

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

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

Facility Name: DuPont Teijin Films
Facility Address: 1 Discovery Drive, Chester, Virginia
Facility EPA ID #: VAD000019273

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

If yes - check here and continue with #2 below.

If no - re-evaluate existing data, or

If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives, which are currently being used as Program measures for the 1993 Government Performance and Results Act (GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	√			Constituents of potential concern (COPCs) identified in site-wide groundwater include: volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), Dowtherm constituents and metals (total and dissolved) (Table 1)
Air (indoors) ²		√		VOCs have been detected in groundwater at the site. However, there were no VOCs that exceeded the scenario-specific screening criteria (Table 2).
Surface Soil (e.g., <2 ft)		√		COPCs limited to one SVOC: benzo(a)pyrene (Table 4)
Surface Water		√		Not considered a medium of concern (see rationale)
Sediment		√		Not considered a medium of concern (see rationale)
Subsurface Soil (e.g., >2 ft)	√			COPCs not identified (Table 5)
Air (outdoors)		√		Not considered a medium of concern (see rationale)

- _____ If no (for all media) - skip to #6, and enter “YE,” status code after providing or citing appropriate “levels,” and referencing sufficient supporting documentation demonstrating that these “levels” are not exceeded.
- _____√ If yes (for any media) - continue after identifying key contaminants in each “contaminated” medium, citing appropriate “levels” (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.
- _____ If unknown (for any media) – skip to #6 and enter “IN” status code.

¹ “Contamination” and “contaminated” describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based “levels” (for the media, that identify risks within the acceptable risk range).

Rationale and Reference(s):

Site Background

This EI evaluation has been prepared for the DuPont Teijin Films (DTF) facility which is located west of the city of Hopewell, Virginia, in Chesterfield County on the southern bank of the James River (see Figure 1). The site began construction under ICI Polyester in May 1970, with manufacturing operations beginning in 1972. DuPont purchased the site in 1998 and later formed a joint venture with Teijin Films in 1999. Various polymer film materials have been manufactured at the facility and are marketed as Melinex and Mylar®. Currently, the DTF facility consists of several buildings that contribute to the manufacturing of over 50 types of polyester film.

Data Set for EI Evaluation

Site data evaluated for this step included groundwater quality data samples collected from up to 43 monitoring well locations and two production well locations during sampling conducted in 2005, 2008 and 2010. Groundwater data collected from in-situ groundwater monitoring points at AOCs D and G during the 2008 Phase I RFI and SWMU 3 during the 2010 Phase II RFI were also utilized. Soil samples utilized in the EI evaluation included surface soil samples (from an interval of 0 to 1 foot below ground surface (ft bgs) or 0.5 to 1.5 feet bgs, depending on the unit) collected from 21 boring locations during the Phase I RFI in 2008 and from five boring locations during the Phase II RFI in 2010; and, subsurface soil samples (collected between 1 and 12 feet bgs) collected from 11 locations during the Phase I RFI in 2008 and from five boring locations during the Phase II RFI in 2010.

SWMU and AOC locations are detailed in Figure 2. Monitoring well locations are also shown on the figure. Soil boring locations are detailed in figures provided in the RFI reports (DuPont CRG, 2008 and URS, 2010).

Screening Levels Used to Evaluate Site Data

Concentrations of constituents detected in the EI evaluation data set were compared to appropriate screening levels to assess potential impact to human health and the environment and to identify COPCs. The following screening levels were utilized during the evaluation:

- Groundwater – There is no potable use of groundwater at the DTF facility or at neighboring facilities and exposure to on-site production well water does not occur except possibly during short-term, intermittent maintenance activities (such as draining lines or repairing pumps) or during use as fire water. However, as a conservative measure, constituents detected in groundwater were compared to the lower of the Federal Maximum Contaminant Level (MCL) or the EPA SLs for tap water (November 2010 edition). The SLs, which assumes a combined exposure including inhalation of volatile compounds and ingestion for residential use, are based on a cancer risk of 1×10^{-6} and a hazard quotient of 0.1 (for non-carcinogens).
- Soil– Soil (surface and subsurface) concentrations were compared to EPA SLs for industrial soil (EPA, 2010). Similar to groundwater, the SLs were based on a cancer risk of 1×10^{-6} and a hazard quotient of 0.1 (for non-carcinogens). The SL represents a combined exposure including inhalation of particulates and volatile compounds, dermal absorption, and ingestion. Soil concentrations were also compared to site-specific soil background concentrations determined during the Phase II RFI (URS, 2010).
- Indoor Air – Occupational Safety and Health Administration (OSHA) permissible exposure levels (PELs) and the American Conference of Governmental Industrial Hygienist (ACGIH) threshold limit values (TLVs) were used as appropriate indoor air target concentrations to evaluate potential on-site exposure. PELs and TLVs are generally 8-hour or 12-hour time-weighted average air concentrations that are considered health-protective of the worker population. Based on the agreement between EPA and OSHA, EPA does not expect that its draft vapor intrusion guidance (*Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, Subsurface Vapor Intrusion Guidance*, November 2002) to be used in occupational settings. Although the subsurface vapor guidance is specific

to residential sites, the general principles may be adjusted for other land uses (i.e., industrial, commercial). The Environmental Indicators Frequently Asked Questions at the following website (last update: February 3, 2009) emphasizes this position: <http://www.epa.gov/epawaste/hazard/correctiveaction/eis/faqs.htm#vapor>. As such, DuPont will ensure that steps (such as modeling, monitoring and hazard communication), as needed, are in place to appropriately address the vapor intrusion pathway if it is identified. In addition to the occupational-based screening criteria, for risk management purposes, risk-based EPA SLs for industrial air were also utilized to evaluate the vapor intrusion pathway. The industrial air SLs were based on a cancer risk of 1×10^{-6} and a hazard quotient of 1 (for non-carcinogens) (see Table 3)

When a screening value was not available, the screening value from a structurally similar chemical was utilized (i.e., acenaphthene for phenanthrene). In addition, DuPont has developed a site-specific screening level for diphenyl ether in groundwater and soil (DuPont CRG, 2007).

Constituents of Potential Concern

Groundwater: The groundwater data set for the EI evaluation includes groundwater collected from seven in-situ groundwater points, 43 monitoring wells and two water supply wells. Groundwater samples were analyzed for Appendix IX VOCs, SVOCs and metals (total and dissolved), Dowtherm® constituents, acetaldehyde, and glycols, depending on the event and location. Monitoring well and production well locations are shown in Figure 2. As detailed above, groundwater results were compared to the lower of MCLs or tap water SLs (Table 1). Based on this comparison, 11 VOCs, 12 SVOCs, Dowtherm constituents (biphenyl and diphenyl ether), and 11 metals (total and dissolved) were identified as COPCs in groundwater.

Indoor Air: Low levels of VOCs have been detected in groundwater in monitoring well locations across the site, some of which are located within 100 feet of occupied buildings. As a result, maximum groundwater detections were compared to groundwater volatilization to indoor air screening levels. Table 3 compares groundwater concentrations from manufacturing area wells to relevant occupational exposure levels and risk-based USEPA SLs for industrial air. As shown in the table, no VOCs exceeded relevant occupational-based screening levels. However, PCE slightly exceeded the risk-based SL. PCE was detected at a concentration of 6.5 ug/L slightly above the risk-based SL of 2.7 ug/L in 1 of the 17 manufacturing area wells sampled (the North Well). However, the constituent was less than the SL calculated (28 ug/L) using EPA's median groundwater-to-indoor air attenuation factor of 0.0001 (EPA, 2008). As PCE has not been detected in shallow groundwater (above the practical quantitation limit) or soil in the manufacturing area and has been detected infrequently in deeper (lower aquifer) groundwater, the use of the range of groundwater-to-indoor attenuation factors is considered appropriate for the evaluation. As a result, indoor air is not considered a medium of concern.

Surface Soil: During the RFIs, 26 surface soil samples (< 2 ft bgs) were collected at the DTF facility. Soil boring locations at each individual SWMU and AOC are shown in the figures provided in the RFI reports (DuPont CRG, 2008 and URS, 2010). Table 4 compares the results for constituents detected in surface soil to USEPA SLs for industrial soil. As shown in the table, one constituent (benzo[a]pyrene) was detected above industrial soil SLs and site-specific soil background concentrations. The exceedance was observed at one boring location (SB-4) at SWMU 3.

Surface Water and Sediment: Surface water and sediment are not considered media of concern at the site. On-site workers do not conduct routine maintenance activities in the drainage features (on-site ditches or adjacent pond) located at the site. Constituents detected in shallow groundwater discharging to off-site surface water (James River) are not a concern. Due to the overall low concentrations of constituents detected in perimeter groundwater monitoring wells combined with their chemical and physical properties, accumulation in sediment of receiving water bodies would likely not be significant (i.e., low soil sorption, readily soluble and low potential to bioconcentrate).

Subsurface Soil: Site data evaluated for this pathway included subsurface soil samples collected during the Phase I RFI (at depths between 2 and 12 ft bgs where direct contact is likely to occur). Soil boring locations at each individual SWMU and AOC are shown in the figures provided in the RFI reports (DuPont CRG, 2008 and URS, 2010). 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 administrative controls including the site-wide excavation permitting process, excavation hazard demarcation program and appropriate health and safety plans. However, Table 5 compares the results for constituents detected in subsurface soil to USEPA SLs for industrial soil. No constituents were detected above industrial soil SLs and site-specific soil background concentrations.

Outdoor Air: Areas where constituents in shallow groundwater or soil exceed screening levels, are covered by either asphalt, concrete, gravel or a vegetative cover (grass); thereby, minimizing the potential for volatilization to outdoor (ambient) air or release to ambient air via fugitive dust. In addition to these covers, as noted above, excavation limitations are in place to ensure the appropriate PPE is used if subsurface conditions are disturbed. As a result, outdoor air is not considered a media of concern.

References:

DuPont CRG. 2007. Revised Phase I RFI Work Plan. DuPont Teijin Films, Hopewell, Virginia. March.

DuPont CRG. 2008. Phase I RFI Report. DuPont Teijin Films, Hopewell, Virginia. October.

EPA, 2002. *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, Subsurface Vapor Intrusion Guidance*

EPA, 2003. *User Guide for Evaluating Subsurface Vapor Intrusion into Buildings*, June 2003. Prepared by: Environmental Quality Management, Inc.

EPA. 2008. *U.S. EPA's Vapor Intrusion Database: Preliminary Evaluation of Attenuation Factors*. Draft. Office of Solid Waste. March 4, 2008.

EPA, 2009. USEPA Regional Screening Level Table. Available on-line: <http://epa-prgs.ornl.gov>. April 2009.

URS. 2010. Phase II RFI Report. DuPont Teijin Films, Hopewell, Virginia. Submitted December 2010.

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

Summary Exposure Pathway Evaluation Table

Potential Human Receptors (Under Current Conditions)

Contaminated Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food²
Groundwater		No		Yes		N/L	No
Air (indoors)							
Soil (surface, e.g., <2 ft)		Yes		Yes			
Surface Water						Yes	Yes
Sediment							
Soil (subsurface- e.g., >2 ft)							
Air (outdoors)							

² Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strikeout specific Media including Human Receptors' spaces for Media which are not (“contaminated”) as identified in #2 above.
2. Enter “yes” or “no” for potential “completeness” under each “Contaminated” Media – Human Receptor combination (Pathway). N/L = Not Likely
3. Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

Note: In order to focus the evaluation to the most probable combinations some potential “Contaminated” Media - Human Receptor combinations (Pathways) do not have check spaces (“___”). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_____ If no (pathways are not complete for any contaminated media-receptor combination) – skip to #6, and enter “YE” status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

_____√ If yes (pathways are complete for any “Contaminated” Media – Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any “Contaminated” Media - Human Receptor combination) - skip to #6 and enter “IN” status code

² Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

Rationale and Reference(s):

Potential Human Receptors:

DuPont Teijin Films is an active manufacturing facility. Therefore, **on-site industrial workers** and **on-site construction/excavation workers** were considered potential receptors. The James River is the only current “receptor” for groundwater downgradient of the site and, therefore, the river is the only exposure point of potential significance associated with off-site groundwater migration from the DTF facility. Therefore, **recreational users of the James River** were also considered potential receptors.

The manufacturing area is entirely fenced and guarded, and access is controlled and limited to authorized personnel only. Outside of the fenced portion of the property, undeveloped land including a wildlife refuge with a 30-acre pond lies to the west. No SWMUs or AOCs are located outside of the property fencing. Therefore, trespassers were not considered potential receptors.

No downgradient receptors of off-site groundwater exist due to the prevailing flow direction towards the James River. Likewise, impacted soils are contained within site boundaries. Therefore, off-site industrial workers and off-site residential receptors were not evaluated.

Sensitive receptors (such as daycare) are not located on or adjacent to the site. Therefore, these receptors were not considered potential receptors.

Potentially Complete Exposure Pathways by Media:

- (1) **Groundwater:** The potential for exposure is low under current conditions, because groundwater is not used on-site for potable purposes and downgradient users of groundwater have not been identified. Exposure to on-site production well water does not occur except possibly during short-term, intermittent maintenance activities (such as draining lines or repairing pumps) or during use as fire water. However, due to the shallow depth of groundwater in some portions of the site exposure may occur during construction/excavation activities. Access restrictions (including excavation permitting process) are in place limiting/prohibiting direct contact. Potentially complete exposure pathways, therefore, may include the following for the **on-site construction/excavation workers**: incidental ingestion of and dermal contact with groundwater, and inhalation of vapor phase chemicals released from groundwater to a confined space (trench). Access restrictions (including excavation permitting process) are in place limiting/prohibiting direct contact.
- (2) **Surface Soil:** There is limited potential for exposure to COPCs in surface soil for potential receptors. Exceedance of industrial soil SLs was limited to one boring at SWMU 3 where benzo(a)pyrene was detected at a concentration equal to the SL. A six-inch gravel cover is in place at this location. The receptor with the greatest potential for exposure is the on-site construction/excavation worker, where a greater likelihood of direct contact with impacted soil is associated with intrusive activities. Potentially complete exposure pathways, therefore, may include the following for the **on-site industrial and construction/excavation workers** – incidental ingestion of and dermal contact with surface soil and inhalation of soil-derived particulates or vapors. Access restrictions (including excavation permitting process) are in place limiting/prohibiting direct contact.
- (3) **Surface Water:** Groundwater may discharge to surface water of the James River where recreational users in the river may potentially be exposed. Therefore, potentially complete exposure pathways for **recreational users of the James River** may include incidental ingestion of and dermal contact with groundwater discharged to river water while swimming and fishing and ingestion of harvested fish from the river.

Incomplete Exposure Pathways by Media:

(1) **Groundwater**: Groundwater is not used on-site for potable uses and no downgradient users of off-site groundwater as drinking water exist. Therefore, in these instances, direct contact (ingestion or dermal contact) with groundwater for on- and off-site receptors is incomplete under current land use conditions.

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

If no (exposures can not be reasonably expected to be significant (i.e., potentially “unacceptable”) for any complete exposure pathway) - skip to #6 and enter “YE” status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

If yes (exposures could be reasonably expected to be “significant” (i.e., potentially “unacceptable”) for any complete exposure pathway) - continue after providing a description (of each potentially “unacceptable” exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

If unknown (for any complete pathway) - skip to #6 and enter “IN” status code

Rationale and Reference(s):

Groundwater Exposure Pathways: There is no potable use of groundwater at the DTF facility or at neighboring facilities and exposure to on-site production well water does not occur except possibly during short-term, intermittent maintenance activities (such as draining lines or repairing pumps) or during use as fire water. Potentially complete exposure pathways are limited to on-site construction/excavation workers who may contact shallow groundwater during intrusive activities. Potential exposure for an on-site construction/excavation worker to groundwater is not considered significant due to the strict adherence to a rigorous system of policies and procedures employed at the DTF facility to protect against unacceptable exposures. The facility utilizes a permitting process that requires Plant authorization for any intrusive activities (boring, drilling, excavation, etc.) into the soils or building foundations at the facility. The purpose of the permitting process is to ensure that appropriate measures are taken for personnel protection should the intrusive activity encounter impacted soils or groundwater. The permit process is a defined process where work locations are checked against site-wide maps. All available site environmental data, soil characterization and utility information are also reviewed to ensure appropriate PPE is used to prevent exposure. In addition, Plant and Area orientations are required for all workers prior to commencing work on site.

Surface Soil Exposure Pathways: Due to the strict adherence to the intrusive activity permitting process that is required at the DTF facility and the location of the surface soil exceedance combined with the existing gravel cover, potential on-site industrial worker and on-site construction/excavation worker exposures to impacted surface soil are not considered significant.

Surface Water Exposure Pathways: COPCs present in site groundwater may discharge to the James River. Consistent with the EI CA750 evaluation, a multi-tiered risk-based screening approach was used for this evaluation. Maximum detected concentrations in nine perimeter monitoring well locations (DMW-5,

³ If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a human health Risk Assessment specialist with appropriate education, training and experience.

MW-109A, MW-100A/B/C, MW-101A, MW-200B, MW-10 and MW-11) were first compared to appropriate groundwater criteria (i.e., MCLs or tap water SLs). Constituents whose maximum detected concentration exceeded the screening criteria were then compared to the groundwater criteria with an applied conservative dilution factor of ten to account for groundwater and surface water interaction. The use of a conservative dilution factor is consistent with current EI guidance and the 1996 Advanced Notice of Proposed Rule Making (ANPRM) regarding establishing point of compliance for surface water discharges (EPA, 1996). As shown in Table 6a, the results of these two screening steps indicate that one inorganic COPC (total arsenic) and three organic COPCs (chloroform, PCE and 1,3-dinitrobenzene) were in excess of ten times the screening criteria.

These four constituents were then further evaluated to determine whether their concentrations in perimeter groundwater monitoring wells would result in exceedances of relevant surface-water quality criteria in the river. The surface water quality criteria used in the evaluation was conservatively based on the lower of the to 9 VAC 25-260 Virginia Water Quality Standards (WQS) for protection of freshwater organisms (chronic) and protection of human health (drinking water and fish consumption). National recommended ambient water quality criteria (AWQC) were used where Virginia WQS were unavailable. A comparison to EPA Region III Biological Technical Assistance Group (BTAG) Freshwater Screening Benchmark values, where Virginia WQS or AWQC values for aquatic life were not available. Similarly, a comparison to tap water SLs were used where Virginia WQS or AWQC values for protection of human health were not available. Both maximum and average detected concentrations in perimeter groundwater monitoring wells were compared to the surface water screening criteria with an applied conservative dilution factor of 10 to account for groundwater to surface water interaction.

As shown in Table 6b, none of the COPCs exceeded the adjusted screening levels. As a result, groundwater discharge to surface water is considered acceptable. Over time while attenuation and degradation of COPCs takes place, current concentrations measured in groundwater will diminish further reducing potential discharge concentrations.

The potential exposure pathways related to food would be indirect exposure from fish or aquatic organisms in surface water. Since concentrations in perimeter groundwater are below the adjusted surface water quality criteria, exposure pathways associated with food are also considered insignificant.

References:

EPA 1996. *Advanced Notice of Public Rulemaking for Corrective Action for Releases from Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule*, (FR 19432, May 1, 1996) [Available on the EPA HQ Web Site: <http://www.epa.gov/epaoswer/hazwaste/ca/subparts.htm> and from NCEPI, Document No. EPA 530-Z-96003.

URS, 2010. *Environmental Indicator Determination Report: Migration of Contaminated Groundwater Under Control (CA750)*. DuPont Teijin Films. December.

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5. Can the “significant” exposures (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all “significant” exposures have been shown to be within acceptable limits) – continue and enter “YE” after summarizing and referencing documentation justifying why all “significant” exposures to “contamination” are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be “unacceptable”)- continue and enter “NO” status code after providing a description of each potentially “unacceptable” exposure.

_____ If unknown (for any potentially “unacceptable” exposure) - continue and enter “IN” status code

Rationale and Reference(s):

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6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under control" at the DuPont Teijin Films, EPA ID # VAD000019273, located at 1 Discovery Drive, Chester, Virginia, under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

NO - "Current Human Exposures" are NOT "Under Control."

IN - More information is needed to make a determination.

Completed by (signature) _____ Date 1/28/11

(print)

Will Geiger

(title)

Supervisor

(signature)

Date

1/31/11

(print)

Luis Pizarro

(title)

(EPA Region or State)

Locations where References may be found:

Contact telephone and e-mail numbers

(name)

(phone #)

(e-mail)

FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

Table 1
Constituents of Potential Concern in Site-Wide Groundwater

EI CA725
DTF Facility
Hopewell, VA

Analyte	CAS No.	Total (T) / Dissolved (D)	Units	No. of Samples ¹	No. of Detects	Minimum Detection	Maximum Detection	Screening Criteria ²	
								EPA SL Tap Water	Federal MCL
1,1,1-TRICHLOROETHANE	71556	T	UG/L	113	4	0.1	0.96	910	200
1,1,2-TRICHLOROETHANE	79005	T	UG/L	113	1	0.1	0.1	0.24	5
1,1-DICHLOROETHANE	75343	T	UG/L	113	22	0.1	9.4	2.4	-
1,1-DICHLOROETHENE	75354	T	UG/L	113	16	0.3	20	34	7
1,2-DICHLOROETHANE	107062	T	UG/L	113	4	0.1	0.3	0.15	5
ACETALDEHYDE	75070	T	UG/L	100	5	20	39	2.2	-
ACETONE	67641	T	UG/L	113	17	2.7	770	2200	-
BENZENE	71432	T	UG/L	113	4	0.1	0.3	0.41	5
BROMODICHLOROMETHANE	75274	T	UG/L	113	7	0.1	0.4	0.12	80
CARBON DISULFIDE	75150	T	UG/L	113	3	0.2	0.7	100	-
CHLOROBENZENE	108907	T	UG/L	113	3	0.1	2.4	9.1	100
CHLOROFORM	67663	T	UG/L	113	58	0.07	3.9	0.19	80
CIS-1,2 DICHLOROETHENE	156592	T	UG/L	113	15	0.2	71	7.3	70
ETHYL CHLORIDE	75003	T	UG/L	113	8	0.1	0.6	2100	-
ETHYLBENZENE	100414	T	UG/L	113	2	0.1	0.2	1.5	700
ETHYLENE GLYCOL	107211	T	UG/L	113	11	12000	26000	7300	-
IODOMETHANE	74884	T	UG/L	113	4	0.1	0.2	-	-
META- AND PARA-XYLENE	EVS0253	T	UG/L	108	2	0.069	0.1	-	10000
METHYL CHLORIDE	74873	T	UG/L	113	4	0.18	0.3	19	-
METHYL ETHYL KETONE	78933	T	UG/L	113	3	29	520	710	-
METHYL TERTIARY BUTYL ETHER	1634044	T	UG/L	13	1	0.14	0.14	12	-
METHYLENE CHLORIDE	75092	T	UG/L	113	10	0.2	27	4.8	5
TETRACHLOROETHYLENE	127184	T	UG/L	113	33	0.1	110	0.11	5
TOLUENE	108883	T	UG/L	113	23	0.077	5.1	230	1000
TRANS-1,2-DICHLOROETHENE	156605	T	UG/L	113	4	0.1	0.6	11	100
TRICHLOROETHENE	79016	T	UG/L	113	23	0.061	8	2	5
TRICHLOROFLUOROMETHANE	75694	T	UG/L	113	16	0.1	0.9	130	-
VINYL CHLORIDE	75014	T	UG/L	131	13	0.014	1	0.016	2
XYLENES	1330207	T	UG/L	18	1	0.069	0.069	20	10000
1,1'-OXYBISBENZENE	101848	T	UG/L	112	23	2	9000	-	-

Table 1
Constituents of Potential Concern in Site-Wide Groundwater

EI CA725
DTF Facility
Hopewell, VA

Analyte	CAS No.	Total (T) / Dissolved (D)	Units	No. of Samples ¹	No. of Detects	Minimum Detection	Maximum Detection	Screening Criteria ²	
								Water	MCL
1,3-DINITROBENZENE	99650	T	UG/L	100	1	6	6	0.37	-
1,4-DIOXANE	123911	T	UG/L	125	49	0.41	89	0.67	-
2-METHYLNAPHTHALENE	91576	T	UG/L	100	4	0.013	1	15	-
2-NITROPHENOL	88755	T	UG/L	87	1	2	2	-	-
4-NITROANILINE	100016	T	UG/L	100	1	1	1	3.4	-
ACENAPHTHENE	83329	T	UG/L	100	2	0.012	0.02	220	-
ACENAPHTHYLENE	208968	T	UG/L	100	2	0.013	0.013	-	-
ANTHRACENE	120127	T	UG/L	100	1	0.018	0.018	1100	-
BENZO(A)ANTHRACENE	56553	T	UG/L	100	3	0.013	0.021	0.029	-
BENZO(B)FLUORANTHENE	205992	T	UG/L	100	3	0.017	0.02	0.029	-
BENZO(G,H,I)PERYLENE	191242	T	UG/L	100	2	0.013	0.015	-	-
BENZO(K)FLUORANTHENE	207089	T	UG/L	100	1	0.023	0.023	0.29	-
BENZO(A)PYRENE	50328	T	UG/L	100	2	0.017	0.02	0.0029	0.2
BIPHENYL	92524	T	UG/L	112	11	1	2900	180	-
BIS(2-ETHYLHEXYL)PHTHALATE	117817	T	UG/L	100	2	2	3	4.8	-
CHRYSENE	218019	T	UG/L	100	3	0.014	0.02	2.9	-
DIALLATE	2303164	T	UG/L	100	2	2	2	1.1	-
DIBENZ(A,H)ANTHRACENE	53703	T	UG/L	100	1	0.014	0.014	0.0029	-
DIBENZOFURAN	132649	T	UG/L	100	4	1	5	3.7	-
DIETHYLENE GLYCOL	111466	T	UG/L	113	12	9400	17000	-	-
DI-N-BUTYL PHTHALATE	84742	T	UG/L	100	2	4	9	370	-
FLUORANTHENE	206440	T	UG/L	100	3	0.014	0.031	150	-
FLUORENE	86737	T	UG/L	100	3	0.013	0.041	150	-
INDENO (1,2,3-CD) PYRENE	193395	T	UG/L	100	2	0.01	0.014	0.029	-
NAPHTHALENE	91203	T	UG/L	100	47	0.01	11	0.14	-
PHENANTHRENE	85018	T	UG/L	100	6	0.01	0.023	-	-
PHENOL	108952	T	UG/L	102	18	1	2500	1100	-
PROPYLENE GLYCOL	57556	T	UG/L	113	29	8290	12100	73000	-
PYRENE	129000	T	UG/L	100	3	0.019	0.023	110	-
TRIETHYLENE GLYCOL	112276	T	UG/L	113	6	6900	12000	-	-

Table 1
Constituents of Potential Concern in Site-Wide Groundwater

EI CA725
DTF Facility
Hopewell, VA

Analyte	CAS No.	Total (T) / Dissolved (D)	Units	No. of Samples ¹	No. of Detects	Minimum Detection	Maximum Detection	Screening Criteria ²	
								Water	MCL
ANTIMONY	7440360	D	UG/L	48	5	1.1	31.4	1.5	6
ANTIMONY	7440360	T	UG/L	100	18	0.3	35.2	1.5	6
ARSENIC	7440382	D	UG/L	48	5	0.97	9.4	0.045	10
ARSENIC	7440382	T	UG/L	100	49	0.79	23	0.045	10
BARIUM	7440393	D	UG/L	48	48	20	196	730	2000
BARIUM	7440393	T	UG/L	100	100	17.6	605	730	2000
BERYLLIUM	7440417	T	UG/L	100	38	0.054	4.9	7.3	4
CADMIUM	7440439	D	UG/L	48	7	0.22	17.2	1.8	5
CADMIUM	7440439	T	UG/L	100	42	0.11	21.2	1.8	5
CHROMIUM	7440473	D	UG/L	48	1	4.9	4.9	5500	100
CHROMIUM	7440473	T	UG/L	100	38	2.6	158	5500	100
COBALT	7440484	D	UG/L	48	14	2.3	53.9	1.1	-
COBALT	7440484	T	UG/L	100	55	2.2	171	1.1	-
COPPER	7440508	D	UG/L	48	1	4.5	4.5	150	1300
COPPER	7440508	T	UG/L	100	39	2.3	104	150	1300
LEAD	7439921	D	UG/L	48	28	0.063	0.68	-	15
LEAD	7439921	T	UG/L	100	90	0.062	49.4	-	15
MERCURY	7439976	D	UG/L	48	3	0.07	0.082	0.057	2
MERCURY	7439976	T	UG/L	100	4	0.059	0.08	0.057	2
NICKEL	7440020	D	UG/L	48	18	3.1	30.3	73	-
NICKEL	7440020	T	UG/L	100	51	3.1	163	73	-
SILVER	7440224	T	UG/L	100	18	2	52.7	18	-
THALLIUM	7440280	T	UG/L	100	7	0.18	0.47	-	2
TIN	7440315	T	UG/L	100	1	10	10	2200	-
VANADIUM	7440622	T	UG/L	100	41	1.5	154	1.8	-
ZINC	7440666	D	UG/L	48	8	10.1	541	1100	-
ZINC	7440666	T	UG/L	100	45	8.2	621	1100	-

Table 1
Constituents of Potential Concern in Site-Wide Groundwater

EI CA725
DTF Facility
Hopewell, VA

1- Detected Constituents. Monitoring wells and in-situ groundwater points sampled in 2005, 2008 and 2010.

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

Yellow Shaded Cells = Concentration above criteria

- No value available

MCL for chloroform is trihalomethanes

1,1'-Oxybisbenzene (diphenyl ether) value is Dupont site-specific value with HQ=0.1

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

Ethylene glycol value used for diethylene glycol and triethylene glycol

P-Xylene value used for meta-and para-xylene

3 - Glycols not considered a COPC. Glycol isomers above tap water SLs during Phase I RFI (2008) were not detected in Phase II RFI (2010). Glycols are susceptible to rapid biodegradation

Table 2
Groundwater-to-Indoor Air Screening Levels
 El CA725
 DTF Facility
 Hopewell, VA

$$C_{gw} = C_{target} \times 10^{-4} \text{ m}^3/\text{L} \times 1/H \times 1/a$$

Appendix D, USEPA 2002

Parameter	Definition	Value
H (dimensionless)	Henry's law constant (atm-m ³ /mol) x 41 (1)	Chemical-Specific
C _{target} (mg/m ³)	Target breathing zone concentration (PEL, TLV or SL) (2)	Chemical-Specific
a	Attenuation factor, ratio of indoor air concentration to source vapor concentration (3)	0.001
C _{gw} (mg/L)	Target groundwater concentration	Calculated

Chemical	H	C _{target} (mg/m ³)	Source	C _{gw} (mg/L)	C _{target} (mg/m ³)	Source	C _{gw} (mg/L)	C _{target} (mg/m ³)	Source	C _{gw} (mg/L)
Acetone	1.59E-03	2.40E+03	OSHA PEL	1.51E+06	7.47E+05	ACGH TLV	4.70E+00	1.40E+02	EPA SL	8.81E-04
Acetaldehyde	2.73E-03	3.00E+02	OSHA PEL	1.32E+05	1.83E+02	ACGH TLV	6.80E+04	8.95E-03	EPA SL	2.05E+00
Benzene	2.28E-01	3.10E+00	OSHA PEL	1.40E+01	1.60E+00	ACGH TLV	7.02E+00	1.60E-03	EPA SL	7.02E-03
Biphenyl	1.29E-02	1.00E+00	OSHA PEL	7.84E+01	1.30E+00	ACGH TLV	1.03E+02	No Value	EPA SL	-
Carbon disulfide	5.90E-01	8.20E+01	OSHA PEL	1.05E+02	3.11E+00	ACGH TLV	6.27E+00	3.10E+00	EPA SL	5.25E+00
Chlorobenzene	1.52E-01	3.50E+02	OSHA PEL	2.30E+03	4.80E+01	ACGH TLV	3.03E+02	2.20E-01	EPA SL	1.45E+00
Chloroform	1.50E-01	2.40E+02	OSHA PEL	1.80E+03	4.90E+01	ACGH TLV	3.27E+02	5.30E-04	EPA SL	3.53E-03
1,1-Dichloroethane	2.30E-01	4.00E+02	OSHA PEL	1.74E+03	4.05E+02	ACGH TLV	1.78E+03	7.70E-03	EPA SL	3.35E-02
1,1-Dichloroethane	1.07E+00	-	-	-	2.00E+01	ACGH TLV	1.87E+01	8.80E-01	EPA SL	8.22E-01
cis-1,2-Dichloroethane	1.87E-01	7.80E+02	OSHA PEL	4.73E+03	7.93E+02	ACGH TLV	4.75E+03	No Value	EPA SL	-
Ethyl chloride	4.50E-01	2.60E+03	OSHA PEL	5.78E+03	2.60E+02	ACGH TLV	5.78E+02	4.40E+01	EPA SL	9.78E+01
Ethyl benzene	3.23E-01	4.35E+02	OSHA PEL	1.35E+03	4.34E+02	ACGH TLV	1.34E+03	4.90E-03	EPA SL	1.52E-02
Naphthalene	2.00E-02	5.00E+01	OSHA PEL	2.50E+03	5.00E+01	ACGH TLV	2.50E+03	3.60E-04	EPA SL	1.80E-02
2-Methylnaphthalene	2.12E-02	-	-	-	-	-	-	-	-	-
meta- and para-Xylene	2.94E-01	4.35E+02	OSHA PEL	1.48E+03	4.34E+02	ACGH TLV	1.48E+03	3.10E+03	EPA SL	1.06E+04
Methyl ethyl ketone	2.33E-03	5.90E+02	OSHA PEL	2.54E+05	5.90E+02	ACGH TLV	2.54E+05	2.20E+04	EPA SL	9.40E+06
Tetrachloroethylene	7.54E-01	6.78E+02	OSHA PEL	6.99E+02	1.70E+02	ACGH TLV	2.25E+02	2.10E-03	EPA SL	2.70E-03
Toluene	2.72E-01	7.54E+02	OSHA PEL	2.77E+03	1.88E+02	ACGH TLV	6.91E+02	2.20E+01	EPA SL	8.00E+01
Trichloroethane	4.22E-01	5.37E+02	OSHA PEL	1.27E+03	2.66E+02	ACGH TLV	6.37E+02	6.10E-03	EPA SL	1.45E-02
Trichlorofluoromethane	4.00E+00	5.80E+03	OSHA PEL	1.40E+03	5.82E+03	ACGH TLV	1.41E+03	3.10E+00	EPA SL	7.75E-01
Vinyl chloride	1.14E+00	2.50E+00	OSHA PEL	2.25E+00	2.50E+00	ACGH TLV	2.20E+00	2.80E+00	EPA SL	2.48E+00

Notes:

- (1) From EPA's Superfund Chemical Data Matrix (SCDM) database or EPA's User Guide for Evaluating Subsurface Vapor Intrusion into Buildings (USEPA 2003)
- (2) OSHA PEL - Occupational Safety and Health Administration Permissible Exposure Levels, ACGIH TLV - American Conference of Governmental Industrial Hygienist Threshold Limit Values
EPA SL - EPA Regional Screening Level for Industrial Ambient Air
- (3) Recommended upperbound generic vapor intrusion attenuation factor Appendix F-USEPA, 2002

References:

- USEPA. 2002. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). Office of Solid Waste and Emergency Response. Washington, D.C. November
- USEPA. 2003. User Guide for Evaluating Subsurface Vapor Intrusion into Buildings. June 2003. Prepared by: Environmental Quality Management, Inc.

**Table 3
Constituents of Potential Concern in Indoor Air**

EI CA725
DTF Facility
Hopewell, VA

Analyte ¹	CAS No.	Units	No. Samples ²	No. Detects	Minimum Detect	Maximum Detect	Location of Max Detect	Screening Criteria ³	
								Occupational Based	Risk-Based
1,1-DICHLOROETHANE	75343	UG/L	18	4	2.00E-01	2.50E+00	NORTHWELL	1.76E+06	3.35E+01
1,1-DICHLOROETHENE	75354	UG/L	18	2	1.10E+00	1.10E+00	NORTHWELL	1.87E+04	8.22E+02
ACETALDEHYDE	75070	UG/L	18	1	2.00E+01	2.00E+01	MW-106A	6.60E+07	2.05E+03
ACETONE	67641	UG/L	18	2	4.60E+01	2.00E+02	MW-2	4.70E+11	8.81E+07
BENZENE	71432	UG/L	18	1	1.00E-01	1.00E-01	MW-4	7.02E+03	7.02E+00
CARBON DISULFIDE	75150	UG/L	18	1	6.00E-01	6.00E-01	MW-203B	5.27E+03	5.25E+03
CHLOROBENZENE	108907	UG/L	18	1	2.10E+00	2.10E+00	MW-4	3.03E+05	1.45E+03
CHLOROFORM	67663	UG/L	18	10	1.00E-01	1.70E+00	MW-203B	3.27E+05	3.53E+00
CIS-1,2-DICHLOROETHENE	156592	UG/L	18	2	1.00E+00	1.00E+00	NORTHWELL	4.75E+06	-
ETHYL CHLORIDE	75003	UG/L	18	2	2.00E-01	2.00E-01	NORTHWELL	5.78E+05	9.78E+04
ETHYL BENZENE	100414	UG/L	18	1	1.00E-01	1.00E-01	MW-4	1.34E+06	1.52E+01
META- AND PARA-XYLENE	EVS0253	UG/L	18	1	1.00E-01	1.00E-01	MW-4	1.48E+06	1.06E+07
METHYL ETHYL KETONE	78933	UG/L	18	2	2.90E+01	1.70E+02	MW-2	2.54E+08	9.46E+09
TETRACHLOROETHYLENE	127184	UG/L	18	7	1.00E-01	6.50E+00	NORTHWELL	2.25E+05	2.79E+00
TOLUENE	108883	UG/L	18	2	1.00E-01	2.00E-01	MW-4	6.91E+05	8.09E+04
TRICHLOROETHENE	79016	UG/L	18	3	1.00E-01	1.50E+00	NORTHWELL	6.37E+05	1.45E+01
TRICHLOROFLUOROMETHANE	75694	UG/L	18	3	1.00E-01	2.00E-01	MW-104A	1.41E+06	7.75E+02
VINYL CHLORIDE	75014	UG/L	27	3	2.90E-02	5.10E-01	MW-203B	2.20E+03	2.46E+03
2-METHYLNAPHTHALENE	91576	UG/L	18	3	1.30E-02	6.20E-01	MW-4	-	-
BIPHENYL	92524	UG/L	18	2	2.00E+02	1.70E+03	MW-4	1.03E+05	-
NAPHTHALENE	91203	UG/L	18	17	1.20E-02	7.70E+00	MW-4	2.50E+06	1.80E+01

1- Detected volatile constituents

2- Manufacturing area results from sixteen 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, MW-107C, MW-203A and MW-203B) and one production well (North Well), includes duplicates.

3 - Screening Criteria is defined in Table 3. Occupational based groundwater to indoor air screening level is lower of OSHA PEL and ACGIH TLV based values.

Yellow Shaded Cells = Concentration above criteria

Table 4
Constituents of Potential Concern in Surface Soil

EI CA725
DTF Facility
Hopewell, VA

Analyte	CAS No.	Units	No. of Samples ¹	No. of Detects	Average Detection	Maximum Detection	Location of Maximum Detect	Site-Specific Background UTL ²	EPA SL Ind Soil ³
<i>Volatile Organic Compounds</i>									
ACETONE	67641	MG/KG	27	26	4.89E-02	3.00E-01	AOCG-SB1	-	6.10E+04
BENZENE	71432	MG/KG	27	2	3.10E-04	9.00E-04	AOCC-SB2	-	5.60E+00
CARBON DISULFIDE	75150	MG/KG	27	3	6.57E-04	2.00E-03	SWMU1-SB7	-	3.00E+02
IODOMETHANE	74884	MG/KG	27	1	1.64E-03	4.00E-03	AOCC-SB2	-	No Value
METHYL ETHYL KETONE	78933	MG/KG	27	13	6.62E-03	2.60E-02	SWMU3-SB2	-	1.90E+04
TOLUENE	108883	MG/KG	27	2	6.83E-04	3.00E-03	SWMU3-SB2	-	4.60E+03
<i>Semivolatile Organic Compounds</i>									
DIPHENYL ETHER	101848	MG/KG	21	8	4.03E-01	7.50E+00	SWMU3-SB2	-	4.20E+03
1,4-DIOXANE	123911	MG/KG	27	3	5.31E-02	2.30E-01	SWMU3-SB2	-	1.60E+02
2-ACETYLAMINOFLORENE	53963	MG/KG	21	1	4.15E-02	9.40E-02	SWMU5-SB1	-	4.50E-01
2-METHYLNAPHTHALENE	91576	MG/KG	21	1	2.22E-02	7.70E-02	SWMU5-SB1	-	4.10E+02
ACENAPHTHENE	83329	MG/KG	21	1	2.15E-02	6.20E-02	SWMU5-SB1	-	3.30E+03
ANTHRACENE	120127	MG/KG	21	3	2.45E-02	6.80E-02	AOCC-SB2	-	1.70E+04
BENZO(A)ANTHRACENE	56553	MG/KG	21	2	3.67E-02	2.30E-01	SWMU3-SB4	-	2.10E+00
BENZO(B)FLUORANTHENE	205992	MG/KG	21	4	4.82E-02	2.50E-01	SWMU3-SB4	-	2.10E+00
BENZO(G,H,I)PERYLENE	191242	MG/KG	21	4	3.38E-02	1.40E-01	SWMU3-SB4	-	1.70E+03
BENZO(K)FLUORANTHENE	207089	MG/KG	21	4	3.13E-02	1.10E-01	SWMU3-SB4	-	2.10E+01
BENZO(A)PYRENE	50328	MG/KG	21	4	4.26E-02	2.10E-01	SWMU3-SB4	-	2.10E-01
BIPHENYL	92524	MG/KG	21	1	9.47E-02	1.60E+00	SWMU3-SB2	-	5.10E+03
BIS(2-ETHYLHEXYL)PHTHALATE	117817	MG/KG	21	4	5.41E-02	1.50E-01	SWMU3-SB1	-	1.20E+02
CHRYSENE	218019	MG/KG	21	4	4.86E-02	2.40E-01	SWMU3-SB4	-	2.10E+02
DIALLATE	2303164	MG/KG	21	1	2.19E-02	7.00E-02	AOCC-SB2	-	2.80E+01
DIBENZOFURAN	132649	MG/KG	21	1	2.20E-02	7.40E-02	SWMU5-SB1	-	No Value
FLUORANTHENE	206440	MG/KG	21	5	8.18E-02	4.80E-01	SWMU5-SB1	-	2.20E+03
FLUORENE	86737	MG/KG	21	1	2.18E-02	6.80E-02	SWMU5-SB1	-	2.20E+03
INDENO (1,2,3-CD) PYRENE	193395	MG/KG	21	4	3.21E-02	1.20E-01	SWMU3-SB4	-	2.10E+00
PHENANTHRENE	85018	MG/KG	21	4	7.11E-02	6.00E-01	SWMU5-SB1	-	1.70E+04
PYRENE	129000	MG/KG	21	5	8.22E-02	4.40E-01	SWMU3-SB4	-	1.70E+03

Table 4
Constituents of Potential Concern in Surface Soil

EI CA725
DTF Facility
Hopewell, VA

Analyte	CAS No.	Units	No. of Samples ¹	No. of Detects	Average Detection	Maximum Detection	Location of Maximum Detect	Site-Specific Background UTL ²	EPA SL Ind Soil ³
<i>Inorganics</i>									
ANTIMONY	7440360	MG/KG	5	5	3.68E+00	8.33E+00	SWMU3-SB4	6.28E-01	4.10E+01
ARSENIC	7440382	MG/KG	21	21	4.82E+00	8.82E+00	SWMU3-SB3	9.49E+00	1.60E+00
BARIUM	7440393	MG/KG	21	21	1.12E+02	1.59E+02	SWMU4-SB2	2.20E+02	1.90E+04
BERYLLIUM	7440417	MG/KG	21	21	1.12E+00	3.35E+00	SWMU2-SB1	1.66E+00	2.00E+02
CADMIUM	7440439	MG/KG	21	7	8.62E-02	1.66E-01	SWMU5-SB3	1.49E-01	8.00E+01
CHROMIUM	7440473	MG/KG	21	21	2.27E+01	3.49E+01	AOCD-SB1	3.02E+01	1.40E+03
COBALT	7440484	MG/KG	21	21	9.48E+00	1.28E+01	SWMU1-SB6	1.43E+01	3.00E+01
COPPER	7440508	MG/KG	21	21	1.91E+01	9.31E+01	SWMU2-SB1	2.02E+01	4.10E+03
LEAD	7439921	MG/KG	21	21	1.84E+01	4.20E+01	SWMU2-SB1	3.45E+01	8.00E+02
MERCURY	7439976	MG/KG	21	13	1.64E-02	4.49E-02	SWMU3-SB3	1.04E-01	3.10E+01
NICKEL	7440020	MG/KG	21	21	1.58E+01	2.26E+01	SWMU1-SB5	1.83E+01	2.00E+03
SILVER	7440224	MG/KG	21	11	2.72E-01	9.85E-01	SWMU3-SB2	NC	5.10E+02
THALLIUM	7440280	MG/KG	20	15	2.66E-01	6.14E-01	SWMU3-SB1	3.80E-01	6.60E+00
TIN	7440315	MG/KG	21	21	3.22E+00	1.77E+01	SWMU2-SB1	NC	6.10E+04
VANADIUM	7440622	MG/KG	21	21	3.89E+01	5.95E+01	AOCD-SB1	5.20E+01	5.20E+02
ZINC	7440666	MG/KG	21	21	1.04E+02	8.85E+02	SWMU2-SB1	1.12E+02	3.10E+04

Yellow shading indicates an exceedance of screening criteria

Notes:

- 1 - Surface soil samples collected during Phase I RFI at depth intervals less than 2 feet bgs
R-qualified data excluded from sample count (i.e., antimony)
Statistical summary includes field duplicates (if applicable)
 - 2 - Site-specific soil background concentrations determine during Phase II RFI
 - 3 - EPA Regional Screening Level for Industrial Soil (HQ=0.1 and risk of 1×10^{-5}) (November 2010)
- Chromium value is Total Chromium
Mercury value is mercuric chloride
Cadmium value is Cadmium (food)
Diphenyl ether value is DuPont-derived
Phenanthrene value is anthracene
Benzo(g,h,i)perylene value is pyrene
Vanadium value is vanadium and compounds

Table 5
Constituents of Potential Concern in Subsurface Soil

EI CA725
DTF Facility
Hopewell, VA

Analyte	CAS No.	Units	No. of Samples ¹	No. of Detects	Average Detection	Maximum Detection	Location of Maximum Detect	Site-Specific Background UTL ²	EPA SL Ind Soil ³
<i>Volatile Organic Compounds</i>									
ACETONE	67641	MG/KG	19	13	3.01E-02	6.80E-02	SWMU1-SB9		6.10E+04
CARBON DISULFIDE	75150	MG/KG	19	3	7.46E-04	2.00E-03	SWMU1-SB3		3.00E+02
CHLOROBENZENE	108907	MG/KG	19	1	5.32E-04	1.00E-03	SWMU1-SB4		1.50E+02
METHYL ETHYL KETONE	78933	MG/KG	19	1	2.32E-03	5.00E-03	SWMU1-SB4		1.90E+04
TOLUENE	108883	MG/KG	19	1	6.04E-04	2.00E-03	AOCC-SB1		4.60E+03
<i>Semivolatile Organic Compounds</i>									
DIPHENYL ETHER	101848	MG/KG	14	1	2.59E-02	1.00E-01	SWMU1-SB4		4.20E+03
BIS(2-ETHYLHEXYL)PHTHALATE	117817	MG/KG	14	1	4.35E-02	8.60E-02	AOCC-SB1		1.20E+02
DIETHYL PHTHALATE	84662	MG/KG	14	1	4.53E-02	1.10E-01	AOCC-SB1		4.90E+04
<i>Inorganics</i>									
ARSENIC	7440382	MG/KG	14	14	5.27E+00	8.39E+00	SWMU1-SB9	3.77E+01	1.60E+00
BARIUM	7440393	MG/KG	14	14	8.79E+01	1.47E+02	SWMU1-SB4	2.77E+02	1.90E+04
BERYLLIUM	7440417	MG/KG	14	14	9.44E-01	1.34E+00	SWMU1-SB8	6.38E+00	2.00E+02
CADMIUM	7440439	MG/KG	14	1	6.23E-02	1.32E-01	AOCC-SB1	4.08E-01	8.00E+01
CHROMIUM	7440473	MG/KG	14	14	2.27E+01	3.20E+01	AOCC-SB1	3.00E+01	1.40E+03
COBALT	7440484	MG/KG	14	14	9.49E+00	1.44E+01	AOCC-SB1	8.99E+01	3.00E+01
COPPER	7440508	MG/KG	14	14	1.72E+01	2.40E+01	SWMU1-SB9	4.91E+01	4.10E+03
LEAD	7439921	MG/KG	14	14	1.38E+01	1.97E+01	SWMU1-SB9	6.84E+01	8.00E+02
MERCURY	7439976	MG/KG	14	10	2.18E-02	7.78E-02	SWMU1-SB9	NC	3.10E+01
NICKEL	7440020	MG/KG	14	14	1.68E+01	2.39E+01	AOCC-SB1	2.03E+01	2.00E+03
SILVER	7440224	MG/KG	14	3	1.40E-01	3.52E-01	AOCC-SB1	NC	5.10E+02
THALLIUM	7440280	MG/KG	12	7	2.20E-01	4.09E-01	SWMU1-SB9	NC	6.60E+00
TIN	7440315	MG/KG	14	14	2.51E+00	3.14E+00	SWMU2-SB2	NC	6.10E+04
VANADIUM	7440622	MG/KG	14	14	3.84E+01	5.32E+01	SWMU1-SB4	2.98E+01	5.20E+02
ZINC	7440666	MG/KG	14	14	6.81E+01	1.60E+02	AOCC-SB2	4.85E+01	3.10E+04

Yellow shading indicates an exceedance of screening criteria

Notes:

1 - Subsurface soil samples collected during Phase I RFI at depth intervals between 2 and 12 feet below ground surface
Statistical summary includes field duplicates

R-qualified data excluded from sample count (i.e., thallium)

2 - Site-specific soil background concentrations determine during Phase II RFI

3 - EPA Regional Screening Level for Industrial Soil (HQ=0.1 and risk of 1×10^{-6}) (November 2010 edition)

Chromium value is Total Chromium

Mercury value is mercuric chloride

Cadmium value is Cadmium (food)

Diphenyl ether value is DuPont-derived

Table 6a
Constituents of Potential Concern in Perimeter Groundwater
EI CA725
DTF Facility
Hopewell, VA

Analyte	CAS No.	Total (T) or Dissolved (D)	Units	No. of Samples ¹	No. of Detects	Tier I Screen		Tier II Screen
						Perimeter Maximum Detection	MCL or Tap Water SL	10 X Screening Criteria
<i>Volatile Organic Compounds</i>								
1,1-DICHLOROETHANE	75343	T	UG/L	10	1	0.6	2.4	24
1,1-DICHLOROETHENE	75354	T	UG/L	10	1	1.7	34	340
BROMODICHLOROMETHANE	75274	T	UG/L	10	2	0.2	0.12	1.2
CHLOROFORM	67663	T	UG/L	10	4	2.5	0.19	1.9
CIS-1,2 DICHLOROETHENE	156592	T	UG/L	10	1	5	7.3	73
METHYLENE CHLORIDE	75092	T	UG/L	10	2	0.3	4.8	48
TETRACHLOROETHYLENE	127184	T	UG/L	10	3	7.2	0.11	1.1
TOLUENE	108883	T	UG/L	10	1	0.1	230	2300
TRANS-1,2-DICHLOROETHENE	156605	T	UG/L	10	1	0.1	11	110
TRICHLOROETHENE	79016	T	UG/L	10	1	0.6	2	20
VINYL CHLORIDE	75014	T	UG/L	16	2	0.036	0.016	0.16
<i>Semivolatile Organic Compounds</i>								
1,3-DINITROBENZENE	99650	T	UG/L	10	1	6	0.37	3.7
BIS(2-ETHYLHEXYL)PHTHALATE	117817	T	UG/L	10	1	2	4.8	48
NAPHTHALENE	91203	T	UG/L	10	9	0.025	0.14	1.4
<i>Glycols</i>								
PROPYLENE GLYCOL	57556	T	UG/L	10	6	9380	73000	730000
<i>Metals</i>								
ANTIMONY	7440360	D	UG/L	10	1	1.5	1.5	15
ANTIMONY	7440360	T	UG/L	10	1	1.6	1.5	15
ARSENIC	7440382	T	UG/L	10	3	1.2	0.045	0.45
BARIUM	7440393	D	UG/L	10	10	83.4	730	7300
BARIUM	7440393	T	UG/L	10	10	155	730	7300
BERYLLIUM	7440417	T	UG/L	10	2	0.38	4	40
CADMIUM	7440439	D	UG/L	10	1	0.43	1.8	18
CADMIUM	7440439	T	UG/L	10	1	0.45	1.8	18
COBALT	7440484	D	UG/L	10	1	4	1.1	11
COBALT	7440484	T	UG/L	10	1	3.9	1.1	11

Table 6a
Constituents of Potential Concern in Perimeter Groundwater

EI CA725
DTF Facility
Hopewell, VA

Analyte	CAS No.	Total (T) or Dissolved (D)	Units	No. of Samples ¹	No. of Detects	Tier I Screen		Tier II Screen
						Perimeter Maximum Detection	MCL or Tap Water SL	10 X Screening Criteria
LEAD	7439921	D	UG/L	10	6	0.11	15	150
LEAD	7439921	T	UG/L	10	10	4.8	15	150
MERCURY	7439976	D	UG/L	10	2	0.078	0.057	0.57
MERCURY	7439976	T	UG/L	10	1	0.066	0.057	0.57
NICKEL	7440020	D	UG/L	10	1	3.4	73	730
NICKEL	7440020	T	UG/L	10	1	3.1	73	730
VANADIUM	7440622	T	UG/L	10	3	4	1.8	18
ZINC	7440666	D	UG/L	10	1	10.1	1100	11000
ZINC	7440666	T	UG/L	10	3	10.4	1100	11000

Notes:

- 1 - Perimeter monitoring well locations (DMW-5, MW-109A, MW-100A/B/C, MW-101A, MW-200B, MW-10 and MW-11).
- 2 - Screening Criteria = Lower of EPA Regional Screening Level (HQ=0.1) or Federal MCL listed in Table 1

Highlighted cells indicate an exceedance

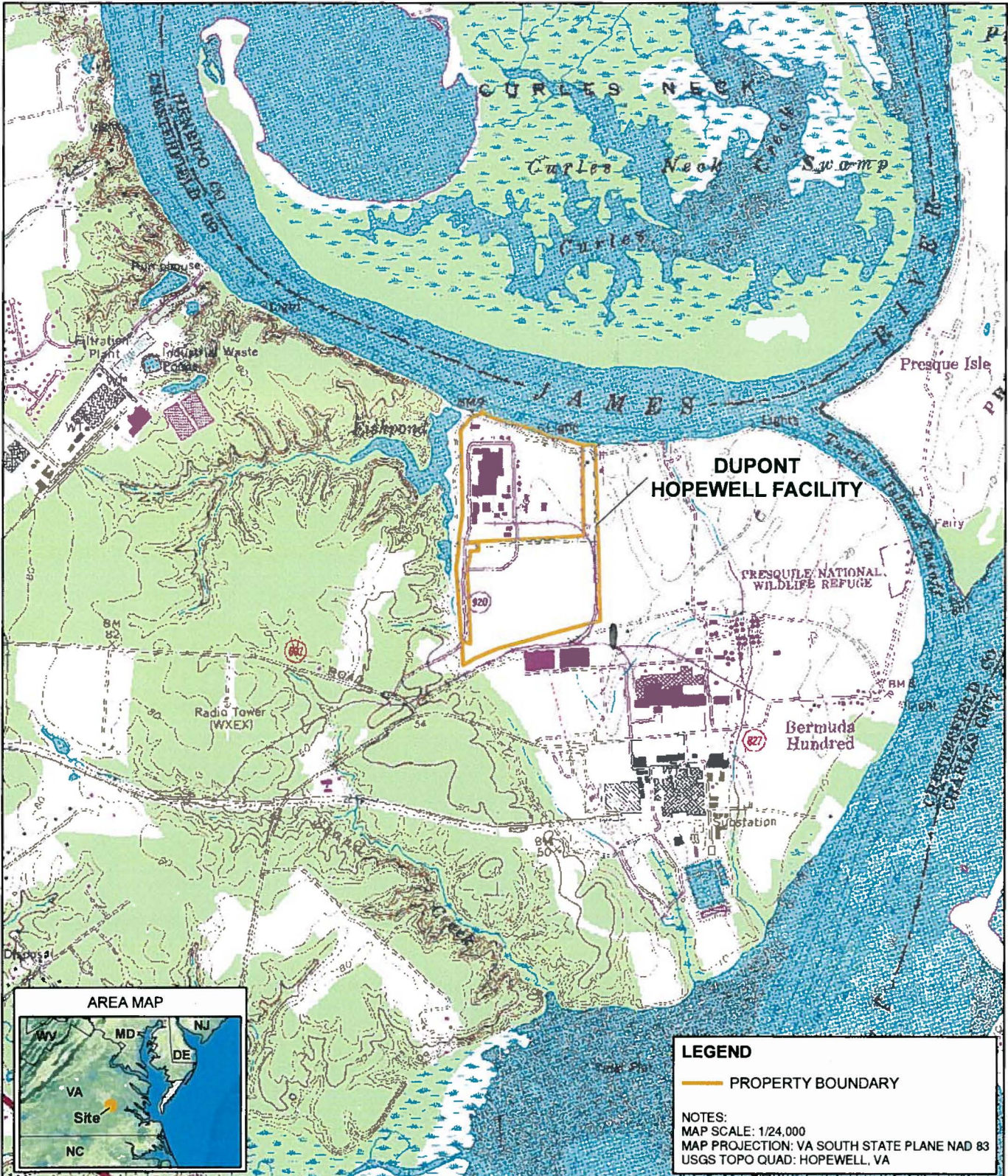
Table 6b
Groundwater to Surface Water Evaluation
 EI CA725
 DTF Facility
 Hopewell, VA

Analyte	CAS No.	Units	No. of Samples ¹	No. of Detects	Perimeter Average Detection	Perimeter Maximum Detection	Ecological Benchmarks		Human Health Criteria			Screening Criteria ²	Source	Max > 10 X SC?	Avg > 10X SC?
							9 VAC 25-260 FW Chronic	Region III BTAG FW	9 VAC 25-260 HH PWS	NAWQC	Tap Water SL				
CHLOROFORM	67663	UG/L	10	4	5.90E-01	2.50E+00	-	1.80E+00	-	5.70E+00		1.80E+01	EPA_SL	No	No
TETRACHLOROETHYLENE	127184	UG/L	10	3	8.50E-01	7.20E+00	-	1.11E+02	8.00E+00			8.00E+01	VQ_WQS_HH	No	No
1,3-DINITROBENZENE	99650	UG/L	10	1	2.40E+00	6.00E+00	-	-	-		3.70E+00	3.70E+01	EPA_SL	No	No
ARSENIC	7440382	UG/L	10	3	9.91E-01	1.20E+00	1.50E+02		1.00E+01			1.00E+02	VQ_WQS_HH	No	No

Notes:

- 1 - Perimeter monitoring well locations (DMW-5, MW-109A, MW-100A/B/C, MW-101A, DMW-4, MW-10 and MW-11).
- 2 - Lower of the 9 VAC 25-260 values for protection of freshwater organisms (chronic) and protection of human health (drinking water and fish consumption).
 If WQS was unavailable then USEPA tap water SL or Region III BTAG freshwater surface water benchmark values also utilized.

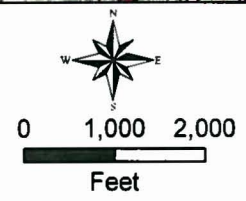
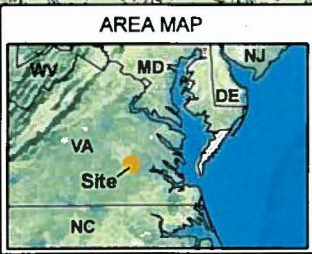
Highlighted cells indicate an exceedance



LEGEND

— PROPERTY BOUNDARY

NOTES:
 MAP SCALE: 1/24,000
 MAP PROJECTION: VA SOUTH STATE PLANE NAD 83
 USGS TOPO QUAD: HOPEWELL, VA



FILE NUMBER:
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URS Corporation
 Iron Hill Corporate Center
 4051 Ogletown Road, Suite 300
 Newark, DE 19713

TOPOGRAPHIC SITE LOCATION MAP

EI CA725
 DUPONT TEIJIN FILMS
 HOPEWELL, VIRGINIA

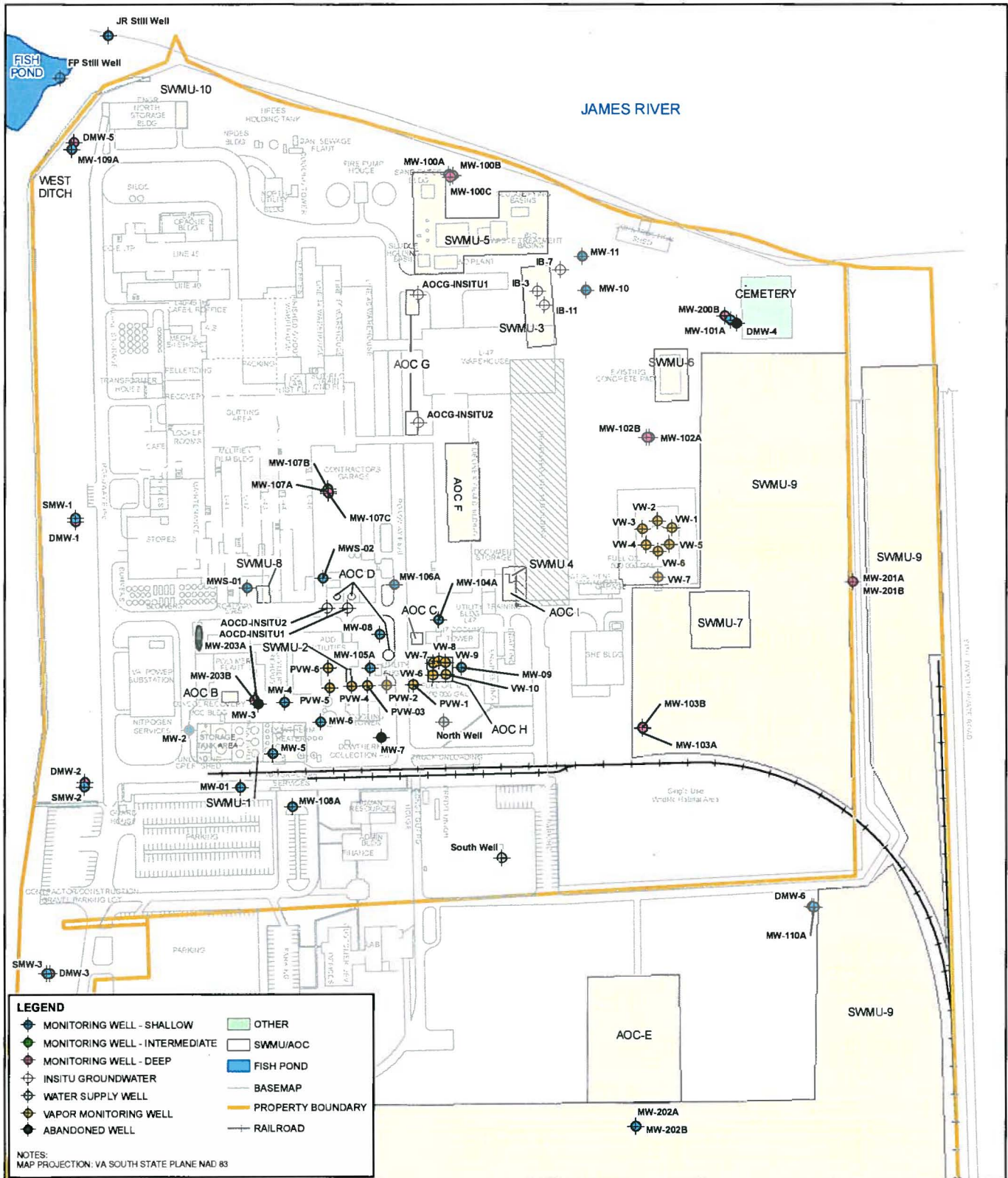
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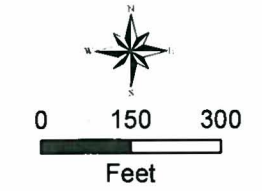
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MAP FORMATTED FOR "A" (8.5" X 11") SIZE SHEET.
 SCALE NOT VALID FOR DIFFERENT PAGE SIZE.



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MONITORING WELL LOCATION MAP

EI CA725
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PROJECT NUMBER:	1898575
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FIGURE NUMBER:	2