water SL.

12. AOC H (Fuel Oil Tank #1)

Groundwater was sampled from existing monitoring well MW-9 and analyzed for VOCs, SVOCs, and metals.

a. Groundwater

No organic constituents were detected in the monitoring well. Of the inorganic constituents detected, arsenic and cobalt were detected above screening criteria. Arsenic was detected above the tap water SL but below the Federal MCL. Cobalt was detected at above the tap water SL but below concentrations observed in the upgradient location.

B. Phase II RFI

In 2010 DuPont conducted a Phase II RCRA Facility Investigation (Phase II RFI), in which it addressed data gaps identified in the Phase I RFI, specifically focusing on Facility-wide groundwater contamination.

1. Glycol Detections in Groundwater

a. Groundwater

During the Phase I RFI, three glycol isomers (ethylene glycol, diethylene glycol or triethylene glycol) were detected at estimated concentrations above tap water SLs in 13 monitoring well locations (DWM-1 through DWM-6, MW-1, MW-2, MW-3, MW-7, MW-100A, MW-100B and MW-100C). However, during the Phase II RFI, none of these isomers was detected in the monitoring wells in 2010. This result is not unexpected since glycols have reported half-lives in groundwater of one day to several weeks. During the Phase II RFI, glycol detections were limited to the propylene glycol isomer, at concentrations below the tap water SL. Propylene glycol was not previously detected in the Phase I RFI monitoring event conducted in April 2008.

2. Background Soil Quality

a. Soil

Surface and subsurface soils samples were collected from six soil boring locations. Boring locations were installed in portions of the Facility where manufacturing operations have not taken place. Soil samples from each location were analyzed for metals.

The soil inorganic analytical data were used to calculate a 95% upper tolerance limit (UTL), which represents the upper background concentration limit. Any concentrations that exceed this value would not be considered indicative of background concentrations. UTLs were calculated for two soil types: the shallow silty clay/clayey silt/clay and the deeper sand/silty sand. EPA's ProUCL software program was used to calculate the UTL. For analytes with non-detect results, the reporting limit was used in the calculation.

UTLs were not calculated for constituents that were not detected in any background soil sample (selenium and silver in surface and subsurface soil and antimony in subsurface soil) or were detected at a low frequency (mercury and thallium in subsurface soil). Antimony, arsenic, and cobalt are the primary inorganic constituents that were detected above screening criteria (SLs or SSLs) in the Phase I RFI. Based on a comparison of the Phase I RFI data to the Facility-specific soil background concentrations, arsenic was not detected above the 95% UTL in surface or subsurface soil. Similarly, antimony and cobalt detections above the 95% UTL were limited to one location for each analyte in shallow soil samples collected (defined less than 3 ft bgs). Therefore, inorganic concentrations observed at the Facility are considered consistent with background and are not indicative of a release from any SWMU or AOC.

3. Chlorinated Compounds in area of SWMU-6

a. Soil

To evaluate for the presence of an on-site source of chlorinated compounds, 35 soil gas samples were collected during the Phase II RFI and analyzed for a target chlorinated compound analyte list.

A total of four chlorinated compounds [tetrachloroethylene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (TCA), and 1,1-dichloroethene (DCE)], were detected in the soil gas samples at 13 locations during the Phase II RFI Stage I investigation with masses slightly exceeding their respective detection limits. PCE was the most frequently detected chlorinated compound (detected at 10 locations).

Based on the soil-gas sampling results, five Phase II RFI locations were selected for surface and subsurface soil sampling during the Phase II effort. A macro-core soil sampler was advanced by direct push technology (DPT) to the top of the water table at each of the five locations. Surface soil samples were collected at approximately one foot bgs, and subsurface soil samples were collected at the interval above the water table that registered the highest organic vapor readings based upon field screening measurements with a photo-ionization detector (PID). Subsurface soil sample depths ranged from 20 to 30 feet bgs depending on location.

A contouring analysis of the soil-gas data indicated that the area of highest target compound concentrations was located in the vicinity of SWMU-6. However, chlorinated VOCs were not detected in soil samples collected within this area or other portions of the grid investigated. Only acetone was detected in the Phase II RFI soil samples. No exceedance of soil screening criteria (SLs or SSLs) was observed.

b. Groundwater

Chlorinated VOCs including PCE and its associated degradation products (such as TCE, 1,2-DCE, and vinyl chloride) were detected in the upper aquifer near SWMU-6 during the Phase II RFI groundwater monitoring event. PCE exceeded its Federal MCL in two wells (MW-101A and MW-102A). Overall concentrations observed at these locations are consistent between the Phase II and Phase I RFI events. No chlorinated compounds were detected in deep monitoring wells in this portion of the Facility.

4. SWMU 3

SWMU 3 was an early construction disposal pit, which consisted of two trenches approximately 40 feet long, 10 feet wide, and approximately 20 feet deep. Materials reportedly placed in this area consisted of pallets, construction debris (metal wire, fencing, and nails), paper products, film rolls, polyester chip, and buried drums of degraded polymer. During construction activities associated with a warehouse (1985), some waste materials (including all drums) were removed.

a. Soil

A geophysical survey that identified soil anomalies was completed in 1997. Four soil borings were collected from this unit in 1998 in an attempt to identify the geophysical anomalies.

Soil analytical results at concentrations above respective laboratory limits were noted for two compounds (acetone and 2-butanone); however, acetone was also detected in the associated laboratory blank.

b. Groundwater

As part of the Phase II RFI Stage II activities at SWMU 3 area, three borings were installed utilizing DPT techniques. The borings were biased towards previous locations where the highest soil detections were observed in the subsurface soil samples collected during the Phase I RFI.

Groundwater samples were collected from each location and analyzed for VOCs, SVOCs, metals (total), 1,1 biphenyl, diphenyl ether, acetaldehyde, and glycols.

Acetaldehyde, PCE, and 1,4-dioxane were detected in the Phase II RFI groundwater samples. Acetaldehyde was detected in each of the three locations at estimated concentrations ranging between 35 and 39 $\mu\text{g/L}$, which was above the tap water SL (2.2 $\mu\text{g/L}$). However, acetaldehyde was also detected in water used to develop the wells at an estimated concentration of 58 $\mu\text{g/L}$. 1,4-dioxane was detected in two of the three locations at an estimated concentration of 3 $\mu\text{g/L}$ and a concentration of 5 $\mu\text{g/L}$, which were above the tap water SL (0.67 $\mu\text{g/L}$). PCE was detected at a concentration of 0.2 $\mu\text{g/L}$ in one location which is below the Federal MCL (5 $\mu\text{g/L}$).

In addition to the organic constituents noted above, one additional organic constituent (chloroform) was detected above screening criteria. Chloroform was detected in each of the three locations at concentrations ranging between 0.4 $\mu\text{g/L}$ and 0.8 $\mu\text{g/L}$, below the Federal MCL (80 $\mu\text{g/L}$). Similar to acetaldehyde, chloroform was detected in the development water sample.

5. Occurrence of Chlorinated Compounds from an Off-Site Upgradient Source

a. Groundwater

Groundwater samples were collected from six upgradient wells (MW-110A, DMW-6, MW-201A/B and MW-202A/B) of the Facility and analyzed for VOCs, SVOCs, metals (total and dissolved), 1,1 biphenyl, diphenyl ether, acetaldehyde, and glycols near AOC E.

Analytical detections of the six monitoring wells sampled, chlorinated organic constituents were most frequently detected in the upgradient lower aquifer near AOC E. At this location, PCE and its degradation products TCE and vinyl chloride were detected below their respective Federal MCLs. PCE and its breakdown products were not detected in the nearby shallow well and other nearby lower aquifer wells sampled in the area.

Three additional chlorinated VOCs (chloroform, 1,1-DCA, and 1,2-DCA) and one SVOC (1,4-dioxane) were also detected. Chloroform was detected in associated shallow well upgradient of AOC E, and chloroform along with its associated trihalomethane and bromodichloromethane was detected and at a nearby downgradient shallow well. Concentrations were below their respective Federal MCLs. The presence of trihalomethanes is likely due to municipal water sources rather than a release from Facility operations.

The occurrence of the chlorinated VOCs in an upgradient deep well and the absence of these compounds in the nested shallow well and other shallow monitoring wells in the area further support the presence of an off-site source of chlorinated VOCs in the lower aquifer.

6. AOC A - Manufacturing Area Groundwater Characterization

a. Groundwater

Fourteen existing shallow monitoring wells (MW-2, MW-4, MW-5, MW-6, MW-8, MW-9, MWS-01, MWS-02, MW-104A, MW-105A, MW-106A, MW-107A, MW-107B, and MW-107C), North production well, and two newly installed wells (MW-203A and MW-203B) were used in the evaluation. Eighteen VOCs, 21 SVOCs, 1,1-biphenyl, diphenyl ether, one glycol, and 14 metals were detected above MDLs in the groundwater samples collected.

Of the organic constituents detected, five VOCs (1,1-DCA, acetaldehyde, chloroform, PCE, and vinyl chloride), 1,1-biphenyl, diphenyl ether and four SVOCs (1,4-dioxane, benzo[a]pyrene, dibenz[a,h]anthracene and naphthalene) exceeded screening criteria.

Chloroform, PCE and 1,4-dioxane most frequently exceeded screening criteria. Chloroform concentrations ranged from 0.1 µg/L to 1.7 µg/L, which are below the Federal MCL (80 µg/L). PCE was detected above the Federal MCL (5 µg/L) at the North Well. 1,4-Dioxane concentrations ranged from 7 µg/L to 18 µg/L. The highest concentration (18 µg/L) was observed in the upper aquifer monitoring well location located down gradient of SWMU 1 and AOC B.

Diphenyl ether was detected above the DuPont Facility-specific screening criteria in three upper aquifer locations (DuPont proposed, and EPA, approved, risk-based screening criteria for Diphenyl ether since EPA had not calculated one for this contaminant). The highest concentration (5,900 µg/L) was observed in a monitoring well location located near the DuPont heaters of SWMU 1. The diphenyl ether plume extends in a relatively compact area extending around SWMU 2. The plume depicts the same pattern observed during the Phase I RFI monitoring event.

Of the inorganic constituents detected, total and dissolved antimony, arsenic, cadmium, cobalt and mercury, and total vanadium exceeded tap water SLs. Of these, total and dissolved cobalt and total arsenic exceeded the tap water SL in 18 locations. Total cobalt concentrations ranged from 2.3 µg/L to 55.7 µg/L, which were above the tap water SL (1.1 µg/L). Cobalt does not have a Federal MCL. The highest total cobalt concentration was observed west of SWMU 8. Dissolved cobalt concentrations were similar. Total arsenic concentrations ranged from 1.1 µg/L to 6.6 µg/L, which are below the Federal MCL (10 µg/L).

7. AOC A - Perimeter Area Groundwater Characterizations

a. Groundwater

Seventeen existing shallow wells (MW-1, MW-10, MW-11, SMW-1, SMW-2, SMW-3,

MW-100A/B/C, MW-101A, MW-102A/B, MW-103A/B, MW-108A, MW-109A, and MW-110A), five existing deep wells (DMW-1, DMW-2, DMW-3, DMW-5, and DMW-6), South production well, and five newly installed wells (MW-200B, MW-201A/B, and MW-202A/B) were used in the evaluation. Eighteen VOCs, 13 SVOCs, diphenyl ether, one glycol (propylene glycol), and 13 metals were detected above MDLs in the groundwater samples collected.

Of the organic constituents detected, eight VOCs (1,1-DCA, 1,2-DCA, chloroform, cisacetaldehyde, bromodichloromethane, PCE, TCE, and vinyl chloride), and three SVOCs (1,3-dinitrobenzene, 1,4-dioxane, and benzo[a]pyrene) exceeded screening criteria.

Of the VOCs, chloroform, bromodichloromethane, and PCE most frequently exceeded screening criteria. Similar to the manufacturing area, chloroform concentrations were low (between 0.1 µg/L and 3.9 µg/L), which are below the Federal MCL (80 µg/L). Similarly, bromodichloromethane concentrations were low (between 0.1 µg/L and 0.4 µg/L), which are below the Federal MCL (80 µg/L). The presence of trihalomethanes (which includes chloroform and bromodichloromethane) is likely attributable to municipal water sources rather than a release from Facility operations. Both of these constituents were detected in Facility tap water. Tap water was used for well development of the newly installed monitoring well locations.

PCE was detected in seven locations. PCE concentrations ranged between 0.3 µg/L to 22 µg/L. The highest concentration in the upper aquifer was noted at a monitoring well location which is located south of SWMU 6. The PCE concentration at this location (22 ug/l) was above the Federal MCL (5 µg/L). Exceedance of the Federal MCL was also noted in a upper aquifer monitoring well location which is located north of SWMU 6 adjacent to a cemetery. Phase II RFI activities did not identify a potential on-site source area for chlorinated constituents in the upper aquifer in this area. The highest PCE concentrations in the lower aquifer (3 µg/L) were noted at a upgradient monitoring well location, confirming a potential off-site source area for the presence of the chlorinated solvents (PCE and its degradation products) in the deeper aquifer.

Each of the SVOCs detected above tap water SLs were detected infrequently (one out of 30 samples) and were observed in two deep monitoring well locations, one of which is upgradient. No additional evaluation of these exceedances was conducted.

Of the inorganic constituents, five metals (total and dissolved arsenic, cobalt, mercury, total antimony, and total vanadium) exceeded screening criteria. Total arsenic concentrations above the Federal MCL (10 µg/L) were limited to two locations. Dissolved arsenic concentrations at both locations were either non-detect or were detected below the Federal MCL. Total cobalt exceeded the tap water SL (1.1 µg/L) in 9 of 27 locations, with concentrations ranging from 3 µg/L to 32.8 µg/L. Dissolved cobalt concentrations were observed to be similar. The highest concentration was observed near SWMU 6. Cobalt does not have a Federal MCL.

8. Monitoring Wells in the AOC B Area

a. Groundwater

Groundwater samples were collected from a shallow and lower aquifer well pair (MW-203A/B) and analyzed for VOCs, SVOCs, metals (total and dissolved), 1,1 biphenyl, diphenyl

ether, acetaldehyde, and glycols.

Consistent with Phase I RFI findings, three Facility-related constituents (diphenyl ether, biphenyl, and 1,4-dioxane) were detected during the Phase II RFI shallow well monitoring. Concentrations of each constituent were above screening criteria (tap water SLs or the DuPont-derived tap water SL). None of these SVOCs was detected in the paired deep well (MW-203B).

Two chlorinated VOCs (chloroform and vinyl chloride) were detected in the deep well above tap water SLs but below their respective Federal MCLs. No other organic exceedances were noted.

Total and dissolved cobalt were detected above the tap water SL in both the shallow and deep monitoring well. Cobalt concentrations ranged between 7.9 µg/L and 10.9 µg/L, which are above the tap water SL (1.1 µg/L). Total and dissolved arsenic and total vanadium were also detected in the deep monitoring well. Arsenic concentrations ranged between 1.5 and 1.9 µg/L, which are below the Federal MCL (10 µg/L). Inorganic concentrations observed at the nested well pair were consistent with those observed in the upgradient well pair.

C. Environmental Indicators (EIs)

EPA has set national goals to measure progress toward meeting the nation's major environmental goals. For Corrective Action, EPA evaluates two key environmental indicators for each Facility: (1) current human exposures under control and (2) migration of contaminated groundwater under control. EPA determined that the Facility met these indicators on January 31, 2011.

D. Corrective Measures Study (CMS)

The Corrective Measures Study (CMS) was submitted to EPA and VADEQ for review on August 29, 2011. The CMS was approved by EPA on November 21, 2011. Consistent with EPA guidance entitled "Corrective Action for Releases From Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule," 61 Fed. Reg. 19431, May 1, 1996, in the CMS, DuPont evaluated various possible remedial alternatives against the three threshold criteria and seven balancing criteria.

The CMS is based on investigation results presented in the Phase II RFI, which was approved by the EPA in a letter dated March 16, 2011. Based on the Phase II RFI, groundwater is the only medium of concern. However, the groundwater plume appears to be stable (not migrating), and concentrations of constituents of potential concern (COPCs) are either stable or declining over time. Groundwater is not used at the Facility for drinking water, and no down gradient users of off-site groundwater exist between the Facility boundary and the James River.

In its CMS, DuPont recommended groundwater monitoring to ensure protection of off-site receptors combined with institutional controls to prevent exposure for workers and the public at the Facility. Facility controls already in place at the DuPont Teijin Facility include fencing, access controls by Facility security, and existing paving, which prevents worker exposure to soil

in the manufacturing area. Likewise, groundwater is not being used for potable purposes at the DuPont Teijin Facility or at neighboring facilities. Also DuPont's internal permitting process at its Facility requires approval for any intrusive activities (boring, drilling, excavation, etc.) into the soils or building foundations at the Facility. The sampling program includes annual sampling of 16 wells. The monitoring program includes six wells along the James River to monitor for migration in the north, three wells along the eastern perimeter of the Facility to monitor for migration onto the Facility from source(s) located off-site, and seven wells located within the diphenyl ether and PCE plumes to monitor concentration trends over time.

E. Summary

Investigation activities associated with the Phase I RFI were completed in the spring of 2008 and the Phase II RFI report was submitted to EPA and VADEQ in late December, 2010, and approved by EPA on March 16, 2011.

Table 1 provides a comparison of constituents detected in Facility-wide groundwater to the screening criteria (Federal MCLs or tap water SLs). Monitoring well locations are detailed in Figure 3. As shown in Table 1, 11 VOCs, 12 SVOCs, biphenyl, diphenyl ether, and 11 metals (total and dissolved) were identified as concentrations of constituents of potential concern (COPCs) in groundwater. COPCs most frequently detected above tap water SLs and Federal MCLs (where applicable) included three organics (tetrachloroethylene [PCE], 1,4-dioxane, one DuPont constituent [diphenyl ether]) and two metals (total cobalt and total arsenic).

IV. Corrective Action Objectives

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

1. Soils

EPA has determined that EPA Region 3's Screening Levels for Industrial Soils for direct contact with soils are protective of human health and the environment for individual contaminants at this Facility, provided that the Facility is not used for residential purposes. Therefore, EPA's Corrective Action Objective for Facility soils is to control exposure to the hazardous constituents remaining in soils by requiring the compliance with and maintenance of land use restrictions at the Facility.

2. Groundwater

EPA's Corrective Action Objectives for Facility groundwater is to control exposure to the hazardous constituents remaining in the groundwater by requiring the continued implementation of the groundwater monitoring program, compliance with and maintenance of groundwater use restrictions at the Facility to prevent off-site migration of contaminants while levels remain above Federal MCLs and SLs.

V. Proposed Decision

The proposed remedy for the Facility consists of land use restrictions (institutional controls) and the continued implementation of a groundwater monitoring program already in place until groundwater clean-up standards are met. The goal of the proposed remedy is to ensure the overall protection of human health and the environment.

A. Soils

Based on the available information, there are currently no unacceptable risks to human health and the environment via the soil or vapor intrusion pathways for the present and anticipated use of the property (Industrial use). Because contaminants will remain in Facility soils above levels appropriate for residential uses, the proposed remedy for soils is institutional controls (See Section C) to restrict the Facility to non-residential uses.

B. Groundwater - Long-Term Monitoring

Based on the RFI, the groundwater plume appears to be stable (not migrating), and concentrations of constituents of potential concern (COPCs) are either stable or declining over time. Groundwater is not used on the Facility for drinking water, and no downgradient users of off-site groundwater exist between the Facility boundary and the James River. Therefore, the proposed remedy for the groundwater is the combination of groundwater use restriction (See Section C) and the continuation of a groundwater monitoring program already in place until groundwater clean-up standards are met.

C. Institutional Controls

ICs are non-engineered instruments such as administrative and legal controls that minimize the potential for human exposure to contamination and/or protect the integrity of the decision by limiting land or resource use. Under this proposed decision, some contaminants remain in the groundwater and soil at the Facility above levels appropriate for residential uses. Because some contaminants remain in the soil and groundwater at the Facility at levels which exceed residential use, EPA's proposed decision requires the compliance with and maintenance of land and groundwater use restrictions.

The ICs shall include, but not be limited to, the following land and groundwater use restrictions:

1. Groundwater at the Facility shall not be used for any purpose other than 1) industrial use as non-contact cooling water; and 2) the operation, maintenance, and monitoring activities required by VADEQ and/or EPA, unless it is demonstrated to EPA, in consultation with VADEQ, that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy and EPA, in consultation with VADEQ, provides prior written approval for such use;
2. The Facility property shall not be used for residential purposes unless it is demonstrated

to EPA, in consultation with VADEQ, that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and EPA, in consultation with VADEQ, provides prior written approval for such use;

3. All earth moving activities, including excavation, drilling and construction activities, in the areas at the Facility where any contaminants remain in soils above EPA's Screening levels for non-residential use or groundwater above Federal MCLs/Tap Water RBCs, shall be prohibited unless it is demonstrated to EPA, in consultation with VADEQ, that such activity will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and EPA, in consultation with VADEQ, provides prior written approval for such use;

4. The Property will not be used in a way that will adversely affect or interfere with the integrity and protectiveness of the final remedy;

4. No new wells will be installed on Facility property unless it is demonstrated to EPA, in consultation with VADEQ, that such wells are necessary to implement the final remedy and EPA provides prior written approval to install such wells.

5. Owner agrees to provide EPA and VADEQ with a "Certified, True and Correct Copy" of any instrument that conveys any interest in the Facility property or any portion thereof.

6. Owner agrees to allow the EPA, state, and/or their authorized agents and representatives, access to the Property to inspect and evaluate the continued effectiveness of the final remedy and if necessary, to conduct additional remediation to ensure the protection of the public health and safety and the environment based upon the final remedy to be selected by EPA in the Final Decision and Response to Comments (FDRTC).

In addition, any Environmental Covenant or order will require the Facility owner to continue the groundwater monitoring program already in place.

D. Implementation

EPA proposes to implement the land and groundwater use restrictions necessary to prevent human exposure to contaminants at the Facility through enforceable ICs such as orders and/or an Environmental Covenant pursuant to the Virginia Uniform Environmental Covenants Act, Title 10.1, Chapter 12.2, §§10.1-1238 - 10.1-1250 of the Code of Virginia, (UECA) and UECA's implementing regulations, 9VA15-90-10-60. If an Environmental Covenant is to be the institutional control mechanism, it will be recorded in the chain of title for the Facility property. In addition, EPA acknowledges that the Virginia Department of Health issues drinking water permits for wells and does not allow the use of contaminated groundwater as a drinking water source. The continuation of the existing groundwater monitoring program until groundwater clean-up standards are met will be enforceable through an enforceable instrument such as an order or an Environmental Covenant. If EPA determines that additional institutional controls or other corrective actions are necessary to protect human health or the environment, EPA has the authority to require and enforce such additional corrective actions through an enforceable

mechanism which may include an order or Environmental Covenant.

VI. Evaluation of EPA's Proposed Decision

This section provides a description of the criteria EPA used to evaluate the proposed decision consistent with EPA guidance, "Corrective Action for Releases From Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule," 61 Fed. Reg. 19431, May 1, 1996. 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.

A. Threshold Criteria

1. Protect Human Health and the Environment

With respect to groundwater, while low levels of contaminants remain in the groundwater beneath the Facility, the contaminants are contained in the aquifer and do not migrate beyond the areas on the Facility property. For this reason, the area of contaminated groundwater is contained. In addition, a groundwater monitoring program already in place will continue until groundwater clean-up standards are met. The Virginia Department of Health issues drinking water permits for wells, and does not allow the use of contaminated groundwater as a drinking water source. With respect to future uses, the proposed remedy requires groundwater use restrictions to minimize the potential for human exposure to contamination and protect the integrity of the remedy.

With respect to Facility soils, all contaminated soil is below the surface and contained within Facility property. There is no direct exposure of industrial workers to subsurface soil under current land use, and direct exposure of construction/excavation workers is controlled by the existing Facility administrative controls including the Facility-wide excavation permitting process, excavation hazard demarcation program and appropriate health and safety plans. With respect to future uses, EPA has proposed land use restrictions in order to minimize the potential for human exposure to contamination.

2. Achieve Media Cleanup Objectives

The Facility has achieved the EPA's non-residential Risk Based Contaminants (RBCs) for industrial soils. The groundwater plume appears to be stable (not migrating), and COPCs though above Federal MCLs are either stable or declining over time. In addition, a groundwater monitoring program already in place will continue until groundwater clean-up standards are met. The Facility meets EPA risk guidelines for human health and the environment. EPA's proposed decision requires the implementation and maintenance of institutional controls to ensure that Facility property is not used for residential purposes and groundwater beneath Facility property is not used for any purpose except for industrial use as non-contact cooling water and to conduct the operation, maintenance, and monitoring activities required by VADEQ and EPA.

3. Remediating the Source of Releases

In all proposed decisions, 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. As shown in the Phase II RFI Report, the Facility met this objective. Groundwater is not used for potable purposes at the Facility or at neighboring facilities. In addition, a groundwater monitoring program already in place will continue until groundwater clean-up standards are met. The Virginia Department of Health issues drinking water permits for wells and does not allow use of contaminated groundwater as a drinking water source. There are no remaining large, discrete sources of waste from which constituents would be released to the environment. Therefore, EPA has determined that this criterion has been met.

B. Balancing/Evaluation Criteria

1. Long-Term Effectiveness

The proposed ICs will maintain protection of human health and the environment over time by controlling exposure to the hazardous constituents remaining in soils and groundwater. EPA's proposed decision requires the compliance with and maintenance of land use and groundwater use restrictions at the Facility. EPA anticipates that the land use and groundwater use restrictions will be implemented through orders and/or an environmental covenant to be recorded in the chain of title for the Facility property. If the mechanism is to be an environmental covenant, the environmental covenant will run with the land and as such, will be enforceable by EPA and/or other stakeholders against future land owners. In addition, a groundwater monitoring program already in place will continue until groundwater clean-up standards are met.

2. Reduction of Toxicity, Mobility, or Volume of the Hazardous Constituents

The reduction of toxicity, mobility and volume of hazardous constituents at the Facility has already been achieved, as demonstrated by the data of the groundwater monitoring showing that the plume appears to be stable (not migrating), and concentrations of constituents of potential concern (COPCs) are either stable or declining over time. In addition, a groundwater monitoring program already in place will continue until groundwater clean-up standards are met.

3. Short-Term Effectiveness

EPA's proposed decision does not involve any activities, such as construction or excavation, that would pose short-term risks workers, residents, and the environment. In addition, EPA anticipates that the land use and groundwater use restrictions will be fully implemented shortly after the issuance of the Final Decision and Response to Comments. In addition, a groundwater monitoring program already in place will continue until groundwater clean-up standards are met.

4. Implementability

EPA's proposed decision is readily implementable. EPA proposes to implement the

institutional controls through an enforceable mechanism such as an order or an Environmental Covenant, pursuant to the Virginia Uniform Environmental Covenants Act, Title 10.1, Chapter 12.2, Sections 10.1-1238-10.1-1250 of the Code of Virginia. EPA proposes to continue the groundwater monitoring through an enforceable mechanism such as an environmental covenant or order. Environmental Covenants are readily implemented. In addition, EPA does not anticipate any regulatory constraints in issuing orders.

5. Cost-Effectiveness

EPA's proposed decision is cost effective. The costs associated with this proposed administrative remedy and the continuation of groundwater monitoring are minimal. The costs to record an environmental covenant in the chain of title to the Facility property are minimal. Likewise the costs associated with issuance of orders are also minimal.

6. Community Acceptance

EPA will evaluate Community acceptance of the proposed decision during the public comment period, and it will be described in the Final Decision and Response to Comments.

7. State/Support Agency Acceptance

VADEQ has reviewed and concurred with the proposed remedy for the Facility. Furthermore, EPA has solicited VADEQ input and involvement throughout the investigation process at the Facility.

VII. Environmental Indicators

EPA sets national goals to measure progress toward meeting the nation's major environmental goals. For Corrective Action, EPA evaluates two key environmental indicators for each Facility: (1) current human exposures under control and (2) migration of contaminated groundwater under control. EPA determined that the Facility met these indicators on January 31, 2011.

VIII. Financial Assurance

EPA has evaluated whether financial assurance for corrective action is necessary to implement EPA's proposed decision at the Facility. The costs to obtain orders or environmental covenants are minimal. The Facility has already provided the information necessary for EPA to issue an order. Also, given that EPA's proposed decision does not require any further engineering actions to remediate soil, groundwater or indoor air contamination at this time and given that the costs of implementing institutional controls and the continuation of groundwater monitoring at the Facility will be minimal, EPA is proposing that no financial assurance be required.

IX. Public Participation

Before EPA makes a final decision on its proposal for the Facility, the public may participate in the decision selection process by reviewing this SB and documents contained in the Administrative Record (AR) for the Facility. The AR contains all information considered by EPA in reaching this proposed decision. It is available for public review during normal business hours at:

U.S. EPA Region III
1650 Arch Street
Philadelphia, PA 19103
Contact: Leonard E. Hotham
Phone: (215) 814-5778
Fax: (215) 814-3113
Email: Hotham.Leonard@epa.gov

Interested parties are encouraged to review the AR and comment on EPA's proposed decision. The public comment period will last thirty (30) calendar days from the date that notice is published in a local newspaper. You may submit comments by mail, fax, or e-mail to Leonard E. Hotham. EPA will hold a public meeting to discuss this proposed decision upon request. Requests for a public meeting should be made to Leonard E. Hotham.

EPA will respond to all relevant comments received during the comment period. If EPA determines that new information warrant a modification to the proposed decision, EPA will modify the proposed decision or select other alternatives based on such new information and/or public comments. EPA will announce its final decision and explain the rationale for any changes in a document entitled the Final Decision and Response to Comments (FDRTC). All persons who comment on this proposed decision will receive a copy of the FDRTC. Others may obtain a copy by contacting Leonard E. Hotham at the address listed above.

Date: 5/25/12



Abraham Ferdas, Director
Land and Chemicals Division
US EPA, Region III

Attachments

Figure 1: Location Map
Figure 2: SWMUs and AOC location map
Figure 3: Monitoring Wells Location Map
Table 1: Summary of Site-Wide Groundwater Results
Dupont Teijin Administrative Record Index

Figure 1: Location Map

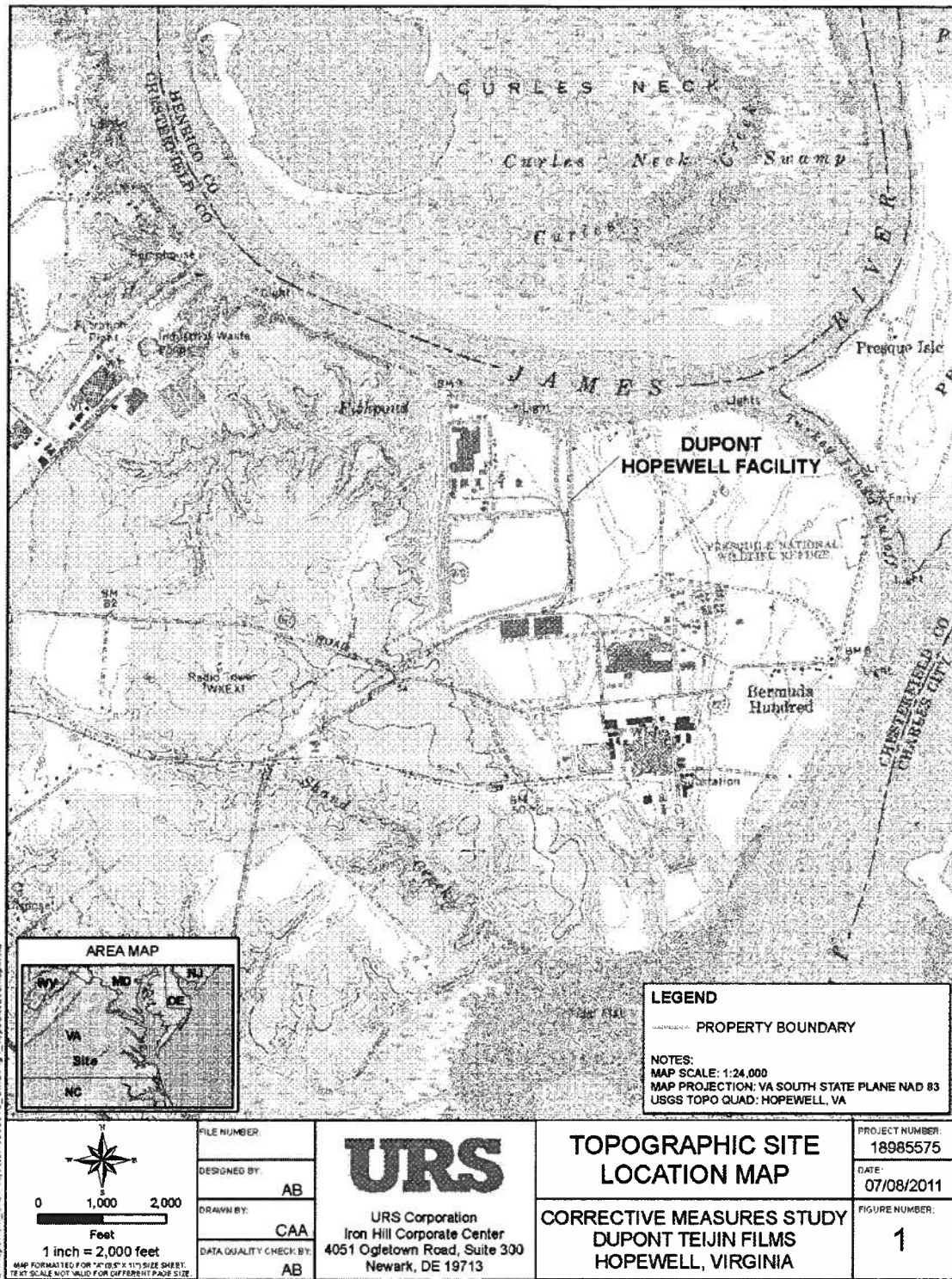


Figure 2: SWMUs and AOC location map

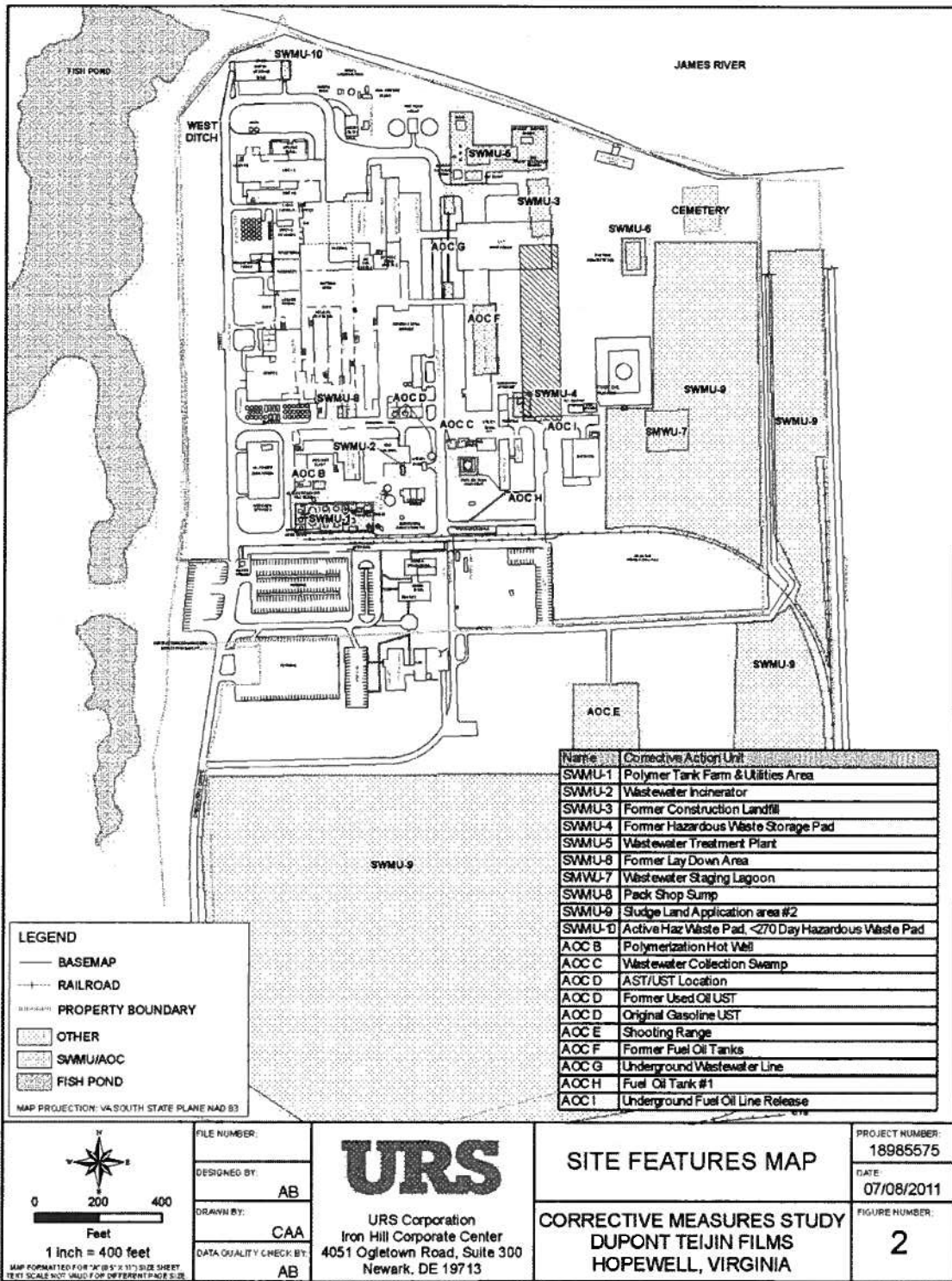
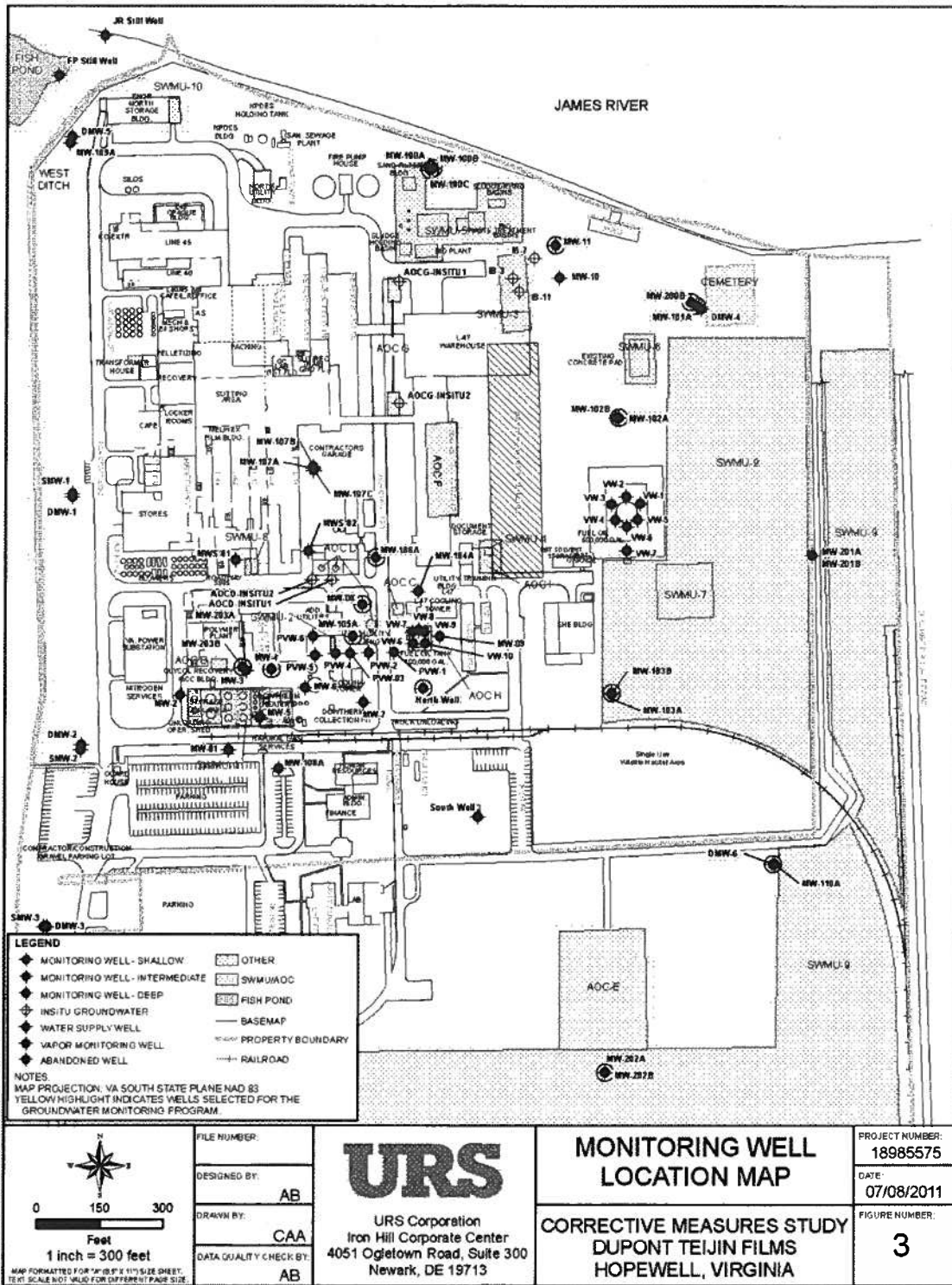


Figure 3: Monitoring Wells Location Map



Analyte	Units	Total (T)/ Diss. (D)	Screening Criteria EPA Regional SL Tap Water	Screening Criteria Federal MCL	Location	CHESTER	DMW-1	DMW-2	DMW-3	DMW-5	DMW-6	MW-1	MW-2	MW-4	MW-5	MW-6	MW-8	MW-9					
					Date	6/28/10	6/25/10	6/26/10	6/28/10	6/26/10	6/28/10	6/26/10	6/27/10	6/27/10	6/27/10	6/27/10	6/23/10	6/23/10	6/23/10	6/23/10	6/23/10		
					Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
					Bottom (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					Duplicate	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
CADMIUM	UG/L	T	1.8	5	<0.2 U	<0.2	0.33 J	<0.2	<0.2	<0.2 U	0.22 J	<0.2	0.87	0.29 J	<0.2	<0.2	<0.2	0.23 J					
CHROMIUM	UG/L	D	5,500	100	<3.4 U	<3.4	<3.4	<3.4	<3.4	<3.4 U	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4					
CHROMIUM	UG/L	T	5,500	100	<3.4 U	7.6 J	<3.4	<3.4	<3.4	3.5 B	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4					
COBALT	UG/L	D	1.1		^<2.3 U	^<2.3	^<2.3	^<2.3	^<2.3	^3 J	^<2.3	^<2.3	^<2.3	^<2.3	^3.3 J	^<2.3	^<2.3	^<2.3					
COBALT	UG/L	T	1.1		^<2.3 U	^<2.3	^3.3 J	^<2.3	^<2.3	^4.1 J	^<2.3	^<2.3	^<2.3	^<2.3	^3.1 J	^<2.3	^<2.3	^<2.3					
COPPER	UG/L	D	150	1,300	59.2	<2.7	<2.7	<2.7	<2.7	<2.7 UL	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7					
COPPER	UG/L	T	150	1,300	59.6	<2.7	<2.7	<2.7	<2.7	8 J	<2.7	<2.7	<2.7	<2.7	3.7 J	<2.7	<2.7	<2.7					
LEAD	UG/L	D		15	0.11 J	0.092 J	0.064 J	<0.05	<0.05	<0.05 U	0.097 J	<0.05	<0.05	<0.05	<0.05	0.11 J	0.082 J	0.069 J					
LEAD	UG/L	T		15	0.17 J	0.53 J	0.87 J	0.07 J	0.22 J	1.6	0.11 J	0.074 J	0.19 J	0.062 J	<0.05	0.23 J	0.18 J						
MERCURY	UG/L	D	1.1	2	<0.056 UL	<0.056	<0.056	<0.056	<0.056	<0.056 UL	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056					
MERCURY	UG/L	T	1.1	2	<0.056 UL	<0.056	<0.056	<0.056	<0.056	<0.056 UL	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056					
NICKEL	UG/L	D	73		<3 U	<3	3.6 J	<3	<3	<3 U	3.2 J	<3	4.1 J	<3	3.6 J	3.9 J	<3						
NICKEL	UG/L	T	73		<3 U	<3	4.8 J	<3	<3	<3 U	3.7 J	<3	4.3 J	<3	3.3 J	4.1 J	<3						
THALLIUM	UG/L	T		2	<0.15 UL	<0.15	<0.15	<0.15	<0.15	<0.15 UL	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15					
VANADIUM	UG/L	T	1.8		^<2.5 U	^5.5	^4.5 J	^<2.5	^<2.5	^5.9 B	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5					
ZINC	UG/L	D	1,100		16.6 J	<8.1	11.6 J	<8.1	10.1 J	<8.1 U	<8.1	<8.1	12.6 J	19.5 J	<8.1	<8.1	<8.1						
ZINC	UG/L	T	1,100		18.6 J	14.7 J	23.4	<8.1	9.5 J	<8.1 U	<8.1	<8.1	15.4 J	13.6 J	<8.1	<8.1	<8.1						

Page 2

Criteria = EPA Regional Screening Level (HQ=0.1) (November 2010 version) or Federal MCL

^ Orange Shaded Cells = MDL > than Screening Criteria

^ Yellow Shaded Cells = Concentration above criteria

< DL = Not detected at stated reporting limit

UL = Not detected at stated reporting limit, which may be biased low.

J = Estimated value

B = Detected in associated laboratory or field blank.

R = Unusable result. Compound may or may not be present in this sample.

1,1-Oxybisbenzene value is Dupont site-specific value with HQ=0.1

MCL for chloroform is trihalomethanes

The following surrogates were used where SLs were unavailable:

Acenaphthylene value is acenaphthene

Benzo(g,h,i)perylene value is pyrene

Phenanthrene value is anthracene

Chromium value is Chromium III

Cadmium value is Cadmium (water)

Mercury value is mercuric chloride

Analyte	Units	Total (T)/ Diss. (D)	Screening Criteria EPA Regional SL Tap Water	Screening Criteria Federal MCL	Location	MW-10	MW-11	MW-100A	MW-100B	MW-100C	MW-101A	MW-102A	MW-102B	MW-103A	MW-103B	MW-104A	MW-105A	MW-106A				
					Date	6/24/10	6/24/10	6/24/10	6/24/10	6/24/10	6/24/10	6/25/10	6/25/10	6/25/10	6/25/10	6/25/10	6/23/10	6/23/10	6/22/10			
					Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
					Bottom (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					Duplicate	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS
CADMIUM	UG/L	T	1.8	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.45 J	<0.2	<0.2	0.44 J	<0.2	<0.2	<0.2	0.39 J				
CHROMIUM	UG/L	D	5,500	100	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4				
CHROMIUM	UG/L	T	5,500	100	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	9.1 J	<3.4	24.7	<3.4	<3.4	<3.4				
COBALT	UG/L	D	1.1		^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^4 J	^32.3	^3.6 J	^<2.3	^<2.3	^2.3 J	^5.5	^10.9				
COBALT	UG/L	T	1.1		^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^3.9 J	^32.8	^4 J	^3 J	^<2.3	^7.4	^6.1	^12.3					
COPPER	UG/L	D	150	1,300	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7				
COPPER	UG/L	T	150	1,300	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	18.8	<2.7	<2.7				
LEAD	UG/L	D		15	0.065 J	<0.05	0.091 J	0.08 J	0.085 J	<0.05	0.088 J	0.093 J	0.066 J	<0.05	0.086 J	0.12 J	0.098 J					
LEAD	UG/L	T		15	0.078 J	0.2 J	0.68 J	0.88 J	0.37 J	0.12 J	0.12 J	0.69 J	3.2	0.21 J	9.7	0.53 J	0.32 J					
MERCURY	UG/L	D	1.1	2	<0.056	<0.056	<0.056	0.078 B	0.07 B	<0.056	<0.056	<0.056	<0.056	<0.056	0.082 J	<0.056	<0.056					
MERCURY	UG/L	T	1.1	2	<0.056	<0.056	<0.056	0.066 B	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	0.059 J	<0.056	<0.056				
NICKEL	UG/L	D	73		<3	<3	<3	<3	<3	3.4 J	4.5 J	<3	3.2 J	<3	4.9 J	4.3 J	5.4 J					
NICKEL	UG/L	T	73		<3	<3	<3	<3	<3	3.1 J	4.9 J	<3	4.8 J	<3	15.7	4.5 J	5.7 J					
THALLIUM	UG/L	T		2	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.26 J	<0.15	<0.15				
VANADIUM	UG/L	T	1.8		^<2.5	^2.7 J	^4 J	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5	^9.7	^<2.5	^27.2	^<2.5	^<2.5					
ZINC	UG/L	D	1,100		<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	<8.1	11.8 J					
ZINC	UG/L	T	1,100		<8.1	<8.1	<8.1	<8.1	10.4 J	<8.1	<8.1	<8.1	16 J	<8.1	45.5	<8.1	13.1 J					

Page 4

Criteria = EPA Regional Screening Level (HQ=0.1) (November 2010 version) or Federal MCL

^ Orange Shaded Cells = MDL > than Screening Criteria

^ Yellow Shaded Cells = Concentration above criteria

< DL = Not detected at stated reporting limit

UL = Not detected at stated reporting limit, which may be biased low.

J = Estimated value

B = Detected in associated laboratory or field blank.

R = Unusable result. Compound may or may not be present in this sample.

1,1-Oxybisbenzene value is Dupont site-specific value with HQ=0.1

MCL for chloroform is trihalomethanes

The following surrogates were used where SLs were unavailable:

Acenaphthylene value is acenaphthene

Benzo(g,h,i)perylene value is pyrene

Phenanthrene value is anthracene

Chromium value is Chromium III

Cadmium value is Cadmium (water)

Mercury value is mercuric chloride

Analyte	Units	Total (T)/ Diss. (D)	Screening Criteria EPA Regional SL Tap Water	Screening Criteria Federal MCL	Location	MW-107A	MW-107B	MW-107C	MW-108A	MW-109A	MW-110A	MW-200B	MW-200B	MW-201A	MW-201B	MW-202A	MW-202B	MW-203A					
					Date	6/22/10	6/22/10	6/22/10	6/26/10	6/26/10	6/28/10	6/28/10	6/28/10	6/28/10	6/28/10	6/28/10	6/28/10	6/28/10	6/28/10	6/28/10	6/27/10		
					Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
					Bottom (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
					Duplicate	FS	FS	FS	FS	FS	FS	DUP	FS	FS	FS	FS	FS	FS	FS	FS	FS	FS	
CADMIUM	UG/L	T	1.8	5		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.26 J	<0.2	<0.2					
CHROMIUM	UG/L	D	5,500	100		<3.4	<3.4	<3.4	<3.4	<3.4	<3.4 U	<3.4 U	<3.4 U	<3.4 U	<3.4 U	<3.4	<3.4	<3.4					
CHROMIUM	UG/L	T	5,500	100		22.9	<3.4	4.3 J	<3.4	<3.4	<3.4 U	<3.4 U	<3.4 U	14.6 J	<3.4 U	23.5	14.2 J	<3.4					
COBALT	UG/L	D	1.1			^14.7	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3 U	^<2.3 U	^<2.3 U	^<2.3 U	^<2.3 U	^14	^6.6	^10.8					
COBALT	UG/L	T	1.1			^16.2	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3 U	^<2.3 U	^<2.3 U	^4.1 J	^<2.3 U	^19.1	^9.3	^10.9					
COPPER	UG/L	D	150	1,300		<2.7	<2.7	<2.7	<2.7	<2.7	<2.7 UL	<2.7 UL	<2.7 UL	<2.7 UL	<2.7 UL	<2.7	<2.7	<2.7					
COPPER	UG/L	T	150	1,300		5.6 J	<2.7	<2.7	<2.7	<2.7	<2.7 U	<2.7 U	<2.7 U	7 J	2.8 J	6.5 J	6.6 J	<2.7					
LEAD	UG/L	D		15		0.19 J	0.071 J	<0.05	0.1 J	<0.05	<0.05 U	0.11 J	0.1 J	<0.05 U	0.11 J	<0.05	<0.05	<0.05					
LEAD	UG/L	T		15		3.7	0.68 J	0.3 J	<0.05	0.34 J	<0.05 U	3.6 J	4.8 J	14.5	2.2	7.6	13.9	0.078 J					
MERCURY	UG/L	D	1.1	2		<0.056	<0.056	<0.056	<0.056	<0.056	<0.056 UL	<0.056 UL	<0.056 UL	<0.056 UL	<0.056 UL	<0.056	<0.056	<0.056					
MERCURY	UG/L	T	1.1	2		<0.056	<0.056	<0.056	<0.056	<0.056	<0.056 UL	<0.056 UL	<0.056 UL	<0.056 UL	<0.056 UL	<0.056	<0.056	<0.056					
NICKEL	UG/L	D	73			20.3	<3	<3	<3	<3	<3 U	<3 U	<3 U	<3 U	<3 U	5.9 J	4 J	6.7 J					
NICKEL	UG/L	T	73			30.9	<3	<3	<3	<3	<3 U	<3 U	<3 U	6.2 J	<3 U	13.8	8.8 J	7.6 J					
THALLIUM	UG/L	T		2		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15 UL	<0.15 UL	<0.15 UL	<0.15 UL	<0.15 UL	<0.15	<0.15	<0.15					
VANADIUM	UG/L	T	1.8			^12.3	^4.6 J	^<2.5	^<2.5	^<2.5	^<2.5 U	^<2.5 U	^3 B	^8.8 B	^<2.5 U	^24.1	^11	^<2.5					
ZINC	UG/L	D	1,100			<8.1	<8.1	<8.1	<8.1	<8.1	<8.1 U	<8.1 U	<8.1 U	<8.1 U	<8.1 U	<8.1	<8.1	<8.1					
ZINC	UG/L	T	1,100			17.6 J	<8.1	<8.1	<8.1	<8.1	<8.1 U	<8.1 U	8.2 J	26.5	<8.1 U	29.8	25.5	<8.1					

Page 6

Criteria = EPA Regional Screening Level (HQ=0.1) (November 2010 version) or Federal MCL

^ Orange Shaded Cells = MDL > than Screening Criteria

^ Yellow Shaded Cells = Concentration above criteria

< DL = Not detected at stated reporting limit

UL = Not detected at stated reporting limit, which may be biased low.

J = Estimated value

B = Detected in associated laboratory or field blank.

R = Unusable result. Compound may or may not be present in this sample.

1,1-Oxybisbenzene value is Dupont site-specific value with HQ=0.1

MCL for chloroform is trihalomethanes

The following surrogates were used where SLs were unavailable:

Acenaphthylene value is acenaphthene

Benzo(g,h,i)perylene value is pyrene

Phenanthrene value is anthracene

Chromium value is Chromium III

Cadmium value is Cadmium (water)

Mercury value is mercuric chloride

Analyte	Units	Total (T)/ Diss. (D)	Screening Criteria EPA Regional SL Tap Water	Screening Criteria Federal MCL	Location	MW-203B	MWS-01	MWS-02	NORTHWEL	NORTHWEL	SMW-1	SMW-1	SMW-2	SMW-3	SOUTHWEL	
					Date	6/27/10	6/26/10	6/26/10	6/27/10	6/27/10	6/25/10	6/25/10	6/25/10	6/28/10	6/28/10	
					Top (ft)	0	0	0	0	0	0	0	0	0	0	0
					Bottom (ft)	0	0	0	0	0	0	0	0	0	0	0
					Duplicate	FS	FS	FS	DUP	FS	DUP	FS	FS	FS	FS	FS
CADMIUM	UG/L	T	1.8	5	<0.2	^19	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
CHROMIUM	UG/L	D	5,500	100	<3.4	4.9 J	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	
CHROMIUM	UG/L	T	5,500	100	3.9 J	4.7 J	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	
COBALT	UG/L	D	1.1		^7.9	^53.9	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	
COBALT	UG/L	T	1.1		^8.3	^55.7	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	^<2.3	
COPPER	UG/L	D	150	1,300	<2.7	4.5 J	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	
COPPER	UG/L	T	150	1,300	<2.7	5.4 J	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	3.5 J	
LEAD	UG/L	D		15	<0.05	0.6 J	0.081 J	0.07 J	0.063 J	<0.05	0.068 J	<0.05	<0.05	0.68 J	0.68 J	
LEAD	UG/L	T		15	2	0.62 J	<0.05	0.084 J	0.1 J	0.19 J	0.2 J	0.065 J	<0.05	0.68 J	0.68 J	
MERCURY	UG/L	D	1.1	2	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	
MERCURY	UG/L	T	1.1	2	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	<0.056	
NICKEL	UG/L	D	73		3.1 J	30.3	<3	<3	<3	<3	<3	<3	<3	<3	4.3 J	
NICKEL	UG/L	T	73		4.4 J	31.4	<3	3.1 J	3.1 J	<3	5.5 J	<3	<3	<3	5.1 J	
THALLIUM	UG/L	T		2	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	
VANADIUM	UG/L	T	1.8		^3.8 J	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5	^<2.5	
ZINC	UG/L	D	1,100		<8.1	541	<8.1	<8.1	<8.1	<8.1	<8.1	10.3 J	<8.1	170	170	
ZINC	UG/L	T	1,100		<8.1	548	<8.1	<8.1	<8.1	<8.1	<8.1	13.2 J	<8.1	163	163	

Page 8

Criteria = EPA Regional Screening Level (HQ=0.1) (November 2010 version) or Federal MCL

^ Orange Shaded Cells = MDL > than Screening Criteria

^ Yellow Shaded Cells = Concentration above criteria

< DL = Not detected at stated reporting limit

UL = Not detected at stated reporting limit, which may be biased low.

J = Estimated value

B = Detected in associated laboratory or field blank.

R = Unusable result. Compound may or may not be present in this sample.

1,1-Oxybisbenzene value is Dupont site-specific value with HQ=0.1

MCL for chloroform is trihalomethanes

The following surrogates were used where SLs were unavailable:

Acenaphthylene value is acenaphthene

Benzo(g,h,i)perylene value is pyrene

Phenanthrene value is anthracene

Chromium value is Chromium III

Cadmium value is Cadmium (water)

Mercury value is mercuric chloride