DOE/EA--0564

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ENVIRONMENTAL ASSESSMENT

STEAM PLANT ASH DISPOSAL FACILITY AND INDUSTRIAL LANDFILL AT THE Y-12 PLANT ANDERSON COUNTY, TENNESSEE

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PREPARED BY
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for the
Oak Ridge Y-12 Plant
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for the
U.S. DEPARTMENT OF ENERGY
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CONTENTS (CONTINUED)

ABBREVIATIONS AND ACRONYMS

BOD	biological oxygen demand
CSL II	Centralized Sanitary Landfill II
CDL VI	Construction/Demolition Landfill VI
DOE	U.S. Department of Energy
EA	Environmental Assessment
ECR	East Chestnut Ridge
EFPC	East Fork Poplar Creek
EPA	Environmental Protection Agency
FWS	Fish and Wildlife Service
NAAQS	National Ambient Air Quality Standards
NPDES	National Pollutant Discharge Elimination System
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
SIWTF	Sanitary and Industrial Wastewater Treatment Facility
SPAD	Steam Plant Ash Disposal
TCLP	Toxicity Characteristics Leaching Procedure
TDEC	Tennessee Department of Environment and Conservation
WBW	Walker Branch Watershed
WCR	West Chestnut Ridge
WMD	Oak Ridge Y-12 Plant Waste Management Division

1. INTRODUCTION

1.1 PURPOSE OF AND NEED FOR ACTION

The U.S. Department of Energy (DOE) is proposing to install a wet ash handling system to dewater bottom ash from the coal-fired steam plant at its Y-12 Plant and to construct a new landfill for disposal of industrial wastes, including the dewatered bottom ash. The DOE operates three major facilities on its Oak Ridge Reservation (ORR): the Oak Ridge Y-12 Plant, the inactive Oak Ridge Gaseous Diffusion Plant, and the Oak Ridge National Laboratory (ORNL). Operation of these facilities results in the production of a variety of nonhazardous, nonradioactive solid wastes (approximately 300 m^3 per day, compacted) including sanitary wastes, common industrial wastes and construction debris. Disposal of these wastes is the responsibility of the Y-12 Plant Waste Management Division (WMD) staff. Currently, WMD personnel operate the existing Centralized Sanitary Landfill II (CSL II) on Chestnut Ridge south of the Y-12 Plant (Fig. 1). At the current rate of use, this existing landfill will be filled within approximately 18 months, and more space is urgently needed. In an effort to alleviate this problem, DOE and WMD management propose to create additional landfill facilities at a nearby site. The potential environmental impacts associated with this proposed action are the subject of this environmental assessment (EA).

The purpose of the proposed activities is to: (1) bring the disposal of coal ash from the Y-12 Steam Plant into environmental compliance, and (2) provide additional landfill capacity for disposal of industrial wastes generated by the three Oak Ridge facilities. The responsible parties from the State of Tennessee have declared that the current method of disposal of coal ash sluice water into an abandoned water-filled rock quarry is in violation of the Tennessee Water Quality Control Act. Consequently, the Y-12 Plant staff are implementing projects to eliminate the discharge and bring the disposal of coal ash into compliance. A dry ash handling system was completed in April 1990 to remove fly ash from the steam plant baghouses in a dry form for disposal in existing CSL II. The proposed wet ash handling system will provide facilities to dewater the bottom ash from the steam plant boilers and landfill the residue. The DOE has reached an agreement with the Tennessee Department of Environment and Conservation (TDEC) to complete the wet ash handling facility by July 1993.

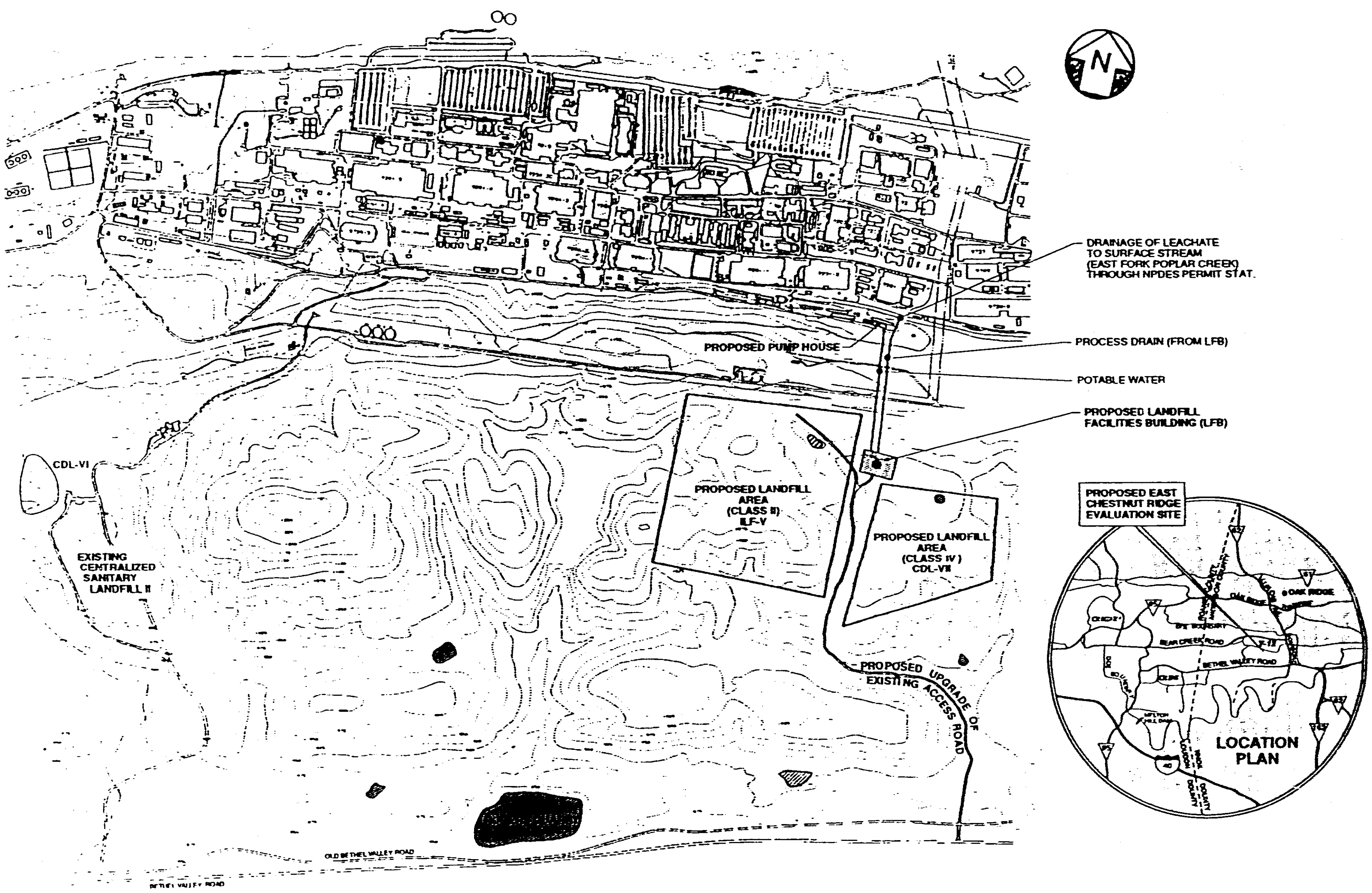

Figure 1. Location of the East Chestnut Ridge proposed landfill site and associated facilities in relation to the Y-12 Plant site and the existing landfill.

1.2 BACKGROUND ON THE EXISTING LANDFILL

CSL II (the existing landfill) at the Y-12 Plant is located in the Bethel Valley quadrangle (130-NE) at latitude 35°58'14", longitude 84°15'55" (Fig. 1), approximately 1.2 km (0.75 mi) southwest of the Y-12 Plant. The site is bounded on the east by Mt. Vernon Road, on the north by Mt. Vernon Cemetery, and on the south and west by a wooded watershed. The landfill accepts combustible and decomposable solid waste; construction spoil material such as asphalt; fly ash, bottom ash, and sludge from the operation of a coal-burning power plant; various empty containers; and some other special wastes such as asbestos and beryllium oxide. No hazardous or radioactive wastes are accepted at this facility. Approximately 50 percent of the solid waste is paper, plastic, and wood products. The southern end of the site serves as a stockpiling area for dirt.

An area fill method is employed at the site, with the cell being the daily unit of disposal. The site is designed for one large (1250 ft by 400 ft) and one small (1000 ft by 80 ft) excavation. Neither exceeds 9 m (30 ft) below normal land surface in depth, which is varied as needed to provide surface drainage. Other drainage controls include construction of diversion dikes and berms above land surface, use of diversion channels and a sediment basin, and installation of filter fabric fences along active cells. Each day, refuse is spread and compacted in multiple layers about 0.6 m (2 ft) thick in cells usually 1.2 to 1.5 m (4 to 5 ft) high but sometimes extending to 2.4 m (8 ft) in height. The cell is covered with at least 15 cm (6 in) of soil at the end of each day. Intermediate and final clay covers are followed with topsoil and revegetation. Further details of the operation and of site characteristics are supplied in Bailey et al. (1986).

1.3 SCOPE OF THE ASSESSMENT

The scope of this EA is limited to the impacts of (1) installing a wet ash handling facility and (2) constructing and operating landfill facilities on a single site. The DOE staff has chosen to evaluate these actions in a single EA because constructing and operating the wet ash handling facility will lead to disposal of the ash at a new site which will also receive other wastes. If additional landfill areas at another location are needed in the future, the DOE staff will evaluate their environmental impacts separately.

1.4 AGENCIES CONSULTED

The following agencies were consulted during preparation of this EA:

- Tennessee Historical Commission
- Tennessee Department of Health and Environment
- U. S. Fish and Wildlife Service
- Tennessee Wildlife Resources Agency
- U.S. Army Corps of Engineers
- Environmental Protection Agency, Region IV
- Tennessee Valley Authority

2. PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The DOE proposes to develop two disposal areas, totaling about 20 ha (50 acres), on the East Chestnut Ridge (ECR) site (Fig. 1). Based on current generation rates, the new areas would be required to provide space for disposal of approximately 119,000 m^3/year (155,000 yd^3/year) nonhazardous, nonradioactive industrial wastes and from 4500 to 21,000 m^3/year (6,000 to 28,000 yd^3/year) coal ash. From twenty to fifty percent of the industrial waste other than coal ash is anticipated to be construction/demolition waste. Two burial cells would be opened initially, with others to be opened as needed. Under State of Tennessee solid waste regulations, landfills are classified and permitted based on the type of waste handled. The state regulations address Class I through Class VI disposal facilities. The landfill is being designed for and the site would be developed for receipt of both Tennessee Class IV waste (e.g., construction debris and rubble) and Tennessee Class II waste (e.g., nonhazardous, nonradioactive industrial wastes) in separate areas. Dewatered bottom ash and dry fly ash will be disposed of in either the Class II or Class IV areas depending on the state solid waste regulations in force at the time. Currently, state landfill regulations are unclear on the disposal of these materials and precedence establishes coal ash as a Class IV waste. However, it is likely that the regulations will be clarified to require Class II disposal before the new landfill is operational. The landfill is being designed to accommodate the disposal of ash in either the Tennessee Class II or the Tennessee Class IV disposal area as required. The exact location within the proposed areas and the time of development of additional cells are not yet known. The number of cells finally developed will depend on waste generation rates, the success of waste minimization and recycle efforts, and the topography and other characteristics of the site. Site preparation would include clearing, grading, and fencing; construction and upgrading of access roads; and on-site disposal of construction spoils. The proposed action includes creation of a small pond (approximately 0.5 acre) to replace the functional value of two small wetland areas on the site which will be destroyed by construction of the landfill.

All construction and operations will be in accordance with applicable DOE, State of Tennessee, and Environmental Protection Agency (EPA) environmental requirements. Construction of the facilities is expected to require the equivalent of approximately 30 to 50 people and the construction period is expected to be approximately 2 years. Operation of the facilities will require approximately 10 people.

2.1.1 Wet Ash Handling System

Wet bottom ash will be collected and dewatered in new tanks and bins located approximately 60 m (200 ft) south of the existing steam plant on the main Y-12 Plant site (Fig. 2). Construction and operation of the facility will replace the existing ash-sluicing procedure. Dewatered ash will be transported to the main landfill site by truck, which will have adequate containment to prevent spills. Water from this operation will be recycled internally with treatment to reduce corrosion; water from periodic blowdown of the recycle stream (approximately 4500 gallons per day), including a small amount of cleaning water from steam

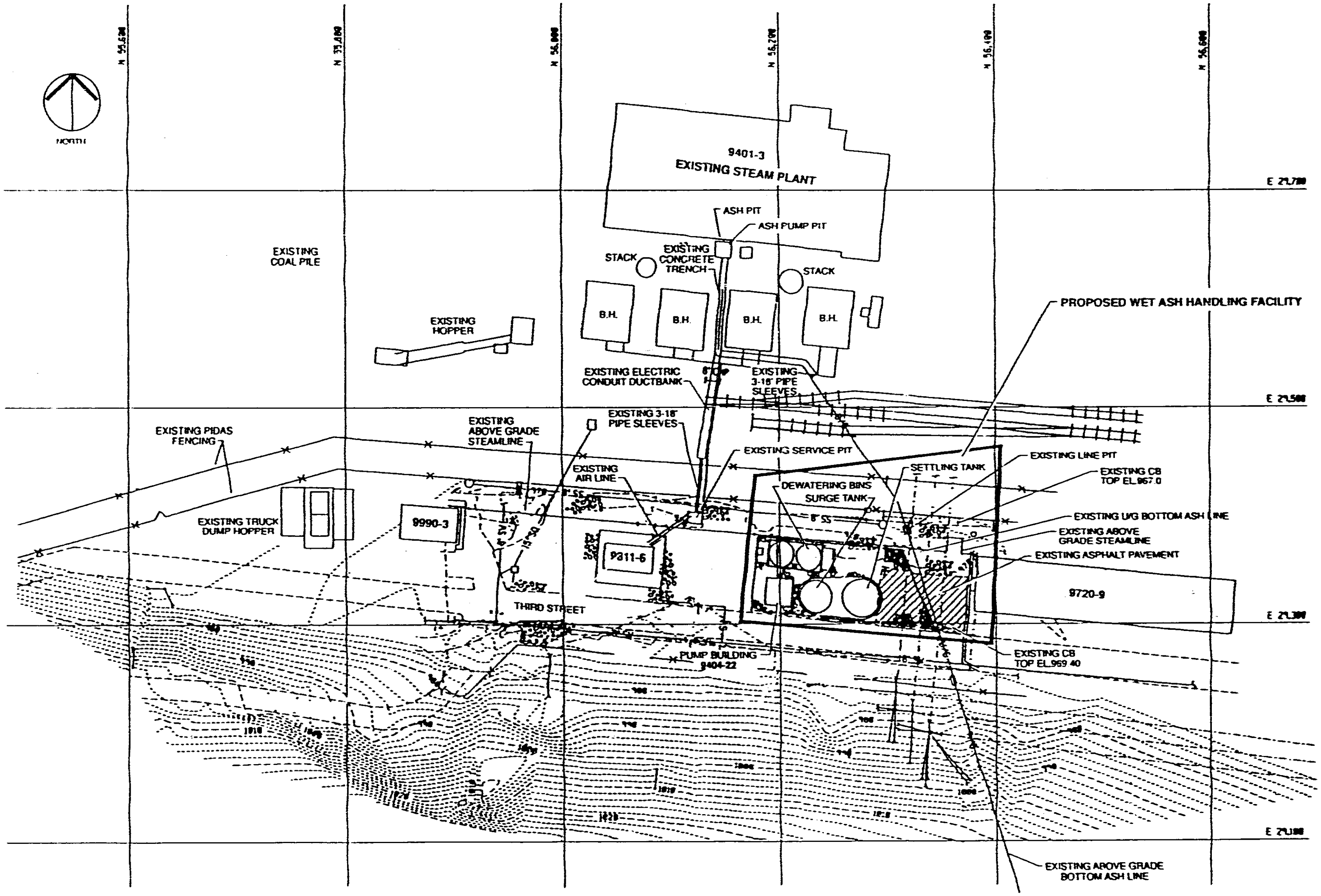

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Figure 2. Location of the proposed wet ash handling facility site in relation to Building 9401-3 on the Y-12 Plant site.

plant washdown, will be pumped to the existing Y-12 Steam Plant Wastewater Treatment Facility, treated, and discharged to East Fork Poplar Creek (EFPC) under an existing NPDES permit. The total amount of water involved from blowdown of recycle including cleaning water will be insignificant in comparison to the volume of water currently treated (ca. 300,000 to 500,000 gallons per day). The capacity of the facility is adequate to process this additional waste stream, which will in any case be well diluted by treated water from other sources. The Steam Plant Wastewater Treatment Facility is designed to treat inorganic wastewater comprised of coalyard runoff, boiler blowdown, and water treatment column regeneration wastes. Wastes are collected and equalized in a 400,000 gallon equalization basin. Wastes are treated with lime, clarified, and pH adjusted prior to discharge. No demolition of existing facilities will be required to install the bottom ash dewatering equipment, and no previously undisturbed areas will require excavation.

The cleaning water is expected to have water quality characteristics similar to the water from coalyard runoff (presently treated at the Steam Plant Wastewater Treatment Facility), and the blowdown is expected to have the following water quality characteristics:

pH - 7.2
Alkalinity - 50
Mg - 24 mg/l
Ca - 137 mg/l
Na - 25 mg/l
K - 2 mg/l
SO_4 - 404 mg/l
Cl - 7 mg/l
PO_4 - 1 mg/l
F - 2 mg/l
B - 1 mg/l
Sr - 3 mg/l

2.1.2 Construction and Use of Disposal Cells

Tennessee Class II disposal cells would be single-lined and equipped with a leachate collection system. The liner, consisting of natural and/or synthetic materials, would be designed to achieve a maximum hydraulic conductivity of 1×10^{-7} cm/s and to last the life of the site (expected to be from 15 to 25 years depending primarily on waste volumes) plus 30 years (the post-closure period). The liner would be underlain by at least 3 m (10 ft) of soil (geologic buffer) as required by regulations between the bottom of the liner to the top of the seasonally high water table (Section 3.2.1), which will be verified and monitored by construction and observation of piezometers on the site. Due to the geologic buffer required by regulation, it is not anticipated that groundwater will rise into or above the liner of the Class II landfill. A leachate collection and removal system would be installed above the liner. DOE proposes to construct a new facility to treat the leachate collected from the landfill. Treated leachate would be discharged to EFPC through a new NPDES permit station. Alternatives of pumping and/or transporting the leachate to another treatment/disposal facility are discussed in Section 2.3.

Tennessee Class IV disposal cells would be underlain by at least 1.5 m (5 ft) of soil (geologic buffer) between the bottom of the area and the seasonally high water table (Section 3.2.1), which will be verified and monitored by construction and observation of piezometers on the site. The buffer will have a maximum saturated conductivity of 1×10^{-5} cm/s. Due to the geologic buffer required by regulation, it is not anticipated that groundwater will rise into the Class IV landfill.

The new landfills would be constructed and operated under solid waste disposal permits from the TDEC. The permits are not RCRA hazardous waste permits, and additional specific construction permits will not be required.

Permit requirements for landfill operation will include a groundwater monitoring program. The program will include (1) a conventional approach of one upgradient and four downgradient wells, and (2) a comparison of both site groundwater and leachate to the regional background water quality as determined by a well remote from the landfill. This dual system is intended to reveal whether other activities on the ORR affect the water beneath the landfill. Locations for the conventional monitoring wells will be selected based on information on the water table obtained from existing piezometer installations. The wells will be screened approximately 20 feet below the piezometric surface at depths below ground level ranging from 25 to 188 feet. Chemical analyses of leachate and water will be conducted for both inorganics including potential contaminants (e.g. heavy metals) and volatile organic constituents. Sample collection and analysis for background characterization will begin at least two quarters before the landfill begins operating, will continue on a quarterly basis for a year thereafter, and will be continued throughout the post-closure period. All procedures and analyses will be conducted as stipulated in the document "Y-12 Industrial Landfill V and Construction/Demolition Landfill VII Groundwater Sampling and Analysis Plan," which will be appended to the permit application.

2.1.3 Ancillary Facilities

Development of the new landfills will require construction of the following support facilities:

- A leachate treatment building;
- Up-gradient and down-gradient groundwater monitoring wells;
- Run-on, runoff, and erosion controls;
- Methane gas collection system; and
- Access and utilities.

Unless another alternative for handling leachate from the Tennessee Class II disposal area is selected (see below), a leachate treatment building, comprising approximately 650 m^2 (7,200 ft^2), will be located on the ECR site (Fig. 1) and will include restrooms, a lunchroom, a laboratory area, and an equipment garage with heating, cooling, ventilation, utilities, instrumentation, automatic sprinklers, smoke and heat detectors, and fire alarms and extinguishers. The facility will treat leachate for removal of heavy metals and organics before it is discharged (Bailey et al., 1986). Leachate collection and treatment will be designed for an average rate of 1.7 L/s (25 gal/min) based on hydrologic modeling of landfill performance. Treatment processes under consideration include: pH adjustment, heavy metal removal (flocculation/tube settling/mixed media filtration), BOD removal (biological packed tower), clarification (lamellar clarifier), BOD polishing (carbon columns), and sludge dewatering (filter press). Final treatment requirements will be determined based subsequent leachate characterization and discharge limits negotiated with the TDEC. The attached tables (Tables 1 and 2) represent results of samples of liquid obtained from CSL II at the Y-12 Plant. The samples were obtained with the goal of estimating the anticipated concentrations of expected contaminants in the leachate, before treatment, that will be collected from the new Class II landfill when it is operated. The samples in the Table 1 are averages from samples of standing water observed at various locations around the side slopes and downgradient of CSL II, usually several days after rainfall occurred. Attempts were made to collect samples that appeared to be somewhat concentrated and to avoid liquid that was clean runoff. Table 2 contains results of Toxicity Characteristics Leaching Procedure (TCLP) analyses performed on two samples. The samples were obtained from an underdrain through the top layer of the oldest section of the CSL II. While the samples represented in the tables were not true leachate, they provide a useful approximation of leachate that will be collected from the new Tennessee Class II landfill. Concentrations of potential contaminants in the samples were quite low and below regulatory standards where these are stated. The treatment facility or alternative will be designed to remove or be capable of removing these contaminants to at or below regulatory standards. No difficulty is anticipated in obtaining and complying with an NPDES permit for discharge of leachate treated in this facility.

Run-on, runoff, and erosion controls will include a sedimentation basin operated separately from the leachate collection, removal, and discharge system and will be designed to detain the predicted 24-h/25-y precipitation event, discharging through spillways.

Evolution of methane gas is a normal and expected occurrence in landfills of this type in this region. It is estimated that the Tennessee Class II landfill could produce 400 to 500 cubic feet per minute of gas when the landfill is full. Vacuum blowers and gas flares are available for handling gas at rates up to several thousand cubic feet per minute with one unit, and multiple units can be used. The Tennessee Class II landfill would be served by a single blower with 500 cubic foot per minute capacity.

Road access will be provided by upgrading an existing road to a 24-foot wide paved road with 6-foot shoulders. The road will follow the existing road for approximately 4400 feet. A portion of the middle section will be located across the stream along an old track through pasture to minimize impacts to the stream. Relocating the road in this manner will entail constructing two stream crossings, using standard best management practices. The final segment of the road will be built up on a 6% grade to achieve the correct elevation at the entrance to the landfill. A concrete retaining wall approximately 8 feet high will be constructed along parts of the roadway to minimize slope cutting and protect the stream and two USGS monitoring stations. Guardrails will be installed on top of all retaining walls for safety. Utilities will be extended from the Y-12 Plant (Fig. 1).

The proposed action includes creation of a small pond (approximately 0.5 acre) to replace the functional value (Section 3.4.1) of two small wetlands on the site which will be destroyed (Section 4.1.2.2).

SANITARY LANDFILL SEEP RESULTS

Summary of Results

Compound	Results Minimum	Mean	Maximum	# Samples
Miscellaneous Parameters				
Alkalinity	110.	1060.	1600.	7
BOD	6.	460.	1600.	9
COD	46.	1460.	5800.	7
TOC	24.	450.	1100.	5
NH_3	0.2	9.	28.	5
TKN	1.4	27.	40.	5
Oil & Grease	2.	17.	72.	5
pH	7.3	7.4	7.4	2
Chloride	2.	160.	300.	9
Sulfate	1.	194.	690.	9
Acetate	150.	960.	3500.	6
Orthophosphate	0.1	1.	2.8	5
Metals by ICP				
Aluminum	0.2	7.2	39.6	9
Barium	0.02	1.1	2.6	9
Calcium	9.	590.	1140.	9
Iron	5.9	50.	150.	9
Lithium	0.005	1.3	4.1	9
Magnesium	1.7	121.	183.	9
Manganese	0.09	16.8	58.5	9
Phosphorus	0.3	0.9	2.5	9
Potassium	2.5	41.	85.	9
Sodium	0.1	158.	399.	9
Strontium	0.014	2.7	5.76	9
Zinc	0.015	0.4	1.09	9

[1] All results in mg/l except pH; Alkalinity as mg $CaCO_3$ per liter.

Table 1.

SANITARY LANDFILL - ESTIMATED LEACHATE DATA

TCLP Analysis Results

Compound	Sample 1 (mg/l)	Sample 2 (mg/l)	Regulatory Limit (mg/l)
TCLP Metals			
Arsenic	< 0.5	< 0.5	5.0
Barium	< 10.0	< 10.	100.0
Cadmium	< 0.1	< 0.1	1.0
Chromium	< 0.5	< 0.5	5.0
Lead	< 0.5	< 0.5	5.0
Mercury	< 0.02	< 0.02	0.2
Selenium	< 0.1	< 0.1	1.0
Silver	< 0.5	< 0.5	5.0
TCLP VOAs			
1,1-Dichloroethene	< 0.01	< 0.07	0.7
1,2-Dichloroethan	< 0.01	< 0.05	0.5
1,4-Dichlorobenzene	< 0.75	< 0.75	7.5
2-Butanone (MEK)	4.1	< 20.	200.0
Benzene	< 0.01	< 0.05	0.5
Carbon Tetrachloride	< 0.01	< 0.05	0.5
Chlorobenzene	< 0.01	< 10.	100.0
Chloroform	< 0.01	< 0.6	6.0
Tetrachloroethene (Perk)	< 0.01	< 0.07	0.7
Trichloroethene	< 0.01	< 0.05	0.5
Vinyl Chloride	< 0.01	< 0.02	0.2
TCLP Base Neutral/Acid Extractable			
2,4,5-Trichlorophenol	< 40.	< 40.	400.0
2,4,6-Trichlorophenol	< 0.2	< 0.2	2.0
2,4-Dinitrotoluene	< 0.013	< 0.013	0.13
2-Methylphenol	< 20.	< 20.	200.0
3-Methylphenol	< 20.	< 20.	200.0
4-Methylphenol	< 20.	< 20.	200.0
Hexachlorobenzene	< 0.013	< 0.013	0.13
Hexachlorobutadiene	< 0.05	< 0.05	0.5
Hexachloroethane	< 0.3	< 0.3	3.0
Nitrobenzene	< 0.2	< 0.2	2.0
Pentachlorophenol	< 10.	< 10.	100.0
Pyridine	< 0.5	< 0.5	5.0
TCLP Herbicides/Pesticides			
2,4,5-TP (Silvex)	NA[1]	< 0.1	1.0
2,4-D	NA	< 1.0	10.0
Chlordane	NA	< 0.003	0.03
Endrin	NA	< 0.002	0.02
Heptachlor	NA	< 0.0008	0.008
Heptachlor Epoxide	NA	< 0.0008	0.008
Methoxychlor	NA	< 1.0	10.0
Toxaphene	NA	< 0.05	0.5
gamma-BHC (Lindane)	NA	< 0.04	0.4

[1] NA = Not Analyzed

Table 2.

2.2 NO-ACTION ALTERNATIVE

The existing landfill, CSL II, has space for, at most, only 18 months accumulation of industrial waste and ash. A planned landfill, Construction/Demolition Landfill VI (CDL VI), will be constructed adjacent to CSL II on the northwest side. The solid waste permit application for CDL VI is currently undergoing TDEC review, and construction is scheduled to begin during 1992. However, CDL VI will provide space for only a few more years accumulation of Tennessee Class IV waste and none for Tennessee Class II waste. Failure to create additional landfill areas would intensify the existing waste disposal crisis and could lead to the shut down of many operations at the three DOE Oak Ridge facilities. Because the installation of the wet ash handling system is part of an agreement with the State of Tennessee, the no action alternative is not feasible unless the agreement can be renegotiated. DOE will potentially be subject to fines and enforcement action under the Tennessee Water Quality Control Act and the Federal Water Pollution Control Act if the bottom ash handling system is not constructed.

2.3 OTHER ALTERNATIVES

The planning stage of the project included consideration of the following alternatives to the proposed action for dealing with disposal of ash and sluice water:

- No action;
- Construction of a new steam plant;
- Purchase of steam from an outside supplier; and
- Conversion of the existing plant to natural gas.

The first alternative is not viable (Sect. 2.2); the other alternatives were rejected because of high relative costs and/or questions regarding reliability and security. The following alternatives were considered for providing long-term waste disposal capability:

- No action;
- Use of commercial disposal; and
- Reduction of waste generation.

The first alternative is not viable (Sect. 2.2); the second was rejected as discussed below; and the third will be pursued in any case but does not completely eliminate the need for a long-term waste disposal capability.

Use of off-site commercial landfill space was evaluated and rejected for a variety of reasons. In particular, commercial landfill space is limited in the Oak Ridge area, licensing of new facilities is difficult, and commercial operations are reluctant to accept additional wastes.

Two alternative sites were considered and rejected as locations for these waste disposal facilities. Both alternatives included the area northwest of CSL II currently planned to be developed as CDL VI. In addition, one alternative consisted of a segment running south from the CDL VI area, and the other substituted an east-west-oriented segment for the north-to-south segment. Both segments are immediately west of CSL II. These additional areas (north-south or east-west aligned segment) would have been developed as a Tennessee Class II disposal area as described in Sect. 2.1. These areas under consideration to receive Tennessee Class II wastes were rejected as a result of geologic unsuitability and/or land use conflicts (Huston et al., 1989) with a nearby research area (Walker Branch Watershed [WBW]).

Alternatives to discharging treated leachate through a new NPDES station are still under consideration. Both the proposed leachate treatment facility and the alternatives briefly described below would result in disposal of leachate treated to at or below regulatory standards (i.e., a permit is expected); the final selection will be based on cost, viability, and timing.

The Y-12 Plant staff is currently proposing design and construction of a Sanitary and Industrial Wastewater Treatment Facility (SIWTF). In addition to sanitary wastewater, such a facility could treat effluent from existing wastewater treatment facilities, wastewater from specific floor drains throughout the plant, and, possibly, leachate from the new landfill. The proposed schedule calls for this facility to be operational by Calendar Year 1996. The proposed SIWTF represents a potential alternative to treatment of leachate by the SPAD leachate treatment facility. However, DOE personnel must resolve uncertainties in the scope and funding of the SIWTF before this alternative can be seriously considered. Additionally, managing the leachate in the interim between the SPAD and SIWTF projects requires that another alternative be developed.

Other viable potential alternatives to discharging treated leachate through the proposed NPDES station include 1) discharge of the leachate into the Y-12 sanitary sewer and subsequent treatment at the City of Oak Ridge municipal publicly owned treatment works; 2) treatment of the leachate at the ORNL Sewage Treatment Plant; and 3) treatment of the leachate at the Sewage Treatment Plant at the K-25 Site. Under the latter two alternatives of this plan, the leachate would be trucked to the treatment plants from a holding tank at the new landfill and fed to the influent stream of the plants using standard procedures to prevent large spikes in contaminant loads (Reed, 1990). It is expected that the treatment plants could easily incorporate such a procedure. Prior to implementation of one of these alternatives, verification would be obtained that the existing treatment plant NPDES permit could be modified as necessary to address the leachate and that the plant could effectively treat and discharge the leachate in accordance with its NPDES permit.

3. AFFECTED ENVIRONMENT

3.1 GEOLOGY AND SOILS

3.1.1 Geology

The ORR is located in the valley and ridge physiographic province of the southern Appalachians. The region is characterized by a series of roughly parallel ridges and intervening valleys, oriented northeast-southwest. In the Oak Ridge area, the ridges are formed by the Rome Formation and the Knox Group, and the valleys are underlain by the Conasauga and Chickamauga Groups.

The proposed areas at the ECR site are underlain by carbonate rocks of the Cambro-Ordovician Knox Group. The estimated formation thicknesses and the general lithology of the formations within the Knox Group are suggested by detailed subsurface investigations at two sites on Chestnut Ridge, the West Chestnut Ridge (WCR) and ECR sites (i.e., the proposed site). These sites are located approximately 7.5 km to the west and 2.5 km to the east, respectively, of CSL II but are within the same strike belt (Woodward-Clyde Consultants, 1984 and Golder Associates, 1989). Detailed descriptions of the rock groups may be found in the studies by Ketelle and Huff (1984) and Lee and Ketelle (1988).

If unweathered, the Knox Group typically has low permeability and porosity; however, the Knox dolostones are susceptible to the formation of solutional features, primarily along bedding planes and fractures caused by folding and faulting. Karst features such as dolines, disappearing streams, and sinkholes have been observed at the WCR site (Ketelle and Huff, 1984). Although not as well defined, similar features have also been observed at the ECR site (R. H. Ketelle, ORNL, personal communication to D. G. Jernigan, ORNL, October 5, 1989; Golder Associates, 1989).

There is a single karst feature with surface expression (sinkhole) in close proximity to the proposed landfill area. This is the surface depression in the northeast portion of the Class IV site, near coordinates N 27,000; E 61,000. This area will be used to stockpile soil; however, no landfilling is proposed in the vicinity of this feature.

All other known karst features beneath the two sites are within the bedrock (cavities), and not in the soil overburden. Recent test borings on the site show that the overburden on the site is substantial. These residual soil materials, derived from weathering of the bedrock, blanket the bedrock to depths generally ranging from 40 feet to over 120 feet. The soil consists primarily of clay and silty clay of low to high plasticity (CL to CH, according to the Unified Soil Classification System). There are numerous nodules, lenses and zones of chert (flint) within the mass of overburden soils. Where the chert nodules are broken up, they provide a sandy or gravelly component to the predominantly clay soils. The soil overburden thickness over the bedrock cavity in the west-centered portion of the Tennessee Class II landfill (near coordinates N 27,500; E 59,000) is over 110 feet. With this overburden thickness a void would be classified as stable. The other known or suspected cavities in the bedrock beneath the site are outside the proposed active landfill areas (W. T. Shefchik, Senior Geologist, Burns & McDonnell Engineers, Architects, & Consultants, personal communication with J. W. Webb, ORNL, March 11, 1991).

3.1.2 Soils

Detailed soil investigations (Woodward-Clyde Consultants, 1984; Lee and Ketelle, 1988; Ketelle and Huff, 1984; and Lietzke et al., 1989) have been conducted at the WCR and ECR sites to ascertain soil types and characteristics. The soils mapped on WCR and ECR are predominantly the thick varieties, although soil varieties that are thinner in character were mapped where recent alluviation has occurred. The average permeability of the residual soils on the Knox Group at the WCR site is about 6 x 10^{-6} cm/s (2.4 x 10^{-6} in/s) in the upper 3 m (10 ft), and it decreased to about 6 x 10^{-8} cm/s (2.4 x 10^{-8} in/s) at depths in excess of 20 m (65 ft).

The thickness of the soils developed on the Knox Group on Chestnut Ridge is variable. In general, the thicker soil development is found at the higher ground surface elevations, whereas thinner soil development is common at the lower ground surface elevations. At the ECR site, soil thickness varies between 22.5 m (74 ft) and 42 m (138 ft).

3.2 HYDROLOGY AND WATER QUALITY

3.2.1 Groundwater

The hydrogeologic setting of the area is complicated. Weathered Knox bedrock and its overlying residual soils are hydraulically connected and are generally considered a single aquifer. Groundwater movement in the Knox Group in upper east Tennessee has been summarized by Hollyday and Goddard (1979) and Seaber et al. (1989). Typically, groundwater flow is across strike from ridge to valley, where the water either discharges directly to local streams or is intercepted and routed along strike by a highly permeable layer or zone. These highly permeable layers or zones typically are carbonate rocks with well-developed secondary porosity and permeability or are permeable fracture zones that may be secondarily enlarged (Seaber et al., 1989).

The results of field studies at the ECR and WCR sites indicate that the Chestnut Ridge area is underlain by a network of developed karst (i.e., sinkholes and other solution features) (Woodward-Clyde Consultants, 1984; Ketelle and Huff, 1984; Golder Associates, 1989). Although the complexity and extent of this network is not currently known, it is generally believed that groundwater flow on Chestnut Ridge is controlled by the fractures and solution cavities within the rock.

At the WCR site, Ketelle and Huff (1984) found that groundwater flow in the Knox Group is strongly controlled by the location and orientation of cavities, which are in turn controlled by the local bedding orientation and the orientation of penetrative joints (fractures) that become widened by solution. At the ECR site, a conceptual model for groundwater flow has been developed by Golder Associates (1989) that is consistent with the data of Hollyday and Goddard (1979) and Ketelle and Huff (1984). The ECR flow model is a gravity flow, dominated model with the downward flow of groundwater from the recharge areas located at the topographic high areas, moving toward areas of lower elevation and in general reappearing as surface flow at streams and springs located on the lower slopes and in the valleys. There is also observational evidence for groundwater flow parallel to geologic strike at the ECR site, based on continuing site characterization work at that location (R. H. Ketelle, ORNL, personal communication to D. G. Jernigan, ORNL, August 21, 1989).

A generalized model of groundwater recharge and discharge patterns for the Chestnut Ridge/Bethel Valley area is useful in understanding the likely performance of the proposed facility. Chestnut Ridge is an upland landform with a thick mass of silty clay soil, generally woodland covered, and with a high potential for groundwater recharge. The large soil mass which has developed on the Knox Group outcrop areas has a high moisture retention capacity. Recharge occurs via both diffuse moisture movement through the soil mass and rapid infiltration through dolines and other karstic features which are capable of concentrating flows into the internal drainage system. Recharge water which passes through the diffuse recharge pathway is very low in dissolved constituents since the soil mass is itself quite low in soluble materials, due to its prolonged weathering history. The observed low hydraulic conductivity of soils is indicative of the low rate of diffuse recharge. Once recharge water reaches the water table (which may locally occur either near the base of the soils or at greater depth in the bedrock zone) flow is partitioned between slow movement in the soil mass and rapid movement through the bedrock cavity system. In the ORR area, the Knox Group is generally observed to have fresh water circulation to depths of 200 to 300 feet with moderate hydraulic conductivity in fractured and weathered zones. This characteristic is indicative of the large mixing volumes for groundwater flow in the Knox aquifer. The proposed landfill site lies in the central portion of Chestnut Ridge, to the southeast of the hydrologic divide which coincides with the highest crest of the ridge to the northwest of the proposed development area. The generalized piezometric surface for the area indicates the groundwater flow from the developed area will be east-southeast toward Bethel Valley. Observations of piezometers present on the site before its selection reveal that the seasonally high water table lies at depths ranging from 10 to 60 feet below the bottom of the proposed landfill (R. H. Ketelle, ORNL, personal communication with J. W. Webb, ORNL, January 28, 1992). The piezometric surface will be more fully defined before the site is developed.

Bethel Valley is underlain by siltstones and argillaceous limestones of the Chickamauga Group. These bedrock units are much less permeable than the dolostones of the Knox Group, as demonstrated by hydraulic testing performed at ORNL, which lies in Bethel Valley approximately 6 miles southwest of the proposed landfill site. The location of the very low permeability bedrock of the Chickamauga Group between the landfill site and the Melton Hill Reservoir creates a barrier to direct groundwater flow from the landfill site to the lake. Instead, the observed groundwater discharge from Chestnut Ridge emerges through springs which lie near the southeastern toe of Chestnut Ridge and in the northwestern edge of Bethel Valley. Water from the springs then flows as surface streams across Bethel Valley before entering Melton Hill Reservoir and the Clinch River flow system.

The significance of this hydrogeologic setting to monitoring the performance of facilities located on the Knox Group portion of the local watersheds is that near-field groundwater monitoring may detect local contaminants and use of springs at the edge of Bethel Valley as watershed monitoring points can provide an integrated sample of large area discharge. Some monitoring wells have already been installed and the information available is adequate to support a reasoned selection of additional well locations.

TDEC rules for Tennessee Class II landfills require groundwater monitoring. Specifically, the compliance monitoring boundary shall be:

(i) The waste management boundary of the facility; or

(ii) If the facility contains more than one disposal unit, the imaginary boundary circumscribing the waste management boundaries of the several units; or

(iii) An alternative boundary as may be established by the Commissioner in the permit. The Commissioner may establish an alternative boundary if he finds that the change to such a boundary would not result in contamination of groundwater, which such selection may be in consideration of all of the following factors that are relevant:

(I) The hydrogeological characteristics of the facility and surrounding land, including any natural attenuation and dilution characteristics of the aquifer;

(II) The volume and physical and chemical characteristics of the leachate;

(III) The quantity, quality, and direction of flow of groundwater underlying the facility;

(IV) The proximity and withdrawal rates of groundwater users;

(V) The availability of alternative drinking water supplies;

(VI) The existing quality of the groundwater, including other sources of contamination and their cumulative impacts on the groundwater; and

(VII) Public health, safety, and welfare effects.

The proposed Tennessee Class II facility must have a groundwater monitoring system consisting of a sufficient number of wells, not less than 1 upgradient and 2 downgradient wells unless otherwise approved by the Commissioner. The general hydraulic gradient map and information contained in the hydrogeologic report that will be developed and submitted as part of the permit application will provide data necessary to establish the locations of both groundwater monitoring wells for compliance with regulatory requirements and groundwater characterization wells.

Siting requirements for industrial waste landfills are essentially identical to those for sanitary landfills (Tennessee Class I). Similar geologic formations have been permitted and developed for sanitary waste landfills in Tennessee.

There are no regulatory requirements of groundwater characterization or monitoring wells for the proposed Tennessee Class IV facility. Groundwater characterization wells are proposed for the Class IV facility as a best management practice.

Results of pumping well tests at WCR indicate that transmissivity for weathered rock is approximately 1.3 m^2/day (14 ft^2/day) (Woodward-Clyde Consultants, 1984). The corresponding average permeability would be about 2×10^{-4} cm/s (8×10^{-5} in/s). The permeability for unweathered rock, which at higher elevations is generally found at depths exceeding 61 m (200 ft), would be about 1×10^{-4} cm/s (4×10^{-5} in/s) (Woodward-Clyde Consultants 1984; Ketelle and Huff, 1984). Results of packer tests and variable head tests of unweathered bedrock at the ECR site indicate that permeability (hydraulic conductivity) varies from about 4×10^{-3} cm/s to about 7×10^{-7} cm/s. However, most results are generally in the range of 10^{-4} cm/s to 10^{-6} cm/s. Overall, the lateral (along strike) variation in the permeability of each Knox formation is not expected to be great. However, it is likely that the permeability of individual Knox Group formations would be variable at the proposed site and at the alternative sites, due to differential enlargement of fractures by solutional processes.

The use of groundwater for industrial and drinking water supplies in the Oak Ridge area is limited. Most water is supplied from surface water sources (Boyle et al., 1982). However, in rural areas not served by public water supply systems, single-family wells are commonly used. Private water supply wells near the proposed areas are located south of the Clinch River, and there are no known public or private water supply wells located along the groundwater pathway between the proposed site or the alternative sites and the Clinch River. It is not expected (see above) that groundwate flowing from the site would flow beneath the river.

3.2.2 Surface Water and Wetland Assessment

Several bodies of water exist within the ECR site, including two small ponds and one small unnamed stream. One pond (ca. 0.15 acre), located near the north-central boundary of the site (Fig. 1), is a small man-made farm pond, probably constructed years ago when cattle were maintained on the area. The second pond (ca. 0.05 acres), located near the northeastern boundary site (Fig. 1), is in an apparently natural topographic depression. These ponds support common wetland vegetation, such as willow, cattails, and rushes, around their periphery and may be considered freshwater wetlands (see also Section 3.4). The stream originates as seepage from the embankment of the man-made pond, continuing south along the road through the middle of the site for about 0.62 km before exiting the proposed site boundary. The seepage then flows as surface runoff an additional 1.4 km (0.85 mi) before draining into a small, unnamed stream which flows into Melton Hill Reservoir, which is located south of Bethel Valley Road on Figure 1. Melton Hill Reservoir provides water for power production, navigation, recreation, and residential/industrial use; however, there are no major withdrawals for potable water use from the reservoir below the drainage from the proposed site (Boyle et al. 1982). Within the proposed site, the stream is clearly intermittent (J. W. Webb, Environmental Sciences Division, ORNL, personal observations, April 1991), with flow reportedly occurring primarily during the winter and spring after rainfall (H. L. Boston, Environmental Sciences Division, ORNL, October 13, 1989). During a reconnaissance of the site, flow was observed in the lower reaches of the stream for approximately 0.4 km (0.2 mi) downstream of the southern boundary before going underground (J. G. Smith and J. W. Webb, Environmental Sciences Division, ORNL, personal observations, October 1989). The TDEC concurred with this interpretation of the stream during a site visit (R. Doug McCoy, TDEC, April 1991). Moreover, the TDEC does not consider that either "Water of the State" (i.e. perennial streams) or jurisdictional "wetlands" exist within the boundaries of the site as defined in the Tennessee Water Quality Control Act.

As discussed in sections 3.4.1 and 4.1.4.1, the two small freshwater ponds on the ECR site may qualify as wetlands; their present function is habitat for wildlife (waterfowl, deer, and mammalian carnivores). The proposed action includes creation of a small pond (approximately 0.5 acre) to replace the functional value of these two small wetland areas which would be destroyed by construction of the landfill.

Water quality data were not available for either the ponds or the stream on the ECR site. However, during the reconnaissance on October 12, 1989, dense algal blooms were observed on the surface of the man-made pond, suggesting that runoff from sludge farming operations on the site is probably enriching the pond and possibly the stream. Furthermore, concentrations of some metals are also known to be elevated somewhat in the soils on the site from the sludge farm (Boston, 1989), suggesting the possibility that concentrations of some metals may also be elevated in surface waters on the site.

Water from the leachate treatment facility will travel by process drain to the Y-12 Plant area, where it will be discharged under permit to the EFPC (Fig. 1). This creek originates within the boundaries of the Y-12 Plant, receiving numerous effluent discharges from the site in its upper 1.5 km (Loar, 1988). Mean annual discharge of EFPC near the Y-12 site boundary and below the proposed discharge point is approximately 388 L/s (6150 gal/min), of which about 85 percent is from Y-12 site effluent discharges. At the proposed point of discharge for treated leachate, current flows may be on the order of half this value (J.M. Loar, ORNL, personal communication with J.W. Webb, ORNL, June 5, 1991). Discharges from the Y-12 Plant to the upper reaches of EFPC in the vicinity of the proposed treated leachate discharge include the Central Pollution Control Facility/Plating Rinsewater Treatment Facility, Steam Plant Wastewater Treatment Facility, and other miscellaneous sources (cooling water, storm drains, etc.) (Kasten, 1986). Monitored contaminants in the EFPC include but are not limited to alkalinity, calcium, chloride, copper, fluoride, lithium, magnesium, mercury, molybdenum, nitrate, phosphorus, potassium, sodium, sulfate, total dissolved and suspended solids, and zinc (Loar 1991). Ambient toxicity tests with fathead minnows have shown that, although several contaminants are above background levels, only chlorine exists in toxic concentration in the upper reaches of EFPC. Although there are occasional toxic excursions (e.g., nitrates, nickel) leading to fish kills, there is no chronic toxicity from heavy metals or organics (J.M. Loar, ORNL, personal communication with J.W. Webb, ORNL, May 31, 1991).

3.3 METEOROLOGY AND AIR QUALITY

The Oak Ridge area has a temperate, continental climate. Summers are warm and humid, while winters are typically cool. Spring and fall are transitional seasons, normally warm and sunny. Severe weather, such as tornadoes or high winds, severe thunderstorms with damaging lightning or precipitation, extreme temperatures, and heavy precipitation, is rare. The Oak Ridge area has one of the country's lowest average wind speeds. Prevailing wind directions are up-valley (from the southwest) and down-valley (from the northeast). Wind data (1988) from the 10-m level are routinely collected at the east meteorological tower at the Y-12 Plant. The atmosphere is commonly quite stable in the area. Annual average precipitation is about 140 cm (55 in) but is quite variable, ranging from roughly 89 cm (35 in) to 190 cm (75 in) during the period 1948 through 1979. Humidity values tend to be high throughout the year, due in a large part to the numerous regional sources of moisture, coupled with the limited ventilation of the area.

The Oak Ridge area is an attainment area with respect to National Ambient Air Quality Standards (NAAQS) for all criteria pollutants (sulfur dioxide, particulate matter, nitrogen dioxide, carbon monoxide, ozone, and lead) (Mark Mitkes, EBASCO Services, Inc., Oak Ridge, personal communication to R. Redus, Tennessee Division of Air Pollution Control, July 14, 1989).

3.4 ECOLOGICAL RESOURCES

3.4.1 Terrestrial Ecology

Candidate disposal areas within the ECR site consist of pasture and pine plantation, with second-growth hardwood communities (primarily White Oak, Northern Red Oak, Hickory, Hickory Yellow Poplar, Northern Red Oak) common to the region along the edge of the area to be disturbed. As a result, terrestrial animals present on the site are also likely to be common and widespread on the ORR and in the region. Although several unusual or sensitive communities and plant species are present along the East Chestnut Ridge area, none occurs in the candidate waste disposal areas (Cunningham et al., as described in Appendix O of ORNL [1988]). Further details on the terrestrial ecology of the area appear in ORNL (1988).

The two ponds present on the site (Section 3.2.2) support some common emergent aquatic vegetation and provide habitat for common waterfowl. No rare or sensitive plant species are present. Evidence of deer and common mammalian predators such as coyote, raccoon, or fox can be found around the man-made pond. The north-central pond was created several years ago when construction of a road blocked existing drainage. Currently, this pond is adversely affected by runoff from sludge farming. The northeastern pond is formed in a topographic depression, possibly an ancient, collapsed karst feature (no longer extant). There is no indication that either pond has any connection to groundwater. Given the thick overburden above bedrock (up to 100 feet), such a connection is extremely unlikely. The northeastern pond appears to contain water only seasonally. The character of both ponds is of small farm ponds in a disturbed area, similar to those found elsewhere on the ORR. A wetland survey of the ponds conducted in April and May 1991 (Appendix 2) supported these observations and conclusions.

3.4.2 Aquatic Ecology

There are no reported studies published on the aquatic biota of the ponds or the stream on the ECR site. Intermittent streams such as that on the site are typically colonized by numerous invertebrate taxa that are adapted to living in periodically dry conditions (Williams, 1987). Several streams are currently being monitored on the ORR that typically become dry during the summer and fall, but that have well-developed invertebrate communities during extended wet periods (Smith, 1988a and 1988b). During site visits in October 1989 and April 1991, several invertebrates (e.g., mayflies and several species of caddisflies) were found in the seepage zone below the man-made pond and inhabiting small cobbles in the stream just south of the proposed boundary of the ECR site (personal observations, October 1989 and May 1991), thus suggesting that, during extended periods of flow, invertebrates are able to colonize this stream in at least its midreaches. Because the stream is intermittent, fish, if they occur, are most likely to be present in the stream only during extended periods of flow (i.e., winter and spring).

3.4.3 Endangered and Threatened Species

No plants or terrestrial mammals listed as endangered or threatened by the U.S. Fish and Wildlife Service are known to occur on the ECR site. The site consists of habitat that might be used for foraging by the Cooper's hawk, a species listed by the state as threatened. This species is believed to be scarce on the ORR (i.e., perhaps 6 pairs on the entire ORR, or one pair per 6 to 8 square miles) and has not been seen on the site (R. L. Kroodsma, Environmental Sciences Division, ORNL, personal communication to J. W. Webb, ORNL, August 1989). It is unlikely that the species nests on the site, but it may occasionally forage there. Similarly, the site provides potential foraging and, possibly, nesting habitat for species listed by the state as in need of management, the black vulture and the red-shouldered hawk.

No threatened or endangered fish or invertebrates listed by either the state of Tennessee or the U.S. Fish and Wildlife Service have been found or are known to occur on the ORR. One species of fish, the Tennessee Dace (Phoxinus tennesseensis), listed by the State of Tennessee as a species in need of management, occurs in several streams on the ORR, but there is no record of its occurrence in either of the streams on the proposed site and it has not been found in any stream draining the south side of Chestnut Ridge that has been recently sampled (M. G. Ryon, Environmental Sciences Division, ORNL, August 1989). Two fish species listed by the state might be present in Melton Hill Reservoir (P. W. Shute, TVA, personal communication with J. G. Smith, ORNL, January 24, 1992). The blue sucker (Carpiodes velifer) is listed as threatened in Tennessee and is a Candidate 2 (inconclusive data) species for listing by the U.S. Fish and Wildlife Service. The highfin carpsucker (Carpiodes sp.) is listed in Tennessee as in need of management. Both species were collected in Melton Hill Reservoir as late as the mid-1960s, shortly after the dam was completed (Fitz 1968). However, because both species prefer free-flowing water conditions in medium to large rivers and are intolerant of siltation (Pflieger 1975, Etnier 1987), it is unlikely that they occur in reservoir embayments such as that to which the landfill site eventually drains, if indeed they still exist in the reservoir. No other state or federally listed species occur in Melton Hill Reservoir.

3.5 LAND USE, DEMOGRAPHY, AND CULTURAL RESOURCES

Both proposed areas (Fig. 1) are part of the DOE-ORR. Although the areas are currently unoccupied, evidence of human habitation occurring before federal ownership (e.g., cabins, road traces) is found throughout the reservation, including in the vicinity of the proposed site. Prehistoric sites have also been found on the reservation. Fielder (1974) did not designate any archaeological sites in any of the proposed areas, and the Deputy State Historic Preservation Officer, Tennessee Historical Commission, has expressed no objection to activities on the site (Appendix 1).

A portion of the ECR has been used in the past for application of sewage sludge. Approximately 15 dry tons of anaerobically digested sewage sludge from the city of Oak Ridge was applied to a 23-acre pine plantation on the western part of the site. Plans for continued research at the site include the monitoring (over the next 10 to 20 years) of tree growth, soil nutrient dynamics, and the fate of sludge constituents, including low concentrations of radionuclides that were contained in the sludge at the time of application.

4. ENVIRONMENTAL CONSEQUENCES

4.1 IMPACTS OF THE PROPOSED ACTION

4.1.1 Geology and Soils

Soil disturbance required for the construction of the wet ash handling facility will be minor in extent and involve previously disturbed areas; no hazardous or radioactive materials will be involved. Hence, impacts are expected to be negligible.

One of the most important geological criteria for development of an industrial landfill is the presence of a thick soil or residuum layer above the bedrock surface at the proposed site. On Chestnut Ridge at both the ECR and WCR sites, detailed site characterization studies have shown that the residuum layer on the southward-facing slope of the ridge decreases substantially near the contact between the Knox Group and the Chickamauga Group, which is located close to the base of the ridge. Based on comparisons with the soil studies at ECR and WCR, the soils of the ECR site typically exceed 60 ft in thickness and, thus, are more than adequate for the development of a sanitary landfill (see Section 3.1.1 for details).

No landfilling is proposed in the vicinity of the single karst feature with surface expression (sinkhole) located in the northeast portion of the Tennessee Class IV site, near coordinates N 27,000; E 61,000 (Section 3.1.1). Thus, this feature does not pose a threat to the integrity or stability of the landfill liner. Also, the risk of damage to earthmoving equipment (operating on the soil stockpile) due to catastrophic subsidence over subsurface solution cavities (Section 3.1.1) is negligible. This is primarily because (1) the great thickness of overburden soils (over 70 feet in this area) will bridge across any subsurface voids present; (2) no subsurface voids were found in the soil in adjacent borings; and (3) a soil stockpiling operation would naturally decrease the potential for subsidence by directing surface water runoff away from this feature, thus reducing the potential for further washing away of soils by infiltrating surface water (W. T. Shefchik, Senior Geologist, Burns & McDonnell Engineers, Architects, & Consultants, personal communication with J. Warren Webb, ORNL, March 11, 1991).

Since development of the industrial landfill will include removal of vegetation and the disturbance of the soil column at the site, it is probable that development and use of the ECR site would adversely impact ongoing research on the environmental effects of sewage sludge land-farming, which began at the site in 1988. However, most research activities on the site have been terminated as of spring 1991 (H. L. Boston, ORNL, personal communication with J. W. Webb, ORNL, April 26, 1991).

4.1.2 Hydrology and Water Quality

4.1.2.1 Groundwater

Although the design of the Tennessee Class II landfill includes lined cells and a leachate collection system, it is possible that, over the approximate 25-year life of the project or sometime thereafter, the liners will develop minor leaks. Such leaks might ultimately result in minor, nonhazardous, nonradioactive contamination of groundwater to some slight degree. However, concentrations of contaminants in the leachate are expected to be quite low (Tables 1 and 2). Considering the low volume of any leaking, the low contamination levels, thick residuum, and dilution by groundwater, it is not anticipated that groundwater contamination would pose a threat to human health or biota. No public or private water supply wells are located between the proposed site or the alternative sites and the Clinch River. The closest water supply wells near the proposed landfill areas are located south of the Clinch River, and it is not expected that groundwater leaving the site would flow beneath the river and impact the wells (Section 3.2.1).

4.1.2.2 Surface Water

Construction and operation of the ash-dewatering facility on the Y-12 Plant site would have negligible impacts on water quality. Blowdown from the ash dewatering system would be managed at the Y-12 Steam Plant Wastewater Treatment Facility and discharged under existing permits. The amount of water involved (approximately 4500 gallons per day) will be insignificant in relation to the approximately 400,000 gallons per day currently treated, and the capacity of the facility is adequate to process this additional waste stream. Water quality characteristics of the blowdown are expected to be relatively good even before incorporation into and dilution by the treatment stream (Section 2.1.1).

With the exception of chlorine (see below), toxicity events in EFPC are episodic and related to identifiable conditions and releases within the Y-12 Plant. Concentrations of heavy metals and other contaminants in untreated leachate are expected to be quite low (Tables 1 and 2) and to be further reduced by treatment. Discharge to the EFPC of treated leachate at an average rate of 1.7 L/s (25 gal/min) represents less than 1 percent of the estimated flow of 194 L/s (3075 gal/min) at the proposed point of discharge (Section 3.2.2). Thus, any residual contaminant concentrations (e.g., heavy metals) remaining in leachate after treatment would be diluted at least by a factor of 100, and would have an insignificant effect, if any, on total concentrations of contaminants in the stream. The effect on water quality and, hence, aquatic biota, will be inconsequential. Moreover, total residual chlorine (as opposed to chloride ion), the major contaminant of concern in EFPC (Section 3.2.2), is a constituent only of water treated (purified) for human health protection. It is not present in rainwater and would not be found in untreated or treated leachate. Thus, the addition of treated leachate to EFPC would not affect current chronic toxicity problems from chlorine in the upper reaches of the stream.

The two wetlands/ponds located on the site will be destroyed in the course of landfill construction and operation. The U.S. Army Corps of Engineers reports that filling such wetlands, under 1 acre, would be covered by a Nationwide permit under Section 404 of the Clean Water Act (Dredging and Filling Regulations), which will be obtained (Kathy Eliot, COE, personal communication with M.E. Wiest, Y-12 Plant, March 2, 1991). The TDEC does not object to the plan to fill the wetlands (R. Doug McCoy, TDEC, site visit and personal communication with J.W.Webb, ORNL, April 26, 1991, Appendix 1). The EPA, Region IV, has also indicated they have no concern with this activity due to the small size of the area to be impacted (Tom Wilburn, EPA-IV, personal communication with J.L. Sager, DOE, June 28, 1991). In order to prevent a net loss of wetland habitat, DOE will construct a similar pond northwest of the site. The size of the new pond will be approximately 2 times the size of the existing wetlands on site, and will not accept runoff from any portion of the landfill site (Fig. 3). The pond will only accept off-site runoff. Calculations involving anticipated runoff from the drainage area (about 9 acres) and evaporation from the new pond indicate that the runoff from the drainage basin is well more than adequate to support this pond. Pursuant to the requirements of Executive Order 11990 (Protection of Wetlands) and the associated DOE regulations (10 CFR 1022) for a wetlands assessment, the replacement of the ponds by an offsite pond is considered to result in no net loss of wetlands or wetland functional values (see also Sections 3.4.1 and 4.1.4). There are no floodplains involved in the proposed action because the stream course draining the site will be isolated from the landfill by a 200-foot buffer as required by regulation. The incised channel of the stream and steep topography insure that no flooding of this stream will reach the landfill site (J. W. Webb, personal observations, April 1991).

Some minor sedimentation in the stream draining the ECR site is likely, particularly during the construction phase. The grading and paving/regraveling of the existing road will contribute to construction-related sedimentation, but is not expected to be serious. The TDEC does not object to the intent to fill the seepage area below the man-made pond and small storm channel along the east side of the road on the site (R. Doug McCoy, TDEC, site visit and personal communication with J.W.Webb, ORNL, April 26, 1991). As a result of filling the existing pond, seepage and surface runoff from the existing pond will be eliminated. Construction and operation of the landfill will include run-on, runoff, and erosion controls (e.g., diversion dikes and berms, diversion channels and a sediment basin and filter fabric fences along active areas) to replace the existing stream (i.e., storm run-off channel) on the site. Input of sediment into the stream below the site should occur primarily during rain (a negligible amount of dust from the road will be deposited in the stream). Transport of the sediment within the stream would occur primarily during the winter and spring months (when streamflow exists) and during storm events. However, the extent of impact from sedimentation will depend upon the final location of the cells, the effectiveness of silt controls, and the amount of buffer zone left around the stream. In any case, sedimentation may cause low to moderate impacts to the stream, primarily expressed by changes to biotic communities. However, healthy aquatic communities persist in the stream below the existing landfill despite obvious sedimentation, so such impacts are expected to be insignificant.

In addition to sedimentation, low concentrations of contaminants (e.g., metals and nutrients) may also enter the stream from surface water runoff and/or contaminated groundwater occurring not only from landfill operations but also from mobilization of contaminants that currently exist from operation of the sludge land-farm. Any mobilization of contaminants from sludge would be a continuation of an existing impact and is not expected to be significant. Metals would not enter the stream from surface runoff during landfill operation because the landfill will be covered and run-off would be controlled. Contaminated groundwater would enter the stream, and, ultimately, Melton Hill Reservoir only if the leachate collection system failed. Expected contamination in untreated leachate are quite low (Tables 1 & 2). Even in the highly unlikely event that all contaminated leachate entered groundwater and discharged to the stream, contaminant concentrations would be low especially following dilution. Following further massive dilution after discharge to Melton Hill Reservoir, increases in contaminant concentrations would probably be undetectable. Moreover, there are no potable water withdrawals from the reservoir below the discharge of the stream. Thus, impacts on water quality in Melton Hill Reservoir are expected to be insignificant. Consultation with the Tennessee Valley Authority indicates that, if the landfill is constructed and operated in accordance with the state solid waste regulations and other applicable regulations, the anticipated impacts on regional water quality would be minimal. Similarly, the proposed landfill would not be expected to cause or contribute to violations of applicable State water quality standards or toxic effluent standards.

Figure 3. Location of the proposed new pond in relation to one of the existing wetlands on the landfill site.

4.1.3 Meteorology and Air Quality

The impacts of the proposed action on air quality are expected to be similar to those for the existing landfill in most respects. These impacts would be due primarily to minor, localized fugitive emissions associated with occasional earthmoving operations, travel on the unpaved access road, and minor amounts of carbon monoxide, nitrogen oxides, sulfur dioxide, hydrocarbons, and particulate matter from the engine exhaust of earthmoving and other equipment. Although gas migration is not a particular concern, due to the remoteness of the site, some gas production is expected (Section 2.1.3). DOE will install a passive collection system around the perimeter of the Tennessee Class II landfill with the capability for conversion to an active system if necessary at a later time. The gas will be collected in a layer of sand (or geonet) between the waste and the sidewall compacted soil liner. This gas collection layer is connected to the leachate collection layer. Therefore, gas from completely under the landfill can be pulled by vacuum into the gas recovery system. A horizontal perforated pipe located in the sand layer will collect the gas and convey it to the ground surface using connecting vertical pipes located at approximately 200-foot intervals around the landfill perimeter. Passive venting of the gas from the vertical pipes will occur. At any time after the landfill has reached the existing ground level, a header pipe can be connected to the vertical pipes and a vacuum blower used to create a vacuum at the gas collection system. The gas extracted by the blower would be burned in a gas flare.

Some fugitive dust will be generated at ECR from the disposal of fly ash and dewatered bottom ash. Such dust could change the chemistry of area precipitation and dry deposition, which are being monitored at sites in the WBW as part of ongoing research programs. CSL II currently receives bottom and fly ash only from the ORNL Steam Plant. The existing landfill began to accept fly ash from the Y-12 Steam Plant in May 1990. Bottom ash from the Y-12 Plant will continue to be discharged in a slurry form to Rogers Quarry until completion of the proposed wet ash handling system, at which time the dewatered bottom ash would be emplaced in the ECR landfill. Under the proposed action, about 17,000 tons per year of bottom and fly ash from the Y-12 Plant and ORNL Steam Plants would be disposed of on the ECR site. The ORNL ash is mostly bottom ash, which is much coarser than fly ash, while the Y-12 Plant ash is mostly (ca. 80%) fly ash, which is made up of relatively fine particles. The Y-12 Plant ash (bottom and fly) amounts to approximately 12,000 tons/year, while the ORNL total is roughly 5,000 tons/year.

Fugitive dust emissions associated with ash disposal at the proposed landfill ECR site were estimated and compared with emissions from the Y-12 Plant Steam Plant. The emission estimates for unloading fly ash from trucks into the landfill cells were made using EPA-recommended procedures for modeling fugitive dust sources as described in the EPA (1985). It was assumed for these calculations that 17,000 tons/year of ash with a moisture content of 18 percent and a silt (particles under 74 μm in diameter) content of 64 percent would be emplaced at the landfill. The value used for silt content is conservative, since it is based on an analysis of Y-12 Plant fly ash, which is much finer than the bottom ash from either ORNL or the Y-12 Plant. For the disposal operations, a drop height of 5 ft and an average wind speed of 8 mph were assumed. Based on these assumptions, total fugitive dust emissions from ash disposal were calculated to be only 4 lb/year. This amount is minuscule compared with the measured particulate matter emissions of 15 lb/hr for the Y-12 Plant steam plant stacks. This rate is based on performance tests of the Y-12 Plant Steam Plant baghouses that were completed in 1985. The tests were conducted with the Steam Plant burning coal and operating at near-capacity (M. A.

Kane, Production Support Maintenance & Utilities Division, Y-12 Plant, personal communication to Ed Liebsch, Energy Division, ORNL, August 18, 1989).

An application for a fugitive emissions permit for the Y-12 Plant has been submitted to the TDEC. The permit application includes ash handling and landfilling activities. These activities will be conducted in accordance with the state fugitive emissions regulations and any future permit conditions. Best management practices will be employed, as necessary, to minimize impacts of fugitive dust on areas surrounding the landfill.

4.1.4 Ecology

4.1.4.1 Terrestrial Ecology

Impacts to terrestrial ecology would be minor. The proposed site is characterized by pasture, pine plantations and a small area of second-growth hardwood forests common in the region. As far as is known from site surveys and inspections, sensitive plant species would not be disturbed. Building the project could entail loss of a small area of foraging habitat for the red-shouldered hawk and Cooper's hawk. The Tennessee Wildlife Resources Agency does not object to this possible impact (Appendix 1).

The present function of the two small freshwater ponds on the ECR site is habitat for wildlife (waterfowl, deer, and mammalian carnivores). Although these areas will be filled, their functional value will be retained by construction of a replacement pond off site (see Sect. 4.1.2.2).

4.1.4.2 Aquatic Ecology

Construction of the landfill will entail loss of an intermittent stream (i.e., presumed seepage zone and storm run-off channel) present on the site. This loss is considered to be minor because of the intermittent nature of the stream. The drainage function of the stream would be replaced by constructed diversion channels and run-on/runoff controls. Sedimentation associated with construction and operation of the landfill on the ECR site, including the upgrade and use of the road, is expected to be the main impact on the biotic communities in the stream draining this site. Measures taken to reduce impact to surface waters (see Sect. 4.1.2.2) would also reduce impact to aquatic biota. Additional impacts to the biota could also occur from contaminants within the landfill and from mobilization of contaminants existing from current operations of the sludge landfarm. However, concentrations of contaminants are expected to be quite low (Tables 1 and 2). Off-site impacts to aquatic biota in the stream and in Melton Hill Reservoir are expected to be insignificant. Moderate impacts might occur in the stream just downstream of the southern boundary of the site, particularly during road construction.

4.1.4.3 Endangered and Threatened Species

No endangered or threatened fish or invertebrates listed by the state or federal government are known or thought to occur in or use the stream on the ECR site nor are any listed terrestrial invertebrates known to occur on the site. Thus, no impacts to these species are anticipated. The U.S. Fish and Wildlife Service (FWS) has no concerns regarding federally listed species (FWS 1990, Appendix 1). No federally listed fish or invertebrates are known to occur in Melton Hill Reservoir. It is improbable that state-listed fish species that might occur in the reservoir (Section 3.4.3) would encounter harmful concentrations of any contaminants from the facility in the unlikely event that any such contaminants entered Melton Hill Reservoir.

Tennessee state law forbids the intentional destruction of habitat for state-listed endangered or threatened species without a permit. Although the threatened Cooper's hawk could forage on the site (nesting is very unlikely), there is no evidence that it occurs on the site; thus no impacts to this species are expected. The Tennessee Wildlife Resources Agency does not object to the project (Appendix 1).

4.1.5 Land Use, Demography, and Cultural Resources

Because the site is unoccupied and is part of the DOE-ORR, no impacts to demography would occur. The use of a temporary construction force of 60 people and an operations force of 16 people will have minor effects in the context of the Y-12 operations force of 7,100. The Tennessee Historical Commission has no objection to the proposed use of the site (Appendix 1). No significant archeological or historical sites or artifacts are known to occur. Currently, the only alternative use of the areas that would conflict directly or indirectly with the proposed action is the ongoing research on the environmental effects of sewage sludge land-farming, which began at the site in 1988. It is probable that development and use of the ECR site as a landfill would eventually adversely impact this research. These impacts will be minimized by beginning development of the landfill in the eastern part of the ECR site and by developing the landfill cells incrementally over time.

4.1.6 Personnel Health and Safety

Because the landfill will not accept radioactive, hazardous, or mixed waste, few if any health hazards exist for operators. Waste arriving at the landfill will be monitored for radioactivity and rejected (returned to point of origin) if regulatory limits are approached. Operation of the expanded landfill will be conducted in the same manner as the existing operation, employing the same safety practices and facilities.

4.2 CUMULATIVE IMPACTS

Constructing and operating the new landfill areas would commit an additional approximately 20 ha (50 acres) to waste disposal, removing it from other uses. This would be in addition to the approximately 6.8 ha (17 acres) already in use or planned for CSL II and CDL VI. Approximately 20 ha (50 acres) of wildlife habitat, of a type common in the region, would be lost. Although two small ponds would be filled, no net loss of wetland habitat would occur because a replacement pond would be constructed offsite (Fig. 3). Measurable incremental additions of silt would enter streams near the site, which are of a type common in the region during the operational period, causing additional small impacts to fresh water biota. Sediment and erosion control practices during construction and operation will conform to applicable federal, state, or local erosion protection standards, as required. The activities will not impact any 100-year floodplain as regulated in 10 CFR 1022 (Section 4.1.2). A small increase in fugitive dust would occur, particularly during construction but continuing throughout operation.

Discharge of treated blowdown water and leachate to EFPC could cause extremely small incremental increases of contaminants in the stream over those currently measured. However, the increases would probably be undetectable and are not expected to alter existing impacts to biota or water quality. Thus, no significant cumulative degradation of EFPC is expected from the proposed action.

As discussed in section 2.3, there are uncertainties regarding the proposed SIWTF. The location and size of the facility has not been determined, but it would most likely be located near existing plant facilities north of Chestnut Ridge and would not be located in the same watershed as the proposed landfills. The environmental impacts of the SIWTF would be separately evaluated as part of the project planning if a decision is made to pursue the project.

Different surface water streams receive runoff and/or discharge (including leachate) from CSL II, CDL VI (planned), and proposed facilities (the landfills addressed in this EA and the SIWTF). Thus, impacts on surface water would be cumulative only in the sense that some contaminants from all facilities could eventually disperse to the Clinch River. The increment of water-borne contaminants to the Clinch River from all these facilities is expected to be negligible and undetectable. Similarly, any input of contaminants from the various facilities to groundwater would not be expected to mix appreciably with one another, due to the spatial separation of the facilities and the generalized flow of groundwater toward the Clinch River. Incremental contamination of groundwater is expected to be negligible on a regional or area-wide scale.

Because of the proposed location and the types of waste to be disposed in the proposed landfills, construction and operation will have no impact on existing environmental problems on the Oak Ridge Reservation, such as those resulting from radiological and mercury contamination.

4.3 POSSIBLE LONG-TERM IMPACTS

The land involved has been restricted from public use since the 1940s. It is expected to remain a federally owned and controlled entity for much longer than 30 years following closure of the landfill. Intrusion into the site would be unlikely due to the institutional controls. Nonetheless, state regulations require annotation of the deed, for perpetuity, that the land has been used as a landfill. Thus, in the unlikely event that institutional controls failed, the condition and history of the area would still be publicly available.

The waste to be emplaced in the landfills is neither toxic nor hazardous. As described in Section 2.1, the landfills would accept only nonhazardous, nonradioactive wastes. Based on current waste generated and disposed in CSL II, the wastes placed in the Tennessee Class II landfill would be comprised mainly of paper waste and office trash. Placement of any special waste (e.g. fly ash, asbestos, etc.) would be in controlled in accordance with the TDEC solid waste operating permit for the landfill. Waste emplaced in the Tennessee Class IV landfill would be comprised of nondegradable construction debris and rubble. Because the waste to be emplaced is neither toxic nor hazardous, intrusion into the site would not constitute a serious public health problem.

If the landfill were completely excavated at some time in the future, the liner and leachate collection system could be destroyed, and there would be an increased potential for undesirable contaminants (e.g., heavy metals) to disperse in the environment. Any such dispersion could cause local degradation of surface or ground water. However, based on the expected characteristics of the leachate provided in Section 2.1.3, any dispersion would not be expected to create a serious threat to the environment.

4.4 IMPACTS OF NO ACTION

Under the no-action alternative, there would be no additional impacts to groundwater, geology, or soils. Similarly, there would be no change from the present air quality and meteorological characteristics in the vicinity of the proposed landfill. Use of CSL II for the remainder of its life would result in no additional impacts to nearby surface waters, aquatic or terrestrial biota (including endangered and threatened species), or land use.

5. PERMITS AND REGULATORY REQUIREMENTS

The following existing or new permits will be required to complete the action:

- The landfills would be operated under solid waste disposal permits from the TDEC;
- Fugitive emissions would be covered by the Y-12 Plant fugitive emissions permit;
- Discharge from the sedimentation pond would take place under a state NPDES permit;
- Leachate would be collected, treated, and discharged in accordance with a state NPDES permit;
- Sediment and erosion control practices during construction and operation would conform to applicable federal, state or local erosion protection standards;
- Water from periodic blowdown and cleaning would be recycled to the existing Y-12 Steam Plant Wastewater Treatment Plant and disposed of under existing permits; and
- Executive Order 11990 (Protection of Wetlands), the associated DOE regulations (10 CFR 1022), and Section 404 of the Clean Water Act (Dredging and Filling Regulations) will be satisfied before any action is taken in a wetland.

Appendix 1 contains letters from the U. S. Fish and Wildlife Service, Tennessee Wildlife Resources Agency, and the Tennessee Historical Commission regarding requirements under the Endangered Species Act and the National Historic Preservation Act, respectively. Appendix 2 contains the results of a wetlands survey which supports the wetlands assessment performed and documented in this Environmental Assessment pursuant to 10 CFR 1022. A Notice of Wetlands Involvement was printed in the Federal Register on December 27, 1991 (Vol. 56, No. 249, p. 67069).

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7. LIST OF PREPARERS

This environmental assessment was prepared for the Y-12 Plant under the Integrated Analysis and Assessment Section, Energy Division, Oak Ridge National Laboratory (operated by Martin Marietta Energy Systems, Inc., for the U.S. Department of Energy). The following members of the ORNL technical staff contributed to its preparation:

R.B. McLean; Ph.D., Marine Biology; Program Manager
J. Warren Webb; Ph.D., Insect Ecology; EA Project Leader

D. G. Jernigan; M.S., Geology
E. J. Liebsch; M.S., Meteorology
J. G. Smith; M.S., Aquatic Ecology
W. P. Staub; Ph.D., Geology/Soils Engineering

APPENDIX 1.
AGENCY LETTERS

M E M O R A N D U M

To : Mr. Jack Crabtree, TDSWM

From: R. Doug McCoy, RDM TDOE-O and Jonathan Burr, JEB TDWPC

Date: January 22, 1992

Subject: Proposed U.S.D.O.E. East Chestnut Ridge Ash Disposal and Industrial Landfill, "Waters of the State" and/or "Wetlands" Determination

On April 30, 1991, Doug McCoy, then with the Tennessee Division of Water Pollution Control (TWPC), met with U.S.D.O.E. and Martin Marietta Energy Systems, Inc. personnel on the site of their proposed Steam Plant Ash Disposal and Industrial Landfill. The purpose of this visit and a follow-up visit on September 27, 1991, with Mr. Jonathan Burr of TWPC in attendance, was to determine the jurisdictional status of waters within the proposed fill boundary according to the Tennessee Water Quality Control Act (Act).

Observation of surface drainage channels through the proposed site and of two separate small ponds within the headwater drainage determined that neither "Waters of the State" nor "Wetlands" as defined within the 'Act' exist within the proposed site boundary. The two small watershed ponds were observed to be essentially dry on the September visit with no sign of surface or subsurface recharge or discharge. Based on these observations the ponds and drainage channels were determined to be wet-weather impoundments and wet-weather drainages respectively.

Perennial stream flows do exist within the observed drainways at an elevation below the proposed landfill boundaries and should be protected as such. The lower elevation stream flows may be affected by improvements to the existing access road. D.O.E., MMES, and their consulting engineers have been informed that any such alterations of the lower elevation perennial and\or intermittent flows will require permitting under the Aquatic Resource Alteration Permit procedures.

Recently it was brought to the attention of the Tennessee Department of Environment and Conservation (TDEC) that the D.O.E. has provided notification within the Federal Register (Friday, December 27, 1991), in respect to NEPA requirements, of their intent to fill the two small ponds. The D.O.E. refers to the ponds as 'wetlands' and proposes to mitigate their loss by constructing a replacement watershed pond. This activity is both meritorious and desirable, especially from a wildlife habitat enhancement standpoint. The activity is not, however, bound by State requirement in light of the "Waters of the State" determination as stipulated above.

RDM/JEB

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Post Office Box 845
Cookeville, TN 38503

TAKE PRIDE IN AMERICA

May 3, 1990

IN REPLY REFER TO
LOG NUMBER 4-C-90-209

Dr. J. Warren Webb
Environmental Sciences Division
Oak Ridge National Laboratory
P. O. Box 2008
Oak Ridge, Tennessee 37831

Dear Dr. Webb:

We have reviewed the information contained in your letter of April 11, 1990 addressed to Mr. David Flemming of our Atlanta office, concerning proposed actions on the Oak Ridge Reservation involving clearing and disturbance to natural communities.

According to our records there are no federally listed or proposed endangered or threatened species in the three areas indicated on your map. Therefore requirements of Section 7 of the Endangered Species Act are fulfilled. Consultation should be reinitiated if (1) new information reveals impacts not previously considered to listed species, (2) the project is subsequently modified, or (3) new species are listed or critical habitat designated that may be impacted.

We appreciate the opportunity to review and comment.

Sincerely,

Douglas B. Winford
Field Supervisor

JCW/b

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

April 29, 1991

Dr. Warren Webb
Environmental Sciences Division
Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, TN 37831-6036

Dear Dr. Webb:

In response to your letter of March 21, 1991, I concur with your assessment that the proposed new sanitary/industrial landfill on the Oak Ridge Reservation will be unlikely to destroy existing nesting habitat of Coopers hawks, red-shouldered hawks, or black vultures. However, since the Endangered ospreys (nesting) and bald eagles (wintering only to date) are increasing their utilization of the Watts Bar and Melton Hill Reservoirs, there is the potential for impact in the unlikely event that certain contaminants from the landfill reach the lake in significant amounts. It is therefore recommended for their and other species protection, that the substantial expertise and technology of the area be fully utilized for containing such contaminants.

Thank you for the opportunity for comment.

Sincerely,

TENNESSEE WILDLIFE RESOURCES AGENCY

Robert M. Hatcher

Robert M. Hatcher, Coordinator
Nongame/Endangered Species

RMH/cdh/3/misc/ORlnfil.doc

TENNESSEE HISTORICAL COMMISSION
701 BROADWAY
DEPARTMENT OF CONSERVATION
NASHVILLE, TENNESSEE 37243-0442
615/742-6716

August 1, 1990

Mr. Peter J. Gross
Environmental Protection Division
Department of Energy
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831-8739

Re: Five Proposed Waste Disposal and Storage Sites on the Oak Ridge Reservation, Roane and Anderson Counties.

Dear Mr. Gross:

The above-proposed undertaking has been reviewed with regard to National Historic Preservation Act compliance by the participating federal agency or its designated representative. Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (51 FR 31115, September 2, 1986).

Previous archaeological investigations have recorded prehistoric and historic sites in settings similar to that of the five proposed projects. Due to the potential for archaeological resources eligible for the National Register of Historic Places, an archaeological survey of these project areas (excluding East Chestnut Ridge Landfill area) will be necessary. Manual shovel tests, if appropriate, should be conducted in conjunction with the survey to determine if buried cultural deposits are present.

This office rescinds our request (letter of December 12, 1989) for an archaeological survey of the East Chestnut Ridge Landfill project area as previous land use activities have severely disturbed the area. Based upon additional information provided by your office, we determine that the proposed East Chestnut Ridge landfill will have no effect upon properties on or eligible for the National Register of Historic Places.

Enclosed is a list of consulting archaeologists for your information. If you have any questions, please contact Mike

Moore of the Division of Archaeology at (615) 742-6606. Your cooperation in this matter is appreciated.

Sincerely,

Herbert L. Harper
Executive Director and
Deputy State Historic
Preservation Officer

HLH:mm
enc.

APPENDIX 2.
WETLAND SURVEY

June 10, 1991

C.H. Wilkinson, Bldg. 9115, MS-8219, Y-12

RESULTS OF THE Y-12 STEAM PLANT ASH DISPOSAL SURVEY

A rare plant and wetland survey was requested for the proposed Y-12 Steam Ash Disposal Site and was conducted by Larry Pounds on May 24, 1991. This area is characterized by an immature loblolly pine plantation, with an understory of mainly black berries and other "old field" species. This is an unlikely habitat for rare plant species and rare species were not noted.

Three possible wetland areas were indicated by the National Wetlands Inventory Map (NWI) to be on this site (see attached map). Two of the wetland areas, identified by the NWI as L-POWHh-9 and L-POWHh-3, were visited in a Reservation-wide wetlands survey in 1990. L-POWHh-9 was described in the resulting Draft Report of the Wetlands on the Oak Ridge Reservation (April 1991) as a "shallow pond covered with duckweed; emergent herbaceous species along the edge". No rare plants were found. L-POWHh-3 was reported in the same document as having no wetland vegetation.

The third possible wetland site, identified by the NWI as L-POWHh-4, was not covered during the ORR wetland survey. This site was subsequently visited by Larry Pounds on 4-30-91 and again on 5-24-91. A pond was present, which shrank in size between the two visits from a diameter of 20 m to a diameter of about 5 m. Although wetland vegetation was scattered in the margin area of the pond, determining how much would be considered a "jurisdictional" wetland could be quite difficult to estimate. No uncommon plants were noted.

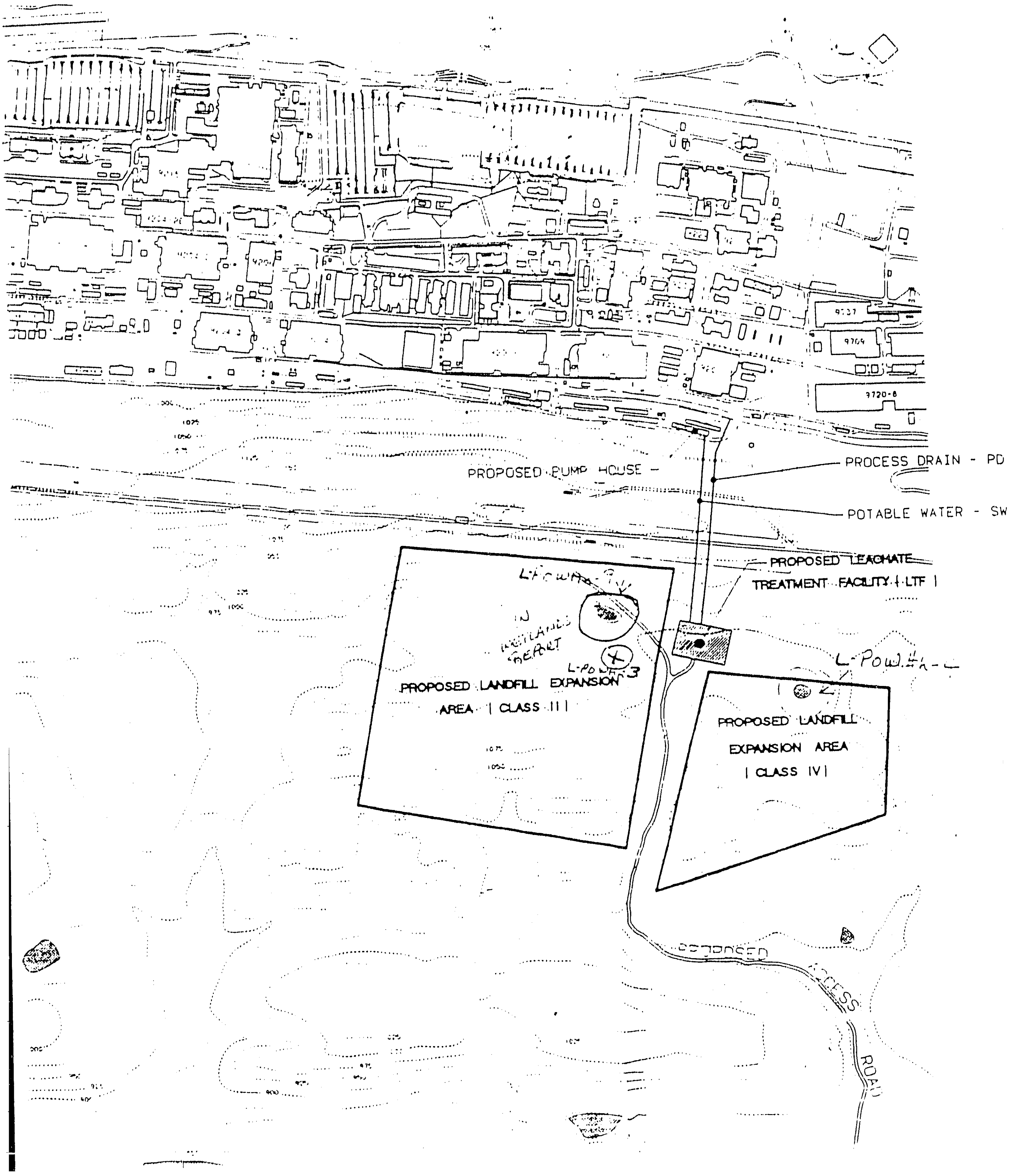
If you have any questions, please feel free to call me.

Carol L. Hardy

Carol L. Hardy, Coordinator, Rare Plant and Wetland Surveys, Environmental Sciences Division, Bldg. 1505, MS-6038, (6-7544)

attachments 1

cc: S. Howard, Bldg. 9983-71, MS-8180, Y-12
D.G. Ailey, Bldg. 9739, MS-8209, Y-12


PROCESS DRAIN - PD
PROPOSED PUMP HOUSE
POTABLE WATER - SW
PROPOSED LEACHATE TREATMENT FACILITY (LTF)
PROPOSED LANDFILL EXPANSION AREA (CLASS II)
PROPOSED LANDFILL EXPANSION AREA (CLASS IV)
PROPOSED ACCESS ROAD
9737
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END

DATE FILMED

6/29/92