

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region III 841 Chestnut Building Philadelphia, Pennsylvania 19107

July 26, 1991

Michael A. Izzo Assistant County Engineer Sussex County Courthouse Annex Building Corner of Race and Pine Streets Georgetown, Delaware 19947

RE: Sussex County Landfill No. 5, Laurel, Delaware Comments on Work Plan for RI/FS Roy F. Weston, Inc. June 3, 1991

Dear Mr. Izzo:

Pursuant to Section VIII. D. of the Administrative Order on Consent (AOC), the Environmental Protection Agency (EPA) has reviewed the Work Plan for RI/FS for the Sussex County Landfill No. 5 and submits the following comments which outline the deficiencies found in the document. Included are comments from the Delaware Department of Natural Resources and Environmental Control (DNREC).

Generally, the Work Plan incorporates most of the required tasks discussed at the scoping meeting in May of this year. However, several tasks that are needed to more fully characterize the site were not mentioned in this draft. A discussion of those additional tasks is provided in the specific comments attached to this letter. Considering our discussion regarding using a phased approach to conduct the remedial investigation (RI), some of the additional tasks may not be required in the initial phase of field work but may need to be completed if results from the first phase indicate that they are necessary. The Work Plan must, however, provide for these contingencies and must provide sufficient detail to describe the manner in which they will be carried out.

In some cases, tasks which were proposed to be included in the initial phase of field work were not explained in enough detail to evaluate whether they were acceptable. While the Work Plan is not expected to be as detailed as the Sampling and Analysis Plan (SAP), there were a few places which warranted further discussion. These are also pointed out in the specific comments.

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Mr. Izzo July 26, 1991 Page 2

One last general comment concerns the past studies performed at the site. Since Weston relied on them fairly heavily to develop this Work Plan, more effort should have been made to summarize and compile all pertinent information and include it in the Work Plan. This information provides the basis for the rationale used to develop the Work Plan strategy and must be incorporated into the document.

Please have Weston revise the Work Plan accordingly and submit the revised version within 30 days. Contact me at 215-597-3167 with any questions or concerns you may have after reviewing the attached comments.

Sincerely,

AR300075

Stephanie Dehnhard Remedial Project Manager DE/MD Section

attachments

cc: Jamie Hackney, DNREC

SPECIFIC COMMENTS

Introduction

1. In the first paragraph on page 1-1, please correct the reference to DNREC to read Delaware Department of Natural Resources and Environmental Control.

2. In Paragraph 3 on Page 1-1, the third sentence states that the most significant route of exposure associated with the site is groundwater; however, the site has not been fully characterized at this time. This statement would be more accurate if it stated that groundwater is the most significant route known at this time.

Section 3 Previous Site Investigation

1. Since previous investigations were heavily relied upon to focus the RI activities, more information from those previous studies must be included in the Work Plan. In addition to the information already provided, the Work Plan should include such information as summary tables of dates of sampling events, parameters analyzed for, analytical results, analytical methods, wells sampled, well logs and construction details, including any known residential well information.

Section 3.3.2 Site Hydrogeology

1. The last sentence on page 3-8, discusses a groundwater flow rate which was estimated in previous investigations. Please provide the references and a brief discussion of how this was derived.

2. Table 3-1 should also include information on residential wells (e.g., depth, screened interval, etc.). This information is needed to determine what part of the aquifer is used for drinking water purposes. The Work Plan discusses the fact that the Joseph well is screened at a depth of 0 to 40 feet, indicating that some information must be available for residential well construction.

3. Figure 3-2 must be revised for the following:

- a. Actual water level readings should be indicated in parentheses beside each well.
- b. Utilize the appropriate monitoring wells to the north of the landfill in approximating equipotential lines.
- c. Use dashed lines when drawing and inferring water elevation contours.

Please follow these guidelines in all future figures for groundwater elevation contours.

Section 3.3.3 Groundwater Quality

1. The statement made in the first bullet is misleading since the majority of groundwater samples collected historically have not included full scan inorganics analysis. Please reword accordingly.

2. It is not clear whether the data discussed in this section is a summary of all the groundwater investigations or the most recent sampling at the landfill.

3. The discussion in bullet 4 on page 3-11 seems to imply that the contamination at the Joseph well is not site related. This seems a bit premature and will need to be substantiated during the remedial investigation (RI). If the County intends to attribute this contamination to offsite sources, documentation must be presented in the RI report to support this. Otherwise, it will be assumed to be site-related.

Section 3.3.6 Wetlands

1. Please discuss in more detail the findings of the soils and surface water analyses conducted during the Site Inspection (SI). Some concerns with the surface waters and sediments were raised as a result of this investigation. Levels of trace metals in surface water samples reported in the SI Report (NUS 1986) were of concern to National Oceanic and Atmospheric Administration (NOAA) representatives. Some metals concentrations exceeded the Ambient Water Quality Criteria (AWQC) for the protection of freshwater aquatic life (EPA 1986). The NOAA report is attached for your information. In addition, Section 7.1 of the SI Report stated that "some contaminants (2-butanone, 4-methyl-2pentanone, toluene, ethylbenzene, and 4-methylphenol) were reported in both sediments samples and in monitoring wells, possibly indicating potential for offsite release."

Section 4.1.1 Potential Contaminant Source(s)

1. In Paragraph 1 on Page 4-1, reference is made to closing of the landfill in 1979. The definition of closing or "closure" should be discussed in more detail. The Work Plan should provide information regarding DNREC's involvement in the closing of the landfill, and the physical actions taken to close the landfill (i.e., what type of cap was placed over the landfill, etc.).

2. Paragraph 3 on Page 4-1 again refers to VOCs as the contaminants of primary concern even though full scan analyses have not been conducted. The same paragraph states that "No significant impact to groundwater from VOCs has been noted in

existing monitor wells.."; however, several VOCs have been detected in monitor well LD-1 for several years and the benzene concentration is above the Maximum Contaminant Level (MCL) for drinking water.

Section 4.1.2 Potential Migration Pathways

1. Again, the first sentence of the first paragraph should read "The most significant potential migration pathway for contamination from the landfill **known at this time** . . . "

2. Paragraph 3 states that there are no prominent drainage features present on the landfill or in the adjacent area. However, a site analysis of aerial photographs shows channelized drainage patterns along the access road immediately adjacent to the landfill on the west side (EPA, 1990). This drainage flows north, around a residence, under County Road 494 and into a wetland area. The report also shows drainage traveling north in the Collins and Culver Ditch, under County Road 494, and on to Broad Creek. Unless all rainwater percolates down to the groundwater, it is safe to assume that runoff from the site may discharge to these drainageways. Section 3.2 of the SI Report also discusses surface runoff in the immediate area entering the Collins and Culver Ditch initially. Please be sure to identify surface runoff patterns when the landfill is not so heavily vegetated as it is during the summer months. The topographic map should also be helpful for this purpose.

3. Potential migration pathways for air should consider particulates, especially asbestos, in addition to landfill gases.

4.1.3 Potential Contaminant Receptors

1. If surface runoff occurs from the landfill, potential receptors might also be located offsite and should be considered during this RI.

2. For the air migration pathway, potential receptors include nearby residents, site workers/ visitors, and sensitive environments (e.g., wetlands, endangered species, etc.).

4.2.1.2 Location-Specific ARARs

1. Please note that the RI report must include documentation showing that all appropriate agencies were contacted and must include any reply received from those agencies.

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4.2.1.3 Action-Specific ARARs

1. DNREC has identified the following ARARs to be included in Table 4-2:

Page 4-7 - Under the heading of Action "Air Stripping", the prerequisite should be modified to include pumpage of groundwater. The regulation associated with the pumpage of groundwater would be the Delaware Regulations Governing the Allocation of Water, and the Delaware Regulations Governing the Construction of Water Wells.

Page 4-9 - Under the heading of Action "Direct discharge of Treatment System Effluent", second paragraph, the line should be revised to read "Compliance with applicable Federal and State approved water quality standards."

Page 4-9 - Under the heading of Action "Direct Discharge of Treatment System Effluent", the regulation should also include the State of Delaware Surface Water Quality Standards (2/2/90).

Page 4-14 - Under the heading of "Underground Injection of Wastes and Treated Groundwater", the regulation should also include the Delaware Regulations Governing Underground Injection Control (1983) since the State of Delaware has received delegation of the UIC Program.

Page 4-12 - Under the heading of Action "Land Treatment", the regulation should also include the Guidance and Regulations Governing the Land Treatment of Wastes (August 1988).

4.4.1 Groundwater Data Requirements

1. See comments on Section 5 for a discussion of the use of existing wells for groundwater sampling.

2. The abandonment of Well LS-6 and any other wells found not to be usable should be conducted in accordance with DNREC's Regulations Governing the Construction of Water Wells.

3. Groundwater elevations from a select number of wells surrounding the landfill should be monitored closely over an extended period of time. This information is necessary in order to determine if the groundwater flow direction varies with seasons. This would be in addition to the irrigation well study which will only run during the part of the year when those wells are in use.

4.4.2 Surface Water and Soils Data Requirements

1. Due to the close proximity of the Collins and Culver Ditch to the landfill, the likelihood of surface runoff entering the ditch, and the possibility of groundwater discharge to the ditch, surface water and sediments sampling in the ditch should be included in the initial sampling plan, at least as a contingency. The Work Plan should state that this sampling will be conducted if surface drainage patterns or groundwater discharge indicate that it is necessary. Sediment samples should be collected during the time of year when the ditch is not heavily vegetated. Also, soil sampling should be conducted in any areas where offsite runoff is indicated.

5.1 Site Survey and Topographic Map

1. As part of the site survey, also determine the exact lateral boundaries of the waste in the landfill.

2. This narrative should indicate the horizontal and vertical plane survey accuracy required in surveying monitoring wells and should be consistent with "A Compendium of Superfund Field Operations Methods", EPA/540/P87/001.

3. As one of the first tasks during the RI, it would be useful to install settlement markers in the landfill to monitor whether the landfill is stable or if it is still settling.

5.2 Groundwater Investigation

1. Section 5 makes no mention of conducting an evaluation and analysis of the physical characteristics of the aquifer in the area of the site (e.g., hydraulic conductivity, transmissivity, etc.). Since an aquifer test has not previously been performed at the site, an aquifer test such as a pumping test should be performed, with the results recorded and analyzed utilizing the appropriate mathematical equation. Please propose an aquifer test and the probable analysis that will be performed.

5.2.1 Monitor Well Installation

1. Please include a task in the Work Plan to inventory all existing monitoring wells in the field. This should include visual inspection of all wells (i.e., note any visible signs of seal and well deterioration) and measurement and verification of total depth of monitoring wells. If the measurement of the total depth is not equivalent to the initial total depth of the monitoring well, then an attempt to re-develop the well should be made. Well inventory results must be provided in order for EPA to approve the use of existing monitoring wells for the RI and to determine which monitoring wells need to be replaced.



2. After reviewing existing well construction logs for monitoring wells, it is apparent that well LS-7 must be replaced in addition to LS-6. Any monitoring well with the filter pack extending 10 ft. or greater above the top of the well intake must be replaced due to the unknown effects of the longer filter pack on the water quality and hydraulics of the well which would render the results from these wells questionable.

3. In addition to the installation of the new monitoring wells LS-15 and LS-16 at a depth of 50-60 ft., several other new wells must be installed in order to fully characterize the groundwater conditions in the area. The wells must be placed in clusters at each location, three depths per cluster, to monitor various intervals of the aquifer, much like the cluster at LS-5,6,7. Suggested screen lengths would include 15-30 ft. below ground surface (BGS), 40-50 ft. BGS, and 70-90 ft. BGS. These intervals would effectively monitor the interval where most of the groundwater contamination has been detected, well LD-1, as well as an interval above and below.

4. In addition to the new well clusters placed in the vicinity of LS-15 and LS-16, a well cluster must also be placed to the east, between the landfill and the Collins irrigation well. Several piezometers should also be placed east and west of the landfill. The wells and piezometers east and west of the landfill will serve to monitor the dispersive properties of the contaminant plume and can be used to evaluate the impact on the flow of groundwater from the irrigation wells.

5.2.2 Groundwater Sampling

1. Please indicate which residential wells are proposed to be sampled for groundwater quality. The County should consider sampling all private drinking water wells located in the three groundwater management zones since these are the wells most likely to be impacted by the site. Sampling a few residential wells upgradient would also help to characterize background conditions.

2. As discussed at the scoping meeting on May 1, 1991, limiting the initial phase of groundwater sampling to 2 monitoring wells is not sufficient to construct a baseline groundwater contamination database. All existing usable monitoring wells, newly constructed monitoring wells, and a representative number of residential wells must be sampled initially before specific contaminants of concern can be selected. Samples from many of the existing monitoring wells have never been analyzed for the full scan of contaminants and newly installed wells will be placed in areas that have not yet been investigated. In addition, the irrigation wells must also be included in the sampling plan. Residents in the area have expressed concern that

the irrigation water sprays onto their properties and that it may be contaminated.

3. With regard to analytical methods, because the aquifer in the area is a drinking water source and because the concentrations of volatile contaminants have been fairly low, the groundwater samples must be analyzed using EPA methods 500 Series for drinking water which have lower detection limits for some contaminants.

4. Please note that both filtered and unfiltered groundwater samples from monitoring wells and irrigation wells are required for target analyte list (TAL) analysis. Only unfiltered samples should be collected at residential wells.

5. The groundwater sampling plan implies that only two rounds of sampling will be conducted during the RI. Please be aware that sampling should be conducted on a periodic basis for the duration of the RI and must be sufficient to cover seasonal variations. It is beneficial to gather a fairly large database of information in order to be able to characterize the site accurately. The more data collected, the fewer assumptions that will have to be made regarding the site conditions. Keep in mind that if enough data is not available to see trends and to draw conclusions, EPA will take the most conservative approach when preparing the risk assessment.

6. Because Weston intends to use its own laboratory for analyses of samples collected at the site, and because the Weston laboratory is no longer participating in the Contract Lab Program, EPA's Central Regional Laboratory will be reviewing selected data validation packages to be determined by EPA. Attached is an outline of the requirements and format in which the data validation packages should be prepared.

5.2.3 Impacts of Irrigation Well Pumping

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1. Please revise the list of wells to be used to study the influence of the irrigation wells to include LS-2, LS-3, and one of the new wells to be placed east of the site. These wells will provide a more thorough coverage of the area and a better understanding of the influence of the irrigation wells on the groundwater flow near the site.

5.3 Soil and Surface Water Investigations

1. Collecting only three soil cover samples from depressional areas on the landfill is hardly sufficient to characterize the soils on a 35 acre landfill. Please use a more scientific approach to determine both the number of samples to be taken and the sampling locations. Refer to "Test Methods for Evaluating Solid Waste", SW-846, US EPA, April 1984, for a discussion on

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setting up sampling grids and choosing random samples for this purpose.

2. The best time of year to collect the surface water samples from the depressional areas on the landfill would be during early spring when the site is less vegetated and there is more likely to be ponded water present.

3. As mentioned in a previous comment, the Work Plan must state that surface water and sediment sampling will be conducted in the Collins and Culver Ditch if surface runoff or groundwater discharge indicate that it is necessary. Soil samples must also be collected in areas where surface runoff occurs. Also, consider that airborne asbestos is a possibility at this site and may warrant sampling offsite soils.

4. Please include a statement regarding possible sampling of Broad Creek should it become necessary. The decision will await review of groundwater data from wells located between the landfill and Broad Creek, but a discussion to that effect must be included in the Work Plan.

5. The Work Plan states that the SAP will include a complete description of analytical procedures for surface water and sediment samples. Attached are recommended chemical and physical parameters that should be measured for this task.

5.4 Air Investigation

1. The air investigation discussion in the Work Plan does not provide much information on sampling locations or procedures. Please discuss where the initial screening with the direct reading instruments will take place. Keep in mind that landfill gases tend to migrate offsite and that the screening should not be limited to the boundaries of the landfill. Also, please include a contingency for soil gas sampling, onsite and offsite if necessary, in areas where the initial screening indicates high landfill gas emissions or VOCs.

2. Again, since airborne asbestos could be leaving the site, please include air sampling for asbestos in the initial air monitoring program.

5.5 Biota/Wetland Investigations

1. The discussion pertaining to the biota/wetland investigation is incomplete. A more thorough discussion regarding the actual activities involved in the planned investigation must be included. This should include discussion of a baseline environmental receptor survey, consideration of exposure routes and assessment of possible impacts. This task should begin with a literature search and should be conducted by a trained ecologist.

2. As in section 4.3, sensitive environments need to be considered when assessing potential contamination migration via the air pathway.

5.6 Solid Waste Thickness Evaluation

1. Although there is no evidence known at this time of highly contaminated areas or "hot spots" in the landfill, the initial screening conducted for the air investigation or possible soil gas sampling may reveal areas where hot spots exist. In that case, the hot spots would have to be further studied by performing borings or digging trenches to characterize the wastes. Perhaps the auger borings proposed to determine waste thickness should be located in areas where hot spots are indicated, rather than located randomly on the landfill.

2. Any leachate encountered during the solid waste thickness evaluation auger borings should be sampled and analyzed for TCL/TAL parameters and asbestos.

5.7.1 Review of Existing Data

1. As mentioned in a previous comment, historical data must be compiled and included in the Work Plan since it was heavily relied upon to develop the Work Plan.

6.6 Summary of Alternatives

1. The discussion of the feasibility study (FS) stops with the individual analysis of each alternative and the presentation in tabular format for comparison. This must be followed by the comparative analysis in which the alternatives are then evaluated against one another to identify the advantages and disadvantages of each. See the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", EPA/540/G-89/004, Section 6.2.5, for a discussion of comparative analysis.

Section 7 Scheduling and Reporting

1. The timeline of more than three years to complete the RI/FS is too long for this project and must be shortened. The work proposed in the Work Plan is fairly routine and therefore should not present any unusual problems. There are several areas where the time allotted for particular tasks could be shortened or the task could be scheduled to begin at an earlier time. For example, the FS should be conducted concurrently with the RI, not started after the RI is complete, especially for a municipal landfill where the universe of technologies available to deal

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with this type of site is well known. (See "Conducting Remedial Investigation/Feasibility Studies for CERCLA Municipal Landfill Sites", EPA/540/P-91/001). For the same reason, it should not take three months to evaluate remedial alternatives. The risk assessment tasks can also be scheduled to start earlier in the process since EPA can start writing the risk assessment once the Draft RI Report is submitted. Please reconsider this proposed schedule and modify accordingly.

REFERENCES

National Oceanic and Atmospheric Administration, <u>Waste Site</u> <u>Report, Sussex County Landfill, Laurel Delaware, Region 3.</u>

NUS Corporation, January 1986, <u>Site Inspection for Sussex County</u> <u>Landfill No. 5</u>, TDD No. F3-8410-13.

U.S. EPA. April 1984. <u>Test Methods for Evaluating Solid Waste,</u> <u>Physical/Chemical Methods</u>, SW-846, Second Edition, Revised.

U.S.EPA. 1987. <u>A Compendium of Superfund Field Operations</u> <u>Methods</u>. EPA/540/P-87/001.

U.S. EPA. October 1988. <u>Guidance for Conducting Remedial</u> <u>Investigations and Feasibility Studies Under CERCLA</u>. EPA/540/G-89/004.

U.S. EPA. December 1990. <u>Site Analysis, Sussex County Landfill</u> <u>#5, Laurel, Delaware</u>. Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. TS-PIC-90907.

U.S. EPA. February 1991. <u>Conducting Remedial</u> <u>Investigations/Feasibility Studies for CERCLA Municipal Landfill</u> <u>Sites</u>. EPA/540/P-91/001.

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The contents of a data validation package are as follows:

<u>Narrative</u>

The narrative describes and summarizes the results of the analytical process. It is composed of:

Overview - Describes the sample set (e.g. number of samples, matrices) and informs the user of the method of analysis.

Summary - Provides a synopsis of the sample analysis and advises the user of any unsuccessful analyses.

Major issues - Presents issues which directly affect data quality in an adverse manner. May include statements regarding suspect and unusable data, or problems concerning sample integrity.

Minor issues - Summarizes data qualifiers that have been applied to positive values or quantitation limits and informs the user of the limitations of data use.

Attachments

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Each report must have the following attachments:

Appendix A - Glossary of data qualifiers

Appendix B - Data Summary Forms (Regional data summary forms are available from the Quality Assurance Branch.)

Appendix C - Results as reported by the laboratory (Form 1 or equivalent)

Appendix D - Results of all Tentatively Identified Compounds which have been corrected to exclude blank contamination (Organics only)

Appendix E - Support documentation which substantiates qualifiers placed on data during review (i.e. method blank forms, calibration forms, quantitation reports).

ATTACHMENT

Surface Water and Sediment Investigation: Chemical/Physical Parameters

Recommended or Required by the Bioassessment Work Group

Note: These are the minimum required parameters for surface water and sediment investigations and probably will not fully characterize the site. Additional site-specific parameters and the rationale in choosing these parameters should be described in the work plan.

A. Surface Water

- 1. Field parameters
 - a. temperature
 - b. dissolved oxygen (DO) *
 - c. Eh
 - d. pH *
 - e. specific conductance
 - f. salinity (in estuarine and marine systems) *
- * Can be measured in the lab, but preferable to use field instrumentation.
 - 2. Laboratory parameters
 - a. Total Suspended Solids (TSS)
 - b. Alkalinity
 - c. Hardness
 - d. optional
 - 1) BOD
 - 2) COD
 - 3). Total Dissolved Solids (TDS)
 - 4). Total Organic Carbon (TOC)

B. Sediment

- 1. Field parameters
 - a, temperature
 - b. Eh (all EPA 9045)
 - c. pH
 - d. specific conductance (EPA 120.1)
 - e. color
- 2. Laboratory parameters
 - a. Total Organic Carbon (EPA 415.13, combustion methodology; TOC = % Organic Carbon)
 - b. grain size analysis (ASTM Method with hydrometer analysis)
 - c. % moisture (RAS)
 - d. % solids (RAS)

Sussex County Landfill Laurel, Delaware Region 3 DED980494637

National Electric and Att musphere municipation Waste Site Report

Site Exposure Potential

The inactive Sussex County Landfill occupies a 15.2-hectare site 3 km southwest of Laurel, Delaware (Figure 1) (EPA 1987). From May 1970 to April 1979, the unpermitted landfill accepted municipal wastes and an unknown quantity of VOCs. The wastes were deposited below the water table. The groundwater flows north at an estimated 12 cm per day. The total volume of the landfill has been estimated to be 298,000 m³.

The landfill is in an area dominated by agriculture and pine forest and is 30.3 to 33.2 meters above mean sea level (EPA 1987). The landfill is mostly vegetated with stands of young pine trees. However, there are scattered patches of dead vegetation and some completely barren areas on the landfill (NUS 1985). Surface waters near the site



Figure 1. The Sussex County Landfill site in Laurel, Delaware,

include two shallow ponds and a ditch. The two ponds on the site cover 4 m² and 12.5 m², respectively. Culver Ditch runs 0.5 km east of the landfill and feeds into Broad Creek, 3.5 km north of the site. Broad Creek flows west and discharges into the Nanticoke River, 11 km from the site. Nanticoke River enters the Chesapeake Bay 45 km below the confluence of Broad Creek.

Possible contaminant migration pathways to NOAA trust resources are surface water runoff and groundwater flow to Broad Creek and the Nanticoke River.

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Site-Related Contamination

The contaminants of concern to NOAA at the site are trace metals (NUS 1985). Seven trace metals were detected in on-site groundwater at concentrations that exceeded AWQC for the protection of freshwater aquatic life (Table 1). In addition, the criteria for cadmium, mercury, silver, and zinc were exceeded in surface water from the ponds. A groundwater plume has been detected extending to a depth of 10.6 meters, approximately 150 meters north of the landfill.

Table 1.	Maximum concentrations of selected contaminants at the Sussex County Landfill
	(NUS 1985); AWQC for the protection of freshwater aquatic life (EPA 1986);
	concentrations in sediment and soil in mg/kg and in water in µg/l.

	On-site	Pond	Pond	Culver Ditch	1	AWQC
Contaminant	Groundwate	r Sediment	Surface water	Sediment	Acute	Chronic
Volatile Organic	Compounds				[
acetone	28011	N/A	N/A	N/A	NO	N/O
benzoic acid	N/Å	N/A	N/A	4.68	N/D	• N/D
2-butanone	470††	N/A	N/A	N/A	N/D	N/D
Trace Metals						
cadmium	34*	N/A	2.3*	N/A	3.9t	1.1†
chromium	· 47	N/A	N/A	N/A	16	11
copper	32	3.5	N/A	N/A	18†	12†
lead	. 64	8.6	N/A	105	821	3.2
mercury	8.1*	N/A	2.3*	0.12	2.4	0.012
silver	13*	N/A	13*	N/A	4.1†	0.12
zinc	629*	18*	342*	291	1201	1101
* Questionable	data;	+ Hardness-depe	endent (based on	100 mg/l CaCO	3)	
++ Quantitative approximation;		N/A: Not available	e: N/D: (Criteria not deve	bed	

NOAA Trust Habitats and Species in Site Vicinity

Habitats of concern to NOAA include Broad Creek and the Nanticoke River. There is insufficient information on Culver Ditch to determine its importance as a habitat. Broad Creek is a slow, continuously flowing, low-gradient stream with 1.5-meter high banks and extensive freshwater wetlands along its shoreline. Near the site, the creek has sandy substrate and is 23 to 30 meters wide and one meter deep. Broad Creek has high water quality and is tidal past its confluence with Culver Ditch. The Nanticoke River, 76 meters wide and three to six meters deep, is the largest river in Delaware. The river is bordered by extensive freshwater wetlands. The substrate in the river is sandy silt and the water quality is high. The Nanticoke Wildlife Area is at the confluence of Broad Creek and the Nanticoke River, less than 8 km downstream from the site (Blosser 1988).

Alewife, blueback herring, white perch, and, possibly, striped bass use Broad Creek as a spawning/nursery area and as a migration route (Table 2) (Miller 1988; Martin 1989). Fish found in Broad Creek, along with American eel and American shad, also use the reach of the Nanticoke River near the mouth of Broad Creek. The State of Delaware has given Broad Creek Exceptional Recreational Ecological Significance (ERES) status, which does not permit the release of any contaminants above background levels. Both Broad Creek and the Nanticoke River are valuable recreational fishing areas (Miller 1988).

Table 2. NOAA trust resource use of Broad Creek and the Nanticoke River (Miller 1988).

Species		Broad Creek	Nanticoke River
alewife		S,N,M	S,N,M
American eel	•	A	A.M.R
American shad			S,N,M,R
blueback herring		S,N,M	S.N.M
striped bass	•	S.N.M.R	S.N.M.R
white perch		S,N,M,R	S,N,M,R
S: Spawning area,	N: Nursery area,	M: Migration route	A: Adult area, R: Recreational fishing

Response Category: Federal Enforcement Lead

Current Stage of Site Action: RI/FS Workplan

EPA Site Manager Eric Newman 215-597-9238

NOAA Coastal Resource Coordinator Alyce T. Fritz 215-597-3636

References

Blosser, M., Department of Natural Resources and Environmental Control, Dover, Delaware, personal communication, November 10, 1988.

EPA. 1986. Quality Criteria for Water. Washington, D.C.: Office of Water Regulations and Standards, Criteria and Standards Division. EPA 440/5-86-001.

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EPA. 1987. National Priorities List, Superfund Hazardous Waste Site Listed under CERCLA, Sussex County Landfill #5. Philadelphia: U.S. Environmental Protection Agency, Region 3.

Martin, C. fisheries biologist, U.S. Fish and Wildlife Service, Dover, Delaware, personal communication, March 15, 1989.

Miller, R., fisheries biologist, U.S. Fish and Wildlife Service, Dover, Delaware, personal communication, December 12, 1988.

NUS Corporation. 1985. Site Inspection of Sussex County Landfill #5, August 7, 1985. Philadelphia: U.S. Environmental Protection Agency, Region 3.

