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May 7, 2002

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May 7, 2002

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Re: CAT Meeting To Discuss C-8 Screening Levels/Risk Factors

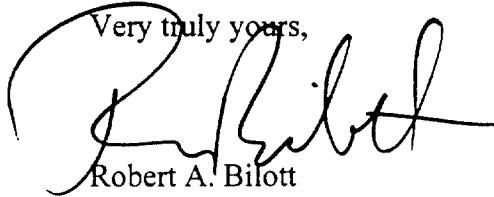
Ladies and Gentlemen:

Attached hereto is Section 6 of DuPont's June 1999 RCRA Facility Investigation Report for its Washington Works facility in Wood County, West Virginia, which sets forth DuPont's calculations in support of a 3 ppb "preliminary screening level" for C-8 in drinking water. Although we assume that each of you have been provided with a copy of this document by

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Page 3

DuPont (we understand that the document was submitted to at least the USEPA and WVDEP back in 1999), we wanted to make sure that each of the CAT Team members is aware of the existence of this document in the publicly-available files. Thank you.

Very truly yours,

Robert A. Bilott

RAB/mdm
Attachment

000101



DuPont
Washington Works
P. O. Box 1217
Parkersburg, WV 26102-1217

**CERTIFIED MAIL -
RETURN RECEIPT REQUESTED**

June 24, 1999

Mr. Martin Kotsch
Project Manager
U.S. EPA, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

RE: Permit WVD045875291

Dear Mr. Kotsch:

Please find enclosed the RCRA Facility Investigation (RFI) Report of Findings for your review and comment.

If you have any questions or comments, please contact me at (304) 863-4271.

Very truly yours,

R. L. Ritchey
Sr. Environmental Control Consultant
Washington Works

Attachment

CC: Mr. Mark Priddy
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Ms. Barbara Taylor, Chief*
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RCRA FACILITY INVESTIGATION REPORT DUPONT WASHINGTON WORKS WASHINGTON, WEST VIRGINIA USEPA PERMIT NUMBER WVD04-587-5291

June 30, 1999

Project No. 0D6W7205



CORPORATE REMEDIATION GROUP
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EID109643

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GLK002615

6.1 OBJECTIVES AND APPROACH

The overall objective of this risk evaluation is to determine whether identified releases from the SWMUs are a potential concern for human health or the environment and whether further evaluation or action is warranted.

In the screening-level health risk evaluation, concentrations of constituents detected in soil and groundwater were compared to generic health-protective screening levels for soil and groundwater, in order to identify constituents and exposure pathways of potential concern. The ecological evaluation focused on characterizing the habitat within the RFI study area and identifying whether complete exposure pathways exist between SWMU releases and significant ecological resources or receptors. This approach allows identification of the constituents and exposure routes of concern early in the RFI/CMS process, and avoids expending effort on minor constituents and exposure routes that do not influence overall risk (USEPA Region III, 1993).

The risk evaluation has been prepared consistent with the screening-level approaches outlined in the following documents:

- ☐ RCRA Facility Investigation Plan, DuPont Washington Works (DuPont, 1997).
- ☐ RCRA Facility Investigation Requirements (included as Attachment D to the RCRA Facility Investigation Plan).
- ☐ USEPA Region III Technical Guidance Manual "Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening" (USEPA Region III, 1993).
- ☐ USEPA Region III Risk-Based Concentration Table (USEPA Region III, 1999).
- ☐ USEPA guidance for ecological risk assessment (USEPA 1997; 1998a; 1998b).

In keeping with the above guidance documents, the risk evaluation includes:

- ☐ Description of on-site and adjacent land use (Section 6.2).
- ☐ Evaluation of data used in risk screening (Section 6.3).
- ☐ Screening-level health risk evaluation, in which analytical data were compared to generic health-based screening levels for soil, to drinking water criteria for groundwater, or to background levels (Section 6.4).
- ☐ Identification of constituents and exposure pathways of concern screening step (Section 6.5).
- ☐ Ecological exposure evaluation (Section 6.6).
- ☐ Summary and conclusions (Section 6.7).

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6.2 SITE DESCRIPTION AND LAND USE

This section provides an overview of land use at the Washington Works site and identifies potential human and ecological receptors. Additional information on current and future land use is provided in Attachment 1, Land Use Report.

6.2.1 On-Site and Adjacent Land Use

The Washington Works facility has been the site of ongoing industrial activities since the initial plant was first constructed in 1948. It occupies 1,200 acres, extending about a mile along the Ohio River seven miles west of Parkersburg, WV. Most of the facility is developed for manufacturing purposes and is covered with paving, rail tracks, and buildings. Open areas include lawns, mowed fields, and a few areas of natural growth along portions of the riverbank. The developed portion of the property is fenced, and access is rigorously controlled by a security system. The riverbank itself lies outside the security fence, but is regularly patrolled. The riverbank adjacent to the facility is relatively inaccessible, due to its location and the regular security patrols, and there is little to attract casual visitors to the river's edge.

Adjacent land use is a mix of industrial, commercial, agricultural, residential, recreational, and open space. Adjacent industrial or commercial properties include GE Plastics and two warehouses to the west. Nearby residential areas include the unincorporated town of Washington, whose eastern extent is adjacent to the DuPont property, and individual homes and subdivisions within about a mile of the property to the east, south, and west.

Figure 2.2 show the Washington Works site and adjacent land use.

The Washington Works facility will continue to be used for industrial purposes in the future. Likewise, adjacent land use is expected to remain a mix of industrial, residential, and other uses. Land use issues are addressed in more detail in Attachment 1, Land Use Report.

6.2.2 Groundwater Uses

The alluvial terrace unconfined aquifer is the principal regional aquifer and is used locally for industrial, municipal, and rural water supplies. Depth to groundwater is approximately 60 to 70 feet in the main plant area, and the saturated zone is about 30 to 40 feet deep, extending to bedrock at roughly 100 feet BGS. As indicated in previous sections of this report, DuPont Washington Works operates several production well fields on the plant property that provide industrial process water and potable water to the plant (potable water is provided by Wells 331 (AO08, PW01), 332 (AQ09-PW01), and 336 (AM07-PW01), in the East Well Field).

Off-site well fields in the downstream direction include eleven industrial and five potable water wells on the GE Plastics site located just to the west of Washington Works and the Lubeck Public Service District (PSD) well field located about 2.3 miles south (downriver) of the plant. The Lubeck PSD provides water to nearly 99 % of the population in this portion of Wood County (Lubeck PSD, 1999). Other private wells or small community wells of unknown status were identified during a well search, but they are suspected of being inactive (see Section 4.3 of Attachment 1, Location of Wellhead Protection Areas and Drinking Water Wells).

As discussed in Section 5, pumping of the Washington Works well fields controls groundwater flow, so that groundwater affected by SWMU releases is contained on-site.

6.2.3 Surface Water

Surface water of the Ohio River provides water to the cities of Parkersburg, West Virginia, and Belpre, Ohio, about seven miles upstream of the Washington Works facility. There are no permanent streams or surface water bodies on the main plant area at Washington Works. Precipitation in the main plant area is directed toward drains and storm sewers, which ultimately discharge to the Ohio River. Two drainage swales that convey surface runoff to the Ohio River during rainy weather are located on the property, one in the facility's southwest corner and the other on the extreme eastern (upgradient) end of the property.

The former BG and PWI have been excavated, backfilled, and resurfaced, so there are no surface water impacts from these SWMUs. The slopes of the RBL/ADP above the Ohio River are heavily vegetated, and the SWMUs have been covered with clean fill, so surface water impacts via surface runoff from these SWMUs are considered negligible. As indicated in the previous sections, SWMU-impacted groundwater does not discharge to surface water because of production well pumping.

6.2.4 Ecological Setting

The Washington Works site itself is largely developed and used for manufacturing activities, with manicured lawns, mowed fields, and a few areas of natural growth along portions of the river bank. These areas provide a narrow and intermittent terrestrial habitat for a variety of birds, small mammals, and other animals. The upper terraces upstream and downstream from the plant are kept in grassland with some small areas of trees and brush. A small chestnut grove is being developed by the facility's Wildlife Habitat Enhancement Program, in conjunction with the American Chestnut Foundation.

There are no known records of any federal or state listed species in the vicinity of the Washington Works Site (West Virginia Division of Natural Resources [WVDNR], 1999). In addition, no wetlands or critical terrestrial habitat were identified at the Washington Works facility during field observations conducted at the site. Section 6.6, Ecological Exposure Evaluation, provides additional site-specific information about ecological resources and exposures at the site.

6.3 DATA AND MEDIA EVALUATED

Soil and groundwater analytical data collected during the RFI were discussed in Sections 4.2 and 4.3. No quality assurance or quality control issues were identified that would affect data usability in risk assessment.

Tables 6.1 through 6.4 show the soil data included in the risk evaluation. These data were from samples collected between 0 and 20 feet BGS at the BG and RBL/ADP units. The depth of 20 feet is considered a conservative estimate of depth of excavation for future construction or utility work. Two soil intervals were evaluated: 0 to 2 feet (surface soil) and 2 to 20 feet (subsurface soil).

Table 6.5 shows the groundwater data included in the risk evaluation. These data were from water quality samples collected at the five production wells sampled during the RFI investigation: K16-PW01, L17-PW01, AM07-PW01, VO5-PW01, and LO4-PW01. Water from these wells is used to supply process water to the manufacturing area, and water from Wells AM07-PW01 (336) provides potable water to the plant. Therefore, groundwater drawn from these wells is representative of the exposure medium to which humans are or could be exposed.

6.4 SCREENING-LEVEL HEALTH RISK EVALUATION

The purpose of the screening-level health risk evaluation is to identify the constituents and exposure pathways that may be a concern for human health and that may warrant further evaluation or action. Constituents whose maximum concentrations do not exceed health-protective screening levels and environmental media that have no constituents exceeding screening levels are concluded to pose no concern for human health and can be eliminated from further evaluation. Potential exposure to multiple chemicals and multiple media also is considered in the risk evaluation, in order to strengthen conclusions drawn from the risk-based screen.

6.4.1 Potential Human Receptors

Human exposure to hazardous constituents released from the SWMUs is minimal or non-existent, because they have been removed and regraded or paved (BG, PWI, ADP) or covered and vegetated (RBL). However, for the risk evaluation it was assumed that potential on-site human receptors include site workers, occasional trespassers along the riverbank, and construction workers performing excavation work. Of these, the on-site worker is the most exposed individual, because he or she is assumed to be present on a daily basis for the duration of his/her career. Therefore, evaluating presumed on-site worker exposure to soil at the SWMUs is protective of construction workers and trespassers, whose exposure would be short-term and intermittent.

Likewise, workers are the only receptors who are exposed to production well water. Construction workers would not be exposed to groundwater during excavation because the water table is about 60 feet BGS.

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6.4.2 Screening Levels Used in the Evaluation

Soil data were compared to the following screening levels:

- ☐ USEPA Region III RBCs for industrial soil (soil ingestion pathway) (USEPA Region III, 1999). The RBCs are based on a target excess cancer risk of 10^{-6} (1 in 1 million) and a noncancer hazard quotient (HQ) of one. These RBCs represent chemical concentrations in soil that would be expected to pose no adverse impacts to health under the exposure conditions evaluated. Industrial soil RBCs were used because the current and future use of the property is industrial (Section 6.2.1 and Attachment 1, Land Use Report).
- ☐ A screening level for lead in industrial soil of 1000 mg/kg. This level is a conservative (low) estimate for industrial soil screening purposes, because it is below typical screening levels calculated using USEPA's Adult Lead Exposure Model (1,200 to 1,800 mg/kg, using default parameters) (USEPA 1996a).
- ☐ Federal MCLs for drinking water or the federal action level for lead in tap water.
- ☐ USEPA Region III RBCs for tap water (in the absence of an MCL) (USEPA Region III, 1999).
- ☐ Preliminary screening levels for FC-143 in soil and groundwater (see Section 6.4.3).

Certain potential exposure pathways are not included in the derivation of the screening levels, namely:

- ☐ Inhalation: The inhalation pathway is not included in the derivation of the USEPA soil screening levels used in this evaluation. Nor are there USEPA-established "soil-to-air" screening levels for an industrial scenario. However, neglecting the inhalation pathway is not expected to significantly affect the results of the risk screening for the following reasons.
 - First, inhalation of non-volatile constituents (such as metals or FC-143) that are adhered to soil particulate matter usually does not contribute significantly to overall risk because air emissions from wind erosion are, on an annual average basis, relatively low. This is represented in USEPA's default Particulate Emission Factor (PEF) of 1.32×10^{-5} m³/kg soil (USEPA 1996b). When applied in the denominator of an equation to estimate air concentrations of particulate matter, the resulting air particulate matter concentrations are negligible and usually do not contribute to overall risk.
 - Secondly, volatile constituents, such as methylene chloride or trichloroethylene, were relatively infrequently detected in soil (see Tables 6.1 through 6.4), and would not be expected to contribute to a significant inhalation hazard. Therefore, the industrial soil RBCs are considered sufficiently conservative (protective) for the screening-level risk evaluation. If constituent concentrations in soil exceed the RBCs, the inhalation pathway may warrant consideration in the future.

- ❑ Dermal absorption: The dermal absorption exposure route is not included in the derivation of the USEPA soil RBCs used in this evaluation. Although this adds a small uncertainty to the screening levels, it will not significantly affect the results of the screening. In cases where constituent concentrations in soil exceed RBCs, dermal absorption may warrant further consideration in the future.
- ❑ Migration to groundwater: Soil screening levels for protection of groundwater used as drinking water were not included in the risk screening evaluation because groundwater data were compared directly to drinking water criteria.

6.4.3 Derivation of Preliminary Screening Levels for FC-143

USEPA-established screening levels are not available for FC-143. Therefore, preliminary screening levels analogous to Region III RBCs for soil and groundwater were derived from a health-based Community Exposure Guideline (CEG) of 0.0003 mg/m³ air (Haskell Laboratory 1991). The CEG was developed by Haskell Laboratory to be protective of public exposure via the inhalation pathway.

The CEG was derived from the DuPont Allowable Exposure Level (AEL) for workers of 0.01 mg/m³. Both the AEL and the CEG are health-protective of the exposure conditions to which they apply. For example, the AEL for workers is 100 times lower than a No Observed Effect Level in a laboratory animal inhalation study and is 1,000 times lower than a Marginal Effect Level in a laboratory animal feeding study (Haskell Laboratory 1991). Therefore, the AEL is considered to be a safe level for workers potentially exposed for eight hours/day.

To derive a level protective of sensitive subpopulations (such as infants and the elderly) and to account for a 24-hour/day exposure time, the AEL was reduced further by a safety factor of ten to account for the presence of sensitive subpopulations in the community and again by a safety factor of three to account for a 24-hour/day exposure time, resulting in the CEG of 0.0003 mg/m³. Therefore, the CEG is considered protective of general public exposures that could include sensitive subpopulations, exposed 24 hours/day.

Exposure to the CEG of 0.0003 mg/m³ would result in an allowable daily intake of 0.006 mg/day, assuming an inhalation rate of 20 m³/day (USEPA Region III default residential inhalation rate). From this allowable intake, preliminary screening levels for soil and groundwater can be calculated using USEPA default exposure assumptions for industrial soil ingestion and residential groundwater ingestion.

Table 6.6 shows the calculation of preliminary screening levels for FC-143 in industrial soil (120 mg/kg) and for groundwater used as drinking water (0.003 mg/L). These preliminary screening levels were used in evaluating site soil and production well water data for FC-143.

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6.4.4 Results of Risk-Based Screening for Soil

Tables 6.1 through 6.4 show the sample analytical results for constituents detected in soil and groundwater and include the SLs for comparison. Table 6.7 summarizes the results of the risk-based screening for soil.

Table 6.7 shows that maximum observed concentrations of all constituents at all SWMUs and soil intervals were well below their respective screening levels, with the exception of arsenic (which is present at concentrations comparable to background levels). Therefore, it is concluded that constituents in soil do not pose a health concern for workers via the soil ingestion pathway.

Potential exposure via other routes (e.g., dermal absorption or inhalation) and possible additive effects of multiple noncarcinogens are also not a concern. Maximum observed concentrations of all site-related constituents were lower than screening levels by factors of ten to one million, except for FC-143 and methylene chloride in the 2- to 20-foot interval at the RBL/ADP, where maximum concentrations of these two constituents were lower than their respective screening levels by a factor of about 2.4.

Because maximum observed concentrations of site-related constituents are well below conservative health-protective screening levels, it is concluded that constituents in soil do not pose a health concern for workers or transient receptors.

6.4.5 Risk Screening for Production Well Water

Table 6.5 compares sample analytical results from production well samples to MCLs or other health-based screening levels for drinking water. Table 6.8 summarizes the risk-based screen for production well water.

In well AM07-PW01, which supplies potable water for the plant, maximum concentrations of all constituents were below their respective drinking water criteria. To confirm this conclusion, a third round of analysis for FC-143 was conducted in May, 1999 (see Appendix D). Therefore, no unacceptable health risk would be associated with the observed concentrations in the potable water well.

In production wells providing industrial process water, maximum concentrations of all constituents were also below health-based criteria for drinking water, with the exception of TCE in production well V05-PW01 and FC-143 in production wells K16-PW01, V05-PW01, and L04-PW01. Specifically, the maximum concentration of TCE (22 micrograms per liter (ug/L)) exceeded the MCL of 5 ug/L, and the maximum concentration of FC-143 (16.2 ug/L) exceeded its preliminary screening level for drinking water of 3 ug/L (Table 6.8). For both constituents, maximum concentrations exceeded their respective drinking water criteria by factors of four to five. Because water from these wells is not used for drinking, but rather for industrial processes such as non-contact cooling water or fire water where exposure is nonexistent or intermittent, it was concluded that the exceedances of the drinking water criteria by relatively small factors is not likely to pose health concern for workers who may be exposed to process water.

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6.5 SUMMARY OF CONSTITUENTS AND PATHWAYS OF CONCERN (HUMAN HEALTH)

All constituents in all media evaluated were below health-protective criteria, with the exception of TCE and FC-143, whose maximum concentrations in industrial process well water exceeded drinking water criteria by factors of four to five (see Appendices B and C). However, average concentrations in process water at the point of use (which is a mixture of water from several production wells) will be lower than maximum concentrations detected in one well. Therefore, these exceedances are not considered a concern for worker health under exposure conditions typical for industrial process water.

As demonstrated in Section 5, SWMU-impacted groundwater is contained on-site by production well pumping and does not migrate off-site or to surface water.

In summary, the identified releases from the SWMUs are not a concern for human health. Site-related constituent concentrations in soil (0 to 20 feet) did not exceed screening levels. While TCE and FC-143 somewhat exceeded screening levels in production well water used for industrial process water (but not in potable well water), there is limited exposure to industrial process water. In addition, SWMU-impacted groundwater is contained on site.

These findings are summarized in Figure 6.1, Human Exposure Pathway Evaluation. The figure indicates that potential exposure routes for site receptors (workers, riverbank trespasser, and construction worker) are either incomplete or insignificant and that groundwater migration to surface water is an incomplete pathway due to pumping.

6.6 ECOLOGICAL EXPOSURE EVALUATION

The ecological evaluation focused on identifying whether significant ecological resources may be exposed to site-related constituents released from the SWMUs. According to USEPA guidance (USEPA 1997, 1998a, 1998b), valued ecological resources are those that either provide critical habitat (such as wetlands or fisheries), are critical to sustaining populations of species or habitat, are reflective of public concerns (e.g., wildlife habitat for game animals), or are federal or state listed species that could be exposed and susceptible to site-related constituents.

The study area for the ecological evaluation included the four SWMUs and surrounding terrestrial habitat. The ecological evaluation included a day and a half of field reconnaissance for habitat characterization (April 6 to 7, 1999), principally along the portion of the property adjacent to the river, which includes the RBL/ADP.

6.6.1 Exposure Areas and Media

Surface soil at the RBL/ADP is the only potential ecological exposure medium within the RFI study area. The PWI and BG SWMUs are covered with gravel, asphalt, or buildings and do not provide ecological habitat. Subsurface soil (greater than 2 feet) and groundwater are not exposure media of concern for ecological receptors, and groundwater does not discharge to surface water at the site.

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6.6.2 Habitat Characterization at the RBL/ADP

The RBL/ADP lies in a narrow band between the river and the main manufacturing area. It runs approximately 4,500 feet and rises 30 feet above the floodplain, covering a portion of the alluvial terrace on which the main plant is located. A layer of clean fill 6 to 36 inches thick was placed over the RBL upon closure in the 1960s. The southern side of the RBL is within the active manufacturing area and is covered with gravel or buildings. The ADPs were closed in 1988 and removed. The ponds were filled and capped and are now covered with grassy vegetation.

The slope of the RBL/ADP is covered with hardwood trees, shrubs, grass, and other dense vegetation that has grown in the 30 years since the landfill was closed. The area between the RBL/ADL and the river is manicured grass, with a few trees and shrubs. At the upstream end of the RBL, the grassy area gives way to natural vegetation of trees and shrubs. Major vegetation species include beech, maples, oaks, ash, cottonwood, black willow, and sweetgum.

Wildlife observations, including tracks, burrows, and scat, included small mammals (woodchucks, cottontail rabbits, squirrels) and deer tracks along portions of the river. It can be assumed that other small animals such as mice, voles, raccoons, and various reptile and amphibian species would inhabit the area near the riverbank. Birds observed in the area were primarily bank swallows, crows, and redwing blackbirds. Other passerine birds will likely occur during different seasons. Hawks were observed hunting over the area and several species of waterfowl were observed on the river that might feed on vegetation on the riverbank. Ospreys, reintroduced by DuPont's Wildlife Habitat Enhancement Program, were reported by a plant employee to nest in the area. Bluebird and wood duck nesting boxes were placed near the river, but these species were not seen.

6.6.3 Identification of Significant Ecological Resources

While numerous plant and animal species were observed along the riverbank area, no significant ecological resources such as wetlands, game habitat, or threatened or endangered species were identified within the RFI study area. In addition, according to the WVDNR, Wildlife Resources Section, no rare, threatened, or endangered species are recorded for the vicinity of the Washington Works plant. Table 6.9 lists the terrestrial species that are listed as Rare, Threatened or Endangered (RTE) by both the U.S. Fish and Wildlife and the West Virginia Natural Heritage Program.

In conclusion, no significant ecological habitat or species of special concern were identified within the study area, and therefore potential ecological impacts from constituents in soil at the SWMUs are expected to be insignificant.

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6.6.4 Ecological Exposure Pathway Evaluation

In conclusion, there appear to be no significant ecological resources or exposure pathways of concern related to soil at the SWMUs. Groundwater is not an exposure medium for ecological receptors, because there are no surface expressions of groundwater at the site (water table is about 60 feet BGS).

These findings are summarized in Figure 6.2, Ecological Exposure Pathway Evaluation. The figure indicates that potential soil exposure pathways are either incomplete or insignificant, primarily due to the absence of significant ecological resources in the study area.

6.7 SUMMARY AND CONCLUSIONS

Soil at all SWMUs is not a medium of concern for human health because maximum observed concentrations in soil were below health-protective screening levels. In the well supplying potable water (AM07-PW01), constituent levels were below MCLs or other health criteria, so the water is not a significant source of exposure for workers. In wells supplying industrial process water, maximum concentrations of two constituents somewhat exceeded MCLs or health criteria for drinking water, but the water is not ingested, and therefore, the production well water is not considered a health concern under exposure conditions typical for industrial process water.

SWMU - impacted groundwater is contained on site by production well pumping.

Ecological habitat in the study area is limited to a narrow band of woody or grassy vegetation along the river bank and slopes of the RBL/ADP, inhabited or visited by small mammals, birds, and other animals. No significant ecological resources were identified within the RFI study area, and no rare, threatened, or endangered species have been recorded for the vicinity of the Washington Works site. Because of the absence of significant ecological resources and the limited potential for exposure, ecological exposure pathways were concluded to be incomplete or insignificant.

Table 6.10 summarizes the findings of the screening-level risk evaluation and ecological exposure evaluation.

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TABLE 4.6

**FC-143 RESULTS FOR GROUNDWATER SAMPLING
RCRA FACILITY INVESTIGATION
DUPONT WASHINGTON WORKS PLANT**

Groundwater Results for November Sampling

AA04-MW01	11/12/98	0.1	UG/L	0.1	
AA05-MW01	11/11/98	0.77	UG/L	0.1	
AB07-MW02	11/16/98	0.2	UG/L	0.2	I
AC07-MW02	11/16/98	0.79	UG/L	0.1	
AE11-MW01	11/10/98	0.41	UG/L	0.1	
AI06-MW01	11/16/98	0.1	UG/L	0.1	
AM07-PW01	11/18/98	1.9	UG/L	0.1	
E13-MW01	11/11/98	2	UG/L	0.1	
F06-MW01	11/11/98	0.1	UG/L	0.1	
G17-MW01	11/11/98	13	UG/L	2	
K16-PW01	11/18/98	0.46	UG/L	0.1	
L04-PW01	11/18/98	7.9	UG/L	1	
L06-MW01	11/13/98	870	UG/L	50	
L17-PW01	11/18/98	0.33	UG/L	0.1	
M04-MW02	11/12/98	0.2	UG/L	0.1	
M04-MW03	11/12/98	0.1	UG/L	0.1	
M16-MW01	11/10/98	0.86	UG/L	0.1	
N04-MW02	11/12/98	380	UG/L	20	
N05-MW01	11/13/98	13	UG/L	2	
N13-MW01	11/11/98	0.1	UG/L	0.1	
P04-MW02	11/12/98	8300	UG/L	800	
P05-MW02	11/13/98	1200	UG/L	100	
P06-MW02	11/13/98	31	UG/L	2	
P08-MW01	11/13/98	36	UG/L	5	
Q04-MW02	11/13/98	660	UG/L	50	
Q05-MW01	11/13/98	38	UG/L	2	
R04-MW02	11/12/98	1300	UG/L	100	
S05-MW02	11/13/98	690	UG/L	50	
T13-MW01	11/17/98	0.1	UG/L	0.1	
U04-MW01	11/12/98	1.6	UG/L	0.1	
V05-PW01	11/18/98	0.66	UG/L	0.1	
V06-MW01	11/16/98	1.7	UG/L	0.2	

Groundwater Results for February Sampling

AA04-MW01	2/6/99	5.43	UG/L	0.028	0.095
AA05-MW01	2/4/99	1.46	UG/L	0.032	0.11
AB07-MW02	2/4/99	0.535	UG/L	0.030	0.099
AC07-MW02	2/4/99	0.356	UG/L	0.028	0.095
AE11-MW01	2/2/99	0.69	UG/L	0.030	0.1
AI06-MW01	2/3/99	0.13	UG/L	0.030	0.1
AM07-PW01	2/3/99	0.082	UG/L	0.030	0.1 J
E13-MW01	2/2/99	0.59	UG/L	0.030	0.1
F06-MW01	2/2/99	0.35	UG/L	0.030	0.1
G17-MW01	2/2/99	2.1	UG/L	0.030	0.1
K16-PW01	2/9/99	16.2	UG/L	0.29	1
L04-PW01	2/7/99	5.89	UG/L	0.028	0.094
L06-MW01	2/5/99	4.91	UG/L	0.028	0.095
L17-PW01	2/9/99	2.76	UG/L	0.029	0.098
M04-MW02	2/7/99	17.0	UG/L	0.14	0.47
M04-MW03	2/7/99	21.1	UG/L	0.16	0.53
M16-MW01	2/3/99	3.66	UG/L	0.030	0.1
N04-MW02	2/7/99	329.	UG/L	3.1	10
N05-MW01	2/5/99	815.	UG/L	28.	95
N13-MW01	2/2/99	29.6	UG/L	0.60	2
P04-MW02	2/6/99	13600.	UG/L	320.	1100
P05-MW02	2/5/99	434.	UG/L	2.8	9.5
P06-MW02	2/5/99	414.	UG/L	3.1	10
P08-MW01	2/4/99	43.4	UG/L	0.70	2.3
Q04-MW02	2/4/99	994.	UG/L	6.1	20
R04-MW02	2/6/99	9420.	UG/L	280.	950
S05-MW02	2/5/99	174.	UG/L	3.1	10
T13-MW01	2/3/99	0.64	UG/L	0.030	0.1
U04-MW01	2/6/99	4.20	UG/L	0.033	0.11
V05-PW01	2/7/99	12.4	UG/L	0.14	0.47
V06-MW01	2/4/99	1.91	UG/L	0.029	0.095

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TABLE 4.6

**FC-143 RESULTS FOR GROUNDWATER SAMPLING
RCRA FACILITY INVESTIGATION
DUPONT WASHINGTON WORKS PLANT**

Groundwater Results for November Sampling

W05-MW01	11/17/98	0.31	UG/L	0.1	
Y14-MW01	11/10/98	12	UG/L	2	
Z06-MW02	11/16/98	4.5	UG/L	0.5	
Z07-MW01	11/16/98	3.8	UG/L	0.5	
Z09-MW01	11/17/98	0.1	UG/L	0.1	

Groundwater Results for February Sampling

W05-MW01	2/6/99	0.729	UG/L	0.028	0.095
Y14-MW01	2/2/99	4.95	UG/L	0.030	0.1
Z06-MW02	2/4/99	0.803	UG/L	0.029	0.097
Z07-MW01	2/4/99	2.05	UG/L	0.028	0.095
Z09-MW01	2/6/99	2.74	UG/L	0.029	0.095

Preliminary Screening Level (SL): 3 ug/L

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TABLE 6.5
PRODUCTION WELL GROUNDWATER CONCENTRATIONS
COMPARED TO MCLs OR OTHER SCREENING CRITERIA

SRCNAME	Date	Arsenic mg/L	Qual	PQL	Barium mg/L	Qual	PQL	Cadmium mg/L	Qual	PQL	Lead mg/L	Qual	PQL	Nickel mg/L	Qual	PQL
K16-PW01	11/18/98	0.0013	J	0.01	0.15	J	0.1	ND		0.01	ND		0.003	ND		0.05
K16-PW01	2/9/99	ND		0.01	0.14		0.1	ND		0.01	ND		0.003	ND		0.05
L17-PW01	11/18/98	0.0043	J	0.01	0.13		0.1	ND		0.01	0.0022	J	0.003	ND		0.05
L17-PW01	2/9/99	ND		0.01	0.13		0.1	ND		0.01	ND		0.003	ND		0.05
AM07-PW01 *	11/18/98	0.01		0.01	0.0672	J	0.1	ND		0.01	ND		0.003	ND		0.05
AM07-PW01 *	2/7/99	ND		0.01	0.0743	J	0.1	ND		0.01	ND		0.003	ND		0.05
V05-PW01	11/18/98	0.0025	J	0.01	0.0845	J	0.1	ND		0.01	ND		0.003	ND		0.05
V05-PW01	2/7/99	0.0017	J	0.01	0.0848	J	0.1	ND		0.01	ND		0.003	ND		0.05
L04-PW01	11/18/98	0.0068	J	0.01	0.16		0.1	ND		0.01	ND		0.003	ND		0.05
L04-PW01	2/7/99	0.0028	J	0.01	0.14		0.1	ND		0.01	ND		0.003	ND		0.05
Maximum Concentration		0.01			0.16			ND			0.0022			ND		
MCL or Other Criterion		0.05	MCL		2	MCL		0.005	MCL		0.015	(1)		0.14	MCL	
Maximum conc. Exceeds Criterion?		No			No			No			No			No		

SRCNAME	Date	FC-143 ug/L	Qual	PQL	PCE ug/L	Qual	PQL	TCE ug/L	Qual	PQL	MeCl ug/L	Qual	PQL	Freon 113 ug/L	Qual	PQL
K16-PW01	11/18/98	0.46		0.1							ND		5			
K16-PW01	2/9/99	16.2		1							ND		5			
L17-PW01	11/18/98	0.33		0.1							ND		5			
L17-PW01	2/9/99	2.76		0.098							ND		5			
AM07-PW01 *	11/18/98	1.9		0.1	ND		5	ND		5	ND		5	ND		10
AM07-PW01 *	2/7/99	0.082	J	0.1	ND		5	ND		5	ND		5	ND		10
V05-PW01	11/18/98	0.66		0.1	4	J	5	22		5	ND		5	64		10
V05-PW01	2/7/99	12.4		0.47	5		5	22		5	ND		5	56		10
L04-PW01	11/18/98	7.9		1	4	J	5	5		5	ND		5			
L04-PW01	2/7/99	5.89		0.094	4	J	5	5	J	5	ND		5	270		10
Maximum Concentration		16.2			5			22						270		
MCL or Other Criterion		3	(2)		5	MCL		5	MCL		5	MCL		59000	(3)	
Maximum conc. Exceeds Criterion?		Yes			No			Yes			No			No		

J = Estimated value below PQL.

MCL = Federal maximum contaminant Level for drinking water.

ND = Not detected.

PQL = Practical quantitation limit.

* Plant potable water supply (well 336). Observed concentrations did not exceed screening levels.

(1) Federal action level for lead in tap water.

(2) Preliminary screening level; see Table 6.6 and Section 6.4.2.

(3) Risk-based concentration for Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane) in tap water (USEPA Region III, 1999)

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TABLE 6.6
CALCULATION OF PRELIMINARY SCREENING LEVELS
FOR FC-143 IN SOIL AND DRINKING WATER

CEGair (1)	Inhalation Rate (2)	Allowable Daily Intake (3)	Water Ingestion Rate (4)	PSL water (5)	Soil Ingestion Rate (6)	Conversion Factor	PSL soil (7)
mg/m ³	m ³ /day	mg/day	L/day	mg/L	mg/day	mg/kg	mg/kg
0.0003	20	0.006	2	0.003	50	1.E+06	120

Legend:

Allowable Daily Intake = CEGair x Inhalation Rate

PSL water = Preliminary Screening Level for drinking water = Allowable Daily Intake / Water Ingestion Rate

PSL soil = Preliminary Screening Level for industrial soil = Allowable Daily Intake x 10⁻⁶ mg/kg / Soil Ingestion Rate

Notes

- (1) CEGair = Community Exposure Guideline for air exposures (Haskell Laboratory, 1991).
- (2) USEPA Region III default residential inhalation rate (USEPA Region III, 1999).
- (3) Allowable Daily Intake = CEGair x Inhalation Rate.
- (4) USEPA Region III default residential groundwater ingestion rate (USEPA Region III, 1999).
- (5) PSL water = Allowable Daily Intake / Water Ingestion Rate.
- (6) USEPA default industrial soil ingestion rate (USEPA region III, 1999).
- (7) PSL soil = Allowable Daily Intake x mg/kg / Soil Ingestion Rate.

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Table 6.7
RISK-BASED SCREENING FOR SOIL

Constituent	Maximum Detected Concentration, mg/kg				Industrial Soil SL (1) mg/kg	Max > Soil SL?
	BG 0 - 2 ft	BG 2 - 20 ft	RBL/ADP 0 - 2 ft	RBL/ADP 2 - 20 ft		
Arsenic	12.7	13	15	22	3.8	All SWMUs
Barium	562	150	972	830	140000	No
Cadmium	2	0.88	7.4	11.8	1000	No
Lead	26	17	80	114	1000 (2)	No
Nickel	17.3	22.6	46.3	44.6	4100C	No
Carbon Tetrachloride	ND (<0.24)	0.84	-	-	44	No
FC-143	0.082	0.14	9.5	48	120 (3)	No
Freon 113	-	-	1.8	1.6	6.10E+07	No
Methylene Chloride	-	-	ND (<0.3)	320	760	No
Tetrachloroethylene	-	-	0.51	1.4	110	No
Trichloroethylene	-	-	0.16	8.8	520	No

Legend:

- Not analyzed.

na = not available.

BG = Burning Ground.

RBL/ADP = Riverbank Landfill and Anaerobic Digestion Ponds

SL = Screening Level

Notes:

(1) Industrial soil SL = Risk-based concentration (RBC) for industrial soil. USEPA Region III 1999.

(2) Conservative SL for lead in industrial soil; see Section 6.4.1.

(3) Preliminary screening level; see Table 6.6 and Section 6.4.2.

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**TABLE 6.8
HEALTH-BASED SCREENING
FOR PRODUCTION WELL WATER**

Constituent	Units	Potable Water Well (1)	Process Water Wells (2)	Screening Level	Type	Max > SL?
Arsenic	mg/L	0.01	0.0068	0.05	MCL	No
Barium	mg/L	0.07	0.16	2	MCL	No
Cadmium	mg/L	ND (<0.01)	ND (<0.01)	0.005	MCL	No
Lead	mg/L	ND (<0.003)	0.0022	0.015	MCL	No
Nickel	mg/L	ND (<0.05)	ND (<0.05)	0.14	MCL	No
FC-143	ug/L	1.9	16.2	3	PSL	Potable - No Process - Yes (3)
Tetrachloroethylene	ug/L	ND (<5)	5	5	MCL	No
Trichloroethylene	ug/L	ND (<5)	22	5	MCL	Potable - No Process - Yes (4)
Methylene Chloride	ug/L	ND (<5)	-	5	MCL	No
Freon 113	ug/L	ND (<10)	270	59000	RBC	No

Legend:

MCL = Maximum Contaminant Level for drinking water.

PSL = Preliminary Screening Level; see Table 6.6 and Section 6.4.2.

RBC = Risk-based concentration for tap water (USEPA Region III, 1999)

- = Not analyzed.

Notes:

(1) Well 336 (AM07-PW01)

(2) Process Water Wells:

K16-PW01

K16-PW01

L17-PW01

L17-PW01

V05-PW01

V05-PW01

L04-PW01

L04-PW01

(3) Trichloroethylene exceeded the MCL in production well V05-PW01.

(4) FC-143 exceeded the preliminary SL in production wells K16-PW01, V05-PW01, and L04-PW01.

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**TABLE 6.10
RISK EVALUATION RESULTS**

Exposure Medium	Do Constituent Levels Pose Potential Concern?		
	Soil 0 – 2 ft	Soil 2 – 20 ft	Groundwater
BG Soil	No	No	
PWI Soil	No	No	
RBL/ADP Soil	No	No	
Potable Water Wells (2)			No
Process Water Wells (3)			No
SWMU Impacted Groundwater			Contained on site

- (1) No = All constituent concentrations were below health screening levels or (for industrial process water) were below levels that would be expected to pose a concern under intermittent exposure during manufacturing operations. There were no significant ecological resources or listed species identified within the RFI study area.
- (2) Potable water well = Well 336 (AM07-PW01).
- (3) Process water wells = K16-PW01, L17-PW01, V05-PW01, L04-PW01.

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