United States
Environmental Protection
Agency

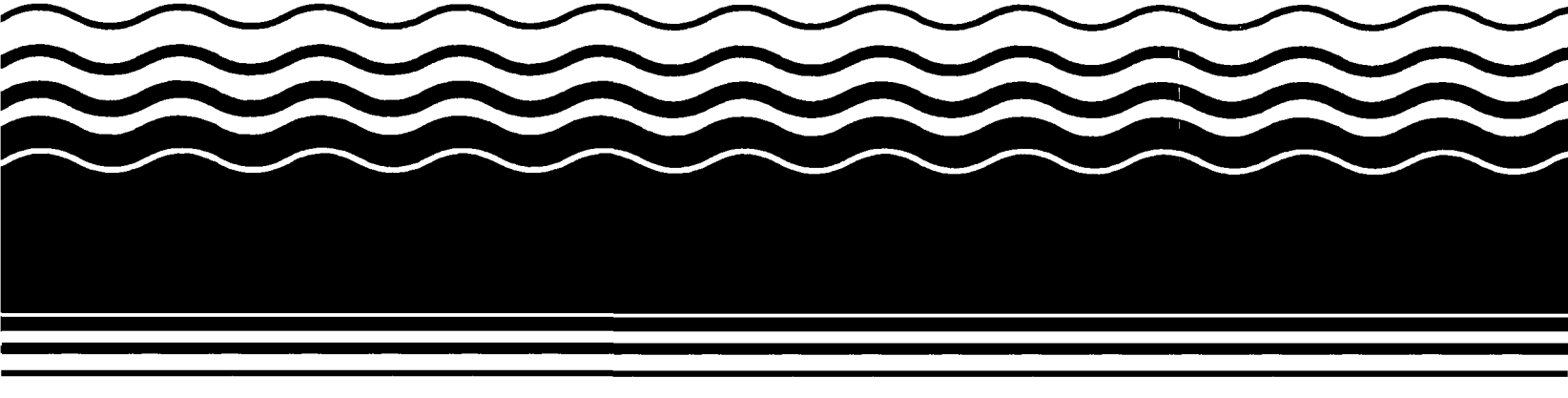
Office of
Emergency and
Remedial Response

EPA/ROD/R04-93/153
September 1993

EPA

Superfund Record of Decision:

Beulah Landfill, FL



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SUPERFUND RECORD OF DECISION
Beulah Landfill, FL
First Remedial Action - Final

5. Report Date
09/16/93

6.

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800/800

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PB94-964046

16. Abstract (Limit: 200 words)

The 102-acre Beulah Landfill site is an inactive landfill located in Pensacola, Escambia County, Florida. Land use in the area is predominantly undeveloped, with some adjacent woodlands. The site is divided into the northern-half and the southern-half by Coffee Creek. The northern half of the site contains a closed, inactive landfill, which accepted solid waste during its operation. Prior to 1965, the southern half was a borrow pit for sand. From 1966 until its closure in 1984, the site operated as a sanitary landfill. In 1968, seepage and wastewater treatment sludge were deposited in a 10-acre area in the southwest corner of the site. In 1976, the first sludge holding pond was filled in with construction and demolition debris and solid waste, and then covered with a minimum of 12 inches of onsite soil. In 1977, the eastern-most 20-acre sludge pit was constructed in a diked area onsite, where approximately 20,000 gallons per day of liquid waste was deposited on previous fill of solid waste. The solid waste absorbed much of the liquid, creating a semi-solid, spongy surface that is still present. The former ponds currently are covered with grass and shrubs, and a soil cover never was placed on the sludge when disposal operations ceased. This ROD addresses a first and final action for all onsite media. Studies conducted as part of the RI, along with the Baseline Risk Assessment and the comparison of exposure

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Beulah Landfill, FL
First Remedial Action - Final
Contaminated Medium: None
Key Contaminants: None

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 92
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

Abstract (Continued)

concentrations to chemical-specific standards, indicate that the site does not pose any risk to human health or the environment; therefore, there are no contaminants of concern affecting this site.

The selected remedial action for this site is no action, with ground water monitoring. Based on risk assessment results, there currently is no risk to human health or the environment at the site. EPA understands that the State will close the site in accordance with State code. There are no present worth or O&M costs associated with this no action remedy.

PERFORMANCE STANDARDS OR GOALS:

Not applicable.

RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

BEULAH LANDFILL SITE
PENSACOLA, ESCAMBIA COUNTY, FLORIDA

ROD signed
9/16/93
per RPM

Prepared by:
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia

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RECORD OF DECISION

Declaration

SITE NAME AND LOCATION

Beulah Landfill Site
Escambia County
Pensacola, Florida

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the U.S. Environmental Protection Agency's (EPA) selected Remedial Action (RA) for the Beulah Landfill Site. This final ROD was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, 42 U.S.C. 9601 et seq., and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Section 105 of CERCLA), 40 CFR, Part 300. This ROD is based on the Beulah Landfill Site Administrative Record.

The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has been the support agency during the Remedial Investigation for the Site. In accordance with 40 CFR 300.430, as the support agency, FDEP has provided input during this process and although a formal letter of concurrence has not yet been received, concurrence is expected.

ROD EXPLANATION

A Remedial Investigation was performed by Potentially Responsible Parties (PRPs) under an Administrative Order on Consent (AOC). The EPA used information obtained in the RI to develop a Baseline Risk Assessment. The Baseline Risk Assessment evaluated the risk associated with a current trespasser scenario. For this scenario, an acceptable risk level of 10^{-6} exists. Outside of the Baseline Risk Assessment, a single groundwater contaminant, Pentachlorophenol (PCP), exists in one of the on-site wells (MW-6) above the Maximum Contaminant Level (MCL). The contaminant appears to be isolated to the immediate area surrounding MW-6.

DESCRIPTION OF THE SELECTED REMEDY

The Baseline Risk Assessment and the comparison of exposure concentrations to chemical-specific standards indicates that there is no unacceptable risk to human health or the environment at the Site. Therefore, no action is necessary to ensure the protection of human health or the environment. However, the groundwater will be monitored to ensure that this no action

remains protective of human health or the environment.

The EPA understands that the Site will be closed by the State of Florida in accordance with the Florida Administrative Code: Chapter 17-701, Solid Waste Management Facilities.

DECLARATION STATEMENT

The EPA has determined that no action is necessary to ensure the protection of human health or the environment. The five year review will apply to this action because groundwater monitoring will be performed. The EPA has determined that, with the exception of groundwater monitoring, its response at this Site is complete. Therefore, the Site now qualifies for inclusion on the Construction Completion List.

9-16-93
DATE

Patrick M Tobin
Patrick M. Tobin
Acting Regional Administrator

RECORD OF DECISION
BEULAH LANDFILL SITE
PENSACOLA, ESCAMBIA COUNTY, FLORIDA

1.0 INTRODUCTION

This Record of Decision (ROD) presents the selected remedial alternative for the Beulah Landfill Site. This ROD was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and to the extent practicable, the National Contingency Plan (NCP). This ROD is based on the Beulah Landfill Site Administrative Record.

2.0 SITE LOCATION

The Site is about 10 miles northwest of Pensacola (Figure 1). Access to the Site is north on Jamesville Road from Mobile Highway (U.S. Highway 90) at a point about 5 miles southeast of its intersection with Nine Mile Road (U.S. Highway 90A). The Site is divided into a north side and a south side by Coffee Creek
(Figure 2). Coffee Creek drains to Eleven Mile Creek, which drains to Perdido Bay.

3.0 PHYSICAL DESCRIPTION

Topographically, the Site is located on the W1/2NW1/4 and a portion of the E1/2NW1/4 of Section 15, T.1S., R31W., Tallahassee Base Line in southern Escambia County, Florida.

The Site is approximately 101.9 acres in size. The Site is relatively flat with steeper slopes next to the creeks. Site elevations range from about 65 feet National Geodetic Vertical Datum (NGVD) to about 25 feet NGVD. The area surrounding the Site is heavily wooded and relatively undeveloped. The Site is heavily vegetated with a thick understory of shrubs and a rapidly developing canopy.

4.0 OPERATION HISTORY

The Site was operated as a landfill between the years of 1966 to 1984. The Site is made up of two sections (northern-half and southern-half).

FIGURES

Figure 1 - Site Location Map 2

Figure 2 - Site Map 3

Figure 3 - Groundwater Gradient Map 9

Figure 4 - Remedial Investigation Sample Location Map 10

APPENDICES

Appendix A: Record of Decision Responsiveness Summary

Appendix B: Remedial Investigation Analytical Data Summary Tables

Appendix C: Risk Assessment Tables

FIGURE 1

SITE LOCATION MAP
BEULAH LANDFILL SITE

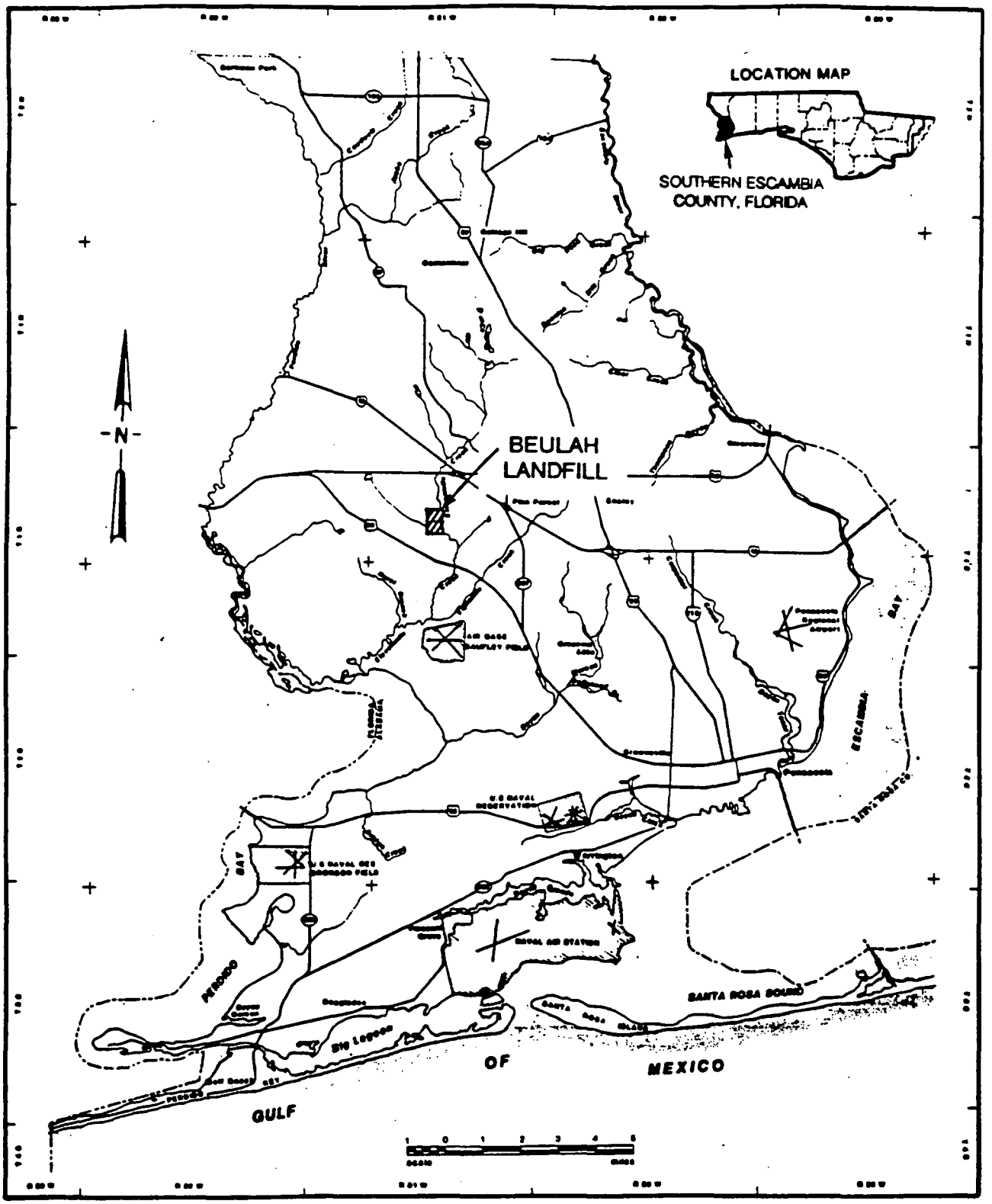
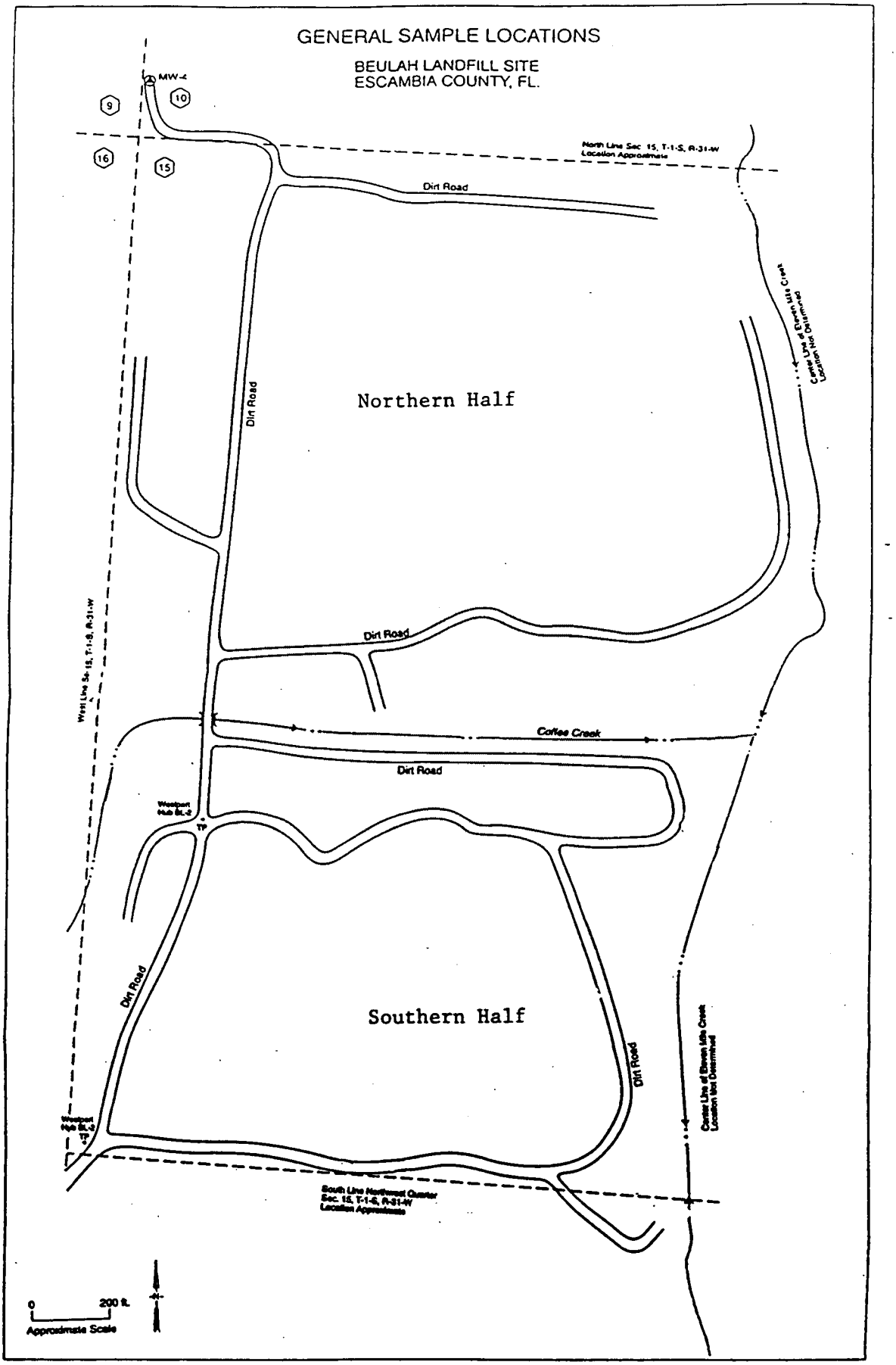


FIGURE 2


GENERAL SAMPLE LOCATIONS
BEULAH LANDFILL SITE
ESCAMBIA COUNTY, FL.
MW-4
9
10
16
15
North Line Sec 15, T-1-S, R-31-W
Location Approximate
Dirt Road
Dirt Road
Northern Half
Center Line of Eleven Mile Creek
Location Not Determined
West Line Sec 15, T-1-S, R-31-W
Dirt Road
Coffee Creek
Dirt Road
Westport
Pub #L-2
TP
Dirt Road
Southern Half
Dirt Road
Center Line of Eleven Mile Creek
Location Not Determined
Westport
Pub #L-3
TP
South Line Northwest Quarter
Sec. 15, T-1-S, R-31-W
Location Approximate
0
200 ft.
Approximate Scale

(Northern-Half)

The northern half of the Site is a closed landfill. During its operation, only solid wastes were accepted. Depths of the wastes range from 4 to 10 feet in the northwest section, increasing to 25 to 30 feet in the northeast section. The wastes are covered with 4 to 6 inches of native soil.

(Southern-Half)

The southern half of the Site was a borrow pit for sand prior to 1965. Solid wastes were initially deposited in the southwest corner of the borrow pit to depths of 15 to 20 feet. The disposal cells moved to the east as the landfill matured, and increased in depth to about 35 feet. Coffee Creek was gradually moved north to its present position along the Gulf Power/Telephone Line easement. In 1968, the first domestic septage and wastewater treatment sludges were deposited in a 10-acre excavated and bermed area at the southwest corner of the Site. Initial deposition rates were about 5,000 gallons per day (gpd). The first sludge holding pond was filled in 1976 with construction and demolition debris, and solid waste, and then covered with a minimum of 12 inches of on-site soil. The eastern-most 20-acre sludge pit was constructed in November, 1977 in a diked area on the Site. Liquid wastes were deposited in the diked area on a previous fill of solid wastes. The solid wastes absorbed much of the liquid, creating a semi-solid spongy surface that persists to the present. All sludge disposal ceased in June, 1984. The final deposition rates were about 20,000 gpd. The former ponds are currently covered with grass and shrubs. No soil cover was placed on the sludges after disposal ceased.

5.0 ENFORCEMENT HISTORY

In 1982, a Site Investigation was performed by Ecology and Environment, Inc. In 1985, the EPA performed a Preliminary Assessment of the Site. In 1988, the Site was proposed for the National Priortiies List (NPL). In 1990, the NPL proposal was finalized.

In 1990, the EPA performed a search for Potentially Responsible Parties (PRPs). Following a review of the PRP search list, on March 30, 1991, pursuant to Section 107(a) of the CERCLA, 42 U.S.C. S 9607(a) as amended, the EPA sent 104(e) General Notice (information request) letters to the PRPs. Following a review of the information supplied, on May 20, 1991, pursuant to Section 122(e) of CERCLA, 42 U.S.C. S 9622(e), the EPA sent Special Notice letters to a number of the PRPs.

On May 20, 1991, the EPA entered into negotiations with the PRP group to perform a Remedial Investigation/Feasibility Study (RI/FS). On September 16, 1991, the EPA signed a RI/FS

Administrative Order on Consent (AOC) with the PRP group.

6.0 COMMUNITY PARTICIPATION HIGHLIGHTS

In accordance with CERCLA Sections 113 (k)(2)(B)(i-v) and 117 requirements, a Community Relations Plan (CRP) for the site was developed by the EPA. The CRP outlines citizen involvement and the community's concern.

On April 21, 1992, the EPA conducted a RI kick-off meeting in Pensacola, Florida. At the meeting, the public was informed of scheduled RI activities and of EPA's general involvement with the site. Response from the community was very positive.

On August 5, 1993, the EPA published a notice in the newspaper (Pensacola News Journal) notifying the public of the EPA's upcoming Proposed Plan Public Meeting, the availability of the AR and the 30 day public comment period (August 7, 1993 to September 7, 1993). In addition, the EPA mailed a Proposed Plan Fact Sheet to those citizens on the CRP mailing list.

On August 7, 1993, the RI and Risk Assessment documents along with the Proposed Plan were made available to the public. Locally, the documents are available at the information repository at the George Stone Vocational School Media Center (2400 Longleaf Drive, Pensacola, Florida). Regionally, the documents are available at the EPA Region IV Records Center (345 Courtland Street, Atlanta, Georgia).

On August 17, 1993, a Public Meeting was held at the George Stone Vocational School to discuss the RI, Risk Assessment and the Proposed Plan. At this meeting, representatives from the EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) were present to answer questions and address community concerns.

Responses to comments received during the public comment period were incorporated into a Responsiveness Summary **(Appendix A)**.

7.0 SCOPE AND ROLE OF RECORD OF DECISION

The RI characterizes the extent and magnitude of contamination at the Site. The Baseline Risk Assessment utilizes data found in the RI to identify present or future risks to the public health and the environment. The Proposed Plan informs the public of the EPA's preferred Remedial Action (RA) alternative prior to the ROD. The ROD summarizes the RI and Baseline Risk Assessment documents and identifies the selected RA alternative along with addressing comments which were received during the public comment period.

The RI and Baseline Risk Assessment documents were finalized

under both State and Federal review. This ROD is considered to be the first and final action for the Site.

8.0 PHYSICAL CHARACTERIZATION

The Site is physically characterized by its geology, surface water flow and groundwater aquifer. As part of the characterization, regional and site-specific information are provided.

8.1 Geology

(Regional)

The Pensacola area is underlain by sands, silts, clays, and limestones of Mesozoic to Cenozoic age. The area lies on the north flank of the Gulf Coast Sedimentary Basin and the east flank of the Mississippi Embayment. This results in a regional soutwestward dip and gulf-ward thickening of most formations down to the basal Cretaceous deposits.

In central Escambia County, Pleistocene terrace deposits and the Citronelle Formation extend from land surface to 300-400 feet below the surface. Underlying the Citronelle Formation are Miocene coarse clastics. Underlying the Miocene clastics is the Pensacola Clay. Underlying the Pensacola Clay is the Chickasaway Limestone. Underlying the Chickasaway Limestone is the Bicatunna Clay Member of the Byran Formation. Underlying the Byran Formation is the Ocala Limestone. Underlying the Ocala Limestone is the Lisbon Equivalent. Underlying the Lisbon Equivalent is the Tallahatta Formation and the Hatchetigbee Formation.

(Site-Specific)

The dominant lithology of the Site is quartz sand (Citronelle Formation) overlain by Pleistocene terrace deposits. A stiff, red clay and white variegated kaolinitic clay exists at 10 to 14 feet below land surface. Clayey sands exist at 100 to 120 feet below land surface.

8.2 Surface Water Flow

(Regional)

The Pensacola area lies on the Gulf of Mexico Coastal Plain, an area with abundant natural precipitation. Surface water drainages are numerous and upland areas that are more than 0.5 miles from surface streams are uncommon. In the Florida Panhandle, virtually all surface water flow is south towards the Gulf of Mexico.

The master drainage for the Site is Eleven Mile Creek, which

drains directly into Perdido Bay. Perdido Bay is a saltwater bay, connected to the Gulf of Mexico by Perdido Pass.

Eleven Mile Creek, above the Site, drains an area of approximately 23 square miles. The headwaters of Eleven Mile Creek are about 5.5 miles north of the Site, just west of the town of Cantonment.

Coffee Creek, which bisects the Site and is a tributary to Eleven Mile Creek, drains an area of about 5 square miles. Coffee Creek follows a general southeasterly drainage course from its headwaters, which are located approximately 3 miles northwest of the site. The lowermost reach of Coffee Creek was diverted to its present location by the landfill operators during the active period of operations.

(Site-Specific)

In Eleven Mile Creek, a classic sand channel morphology of channel and slip-off slope was noted. Coffee Creek lacks the discharge needed to establish this streambed morphology and has a relatively flat bottom of uniform depth. In both streams, bottom sediments are comprised of medium to fine quartz sand with traces of muscovite mica. Localized deposits of fine gravel were noted and moderate amounts of woody debris occur in each stream.

All groundwater elevations in the shallow wells at the Site are higher than the corresponding surface water elevations in the adjacent streams. This indicates that groundwater west of Eleven Mile Creek in the site area is discharging to the creek.

8.3 Groundwater Aquifer

(Regional)

Regional geological formations are grouped into six hydrogeologic units (aquifers and confining beds) based on lithology and permeability. In the northern half of Escambia County, fresh groundwater is found in both the Sand-and-Gravel Aquifer and the Upper Floridan Aquifer. However, in southern Escambia County the principal supply of fresh groundwater is in the Sand-and-Gravel Aquifer. In southern Escambia County the Floridan aquifer is saline.

The Sand-and-Gravel Aquifer is composed of three principal zones, the surficial zone, the low permeability zone and the main producing zone. The surficial zone is generally under water table (unconfined) conditions and is primarily composed of fine silt, sand and clay. The low permeability zone is predominantly clay and silt. Water in the main producing zone is nearly always

under confined or semi-confined conditions consisting mostly of quartz grains.

(Site-Specific)

In the northern-half of the Site, groundwater enters the Site from the west, flows easterly and southerly beneath the former landfill cells and discharges to Eleven Mile Creek and Coffee Creek. The horizontal gradient through most of the Site is low (0.0044 foot/foot) (Figure 3).

In the southern-half of the Site, groundwater enters the Site along the southwest margin, flows eastward and northward and discharges into Eleven Mile Creek and Coffee Creek. The horizontal gradient is lower than that of the northern-half (0.0035 foot/foot) (Figure 3).

9.0 REMEDIAL INVESTIGATION

A Work Plan was developed for the Site using the EPA guidance: Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites (EPA/540/P-91/001: February, 1991). In accordance with the guidance, the RI was "streamlined". In streamlining the RI, the primary focus of the RI was to characterize the Site by identifying "hot spots" and collecting the necessary information to be used in the EPA's Baseline Risk Assessment. The Work Plan included a Sampling and Analysis Plan and Quality Assurance/Quality Control (QA/QC) Plan.

The PRP's contractor (Engineering Science, Inc.) performed the RI with "oversight" of field operations by the EPA's contractor (Bechtel Environmental, Inc.).

The RI samples were taken from various media across the Site at a number of locations (Figure 4). In accordance with the Work Plan, RI sampling was performed (first sampling round). The Work Plan was "addended" afterwards to allow for additional sampling (second sampling round).

9.1 First Sampling Round

The first sampling round included sampling of the following media: surface soil/sludge (dried) in the southern "uncapped" portion of the Site (SB-1 through SB-28), sediment from both Coffee Creek and Eleven-Mile Creek (SD-1 through SD-8), surface water from both Coffee Creek and Eleven-Mile Creek (SW-1 through SW-8), groundwater from on-site perimeter monitor wells (BM-1 through BMW-7 and MW-2 through MW-6) and air from temporary locations south (Stations 1 and 2 (QA/QC)) and north (Stations 3 through 5) of the Site.

All media sampled were analyzed for Target Compound List/Target

FIGURE 3

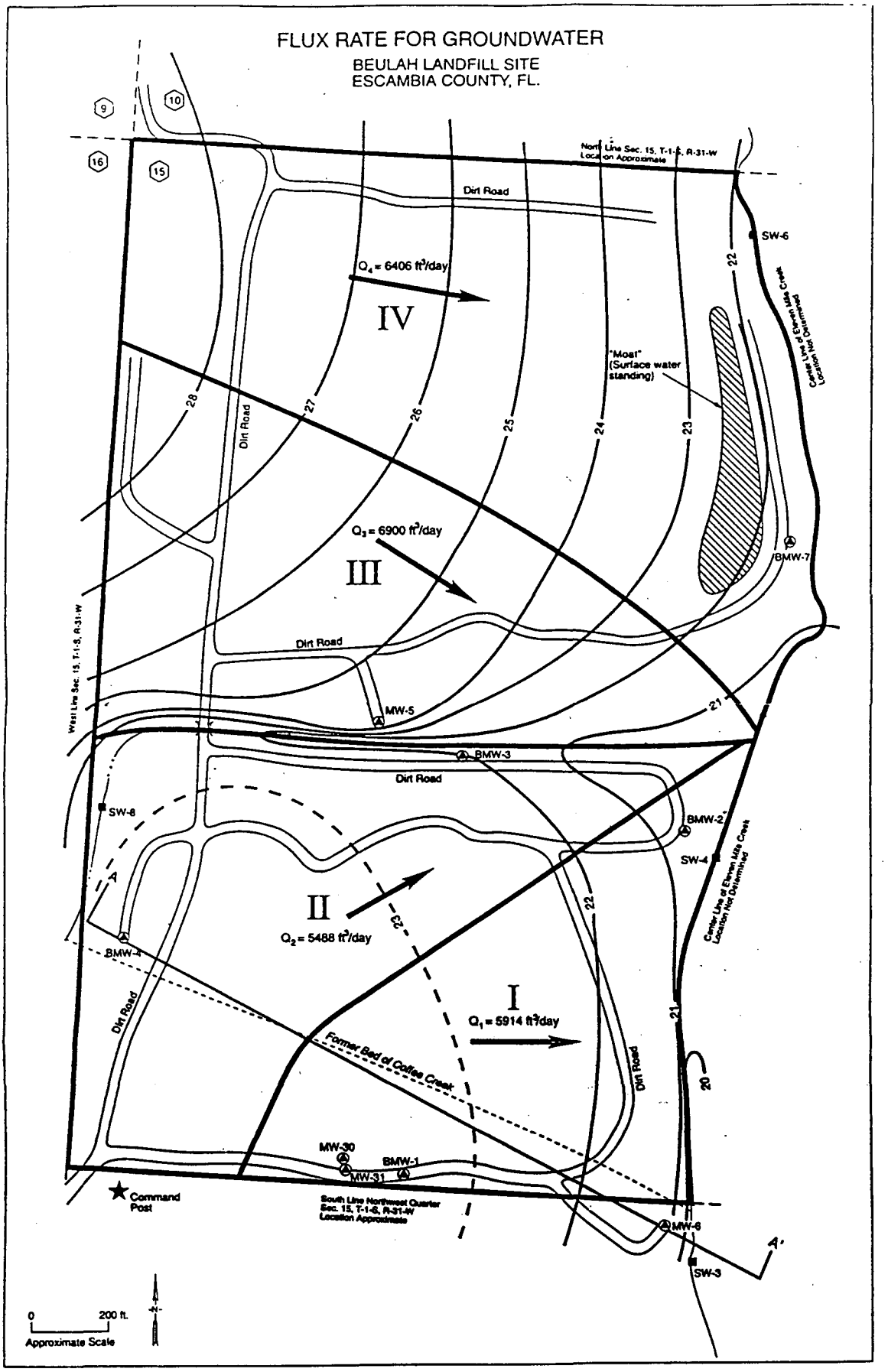
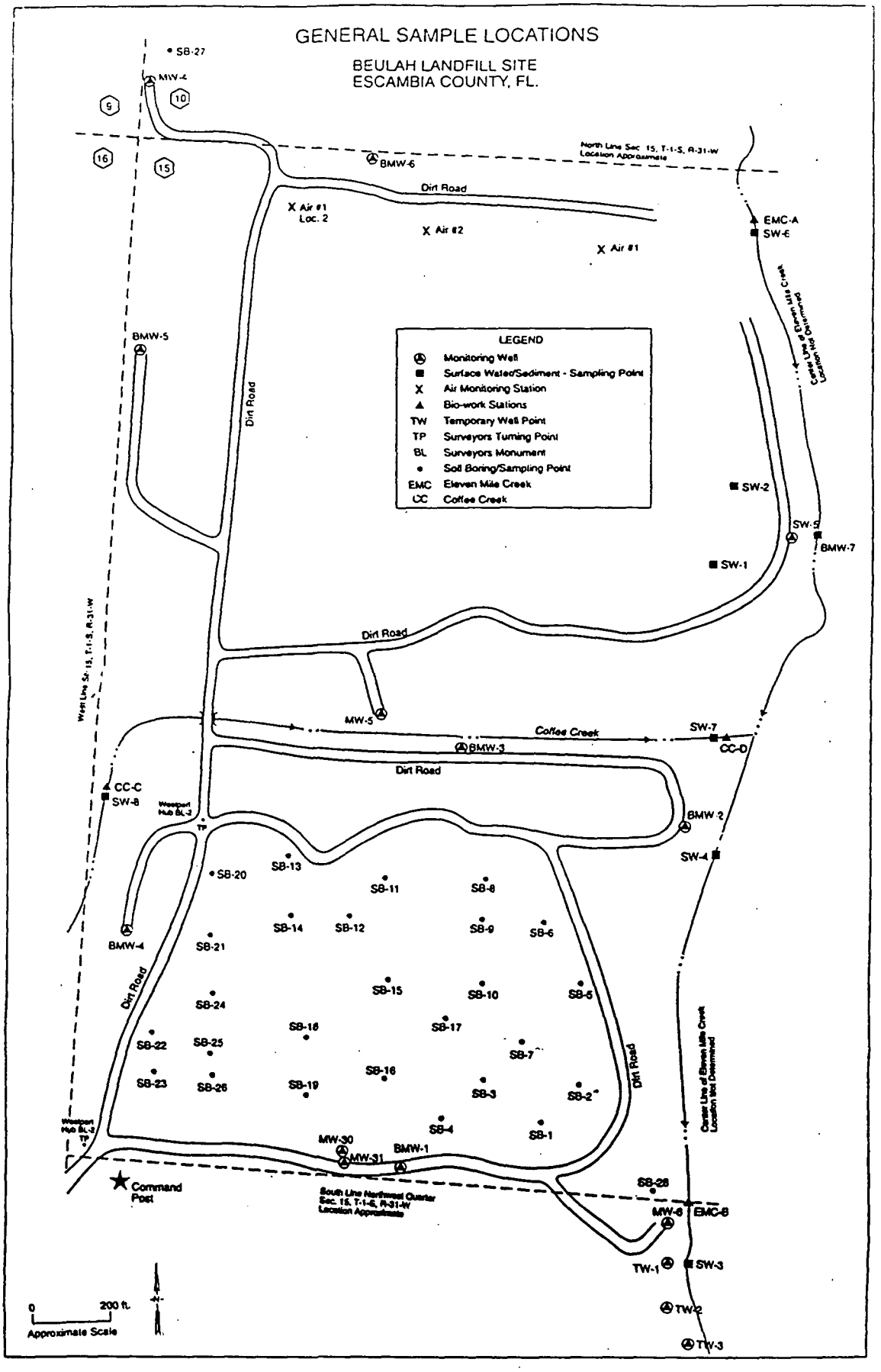

FLUX RATE FOR GROUNDWATER
BEULAH LANDFILL SITE
ESCAMBIA COUNTY, FL.
North Line Sec. 15, T-1-S, R-31-W Location Approximate
Dirt Road
SW-6
Q_4 = 6406 ft³/day
IV
"Moat" (Surface water standing)
Center Line of Eleven Mile Creek Location Not Determined
28
27
26
25
24
23
22
Dirt Road
Q_3 = 6900 ft³/day
III
BMW-7
West Line Sec. 15, T-1-S, R-31-W
Dirt Road
MW-5
21
BMW-3
Dirt Road
SW-8
BMW-2
SW-4
Center Line of Eleven Mile Creek Location Not Determined
A
II
Q_2 = 5488 ft³/day
23
22
BMW-4
Dirt Road
I
Q_1 = 5914 ft³/day
Former Bed of Coffee Creek
Dirt Road
21
20
MW-30
BMW-1
MW-31
Command Post
South Line Northwest Quarter Sec. 15, T-1-S, R-31-W Location Approximate
MW-6
A'
SW-3
0
200 ft.
Approximate Scale
N

FIGURE 4


GENERAL SAMPLE LOCATIONS
BEULAH LANDFILL SITE
ESCAMBIA COUNTY, FL.
LEGEND
Monitoring Well
Surface Water/Sediment - Sampling Point
Air Monitoring Station
Bio-work Stations
TW Temporary Well Point
TP Surveyors Turning Point
BL Surveyors Monument
Soil Boring/Sampling Point
EMC Eleven Mile Creek
CC Coffee Creek
SB-27
MW-4
BMW-6
Dirt Road
X Air #1 Loc. 2
X Air #2
X Air #1
EMC-A
SW-6
BMW-5
SW-2
SW-5
BMW-7
SW-1
MW-5
Coffee Creek
SW-7
CC-D
BMW-3
CC-C
SW-8
BMW-2
SW-4
SB-20
SB-13
SB-11
SB-8
SB-14
SB-12
SB-9
SB-6
BMW-4
SB-21
SB-15
SB-10
SB-5
SB-24
SB-18
SB-17
SB-22
SB-25
SB-7
SB-16
SB-23
SB-26
SB-19
SB-3
SB-2
SB-4
SB-1
MW-30
MW-31
BMW-1
Command Post
SB-28
MW-8
EMC-8
TW-1
SW-3
TW-2
TW-3
0
200 ft.
Approximate Scale

Analyte List (TCL/TAL) including Pesticides and Polychlorinated Byphenyls (PCBs).

9.2 Second Sampling Round

The second sampling round included "re-sampling" of the following media: surface soil/sludge (SB-3, SB-5, SB-17, SB-18, SB-22 and SB-27), sediment (SD-1, SD-3, SD-6, SD-7 and SD-8), surface water (SW-1, SW-3, SW-6, SW-7 and SW-8) and groundwater (BMW-1, BMW-2, BMW-3, BMW-5, BMW-6, BMW-7, MW-3i, MW-5 and MW-6). In addition, new temporary wells (TW-1, TW-2 and TW-3) were installed and sampled south of MW-6. The temporary wells were installed to determine whether contaminants found in MW-6 were migrating off-site.

The surface soil/sludges were re-sampled for Pesticides and PCBs because the laboratory holding times for these were exceeded in nearly all of samples in the first sampling round. Rather than re-sampling every first sampling round location, a limited number of locations were chosen. The surface soil/sludge location (SB-27) was also re-sampled for the full TCL/TAL analytes and Polychlorinated Dibenzodioxins and Dibenzofurans (PCDD/PCDF), calculated in Total Equivalency Quotient (TEQ) values. Sediment and surface water were also re-sampled for Pesticides and PCBs because the laboratory holding times for these were exceeded in the first sampling round. In addition, sediment and surface water were re-sampled for cyanide.

The groundwater was re-sampled for Pesticides and PCBs, as well because the holding times for these were exceeded in the first sampling round. The groundwater location (BMW-5) was re-sampled for lead. The groundwater location (MW-6) was re-sampled, and the temporary well locations were sampled for the first time for Pesticides, PCBs and the TCL.

9.3 Sampling Results

A range of organic and inorganic contaminants were found in all media sampled (Appendix B). The RI groundwater data reflects both filtered and un-filtered inorganics data. However, in accordance with the EPA Region IV policy, only the un-filtered data was used in the development of the Baseline Risk Assessment.

Contaminants found in groundwater above Maximum Contaminant Levels (MCLs) are as follows:

<u>Beryllium</u>

Beryllium occurs in three of the on-site wells (MW-3d, BMW-3 and MW-6) at "un-filtered" concentrations of 1.1 ppb, 1.6 ppb and 1.2-1.8 ppb, respectively. It occurs at levels slightly higher than the Federal Proposed MCL (1 ppb). It should be noted that

these are J "estimated" levels which may not represent "actual" conditions at the Site. Since the levels are so close to the Federal Proposed MCL, Beryllium is not considered to be a contaminant of concern.

Pentachlorophenol (PCP)

Pentachlorophenol (PCP) occurs in one of the on-site wells (MW-6) at concentrations of 120-130 ppb. It occurs at levels much higher than the Federal MCL (1 ppb) therefore, PCP is considered to be a contaminant of concern.

10.0 BASELINE RISK ASSESSMENT

The Baseline Risk Assessment provides the basis for taking action and indicates the exposure pathways that need to be addressed by the RA. It serves as the baseline, indicating what risks could exist if no action was taken at the site. This section of the ROD summarizes the results of the Baseline Risk Assessment conducted for the Site. The components of the Baseline Risk Assessment include a Summary of Site Risk (Contaminants of Concern, and Fate and Transport Analysis), Human Health and Environmental Risk (Exposure Assessment, Toxicity Assessment and Risk Characterization).

The EPA's contractor (Roy F. Weston) developed the Baseline Risk Assessment using information obtained in the RI.

10.1 Site Risk Summary

The assessment of risk posed by the Site was evaluated in a site-specific Baseline Risk Assessment dated July 1993 (USEPA Contract Number 68-W9-0057). This assessment examined the concentration, properties, and environmental fate and transport of the contaminants associated with various media at the Site as well as the populations and environments potentially at risk. The risks associated with the Site were calculated based on current and future exposure scenarios. The numerical carcinogenic (cancer) risk values are theoretical quantifications of the excess lifetime carcinogenic risk, that is, the increased probability of contracting cancer as a result of exposure to Site wastes, compared to the probability if no exposure occurred. For example, a 10^{-6} excess carcinogenic risk represents an exposure that could result in one extra cancer case per million people exposed. The 10^{-6} risk level is considered the goal for remediation at Superfund Sites [40 CFR 300.430 (e)(2)(i)(A)(2)].

Though there are no known currently complete exposure pathways, a trespasser scenario was developed to be protective. The resulting current scenario's carcinogenic risk equalled 4.5×10^{-6} while the total non-carcinogenic HI equalled 0.36. There were no residents in the immediate vicinity of the Site (i.e.,

hydrologically downgradient). Therefore, the regional risk managers have determined that the trespasser scenario is the most likely future use for the Site.

10.1.1 Contaminants of Concern

In choosing the contaminants of concern for groundwater, consideration is given to factors such as, "any available site background data, disposal history (and records, if available), types of remedial actions being considered, on-site and off-site chemical analysis data and site characterization data necessary for exposure assessment" (Chapter 3, "Superfund Public Health Evaluation Manual" EPA/540/1-86/060, OSWER Directive 9285.4-1, December 1989 and "Risk Assessment Guidance for Superfund" EPA/540/1-89/002).

The list of contaminants of concern for all media is included **(Appendix C: Table 1)**. Other contaminants were discounted as contaminants of concern for various reasons (i.e., concentrations of contaminants that are similar to area/regional background concentration and thus were not considered site-related, concentrations that are of low prevalence/occurrence, or concentrations that were laboratory analysis related).

The surface soils were found to be contaminated with low levels of volatile organic compounds (VOCs), semi-VOCs, metals, and Pesticides. Surface water and sediments were contaminated with VOCs, semi-VOCs, and metals. Groundwater was contaminated with VOCs, semi-VOCs, and metals. Air samples indicated that air contamination was confined to semi-VOCs and metals.

The contaminants localized to the respective environment media were somewhat inconsistent from media to media. Few contaminants were found to be associated with all media of concern. Cross media contaminants include Arsenic, Barium, Manganese, Zinc, and Bis(2-ethylhexyl)phthalate. A comparison of surface soil contaminants to sediment/surface water data indicated that migration via overland flow into the tributary system adjacent to the Site area had already occurred. Similarly, air contamination reflected surface soil metal contaminants. Contrarily, groundwater contamination did not agree with surface soil contamination which was understandable since the sub-surface landfill contaminants are the most probable source of groundwater contamination.

10.2 Human Health Risk Evaluation

The risk to human health is determined through the development of exposure and toxicity assessments and the characterization of risk.

10.2.1 Human Health Exposure Assessment

An exposure assessment is an estimation of the magnitude, frequency, duration, and routes of exposure to humans. Exposure contaminants at the Site were assessed in the Baseline Risk Assessment. To this end, exposure was divided into current and future scenarios. The current and future exposure routes consisted solely of a trespasser scenario. Conservative exposure assumptions were developed by the EPA in conducting the assessment.

The current and future soil exposure routes were based on a youth 7-12 years of age. The assumptions included 100 mg/day ingestion rate, exposure frequency of 52 days/year, 6 years exposure duration, a body weight of 27 kg, 3580 cm^2/day surface area, adherence factor of 0.6 mg/cm2, and absorption factors of 0.01 and 0.001 for organics and inorganics respectively. Similar values were used for surface water and sediment exposure including 100 mg/day ingestion rate, 0.05 1/hr, 2.6 hours/day, and chemical specific K_p's.

10.2.2 Human Health Toxicity Assessment

Reference doses (RfDs) have been developed by the EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. The RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help to ensure that the RfDs will not underestimate the potential for adverse non-carcinogenic effects to occur.

The RfDs for the contaminants of concern are included **(Appendix C: Table 2)**.

Cancer Potency Factors (CPFs) have been developed by the EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at the intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the CPFs. Use of this approach makes under-estimation of the actual cancer risks highly unlikely. Cancer potency factors are derived from the results of

human epidemiological studies or chronic animal bioassays to which animal-to-animal extrapolation and uncertainty factors have been applied.

The CPFs for the Site's contaminants of concern are included **(Appendix C: Table 2).**

Although the residential scenario was not applied as a plausible future Site use, the Uptake Biokinetic Model was applied to the Site's lead concentrations to determine the possibility of adverse health effects due to lead exposure. The results indicated that lead contamination levels would not lead to significant predictable blood lead levels in children.

10.2.3 Human Health Risk Characterization

Potential human exposure to site-related contaminants were evaluated via the current and future exposure pathways. Potential exposure was estimated using the conservative assumptions of Site development and exposures in the absence of further remedial measures.

Excess lifetime cancer risks are determined by multiplying the intake level by the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6} or $1E^{-6}$). An excess lifetime cancer risk of 1×10^{-6} indicates that as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of Site-related exposure to a carcinogen over a 70 year lifetime under the specific exposure conditions at a Site. The EPA considers individual excess cancer risks in the range of 10^{-4} to 10^{-6} as protective; however, the 10^{-6} risk level is generally used as the point of departure for setting clean-up levels at Superfund Sites. Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as the Hazard Quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the HI can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The cancer risks based on current and future exposure to Site contaminants are included **(Appendix C: Table 3).** The total risk based on trespasser exposure is 4.5×10^{-6} which is within the EPA's acceptable risk range of 10^{-4} to 10^{-6}. The largest portion of the risk was based on surficial exposure to Arochlor 1254 (7.4×10^{-7}) and outdoor air inhalation 1.3×10^{-6} **(Appendix C: Table 4).**

The HI, based on the current and future scenario totaled 0.36, which is less than unity (1) **(Appendix C: Table 5)**.

Actual or threatened releases of hazarous substances from this Site do not present an imminent and substantial endangerment to public health or welfare.

10.3 Environmental (Ecological) Risk Evaluation

The risk to the environment is determined through the assessment of potential adverse effects to ecosystems and populations resulting from site-related contamination using qualitative methods.

10.3.1 Environmental Exposure Assessment

The exposure assessment identifies species present in the area of risk, based upon the available habitats. The pathways of likely exposure are delineated and those contributing the most potential risk are chosen for inclusion into the Baseline Risk Assessment. The potential magnitude and frequency of exposure to the contaminants of concern can then be calculated for the selected species and pathways using qualitative and/or quantitative methods.

The objectives of the exposure assessment include the identification of habitats, significant pathways/exposure routes, and threatened or endangered species; selection of target species representing exposed organisms (populations and/or communities); and estimation of exposure doses.

The Site encompasses an estimated 102 acres, consisting of a mixed forest and grassland intersected by a series of dirt roads. The Site is divided by Coffee Creek. This creek flows eastward into Eleven Mile Creek, which in turn flows south along the eastern boundary of the Site and eventually empties into Perdido Bay. The main pathways or media of ecological concern are surface soil, surface water, and sediments. For terrestrial biota, the main exposure routes of concern are ingestion of contaminated soils and vegetation by animals and uptake of soil contaminants through plant roots. For aquatic biota, the exposure routes of concern are direct contact with contaminated surface water and sediments and ingestion of aquatic or benthic plants and animals.

Based on available literature, a number of endangered, threatened or otherwise sensitive wildlife species may inhabit portions of the Site. However, none of these species were selected for use in the Baseline Risk Assessment because exposure to these species is expected to be minimal. The target species were divided into two main categories: terrestrial and aquatic. A quantitative method was used to estimate exposure doses for the eastern

cottontail (mammal) and the chipping sparrow (bird), representing terrestrial animals; a qualitative exposure assessment was used for the terrestrial plant communities. Qualitative exposure assessments were also used for aquatic biota living in the water column (aquatic community) and those living in or on the bottom sediments (benthic community) **(Appendix C: Tables 6 and 7)**.

Elevated levels of contaminants were found in the surface water and sediments in a swale area located in the southeastern portion of the northern half of the Site. The swale area was not considered to be an aquatic habitat in the Baseline Risk Assessment since it periodically contains water from rainfall.

10.3.2 Environmental Toxicity Assessment

The toxicity assessment characterizes the toxicity of the contaminants of concern. Toxicity values expressed in terms of a dose are used in the assessment of specific receptor species. In the case of community assessments, established state or federal criteria or other media-specific guidelines are used for direct comparison with measured media-specific contaminant concentrations. In the assessment of terrestrial plants, phytotoxicity data expressed in terms of a soil concentration are compared with site-specific soil concentrations.

Due to the differences in physiology, toxicity data was not extrapolated between organisms from different phylogenetic classes. Preferentially, toxicity values that represented the highest No Observable Effect Level (NOEL) or the Lowest Observable Effect Level (LOEL) were selected. Data for chronic toxicity were preferentially (in relation to population effects) used, when available, rather than acute or subchronic values since these are reflective of the most sensitive endpoints and effects. Carcinogenic endpoints were not considered in the assessment of toxicity endpoints.

For most contaminants, several data bases and literature sources were reviewed to obtain the most accurate toxicity value. These studies provide exposure and response data associated with a variety of toxicity endpoints. Specific toxic effects are broadly grouped and listed preferentially (in relation to population effects) as follows: overt effects (organism reproductivity), probable effects (decreased survivability due to alteration in bio-chemical functions of organs) and potential effects (alteration of the organism not readily associated with decreased survivability or longevity).

The Baseline Risk Assessment discusses the application of safety factors (in extrapolating toxicity data from animals other than the target species or from different toxicity endpoints) and the Critical Toxicity Values (CTVs) for the terrestrial species **(Appendix C: Tables 8, 9 and 10)**.

The toxicity of contaminants of concern to aquatic life was assessed by comparing surface water concentrations (average and 95 % upper confidence limit) from Coffee Creek and Eleven Mile Creek to Florida Surface Water Quality Standards and Federal Ambient Water Quality Criteria (AWQC) (both acute and chronic) (Appendix C: Table 11).

Although no sediment specific quality criteria are currently available, the toxicity of contaminants of potential concern identified in Coffee Creek and Eleven Mile Creek to benthic and epibenthic life was primarily assessed by comparison to the National Oceanic and Atmospheric Administration (NOAA) sediment effects and Ontario Ministry of Environment, Water Resources Branch sediment quality values (Appendix C: Table 12).

There is currently no EPA guidance for quantitatively evaluating potential adverse effects to plants growing in contaminated soils. Potential phytotoxicity was addressed qualitatively by comparing soil contaminant concentrations with toxicity values from the literature (Appendix C: Table 13).

The Federal AWQC was established to provide protection of 95 % of all aquatic organisms including plants. Therefore, potential toxicity to aquatic plants is evaluated in the comparison of surface water contaminant concentrations to AWQCs (Appendix C: Table 14).

10.3.3 Environmental Risk Characterization

Risk characterization involves the integration of exposure doses and toxicity information into a quantitative estimation of non-carcinogenic risks. Receptor-specific quantitative risk estimates for the eastern cottontail and the chipping sparrow were calculated for each exposure scenario. Quantitative risk estimates were also calculated for aquatic and benthic communities in Coffee Creek and Eleven Mile Creek. Potential effects to terrestrial plant communities were assessed qualitatively. Risks were calculated individually for each constituent and exposure route.

The quotient method was used to quantitatively assess potential ecological impacts. The quotient method compares exposure doses or concentrations with CTVs to yield a HQ. If the HQ exceeds 1, it indicates that the species of concern may be at risk to an adverse effect from that constituent through that exposure route. Because CTVs incorporate a number of safety factors, if a CTV is exceeded (the HQ exceeds 1), it does not necessarily indicate that an adverse effect will occur.

A cumulative Hazard Index (HI) is calculated by summing HQs across chemicals and/or exposure routes. If the cumulative HI is greater than 1, the total exposure routes may potentially pose a

risk for adverse effects to the species of concern. However, as with the HQ, a cumulative HI of greater than 1 does not necessarily indicate that an adverse effect will occur.

During the assessment of surface waters, HQs were not added. The AWQCs give consideration to all the routes of exposure to aquatic species therefore, different exposure pathways do not need to be added to obtain a total HI. Calculation of a cummulative HI is not appropriate since AWQCs are applicable to only one chemical.

A reasonably conservative strategy was used in the development of the various components of the Baseline Risk Assessment. For example, the lowest reasonable toxicity values were selected when reviewing ecological databases. This approach decreased the likelihood that potential risks will be under-estimated.

Risk estimates for each terrestrial animal receptor (eastern cottontail and chipping sparrow) were calculated based on a "No Action" remedial alternative (**Appendix C: Table 15**). Exposure for both receptors comes from ingestion of surface soils and vegetation. Potential risks come from metals, Pesticides and Polyaromatic Hydrocarbons (PAHs). For the eastern cottontail, Iron contributed 83 % of the cummulative HI. Aluminum, Aroclor 1254, Iron and PCP collectively contributed 95 % of the cummulative risk. For the chipping sparrow, Dieldrin contributed 69 % of the cummulative HI. Alpha Chlordane, Beta Chlordane, Dieldrin, PCP and Zinc collectively contributed 95 % of the cummulative risk.

These risk estimates must be viewed from the perspective of the Site as a whole. Based upon the low frequency of detection in surface soil samples, the organic contaminants resulting in the greatest risks to the eastern cottontail and the chipping sparrow were present only in limited areas of the Site. Thus, exposure of terrestrial animals to toxic levels of these contaminants would be limited. The inorganic surface soil contaminants were more widespread. Inorganic contaminants were of a greater concern for the eastern cottontail than for the chipping sparrow, since ingestion of soils was the primary exposure route for the eastern cottontail. The ingestion rate used in calculating exposure doses may have over-estimated exposure, since it was based upon data for a rabbit species that lives in a different type of habitat. Also, the background soil concentration for iron (which accounted for the majority of the risk) was the same order of magnitude as the mean surface soil concentration. Thus, the risk for exposure to iron in background soils might be similar to the risk for exposure to iron in on-site soils, with the possible exception of localized areas containing the highest iron concentrations. Finally, the conservative nature of the CTVs used in determining risk may over-estimate the risk to populations. Although contaminants at CTV levels might adversely affect some individuals in a population, the population as a

whole might be expected to survive and reproduce.
The bio-assessment provided the primary source of data regarding the assessment of potential impacts and/or risks to the aquatic communities of Coffee Creek and Eleven Mile Creek. The potential risk to aquatic and benthic organisms was also quantitatively assessed by comparing ambient water quality criteria and sediment quality standards with media-specific concentrations.

Potential risk to aquatic receptors were assessed by comparing media-specific concentrations with surface water quality standards or criteria and sediment quality or effects values. In cases where state specific criteria were absent, AWQC were used.

For the aquatic communities associated with Coffee Creek and Eleven Mile Creek, Cyanide was the only contaminant of concern that had a HQ greater than 1 **(Appendix C: Table 11)**. Cyanide in Eleven Mile Creek was the only contaminant. The average and acute HI 95 % UCL concentrations of Cyanide both exceeded the chronic FSWQS of 5.2 ug/l (HIs of 9.95 and 30.8, respectively). These cyanide concentrations also exceeded the acute AWQS of 22.0 ug/l (HIs of 2.35 and 7.27, respectively). Cyanide was not detected in Coffee Creek.

For the sediment community associated with Coffee Creek and Eleven Mile Creek, sediment concentrations were compared to NOAA sediment effect values (NOAA ER-L and ER-M) and the Ontario sediment quality values **(Appendix C: Table 12)**. No HI exceeded 1 in either mean or UCL concentrations.

For the terrestrial plant community, Alpha-Chlordane, Arsenic, Copper, Dieldrin, Di-N-butylphthalate, Gamma-Chlordane, Lead and Zinc are contaminants of concern. These contaminants exceeded the lowest LOEL concentrations in the Phytotox database. Phytotoxicity information was not available for a number of chemicals of concern; therefore, a complete evaluation could not be made. In addition, phytotoxicity is frequently species-specific and is influenced by many physical and chemical parameters. For example, much of the plant toxicity data used in this risk assessment was based upon studies using agricultural plants, so its applicability to the Site plants is uncertain. As mentioned for terrestrial animals, the organic surface soil contaminants were present at elevated levels only in limited areas, so the areas of possible toxic effects would be limited. Although inorganic surface soil contaminants are more widespread, the available toxicity information indicates that their toxic effects would apparently be limited to some decrease in plant growth or yield.

Actual or threatened releases of hazardous substances from this Site do not present an imminent and substantial endangerment to the environment.

11.0 APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The Baseline Risk Assessment and the comparison of exposure concentrations to chemical-specific standards indicates that there is no unacceptable risk to human health or the environment at the Site.

CERCLA Section 121 clean-up standards for selection of a Superfund remedy, including the requirement to meet Applicable, Relevant and Appropriate Requirements (ARARs), are not triggered at this Site. However, the Florida Department of Environmental Protection (FDEP) has promulgated state closure requirements for municipal and industrial landfills.

12.0 SELECTED REMEDY

The Baseline Risk Assessment and the comparison of exposure concentrations to chemical-specific standards indicates that there is no unacceptable risk to human health or the environment at the Site. Therefore, no action is necessary to ensure protection of human health or the environment. However, the groundwater will be monitored to ensure that this no action remains protective of human health or the environment.

The EPA understands that the Site will be closed by the State of Florida in accordance with the Florida Administrative Code: Chapter 17-701, Solid Waste Management Facilities.

13.0 DOCUMENTATION OF SIGNIFICANT DIFFERENCES

The selected RA alternative as presented in this ROD has no difference, significance or otherwise, from the Proposed Plan.

APPENDIX A

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

The U. S. Environmental Protection Agency (EPA) established a Record of Decision (ROD) public comment period from August 7, 1993 through September 7, 1993 for interested parties to comment on EPA's Proposed Plan for Remedial Action (RA) at the Beulah Landfill Site (Site). The comment period included a public meeting conducted by the EPA on August 17, 1993 at the George Stone Vocational School in Pensacola, Florida. At the public meeting, the EPA presented the results of the Remedial Investigation (RI) and Risk Assessment along with the Proposed Plan (No Action).

A responsiveness summary is required by Section 117 of the Comprehensive Environmental Response, Liability and Compensation Act (CERCLA) 42 U.S.C.9601 et seq. and Section 300.430(f)(3)(F) of the National Contingency Plan to provide a summary of citizens comments and concerns about the Beulah Landfill Site and the EPA's Proposed Plan, as raised during the public comment period and the EPA's responses to those concerns. All comments summarized in this document have been factored into the final decision concerning the Proposed Plan for RA at the Site.

This responsiveness summary for the Site is divided into the following sections:

I. Overview: this section discusses the Proposed Plan for the Site and the public reaction to this alternative.

II. Background on Community Involvement and Concerns: this section discusses a brief history of community interest and concerns regarding the Site.

III. Summary of Major Questions and Comments Received During the Public Comment Period and the Florida Department of Environmental Protection's (FDEP's) or the EPA's Responses: this section presents both oral and written comments submitted during the public comment period and provides the responses to these comments.

IV. Remaining Concerns: this section discusses community concerns that the EPA should be aware of in the design and implementation of the Proposed Plan for RA at the Site.

I. Overview

The Proposed Plan for RA at the Site was presented to the public in a Fact Sheet released on August 5, 1993 and at a public meeting held on August 17, 1993.

The No Action with groundwater monitoring remedy proposed by the EPA, and selected in the ROD, is considered to be protective of human health or the environment.

Major components of the ROD are as follows:

- no action is necessary to ensure protection of human health or the environment

- the groundwater will be monitored to ensure that this no action remains protective of human health or the environment

- the EPA understands that the State of Florida will close the Site in accordance with the Florida Administrative Code: Chapter 17-701, Solid Waste Management Facilities

II. Background on Community Involvement and Concerns

The Beulah community has lived around the landfill for years and has been aware of the EPA's efforts to characterize the extent of contamination at the Site.

The EPA Remedial Project Manager and Community Relations Coordinator interviewed members of the community and held a "RI kick-off" meeting prior to beginning the RI. At the meeting, the overall goals of the RI were explained along with basis for the Sampling and Analysis Plan. In addition, the EPA distributed a "RI kick-off" Fact Sheet containing information related to the Site prior to the meeting.

Since that time, the EPA has completed the RI and the Baseline Risk Assessment for the Site. The EPA distributed a "Proposed Plan" Fact Sheet containing information on the RI and the Baseline Risk Assessment along with the Proposed Plan for RA at the Site. The Fact Sheet also announced the public meeting date. At the public meeting, information related to the RI and the Baseline Risk Assessment were presented and questions from the public were answered.

The "key issues and concerns" identified in the public meeting and written comments received by the EPA during the public comment period are presented in Section III.

III. Summary of Major Questions and Comments Received During the Public Comment Period and FDEP's or EPA's Responses

Comment: Mr. Jack Kelly, who attended the Public Meeting and later called the EPA Region IV office during the public comment period, asked about the groundwater flow direction in the southernmost portion of the southern half of the Site. He stated that the true groundwater flow direction is more southeastward than what the RI shows because of the former location of Coffee Creek. The RI shows an eastward flow direction.

Answer: It should be noted that early in the "development" of the landfill, Coffee Creek was re-routed to coincide with the telephone utility easement running between the northern

and southern half of the Site. Coffee Creek "originally" traversed the southern half of the Site in a northwest to southeast direction. The original flow direction may have been modified "slightly" by the re-routing of the creek but the groundwater flow directions that exist today are based on the groundwater measurements from on-site wells.

The groundwater monitoring well MW-6, located in the southeast corner of the Site contains Pentachlorophenol (PCP) above Maximum Contaminant Levels (MCLs). This Record of Decision (ROD) calls for the monitoring of groundwater to ensure that PCP does not migrate off-site. PCP was not found in any of the temporary well samples (TW-1, TW-2 and TW-3) located south of MW-6. If the groundwater flow direction was in a more southeastward direction than that shown in the RI, the temporary well samples would have been in a better position to detect contamination than that of an easterward flow direction.

Comment: Mr. Kelly also asked, in a phone conversation, if the future growth potential of the land northwest of the Site was taken into account in the development of the Baseline Risk Assessment. Mr. Kelly noted that he has plans to develop land northwest of the Site (Quadrants 8,9 and 16) as an industrial park with a reservoir.

Answer: The EPA performed a Baseline Risk Assessment for the Site based on information obtained from the Remedial Investigation (RI). In the assessment, a current tresspasser and future land use scenario was evaluated. These scenarios primarily focus on the Site itself and the land immediately adjacent to the Site. Future land development of areas surrounding the Site are generally not an active part of the assessment. The current tresspasser scenario is the most likely scenario at the Site and was used in the development of the ROD.

Comment: Mr. and Mrs. Welton & Ester Johnson wrote a letter to the EPA Region IV office to express their concerns as citizens living on Perdido Bay. The Johnsons note that Superfund Sites such as this should not be excavated and mounded above ground creating conditions where contaminants could be blown around or washed away. Their suggestion for this Site is place a fence around it and restrict its usage for anything.

Answer: This ROD calls for no action with monitoring of the groundwater. The EPA understands that the State of Florida will close the Site in accordance with the Florida Administrative Code: Chapter 17-701, Solid Waste Management Facilities. This Code provides the Florida Department of Environmental Protection (FDEP) with the enforcement authority to implement corrective measures. The FDEP will have to determine whether a fence is

necessary as part of its Closure Plan.

IV. Remaining Concerns

The EPA is not aware of any remaining concerns associated with the selected remedy.

APPENDIX B

ANALYTICAL DATA SUMMARY TABLES

TABLE 1
ANALYTICAL DATA SUMMARY FOR BACKGROUND SOILS BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: *Constituents not listed were non-detect in all samples.*

Sample Location	SB-27,SS1	SB-27,SS2	SB-27	USGS REPORT
Volatile Organic Compounds (µg/kg)				
Bromodichloromethane	3 J	6 U	NA	NA
Chloroform	23	6 U	NA	NA
Semivolatile Organic Compounds (µg/kg)	ND	ND	NA	NA
Pesticides and PCB (µg/kg)	NA	NA	ND	NA
Inorganics (mg/kg)				
Aluminum	5480 J	6230 J	NA	<2%
Arsenic	ND	ND	ND	<3 ppm
Barium	7.8 J	12.6 J	NA	<200 ppm
Beryllium	0.25 J	0.23 U	NA	<1 ppm
Calcium	50.3 J	57 J	NA	<0.35%
Chromium	49.4 J	8.8 J	NA	<30 ppm
Cobalt	ND	ND	ND	<3 ppm
Copper	1.5 J	2.1 J	NA	<15 ppm
Iron	17500 J	4850 J	NA	<1.5%
Lead	4.5 J	4.7 J	NA	<10 ppm
Magnesium	73.9 J	182 J	NA	<0.2%
Manganese	40.2 J	5.7 J	NA	<200 ppm
Mercury	0.09 J	0.1 J	NA	<5.1 ppm
Nickel	ND	ND	ND	<7 ppm
Potassium	89.7 U	116 J	NA	<1.6%
Selenium	ND	ND	ND	<0.15 ppm
Sodium	21.7 U	76 J	NA	<0.3%
Vanadium	41.4 J	13.5 J	NA	<30 ppm
Zinc	2.3 U	3.8 J	NA	<28 ppm

NOTES:

SS1, SS2 - Duplicate samples.

U - Undetected; quantity shown is the detection limit.

J - Estimated quantity.

NA - Not analyzed.

ND - None detected.

TABLE 2
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-1	SB-2	SB-3	SB-4	SB-5	SB-5(RE)	SB-6	SB-6(RE)	SB-7	SB-8
Volatile Organic Compounds (µg/kg)										
Acetone	BDL	BDL	97 J	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bromodichloromethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Disulfide	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloroform	BDL	BDL	BDL	0.3 J	BDL	BDL	0.4 J	0.3 J	BDL	BDL
Ethylbenzene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2 J	BDL	4 J
1,1,1-Trichloroethane	BDL	0.6 J	BDL	BDL	BDL	BDL	0.4 J	0.8 J	BDL	1 J
Xylene (total)	BDL	BDL	BDL	0.9 J	BDL	BDL	BDL	BDL	BDL	BDL
Semivolatile Organic Compounds (µg/kg)										
Acenaphthene	BDL	BDL	44 J	BDL	BDL	NA	BDL	NA	BDL	BDL
Acenaphthylene	BDL	BDL	BDL	BDL	BDL	NA	290 J	NA	BDL	BDL
Anthracene	BDL	BDL	110 J	BDL	38 J	NA	BDL	NA	25 J	9 J
Benzo(a)anthracene	150 J	94 J	260 J	BDL	120 J	NA	360 J	NA	20 J	26 J
Benzo(a)pyrene	140 J	70 J	180 J	18 J	140 J	NA	300 J	NA	66 J	31 J
Benzo(b)fluoranthene	260 J	120 J	270 J	22 J	180 J	NA	1100 J	NA	60 J	45 J
Benzo(g,h,i)perylene	170 J	69 J	140 J	32 J	120 J	NA	540 J	NA	70 J	44 J
Benzo(k)fluoranthene	92 J	53 J	120 J	7 J	65 J	NA	270 J	NA	14 J	9 J
bis(2-ethylhexyl)phthalate	1100 J	2400 J	400 J	420 J	1900 J	NA	190 J	NA	390 J	600 J
Butylbenzylphthalate	BDL	170 J	40 J	BDL	250 J	NA	BDL	NA	71 J	32 J
Chrysene	240 J	110 J	250 J	BDL	130 J	NA	410 J	NA	53 J	65 J
Di-n-butylphthalate	BDL	5400 J	BDL	BDL	BDL	NA	BDL	NA	BDL	BDL
Di-n-octylphthalate	BDL	BDL	BDL	BDL	BDL	NA	48 J	NA	10 J	BDL
Dibenz(a,h)anthracene	BDL	BDL	35 J	BDL	BDL	NA	120 J	NA	BDL	BDL
Dibenzofuran	BDL	BDL	BDL	BDL	BDL	NA	37 J	NA	BDL	BDL
Diethylphthalate	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	BDL	BDL
Fluoranthene	180 J	120 J	540 J	18 J	190 J	NA	720 J	NA	23 J	43 J

TABLE 2 - Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-1	SB-2	SB-3	SB-4	SB-5	SB-5(RE)	SB-6	SB-6(RE)	SB-7	SB-8
Fluorene	BDL	BDL	54 J	BDL	BDL	NA	44 J	NA	BDL	BDL
Indeno(1,2,3-cd)pyrene	150 J	62 J	130 J	18 J	71 J	NA	430 J	NA	50 J	26 J
2-Methylnaphthalene	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	BDL	BDL
Naphthalene	BDL	BDL	BDL	BDL	BDL	NA	34 J	NA	BDL	BDL
Pentachlorophenol	3600 J	BDL	660 J	BDL	780 J	NA	8200 J	NA	2000 J	BDL
Phenanthrene	BDL	BDL	400 J	BDL	140 J	NA	260 J	NA	15 J	27 J
Pyrene	200 J	96 J	400 J	14 J	150 J	NA	730 J	NA	47 J	40 J
Pesticides and PCB (µg/kg)										
Aldrin	NA	NA	BDL	NA	BDL	BDL	NA	NA	NA	NA
alpha-Chlordane	NA	NA	6.9 J	NA	30 J	38 J	NA	NA	NA	NA
gamma-Chlordane	NA	NA	6.7 J	NA	31	32 J	NA	NA	NA	NA
Dieldrin	NA	NA	9.1 J	NA	23 J	23 J	NA	NA	NA	NA
4,4'-DDE	NA	NA	BDL	NA	BDL	74 J	NA	NA	NA	NA
4,4'-DDD	NA	NA	5.3 J	NA	BDL	BDL	NA	NA	NA	NA
Aroclor-1254	NA	NA	BDL	NA	BDL	BDL	NA	NA	NA	NA
Dioxin/furan TEQ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)										
Aluminum	11700	16600	11100	10600	12200	NA	8660	NA	14200	10400
Antimony	4 J	4.6 J	BDL	BDL	4.6 J	NA	BDL	NA	BDL	BDL
Arsenic	8 J	13 J	5.9 J	8.2 J	7.6 J	NA	2.7 J	NA	7.5 J	NA
Barium	126	202	33.4 J	43.1 J	162	NA	37.3 J	NA	155	37.5 J
Beryllium	0.4 J	BDL	BDL	0.33 J	0.31 J	NA	BDL	NA	BDL	BDL
Cadmium	5.8	12.4	0.85 J	0.59 J	4.1	NA	0.3 J	NA	3.1	0.57 J
Calcium	2160	3390	791 J	5630	1870	NA	5780	NA	1340	1380
Chromium	195	81.7	38.7	20.3	105	NA	38.9	NA	39.4	49.7
Cobalt	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA	BDL	BDL
Copper	233	226	119	27.9	226	NA	26.4	NA	135	35.8
Iron	59300	51500	23200	13200	28100	NA	10400	NA	16800	33100

TABLE 2 - Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-1	SB-2	SB-3	SB-4	SB-5	SB-5(RE)	SB-6	SB-6(RE)	SB-7	SB-8
Lead	359 J	235 J	55.1 J	35.2 J	182 J	NA	36.4 J	NA	130 J	36.3 J
Magnesium	244 J	231 J	161 J	730 J	223 J	NA	453 J	NA	179 J	107 J
Manganese	197	361	64.4	81	105	NA	153	NA	26.9	70.5
Mercury	0.54 J	0.91 J	0.58 J	0.18 J	1 J	NA	0.37 J	NA	1.4 J	0.29 J
Nickel	139	29.2	29.4	6.1 J	39.3	NA	13.6	NA	14.8	78.9
Potassium	116 J	105 J	152 J	285 J	307 J	NA	306 J	NA	251 J	BDL
Selenium	BDL	BDL	BDL	BDL	1.1 J	NA	BDL	NA	0.96 J	BDL
Silver	5.2	7.7	1.2 J	BDL	10.1	NA	BDL	NA	2.9	BDL
Sodium	BDL	BDL	BDL	89.4 J	BDL	NA	74 J	NA	BDL	BDL
Vanadium	26.9	18.1	19.7	26.5	28.1	NA	14.6	NA	26.3	26.8
Zinc	1080 J	773 J	341 J	85.3 J	570 J	NA	68.2 J	NA	289 J	261 J
Cyanide	0.35 J	1.3 J	0.33 J	BDL	2.1 J	NA	1.4 J	NA	0.61 J	0.53 J

Notes:

Shaded areas indicate duplicate extraction or analysis of the same sample.
SS1, SS2 - Duplicate samples.
RE - Reextracted.
BDL - Below detection limit.
NA - Not analyzed
J - Estimated quantity.
2ND - Second field effort.

TABLE 2--Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-9	SB-10,SS1	SB-10,SS2	SB-11	SB-12	SB-13	SB-14	SB-15	SB-16
Volatile Organic Compounds (µg/kg)									
Acetone	BDL	BDL	BDL	610 J	34 J	BDL	24	120	BDL
Bromodichloromethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Carbon Disulfide	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.7 J	BDL
Chlorobenzene	5 J	BDL	BDL	BDL	BDL	BDL	BDL	0.9 J	BDL
Chloroform	0.7 J	BDL	0.4 J	BDL	BDL	BDL	BDL	BDL	BDL
Ethylbenzene	0.8 J	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethene	1 J	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1,1-Trichloroethane	0.6 J	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Xylene (total)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Semivolatile Organic Compounds (µg/kg)									
Acenaphthene	BDL	BDL	BDL	BDL	30 J	BDL	BDL	BDL	BDL
Acenaphthylene	BDL	BDL	BDL	79 J	BDL	BDL	BDL	BDL	15 J
Anthracene	8 J	23 J	11 J	220 J	84 J	BDL	BDL	24 J	34 J
Benzo(a)anthracene	24 J	80 J	33 J	200 J	230 J	BDL	13 J	22 J	91 J
Benzo(a)pyrene	26 J	65 J	32 J	110 J	180 J	BDL	50 J	33 J	160 J
Benzo(b)fluoranthene	31 J	110 J	64 J	99 J	260 J	BDL	37 J	46 J	160 J
Benzo(g,h,i)perylene	24 J	69 J	39 J	230 J	130 J	BDL	110 J	92 J	240 J
Benzo(k)fluoranthene	9 J	33 J	18 J	100 J	65 J	BDL	51 J	25 J	40 J
bis(2-ethylhexyl)phthalate	970 J	210 J	190 J	680 J	67 J	19 J	22 J	3900 J	310 J
Butylbenzylphthalate	BDL	30 J	49 J	BDL	BDL	BDL	18 J	27 J	53 J
Chrysene	32 J	88 J	54 J	200 J	230 J	BDL	10 J	49 J	120 J
Di-n-butylphthalate	BDL	BDL	BDL	BDL	BDL	68 J	BDL	BDL	BDL
Di-n-octylphthalate	BDL	BDL	BDL	BDL	BDL	BDL	BDL	9 J	6 J
Dibenz(a,h)anthracene	BDL	BDL	BDL	BDL	35 J	BDL	100 J	65 J	BDL
Dibenzofuran	BDL	BDL	BDL	BDL	BDL	BDL	BDL	30 J	BDL
Diethylphthalate	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Fluoranthene	34 J	130 J	49 J	100 J	400 J	BDL	BDL	59 J	110 J

TABLE 2--Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-9	SB-10,SS1	SB-10,SS2	SB-11	SB-12	SB-13	SB-14	SB-15	SB-16
Fluorene	BDL	BDL	BDL	BDL	26 J	BDL	BDL	47 J	BDL
Indeno(1,2,3-cd)pyrene	16 J	44 J	34 J	BDL	110 J	BDL	93 J	81 J	130 J
2-Methylnaphthalene	BDL	BDL	BDL	170 J	BDL	BDL	BDL	260 J	BDL
Naphthalene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	44 J	BDL
Pentachlorophenol	BDL	640 J	260 J	1100 J	BDL	BDL	BDL	2200 J	270 J
Phenanthrene	29 J	79 J	23 J	220 J	340 J	BDL	BDL	100 J	29 J
Pyrene	34 J	110 J	47 J	210 J	390 J	BDL	BDL	58 J	260 J
Pesticides and PCB (µg/kg)									
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dioxin/furan TEQ	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)									
Aluminum	13300	9470	8320	10200	6140	6920 J	15800 J	7970 J	9500 J
Antimony	2.8 J	BDL	BDL	BDL	BDL	BDL	2.7 J	BDL	4.6 J
Arsenic	6.7 J	3.2 J	NA	7.4 J	NA	2.3	2.8	2.4	3.8
Barium	27.4 J	57.3	56.9	68.2	12 J	14.3 J	17.9 J	39.6 J	98.3
Beryllium	BDL	BDL	BDL	0.35 J	BDL	BDL	BDL	BDL	0.28 J
Cadmium	BDL	0.53 J	0.43 J	1.8	0.49 J	BDL	BDL	0.93 J	1.8
Calcium	645 J	1650	957 J	3870	937 J	573 J	255 J	645 J	10400
Chromium	26.4	22.5	20.8	69.4 J	12.7 J	12.7 J	16 J	32.9 J	134 J
Cobalt	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Copper	23.9	50.3	49.4	78.9 J	10.3 J	2.7 J	5 J	51.9 J	103 J
Iron	24800	15300	12900	8530	8800	9960 J	15600 J	10100 J	21400 J

TABLE 2--Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-9	SB-10,SS1	SB-10,SS2	SB-11	SB-12	SB-13	SB-14	SB-15	SB-16
Lead	121 J	41.8 J	33.6 J	73.9 J	17 J	5.2 J	6 J	56.5 J	271 J
Magnesium	134 J	217 J	171 J	513 J	156 J	127 J	197 J	99.4 J	702 J
Manganese	22.7	253	231	37.7	30.6	12.7 J	15.5 J	61 J	104 J
Mercury	0.3 J	0.54 J	0.14 J	0.32 J	0.03 J	0.05 J	0.05 J	0.7 J	1.6 J
Nickel	1.6 J	13	8 J	22	2.3 J	1.7 J	5.1 J	6.4 J	50.6
Potassium	193 J	135 J	123 J	152 J	BDL	103 J	453 J	BDL	228 J
Selenium	BDL	BDL	BDL	0.78 J	BDL	NA	NA	NA	NA
Silver	0.72 J	1.5 J	1.1 J	2.3 J	BDL	BDL	1 J	BDL	1.2 J
Sodium	BDL	BDL	BDL	73.1 J	BDL	BDL	52.9 J	98.1 J	168 J
Vanadium	30.7	17.9	15.8	18.3	21.8	19.6 J	26.5 J	14.6 J	23.6 J
Zinc	75.9 J	194 J	119 J	157 J	25.2 J	4.5 J	22.5 J	75.7 J	313 J
Cyanide	BDL	BDL	0.3 J	3.6 J	BDL	NA	NA	NA	NA

Notes:

Shaded areas indicate duplicate extraction or analysis of the same sample.
SS1, SS2 - Duplicate samples.
RE - Reextracted.
BDL - Below detection limit.
NA - Not analyzed
J - Estimated quantity.
2ND - Second field effort.

TABLE 2--Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-17	SB-17RE	SB-17DL	SB-18	SB-19	SB-20SS1	SB-20SS2	SB-21	SB-22	SB-22
Volatile Organic Compounds (µg/kg)										
Acetone	BDL	NA	NA	BDL	100	BDL	BDL	BDL	BDL	NA
Bromodichloromethane	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL	NA
Carbon Disulfide	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL	NA
Chlorobenzene	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL	NA
Chloroform	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL	NA
Ethylbenzene	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL	NA
Tetrachloroethene	BDL	NA	NA	BDL	2 J	BDL	BDL	BDL	BDL	NA
1,1,1-Trichloroethane	BDL	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL	NA
Xylene (total)	BDL	NA	NA	BDL	6	BDL	BDL	BDL	BDL	NA
Semivolatile Organic Compounds (µg/kg)										
Acenaphthene	120 J	NA	NA	30 J	30 J	42 J	47 J	55 J	BDL	NA
Acenaphthylene	45 J	NA	NA	BDL	BDL	8 J	BDL	BDL	BDL	NA
Anthracene	600 J	NA	NA	5 J	7 J	92 J	96 J	110 J	12 J	NA
Benzo(a)anthracene	690 J	NA	NA	18 J	32 J	220 J	270 J	210 J	33 J	NA
Benzo(a)pyrene	580 J	NA	NA	33 J	27 J	180 J	260 J	180 J	33 J	NA
Benzo(b)fluoranthene	880 J	NA	NA	34 J	38 J	260 J	360 J	260 J	51 J	NA
Benzo(g,h,i)perylene	550 J	NA	NA	44 J	32 J	140 J	200 J	120 J	35 J	NA
Benzo(k)fluoranthene	280 J	NA	NA	11 J	15 J	100 J	110 J	76 J	13 J	NA
bis(2-ethylhexyl)phthalate	1600 J	NA	NA	140 J	38 J	140 J	89 J	1800 J	110 J	NA
Butylbenzylphthalate	46 J	NA	NA	18 J	18 J	35 J	BDL	BDL	28 J	NA
Chrysene	680 J	NA	NA	23 J	33 J	240 J	300 J	220 J	40 J	NA
Di-n-butylphthalate	BDL	NA	NA	BDL	BDL	210 J	BDL	BDL	BDL	NA
Di-n-octylphthalate	19 J	NA	NA	5 J	BDL	5 J	BDL	BDL	BDL	NA
Dibenz(a,h)anthracene	190 J	NA	NA	23 J	18 J	40 J	65 J	31 J	BDL	NA
Dibenzofuran	70 J	NA	NA	BDL	BDL	25 J	16 J	21 J	BDL	NA
Diethylphthalate	15 J	NA	NA	BDL	BDL	45 J	BDL	BDL	BDL	NA
Fluoranthene	1600 J	NA	NA	29 J	72 J	570 J	670 J	510 J	83 J	NA

TABLE 2--Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-17	SB-17RE	SB-17DL	SB-18	SB-19	SB-20SS1	SB-20SS2	SB-21	SB-22	SB-22
Fluorene	200 J	NA	NA	26 J	26 J	30 J	33 J	45 J	BDL	NA
Indeno(1,2,3-cd)pyrene	440 J	NA	NA	34 J	30 J	110 J	170 J	100 J	25 J	NA
2-Methylnaphthalene	110 J	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL	NA
Naphthalene	60 J	NA	NA	BDL	BDL	31 J	21 J	19 J	BDL	NA
Pentachlorophenol	160 J	NA	NA	BDL	BDL	BDL	BDL	BDL	BDL	NA
Phenanthrene	1300 J	NA	NA	9 J	49 J	530 J	490 J	460 J	39 J	NA
Pyrene	1100 J	NA	NA	22 J	56 J	420 J	500 J	380 J	60 J	NA
Pesticides and PCB (pg/kg)										
Aldrin	230 J	BDL	BDL	BDL	NA	NA	NA	NA	NA	BDL
alpha-Chlordane	BDL	BDL	BDL	BDL	NA	NA	NA	NA	NA	BDL
gamma-Chlordane	BDL	BDL	BDL	BDL	NA	NA	NA	NA	NA	BDL
Dieldrin	650 J	BDL	BDL	BDL	NA	NA	NA	NA	NA	BDL
4,4'-DDE	140 J	BDL	BDL	BDL	NA	NA	NA	NA	NA	BDL
4,4'-DDD	57 J	BDL	BDL	BDL	NA	NA	NA	NA	NA	BDL
Aroclor-1254	2300 J	1400 J	2200 J	BDL	NA	NA	NA	NA	2800 J	1500 J
Dioxin/furan TEQ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)										
Aluminum	14600 J	BDL	BDL	10200 J	4780 J	24300 J	30400 J	34100 J	8190 J	NA
Antimony	BDL	BDL	BDL	BDL	BDL	2.7 J	BDL	BDL	BDL	NA
Arsenic	BDL	BDL	BDL	2.7	BDL	BDL	3.4	BDL	3	NA
Barium	87.4	BDL	BDL	36.6 J	9.6 J	12.6 J	6.9 J	14 J	83.9	NA
Beryllium	BDL	BDL	BDL	0.43 J	BDL	BDL	0.25 J	0.3 J	BDL	NA
Cadmium	1.9	BDL	BDL	BDL	BDL	0.28 J	BDL	BDL	BDL	NA
Calcium	4000	BDL	BDL	12000	325 J	807 J	393 J	678 J	1580	NA
Chromium	37.4 J	BDL	BDL	19.5 J	12.1 J	63.9 J	29.4 J	52.2 J	20.4 J	NA
Cobalt	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA
Copper	94.1 J	BDL	BDL	13.9 J	3.8 J	190 J	37.1 J	86.5	6.6	NA
Iron	41200 J	BDL	BDL	7020 J	7490 J	20900 J	22300 J	24300 J	20400 J	NA

TABLE . 2--Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-17	SB-17RE	SB-17DL	SB-18	SB-19	SB-20SS1	SB-20SS2	SB-21	SB-22	SB-22
Lead	229 J	BDL	BDL	20.5 J	12.4 J	12.7 J	27 J	12.7 J	15.8 J	NA
Magnesium	453 J	BDL	BDL	2010	86.8 J	97.1 J	76.9 J	151 J	271 J	NA
Manganese	273 J	BDL	BDL	89.6 J	13.6 J	36.1 J	34.9 J	37.8 J	32.6 J	NA
Mercury	0.68 J	BDL	BDL	0.11 J	0.06 J	0.07 J	0.08 J	0.08 J	0.1 J	NA
Nickel	21.5	BDL	BDL	32.4	1.4 J	23.5	1.7 J	14.7	BDL	NA
Potassium	132 J	BDL	BDL	BDL	BDL	BDL	BDL	BDL	282 J	NA
Selenium	NA	BDL	BDL	NA	NA	NA	NA	NA	NA	NA
Silver	1.7 J	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NA
Sodium	68.4 J	BDL	BDL	392 J	BDL	BDL	BDL	BDL	51.1 J	NA
Vanadium	19.7 J	BDL	BDL	19.6 J	17.5 J	46.5 J	52.4 J	53.8 J	34.7 J	NA
Zinc	902 J	BDL	BDL	48.9 J	11.2 J	126 J	48.6 J	77.7 J	65.8 J	NA
Cyanide	NA	BDL	BDL	NA	NA	NA	NA	NA	NA	NA

Notes:

Shaded areas indicate duplicate extraction or analysis of the same sample.
SS1, SS2 - Duplicate samples.
RE - Reextracted.
BDL - Below detection limit.
NA - Not analyzed
J - Estimated quantity.
2ND - Second field effort.

TABLE 2--Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-22DL	SB-22DUPRE	SB-22DUP	SB-24	SB-25	SB-26	SB-28	SB-28 2ND
Volatile Organic Compounds (µg/kg)								
Acetone	NA	NA	NA	BDL	BDL	BDL	NA	BDL
Bromodichloromethane	NA	NA	NA	BDL	BDL	BDL	NA	BDL
Carbon Disulfide	NA	NA	NA	BDL	BDL	BDL	NA	BDL
Chlorobenzene	NA	NA	NA	BDL	BDL	BDL	NA	BDL
Chloroform	NA	NA	NA	BDL	BDL	BDL	NA	BDL
Ethylbenzene	NA	NA	NA	BDL	BDL	BDL	NA	BDL
Tetrachloroethene	NA	NA	NA	BDL	BDL	BDL	NA	BDL
1,1,1-Trichloroethane	NA	NA	NA	BDL	BDL	BDL	NA	BDL
Xylene (total)	NA	NA	NA	BDL	BDL	BDL	NA	BDL
Semivolatile Organic Compounds (µg/kg)								
Acenaphthene	NA	NA	NA	BDL	BDL	BDL	8400 J	BDL
Acenaphthylene	NA	NA	NA	BDL	130 J	BDL	260 J	BDL
Anthracene	NA	NA	NA	21 J	170 J	35 J	13000 J	8100
Benzo(a)anthracene	NA	NA	NA	71 J	910 J	100 J	4500 J	5300
Benzo(a)pyrene	NA	NA	NA	78 J	740 J	110 J	800 J	BDL
Benzo(b)fluoranthene	NA	NA	NA	96 J	1100 J	150 J	1500 J	2400
Benzo(g,h,i)perylene	NA	NA	NA	100 J	430 J	84 J	290 J	BDL
Benzo(k)fluoranthene	NA	NA	NA	44 J	280 J	41 J	610 J	BDL
bis(2-ethylhexyl)phthalate	NA	NA	NA	81 J	220 J	33 J	350 J	BDL
Butylbenzylphthalate	NA	NA	NA	BDL	BDL	BDL	BDL	BDL
Chrysene	NA	NA	NA	77 J	920 J	120 J	3600 J	4600
Di-n-butylphthalate	NA	NA	NA	BDL	180 J	280 J	BDL	BDL
Di-n-octylphthalate	NA	NA	NA	BDL	13 J	BDL	16 J	BDL
Dibenz(a,h)anthracene	NA	NA	NA	55 J	200 J	BDL	100 J	BDL
Dibenzofuran	NA	NA	NA	BDL	BDL	BDL	7600 J	2700
Diethylphthalate	NA	NA	NA	BDL	BDL	BDL	BDL	BDL
Fluoranthene	NA	NA	NA	150 J	1200 J	240 J	21000 J	27000

TABLE 2--Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-22DL	SB-22DUPRE	SB-22DUP	SB-24	SB-25	SB-26	SB-28	SB-28 2ND
Fluorene	NA	NA	NA	BDL	39 J	BDL	13000 J	6500
Indeno(1,2,3-cd)pyrene	NA	NA	NA	85 J	420 J	73 J	290 J	BDL
2-Methylnaphthalene	NA	NA	NA	BDL	BDL	BDL	450 J	BDL
Naphthalene	NA	NA	NA	BDL	BDL	BDL	480 J	BDL
Pentachlorophenol	NA	NA	NA	180 J	BDL	BDL	210 J	BDL
Phenanthrene	NA	NA	NA	85 J	420 J	160 J	19000 J	18000
Pyrene	NA	NA	NA	120 J	920 J	180 J	3400 J	13000
Pesticides and PCB (µg/kg)								
Aldrin	BDL	BDL	BDL	NA	NA	NA	NA	46
alpha-Chlordane	BDL	BDL	BDL	NA	NA	NA	NA	BDL
gamma-Chlordane	BDL	BDL	BDL	NA	NA	NA	NA	3.1
Dieldrin	BDL	BDL	BDL	NA	NA	NA	NA	BDL
4,4'-DDE	BDL	BDL	BDL	NA	NA	NA	NA	BDL
4,4'-DDD	BDL	BDL	BDL	NA	NA	NA	NA	4.3
Aroclor-1254	2200 J	1100 J	1700 J	NA	NA	NA	NA	BDL
Dioxin/furan TEQ	NA	NA	NA	NA	NA	NA	NA	0.244
Inorganics (mg/kg)								
Aluminum	NA	NA	NA	14200 J	7610 J	6560 J	4330 J	3320 J
Antimony	NA	NA	NA	BDL	BDL	BDL	BDL	BDL
Arsenic	NA	NA	NA	4.2	BDL	BDL	BDL	0.71
Barium	NA	NA	NA	34.4 J	15.6 J	12 J	30.4 J	12.8 J
Beryllium	NA	NA	NA	BDL	BDL	BDL	BDL	BDL
Cadmium	NA	NA	NA	0.36 J	BDL	BDL	0.57 J	BDL
Calcium	NA	NA	NA	3300	1400	3170	1690	454 J
Chromium	NA	NA	NA	17.9 J	11.2 J	7.4 J	9.5 J	4.1 J
Cobalt	NA	NA	NA	BDL	BDL	BDL	BDL	0.77
Copper	NA	NA	NA	14.4	4.7 J	5.8	9.7	3.5 J
Iron	NA	NA	NA	17600 J	7590 J	3910 J	8860 J	3130 J

TABLE 2--Continued
ANALYTICAL DATA SUMMARY FOR SOILS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	SB-22DL	SB-22DUPRE	SB-22DUP	SB-24	SB-25	SB-26	SB-28	SB-28 2ND
Lead	NA	NA	NA	53.6 J	20.6 J	33.9 J	147 J	9.1 J
Magnesium	NA	NA	NA	482 J	229 J	351 J	129 J	67.6 J
Manganese	NA	NA	NA	78 J	37.5 J	47.3 J	73.7 J	14.4 J
Mercury	NA	NA	NA	0.1 J	0.11 J	0.09 J	0.29 J	BDL J
Nickel	NA	NA	NA	3.5 J	9 J	BDL	3.4 J	2.2
Potassium	NA	NA	NA	147 J	BDL	BDL	BDL	BDL J
Selenium	NA	NA	NA	NA	NA	NA	NA	BDL
Silver	NA	NA	NA	BDL	BDL	BDL	BDL	BDL
Sodium	NA	NA	NA	60.9 J	BDL	50.7 J	46.5 J	25.7 J
Vanadium	NA	NA	NA	24.5 J	15.1 J	10.3 J	7.4 J	5.1 J
Zinc	NA	NA	NA	153 J	41.4 J	21.4 J	156 J	19.6 J
Cyanide	NA	NA	NA	NA	NA	NA	NA	BDL

Notes:

Shaded areas indicate duplicate extraction or analysis of the same sample.
SS1, SS2 - Duplicate samples.
RE - Reextracted.
BDL - Below detection limit.
NA - Not analyzed
J - Estimated quantity.
2ND - Second field effort.

TABLE 4.3
ANALYTICAL DATA SUMMARY FOR BACKGROUND GROUNDWATER BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in background samples.

Sample Location	BMW-4	BMW-5	MW-4	AVG
Volatile Organic Compounds (µg/L)				
Acetone	10 UJ	2 J	14 J	9 J
Carbon Disulfide	0.2 J	5 U	5 U	3 J
Chlorobenzene	3 J	0.5 J	5 U	3 J
Ethylbenzene	0.2 J	0.2 J	5 U	2 J
Tetrachloroethene	5 U	0.9 J	5 U	4 J
Xylene (total)	0.8 J	0.6 J	5 U	2 J
Semivolatile Organic Compounds (µg/L)				
Acenaphthene	1 J	10 UJ	10 UJ	7 J
bis(2-ethylhexyl)phthalate	1 J	10 UJ	10 UJ	7 J
Dibenzofuran	0.4 J	10 UJ	10 UJ	7 J
1,4-Dichlorobenzene	2 J	10 UJ	10 UJ	7 J
Diethylphthalate	10 UJ	2 J	10 UJ	7 J
Fluorene	0.9 J	10 UJ	10 UJ	7 J
2-Methylnaphthalene	2 J	10 UJ	10 UJ	7 J
N-Nitrosodiphenylamine	2 J	10 UJ	10 UJ	7 J
Phenanthrene	1 J	10 UJ	10 UJ	7 J
Pesticides and PCB (µg/L)	NA	NA	BDL	NA
Total (Unfiltered) Inorganics (µg/L)				
Aluminum	1430 J	26000 J	20200 J	15900 J
Barium	300	72.1 J	73.9 J	149 J
Calcium	130000	3870 U	5090 U	46300
Chromium	4.4 U	35.3	33.7 J	24 J
Iron	38200	39400	20600 J	32700 J
Lead	10.7 J	130, 12.3*	12	41 J
Magnesium	17500	1760 U	1340 U	6900
Manganese	158	97.5	153	136
Potassium	20300	1950 J	2410 J	8200 J
Sodium	33200 J	3850 J	2680 J	13200 J
Vanadium	3.3 U	42.2 J	33.1 J	26 J

TABLE 3--CONTINUED
ANALYTICAL DATA SUMMARY FOR
BACKGROUND GROUNDWATER
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in background samples.

Sample Location	BMW-4	BMW-5	MW-4	AVG
Dissolved (Filtered) Inorganics (µg/L)				
Barium	284	13.4 U	15.9 U	104
Calcium	125000	3570 U	4500 U	44400
Iron	34800	1630	69.6 U	12200
Lead	2.1 J	7.2 UJ	2.4 UJ	4 J
Magnesium	16900	1080 U	863 U	6300
Manganese	151	76.3	22.9	83
Potassium	20600	644 J	674 J	7300 J
Sodium	31600 J	3960 J	2540 J	12700 J

NOTES:

NA - Not analyzed.

U - Undetected; quantity shown is the detection limit.

J - Estimated quantity.

UJ - Undetected; quantity shown is an estimated detection limit.

BDL - Below detection limit.

* - Results of first and second field effort

TABLE 4
ANALYTICAL DATA SUMMARY FOR GROUNDWATER
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	BMW-1	BMW-2	BMW-3	BMW-6	BMW-7,W1	BMW-7,W2	MW-3D	MW-3I
Volatile Organic Compounds (µg/L)								
Acetone	10 UJ	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	0.6 J	BDL	BDL	BDL	0.6 J	BDL	BDL	3 J
Carbon Disulfide	BDL	BDL	BDL	BDL	BDL	0.5 J	BDL	BDL
Chlorobenzene	2 J	BDL	0.3 J	BDL	5	5 J	BDL	0.5 J
Chloroform	BDL	BDL	BDL	0.3 J	0.2 J	BDL	BDL	BDL
Ethylbenzene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2 J
Styrene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Toluene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.4 J
1,1,1-Trichloroethane	BDL	0.2 J	BDL	BDL	BDL	BDL	BDL	BDL
Xylene (total)	BDL	0.6 J	BDL	BDL	BDL	BDL	BDL	1 J
Semivolatile Organic Compounds (µg/L)								
Acenaphthene	BDL	BDL	BDL	BDL	1 J	0.9 J	BDL	0.4 J
Acenaphthylene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Anthracene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
bis(2-ethylhexyl)phthalate	0.4 J	BDL	BDL	BDL	0.6 J	0.6 J	0.4 J	0.4 J
2-chloronaphthalene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Di-n-butylphthalate	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dibenzofuran	BDL	BDL	BDL	BDL	0.4 J	0.4 J	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL	1 J	2 J	BDL	BDL
Diethylphthalate	BDL	BDL	BDL	BDL	0.4 J	0.3 J	2 J	0.5 J
2,4-Dimethylphenol	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Fluoranthene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Fluorene	BDL	BDL	BDL	BDL	0.7 J	0.7 J	BDL	BDL
Isophorone	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Methylnaphthalene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2-Methylphenol	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4 - Continued
ANALYTICAL DATA SUMMARY FOR GROUNDWATER
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	BMW-1	BMW-2	BMW-3	BMW-6	BMW-7,W1	BMW-7,W2	MW-3D	MW-3I
4-Methylphenol	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
N-Nitrosodiphenylamine	BDL	BDL	BDL	BDL	1 J	1 J	BDL	BDL
Naphthalene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1 J
Pentachlorophenol	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Phenanthrene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Phenol	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Pyrene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4,5-Trichlorophenol	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Pesticides and PCB (µg/L)								
Methoxychlor	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.21 J
Total (Unfiltered) Inorganics (µg/L)								
Aluminum	1400 J	3650 J	89400 J	472 J	2590 J	2130 J	28800 J	562 J
Arsenic	BDL	BDL	BDL	BDL	17.8	19.4 J	BDL	BDL
Barium	39.9 J	BDL	274	BDL	104 J	102 J	74.6 J	112 J
Beryllium	BDL	BDL	1.6 J	BDL	BDL	BDL	1.1 J	BDL
Cadmium	BDL	BDL	BDL	BDL	BDL	BDL	2.4 J	BDL
Calcium	BDL	BDL	27700	BDL	56500 J	56500 J	BDL	18300 J
Chromium	BDL	BDL	89.7	BDL	BDL	BDL	25.2 J	BDL
Cobalt	BDL	BDL	5.2 J	BDL	BDL	BDL	BDL	BDL
Copper	BDL	BDL	BDL	BDL	BDL	BDL	47.8	BDL
Iron	1110	3690	25600	771	54200	54500	9920 J	1540 J
Lead	BDL	5.7 J	7.4 J	BDL	BDL	BDL	9.4 J	BDL
Magnesium	BDL	BDL	12500	BDL	13700	13800	BDL	14200
Manganese	BDL	BDL	71.9	67.3	210	212	67.3	479
Mercury	0.23 J	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Potassium	677 J	1160 J	36700	BDL	32300	32200	2670 J	1370 J
Sodium	19200 J	3890 J	51800 J	2490 J	45400 J	46000 J	2240 J	35100 J
Vanadium	BDL	6.9 J	92.1	BDL	5.6 J	3.9 J	28 J	BDL

TABLE 4 - Continued
ANALYTICAL DATA SUMMARY FOR GROUNDWATER
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	BMW-1	BMW-2	BMW-3	BMW-6	BMW-7,W1	BMW-7,W2	MW-3D	MW-3I
Zinc	BDL	BDL	BDL	BDL	BDL	BDL	1300	BDL
Dissolved (Filtered) Inorganics (µg/L)								
Aluminum	BDL	BDL	571	BDL	BDL	BDL	BDL	BDL
Arsenic	BDL	BDL	BDL	BDL	23.9 J	45 J	BDL	BDL
Barium	28.1 J	BDL	49.5 J	BDL	99.4 J	108 J	BDL	127 J
Calcium	BDL	BDL	14200	BDL	55500 J	56500 J	BDL	15700 J
Chromium	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Cobalt	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3.8 J
Iron	BDL	44.3 J	2650	BDL	51800	52700	BDL	BDL
Lead	BDL	3.2 J	3.8 J	BDL	BDL	BDL	BDL	BDL
Magnesium	BDL	BDL	5200 J	BDL	13700	14000	BDL	13400
Manganese	BDL	BDL	30.1	74.2	208	212	40.3	523
Mercury	BDL	BDL	0.12 J	BDL	BDL	BDL	BDL	BDL
Potassium	680 J	BDL	17100	959 J	33500	33900	BDL	1280 J
Sodium	16000 J	2850 J	26600 J	2140 J	46600 J	47300 J	BDL	41700 J
Thallium	BDL	BDL	BDL	BDL	BDL	BDL	5 J	BDL
Vanadium	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Notes:

SS1, SS2 - Duplicate samples.

Shaded areas indicate duplicate extraction or analysis of the same sample.

NA - Not analyzed.

U - Undetected; quantity shown is the detection

J - Estimated quantity.

UJ - Undetected -- quantity shown is an estimated detection limit.

BDL - Below detection limit.

TABLE 4 -- Continued
ANALYTICAL DATA SUMMARY FOR GROUNDWATER
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	MW-5	MW-6W1	MW-6W2	TW-1	TW-2	TW-3
Volatile Organic Compounds (µg/L)						
Acetone	32 J	BDL	BDL	2500 J	1600 J	26 J
Benzene	0.3 J	0.9 J	0.9 J	BDL	BDL	BDL
Carbon Disulfide	BDL	BDL	BDL	BDL	BDL	BDL
Chlorobenzene	BDL	0.4 J	0.4 J	BDL	BDL	BDL
Chloroform	BDL	BDL	BDL	BDL	BDL	BDL
Ethylbenzene	BDL	3 J	3 J	BDL	BDL	BDL
Styrene	BDL	0.3 J	0.4 J	BDL	BDL	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL	BDL	BDL
Toluene	0.3 J	5	6	BDL	BDL	BDL
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL	BDL	BDL
Xylene (total)	0.9 J	7	8	BDL	BDL	BDL
Semivolatile Organic Compounds (µg/L)						
Acenaphthene	BDL	180 J	170 J	BDL	BDL	BDL
Acenaphthylene	BDL	6 J	6 J	BDL	BDL	BDL
Anthracene	BDL	19 J	18 J	BDL	BDL	BDL
bis(2-ethylhexyl)phthalate	BDL	0.6 J	0.6 J	1 J	BDL	BDL
2-chloronaphthalene	BDL	12 J	11 J	BDL	BDL	BDL
Di-n-butylphthalate	BDL	BDL	BDL	BDL	1	BDL J
Dibenzofuran	BDL	130 J	130 J	BDL	BDL	BDL
1,4-Dichlorobenzene	BDL	BDL	BDL	BDL	BDL	BDL
Diethylphthalate	BDL	0.6 J	0.5 J	BDL	BDL	BDL
2,4-Dimethylphenol	BDL	35 J	33 J	BDL	BDL	BDL
Fluoranthene	BDL	7 J	6 J	BDL	BDL	BDL
Fluorene	BDL	120 J	120 J	BDL	BDL	BDL
Isophorone	BDL	2 J	2 J	BDL	BDL	BDL
2-Methylnaphthalene	BDL	220 J	230 J	BDL	BDL	BDL
2-Methylphenol	BDL	7 J	7 J	BDL	BDL	BDL

TABLE 4 -- Continued
ANALYTICAL DATA SUMMARY FOR GROUNDWATER
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	MW-5	MW-6W1	MW-6W2	TW-1	TW-2	TW-3
4-Methylphenol	BDL	9 J	9 J	BDL	BDL	BDL
N-Nitrosodiphenylamine	BDL	BDL	BDL	BDL	BDL	BDL
Naphthalene	BDL	610 J	640 J	BDL	BDL	BDL
Pentachlorophenol	BDL	130 J	120 J	BDL	BDL	BDL
Phenanthrene	BDL	110 J	110 J	BDL	BDL	BDL
Phenol	BDL	0.8 J	0.6 J	BDL	BDL	BDL
Pyrene	BDL	3 J	2 J	BDL	BDL	BDL
2,4,5-Trichlorophenol	BDL	2 J	2 J	BDL	BDL	BDL
Pesticides and PCB (µg/L)						
Methoxychlor	BDL	BDL	BDL	BDL	BDL	BDL
Total (Unfiltered) Inorganics (µg/L)						
Aluminum	13600 J	96900 J	57000 J	NA	NA	NA
Arsenic	BDL	BDL	BDL	NA	NA	NA
Barium	43.3 J	200 J	139 J	NA	NA	NA
Beryllium	BDL	1.8 J	1.2 J	NA	NA	NA
Cadmium	BDL	BDL	BDL	NA	NA	NA
Calcium	13000 J	14600	14000	NA	NA	NA
Chromium	30 J	89.8	54.4	NA	NA	NA
Cobalt	BDL	6.2 J	BDL	NA	NA	NA
Copper	BDL	BDL	BDL	NA	NA	NA
Iron	4410 J	41200	27900	NA	NA	NA
Lead	BDL	9.3 J	8.4 J	NA	NA	NA
Magnesium	BDL	7550	6640	NA	NA	NA
Manganese	43.1	412	391	NA	NA	NA
Mercury	BDL	0.13 J	BDL	NA	NA	NA
Potassium	4360 J	4580 J	2810 J	NA	NA	NA
Sodium	4380 J	15100 J	15100 J	NA	NA	NA
Vanadium	13.2 J	137	81.3	NA	NA	NA

TABLE 4 -- Continued
ANALYTICAL DATA SUMMARY FOR GROUNDWATER
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were non-detect in all samples.

Sample Location	MW-5	MW-6W1	MW-6W2	TW-1	TW-2	TW-3
Zinc	BDL	BDL	BDL	NA	NA	NA
Dissolved (Filtered) Inorganics (µg/L)						
Aluminum	14600 J	BDL	BDL	NA	NA	NA
Arsenic	BDL	BDL	BDL	NA	NA	NA
Barium	45.5 J	39.4 J	43 J	NA	NA	NA
Calcium	12600 J	12200	13600	NA	NA	NA
Chromium	27.4	BDL	BDL	NA	NA	NA
Cobalt	BDL	BDL	BDL	NA	NA	NA
Iron	4560	8800	8730	NA	NA	NA
Lead	10.9 J	1.9 J	2.5 J	NA	NA	NA
Magnesium	BDL	4760 J	5040	NA	NA	NA
Manganese	43	350	346	NA	NA	NA
Mercury	BDL	BDL	BDL	NA	NA	NA
Potassium	4580	688 J	729 J	NA	NA	NA
Sodium	4460 J	14000 J	14000 J	NA	NA	NA
Thallium	BDL	BDL	BDL	NA	NA	NA
Vanadium	13.3 J	BDL	BDL	NA	NA	NA

Notes:

SS1, SS2 - Duplicate samples.

Shaded areas indicate duplicate extraction or analysis of the same sample.

NA - Not analyzed.

U - Undetected; quantity shown is the detection

J - Estimated quantity.

UJ - Undetected -- quantity shown is an estimated detection limit.

BDL - Below detection limit.

TABLE 8
ANALYTICAL DATA SUMMARY
FOR UPSTREAM SURFACE WATERS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were below detection limits in all samples.

Sample Location	SW-6 upstream Elevenmile Creek	SW-8 upstream Coffee Creek
Volatile Organic Compounds (µg/L)		
Acetone	BDL	BDL
Benzene	BDL	BDL
Carbon Disulfide	BDL	BDL
Chloroform	BDL	BDL
Tetrachloroethene	0.5 J	BDL
Semivolatile Organic Compounds (µg/L)		
bis(2-ethylhexyl)phthalate	BDL	BDL
2,4,6-Trichlorophenol	0.9 J	BDL
Pesticides and PCB (µg/L)	BDL	BDL
Total (Unfiltered) Inorganics (µg/L)		
Aluminum	587	344
Antimony	BDL	BDL
Barium	95.4 J	17.8 J
Calcium	26000 J	3550 J
Chromium	BDL	BDL
Cobalt	BDL	BDL
Iron	400 J	1180 J
Magnesium	3400 J	1250 J
Manganese	153	12.4 J
Nickel	BDL	BDL
Potassium	20400	858 J
Sodium	318000	2800 J
Vanadium	5 J	BDL
Zinc	BDL	BDL
Cyanide *	18 J, BDL	BDL, BDL
Dissolved (Filtered) Inorganics (µg/L)		
Aluminum	BDL	290
Barium	104 J	18.7 J
Calcium	28000 J	3720 J
Iron	258 J	962 J
Magnesium	3670 J	1270 J
Manganese	162	12.4 J
Mercury	BDL	0.19 J
Potassium	23200	672 J
Sodium	353000	3060 J
Vanadium	BDL	BDL

NOTES:

SS1, SS2 - Duplicate samples.

Shaded areas indicate duplicate extraction or analysis of the same sample.

U - Undetected; quantity shown is the detection

J - Estimated quantity.

UJ - Undetected; quantity shown is an estimated detection limit.

NA - Not analyzed.

BDL - Below detection limit.

* - results from 1st and 2nd field effort

TABLE 9
ANALYTICAL DATA SUMMARY FOR SURFACE WATERS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were below detection limits in all samples.

Sample Location	SW-1,W2 (swale)	SW-2 (swale)	SW-3	SW-4,SS1	SW-4,SS2	SW-5	SW-7
Volatile Organic Compounds (µg/L)							
Acetone	BDL	BDL	BDL	BDL	BDL	BDL	9 J
Benzene	BDL	0.2 J	BDL	BDL	BDL	BDL	BDL
Carbon Disulfide	BDL	BDL	BDL	BDL	BDL	0.4 J	BDL
Chloroform	BDL	BDL	0.2 J	BDL	BDL	0.2 J	BDL
Tetrachloroethene	BDL	BDL	0.5 J	0.6 J	0.6 J	0.6 J	BDL
Semivolatile Organic Compounds (µg/L)							
bis(2-ethylhexyl)phthalate	BDL	NA	0.3 J	0.3 J	BDL	BDL	BDL
2,4,6-Trichlorophenol	BDL	NA	0.9 J	0.9 J	1 J	BDL	BDL
Pesticides and PCB (µg/L)	NA	NA	BDL	NA	NA	NA	BDL
Total (Unfiltered) Inorganics (µg/L)							
Aluminum	611	14700	694	440	559	591	BDL
Antimony	BDL	18 J	BDL	BDL	BDL	BDL	BDL
Barium	39.5 J	134 J	87.3 J	91.2 J	90.3 J	97.3 J	17.5 J
Calcium	33300 J	98400 J	22700 J	23600 J	23000 J	26500 J	5080 J
Chromium	BDL	32.7 J	BDL	4.4 J	BDL	4.7 J	BDL
Cobalt	BDL	4.8 J	BDL	BDL	BDL	BDL	BDL
Iron	1410 J	24500 J	613 J	574 J	518 J	480 J	1730 J
Magnesium	6440	14900	3480 J	3460 J	3330 J	3490 J	1530 J
Manganese	32.8	541	144	148	151	156	19
Nickel	10.4 J	11.6 J	BDL	BDL	BDL	8.4 J	BDL
Potassium	7060	22000	14700	15500	15200	2060	1620 J
Sodium	8600	39000	244000	259000	263000	322000	3860 J
Vanadium	BDL	19 J	4.2 J	4.2 J	3.3 J	5.3 J	BDL
Zinc	BDL	122	BDL	BDL	BDL	BDL	BDL
Cyanide *	NA,BDL	NA	13 J, BDL	15 J	16 J	19 J	BDL, BDL

TABLE 9 -- Continued
ANALYTICAL DATA SUMMARY FOR SURFACE WATERS
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were below detection limits in all samples.

Sample Location	SW-1,W2 (swale)	SW-2 (swale)	SW-3	SW-4,SS1	SW-4,SS2	SW-5	SW-7
Dissolved (Filtered) Inorganics (µg/L)							
Aluminum	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Barium	40.6 J	75 J	97 J	103 J	101 J	105 J	19.5 J
Calcium	35800 J	85600 J	25000 J	26600 J	25800 J	28800 J	4790 J
Iron	913 J	151 J	423 J	366 J	332 J	284 J	998 J
Magnesium	6910	15300	3780 J	3920 J	3790 J	3820 J	1480 J
Manganese	30.7	322	159	164	161	163	16.4 J
Mercury	BDL	BDL	BDL	BDL	BDL	0.27 J	BDL
Potassium	7950	24500	16700	18000	17800	22800	1350 J
Sodium	9180	43700	282000	298000	293000	354000	3840 J
Vanadium	BDL	BDL	BDL	BDL	3.6 J	BDL	BDL

NOTES:

SS1, SS2 - Duplicate samples.

Shaded areas indicate duplicate extraction or analysis of the same sample.

U - Undetected; quantity shown is the detection limit.

J - Estimated quantity.

UJ - Undetected; quantity shown is an estimated detection limit.

NA - Not analyzed.

BDL - Below detection limit.

* - results from 1st and 2nd field effort

TABLE 11
ANALYTICAL DATA SUMMARY FOR UPSTREAM SEDIMENTS BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were below detection limits for both samples.

Sample Location	SD-6	SD-8
Volatile Organic Compounds (µg/kg)		
Acetone	10 J	BDL
Chlorobenzene	BDL	BDL
Semivolatile Organic Compounds (µg/kg)		
Benzo(g,h,i)perylene	14 J	13 J
bis(2-ethylhexyl)phthalate	29 J	14 J
Indeno(1,2,3-cd)pyrene	13 J	12 J
Pesticides and PCB (µg/kg)		
Heptachlor epoxide	BDL	15 J
Inorganics (mg/kg)		
Aluminum	562	1260
Barium	1.8 J	1.9 J
Cadmium	BDL	0.26 J
Calcium	24.1 J	42.2 J
Chromium	1.3 J	2.1 J
Copper	0.39 J	0.79 J
Iron	291	1150
Lead	0.91	1.4
Magnesium	12 J	18.3 J
Manganese	1.3 J	1.5 J
Vanadium	0.93 J	2.3 J
Zinc	2.6 J	2.4 J

NOTES:

BDL - Below detection limit.

J - Estimated quantity.

TABLE 12
ANALYTICAL DATA SUMMARY FOR SEDIMENT
BEULAH LANDFILL SITE
Escambia County, Florida

NOTE: Constituents not listed were below detection limits in all samples.

Sample Location	SD-1 (swale)	SD-2 (swale)	SD-3	SD-4,SS1	SD-4,SS2	SD-5	SD-7
Volatile Organic Compounds (µg/kg)							
Acetone	BDL	BDL	64	81	BDL	BDL	3 J
Chlorobenzene	BDL	1 J	BDL	BDL	BDL	BDL	0.7 J
Semivolatile Organic Compounds (µg/kg)							
Benzo(a)anthracene	BDL	31 J	BDL	BDL	BDL	BDL	BDL
Benzo(b)fluoranthene	BDL	25 J	BDL	BDL	BDL	BDL	BDL
Benzo(g,h,i)perylene	41 J	74 J	20 J	BDL	BDL	BDL	BDL
Benzo(k)fluoranthene	BDL	9 J	BDL	BDL	BDL	BDL	BDL
bis(2-ethylhexyl)phthalate	BDL	220 J	BDL	BDL	BDL	12 J	BDL
Chrysene	BDL	17 J	BDL	BDL	BDL	BDL	BDL
Dibenz(a,h)anthracene	34 J	84 J	BDL	BDL	BDL	BDL	BDL
Fluoranthene	BDL	34 J	BDL	BDL	BDL	BDL	BDL
Indeno(1,2,3-cd)pyrene	43 J	BDL	BDL	BDL	BDL	BDL	12 J
Pyrene	BDL	32 J	BDL	BDL	BDL	BDL	BDL
Pesticides and PCB (µg/kg)							
Heptachlor epoxide	NA	NA	BDL	NA	NA	NA	BDL
Inorganics (mg/kg)							
Aluminum	6120	14900	667	392	586	486	1460
Antimony	NA	NA	NA	NA	NA	NA	2.3 J
Arsenic	1.8 J	4.8 J	BDL	BDL	BDL	BDL	2.2 J
Barium	29.4 J	60.9 J	4.3 J	2.6 J	3 J	1.2 J	2.2 J

TABLE 12--CONTINUED
ANALYTICAL DATA SUMMARY FOR SEDIMENT
BEULAH LANDFILL SITE
Escambia County, Florida

Sample Location	SD-1	SD-2	SD-3	SD-4,SS1	SD-4,SS2	SD-5	SD-7
Cadmium	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Calcium	2100	10800	31.8 J	42.6 J	46 J	BDL	41.7 J
Chromium	15.6 J	68.9 J	1.2 J	1.1 J	1 J	1.3 J	80.8 J
Copper	11.1	26.4	0.94 J	0.26 J	0.41 J	0.31 J	0.5 J
Iron	8930	17300	712	324	400	232	3930
Lead	11.1	37.4	9.8	3.6	0.55 J	2.2	1.4
Magnesium	212 J	641 J	10.4 J	7.7 J	13.9 J	7.8 J	23 J
Manganese	43.9 J	71	2.5	1.9	2	BDL	4.2
Mercury	0.09	0.2 J	BDL	BDL	BDL	BDL	BDL
Nickel	7.3 J	5.6 J	BDL	BDL	BDL	BDL	BDL
Potassium	329 J	773 J	BDL	BDL	BDL	BDL	BDL
Silver	BDL	3.3 J	BDL	BDL	BDL	BDL	BDL
Sodium	BDL	169 J	BDL	65 J	BDL	BDL	BDL
Vanadium	15.2 J	31.2	1.1 J	0.59 J	0.86 J	0.78 J	2.5 J
Zinc	111 J	221 J	3.1 J	2.2 J	2.7 J	2.5 J	2.4 J

NOTES:

BDL - Below detection limit.

J - Estimated quantity.

Shaded areas indicate duplicate extraction or analysis of the same sample.

SS1, SS2 - Duplicate samples.

RE - Reextracted.

NA - Not analyzed.

APPENDIX C

RISK ASSESSMENT TABLES

Beulah Landfill Site
Contaminants of Concern

	Groundwater	Surface Water	Sediment	Surface Soil	Air
INORGANICS					
Aluminum		X	X	X	X
Antimony		X	X	X	
Arsenic	X		X	X	X
Barium	X	X	X	X	X
Beryllium	X				
Cadmium	X			X	
Chromium	X	X	X	X	
Cobalt	X	X			
Copper			X	X	X
Iron					X
Lead			X	X	X
Manganese	X	X	X	X	X
Mercury			X	X	X
Nickel			X	X	
Silver			X		
Vanadium	X	X	X		
Zinc	X		X	X	X
VOLATILE ORGANICS					
Acetone	X				
Benzene	X	X			
Chloroform	X	X		X	
Methylene Chloride	X			X	
Styrene	X				
Tetrachloroethene	X	X		X	
PESTICIDES/PCBs					
Aldrin				X	
Alpha Chlordane				X	
Gamma Chlordane				X	
Dieldrin				X	
4,4'-DDE(P,P'-DDE)				X	
4,4'-DDD(P,P'-DDD)				X	
Arocior-1254				X	
SEMI-VOLATILE ORGANICS					
Acenaphthene	X				
Benzo(a)anthracene			X	X	
Benzo(b)fluoranthene			X	X	
Benzo(k)fluoranthene			X	X	
Benzo(a)pyrene				X	
Benzyl Alcohol					X
Bis(2-ethylhexyl)phthalate	X	X	X	X	
Butylbenzylphthalate					X
Chrysene			X	X	
Dibenzo(a,h)anthracene			X	X	
Dibenzofuran	X				
Di-n-butylphthalate					X
1,4-Dichlorobenzene	X				
Fluorene	X				
Indeno(1,2,3-cd)pyrene			X	X	
Isophorone	X				
Naphthalene	X				
2-Methylnaphthalene	X				
N-Nitrosodiphenylamine	X				
Pentachlorophenol	X			X	
Phenanthrene	X				
2,4,6-Trichlorophenol		X			

Table 2

Cancer Slope Factors (CSFs)
(mg/kg-day)$^{-1}$

Chemical	Oral	Reference	Inhalation	Reference	Dermal
Organics					
Aldrin	1.7E+1	IRIS, 1993	1.72E+1	IRIS, 1993	3.4E+1d
Arochlor-1254(PCB)	7.7E+0	IRIS, 1993	NTV	--	1.54E+1d
Benzene	2.9E-2	IRIS, 1993	2.92E-2	IRIS, 1993	3.22E-2g
Benzo(a)anthracene	7.3E+0	BaP	NTV	--	1.46E+1d
Benzo(a)pyrene	7.3E+0	EPA, 1992c	NTV	--	1.46E+1d
Benzo(b and/or k)fluoranthene	7.3E+0	BaP	NTV	--	1.46E+1d
Bis (2-ethylhexyl) phthalate	1.4E-2	IRIS, 1993	NTV	--	2.8E-2d
Chlordane	1.3E+0	IRIS, 1993	1.3E+0	--	2.6E+0d
Chloroform	6.1E-3	IRIS, 1993	8.05E-2	IRIS, 1993	6.78E-3w
Chrysene	7.3E+0	BaP	NTV	--	1.46E+1d
Dibenzo(a,h)anthracene	7.3E+0	BaP	NTV	--	1.46E+1d
4,4'-DDE (P,P'-DDE)	3.4E-1	IRIS, 1993	NTV	--	6.8E-1d
4,4'-DDD (P,P'-DDD)	2.4E-1	IRIS, 1993	NTV	--	4.8E-1d
1,4-Dichlorobenzene	2.4E-2	HEAST, 1992	NTV	--	2.67E-2g
Dieldrin	1.6E+1	HEAST, 1992	1.6E+1[2]	IRIS, 1992	3.2E+1d
Indeno(1,2,3-cd)pyrene	7.3E+0	BaP	NC	--	1.46E+1d
Isophorone	9.5E-4	IRIS, 1993	NTV	--	1.05E-3g
Methylene Chloride	7.5E-3	IRIS, 1993	1.65E-3[2]	IRIS, 1993	8.33E-3i,w
N-Nitrosdiphenylamine	4.9E-3	IRIS, 1993	NTV	--	9.8E-3d
Pentachlorophenol	1.2E-1	IRIS, 1993	NTV	--	2.4E-1d
Styrene	NTV	--	NTV	--	--
Tetrachloroethene	5.2E-2	IRIS, 1993	2.03E-3	IRIS, 1993	5.78E-2g
2,4,6-Trichlorophenol	1.1E-2	IRIS, 1993	1.09E-2	IRIS, 1993	2.2E-2d
Inorganics					
Arsenic	1.75E+0	IRIS, 1993	1.51E+1	HEAST, 1992	3.5E+1
Beryllium	4.3E+0	IRIS, 1993	8.4E+0[2]	IRIS, 1993	8.6E+1
Cadmium	NTV[3]	--	6.3E+0	HEAST, 1992	NTV
Chromium (VI)	NTV[3]	--	4.2E+1	HEAST, 1992	--
Lead	NTV	--	NC	--	NTV

[1] The dermal CSF was derived based on the route of administration used in the study on which the oral CSF is derived, where d = dietary, g = gavage, i = inhalation, w = drinking water. The oral doses for gavage, inhalation, and drinking water were assumed to have 90% absorption; the dietary route was assumed to have 50% absorption; and the metals were assumed to have 5% absorption.

[2] Derived from a unit risk by dividing by 20 m^3/day, and multiplying by a body weight of 70 kg and a conversion factor of 1,000 (EPA, 1992a) or b).

[3] Classified as a carcinogen but an oral slope factor has not been designated.

NTV = No toxicity data were available.
NC = Not of concern for this route of exposure. Inhalation was only evaluated for groundwater showering and not for dust inhalation. Therefore, only VOCs were evaluated.
BaP = Toxicity values assigned to Benzo(a)pyrene.

Table 3

Lifetime Cancer Risk-Current and Future Scenarios
Reasonable Maximum Exposure Concentrations

Exposure Medium	Current/Future Trespasser
Groundwater	NE
Surface Soil	2.7E-6
Outdoor Air Inhalation	1.3E-6
Surface Water	1.7E-8
Sediment	4.8E-7
Total	4.5E-6

NE - Not Evaluated

Table 4
Substances of Concern (Reasonable Maximum Concentration)
That Contribute to Carcinogenic Risk
Exceeding One in One Million (10^{-6})

Exposure Medium	Current/Future Trespasser
Outdoor Air Inhalation	Arsenic 1.3E-6
Surface Soil	Arsenic (6.9E-7) Aldrin (2.5E-7) Dieldrin (6.7E-7) Arochlor-1254 (7.4E-7) Total 2.3E-6
Groundwater	NE
Surface Water	NC
Sediment	NC

NE - Not Evaluated
NC - No Concern, did not exceed 1E-6 risk

Table 5
Total Hazard Index - Current and Future Trespasser Scenario
Reasonable Maximum Exposure Concentration

Exposure Medium	Current/Future Trespasser
Groundwater	NE
Surface Water	0.25
Sediment	0.033
Outdoor Air Inhalation	0.02
Surface Soil	0.061
Total	**0.36**

NE - Not Evaluated

Table 6

Model and Assumptions for Calculating Estimated Daily Contaminant Intake by the Eastern Cottontail *(Sylvilagus floridanus)* Through Ingestion of Vegetation (shoots) and Soils Beulah Landfill, Escambia Co., FL.

Estimated Daily Contaminant Intake (mg/kg-day dry weight) Via:

Plant Material Ingestion (mg/kg-day dry weight) = $\frac{CV*VIR*FI}{BW}$

Incidental Soil Ingestion (mg/kg-day dry weight) = $\frac{CS*SIR*FI}{BW}$

Where:

CV	=	Concentration of contaminant in vegetation (mg/kg dry weight). Listed in Appendix I.
CS	=	Concentration of contaminant in soil (mg/kg). Listed in Appendix I.
VIR	=	Estimated mean daily Vegetation Ingestion Rate (kg/day dry weight). Assumed to be 0.108 kg/day based upon literature averages for the black-tailed jackrabbit. (Arnold 1943; Arnold and Reynolds 1943; Arthur and Gates 1988; Nagy et al. 1976).
SIR	=	Estimated mean daily Soil Ingestion Rate (kg/day). Assumed to be 0.006 kg/day based upon the equation given in Arthur and Gates (1988).
FI	=	Fraction ingestion from source: 1.0. This value is dependent upon the home range size of the cottontail. It is conservatively assumed that the swamp rabbit's home range is smaller than the dredge spoils. Therefore, it is exposed to contaminants of concern 100% of the time.
BW	=	Average body weight of an adult cottontail rabbit (kg). Assumed to be similar o that of the Swamp Rabbit: 2.23 kg (Palmer et al. 1991).

Table 7

Model and Assumptions for Calculating Estimated Daily Contaminant Intake by the Chipping Sparrow (*Spizella passerina*) Through Ingestion of Seeds and Soils, Beulah Landfill, Escambia Co., FL.

Estimated Daily Contaminant Intake (mg/kg-day dry weight) Via:

$$\text{Seed Ingestion (mg/kg-day dry weight)} = \frac{CI*FIR*FI}{BW}$$

$$\text{Incidental Soil Ingestion (mg/kg-day dry weight)} = \frac{CS*SIR*FI}{BW}$$

Where:

CI = Concentration of contaminants in seeds (mg/kg dry weight). Listed in Appendix I.

CS = Concentration of contaminants in soil (mg/kg). Listed in Appendix I.

FIR = Estimated mean daily Food (seed) Ingestion Rate (kg/day dry weight). Assumed to be 0.00486 kg/d based on literature averages (Pulliam 1985.).

SIR = Estimated mean daily Soil Ingestion Rate (kg/day). Assumed to be 1% of daily intake (0.0000486 kg/d).

FI = Fraction ingestion from source: 1.0. This value is dependent upon the home range size of the sparrow. It is conservatively assumed that the sparrow's home range is smaller than the dredge spoils. Therefore, it is exposed to contaminants of concern 100% of the time.

BW = Average body weight of an adult sparrow (kg). Assumed to be 0.012 kg (Clench and Leberman 1978).

Table 8

Approach Used to Derive Critical Toxicity Values for Terrestrial Wildlife, Beulah Landfill, Escambia Co., FL.

Available Toxicity Endpoints	Target Endpoints	Divide By (Safety Factors)
Acute lethality (LD_{50})/Acute LOEL	Acute toxicity threshold	5
Acute toxicity threshold	Chronic NOEL	100
Chronic LOEL	Chronic NOEL	5
Within phylogenetic class (different species but same class)	Target species toxicity	5

As an example, in developing a CTV for a rabbit when the only datum available is an LD50 for a rat, the following steps would be taken:

Rat LD_{50} for contaminant X = 50 mg/kg

1. Acute lethality --> Acute toxicity threshold $\frac{(50\ mg/kg)}{5} = 10\ mg/kg$

2. Acute toxicity --> Chronic NOEL threshold $\frac{(10\ mg/kg)}{100} = 0.1\ mg/kg$

3. Within phylogenetic class sensitivity --> Target species CTV $\frac{(1\ mg/kg)}{5} = 0.02\ mg/kg$

Table 9

Summary of Critical Toxicity Values (CTVs) for the Eastern Cottontail
via the Ingestion Pathway,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Endpoint	Duration	Effect Measured	Dose (mg/kg-BW)	CTV (mg/kg-BW)	Reference
Volatile Organics							
Acetone	Rat	Chronic NOEL	90 days	Kidney Effects	1.00E+02	2.00E+01	IRIS 1992
Chlorobenzene	Rat	Chronic NOEL	103 weeks	Survival	8.57E+01	1.71E+01	HSDB 1992
Chloroform	Rabbit	Chronic LOEL	6 to 18 days	Fetotoxicity	2.60E+02	5.20E+01	RTECS 1992
Methylene chloride	Rat	Chronic NOEL	2 years	Hepatotoxicity	5.00E+00	1.00E+00	IRIS 1992
Tetrachloroethene	Rat	Chronic NOEL	NR	Hepatotoxicity	1.40E+01	2.80E+01	IRIS 1992
1,1,1-Trichloroethane	Rat	Chronic NOEL	NR	NR	3.00E+00	6.00E+01	ATSDR 1990
Xylene	Mouse	Chronic NOEL	Gestation	Developmental	2.06E+01	4.24E+01	RTECS 1992
Semivolatile Organics							
Acenaphthene	NDA						
Acenaphthylene	NDA						
Anthracene	Mouse	Chronic NOEL	90 days	Hepatotoxicity	1.00E+03	2.00E+02	IRIS 1992
Benzo(a)anthracene	Rat	Acute NOEL	4 days	Hepato/Gastro/Renal	1.50E+02	3.00E-01	E-507
Benzo(a)pyrene	Mouse	Chronic LOEL	6 months	Aplastic Anemia	1.20E+02	4.80E+00	E-507
Benzo(b)fluoranthene	NDA						
Benzo(g,h,i)perylene	NDA						
Benzo(k)fluoranthene	NDA						
Bis(2-ethylhexyl)phthalate	Mouse	Chronic NOEL	Gestation	Teratogenicity	2.50E+01	5.00E+00	E-303
Butylbenzylphthalate	Rat	Chronic NOEL	26 weeks	Renal	1.59E+02	3.18E+01	IRIS 1992
Chrysene	NDA						
Dibenzo(a,h)anthracene	NDA						
Dibenzofuran	NDA						
Diethylphthalate	NDA						
Di-n-butylphthalate	Rat	Chronic NOEL	1 year	Lethality	1.25E+02	2.50E+01	IRIS 1992
Di-n-octylphthalate	NDA						
Fluoranthene	Mouse	Chronic NOEL	13 weeks	Liver Weight/Kidneys	1.25E+02	2.50E+01	IRIS 1992
Fluorene	NDA						
Indeno(123-c,d)pyrene	NDA						
2-Methylnaphthalene	Rat	LD50	1 dose	Lethality	1.63E+03	6.52E-01	RTECS 1992
Naphthalene	NDA						
Pentachlorphenol	Rat	Chronic NOEL	62 days	Fetotoxicity	3.00E+00	6.00E-01	IRIS 1992
Phenanthrene	Mouse/Rat	LD50	1 dose	lethality	7.00E+02	2.80E-01	E-465
Pyrene	Mouse	Chronic NOEL	13 weeks	Kidney Weight/Hemato	7.50E+01	1.50E+01	IRIS 1992

Table 9 (Continued)

Summary of Critical Toxicity Values (CTVs) for the Eastern Cottontail
via the Ingestion Pathway,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Endpoint	Duration	Effect Measured	Dose (mg/kg-BW)	CTV (mg/kg-BW)	Reference
Pesticides/PCBs							
Aldrin	NDA						
Aroclor-1254	Rat	Chronic NOEL	14 weeks	Systemic	1.25E+00	2.50E-01	E-506
alpha-Chlordane	Rat	Chronic NOEL	NR	Hepatotoxicity	8.00E-01	2.00E-01	Eisler 1990
gamma-Chlordane	Rat	Chronic NOEL	NR	Hepatotoxicity	1.80E+00	4.00E-01	Eisler 1990
Dieldrin	Rabbit	Chronic LOEL	NR	Convulsions	8.60E+00	1.72E+00	HSDB 1991
4,4'-DDE	Rat	Chronic LOEL	78 weeks	Lethality	1.20E+01	4.80E-01	E-12
4,4'-DDD	Mouse	Chronic NOEL	78 weeks	Resp/Gastro/Hemato/Renal	4.28E+02	8.56E+01	E-12
Inorganics							
Aluminum	NDA						
Antimony	NDA						
Arsenic	Mouse	Chronic NOEL	NR	Reproductive	7.00E-01	1.40E-01	E-17
Barium	Rat	Chronic NOEL	68 weeks	Histo/Cardio/Body Weight	1.40E+02	2.80E+01	IRIS 1992
Chromium (VI)	Rat	Chronic NOEL	2 year	Survival/Body Weight	2.40E+00	4.80E-01	E-19
Cadmium	Mouse	Chronic LOEL	6 months	Developmental	1.90E+00	7.60E-02	E-508
Copper	Rat	Chronic NOEL	28 days	Hepatotoxicity	7.90E+00	1.60E+00	ATSDR 1990
Cyanide	NDA						
Iron	Mouse	LD50	1 dose	Lethality	3.06E+02	1.20E-01	E-303
Lead	Rat	Chronic NOEL	NR	Reproductive	7.00E-01	1.40E-01	E-509
Magnesium	NDA						
Manganese	Rat	Chronic LOEL	NR	Reproductive	1.75E+02	7.00E+00	ATSDR 1992
Mercury	Mouse	Chronic NOEL	7 weeks	Immunology	4.21E-01	8.40E-02	E-10
Nickel	Rat	Chronic LOEL	11 weeks	Reproductive	5.00E+01	2.00E+00	E-513
Selenium	Rat	Chronic NOEL	5 generations	Reproductive	2.50E-02	5.00E-03	IRIS 1992
Silver	NDA						
Zinc	Mouse	Chronic NOEL	9 months	Anemia	1.63E+01	3.26E+00	E-15

NDA – No Data Available

Table 10

Summary of Critical Toxicity Values (CTVs) for the Chipping Sparrow via the Ingestion Pathway, Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Endpoint	Duration	Effect Measured	Dose (mg/kg-BW)	CTV (mg/kg-BW)	Reference
Volatile Organics							
Acetone	Japanese Quail	Acute NOEL	5 days	Overt Toxicity	5.27E+02	1.05E+01	E-214
Chlorobenzene	NDA						
Chloroform	NDA						
Methylene chloride	NDA						
Tetrachloroethene	NDA						
1,1,1-Trichlorethane	NDA						
Xylene	Japanese Quail	Acute NOEL	5 days	Overt Toxicity	7.19E+02	1.44E+00	E-214
Semivolatile Organics							
Acenaphthene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Acenaphthylene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Anthracene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Benzo(a)anthracene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Benzo(a)pyrene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Benzo(b)fluoranthene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Benzo(g,h,i)perylene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Benzo(k)fluoranthene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Bis(2-ethylhexyl)phthalate	NDA						
Butylbenzylphthalate	NDA						
Chrysene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Dibenzo(a,h)anthracene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Dibenzofuran	NDA						
Diethylphthalate	NDA						
Di-n-butylphthalate	NDA						
Di-n-octylphthalate	NDA						
Fluoranthene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Fluorene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Indeno(123-c,d)pyrene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
2-Methylnaphthalene	NDA						
Naphthalene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Pentachlorphenol	Mallard	LD50	1 dose	Lethality	3.80E+02	1.52E-01	E-224
Phenanthrene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979
Pyrene	Mallard	Chronic LOEL	7 months	Hepatotoxicity	4.07E+02	1.63E+01	Patton and Dieter 1979

Table 10 (Continued)

Summary of Critical Toxicity Values (CTVs) for the Chipping Sparrow via the Ingestion Pathway, Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Endpoint	Duration	Effect Measured	Dose (mg/kg-BW)	CTV (mg/kg-BW)	Reference
Pesticides/PCBs							
Aldrin	NDA						
Aroclor-1254	Bobwhite	LD50	1 dose	Lethality	8.77E+01	3.50E-02	E-223
alpha-Chlordane	Japanese Quail	Acute NOEL	1 dose	Survival	2.67E+01	5.30E-02	Eisler 1990
gamma-Chlordane	Japanese Quail	Acute NOEL	1 dose	Survival	2.67E+01	5.30E-02	Eisler 1990
Dieldrin	House Sparrow	LD50	1 dose	Lethality	4.78E+01	1.00E-02	HSDB 1992
4,4'-DDE	Bobwhite	LD50	5 day	Lethality	9.69E+01	3.88E-02	E-214
4,4'-DDD	Ring-necked Pheasant	LD50	1 dose	Lethality	3.86E+02	1.54E-01	Hudson et al. 1987
Inorganics							
Aluminum	NDA						
Antimony	NDA						
Arsenic	California Quail	LD50	1 dose	Lethality	4.76E+01	1.90E-02	Hudson et al. 1987
Barium	NDA						
Cadmium	Mallard	Chronic NOEL	12 weeks	Kidney Degeneration	1.70E+00	3.40E-01	E-515
Chromium (VI)	Chicken	Acute NOEL	32 days	Survival/Growth	5.00E+00	1.00E-02	E-520
Copper	Turkey	Acute NOEL	21 days	Lethality/Growth	7.10E+01	1.42E-01	E-519
Cyanide	NDA						
Iron	Turkey	Chronic NOEL	12 weeks	Growth	2.95E+01	5.90E+00	E-303
Lead	American Kestrel	Chronic NOEL	6 months	Reproductive/Survival	5.10E+00	1.02E+00	E-516
Magnesium	Chicken	Chronic NOEL	4 weeks	Adverse Effects	4.80E+02	9.60E+01	E-303
Manganese	Turkey	Acute NOEL	21 days	Lethality/Growth	4.28E+02	8.56E-01	E-519
Mercury	Japanese Quail	Chronic NOEL	1 year	Lethality	2.00E-01	4.00E-03	E-214
Nickel	Japanese Quail	Acute NOEL	5 days	Overt Toxicity	7.13E+02	1.43E+00	E-214
Selenium	Mallard	Chronic NOEL	3 months	Teratogenic	5.00E-01	1.00E-01	Eisler 1987
Silver	NDA						
Zinc	Turkey	Acute NOEL	21 days	Lethality/Growth	2.10E+02	4.20E-01	E-519

NDA - No Data Available

Table 11

Comparison of Surface Water Concentrations at Coffee Creek with Florida State Water Quality Standards or Federal Water Quality Standards, Beulah Landfill, Escambia Co., FL.

Contaminant	Surface Water Concentrations in Beulah Landfill (ug/L)		Florida Chronic Freshwater AWQC Conc. (ug/L)	Florida Acute Freshwater AWQC Conc. (ug/L)	Florida Chronic Freshwater AWQC Hazard Indices[b]		Florida Acute Freshwater AWQC Hazard Indices[b]	
	Average	Maximum			Average	95% UCL or Maximum	Average	95% UCL or Maximum
Organics								
Acetone	9.00E+00	9.00E+00	NCA	NCA	NE	NE	NE	NE

NCA – No criteria available

NE – Not evaluated due to lack of criteria

Table 11 (Continued)

Comparison of Surface Water Concentrations at Elevenmile Creek with Florida State Water Quality Standards or Federal Water Quality Standards, Beulah Landfill, Escambia Co., FL.

Contaminant	Surface Water Concentrations at Beulah Landfill (ug/L)		Florida Chronic Freshwater AWQC Conc. (ug/L)	Florida Acute Freshwater AWQC Conc. (ug/L)	Florida Chronic Freshwater AWQC Hazard Indices[b]		Florida Acute Freshwater AWQC Hazard Indices[b]	
	Average	Maximum			Average	Maximum	Average	Maximum
Organics								
Bis(2-ehtylhexyl)phthalate	3.00E-01	3.00E-01	NCA	NCA	NE	NE	NE	NE
Carbon Disulfide	4.00E-01	4.00E-01	NCA	NCA	NE	NE	NE	NE
Chloroform	2.00E-01	2.00E-01	NCA	NCA	NE	NE	NE	NE
Tetrachloroethene	5.75E-01	6.00E-01	8.85E+00 [a]	NCA	6.50E-02	6.78E-02	NE	NE
2,4,6-Trichlorophenol	9.33E-01	1.00E+00	6.50E+00 [a]	NCA	1.44E-01	1.54E-01	NE	NE
Inorganics								
Chromium(III)	4.55E+00	4.70E+00	ERR [c]	ERR [b]	ERR	ERR	ERR	ERR
Chromium(VI)	4.55E+00	4.70E+00	1.10E+01	1.60E+01 [d]	4.14E-01	4.27E-01	2.84E-01	2.94E-01
Cyanide	5.18E+01	1.60E+02	5.20E+00	2.20E+01 [d]	9.95E+00	3.08E+01	2.35E+00	7.27E+00
Nickel	8.40E+00	8.40E+00	ERR	ERR [b]	ERR	ERR	ERR	ERR

NCA-No criteria available

NE-Not evaluated due to lack of criteria

[a]Based on Florida State annual average flow conditions

[b]Based on a water hardness equation from the Federal Water Quality Standards for acute exposure

[c]Based on a water hardness equation from the Florida Water Quality Standards for chronic exposure

[d]Where there was no available Criteria, Federal Water Quality Standards were utilized.

Table 12

Comparison of Sediment Concentrations at Coffee Creek
with NOAA Biological Effect Levels or Ontario Sediment Quality Guidlines,
Beulah Landfill, Escambia Co., FL.

Contaminant	Sediment Concentrations at Beulah Landfill (ug/kg)		NOAA Biological Effect Levels, ER-Ls[c] (ug/kg)	NOAA Biological Effect Levels, ER-Ms[c] (ug/kg)	Ontario Sediment Quality Guidlines Lowest Effect Level (ug/kg)	Ontario Sediment Quality Guidlines Severe Effect Level (ug/kg)	NOAA ER-L Hazard Indices[b] or Ontario sediment Guidelines		NOAA ER-M Hazard Indices[b] or Ontario sediment Guidelines	
	Average	Maximum[d]					Average	Maximum	Average	Maximum
Organics										
Acetone	3.00E+00	3.00E+00	NCA	NCA	NCA	NCA	NE	NE	NE	NE
Chlorobenzene	7.00E-01	7.00E-01	NCA	NCA	NCA	NCA	NE	NE	NE	NE
PAH's										
Ideno(1,2,3-cd)pyrene	1.20E+01	1.20E+01	4.00E+03 [a]	3.50E+04 [a]	-	-	3.00E-03	3.00E-03	3.43E-04	3.43E-04
Inorganics										
Antimony	2.30E+00	2.30E+00	2.00E+03	2.50E+04	-	-	1.15E-03	1.15E-03	9.20E-05	9.20E-05
Arsenic	2.20E+00	2.20E+00	3.30E+04	8.50E+04	-	-	6.67E-05	6.67E-05	2.59E-05	2.59E-05
Chromium	8.08E+01	8.08E+01	8.00E+04	1.45E+05	-	-	1.01E-03	1.01E-03	5.57E-04	5.57E-04
Iron	3.93E+03	3.93E+03	NCA	NCA	2.00E+07	4.00E+07	1.97E-04 [c]	1.97E-04 [c]	9.83E-05 [c]	9.83E-05 [c]
Manganese	4.20E+00	4.20E+00	NCA	NCA	4.60E+05	1.10E+06	9.13E-06 [c]	9.13E-06 [c]	3.82E-06 [c]	3.82E-06 [c]

NCA - No criteria available

NE - Not evaluated due to lack of data or applicable criteria

[a] Sediment standards are based on a total PAH value

[b] Sediment concentrations were compared with NOAA ER-Ls and ER-Ms or Ontario lowest effects levels and severe effects levels.

[c] Sediment Concentrations were compared with Ontario sediment guidlines where NOAA ER-L's and ER-M's were unavailable

[c] Sediment values are based on estuarian studies

Table 13

Comparison of Sediment Concentrations at Elevenmile Creek with NOAA Biological Effect Levels or Ontario Sediment Quality Guidlines, Beulah Landfill, Escambia Co., FL.

Contaminant	Sediment Concentrations in Beulah Landfill (ug/kg)		NOAA Biological Effect Levels, ER-Ls[e] (ug/kg)	NOAA Biological Effect Levels, ER-Ms[e] (ug/kg)	Ontario Sediment Quality Guidelines Lowest Effect Level (ug/kg)	Ontario Sediment Quality Guidelines Severe Effect Level (ug/kg)	NOAA ER-L Hazard Indices[b] or Ontario sediment Guidelines		NOAA ER-M Hazard Indices[b] or Ontario sediment Guidelines	
	Average	Maximum[d]					Average	Maximum	Average	Maximum
Organics										
Acetone	7.25E+01	8.10E+01	NCA	NCA	NCA	NCA	NE	NE	NE	NE
Bis(2-ethylhexyl)phthalate	1.20E+01	1.20E+01	NCA	NCA	NCA	NCA	NE	NE	NE	NE
PAH's										
Benzo(GHI)perylene	2.00E+01	2.00E+01	4.00E+03 [a]	3.50E+04 [a]	–	–	5.00E-03	5.00E-03	5.71E-04	5.71E-04
Inorganics										
Barium	2.78E+00	4.30E+00	NCA	NCA	NCA	NCA	NE	NE	NE	NE
Copper	4.80E-01	9.40E-01	7.00E+04	3.90E+05	–	–	6.86E-06	1.34E-05	1.23E-06	2.41E-06
Iron	4.17E+02	7.12E+02	NCA	NCA	2.00E+07	4.00E+07	2.09E-05 [c]	3.56E-05 [c]	1.04E-05 [c]	1.78E-05 [c]
Lead	4.04E+00	9.80E+00	3.50E+04	1.10E+05	–	–	1.15E-04	2.80E-04	3.67E-05	8.91E-05

NCA – No criteria available

NE – Not evaluated due to lack of data or applicable criteria

[a]Sediment standards are based on a total PAH value

[b] Sediment concentrations were compared with NOAA ER-Ls and ER-Ms or Ontario lowest effects levels and severe effects levels.

[c]Sediment Concentrations were compared with Ontario sediment guidlines where NOAA ER-L's and ER-M's were unavailable

[e]Sediment values are based on estuarian studies

Table 14

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Volatile Organics						
Acetone	No Data					
Bis(2-ehtylhexyl)phthalate	No Data					
Butylbenzylphthalate	No Data					
Chloroform	No Data					
Dibenzofuran	No Data					
Diethylphthalate	No Data					
Di-N-butylphthalate	corn	2.00 E+02	1.11 E+03	8.20 E+03	No Effect	EPA 1985i

Table D4 (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Di-N-butylphthalate	corn	2.00 E+03	1.11 E+03	8.20 E+03	17% reduction in height; 25% reduction in chlorosis	EPA 1985i
Di-N-butylphthalate	corn	2.00 E+04	1.11 E+03	8.20 E+03	45% reduction in height; 72% reduction in chlorosis	EPA 1985i
Di-N-octylphthalate	No Data					
Methylene Chloride	No Data					
2-Methylnaphthalene	No Data					
Pentachlorophenol	No Data					

Table 14 (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Tetrachloro-ethene	No Data					
1,1,1-Trichloroethane	No Data					
Semivolatile Organics - PAHs						
Acenaphthalene	No Data					
Acenaphthylene	No Data					
Anthracene	No Data					
Benz[a]anthra-cene	No Data					
Benzo[a]pyrene	No Data					
Benzo[b] fluoranthene	No Data					

Table 14 (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Benzo[g,h,i] perylene	No Data					
Benzo[k] fluoranthene	No Data					
Chrysene	No Data					
Dibenzo[a,h] pyrene	No Data					
Fluoranthene	No Data					
Flourene	No Data					
Indeno[1,2,3-CD] pyrene	No Data					
Naphthalene	No Data					
Phenanthrene	No Data					
Pyrene	No Data					

Table 14 (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Semivolatile Organics - Others						
Polychlorinated Biphenyls	Soybean	1.00 E+01	1.45 E+00	1.50 E+00	10% Decrease in Growth	EPA 1985d
Polychlorinated Biphenyls	Soybean	1.00 E+02	1.45 E+00	1.50 E+00	27% Decrease in Growth	EPA 1985d
Polychlorinated Biphenyls	Corn	1.00 E+02	1.45 E+00	1.50 E+00	Significant Decrease in Growth	EPA 1985d
Polychlorinated Biphenyls	Fescue	1.00 E+03	1.45 E+00	1.50 E+00	16% Decrease in Growth	EPA 1985d

Table 14 (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Pesticides/PCBs						
Aldrin	No Data					
Chlordane	Black valentine bean	1.25 E+01	2.05 E+01[a] 1.91 E+01[b]	3.40 E+01[a] 3.15 E+01[b]	19% reduction in root wt.; 11% reduction in top wt.	EPA 1985h
Chlordane	Black valentine bean	5.00 E+01	2.05 E+01[a] 1.91 E+01[b]	3.40 E+01[a] 3.15 E+01[b]	30% reduction in root wt.; 14% reduction in top wt.	EPA 1985h
Chlordane	Black valentine bean	1.00 E+02	2.05 E+01[a] 1.91 E+01[b]	3.40 E+01[a] 3.15 E+01[b]	19% reduction in root wt.; 12% reduction in top wt.	EPA 1985h

Table 14 (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Dieldrin	Corn	1.15 E+00	2.27 E+02	6.50 E+02	No Effect	Phytotox 1992
DDD	No Data					
DDE	No Data					
Inorganics						
Aluminum	No Data					
Antimony	No Data					
Arsenic (arsenite)	Corn	1.00 E+02	5.20 E+00	1.30 E+01	55% Growth Reduction	EPA 1985a
Arsenic (arsenite)	Corn	1.00 E+01	5.20 E+00	1.30 E+01	97% Growth Reduction	EPA 1985a

Table 14 (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Arsenic (arsenate)	Cotton/ Soybean	8.00 E+00	5.20 E+00	1.30 E+01	Significant Yield Reduction	EPA 1985a
Arsenic (arsenate)	Bermuda Grass	1.00 E+01	5.20 E+00	1.30 E+01	No effect	EPA 1985a
Arsenic (arsenate)	Bermuda Grass	4.50 E+01	5.20 E+00	1.30 E+01	75% Growth Reduction	EPA 1985a
Barium	No Data					
Cadmium (chloride)	Broccoli, Cauliflower, Carrots	4.00 E+01	2.13 E+00	1.24 E+01	No Effects	EPA 1985c
Cadmium (chloride)	Spinach, Radish, Peas, Oats	4.00 E+01	2.13 E+00	1.24 E+01	Significant Decrease in Yield	EPA 1985c

Table 14. (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Cadmium	Lettuce	5.00 E+00	2.13 E+00	1.24 E+01	No Effects	EPA 1985c
Chromium	No Data					
Copper (sulfate)	Wheat	1.00 E+02	6.64 E+01	2.33 E+02	4% Decrease in Yield	EPA 1985g
Copper (sulfate)	Wheat	2.00 E+02	6.64 E+01	2.33 E+02	9% Decrease in Yield	EPA 1985g
Cyanide	No Data					
Iron	No Data					
Lead (carbonate)	Lettuce	1.00 E+03	7.89 E+01	3.59 E+02	17% Decrease in Yield	EPA 1985e

Table 14 (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Lead (chloride, carbonate, nitrate)	Oat(tops & roots)	1.00 E+03	7.89 E+01	3.59 E+02	No Effects	EPA 1985e
Lead (chloride)	Alphalfa	1.00 E+02	7.89 E+01	3.59 E+02	25% Decrease in Yield	EPA 1985e
Lead (chloride)	Brome-grass	1.00 E+02	7.89 E+01	3.59 E+02	No Effects	EPA 1985e
Lead (chloride)	Oat (roots)	1.00 E+02	7.89 E+01	3.59 E+02	No Effects	EPA 1985e
Lead (chloride)	Wheat (roots)	5.00 E+02	7.89 E+01	3.59 E+02	14.8% Decrease in Root Biomass	EPA 1985e
Lead (oxide)	Wheat (roots)	1.00 E+03	7.89 E+01	3.59 E+02	No Effects	EPA 1985e

Table 14 (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Magnesium	No Data					
Manganese	No data					
Mercury (chloride)	Bermuda Grass	8.00 E+00	4.00 E-01	1.60 E+00	Reduced Growth	EPA 1985f
Mercury (chloride)	Bermuda Grass	5.00 E+01	4.00 E-01	1.60 E+00	Toxic	EPA 1985f
Nickel	No Data					
Selenium	No Data					
Silver.	No Data					
Zinc	Corn Rye	2.71 E+03	2.18 E+02	1.08 E+03	50% Decrease in Yield	EPA 1985h

Table 14 : (Continued)

Summary of Toxicity Screening Data for Plantlife
As A Function of Soil Concentration,
Beulah Landfill, Escambia Co., FL.

Contaminant	Species	Toxic Soil Conc. (mg/kg dry wt)	Mean Soil Conc. at Beulah L. (mg/kg)	UCL Soil Conc. at Beulah L. (mg/kg)	Effects	Ref.
Zinc	Corn, Rye	1.36 E+03	2.18 E+02	1.08 E+03	No Effects	EPA 1985h
Zinc	Swiss Chard	1.59 E+02	2.18 E+02	1.08 E+03	No Effects	EPA 1985h
Zinc (sulfate)	Corn	2.40 E+02	2.18 E+02	1.08 E+03	5% Decrease in Yield	EPA 1985h
Zinc (sulfate)	Corn	6.00 E+02	2.18 E+02	1.08 E+03	No Effects	EPA 1985h

[a]Surface soil concentration for Alpha Chlordane/2
[b]Surface soil concentration for Gamma Chlordane/2

Babich, H., Bewley, R.J.F., and Stotzky, G. 1983. Application of the "Ecological Dose" Concept to the Impact of Heavy Metals on Some Microbe-mediated Ecologic Processes in Soil." Arch. Environ. Contam. Toxicol. 12, 421-426. 1983.

Table 15

Summary of the Average Hazard Quotients Greater Than One for the Northern Cottontail, Beulah Landfill, Escambia Co., FL.

Contaminant	Soil Ingestion Hazard Quotient (HQ)	Percent Contribution To Total HQ	Shoot Ingestion Hazard Quotient (HQ)	Percent Contribution To Total HQ	Total Hazard Index (HI)	Percent Contribution to Cumulative HI
Methylene chloride	4.70E−02	1%	5.82E+00	99%	5.87E+00	1%
Benzo(a)anthracene	1.57E+00	71%	6.43E−01	29%	2.21E+00	0%
2−Methylnaphthalene	7.43E−01	25%	2.21E+00	75%	2.95E+00	1%
Pentachlorophenol	8.07E+00	53%	7.24E+00	47%	1.53E+01	3%
Phenanthrene	2.28E+00	35%	4.20E+00	65%	6.48E+00	1%
Aroclor−1254	1.56E+01	95%	8.00E−01	5%	1.64E+01	3%
Alpha chlordane	2.76E−01	11%	2.32E+00	89%	2.60E+00	0%
Beta chlordane	1.28E−01	11%	1.08E+00	89%	1.21E+00	0%
Dieldrin	3.59E−01	13%	2.38E+00	87%	2.74E+00	0%
Aluminum	3.16E+01	93%	2.28E+00	7%	3.39E+01	6%
Iron	4.38E+02	93%	3.15E+01	7%	4.70E+02	83%
Lead	1.52E+00	55%	1.23E+00	45%	2.75E+00	0%
Zinc	1.80E−01	4%	4.86E+00	96%	5.04E+00	1%
				Cumulative Hazard Index	5.67E+02	

Table 15 (Continued)

Summary of Average Hazard Quotients Greater Than One for the Chipping Sparrow, Beulah Landfill, Escambia Co., FL.

Contaminant	Soil Ingestion Hazard Quotient (HQ)	Percent Contribution To Total HQ	Shoot Ingestion Hazard Quotient (HQ)	Percent Contribution To Total HQ	Total Hazard Index (HI)	Percent Contribution to Cumulative HI
Pentachlorophenol	4.79E+01	17%	2.39E+02	83%	2.87E+02	11%
Aroclor-1254	4.02E+00	78%	1.15E+00	22%	5.17E+00	0%
Alpha chlordane	2.37E+00	2%	1.11E+02	98%	1.13E+02	4%
Beta chlordane	2.21E+00	2%	1.03E+02	98%	1.05E+02	4%
Dieldrin	4.84E+01	3%	1.78E+03	97%	1.83E+03	69%
4,4'-DDD	8.20E-01	17%	3.89E+00	83%	4.71E+00	0%
4,4'-DDE	1.12E+01	93%	8.30E-01	7%	1.20E+01	0%
Arsenic	1.11E+00	63%	6.50E-01	37%	1.76E+00	0%
Chromium	1.80E+01	69%	8.11E+00	31%	2.61E+01	1%
Copper	1.89E+00	4%	4.73E+01	96%	4.92E+01	2%
Iron	1.34E+01	91%	1.34E+00	9%	1.47E+01	1%
Manganese	4.14E-01	17%	2.07E+00	83%	2.48E+00	0%
Mercury	4.05E-01	5%	8.10E+00	95%	8.51E+00	0%
Zinc	2.10E+00	1%	1.89E+02	99%	1.91E+02	7%
				Cumulative Hazard Index	2.65E+03	

Table 15 (Continued)

Summary of Average Hazard Quotients Greater Than One for the Chipping Sparrow, Beulah Landfill, Escambia Co., FL.

Contaminant	Soil Ingestion Hazard Quotient (HQ)	Percent Contribution To Total HQ	Shoot Ingestion Hazard Quotient (HQ)	Percent Contribution To Total HQ	Total Hazard Index (HI)	Percent Contribution to Cumulative HI
Pentachlorophenol	4.79E+01	17%	2.39E+02	83%	2.87E+02	11%
Aroclor-1254	4.02E+00	78%	1.15E+00	22%	5.17E+00	0%
Alpha chlordane	2.37E+00	2%	1.11E+02	98%	1.13E+02	4%
Beta chlordane	2.21E+00	2%	1.03E+02	98%	1.05E+02	4%
Dieldrin	4.84E+01	3%	1.78E+03	97%	1.83E+03	69%
4,4'-DDD	8.20E-01	17%	3.89E+00	83%	4.71E+00	0%
4,4'-DDE	1.12E+01	93%	8.30E-01	7%	1.20E+01	0%
Arsenic	1.11E+00	63%	6.50E-01	37%	1.76E+00	0%
Chromium	1.80E+01	69%	8.11E+00	31%	2.61E+01	1%
Copper	1.89E+00	4%	4.73E+01	96%	4.92E+01	2%
Iron	1.34E+01	91%	1.34E+00	9%	1.47E+01	1%
Manganese	4.14E-01	17%	2.07E+00	83%	2.48E+00	0%
Mercury	4.05E-01	5%	8.10E+00	95%	8.51E+00	0%
Zinc	2.10E+00	1%	1.89E+02	99%	1.91E+02	7%
				Cumulative Hazard Index	2.65E+03	