OPERATIONS PLAN

PREPARED

FOR

ENVIRONMENTAL WASTE SOLUTIONS

CLASS II INDUSTRIAL WASTE LANDFILL

200 Omar Circle,
Camden, Tennessee 38320

PREPARED

BY

HOUSE ENGINEERING LLC
7308 River Park Drive
Nashville, Tennessee 37221

Revised March 2015

TABLE OF CONTENTS

SECTION		PAGE
1.	INTRODUCTION	1
1.1	SITE HISTORY	1
1.2	PURPOSE OF THE OPERATIONS MANUAL	1
1.3	GENERAL INFORMATION	3
2.0	NARRATIVE DESCRIPTION OF THE FACILITY AND OPERATION	4
2.1	FACILITY OPERATOR	4
2.2	LOCATION OF THE FACILITY	4
2.3	BUFFER ZONES	4
2.4	FAULT AREAS	5
2.5	SEISMIC IMPACT ZONES	5
2.6	UNSTABLE AREAS	6
2.7	ACCESS CONTROL	6
2.8	METHODS AND SEQUENCE OF OPERATION	8
2.9	TYPES AND ANTICIPATED VOLUMES OF SOLID WASTES	10
2.10	NUMBER OF ACRES TO BE FILLED AND PHASE DEVELOPMENT PLANS	12
2.11	WASTE HANDLING AND COVERING PROGRAM	13
2.12	LANDFILL OPERATING EQUIPMENT	20
2.13	LITTER CONTROL	21
2.14	RUN-ON, RUN-OFF, AND EROSION CONTROL	21
2.15	LEACHATE COLLECTION AND HOLDING FACILITIES MANAGEMENT	25
2.16	DUST CONTROL	30
2.17	FIRE SAFETY	30
2.18	PERSONNEL SERVICES / COMMUNICATIONS	32
2.19	CONSTRUCTION QUALITY ASSURANCE PLAN	32
2.20	GAS MIGRATION CONTROL STANDARDS	32
2.21	GROUNDWATER MONITORING PROGRAM	35
2.22	LOCATION IN FLOODPLAINS	35
2.23	ENDANGERED AND THREATENED SPECIES	35
2.24	RANDOM INSPECTION PROGRAM	36
2.25	SEALING OF BOREHOLES	38
2.26	PERMANENT BENCHMARK	38

TABLE OF CONTENTS (continued)

SECTION PAGE

2.27 WETLANDS 38
2.28 AIRPORT SAFETY 40
2.29 FUTURE PLANNING 41
2.30 MONITORING AND RECORDS 41
2.31 BASIS OF DESIGN 42

ILLUSTRATIONS

Drawing 1 – Typical Liner/Leachate Collection System Configurations 9
Drawing 2 - Waste Separation Between Phases 15
Drawing 3 - Leachate Collection Corridor (Burrito Wrap) 26
Drawing 4 - Conceptual Landfill Gas System 34
Drawing 5 - Typical Subtitle D Landfill Liner System 44
Drawing 6 - Typical Subtitle D Liner System 44

TABLES

Table 1: Waste Volume Estimates 11
Table 2 - Order of Landfill Development 12
Table 3 - Landfill Developmental Sequence 13
Table 4 - Alternate Final Cover Configurations 19
Table 5: Soil Requirements 20
Table 6: Sediment Basin/Pond Storage Volume 22
Table 7: Seed Guidelines 24
Table 8 - Proposed TDSWM Regulatory Alternate Liner Sections 27
Table 9: Leachate Collection Stone Equipment Placement Requirements 28
Table 10: Leachate Collection Summary 28

APPENDIX 1 – FIGURES AND MAPS

FIGURE 1 Site Location Map
FIGURE 2 FEMA Map
FIGURE 3 EWS Aerial Photo

APPENDIX 2 – AIR MONITORING / GAS MITIGATION PLAN

AIR MONITORING PLAN
GAS MITIGATION PLAN

APPENDIX 3 – SPECIES REVIEW

ENDANGERED SPECIES REVIEW

APPENDIX 4 – LEAK DETECTION PROGRAM

LEAK DETECTION PROCEDURAL MANUAL

APPENDIX 5 – WASTE ACCEPTANCE PROCEDURE AND FORMS

WASTE ACCEPTANCE PROCEDURE NARRATIVE
WASTE PROFILE SHEET
CLIENT WASTE MANAGEMENT PROCEDURE FORM

1. INTRODUCTION

1.1 SITE HISTORY

Custom Tire and Recycle (CTR) submitted an application and was originally issued a permit to operate a Class IV Tire Monofill (permit # DML 03-0108) approximating ten acres at 200 Omar Circle in Camden, Tennessee on July 11, 2000.

In May 2003, a request was submitted to the Tennessee Division of Solid Waste Management (TDSWM) requesting a minor modification to the Class IV permit which would allow the disposal of coal ash from the TVA fossil fuel plant in New Johnsonville, Tennessee. The request for the minor modification to the permit allowing CTR to dispose of coal ash in the Class IV Monofill was granted to CTR on May 19, 2003.

In September 2004, CTR formally issued a request to Benton County and the city of Camden to secure local approval to expand the footprint as required by the Jackson Law. The Benton County Commission voted to authorize the requested expansion on September 20, 2004 and the City of Camden voted unanimously to authorize the expansion request on October 11, 2004.

In January 2007, CTR submitted the Part I application for the locally approved expansion to the TDSWM. A preliminary Class II industrial permit number (IDL 03-0212) has been assigned to the CTR facility based upon the information provided in the Part I application.

In 2009, CTR sold the landfill to Environmental Waste Solutions, LLC (EWS) at which time the permit was transferred. EWS then submitted a minor modification to the TDSWM to modify the Class II Landfill bottom liner system so the aluminum smelter waste stream could be accepted.

1.2 PURPOSE OF THE OPERATIONS MANUAL

An Operations Manual was originally prepared for the Waste Tire Monofill as required by the Tennessee Division of Solid Waste Management (TDSWM) Rule 1200-1-.04(9)(c). The Operations Manual provided a narrative detailing a method of operation that would provide an efficient operation based upon 1) the projected and current waste disposal volumes and 2) the proposed layout of the landfill footprint.

An Operations Manual was also prepared and submitted to the TDSWM as part of the minor modification submittal in 2003 and again in 2007 to dispose of coal ash. This document replaces all previous Operations Manuals approved for this facility.

This document revises each of the existing Operations Manuals previously prepared for the facility. This modification to the Operations Manual includes information relevant to the proposed expansion which extends the currently permitted footprint approximately 32 acres to the south. It should be noted that this document will serve as the facility Operations Manual as required per the TDSWM Rule 0400-11-01-.04(9)(c).

It shall also be noted that the other associated documents and **Permit Drawings** have been revised to comply with the last revision to the TDSWM regulations (May 2010). A "phased development plan," (as defined on page 65.002 of the TDSWM regulations) utilizing

topographical surveys and projected disposal generation rates has been prepared so as to operate efficiently. An estimate of the landfill footprint required to provide 5 years of disposal capacity will be developed (it should be noted that the limits of the 5 year landfill development will cross phase boundaries) The aerial extent of the landfill footprint at the end of five years will be closed (where applicable) and begin post-closure care as a new five year developmental phase is constructed. This process will continue until the entire permitted area has been closed or until the landfill is no longer needed. This Operations Manual has been written to accommodate the operation, closure and post-closure of the entire landfill footprint.

The following narrative description and **Operations Manual**, for the Class II Landfill facility located in Camden, Tennessee, is submitted in accordance with the TDSWM, Rule 1200-1-.04-(9)(c). The requirements for developing a narrative description and an operating plan that are major components of the Permit for a landfill are described in this rule. A discussion of the facility operations is included to ensure that the facility continues to operate in a manner that satisfies the current revised TDSWM regulations originally promulgated in July of 1993 by the TDSWM.

Information within the **Operations Manual** has been correlated to the permit requirements detailed in the TDSWM regulations. Sections within this report are numbered and titled with respect to the regulations to aid in the review process.

The Operations Manual is one of several required landfill permit documents. As previously stated the required permit documents and accompanying **Permit Drawings** have been upgraded to comply with the TDSWM regulations.

Based upon the TDSWM regulations the permit for the EWS Class II Landfill should include the following documents and **Permit Drawings**, as follows:

Document I -Operations Manual
Document II -Closure/Post-Closure Plan
Document III -Hydrogeological Investigation Reports
Document IV Groundwater Monitoring Plan
Document V Construction Quality Assurance Plan

Attachment I - Permit Drawings
Attachment II - Design Calculations
Attachment III Permit Correspondence

1.3 GENERAL INFORMATION

As previously described the site of the Class II Landfill is located at 200 Omar Circle in Camden, Benton County, Tennessee. The site is currently permitted as a Class II Landfill under IDL 03-0212.

The type wastes to be disposed of in the permitted landfill facility are limited to Class II solid waste materials as defined in Rule 0400-11-01-.01(3).

Topographic maps generated from site surveys and on-site observations indicate that ground surface elevations within the proposed landfill extension, range from a maximum of approximately 469 feet above Mean Sea Level (MSL) in the north central quadrant of the proposed landfill extension area to an elevation approximating 376 feet above MSL at the southeastern tip of the proposed extension.

The **Permit Drawings** indicate that the landfill is permitted to extend to elevation 568 feet MSL. The 2011 modification to the EWS Class II Landfill was limited to a reconfiguration of the liner/leachate collection system.

The 2012 modification is focused on redefining the waste stream accepted at the EWS Class II Landfill as well as providing proper procedures for management of those wastes.

The 2014 modifications included a redesign of the leachate collection sump in Phase 4 which eliminated a geomembrane liner penetration and incorporated a sidewall riser sump design. The type GCL was also modified in Phase 4 which provided flexibility in using the most appropriate GCL for the wastes types disposed. Finally, an additional alternate daily cover was identified for use within the phases of the landfill dedicated to SAS wastes.

The following *italicized text* is copied verbatim from the Tennessee Division of Solid Waste Management Rule 0400-11-01-.04(9)(c). For clarity of discussion, each item requested by the State is provided under said heading.

2.0 NARRATIVE DESCRIPTION OF THE FACILITY AND OPERATION

Rule 0400-11-01.04(9)(c)1. *The part II permit application must include, with appropriate references to the engineering plans and hydrogeological report, a narrative clearly identifying the following issues:*

2.1 FACILITY OPERATOR

Rule 0400-11-01.04(9)(c)(1) *Identifies the name of the individual responsible for operation and maintenance of the facility.*

The current individual responsible for operation of the disposal facility is:

Mr. Chris White
President
Environmental Waste Solutions, LLC
4521 Trousdale Drive,
Nashville, Tennessee 37204

2.2 LOCATION OF THE FACILITY

Rule 0400-11-01.04(9)(c)2. *Describes the location of the facility using roads and highways.*

The location of the permitted landfill facility has not changed from its present location at 200 Omar Circle in Camden, Tennessee. The limits of the facility have been expanded to extend to the southernmost boundary of the abandoned chert pit. The site can also be located on the Camden, Tennessee USGS quadrangle at north latitude 36° 3' 16" and west longitude 88° 05' 16" at an average elevation of 400 feet above mean sea level datum (MSL). The location of the facility is depicted as **Figure 1** in **Appendix 1** of this document.

2.3 BUFFER ZONES

Rule 0400-11-01.04(9)(c)3. *Describes the facilities compliance with all applicable buffer zone standards listed in paragraph (3) of this Rule. Each buffer zone standard must be specifically addressed referencing the closest property lines, residences, wells, and bodies of water as appropriate, and maps may be attached for easy descriptions and reference or otherwise demonstrate compliance.*

Rule 0400-11-01-.04(3)(a) *Class I Disposal Facilities must be located, designed, constructed, operated and maintained such that the fill areas are, at a minimum:*

1. 100 feet from all property lines;

The **Permit Drawings** illustrate that the landfill is located a minimum of 100 feet from all property lines.

2. 500 feet from all residences, unless the owner of the residential property agrees in writing to a shorter distance;

Two local property owners have residences within 500 feet of the waste fill. The owners have signed affidavits previously provided during the original landfill permitting process.

3. *500 feet from all wells determined to be down gradient and used as a source of drinking water by humans or livestock; and*

The closest drinking water well is located approximately 2,500 feet to the north east of the proposed extension. (See **Appendix 3** of the **Hydrogeologic Investigation Report.**)

4. *200 feet from the normal boundaries of springs, streams, lakes, (except that this standard shall not apply to any wet weather conveyance nor to bodies of water constructed and designed to be a part of the facility);*

No bodies of water are within the 200 foot limit. **Figure 2 "FEMA Map"** illustrates the waste footprint relative to Charlie Creek and Cypress Creek which border the Class II waste footprint to the west and south.

5. *A total site buffer with no constructed appurtenances within 50 feet of the property line.*

The **Permit Drawings** depict the location of all constructed appurtenances. The drawings demonstrate that there are no constructed appurtenances planned in the landfill expansion within 50 feet of the property line that surrounds the facility.

2.4 FAULT AREAS

Rule 0400-11-01-.04(9)(c)4. *Describes its compliance with applicable siting and requirements for fault areas.*

Rule 0400-11-01-.04(2)(u) *New Class I and II SWLF units and lateral extension shall not be located within 200 feet (60 meters) of a fault that has had displacement in Holocene time unless the owner or operator demonstrates in the Narrative Description of the Facility and Operations Manual that an alternative setback distance of less than 200 feet (60 meters) will prevent damage to the structural integrity of the SWLF unit and will be protective of human health and the environment.*

A review of published geologic information indicates the proposed landfill is not located within 200 feet of a fault that has had displacement in Holocene time.

2.5 SEISMIC IMPACT ZONES

Rule 0400-11-01-.04(9)(c)5. *Describes its compliance with applicable siting and requirements for seismic impact zones.*

Rule 0400-11-01-.04(2)(v) *New Class I and II SWLF units and lateral extension shall not be located in seismic impact zones unless the owner or operator demonstrates that all containment structures including liners, leachate collection systems and surface water control systems are designed to resist the maximum horizontal acceleration in lithified earth material for the site. The owner or operator must place the demonstration in the Narrative Description of the Facility and Operations Manual.*

Originally, the TDSWM required coal ash fill projects to obtain a Class II landfill permit. Based upon this designation all applicants for a Class II landfill permit must prepare a seismic evaluation. A seismic evaluation for this site is provided in **Appendix E** of the **Hydrogeologic Investigation.** The evaluation has been performed to conform to the procedures detailed in the **TDSWM "Earthquake Evaluation Guidance Document".** The results of the evaluation demonstrate that the proposed containment structures for the EWS landfill can resist the projected maximum horizontal acceleration of 0.339 g's.

2.6 UNSTABLE AREAS

Rule 0400-11-01-.04(9)(c)6. *Describes its compliance with applicable siting and requirements for unstable areas.*

Rule0400-11-01-.04(2)(w) *Owners or operators of new Class I and II SWLF units, existing Class I and lateral expansions located in an unstable area must demonstrate that engineering measures have been incorporated into the SWLF units designed to ensure that the integrity of the structural components of the SWLF unit will not be disrupted. The owner or operator must place the demonstration in the Narrative Description of the Facility and Operations Manual operating record. The owner or operator must consider the following factors, at a minimum, when determining whether an area is unstable:*

1. On-site or local soil conditions that may result in significant differential settlings;

The cherty soil materials that extend under the limits of the proposed waste footprint have a low potential for compressibility due to the cemented lenses of chert and strength properties of the cherty soil materials. In addition, the projected rate of loading will further minimize the potential for differential settlement.

2. On-site or local geologic or geomorphologic features; and

There are no on-site or local geologic or geomorphological features such as sinkholes and voids within the overburden materials that could create unstable conditions.

3. On-site or local human-made features or events (both surface and subsurface).

The mining of the chert materials have not created any unstable conditions at the site.

2.7 ACCESS CONTROL

Rule 0400-11-01.04(9)(c)7. *Describes the barriers, signs, procedures, and other measures to be used to control access to and use of the facility.*

Rule 0400-11-01.04(2)(b) Control of Access and Use.

1. *The Facility must have an artificial or natural barrier which completely surrounds the active portion of the facility and must have a means to control entry, at all times, through the gate or other entrances to the active portion of the facility.*

A wire security fence will be constructed around the perimeter of the site to control entry to the site. The location of the fence is depicted on the **Permit Drawings**, which accompany this document. The existing gates, terrain, and vegetation will be utilized to further restrict unauthorized access to the disposal area. Access to the facility is available from Omar Circle and Hildon King Road which serves the Camden Wastewater Treatment Plant. Hildon King Road has a gate that is locked by the Camden Wastewater Department at the end of each day.

2. *If open to the public, the facility must have clearly visible and legible signs at the points of public access which indicate the hours of operation, the types of materials that will or will not be accepted, emergency telephone numbers, schedule of charges, and any other necessary information.*

A sign has been posted at the landfill entrance that details the hours of operation and emergency contact information. Speed limits for vehicles are posted on signage along the on-site access road leading to the waste footprint. Presently, the EWS facility

accepts waste materials from secondary aluminum smelters as well as TDSWM approved industrial type wastes as are defined *in Rule 0400-11-01-.01(2). of the TDSWM Rules and Regulations Governing Solid Waste Disposal.*. Future waste disposal plans could include coal ash generated at the TVA Power Plant at New Johnsonville, Tennessee or other industrial wastes.

3. *If the facility is open to the public, or if it is otherwise necessary for proper operation, roads within the facility, easements, and parking areas shall be designed, constructed, and maintained so as to be accessible in all weather conditions. Traffic control signs shall be provided as necessary to promote an orderly traffic pattern to and from the solid waste discharge area to maintain efficient operating conditions.*

The entire length of road to the limits of the landfill footprint has an asphalt surface course to provide all weather access. In addition, the materials within the waste footprint are used as sub-base material to provide support for roadways.

Periodic maintenance of the roads includes re-grading the surface to restore the crown, adding gravel as needed and cleaning roadside ditches to ensure drainage. Ramps are constructed along the completed fill areas to provide temporary access to the working face. Temporary turnaround areas are constructed at the working face of the landfill to provide for proper unloading of the delivery trucks. The design and proposed location of the roads are shown on the **Permit Drawings** provided in **Attachment I** of this permit application.

4. *The facility must have trained personnel present and on duty at all times it is in operation to assure compliance with operational requirements and to prevent entry of unauthorized wastes.*

Landfill personnel have been trained to properly operate the facility and manage the type wastes approved for disposal at the facility.

5. *Class I landfill facilities shall have a certified operator or attendant on site during the hours of operation who is trained and certified as provided at Rule 0400-11-01-.12.*

A sufficient number of TDSWM certified operators will be on staff to ensure that there is always at least one certified operator on site at all times.

6. *There must be no scavenging at the facility. Any salvaging or recycling operations must be conducted at safe, designated areas (not working face) and times, and in a sanitary manner.*

Scavenging is not permitted at the facility. Only drivers may exit their vehicles, and then only to un-tarp, unlatch, etc. Spotters and operators at the working face along with site management work together to guarantee these policies are upheld. Scavenging is not anticipated since the facility will not be open to the general public.

2.8 METHODS AND SEQUENCE OF OPERATION

Rule 0400-11-01.04(9)(c)(8) *Describes the method and sequence of operations at the disposal facility.*

1. Preparation of Landfill Base

The disposal facility has been designed as a phased cell type development. Preparation of the site for the construction of each phase will require excavation of variable quantities of soil materials to attain the permitted base grades. However, the site will be developed in four discrete phases to optimize leachate collection and allow for maximum compaction of the wastes. (See **Permit Drawings in Attachment I**)

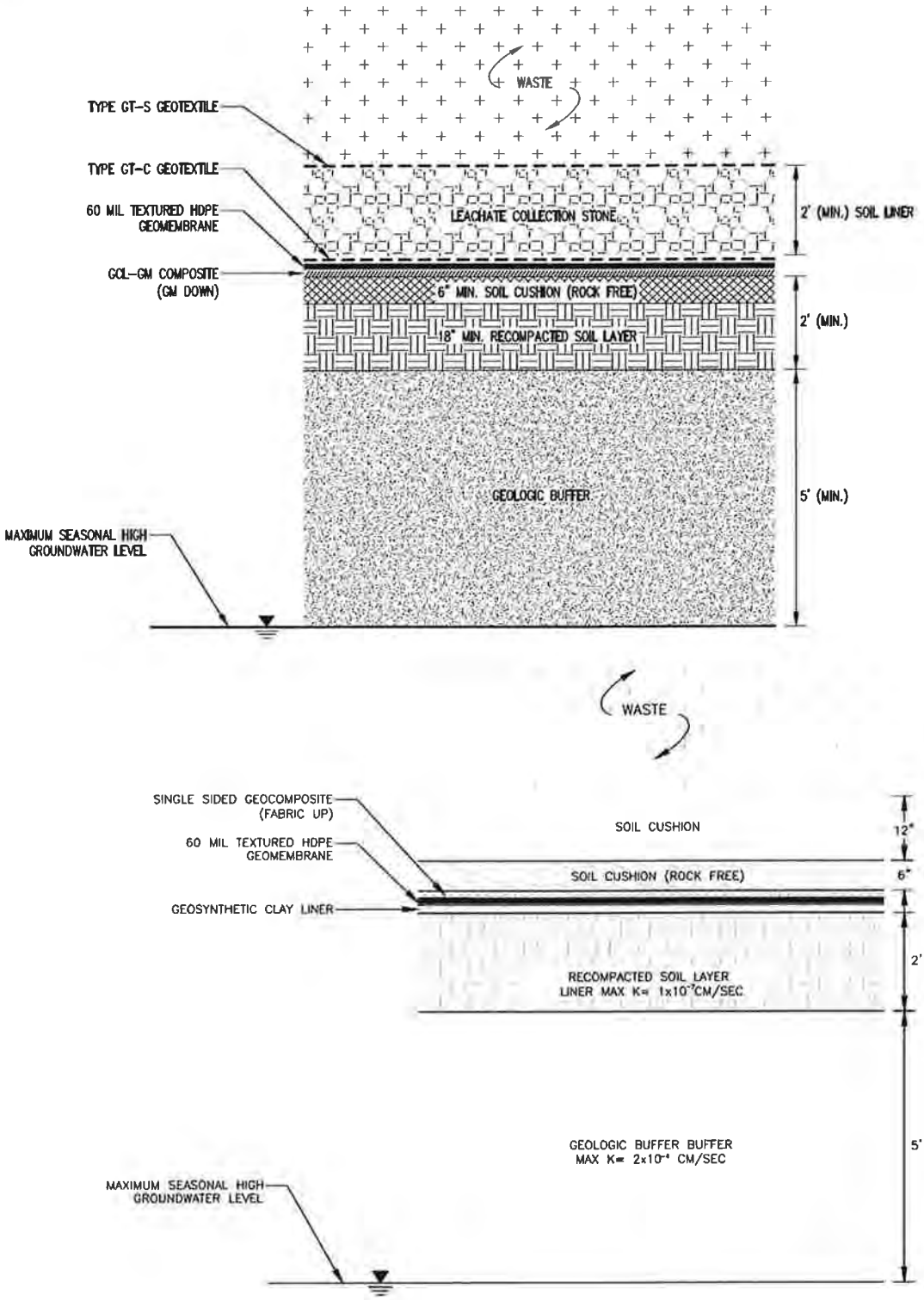
Landfill Base Preparations for Cells 2, 3, and 4

The typical landfill barrier system for the landfill will consist of a combination of different materials which include at a minimum:

- 5 feet geologic buffer with a maximum permeability of 2.24 x 10^{-5} cm/sec of in-situ material separated from the uppermost groundwater table;
- two feet of re-compacted clayey soil material with the top six inches rock free;
- a Geocomposite Clay Liner (GCL),
- a 60 mil textured HDPE geomembrane;
- a leachate collection layer consisting of either a non-woven cushion geotextile, a layer of washed river gravel or a geocomposite drainage layer with a protective cover layer.

The procedures and specifications for proper placement of the liner system are provided in the **Construction Quality Assurance Plan** (**Document V** of this permit application). A review of the soil hydraulic conductivity testing (ASTM D5084) performed on remolded soil samples taken from within the vertical and horizontal limits of the proposed waste footprint revealed hydraulic conductivity (K) test results that ranged from 8.6 x 10^{-8} cm/sec at boring B-5 to 2.5 x 10^{-7} cm/sec. More detailed information regarding the physical properties of the soil and rock materials at the site are provided in **Document III (Hydrogeologic Investigation Reports)**. **Drawing 1** and **Drawing 2** provided in this document illustrate the typical bottom liner configuration for the EWS Class II Landfill.

As previously stated this disposal facility has been designed as a phased type development. At this site, waste will be deposited within four distinct phases. Each of the phases have been designed and contoured so that the boundaries of each phase are topographic highs which direct leachate to a dedicated sump at the lowest elevation of each phase. Waste filling will begin at the sump in each phase and continue north. Two waste working faces will be employed due to the required segregation of secondary aluminum smelter waste from industrial wastes that may be incompatible to co-mingle. As previously stated the area of the landfill projected to provide the first five (5) years of disposal capacity will include Phase 2 and a portion of Phase 3. Please refer to **Section 2.10** of this document and **Sheet 10** of the **Permit Drawings**.



Drawing 1 – Typical Liner/Leachate Collection System Configurations
(See Table 7 for more detailed explanation of alternate liner system components)

Excavation and construction will proceed to the grades and elevations indicated by the base contours depicted on the **Permit Drawings**. The progression of the development of the four phases is depicted on **Drawing 10** of the **Permit Drawings**. The base grades of the landfill have been designed with slopes to provide a minimum post-settlement slope of two percent to the leachate collection header pipes. These slopes are expected to be maintained under the anticipated loading of the landfill. Excessive differential settlement of the soils beneath the site is not anticipated to be of a critical concern due to the relatively slow rate of filling and to the fact that the majority of the base soils have been pre-consolidated.

The design grades have been prepared to ensure proper drainage and maximize the capacity of the facility while maintaining the stability of the slopes. The cell construction shall be performed in a timely manner so that the landfilling operations are not interrupted, while minimizing the amount of exposed earth and the length of time such earth is exposed.

Approved wastes delivered to the facility will be loaded into trucks equipped with a tarp and a sealed tailgate. A temporary turnaround area shall be constructed at the working face of the landfill to provide for proper unloading of the delivery trucks.

Excavation and construction will proceed to the grades and elevations indicated by the base contours depicted on the **Permit Drawings**. The progression of the development of the landfill is depicted on **Sheet 10** of the **Permit Drawings**. The base grades of the landfill have been designed with slopes to the sumps areas of no less than 2%. These slopes are expected to be maintained under the anticipated loading of the landfill. Excessive differential settlement of the soils beneath the site is not anticipated to be of a critical concern due to the relatively slow rate of filling and to the fact that the base soils have been pre-consolidated.

The design grades have been prepared to ensure proper drainage and maximize the capacity of the facility while maintaining the stability of the slopes. The cell construction shall be performed in a timely manner so that the landfilling operations are not interrupted, while minimizing the amount of exposed earth and the length of time such earth is exposed.

Secondary Aluminum Smelter Waste and any other approved wastes delivered to the facility will be loaded into trucks equipped with a tarp and a sealed tailgate. Coal ash will be transported to the EWS Class II landfill and unloaded within the footprint of the permitted fill. A temporary turnaround area shall be constructed at the working face of the landfill to provide for proper unloading of the delivery trucks.

2.9 TYPES AND ANTICIPATED VOLUMES OF SOLID WASTES

Rule 0400-11-01.04(9)(c)(9) *Describes the types and anticipated volumes of solid wastes to be disposed of and the sources which generate the waste, and for special wastes, the physical and chemical characteristics of the wastes and any special handling procedures to be utilized.*

Types and Volumes of Wastes -

The types of wastes permitted for the disposal at the Class II Landfill are stated verbatim from the Tennessee Department of Environment and Conservation definition of a Class II Landfill as follows:

Class II Disposal Facility: *A landfill that receives waste generated by one or more industrial or manufacturing plants and that is used or is to be used for the disposal of solid waste generated by such plants, which may include industrial wastes, commercial wastes, institutional wastes, farming wastes, bulky wastes, landscaping and land clearing wastes, construction/demolition wastes, discarded automotive tires, and dead animals as defined in Rule 0400-11-01-.01(2). of the TDSWM Rules and Regulations Governing Solid Waste Disposal.*

EWS will accept industrial and special wastes in the section of the landfill designated as Phase 4 only after an evaluation of the physical and chemical properties of the waste stream has been performed by EWS and submitted to the TDSWM for approval. A procedure has been developed by EWS and is provided in **Appendix 5** of this document that details the steps necessary to evaluate the potential waste stream relative to compatibility with other industrial and specials wastes disposed at the Class II Landfill. The focus of the procedure is to minimize the potential for a reaction between different waste types and to provide the most effective method to manage disposal of the waste in the landfill. Wastes determined by EWS to be incompatible with in-place waste materials will be disposed of in separate cells with appropriate separation measures such as soil berms or geosynthetic barriers. EWS will maintain a record as to the location incompatible wastes are disposed in the Class II Landfill on a map kept at the landfill office.

As the landfill progresses EWS will maintain this procedure for all special wastes targeted for disposal in the Class II Landfill.

Table 1: Waste Volume Estimates

Landfill Demographic	Unit	Number of Units
Gate Unit Weight of Waste Materials (Smelter Waste)	Lbs./Yd^3	2,000
In-Place Unit Weight of Waste Material (Smelter Waste)	Lbs./Yd^3	2,000
Smelter Waste Disposal Rate	Tons/day	250
In-place Volume of Smelter Waste Consumed	Yd^3 / day	250
Average Gate Unit Weight of Industrial Wastes	Lbs./Yd^3	450
Average In-Place Unit Weight of Industrial Wastes	Lbs./Yd^3	1,200
Industrial Waste Disposal Rate	Tons/day	150
In-Place Volume of Industrial Waste consumed	Yd^3 / day	250
Total In-Place Volume of Waste Consumed	Yd^3 / day	500
In-Place Volume Consumed	Yd^3 / Year	130,000
Net Disposal Volume	Yd^3	5,231,890
Number of Working Days	Days/Year	260
Life of Facility	Years	40

Waste Restrictions

Rule 0400-11-01-.04(2)(k)1. *A facility may receive for disposal only those solid wastes it is allowed to manage under the terms of its permit.*

EWS will limit the types of waste received at the Class II Landfill to the wastes listed in the narrative definition of Class II Landfills which includes "*solid waste generated by such plants, which may include industrial wastes, commercial wastes, institutional wastes, farming wastes, bulky wastes, landscaping and land clearing wastes, construction/demolition wastes, discarded automotive tires, and dead animals*".

It should be noted that EWS modified the liner/leachate collection system for the entire Class II Landfill to comply with the Class I Subtitle D Landfill prescriptive standards in 2011.

The existing landfill facility has previously been granted permission by the TDSWM to dispose of waste tires, coal ash from the TVA steam plant at New Johnsonville, Tennessee, and construction/demolition wastes.

The secondary smelter waste stream was added to the approved wastes list for the EWS Class II Landfill as a result of the 2009 minor modification. Secondary aluminum smelter waste was then approved for disposal in Phase 2 of Cell 1 in 2010 and Cell 1 of Phase 3 in 2011. EWS must submit a request and receive approval from the TDSWM if any industrial or special wastes other than secondary aluminum smelter wastes are targeted for disposal in the landfill. The procedure for securing approval from the TDSWM along with the forms to be used in the approval process is provided in **Appendix 5 Waste Approval Procedure and Forms** of this document.

2.10 NUMBER OF ACRES TO BE FILLED AND PHASE DEVELOPMENT PLANS

Rule 0400-11-01.04(9)(c)(10) *Identifies the number of acres to be filled and the total number of acres to be permitted, including buffer zone acreage (Note: If the site is to be developed in accordance with a phased development plan, each parcel must be separately addressed. If minimum closure areas are to be utilized such proposal must be described here and delineated in the closure plans):*

Table 2 - Order of Landfill Development

PHASE	CELL	AREA (acres)
1	1	3.5
	2	4.3
	3	2.7
Phase 1 Subtotal		10.5
2	1	4.9
Phase 2 Subtotal		4.9
3	1	3.5
	2	3.4
	3	3.6
	4	3.5
Phase 3 Subtotal		14.0
4	1	4.6
	2	4.4
	3	4.0
Phase 4 Subtotal		13.0
Total Landfill Area		42.4

Originally, the permitted footprint of the EWS Landfill approximated 10 acres. The 2007 landfill extension increased the waste footprint to approximately 42.4 acres. The total acreage owned by EWS at this site approximates 128 acres.

The landfill has been designed with four phases based upon management of leachate as well as waste types. Each phase is divided into cells and the order of development of the phases and cells is depicted on the engineering plans. The approximate area of each phase and cell is presented in **Table 2**. However, the development of the landfill will not mimic the phases since the design of the phases was based entirely on leachate management. The order of phase/cell development is presented in **Table 3**.

Table 3 - Landfill Developmental Sequence

Industrial Waste Section Developmental Sequence	Secondary Aluminum Smelter Waste Section Developmental Sequence
	Phase 2 - Cell 1
	Phase 3 - Cell 1
Phase 4-Cell 1	Phase 3 - Cell 2
	Phase 1 - Cell 1
Phase 4-Cell 2	Phase 3 - Cell 3
	Phase 3 - Cell 4
Phase 4-Cell 3	Phase 1 - Cell 3

Secondary aluminum smelter (SAS) waste will be confined to Phases 1, 2, and 3. Most all other industrial wastes will be confined to Phase 4 of the EWS Class II Landfill. However, some inert waste determined to be compatible or have a stabilizing effect on secondary aluminum smelter waste may be placed in the phases designated for SAS waste if approved in writing by the TDSWM. More specifically, gypsum waste types have been reported by the EPA as providing a potential for stabilization of SAS waste materials.

2.11 WASTE HANDLING AND COVERING PROGRAM

Rule 0400-11-01.04(9)(c)(11) *Describes the waste handling and covering program to include but not necessarily be limited to, descriptions of:*

(i) Unloading, spreading, and compacting operations;'

(ii) The frequencies and depths of initial, intermediate, and final cover;

(iii) And, the cover material(s) to be utilized, including the estimated volumes to be needed (show initial, intermediate, and final earthwork calculations) and their sources and availability ***(See also* Rule 0400-11-01-.04(2)(h)).**

(i.) Unloading, Spreading and Compaction Operations

Access

Traffic will be clearly directed to the appropriate active access road. For the active lined landfill, all vehicles entering the unit will use the active ramp to avoid damaging the liner system. Traffic speed on the ramp should be less than 10 MPH.

The location of access roads during waste placement will be determined by operations personnel in order to reflect waste placement strategy. Additionally, access will be maintained for site monitoring locations.

First Lift of Waste Placement Procedures

Special precautions must be taken during placement of the first lift of waste above the liner and leachate collection system on the cell floor and also along the interior side slopes. The thickness of the leachate collection layer has been increased to two feet to further protect the geosynthetic liner materials. The initial loads of waste are placed in the cell by trucks backing to the edge of the cell berm and unloading waste inside the cell. The location of the initial access way into the cell will depend in part on fill progression in adjacent cells. For example, if an adjacent cell is sufficiently filled so that access is obtainable from the adjacent cell then waste trucks may enter the new cell from this location. A low ground pressure bulldozer or equivalent earth moving vehicle will then push the waste over the primary leachate collection layer. This process will

continue until a minimum 5-foot thickness of refuse has been placed on the primary leachate collection layer. Next, cover material will be placed and compacted on the refuse layer to allow waste vehicles to enter into the cell on top of the waste and to turn around before leaving the cell. During placement of the initial refuse layer, a laborer will be stationed at the bottom of the lift to observe the placement of this waste. If objects are spotted that could possibly damage the liner system, they will be removed and disposed of in a manner that will not jeopardize the liner system. Large objects (i.e., heavy metal items, etc.) will be sorted out and recycled.

General Unloading Procedures

Waste transportation vehicles will arrive at the working face at random intervals. There may be a number of vehicles unloading waste at the same time, while other vehicles are waiting. To maintain control over the unloading of waste, a limited number of vehicles will be allowed on the working face at a time. The actual number will be determined by the truck spotter. This procedure will be used to minimize the potential for unloading un-acceptable waste and to control disposal activity. Operations at the working face will be conducted in a manner which will encourage the efficient movement of transportation vehicles to and from the working face, and to expedite the unloading of waste.

The approach to the working face will be maintained such that two or more vehicles may safely unload side by side. A vehicle turn-around area large enough to enable vehicles to arrive and turn around safely with reasonable speed will be provided adjacent to the unloading area. The vehicles will back to a vacant area near the working face to unload. Upon completion of the unloading operation, the transportation vehicles will immediately leave the working face area. Personnel will direct traffic necessary to expedite safe movement of vehicles.

Waste unloading at the landfill will be controlled to prevent disposal in locations other than those specified by site management. Such control will also be used to confine the working face to a minimum width, yet allow safe and efficient operations. The width and length of the working face will be maintained as small as practical in order to maintain the appearance of the site, control windblown waste, and minimize the amount of cover required each day. With the exception of new phase transitions, only one working face will be active on any given day, with all deposited waste in other areas covered by either daily (or approved alternatives), intermediate, or final cover, as appropriate.

Number of Working Face(s)

The variability of the industrial waste types permitted for the EWS Class II Landfill requires the use of more than one working face to ensure that there will be no adverse synergistic effects created from mixing waste streams. Specifically, the secondary aluminum smelter waste will continue to be monofilled and separated from other types of wastes which may create an

undesirable effect. Only, inert wastes which would provide a stabilizing effect as determined from the waste approval procedure detailed in **Appendix 5** of this document will be considered in the sections of the landfill designated for secondary smelter waste.

Spreading and Compaction Procedures

The procedures for placement and compaction of solid waste include: unloading of vehicles, spreading of waste into 3 foot lifts, and compaction on relatively flat slopes using a landfill compactor and a minimum number of three full passes.
The use of portable signs with directional arrows and portable traffic barricades will facilitate the unloading of wastes to the designated disposal locations. These signs and barricades will be placed along the access route to the working face of the landfill or other designated areas which may be established.

Procedures for Secondary Aluminum Smelter Waste Disposal

The wastes from secondary aluminum smelters (SAS) will be managed as per the following criteria;

1. The waste cannot be disposed during periods of rainfall.
2. The waste must be covered in a timely manner to minimize infiltration (tarps or compacted clay soil). This would be immediately under most conditions.
3. The waste must be immediately covered in the event of rainfall.
4. Intermediate cover for this waste shall consist of either one foot of clay soil, soil treated with zeolites or one foot of soil overlain by a GRC — geosynthetic rain cover
5. The HDPE liner must have a two foot buffer layer above it to prevent potential damage due to the heat generation potential of SAS waste.
6. SAS waste must be segregated from other waste(s) that are not compatible due to the potential for adverse reactions such as the release of ammonia and exothermic reactions. Therefore, the SAS will be adequately separated to prevent contact with the other wastes where the industrial wastes adjoin SAS waste phases. Soil berms approximating four feet in thickness will be constructed between the industrial wastes placed in Phase 4 to provide a lateral barrier to separate the SAS waste materials. The interior slopes of the soil berms will be cut vertically prior to waste placement. Exterior slopes will also be constructed as depicted in **Drawing 2** to further encapsulate the SAS waste. The final lateral thickness of the soil berm will provide a minimum of three feet between the SAS waste materials and industrial waste materials in Phase 4.

Drawing 2 - Waste Separation Between Landfill Phases

Procedures for Coal Combustion Wastes / Approved TDSWM Industrial Wastes

Coal ash or other TDSWM approved waste materials will be transported to the landfill in trucks and will be deposited at the base of the working face. Unloading of all vehicles will be observed by facility personnel to ensure compliance with waste restriction requirements. In addition, unloading of coal ash will be confined to as small a working area as possible. From there the waste will be spread in shallow (less than three foot) layers using typical tracked earth moving equipment. The earthmoving equipment will repeatedly pass over the deposited material to achieve maximum compaction. Typical fill progression is represented in the engineering plans and in .

Alternate methods of unloading, spreading and compaction will be implemented for approved industrial wastes on a case by case basis.

(ii) The frequencies and depths of initial, intermediate, and final cover;

Initial/Daily Cover

The compacted solid waste will be covered at the end of the day with six inches of soil or with an alternate daily cover as permitted by the TDSWM. Daily cover will be stripped prior to the commencement of following days' waste disposal operations to provide a pathway for leachate to migrate to the leachate collection system and to help minimize leachate outbreaks on the exterior side slopes.

Environmental Waste Solutions (EWS) has requested in 2014 to implement the use of an alternate daily cover system for the fill areas designated for disposal of secondary aluminum smelter waste (SAS). EWS is of the opinion that the use of foundry sand incorporated with the 12 mil DuraSkrim geosynthetic will provide a more protective system to enhance the minimization of infiltration, the generation of odors, and the minimization of emissions from the smelter waste fill. An explanation of the basis for this opinion is provided in the following paragraphs.

- *Basis for the Use of Foundry Sand as a Protective Base for Placement of the DuraSkrim Daily Cover*

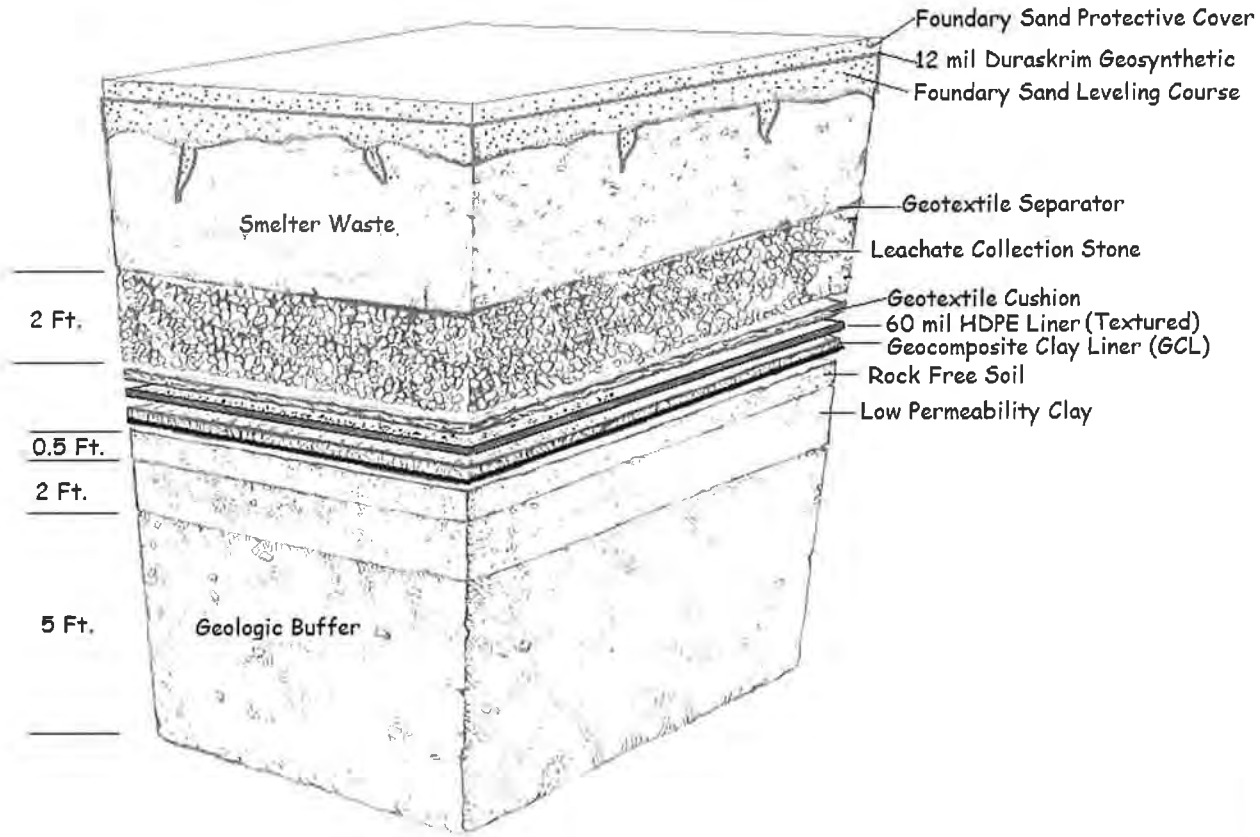
The physical nature of the SAS is often somewhat bulky as is crushed concrete with edges which could compromise the integrity of the 12 mil reinforced DuraSkrim geosynthetic which is incorporated in the daily cover of the ASW. The use of a bulldozer to perform some grading and leveling still leaves some uneven edges and crevices within the SAS which could compromise the DuraSkrim integrity. However, a layer of foundry sand could be placed over the top surface of the SAS to fill crevices and actually form a much more level base for placement of the DuraSkrim. The DuraSkrim would also have more intimate contact with the foundry sand base which would also help to preserve its integrity with future placement of SAS. Another benefit in using the foundry sand as a base layer would be in extending the service life of the heavy equipment used for grading of the SAS since the sand would most likely reduce the amount of time the heavy equipment is in direct contact with the SAS.

- *Basis for the Use of Foundry Sand as a Protective Base for Placement of the DuraSkrim Daily Cover*

Placement of the foundry sand above the DuraSkrim daily cover will provide for a protective cover or cushion layer to help to minimize potential damaging impacts from dumping of the SAS above the DuraSkrim. Based upon the unloading conditions at the working face EWS estimates that as much as 12 inches of foundry sand could also be spread above the DuraSkrim as an additional protective cover.

In summary, the preservation of the integrity of the DuraSkrim will minimize infiltration of moisture and the generation of gas. It is also believed by House Engineering (HE) that moist clay soil placed above SAS materials prolongs the period it takes to stabilize the SAS. The use of sand which is not as moist and has no hygroscopic moisture in combination with the DuraSkrim should provide a better cover section with respect to minimizing the sustained reaction period of SAS. An isometric section of the proposed use of foundry sand is provides as **Drawing 3** of this document which serves as a detailed rendering of the incorporation of foundry sand in the daily cover section.

Drawing 3 – Foundry Sand / DuraSkrim Daily Cover Typical Section



In conclusion, HE has established criteria that the foundry sand must satisfy prior to its use as previously described as follows:

- Lab analytical testing of foundry sand as per the TDSWM Policy Notebook to determine the chemical composition of the foundry sand must performed to ensure that there is no potential for reaction with the SAS wastes.
- The lab analysis must be completed every two years or whenever process changes occur which may affect composition of the sand whichever is more frequent as per TDSWM policy pn091 and:
- Determine the gradation of the foundry sand as well as hydraulic conductivity of the sand.

It should be noted that studies in Wisconsin (TRC Environmental Corp., 2012) have determined that a lot of foundry sand contains approximately 15% sodium bentonite content which has resulted in hydraulic conductivities which average 6.8×10^{-8} cm/sec.

It should also be noted that research performed by Abichou, Benson, and Edil, (Journal of Geotechnical and Geoenvironmental Engineering, December, 2000) determined that the hydraulic conductivity of foundry sands appeared unaffected by permeants such as salt solution and MSW leachate in short (75 days) and long term (433 days or approximately 5 pore volumes) tests they performed. The study also revealed that for five out of six sands the hydraulic conductivity was unaffected by frost and desiccation.

Therefore, the use of foundry sand has been demonstrated that it can be used as a hydraulic barrier comparable to clay soil in landfill applications.

Intermediate Cover

Rule 0400-11-01-.04(6)(a)4. of the TDSWM Solid Waste Regulations states the following:

Except for those completed portions to be finally closed (e.g., the final lift), all surfaces which will be left exposed for a period of over thirty days (e.g., initial and intermediate lifts) must be covered by an intermediate cover consisting of at least a one-foot layer of compacted soil or other material approved by the Commissioner.

The EWS Class II Landfill will apply an intermediate cover of 1 foot of soil (or an alternate approved material) for any surface which will be left exposed for a period longer than 30 days.

Final Cover

As waste disposal operations extend to the permitted final grades of the landfill, the intermediate cover and final cover shall be placed according to **Document II "Closure/Post-Closure Plan"** (C/PC Plan) of this Class II Landfill Permit Package.

The TDSWM regulations require a 3 foot minimum thickness of soil within the final cover system. Twelve inches of the soil cover is for the support of vegetation. In addition, a minimum of 24 inches of soil will be placed in the final cover as a low permeability "infiltration layer" consisting of fine-grained,

low permeability soils. The design of the final cover system is described further in the C/PC Plan. Final grades are also illustrated in the **Permit Drawings**. The final cover system will be placed within 90 days after the final lift is completed. The following table provides a summary of the alternate final cover configurations for the EWS Class II Landfill.

Table 4 - Alternate Final Cover Configurations

Final Cover Components	Proposed TDSWM Regulatory Compliant AlternateFinal Cover Sections Phase Designation Specific to Alternate Final Cover Section Industrial Waste Phase 4 (Alternate 1)	Industrial Waste Phase 4 (Alternate 2)	Secondary Smelter Waste Phases 1,2,3 (Alternate 1)	Secondary Smelter Waste Phases 1,2,3 (Alternate 2)
Vegetative Support Layer	1.0 Ft. Vegetative Support	Closure Turf	1.0 Ft. Vegetative Support	Closure Turf
Low Permeabiltiy Soil Layer	2.0 Ft. Soil Infiltration Layer (6" Rock Free Soil Above Geosynthetics)		1.0 Ft. Soil Infiltration Layer (6" Rock Free Soil Above Geosynthetics)	
Geocomposite Drainage Net	Double Sided Geocomposite	NA	Double Sided Geocomposite	NA
Flexible Membrane Liner	40 mil LLDPE textured	50 mil Super Grip Net	40 mil LLDPE textured	50 mil Super Grip Net
Base Layer for Geosynthetics	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)

It should be noted that the east and south slopes of Phase 2, Cell 1 have been closed using Closure Turf™.

Other alternate final cover systems may be used upon demonstration to the satisfaction of the Commissioner that the alternate final cover system provides equivalent or superior performance to the minimum performance standard presented in Rule 0400-11-01-.04(8)(c)3.(iii).

(iii) And, the cover material(s) to be utilized, including the estimated volumes to be needed (show initial, intermediate, and final earthwork calculations) and their sources and availability ***and as per*** **Rule 0400-11-01-.04(2)(h) -** *Availability of Cover Material - Cover material sufficient to meet the initial and intermediate cover requirements of this rule must be available at the facility. If such material must be hauled in from off-site, at least a 30-day supply shall be maintained on-site at all times.*

The site will maintain a 30 day supply of cover material. The type of cover material will include on-site soils and imported clay materials. The physical characteristics of the on-site soil borrow materials that will be used for cover at the site have been defined during the permit process. The minimum requirements for the soil and geosynthetic components of the final cover can be seen in **Attachment III, "CQA Plan"** of the permit application. The tests listed in

the following paragraphs have been performed on the site soils to be used for cover material as per the referenced ASTM standard:

1. Standard Proctor (ASTM D698);
2. Atterberg Limits (ASTM D4318);
3. Grain Size Analysis (ASTM D422, D1140);
4. Hydraulic Conductivity (ASTM D5084);
5. Classification (ASTM D2487);

Table 5: Soil Requirements

DESCRIPTION	UNITS	QUANTITY
Soil required for Vegetative Support layer (12") of Final Cover	CU.YD.	64,520
Soil Required Low Permeability (24") layer of Final Cover	CU.YD.	129,040
Daily/Intermediate Cover Required	CU.YD.	509,671
TOTAL SOIL REQUIRED	**CU.YD.**	**703,231**
Soil Available from Excavation within Landfill Footprint	CU.YD.	871,727
Soil Available within On-Site Borrow Pit	CU.YD.	160,000
TOTAL SOIL AVAILABLE	**CU.YD.**	**1,031,727**
NET SOIL AVAILABLE (SURPLUS)	**CU.YD.**	**328,496**

2.12 LANDFILL OPERATING EQUIPMENT

Rule 0400-11-01.04(9)(c)(12) *Describes the operation equipment to be utilized (including back-up equipment) and their source and availability.*

Rule 0400-11-01.04(2)(g) *Operating Equipment – At Class disposal facilities, and at Class II, Class III and Class IV disposal facilities unless the Commissioner deems some other arrangement as adequate for proper facility operation, there must be maintained on-site operating equipment capable of spreading and properly compacting the volume of solid wastes received, and capable of handling the earthwork required. Back-up equipment must be available within 24 hours of primary equipment breakdown.*

There is and will be adequate on-site equipment capable of spreading and proper compaction of the volume of waste materials, and capable of handling the earthwork required to operate the proposed disposal facility. The following is a representative list of the major equipment to be used during operation of the disposal facility:

1 Bull Dozer
1 Dump Truck
1 Track Mounted Backhoe
1 Water Truck

The equipment list may be modified as necessary to satisfy regulatory requirements. Additional equipment is available locally if the need arises.

The site is also equipped with support equipment such as pressure washers, pick-up trucks, and pumps. Other small tools and supplies necessary for the proper operation and maintenance of the equipment is available on-site. Maintenance on the vehicles shall be provided by in-house personnel or at one of the commercial locations in the area. Repairs that cannot be made by in-house personnel will be contracted out. In the event both front line and back up equipment become inoperable, EWS maintains the ability to have a replacement piece available within twenty-four (24) hours, provided by local heavy equipment dealerships.

2.13 LITTER CONTROL

Rule 0400-11-01.04(9)(c)(13) *Describes the structures and procedures to be used in controlling and collecting litter.*

Rule 0400-11-01.04(2)(d) – *A facility must be operated and maintained in a manner to minimize litter. Fencing, diking and/or other practices shall be provided as necessary to confine solid wastes subject to dispersal. All litter must be collected for disposal in a timely manner.*

Aluminum smelter waste, coal combustion wastes, and waste tires do not produce litter. Construction/demolition wastes produce limited amounts of litter. However, litter controls will be installed in the event wastes are accepted which could generate litter at the facility.

2.14 RUN-ON, RUN-OFF, AND EROSION CONTROL

Rule 0400-11-01.04(9)(c)(14) *Describes how run-on and run-off collection and holding and erosion control facilities will be managed, including the disposition of collected waters and residues and a comparison of before and after flows in the drainage ways leaving the site.*

Rule 0400-11-01-.04(2)(i) *Run-on, Run-off, and Erosion Control*

1. *The operator must design, construct, operate, and maintain a run-on control system capable of preventing flow onto the active portion of the facility for all flow up to and including peak discharge from a 24-hour, 25- year storm.*

The plan for storm water run-on control is designed to minimize erosion of the on-site areas. Diversion berms will be constructed as necessary to prevent run-on storm water from entering the active portion of the landfill. A perimeter channel has been designed around the entire footprint to convey surface water from the landfill. Should storm water become impounded near the active portion of the landfill as a result of diverting it, this storm water will be pumped into the perimeter channel in which it will be allowed to flow to the respective sedimentation basin. See **Attachment II "Design Calculations"** for storm water control structure design calculations.

2. *The operator must design, construct, operate, and maintain a run-off management system to collect and control at least the peak flow resulting from a 24-hour, 25 year storm.*

The run-off management system for the site includes storm water drainage control structures which have been designed to minimize erosion of off-site areas, minimize conveyance of sediment laden storm water off site as well as to minimize water pollution. Tack-on benches have been designed for placement every 90 feet of slope length and will be constructed as the fill progresses such that no more than 90 feet of slope length is ever exposed before vegetation is established. In this way, the slope is effectively terraced to reduce the time of concentration thereby reducing the peak flow and the potential for rill development. A network of conveyance channels and culverts has been designed around the disposal facility to carry storm water run-off to one of the two sediment ponds. Rows of silt fencing, enhanced silt fencing, straw wattles or straw bales will be placed as needed at the base of the fill areas to control sediment. These structures will reduce the accumulation of sediment in the sediment basin and will also prevent excessive amounts of sediment from being transported to off-site areas. The tentative locations of these erosion control structures are depicted on the **erosion detail sheet** of the **Permit Drawings**.

Two sediment ponds have been designed for the expansion. The drainage area for Pond 1 approximates 25 acres, resulting in a required needed volume of approximately 5.35 acre-feet to accommodate the 24 hour/25 year storm event. The drainage area for Pond 2 approximates 26.5 acres resulting in a required volume of approximately 6.85 acre-feet to accommodate the 24 hour/25 year storm event. Pond 1 is located south of the landfill footprint while Pond 2 is located west of the landfill footprint. Pond 2 is also located within the 100 year floodplain of Charlie Creek, however, all grading associated with Pond 2 results in a net cut in the floodplain. Calculations associated with the sediment ponds are provided in **Attachment II "Design Calculation"** section. These sediment ponds will be monitored periodically to ensure that runoff is controlled at the Class II facility.

3. *Holding facilities (e.g. sediment basins) associated with run-on and run-off control systems must be designed to detain at least the water volume resulting from a 24-hour, 25 year storm and to divert through emergency spillways at least the peak flow resulting from a 24-hour, 100 year storm.*

Basin Storage Design Basis

The sediment basins have been designed to retain the entire volume of storm water run-off from the 24 hour, 25 year storm event.

Sediment Storage Design Basis

The sediment storage for each of the sediment basins have been designed to provide at least 0.1 acre-feet per acre of for the largest disturbed area which will drain to the pond during the life of the landfill. Best management practices (BMPs) will be implemented should sediment-laden water become problematic and not settle adequately prior to discharge from the basin. Specifically, the basin can be retrofitted with skimmer-type discharge structures, such as the Faircloth Skimmers™. The number of skimmer-type discharge structures required is based upon the requirement to discharge the entire volume of runoff produced from a 100 year storm event in 72 hours neglecting any discharge through the emergency spillway without overtopping the basin.

Table 6: Sediment Basin/Pond Storage Volume

Pond	Maximum Drainage Area (ac)	Sediment Storage Volume (ac-ft)	Peak Elevation 24-hr, 25 yr (MSL)	Peak Elevation 24-hr, 100 yr (MSL)	Q_{25}, Inflow (cfs)	Q_{25}, Outflow (cfs)	Q_{100}, Inflow (cfs)	Q_{100}, Outflow (cfs)	Volume 25 yr Storm (ac-ft)	Pond Volume to Principal Spillway El. (ac-ft)
1	19.0	0.6	390.3	91.3	46.8	2.8	57.2	12.9	5.35	5.35
2	24.6	0.7	389.1	390.8	60.6	2.8	74.1	13.5	6.85	6.85

Note:

* Volume of 25 year storm event calculated using spreadsheet provided by TDEC.

Principal Spillway Design Basis

The principal spillways have been designed to pass a 24 hour, 25 year storm event that occurs when the pond is already filled with the entire volume of storm water run-off collected from a previous 24 hour, 25 year storm event. The spillway opening has been designed to pass the second 24 hour, 25 year event in 72 hours.

Emergency Spillway Design Basis

The emergency spillway has been established at the second 24 hour, 25 year peak storm elevation based upon weir flow through the principal spillway. The elevation of the top of the containment berm has been established based upon the 24 hour, 100 year peak storm elevation over the emergency spillway plus 1 foot of freeboard and six inches of settlement.

These design requirements have been developed by Abe Almassi (TDSWM 1992).

4. *Collection and holding facilities associated with run-on and run-off control systems must be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system.*

Basin Maintenance

Inspection Interval

Sediment basins are to be inspected on quarterly intervals. In the event the basins or any of the structural components of the ponds have been damaged they will be repaired immediately.

Sediment Removal Trigger

Basins will be cleaned of sediment as needed to maintain adequate storage volume. Sediment will be removed from the basins when the design sediment storage capacity is reduced by 60 percent. A staff gauge will be installed in each of the basins to provide an indication of the level of accumulated sediment. Removal of sediment shall not extend below the constructed base grade of the basins.

Sediment Management Criteria

Sediment removed from the basins will be managed as follows;

- Sediment removal operations are to be performed prior to winter months,
- Sediment removed from the basins shall be placed at the approved on-site cover soil stockpile locations,
- Sediment may be used for daily cover after drying/processing,
- Sediment will be seeded and strawed after spreading, and,
- Sediment shall not be placed on sloping ground unless processed for use as topsoil.

It should be noted that the area for storing/wasting of sediment will be determined at the point in time the basin is determined to have accumulated the maximum sediment capacity as indicated by the staff gauge. ES personnel will contact the TDSWM and submit a minor modification for selection of the sediment storage waste area. This rationale is based upon uncertainty as to the projected level of site development at the time when a pond reaches its' sediment storage capacity.

5. *Run-on and run-off must be managed separately for leachate unless otherwise approved by the Commissioner.*

Run-on and run-off are diverted to the storm water channels and into the storm water sediment basins.

6. *The operator must take other erosion control measures as necessary to control erosion at the site.*

Rows of silt fencing, enhanced silt fencing, straw wattles or straw bales will be placed as needed at the base of excavated slopes, fills, stockpiles, and borrow areas until a vegetative cover is established. Such structures shall be placed downslope of the exposed areas to intercept the maximum amount of siltation contained in the runoff from the facility. If the length of the exposed area exceeds 150 feet, a series of barriers at no more than 100 foot spacing may be required. In some instances, erosion control blankets or other measures as prescribed within the Tennessee Erosion and Sediment Control Handbook may be required. Installation details of the recommended barrier systems are included on the **"Erosion and Sediment Control Details"** sheet of the **Permit Drawings**.

Temporary seeding operations will be implemented to inhibit erosion within areas which will not be filled on or capped for over 90 days. Permanent seeding will be implemented on all areas of the disposal facility which have been completed. Re-vegetation operations may be required in the borrow area as part of the implementation of the stabilization of the borrow areas. The following guidelines will be followed in establishing final cover:

Seeding – Permanent seeding shall only be performed between March 15 and May 15 or between August 15 and October 15. At other times, sodding or seeding with temporary seed shall be made until the desired spring or late summer seeding time. Seeding shall not be performed on frozen or muddy grounds or when prevailing winds exceed five (5) miles per hour. Grass seed shall be clean, fresh stock, and labeled in accordance with the Federal Seed Act and shall be produced by a recognized manufacturer and guaranteed by the dealer. The seed shall have the State of Tennessee certification. Recommended seed mixtures as well as rates and time of application are provided in **Table Four** (4).

Table 7: Seed Guidelines

SEASON	SEED*	APPLICATION RATE (POUNDS PER ACRE)
Spring (March 15 – May 15)	Kentucky 31 Fescue and White Clover and Weeping Lovegrass	50 25 15
Summer (May 15 – August 15)	Bermuda Grass (hulled)	50
Fall (August 15 – October 15)	Kentucky 31 Fescue and White Clover	60 15
Winter-Temporary (October 15 – March 15)	Annual Ryegrass and White Clover	50 10

Other seed blends may be utilized upon approval from the TDSWM

Fertilizer – The fertilizer used at the EWS Class II Landfill is an agricultural grade of 17-17-17 or equivalent 1-1-1 ratio fertilizer. Fertilizer shall be commercial / agricultural grade, free-flowing, uniform in composition and shall conform to State and Federal

regulation. Fertilizer shall bear the manufacturer's guaranteed statement of analysis. The rate of application is presently and shall be for all future seeding operations be at a rate equivalent to 1000 lbs. / acre. Fertilizer may be applied with the use of a bulk spreader, drop type spreader, hydro-seeder or any other equipment capable of providing even coverage. The application shall result in an even spreading of the fertilizer over the entire area. Care shall be taken as not to spill the fertilizer in the areas to be seeded during the loading and spreading of the fertilizer.

Lime – Lime shall be ground or pulverized agricultural grade limestone containing no less than 85 percent total carbonates and shall be ground to such fineness that at least 50 percent will pass a 100 mesh sieve and at least 90 percent will pass a 20 mesh sieve. Lime shall be applied at a minimum rate of two tons per acre. Lime may be applied with the use of a bulk spreader, drop type spreader, hydro seeder or any other equipment capable of providing even coverage. The application shall result in an even spreading of the lime over the entire area.

Mulching – Mulch shall be hay mulch or ***Wood cellulose fiber.*** Wood cellulose fiber used for hydraulic mulching shall consist of specifically manufactured commercially available products containing wool cellulose fiber, recycled newsprint fibers, or a combination of these materials. The wood cellulose fiber or newsprint fiber will contain no growth or germination inhibiting factor and shall contain a dye for color. The dye shall allow the operator to monitor the amount of mulch being applied to the area to insure proper coverage. The application of wood cellulose fiber mulch shall be in a slurry mix through a hydro-seeder. The slurry mixture shall be constantly agitated from the initial mixing point until the material is discharged onto the ground. The material shall then be applied over the seeded area in a manner not disruptive to the placement of seed.

Hay mulch will be the preferred mulch at the EWS Class II Landfill. The hay mulch shall be from oats, wheat and or barley and shall be free of noxious weeds and noxious weed seeds. The hay shall not contain sticks, rocks, or other objectionable material and will not be wet, moldy, or otherwise undesirable. Hay mulch shall be applied at the rate of 92 lbs. / 1000 sq. ft. The application of the hay mulch will be through a blower or other approved equipment capable of shredding the material bale and distributing it evenly over the seeded areas. The application of mulch will take place no more than 24 hours after the seeding operation of the area.

2.15 LEACHATE COLLECTION AND HOLDING FACILITIES MANAGEMENT

Rule 0400-11-01.04(9)(c)(15) *Describes how leachate collection and holding facilities will be managed, including the disposition of collected leachate.*

Also refer Rule 0400-11-01.04(4) Leachate Migration Control Standards

A leachate collection system has been designed to comply with the rules specific to the management of leachate. The leachate collection and holding systems (LCS) incorporate several specific components to satisfy the intent of the regulations. The major components include the following:

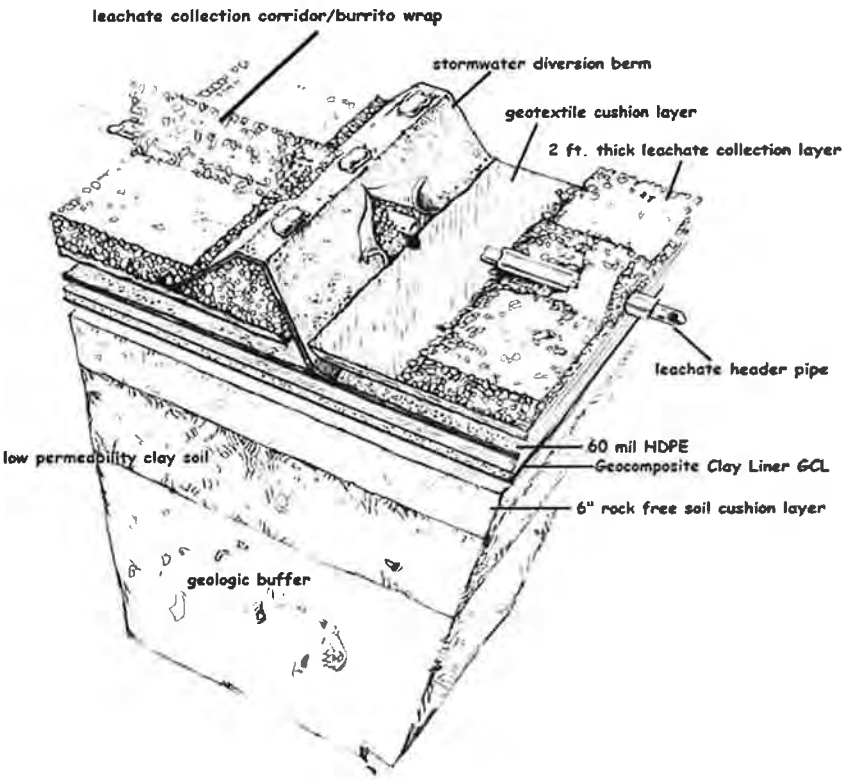
- low permeability composite liner,
- leachate collection pipes and collection media,

- leachate collection sumps and pumps,
- force main piping, and
- a leachate tank farm.

The aforementioned individual components of the LCS will be described in the following paragraphs. The low permeability composite liner system will be detailed initially as the regulatory criteria are also presented in ***Rule 0400-11-01.04(4) Leachate Migration Control Standards.***

Low Permeability Composite Liner

As previously discussed, alternate liner leachate collection systems compliant with the TDSWM Subtitle D regulations specific to the LCS have been developed for the EWS disposal facility. The purpose of developing alternate composite liner designs is to provide an alternate equivalent liner design in the event certain materials are more cost effective or more readily available but which can still demonstrate equivalency with the TDSWM prescriptive liner/leachate collection system. The proposed conceptual designs are often referred to as corridor or "burrito wrap" leachate collection type systems. **Drawing 2** of this document provides a conceptual illustration of the corridor/burrito style leachate collection system proposed for the EWS Class II Landfill. **Drawing 2** depicts the inter-cell storm water berm between the active phase and the inactive phase of the landfill. **Drawing 2** and **Drawing 3** provide a close-up of the alternate equivalent liner sections.



Drawing 4 - Leachate Collection Corridor (Burrito Wrap)

Calculations have been performed to demonstrate the equivalency of the proposed liner/leachate collection system with the prescriptive TDSWM landfill liner/leachate collection system. This "equivalency demonstration" is provided in **Section 2.30 "Basis of Design"** of this document. The specific components of the EWS proposed liner/leachate collection system for the SAS waste disposal phases include at a

minimum the following component layers, from bottom to top;

- a minimum of 5 feet of geologic buffer soil materials
- a 1.5 foot low permeability compacted clay liner,
- a 0.5 foot low permeability rock free compacted soil layer,
- a laminate backed geosynthetic clay liner (GCL) (this layer will be limited to an elevation equal to the elevation in the floor of the landfill that is 1.0 foot above each leachate collection sump in the phases with SAS waste materials,
- a 60 mil textured HDPE geomembrane liner,
- a non-woven geotextile cushion layer,
- a 2.0 foot siliceous gravel leachate collection layer (geocomposite drainage net with 2 feet of soil cushion will replace this layer on all interior side slopes),

The proposed alternate composite liner designs which provide a barrier system equivalent to the prescriptive TDSWM Subtitle D liner system are summarized in the following table.

Table 8 - Proposed TDSWM Regulatory Alternate Liner Sections

Landfill Liner Components	Proposed TDSWM Regulatory Compliant Alternate Liner Sections			
	Phase Designation Specific to Alternate Liner Section			
	Industrial Waste Phase 4 (Alternate 1)	**Industrial Waste Phase 4 (Alternate 2)**	**Secondary Smelter Waste Phases 1,2,3 (Alternate 1)**	**Secondary Smelter Waste Phases 1,2,3 (Alternate 2)**
Leachate Collection System	1.5 Ft.Siliceous Aggregate Non-woven Geotextile Cushion	Gecomposite Drainage Net blanketed with min. 6" Rock Free Soil and an additional 1 foot of cushion material above the rock free soil	2.0 Ft.Siliceous Aggregate Non-woven Geotextile Cushion	Gecomposite Drainage Net blanketed with min. 6" Rock Free Soil and an additional 1.5 feet of cushion material above the rock free soil
Flexible Membrane Liner	60 mil HDPE textured	60 mil HDPE textured	60 mil HDPE textured	60 mil HDPE textured
Clay Liner	2 Ft. Low Permeability Soil with $K = 1 \times 10^{-7}$ cm/sec	2 Ft. Low Permeability Soil with $K = 1 \times 10^{-7}$ cm/sec	2 Ft. Low Permeability Soil with $K = 1 \times 10^{-7}$ cm/sec	2 Ft. Low Permeability Soil with $K = 1 \times 10^{-7}$ cm/sec
Geologic Buffer (Equivalent to 5 ft. of 1×10^{-6} cm/sec)	Gecomposite Clay Liner (GCL)w/o laminate backing plus 5' of existing site soils	Gecomposite Clay Liner (GCL)w/o laminate backing plus 5' of existing site soils	Gecomposite Clay Liner (GCL) w laminate or polymer protection plus 5' of existing site soils	Gecomposite Clay Liner (GCL) w laminate or polymer protection plus 5' of existing site soils
	low permeability soil w K $= 1x10^{-7}$ cm/sec plus 4 Ft. Existing Soils	low permeability soil w K $= 1x10^{-7}$ cm/sec plus 4 Ft. Existing Soils	5.0 Ft. of Existing Geologic Buffer Materials above the seasonal high water table	5.0 Ft. of Existing Geologic Buffer Materials above the seasonal high water table

Leachate Collection Pipes and Collection Media

The proposed EWS Class II Landfill will be divided into four phases. The design of the LCS pipe sizes and spacing is based upon the regulatory requirement to maintain less than one foot of leachate head above the composite liner. Hydraulic analyses were performed using the HELP computer model developed by the Corps of Engineers (COE) to determine the pipe diameter and pipe spacing required to comply with the maximum of one foot of leachate above the liner requirement.

Pipe strength calculations were also performed to determine the required ratio of the diameter of the pipe to the pipe wall thickness (DR) to withstand the predicted loading conditions induced by the waste filling operations.

Placement of the collection media (2 feet of siliceous stone) on interior side slopes shall proceed from the bottom of the slope upwards. Equipment shall not be driven directly on the cushion geotextile or underlying 60 mil geomembrane liner during placement of the siliceous stone or protective cover soil above the geocomposite drainage net. The equipment used to place the stone or protective cover soil above the geosynthetic liner components shall comply with the requirements set forth in **Table 6**.

Table 9: Leachate Collection Stone Equipment Placement Requirements

Maximum Allowable Equipment Ground Pressure (psi)	Thickness of Overlying Stone (ft.)
<5	1.0
<10	1.5
<20	2.0
>20	3.0

Leachate Collection Sumps and Pumps

Leachate collection sumps have been designed to manage leachate collected within the EWS Class II Landfill. Three gravity sumps will convey leachate from within the landfill to exterior manholes and a force main system. In addition, each of the sumps has been fitted with sidewall riser pipes to remove leachate and maintain the maximum one foot head above the liner criteria in the event that the gravity system malfunctions. In addition, each sump will be filled with coarse aggregate and will have a storage capacity of approximately 1,400 gallons (accounting for 30% porosity in the stone between top of pump and top of sump elevation) for operation of the side wall riser pumps.

The allowable maximum leachate head elevation for each sump will be established as the elevation representing one foot above the elevation of the crest of the top of the sump slope. **Table 5** summarizes the proposed bottom of the sump elevation for each phase/cell of the landfill.

A leak detection system (LDS) has been designed for each sump at the EWS Class II Landfill. The **Leak Detection Procedural Manual** is provided in **Appendix 4** of this document that provides a design schematic as well as sampling, monitoring, and response procedures to be implemented for each LDS constructed.

Table 10: Leachate Collection Summary

Landfill Phase / Cell	Area Draining to Sump (Acres)	Base of Sump Elevation (FT. MSL)	Groundwater Table (Feet MSL)
Phases 1 and 2	**15**	**384**	**376**
Phase 3	**13**	**388**	**380**
Phase 4	**12**	**388.5**	**381.5**

Note: Phase 1 and 2 drain to the same sump.

The actual sump elevations will be established based upon the as-built topographic survey performed after construction of each individual sump.

Force Main Piping

A force main pipe system has been designed to convey collected leachate to the leachate tank farm. The force main, which is proposed to be constructed of HDPE pipe with a DR of 11, will be equipped with lift stations situated at critical locations to ensure proper conveyance to the leachate tank farm. The required nominal pipe diameter required for the force main system has been estimated at 2 inches. It should also be noted that exposed piping will be insulated to inhibit freezing.

Leachate Pipe Cleaning Equipment and Methods

High pressure water jet pipe cleaning is the standard method for cleaning of leachate collection piping. The EWS Class II Landfill leachate collection system has been designed with High Density Polyethylene (HDPE) pipe. Waste industry standards specific to HDPE pipe cleaning recommends pumping equipment be capable of providing a minimum of 60 gallons per minute (gpm). The equipment should also be capable of sustaining pressure between 2,000 and 2,500 pounds per square inch (psi) to effectively remove the scale buildup within the HDPE pipe.

Leachate Pipe Cleaning Frequency

Prior to waste placement the leachate collection pipes should be inspected to ensure that the pipe network has not been compromised or clogged with debris during construction. An appropriate method will be selected to demonstrate that the leachate carrying capacity of the pipe network is complies with the intended design flow capacity.

After waste filling operations are initiated it is recommended that the inspection and cleaning of the leachate collection piping be conducted a minimum of once every 3 years, when leachate levels in the system are low. Although leachate flows are continuous year round, the rates are lowest in late summer or early fall and this is the preferred time of year to clean the system. Although it is presently recommended to inspect and clean the leachate collection piping at least once every 3 years, the stress on cleaning the leachate collection system may change if the leachate quality changes over time. The cleaning frequency should actually be governed by the extent of encrustation and sediment buildup observed during each inspection event and, therefore, may be subject to change.

Leachate Tank Farm Storage Capacity, Disposal Options, and Record Keeping

The leachate storage tanks will be glass-fused-to-steel or stainless steel (or equal) for protection against corrosion and all tanks will be situated inside a secondary containment area consisting of another larger diameter tank. The initial leachate storage tank has been sized to provide approximately 115,000 gallons of leachate which presently exceeds the 30 days of storage for the estimated average leachate generation rate of 2,150 gallons/day. This estimate of tank storage capacity is based upon the leachate generation rates for the initial years of operation. As the site is further developed "actual leachate generation rates" will be evaluated and the number of tanks will be installed according to actual quantities of leachate generated.

The secondary containment for the initial leachate storage tank has a capacity of at least 121,355 gallons (which is more than the 110% of the total capacity of the current storage tank when accounting for volume occupied by non-leaking tanks).

The City of Bruceton, and Huntington, Tennessee are presently providing disposal for the leachate generated on-site. In the event that either of these leachate management options becomes inaccessible EWS will deliver the leachate to one of OnSite Environmental's locations in either Nashville or Memphis, Tennessee.

Accurate accounting of the volume of leachate collected is a necessary component of the leachate management at the EWS Class II Landfill. Leachate generation and disposal volumes have and will continue to be closely tracked to determine the cost of disposal. Records of leachate generation have and will be kept at the EWS Landfill office.

2.16 DUST CONTROL

Rule 0400-11-01-.04(9)(c)16. *Describes the dust control measures to be taken and when they would be implemented.*

Rule 0400-11-01.04(2)(j) *The operator must take dust control measures as necessary to prevent dust from creating a nuisance or safety hazard to adjacent and owners or to person engaged in supervising, operating, and using the site. The use of any oils other chemicals (other than water) for dust suppression must be approved in writing beforehand by the DSWM.*

In order to control dust at the site approximately 3,000 feet of the main entrance and waste fill access road is paved with asphalt. Water trucks are also employed when necessary to control dust on roads that are unpaved. Dust control measures will be implemented as necessary to prevent dust from creating a nuisance or safety hazard to adjacent landowners and facility personnel. Drainage ditches will be constructed along the roads as needed to promote drainage. In addition, roads and disturbed areas will be lightly sprayed with water to minimize blowing dust as necessary. The use of any oils or other chemicals (other than water) for dust suppression will be approved by TDSWM prior to application. Re-vegetation will be conducted as soon as practical to establish vegetative growth in areas where work has been completed so that dust problems and wind erosion will be minimized.

2.17 FIRE SAFETY

Rule 0400-11-01.04(9)(c)(17) *Describes the fire safety precautions to be taken, the types and availability of on-site fire suppression equipment, and/or the arrangements made with the local fire protection agency.*

Although secondary aluminum smelter wastes are exothermic there are no other waste materials in the landfill that could ignite. Coal combustion wastes have no potential for burning. However, should solid waste be delivered to the facility, which is burning, smoking or at a temperature that will potentially cause fire, it will be immediately removed from the facility entrance, unloading area and/or working face. The site Emergency Response Coordinator (ERC) will be immediately notified of the situation. If in the event that the fire cannot be controlled by on-site personnel, the Camden Fire Department will be immediately notified to aid in fire-fighting activities. The ERC and Emergency Response Team (ERT) may direct operations to cease and evacuate all facility personnel away from the fire area. The evacuation may require the movement of heavy equipment and/or solid wastes to reduce the risk of the fire from spreading. If necessary, the ERC and the Camden Fire Department will determine if additional fire departments are required to assist in controlling and/or exterminating the fire.

Rule 0400-11-01.04(2)(c) Fire Safety

1. Except as specifically authorized by the Department:

(i) The operator must not permit or engage in open burning of solid wastes at the facility. Any open burning that does occur must be immediately extinguished.

Open burning of solid waste is strictly prohibited and will not be conducted by facility staff. The aluminum smelter wastes and coal combustion wastes accepted at the landfill are not susceptible to combustion. However, fire extinguishers will be placed in the landfill office, maintenance, and also in heavy equipment on site. The fire extinguishers will be properly maintained and recharged as necessary. The landfill personnel will be properly trained in the use of the fire extinguishers. A water truck is available on-site for use in controlling fires. In addition, landfill activities will be conducted in a manner, which will minimize the possibility of the outbreak of fire such as the placement of daily and intermediate cover

(ii) The operator must not allow solid wastes which are burning or smoldering to be deposited into the active portion of the facility. Any such wastes that are received must be deposited at a location safely removed from the active portion and extinguished before being deposited into the active portion.

Should solid waste be delivered to the facility, which is burning, smoking or at a temperature that will potentially cause fire, it will be immediately removed from the facility entrance, unloading area and/or working face. The site Emergency Response Coordinator (ERC) will be immediately notified of the situation. In the event that the fire cannot be controlled by on-site personnel, the Camden Fire Department will be immediately notified to aid in the firefighting activities:

Camden Fire Department
119 West Main Street,
Camden, TN 38320
Telephone - (731) 584-4623

The site ERC and Emergency Response Team (ERT) may direct operations to cease and evacuate all facility personnel away from the fire area. If necessary, the ERC and the responding fire department will determine if additional fire departments are required to assist in controlling and/or exterminating the fire.

2. The facility must have, on-site and continuously available, properly maintained fire suppression equipment in sufficient quantities to control accidental surface fires that may occur, or arrangements must be mad with the local fire protection agency to provide immediate firefighting services when needed. Additional earth moving equipment shall be brought to the facility as necessary to help suppress an underground fire.

If possible, any solid waste that is found burning after unloading will be safely removed with excavating equipment to an open area where it may be extinguished by smothering with the earthen material or by dousing with water. Extinguishing the fire will be completed in such a manner so as to not incur further risk to the facility personnel or equipment. Facility personnel will attempt to extinguish the fire or smoldering material with facility fire control equipment such as soils, water, or fire extinguishers.

EWS will coordinate quarterly site visits with the Camden Fire Department to review expectations of the various parties, equipment limitations, access to the working face and phasing diagrams.

2.18 PERSONNEL SERVICES / COMMUNICATIONS

Rule 0400-11-01.04(9)(c)(18) *Describes the facilities and services available to facility personnel including shelter, drinking water, hand-washing and toilet facilities, and communication equipment.*

Also see Rules 0400-11-01.04(2)(e) Personnel Services and 0400-11-01.04(2)(f) Communications.

An office and a separate check station are located near the entrance of the landfill. In addition, a metal building structure that serves as a shop and break room for site employees is located along the coal ash fill access road. Each of the structures is climate controlled and furnished with restrooms and drinking water.

The facility has operating and effective communication devices (e.g., telephone, 2-way radio) capable of summoning emergency assistance on-site. Telephones are available to all facility personnel at each of the aforementioned structures at all times. In addition, cell phones and 2-way radios are available for personnel to carry with them as they perform duties on and around the landfill.

2.19 CONSTRUCTION QUALITY ASSURANCE PLAN

Rule 0400-11-01.04(9)(c)(19) *Describes in the construction quality assurance plan:*

(i) How each new "as-built" solid waste landfill unit(s) liner(s) and/or lateral expansion liner(s) and cover system(s) will be inspected and/or tested by a registered engineer as per 1200-1-.04(1)(c) during the construction or installation for uniformity, damage, and imperfections, and

(ii) How each constructed section of the liner system or final cover system will be certified by a registered engineer.

The **Construction Quality Assurance (CQA) Plan** for re-compaction of the geologic buffer, GCL placement, soil liner, geosynthetic materials and construction of the final cover system for this project is provided in the **CQA Plan** which is **Document V** of the EWS Class II Landfill Permit Package. All provisions included in the **CQA Plan** will be met during the construction sequence and will be certified by a registered engineer.

2.20 GAS MIGRATION CONTROL STANDARDS

Rule 0400-11-01.04(9)(c)(20) *Describes how the control and migration of explosive gases will be controlled and monitored;*

A field sampling and testing program was performed at the landfill to characterize the composition of the gas produced by the SAS waste materials. Three locations were sampled during the field testing program. The main leachate collection header pipe was sampled near the existing Cell 2 sump and at the upper end of Cell 2. A stainless steel probe was also extended into the waste mass near the center of the top deck of Cell 2. The test methods selected to characterize the composition of the gas included EPA CTM-027, EPA Method 18 and EPA Method TO-15. EPA CTM-027 was determined to be the most accurate method for detection of ammonia. The results of the laboratory testing of the gas samples indicated that there were three main compounds identified in

the gas. Those compounds included ammonia, methane, and hydrogen. The estimated percentages of these gases were reported by the laboratory as follows:

Ammonia – 50.7%, Methane – 36.4%, Hydrogen – 20.2%

It should be noted that the percentages total more than 100%. However, the EPA method allows up to a 10% variance for the test methods used to determine the percentages. In addition, ammonia was determined using EPA CTM-027 while Methane and Ammonia were quantified using EPA Method 18. It should be noted that EPA CTM-027 is considered the most accurate method for estimating ammonia concentrations in gas.

In order to determine the potential explosive nature of the gas the net heating value was calculated. The highest net heating value calculated from the three samples was determined to approximate 384 British Thermal Units (BTU) per Standard Cubic Foot (SCF) of gas from the sample taken within the waste mass. The heating value of landfill gas is known to range from 350 to 600 BTU/SCF. Therefore, the heating value of the gas generated at the EWS landfill was determined to be on the low end of the heating value range for Municipal Solid Waste (MSW) landfill gas.

Gas Migration Control Standards

Rule 0400-11-01.04(5)(a) *Class I Disposal Facilities must be designed, constructed, operated, and maintained such that any gases generated by decomposition or other reaction of solid waste are collected and vented, recovered, or otherwise managed such that:*

1. There is no buildup of gas pressure under the final cover such that the functions of such cover (including any cap) are compromised;

A landfill gas collection system has been designed to minimize gas buildup in the final cover.

2. The concentration of explosive gases in facility structures (excluding gas control or recovery system components) does not exceed 25 percent of the lower explosive limit for the gases;

Devices are provided on-site which provide real time gas measurements to determine gas concentrations near the shop and office.

3. The concentration of explosive gases at the property boundary does not exceed the lower explosive limit for the gases;

An AreaRAE Steel multi-gas monitor has installed for "fence line" or property boundary surveying of emissions at the EWS facility. The AreaRAE Steel is an ATEX-certified Multi Gas, wireless monitor. The AreaRAE is housed in a welded stainless-steel enclosure. An integrated wireless modem transmits real-time gas measurement data to the base station, which has been setup in the EWS office. The base station employs a standard Windows-based PC running ProRAE Remote software. The base station can simultaneously control and display readings for up to eight AreaRAE Steels and/or AreaRAE Steel Gammas (or other AreaRAE-compatible monitors, including MultiRAE Plus, MiniRAE 2000, ppbRAE Plus, Smiths APD-2000®, BAE ChemSentry®, and Coastal Environmental Systems Weatherpak®). This provides a multi-threat detection network that can monitor a wide geographic area.

4. The minimum frequency of monitoring shall be quarterly and the operator shall keep records to comply with the monitoring and records requirements at rule 0400-11-01-.02(4)(a)9; and monitoring shall include at least the following locations:

(i) Underneath or in the low area of each on-site building;

(ii) At locations along the boundary as shown in the permit;

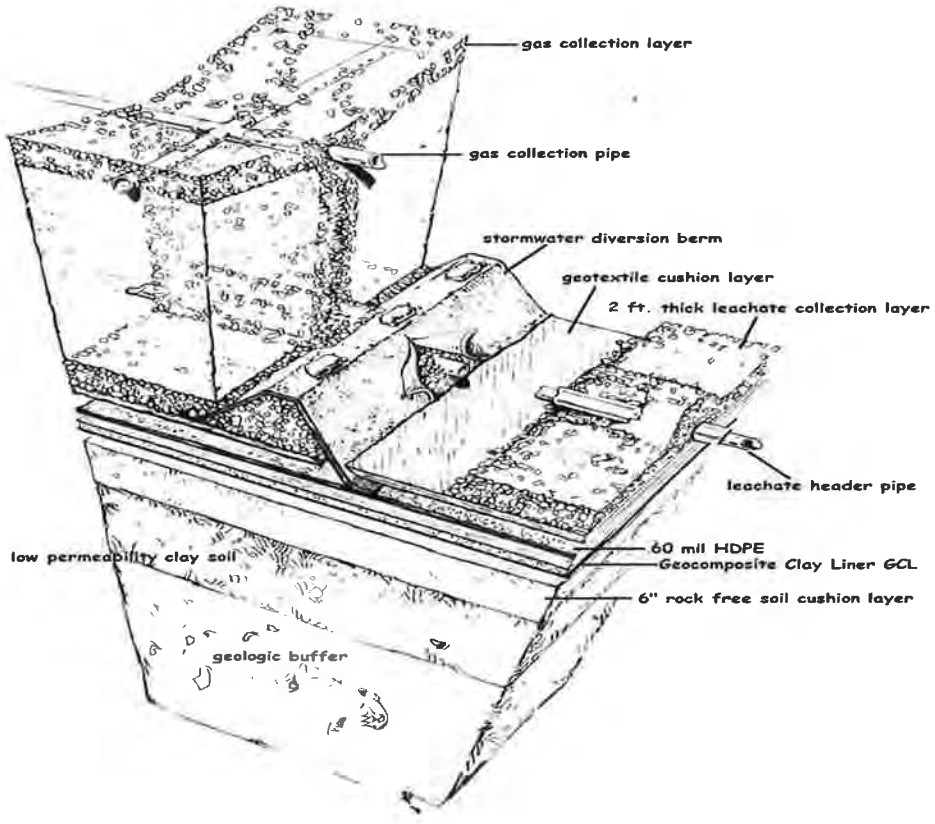
(iii) At any potential gas problem areas, as revealed by dead vegetation or other indicators; and

(iv) At any other points required by the permit.

A MultiRAE Plus gas meter and Draeger tube sample devices are provided on-site to check a number of locations for the presence of ammonia. The sample locations will be identified in the **Air Monitoring Plan**. Readings will be taken at an interval established by the TDSWM and will be recorded and kept in the office as specified in the **Air Monitoring Plan** located in **APPENDIX 2** of this document.

5. Within 60 days of detection above the limits set in parts 1, 2, and 3 of this subparagraph, implement a Department approved remediation plan for the methane gas releases. Pending the remediation, the owner/operator must take all necessary steps to ensure immediate protection of human health.

A system has been developed to collect the gas generated at the site. A conceptual drawing of the landfill gas system is provided on the following page. The gas collection layer which is to be constructed of siliceous river gravel will be placed along the slope interfaces between landfill cells and in horizontal layers above lifts of waste. The landfill gas design will be adjusted as more information is available regarding the rate of gas generation of the potential of the waste to generate gas on a volumetric basis.



Drawing 5 - Conceptual Landfill Gas System

2.21 GROUNDWATER MONITORING PROGRAM

Rule 0400-11-01.04(9)(c)(21) *Describes the planned groundwater monitoring program.*

A ground water monitoring plan and sampling plan has been prepared for the EWS Class II Landfill. Three monitoring wells, (one upgradient and two downgradient wells) have been constructed at the site. Four discrete background sampling and the first semi-annual sampling event has been completed for each of the three groundwater wells. The groundwater monitoring plan prepared for the EWS Class II Landfill is provided as **Document IV** (**Groundwater Monitoring Program**) of this Class II landfill Permit Package.

2.22 LOCATION IN FLOODPLAINS

Rule 0400-11-01.04(9)(c)(22) *Includes an engineering statement of the flood frequency exposure and describes flood protection measures taken.*

Rule 0400-11-01-.04(2)(n) *Facilities must not be located within a 100-year floodplain unless it is demonstrated to the satisfaction of the Commissioner that*

1. Location in the floodplain will not restrict the flow of the 100-year flood or reduce the temporary water storage capacity of the floodplain.

2. The facility is designed, constructed, operated, and maintained to prevent washout of solid waste.

The 100 year flood plain as it relates to the Class II landfill is illustrated on a map provided in **APPENDIX 1** of this document as well as in the **Permit Drawings**. The 100 year floodplain was defined from elevations taken from FEMA Map # 47005C0162D, Panel 162 of 330, dated December 16, 2005. Based upon a review of the maps it is evident that detailed flood studies have been performed at the location of this facility for Charlie Creek and Cane Creek which converge below the southern boundary of the waste footprint.

There will be minimal filling of material within the 100 year flood plain. Therefore, no cut and fill balance calculations will have to be executed for compensation of the loss of flood storage capacity. A portion of Sediment Pond 1 and 2 will be located within the floodplain; however, construction of the pond will provide more storage volume to offset the filling.

All wastes are properly covered with soil materials and berms are constructed to direct storm water away from the working face of the landfill to prevent washout of the coal ash into storm water runoff.

2.23 ENDANGERED AND THREATENED SPECIES

Rule 0400-11-01.04(9)(c)(23) *Describes the impacts the facility will have on endangered or threatened species of plants, fish, or wildlife or their habitat;*

Rule 0400-11-01.04(2)(m) *Facilities will be located, designed, constructed, operated, maintained, closed, and cared for during the post-closure care period in a manner that does not:*

1. Cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife.

2. Result in the destruction or adverse modification of the critical habitat of endangered or threatened species.

A species review was performed for the EWS Class II Landfill and it was determined that no endangered species were observed with a 1 to 4 mile radius of the site. The Species Review is provided in **APPENDIX 3** of this document.

2.24 RANDOM INSPECTION PROGRAM

Rule 0400-11-01.04(9)(c)(24) *Describes the Random Inspection Program required under* ***Rule 0400-11-01-.04(2)(s).***

The owner or operator of a permitted landfill must implement a program at the facility for detecting and preventing the disposal of regulated hazardous wastes, unauthorized special waste, and polychlorinated biphenyl (PCB)'s. This program must include at a minimum:

1. Random inspection of five percent of the daily incoming loads.

In order to conduct and satisfy the random inspection requirements the landfill must have control of the site access. The site will be equipped with a manned scale house during all hours of operation (and outside hours as necessary). Scale house personnel will be responsible for performing (at a minimum) random inspections of 5% of all daily loads brought to the landfill. The following tasks will be routinely performed at the scale house;

- Weigh all incoming waste,
- Manually and/or automatically document waste information, and
- Screen incoming waste (visual screening initially and automated with camera in the future).

2. *Inspection of suspicious loads.*

In order to perform the inspections and identify suspicious loads, personnel at the scale house will be adequately skilled and trained, including having the ability to carry out visual inspection of waste loads to establish the accuracy of the declared load information. This may be done by using an access gantry, or with the assistance of a CCTV camera mounted above the scale house. Personnel at the entry point will be regularly briefed on site operations such that they can direct the load to the appropriate disposal point.

In addition, provisions will be implemented for communication directly between the scale house personnel and the personnel at the waste unloading areas within the site to enable quick cross-checking of information related to waste loads, including waste load quantity and character, and to deal with any loads rejected as unsuitable at the working/tipping face.

All field employees will be responsible for visual inspection of unloading operations at the site to determine whether unapproved wastes have been brought to the site. EWS field employees will inform facility personnel of which trucking company is found transporting unapproved wastes to the site. Therefore, any unauthorized trucks that arrive on-site will be prohibited from entering the fill area. All employees at the working face will inspect the dumped loads for the presence of unapproved waste

materials. In the event unapproved waste is detected, the unapproved materials will be removed for proper disposal and the relevant parties contacted.

3. *Training of facility personnel to recognize regulated hazardous waste.*

The scale house will be capable of recording weights accurately from a computer system and generating reports. Reports and records will be kept on-site of all waste loads which include the date and weight. These records will also contain any observations made by the inspector. Random inspection records will be maintained in a bound notebook at the scale house office. The records will include the information specified in the rule. It is the policy of the TDSWM that random inspection records by kept for a minimum of three (3) years. The EWS Class II Landfill may, at its' discretion, choose to keep those records for a longer time.

4. *Records of all inspections.*

Personnel will be trained prior to assuming responsibilities for working the scale house and the waste working face. The training will include the following topics:

Waste Screening/Random Inspections/Hazardous Waste Identification

Procedures to exclude and/or prevent off-loading of unauthorized hazardous wastes
Recordkeeping, reporting, and record retention requirements
Emergency preparedness/corrective action plan/contingency plan

Industrial Waste

- Hazardous waste determination
- Industrial waste classification and coding
- Manifesting requirements
- Recordkeeping requirements

Special Waste Acceptance

(Also see Section 2.11 and Appendix 5 - Special Waste Acceptance Procedure and Forms)

- Criteria for accepting special waste to include:
- Disposal criteria
- Authorization requirements
- Recordkeeping, reporting, record

5. *Procedures for notifying the proper authorities if a regulated hazardous waste is identified at the facility.*

Notification Of Proper Authorities,

In the event prohibited or hazardous waste is discovered at the scale house or at the working face, the site manager, the Jackson Field Office and the waste generator will be contacted. Depending upon the location the prohibited or hazardous waste is identified the load will either be rejected or removed from the working face and disposed of properly.

EWS policy will be implemented to ensure that unapproved wastes are not placed in the Class II landfill. The potential for unapproved wastes to be delivered to the site is lower than other facilities due to the fact that the site is not open to the public. Check station personnel will coordinate with employees at the disposal working face to

identify unapproved wastes delivered to the site.

All field employees will be responsible for visual inspection of unloading operations at the site to determine whether unapproved wastes have been brought to the site. EWS will inform facility personnel of which trucking company is transporting the wastes to the site. Therefore, any unauthorized trucks that arrive on-site will be prohibited from entering the fill area.

Records are kept on-site of all waste loads which include the date and weight. These records will also contain any observations made by the inspector. All employees at the working face will inspect the dumped loads for the presence of unapproved waste materials. In the event unapproved waste is detected, the unapproved materials will be removed for proper disposal.

2.25 SEALING OF BOREHOLES

Rule 0400-11-01.04(2)(l) *Describes the procedure for sealing boreholes prior to construction of the landfill units.*

Prior to excavation, all bore holes drilled or dug during subsurface investigation of the site, piezometers, and abandoned wells which are either in or within 100 feet of the areas to be filled must be backfilled with a bentonite slurry or other sealant approved by the Commissioner to an elevation at least ten feet greater than the elevation of the lowest point of the landfill base (including any liner), or to the ground surface if the site will be excavated less than ten feet below grade.

Prior to the preparation of the disposal facility base, any open boreholes, any abandoned piezometers, and/or abandoned wells drilled or installed during the Hydrogeologic Investigation which are either in or within 100 feet of the areas to be filled will be abandoned. The abandonment will consist of backfilling the boring/well with bentonite slurry or grout to an elevation at least ten feet greater than the elevation of the lowest point of the landfill base (including any liner), or to the ground surface if the site will be excavated less than ten feet below grade. Each sealing job should be considered as an individual problem, and methods and materials should be determined only after carefully considering the objectives outlined in the EPA Handbook of "Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells".

2.26 PERMANENT BENCHMARK

Rule 0400-11-01.04(2)(o) *Describes the requirements for maintaining a permanent benchmark. There must be installed on-site a permanent benchmark (e.g., a concrete marker) of known elevation.*

Each of the groundwater wells will have a known elevation for the top of the casing and therefore may be utilized as benchmarks. Benchmarks will be installed during the operational life of the facility to help in surveying more efficiently.

2.27 WETLANDS

Rule 0400-11-01.04(2)(p) *Wetlands - Disposal facilities shall not be located in wetlands, unless the owner or operator can make the following demonstrations to the Commissioner:*

1. Where applicable under section 404 of the Clean Water Act or Tennessee Water Pollution

Control Act, the presumption that practicable alternative to the proposed landfill is available which does not involve wetlands is clearly rebutted;

EWS has taken the necessary steps to design the landfill to avoid impacts to streams and wetlands in the vicinity of the proposed Class II landfill.

2. The construction and operation of the landfill will not:

(i) Cause or contribute to violations of any applicable State water quality standard;

The proposed EWS Class II Landfill has been designed to comply with the TDSWM standards which avoid violations of the State water quality standard.

(ii) Violate any applicable toxic effluent standard or prohibition under Section 307 of the Clean Water Act; and

The proposed EWS Class II Landfill does not propose to secure a point source discharge permit for the leachate generated at the site. The EWS Class II Landfill has been designed to collect, control and properly discharge leachate impacted waters.

(iii) Violate subparagraph (m) of this paragraph regarding the protection of endangered species;

As previously stated a species review was performed for the EWS Class II Landfill and it was determined that no endangered species were observed with a 1 to 4 mile radius of the site.

3. The landfill will not cause or contribute to significant degradation of wetlands. The owner or operator must demonstrate the integrity of the landfill unit and its ability to protect ecological resources by addressing the following factors:

(i) Erosion, stability, and migration potential of native wetland soils, mud and deposits used to support the landfill;

Section 2.14 of this document provides a description of the practices which will be implemented to minimize erosion and the potential impacts to wetlands. Specific criteria are listed under ***Sediment Management Criteria*** in **Section 2.14** of this document. In addition, a Storm Water Pollution Prevention Plan (SWPPP) as required by the Tennessee Division of Water Pollution Control (TDWPC) has been prepared to further minimize potential impacts to wetlands in the vicinity of the waste footprint.

(ii) Erosion, stability, and migration potential of dredged and fill materials used to support the landfill;0

The procedures described in the previous paragraph will also be implemented to minimize impacts of soil borrow materials to wetlands.

(iii) The volume and chemical nature of the waste managed in the landfill;

The landfill has been designed with a liner and leachate collection system to prevent impacts to wetlands.

(iv) Impacts on fish, wildlife, and other aquatic resources and their habitat from release of the solid waste;

The purpose of the landfill design has been to protect human health and the environment. A liner/leachate collection system, and a storm water collection/control system will help protect fish, wildlife and other aquatic resources in the vicinity of the

proposed landfill.

(v) The potential effects of catastrophic release of waste to the wetland and the resulting impacts on the environment; and

Berms have been designed to encapsulate the landfill to prevent a release of waste to the wetlands and the environment.

(vi) Any additional factors, as necessary, to demonstrate that ecological resources in the wetland are sufficiently protected.

Other factors which will be employed at the site to protect the ecological resources of wetlands near the landfill will include the following:

- Phasing work to stabilize one area of the property before another is disturbed,
- Protecting on-site fauna, and
- Re-using indigenous materials whenever practical.

4. To the extent required under Section 404 of the Clean Water Act or Tennessee Water Pollution Control Act, steps have been taken to attempt to achieve no net loss of wetlands (as defined by acreage and function) by first avoiding impacts to wetlands to the maximum extent practicable as required by paragraph (a)(1) of this section, then minimizing unavoidable impacts to the maximum extent practicable, and finally offsetting remaining unavoidable wetland impacts through all appropriate and practicable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands); and

The EWS Class II landfill has been designed to minimize impacts to wetlands by not filling within wetlands considered "waters of the state". A 200 foot setback has also been maintained for all springs, streams and the pond indicated on the map.

5. Sufficient information is available to make a reasonable determination with respect to these demonstrations.

The footprint of the current landfill is completely within an abandoned chert pit.

2.28 AIRPORT SAFETY

Rule 0400-11-01.04(2)(r) *Describes the setbacks and procedures for Class I disposal facilities located near airports.*

The owners or operators of Class I disposal facilities located within 10,000 feet (3,048 meters) of any airport runway end used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway end used only by piston-type aircraft must include in the Narrative Description of the Facility and Operations Manual a demonstration that the unit does not pose a bird hazard to aircraft. The owners or operators proposing a new Class I disposal facility within a five-mile radius of any airport runway end used by turbojet or piston-type aircraft must notify the affected airport and the appropriate Federal Aviation Administration (FAA) office.

The closest airport to the EWS Class II Landfill is the Camden Airport which is situated approximately 3.14 miles to the southwest.

2.29 FUTURE PLANNING

Rule 0400-11-01.04(2)(t) *Future Planning - All operators of Class I disposal facilities within the state of Tennessee shall file with the department, by May 1st of every year, an estimate of the remaining life of their site. This report shall include the original usable acreage of the site and the remaining unused portion at the time of the report. Where measuring facilities are available, an average monthly weight (or volume) estimate of the incoming waste shall be supplied. The department shall have final determination of the accuracy of the estimate. If the operator plans to operate a new landfill, a suitable site for the new facility shall be selected at least twelve months before the estimated date for expiration of the operating life of the existing facility, and as applicable, design and construction plans shall be submitted at least six months prior to the estimated date for expiration of the operating life of the existing facility to assure continued operation in an approved facility or site.*

The EWS Class II Landfill management has plans to provide the TDSWM with an annual remaining life report on or prior to May 1st of each year. In the event that he operator decides to operate a new landfill the site will be selected a minimum of 12 months prior to the expiration of the existing facility. Further, design and construction plans will be submitted at least six months prior to the estimated date for expiration of the operating life of the existing facility.

2.30 MONITORING AND RECORDS

Rule 0400-11-01.02(4)(a)9.(i) *Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.*

Individual sampling and analysis plans have been and will be prepared to sample the appropriate monitored activity.

Rule 0400-11-01.02(4)(a)9.(ii) *The permittee shall retain records of all required monitoring information. The permittee shall maintain records from all ground-water monitoring wells and associated ground-water surface elevations, for the active life of the facility, and for the post-closure care period as well. This period may be extended by request of the Commissioner at any time.*

EWS will maintain all records including groundwater monitoring information at the landfill office near the entrance to the site located off Omar Circle in Camden, Tennessee. Presently, it is proposed to retain the records in the storage room in the office during the post-closure period for access during sampling events.

Rule 0400-11-01.02(4)(a)9.(iii) *Records of monitoring information shall include:*

All monitor records will include the following information as specified in the

TDSWM Rules and Regulations Governing Solid Waste Disposal:

(I) The date, exact place, and time of sampling or measurements;

(II) The individual(s) who performed the sampling or measurements;

(III) The date(s) analyses were performed;

(IV) The individual(s) who performed the analyses;

(V) The analytical techniques or methods used (including equipment used); and

(VI) The results of such analyses.

2.31 BASIS OF DESIGN

Equivalent Liner Design Introduction

The purpose of this narrative is to demonstrate equivalent environmental protection specific to the liner/leachate collection and final cover systems designed for the EWS Class II Landfill. The following paragraphs are taken from the TDSWM regulatory requirements for liner/leachate collection facilities at Class I Subtitle D landfills.

Rule 1200-01-07-.04

(4) Leachate Migration Control Standards

(a) Class I Disposal Facilities

1. Such facilities must have a liner designed to function for the estimated life of the site and the post-closure care period. It shall be designed, constructed, and installed to ensure that the concentration values listed in Appendix III of this rule will not be exceeded in the uppermost aquifer at the relevant point of compliance. The liner must be:

(i) A composite liner consisting of two components; the upper component must consist of a minimum 30-mil flexible membrane liner (FML), and the lower component must consist of at least a two-foot layer of compacted soil with a hydraulic conductivity of no more than 1.0 x 10^{-7} cm/sec. FML components consisting of high density polyethylene (HDPE) shall be at least 60-mil thick. The FML component must be installed in direct and uniform contact with the compacted soil component;

2. Underlying the liners shall be a geologic buffer which shall have:

(i) A maximum hydraulic conductivity of 1.0 x 10^{-5} cm/s and measures at least ten (10) feet from the bottom of the liner to the seasonal high water table of the uppermost unconfined aquifer or the top of the formation of a confined aquifer or

(ii) Have a maximum hydraulic conductivity of 1.0 x 10^{-6} cm/s and measures not less than five (5) feet from the bottom of the liner to the seasonal high water table of the uppermost unconfined aquifer or the top of the formation of a confined aquifer or

3. The compacted soil component of the composite liner shall be as follows:

(i) The compacted soil liners shall be free of sharp objects and be compatible with supporting soils and with leachate expected to be generated.

(ii) Admixtures (i.e., cement, bentonite, etc.) and special construction techniques may be used to improve the properties of the compacted soil liner provided that:

(I) In no case shall the liner thickness be less than two (2) feet;

(II) The modified liner shall achieve equivalent or superior performance to requirements of the minimum performance standard as described in this subparagraph.

4. Alternate liner designs may be used provided that:

(i) It is demonstrated to the satisfaction of the Commissioner that the liner design provides equivalent or superior performance to the minimum performance standard for a Class I facility as described in this subparagraph, and

(ii) When approving a design the Commissioner, shall consider at least the following factors:

(I) The hydrogeologic characteristics of the facility and surrounding land;

(II) The climatic factors of the area; and

(III) The volume and physical and chemical characteristics of the leachate.

The primary approach considered when evaluating the equivalence of liner systems (Koerner and Daniel 1993) with the Subtitle D landfill regulations is stated as follows:
The "FLOW RATE EQUIVALENCE DEMONSTRATION APPROACH" is performed to demonstrate an alternate liner system's ability to limit the volume of flow through the liner system (i.e., how many gallons/acre/day) to a volume equal to or less than the TDSWM prescriptive composite liner system allows.
The following paragraphs provide an explanation and calculations used to evaluate the equivalency of the proposed alternate EWS liner/leachate collection system (LCS) with the prescriptive Subtitle D LCS using the aforementioned "flow rate" approach.

Flow Rate Equivalency Approach

To predict flow rate, an estimate of the liquid head acting on the liner system must be calculated. The actual volume of leachate flowing into the collector system can be estimated using the Hydrologic Evaluation of Landfill Performance (HELP) model. This, however, does not address leachate-collection system differences or specific regulatory requirements related to allowable head. For Subtitle D landfills, this regulatory head limit is 30 cm. Alternatively, the highest rate of leakage can be estimated by assuming that 30 cm of leachate is acting on a theoretical puncture of the geomembrane.
This represents the most conservative case, i.e., the most leakage, as compared to performing a HELP model analysis of the proposed landfill. Assuming good contact between the geomembrane and the compacted clay liner (CCL) or geocomposite clay liner (GCL), the leakage through the liner system is calculated as follows.

Flow Rate Equivalency Demonstration

Drawing 4 and **Drawing 5** which are depicted in the following paragraphs illustrate the standard TDSWM prescriptive Subtitle D Class I liner/geologic buffer section. The section depicted provides a graphic of a typical composite liner with a 60 mil geomembrane overlying a fine grained CCL. This composite barrier has advantages over the use of either a geomembrane or CCL individually. The flow through a penetration in the geomembrane is reduced by the clay's presence and is calculated as follows (Giroud and Bonaparte, 1989):
Equation One (Geomembrane/Clay Liner):

$Q = 0.21\ h^{0.9}\ a^{0.1}\ K^{0.74}$
Where;
h = the height of water standing on the geomembrane (m)
a = the area of the hole (m^2)
K= the hydraulic conductivity of the underlying clay (m/sec).

Substituting 30 cm of leachate for (h) and a coefficient of hydraulic conductivity (K) of 1×10^{-7} cm/sec into the aforementioned equation results in a flow of 0.14 gallons/acre/day of leachate migration through the TDSWM prescriptive composite barrier and the typical Subtitle D section depicted both in **Drawing 4** and **Drawing 5**. These drawings are presented on the following pages.

GIROUD'S EQUATION FOR FLOW THROUGH A GEOMEMBRANE , CCL

GEOMEMBRANE plus Compacted Clay Liner

$Q=0.21\ a^{0.1}\ h^{0.9}\ K^{0.74}$ HDPE Geomembrane

HDPE Geomembrane Liner Thickness = 60 mil = 0.00152 meters

where h= the height of the water standing on the geomembrane

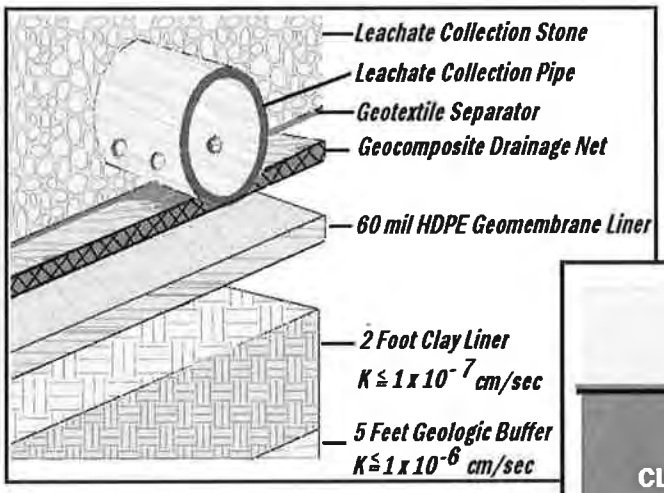
a= the area of the hole

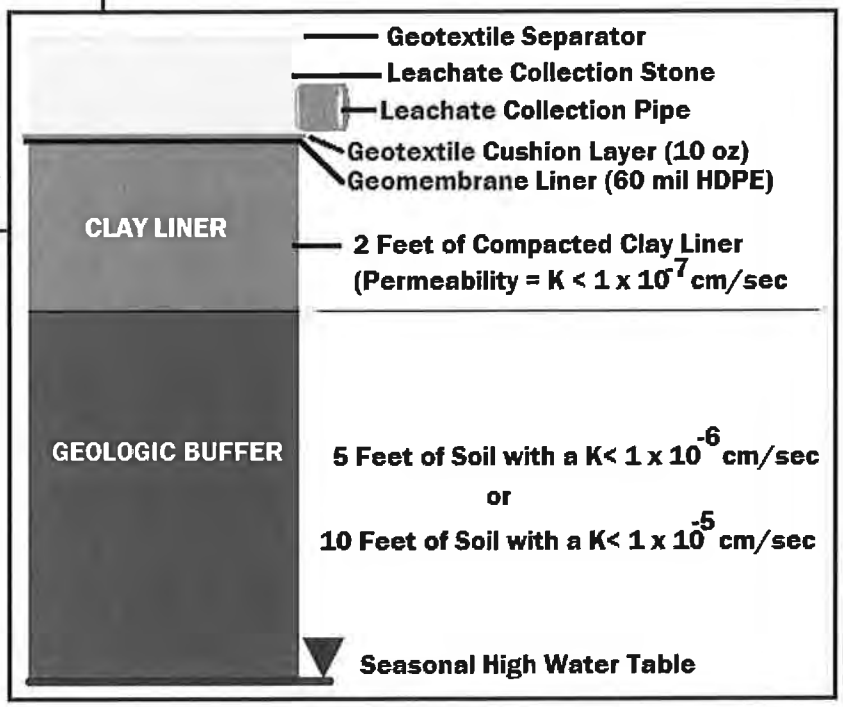
K= the permeability of the underlying clay (m/sec)

HEIGHT WATER	AREA of HOLE	HYDRAULIC CONDUCTIVITY	NUMBER HOLES	FLOW PER HOLE	TOTAL FLOW
h	a	K		q	Q
(m)	(m2)	(m/s)	# / acre	(m3/s)	(gal/acre/day)
0.305	0.00010	1.00E-09	1	6.28E-09	0.14

Note: The hydraulic conductivity used is the maximum rate specified by the Subtitle D regulations

Drawing 6 - Typical Subtitle D Landfill Liner System





Drawing 7 - Typical Subtitle D Liner System

Equation Two (Geomembrane plus Geocomposite Clay Liner (GCL)):

If a GCL is substituted for the CCL, the leakage through the composite liner is calculated as (Giroud, et al.,1992):

$Q = 0.21\ i_{ave}\ h^{0.9}\ a^{0.1}\ K^{0.74}$

Where;

$i_{ave} = 1 + Eh/t_{GCL}$

t_{GCL} = thickness of GCL

$E = 1 / [2 \ln (2R/b)]$

$R = 0.61\ a^{0.05}\ h^{0.45}\ K^{-0.13}$

b = diameter of hole (m)

h = the height of water standing on the geomembrane (m)

a = the area of the hole (m^2)

K= the hydraulic conductivity of the underlying clay (m/sec).

Most commercial GCL materials sold in the United States use Wyoming sodium-type bentonite that develops a permeability of approximately 5×10^{-9} cm/sec when tested under the conditions specified in ASTM D 5887. This test uses an effective confining stress of only 5 psi and a head of 2 psi. Confining stresses in the real world application of GCLs far exceed those in the laboratory test so the permeability is considered conservative. The flow through a single 1 cm^2 hole in a geomembrane with 30 cm of water standing on a non-polyethylene backed GCL is 0.066 gallon/day which is an order of magnitude less than with the CCL composite. However, GCLs manufactured by CETCO with the polyethylene laminate develop even lower permeabilities approximating 5×10^{-10} cm/sec when tested under the conditions specified in ASTM D 5887. Actual long-term confining stresses acting on the GCL will be larger, resulting in lower GCL permeabilities. Recent testing by CETCO has revealed permeabilities of 5×10^{-11} cm/sec. The calculation provided below is performed on the proposed CTR liner/leachate collection system (see **Drawing 1** and **Drawing 2**) which incorporates a GCL laminate material with a hydraulic conductivity of 5×10^{-10} cm/sec.

GIROUD'S EQUATION FOR FLOW THROUGH A GEOMEMBRANE , GCL

GEOMEMBRANE plus GEOCOMPOSITE CLAY LINER (GCL)

$$Q = 0.21\ i_{ave}\ a^{0.1}\ h^{0.9}\ K^{0.74}$$

60 mil = 0.002 meters

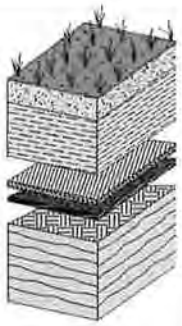
where h= the height of the water standing on the geomembrane
a= the area of the hole
K= the permeability of the underlying clay (m/sec)
i_{ave}= $1+Eh/t_{GCL}$
t_{GCL}= thickness of GCL
E= $1/[2\ln(2R/b)]$
b= diameter of hole (m)
R= $0.61a^{0.05}h^{0.45}K^{-0.13}$

Height of Water (m)	Area of Hole (m2)	Hydraulic Conductivity K (m/s)	GCL Thickness t_{GCL} (m)	Hole Diamater b (m)	E	R	i_{ave}	Number Holes	Flow Per Hole q (m^3/s)	Total Flow Q (gal/acre /day)
0.300	0.0001000	5.00E-11	0.005	0.01	0.07	4.89	5.36	1	3.61E-09	0.082

Liner System Equivalency Summary

A review of the predicted leachate-flux rates reveals that the flux rate through a single puncture in the geomembrane/GCL composite (0.082 gal/acre/day) depicted in **Drawing 4** and **Drawing 5** is less than the flux rate through the regulatory geomembrane/CCL composite depicted in **Drawing 3** (0.14 gal/acre/day) as calculated above. This means that for any equivalent quality of installation, i.e., number, size, and shape of penetrations per acre are identical, the alternative composite liner systems will have a lower rate of flux than the conventional CCL composite liner.

Therefore, the proposed liner/leachate collection system for the EWS Class II Landfill exceeds the TDSWM regulatory requirements.



CLOSURE / POST CLOSURE PLAN

PREPARED

FOR

ENVIRONMENTAL WASTE SOLUTIONS

CLASS II INDUSTRIAL WASTE LANDFILL

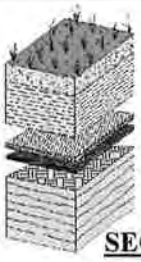
200 Omar Circle,
Camden, Tennessee 38320

PREPARED

BY

HOUSE ENGINEERING LLC
7308 River Park Drive
Nashville, Tennessee 37221

March 2011
Revised December 2011
March 2015 Revision



ENVIRONMENTAL WASTE SOLUTIONS
CLOSURE / POST CLOSURE PLAN

TABLE OF CONTENTS

SECTION PAGE

I. INTRODUCTION 1

A. PURPOSE OF THE CLOSURE AND POST CLOSURE PLAN 1

B. GENERAL INFORMATION 1

II. CLOSURE/POST CLOSURE PLAN REQUIREMENTS AND ACTIVITIES 2

A. CONTENTS OF THE PLAN 2

B. AMENDMENT OF THE PLAN 3

C. CLOSURE REQUIREMENTS 5

D. POST-CLOSURE CARE ACTIVITIES 14

III. PLANNED USE OF THE FACILITY AT THE END OF THE POST CLOSURE PERIOD 18

IV. CONTACT 18

V. COST ESTIMATE 18

TABLES

Table 1 - Steps for Final Landfill Closure 6

Table 2- Final Cover System Alternate Designs 10

Table 3 - Summary of Post Closure Care Costs 19

FIGURES

Figure 1 - Industrial Waste Typical Final Cover Section 7

Figure 2 - Foundry Sand / DuraSkrim Daily Cover Section 8

Figure 3 - Typical Interim Cover Section for SAS Waste Phases 9

Figure 4 - Typical Final Cover Section for SAS Waste Phases 9

Figure 5 - Alternate Final Cover Sections 10

APPENDICES

APPENDIX I **MAP**

APPENDIX II **CLOSURE / POST CLOSURE COST ESTIMATES / WORKSHEETS**

APPENDIX III **PROCEDURES FOR POST CLOSURE CARE COMPLETION**

APPENDIX IV **HELP MODEL COMPUTER OUTPUT FILE**

EWS CLASS II LANDFILL
CLOSURE / POST CLOSURE PLAN

I. INTRODUCTION

A. Purpose of the Closure and Post Closure Plan

Rule 0400-11-01-.04(9)(d) *The Part II permit application must include a closure/post-closure plan described in Rule 1200-1.03(2)*

The following Closure and Post-Closure Care (C/PC) Plan was previously modified to reflect an expansion and reclassification of the Custom Tire and Recycle Company (CTR) Landfill from a Class IV landfill to a Class II landfill. The C/PC Plan has been submitted in accordance with the Tennessee Division of Solid Waste Management (TDSWM), Rule 0400-11-01-.03(2). This plan is a revision of the existing C/PC Plan which was submitted in January 2008 as a Major Permit Modification. This C/PC Plan revision specifically addresses closure and post-closure activities for the proposed liner/leachate collection modification to the permitted Class II Landfill facility which is now owned and operated by Environmental Waste Solutions (EWS). A discussion of the closure and post-closure care is included to provide the TDSWM the information necessary to provide closure and post-closure care under the current landfill regulations adopted by the TDSWM.

Information within the C/PC Plan has been correlated to the permit requirements provided in the TDSWM regulations. Sections within this report are titled with respect to the regulations to aid in the review process. All related materials, maps, previous reports, letter, etc., have been supplied within the various appendices of this permit application.

The C/PC Plan is one of several documents required as part of a landfill permit. The documents and accompanying design drawings are provided to satisfy the requirements of the Environmental Protection Agency (EPA) Subtitle D regulations adopted by the Tennessee Department of Environment and Conservation's Division of Solid Waste Management (TDSWM).

Based upon the TDSWM landfill regulations the permit for the EWS Class II Landfill includes the following documents, design drawings, and design calculations as follows:

DOCUMENTS

Document I	Operations Manual
Document II	Closure/Post-Closure & Construction Quality Assurance Plans
Document III	Hydrogeological Investigation Reports
Document IV	Groundwater Monitoring Plan
Document V	Construction Quality Assurance Plan

ATTACHMENTS

Attachment I	Permit Drawings
Attachment II	Design Calculations
Attachment III	Permit Correspondence

The accompanying engineering plans entitled "EWS Class II Landfill", Dated June 2011, depict the design of the facility as required by Rule 0400-11-01-.04(9)(b).

B. General Information

As previously described the site of the Class II landfill is located at 200 Omar Circle in Camden, Benton County, Tennessee. The site was originally permitted as a Class IV Landfill under TDSWM Permit Number DML 03-0108.

The type wastes to be disposed of in the permitted landfill facility are limited to Class II solid waste materials as defined in Rule 0400-11-01-.01(3).

Topographic maps generated from site surveys and on-site observations indicate that ground surface elevations within the proposed landfill extension, range from a maximum of approximately 469 feet above Mean Sea Level (MSL) in the north central quadrant of the proposed landfill extension area to an elevation approximating 376 feet above MSL at the southeastern tip of the proposed extension.

The original design drawings indicate that the landfill is permitted to extend to elevation 490 feet MSL. This extension will maintain the top of the waste fill at an elevation approximating 568 feet MSL. The location of the facility is depicted in **Figure 1** which may be viewed in **Appendix I – Maps**.

II. CLOSURE/POST CLOSURE PLAN REQUIREMENTS AND ACTIVITIES

A. Contents of the Plan

Rule 0400-11-01.03(2)(b) Contents of Plan

1. *The closure/post-closure plan must identify the steps necessary to completely or partially close the facility at any point during its intended operating life and to completely close the facility at the end of its intended operating life, and must identify the activities which will be carried on after closure and the frequency of these activities. For facilities being developed according to a phased development plan, the closure/post-closure plan must address each parcel separately as well as the whole.*

   The following subsections of this C/PC plan present a detailed description of the steps necessary to partially and completely close each section of the proposed extension.

2. *The closure/post closure plan must include, at a minimum:*

   (i) A description of how and when the facility will be partially closed, if applicable, and finally closed. The description must identify how the applicable closure standards of Rule 0400-11-01-.04(8) will be met. It must also include an estimate of the expected year of closure and a schedule for completing the final steps of final closure;

   Subsection II.B.2 of this document contains a table outlining the steps that will be followed during closure of the facility. Subsection II.B and II.C of this C/PC plan list the requirements of paragraph (8) and identify facility specific methods for meeting these requirements.

   It is estimated that the first area of the landfill to be developed is a 4.87 acre cell within the southern section of the Phase 2 footprint. This section should provide five years of disposal capacity. Closure of the facility at this stage of operation would entail covering approximately 7.5 acres with a final cover system illustrated on **Sheet 10** of the **Permit Drawings** which accompany this document.

   (ii) A description of the planned ground and surface water monitoring and other monitoring and maintenance activities and frequencies at which they will be performed. The description must identify how the applicable post-closure care standards of Rule 0400-11-01-.04(8) and the applicable Ground Water Protection/Monitoring Standards of Rule 0400-11-01-.04(7) will be met.

The **Groundwater Monitoring Plan (GMP)** has included as **Document IV** in the EWS Class II Landfill permit application. The **GMP** has been designed to establish a step-by-step procedure for determining impact on groundwater and surface water quality during the active life and for the post-closure care period of the facility.

(iii) The name address, and phone number of the person or office to contact about the facility during the post-closure care period. This person or office must keep an updated closure/post-closure plan during the closure/post-closure care period.

Mr. Chris White President
Environmental Waste Solutions, LLC
4521 Trousdale Drive,
Nashville, Tennessee 37204

(iv) An itemized estimate of the cost based on hiring a third party to perform the closure and post-closure care activities. Inflation shall be factored into this estimate and the estimated annual inflation rates used shall be included.

Appendix II of this document contains the itemized cost estimates prepared for the proposed extension.

(v) A description of the planned uses of the property during the post-closure care period.

A subsequent section describes the monitoring/maintenance activities to be performed during the post-closure care period specified as a permit condition. At present there are no specific planned uses for the site during this period.

B. Amendment of the Plan

Rule 0400-11-01.03(2)(c) Amendment of Plan – The approved closure/post-closure care plan may be amended at any time during the active life of the facility or during the post-closure care period as set forth in this subparagraph.

1. The operator may request to amend the plan to alter the closure requirements, to alter the post-closure care requirements, or to extend or reduce the post-closure care period based on cause. The request must include evidence demonstrating to the satisfaction of the Commissioner that:

(i) The nature of the facility makes the closure or post-closure care requirement(s) unnecessary; or

(ii) The nature of the facility supports reduction of the post-closure care period; or

(iii) The requested extension in the post-closure care period or alteration of closure or post-closure care requirements is necessary to prevent threats to human health and the environment.

Chart One provides a general procedure for amending the Closure/Post Closure care plan during the post-closure care period. Specifically, modifications to the frequency of monitoring and the length of the post closure care period. Detailed procedures for performing an evaluation of the condition of the landfill during the post-closure care period with respect to potential impact to human health and the environment will be provided in latter sections of this document.

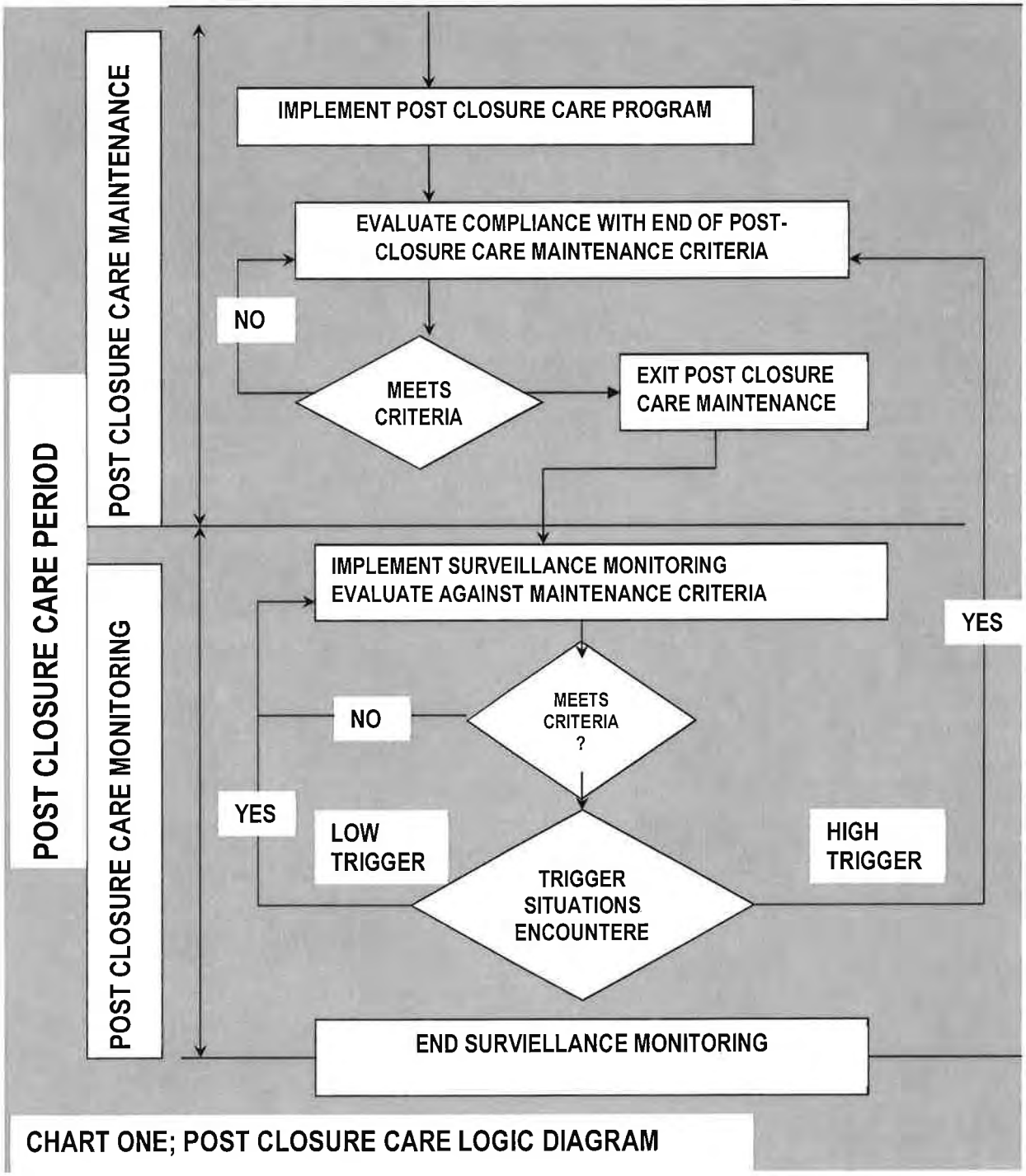


CHART ONE; POST CLOSURE CARE LOGIC DIAGRAM

C. Closure Requirements

Rule 0400-11-01-.04(8) Closure and Post-Closure Standards – Unless specifically noted otherwise, the standards of this paragraph apply to Class I, Class II, Class III, and Class IV disposal facilities.

(a) General Performance Standard

1. The operator must close the disposal facility or disposal facility parcel in a manner that:

(i) Minimizes the need for further maintenance; and

(ii) *Controls, minimizes, or eliminates, to the extent necessary to prevent threats to public health and the environment, post-closure escape of solid waste, solid waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or to the atmosphere.*

This C/PC Plan provides direction to close the disposal facility in a manner that will minimize the need for further maintenance to the facility. In addition, the plan specifies measures to control, minimize, or eliminate, to the extent necessary threats to public health and the environment.

2. The operator must care for a disposal facility or disposal facility parcel for the period of time after closure, specified in subparagraph (d) of this Rule, in a manner that assures that the performance objectives of part 1 of this subparagraph are continuously met.

The operator will provide post-closure monitoring/surveillance for the disposal facility in accordance with this C/PC Plan for the number of years the TDSWM specifies in the permit after the date of final closure of the facility.

(b) Adherence to Plan – The operator must initiate and complete closure activities and conduct post-closure care activities in accordance with the approved closure/post-closure care plan, if such plan has been prepared and approved for the disposal facility or disposal facility parcel being closed.

At the time of facility closure, the operator will initiate and complete closure activities and conduct post-closure care activities in accordance with this closure/post-closure care plan as approved.

(c) Closure Requirements – The following requirements apply to active portions of the facility:

1. The operator must notify the Division Director of his intent to close at least 60 days prior to the date he expects to begin final closure of the disposal facility or disposal facility parcel.

2. The operator must complete closure activities including grading and establishing vegetative cover in the shortest practicable time, not to exceed 180 days, after any fill areas or any portion of the fill area have achieved final grade.

The facility operator will submit a written notification to the TDSWM of its plans to close the

facility at least 60 days prior to closure. The steps that will be followed during closure of the facility will proceed as outlined in the following table.

Table 1 - Steps for Final Landfill Closure

Closure Activities	Day
Notify TDSWM of intent to close landfill Facility	1
Close Landfill	61
Remove unnecessary on-site structures, place erosion control measures, and begin to grade and proof roll area to be capped	61
Complete Low Permeability Cover	120
Complete Placement of Topsoil and begin final sediment control procedures	150
Complete Vegetative Layer, provide notation on deed that property was used as a disposal facility, and initiate final notification of closure to TDSWM	240

3. *Unless otherwise noted in the permit a depth of compacted final cover material (e.g., soil) shall be placed on the disposal facility or disposal facility parcel in the shortest practicable time, not to exceed 90 days, after achieving final grade of any fill area or any portion of a fill area. At least the top twelve inches of this cover material shall be soil which will support the growth of suitable vegetation (e.g., topsoil).*

   (i) *At Class I and Class II facilities the depth of final cover shall be at least 36 inches of soil of which a minimum of 12 inches shall be for the support of vegetative cover.*

   The design of the final cover system shall be such that the infiltration volume of water will be equal to or less than the percolation volume through the bottom liner system or permeability no greater than 1 x 10^{-7} cm/sec, whichever is less. The design shall be supported by the use of the HELP model or other equivalent method approved by the commissioner.

   An alternate final cover system may be used provided that it is demonstrated to the satisfaction of the Commissioner that the final cover system provides equivalent or superior performance to the minimum performance standard in this support.

   (ii) *At Class I, II, III, and IV facilities, with approval of the Commissioner any other low permeability layer construction techniques or materials may be used to provide the final cover, provided that it provides equivalent or superior performance to the requirements of this part.*

Although the Class II regulations provide a mechanism to provide industries with some flexibility in managing their own specific waste streams EWS has developed some alternate final cover designs which will comply with the most stringent performance standards detailed in *Rule 0400-11-01-.04(8)(c)3.*detailed in the previous paragraphs. The following paragraphs address the potential waste streams which may be disposed of in the Class II landfill.

Coal Combustion By-Product Waste Final Cover Requirements

The following paragraphs are taken from TDSWM Rule 0400-11-01-.02 (c) 1. (ii) (V), and (IX) which are specific to the closure requirements for coal combustion by-product (CCB) wastes. An explanation of the manner in which each of the following coal requirements specific to closure of CCB fills is provided below each requirement.

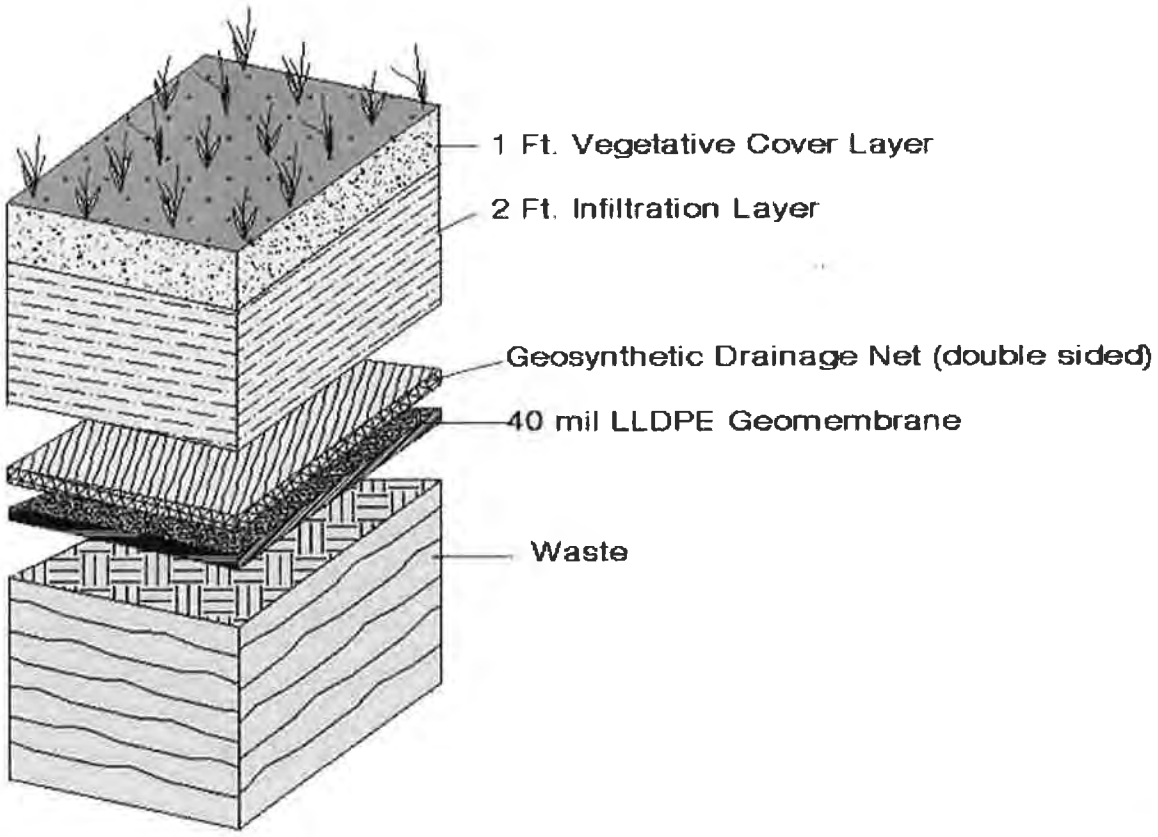
(V) The fill area is constructed, operated, maintained, and closed in such a manner as to minimize:

I. The potential for harmful release of solid wastes or solid waste constituents to the environment; and

(IX) At the completion of the coal-ash fill project, and no later than 90 days after operations have ceased, the final cover must meet the requirement of at least 24 inches of compacted soil on the coal-ash project area, except for those areas covered by structures, asphalt, concrete (including concrete containing coal ash), or other similar barriers to water infiltration. The upper six inches of this cover shall be able to support the growth of suitable vegetation.

The final cover system proposed for this facility that satisfies the minimum requirements for CCB waste fills is provided as ***Drawing 1 Typical Section - Industrial Waste Final Cover*** in this document.

Figure 1 - Industrial Waste Typical Final Cover Section



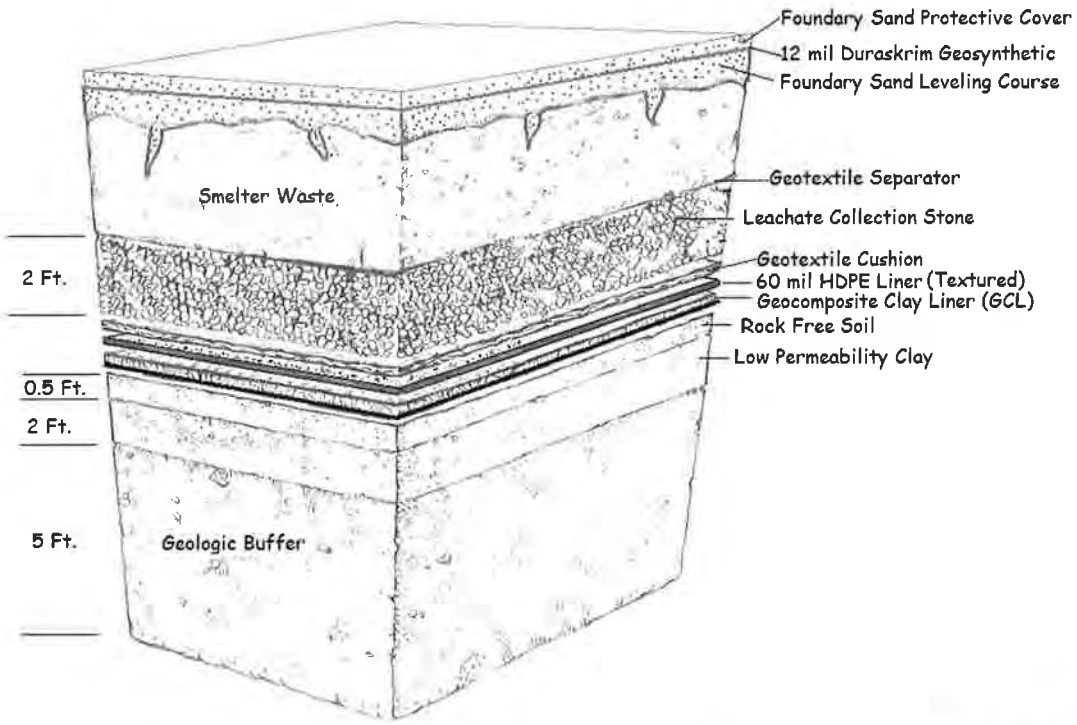
Secondary Aluminum Smelter Waste Final Cover Requirements

EWS has also developed a final cover system that exceeds the minimum requirements for landfills permitted to dispose of Class I municipal solid wastes as well as Class II industrial waste materials generated from Secondary Aluminum Smelters (SAS). A detail of a typical final cover system proposed for closure of the SAS Waste Phases is illustrated in **Figure 2 and Figure 3.** An enhanced geosynthetic cover system designed specifically to inhibit the generation and off-site migration of landfill gas vapors will be installed over the portion of the landfill footprint with gas generation potential. EWS has completed construction of the final cover system for the east and south slopes of Phase 2 Cell 1. Final cover construction over SAS waste phases may be performed in two stages as described in the following paragraphs.

EWS has recently incorporated the use of a 12 mil scrim reinforced geosynthetic material as a standard component of the daily and intermediate cover at the EWS Class II Landfill to inhibit and/or eliminate the release of ammonia vapors generated from the reaction of SAS waste materials with water. The initial stage of construction of the final cover system includes placement of the 12 mil scrim reinforced geosynthetic material as illustrated in **Figure 2**. The second stage of the final cover system construction will be initiated after the landfill gas collection and management system is installed and functioning as designed. The purpose of staging the final cover construction provides EWS to the flexibility to modify and maximize the collection and treatment efficiency of the LFG system without compromising the integrity of the Stage 2 Final Cover Layers.

Figure 2 and **Figure 3** illustrate the specific daily cover and interim cover components that may be installed at the EWS Landfill.

Figure 2 - Foundry Sand / DuraSkrim Daily Cover Section



Interim Cover Scrim Reinforced Geomembrane Installation Specifics

Tires will be employed to ballast and protect the 12 mil geomembrane from wind action. The tires will be tied together with rope and anchored with a steel rebar driven in the soil cover prior. The rebar will be driven prior to placement of the geomembrane cover.

Figure 3 - Typical Interim Cover Section for SAS Waste Phases

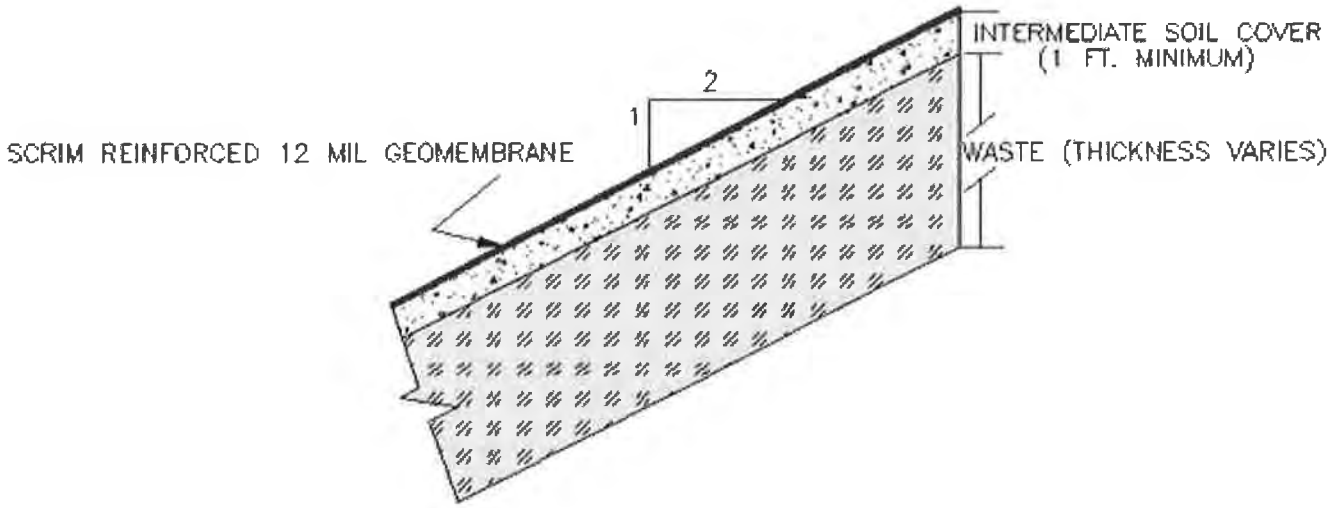
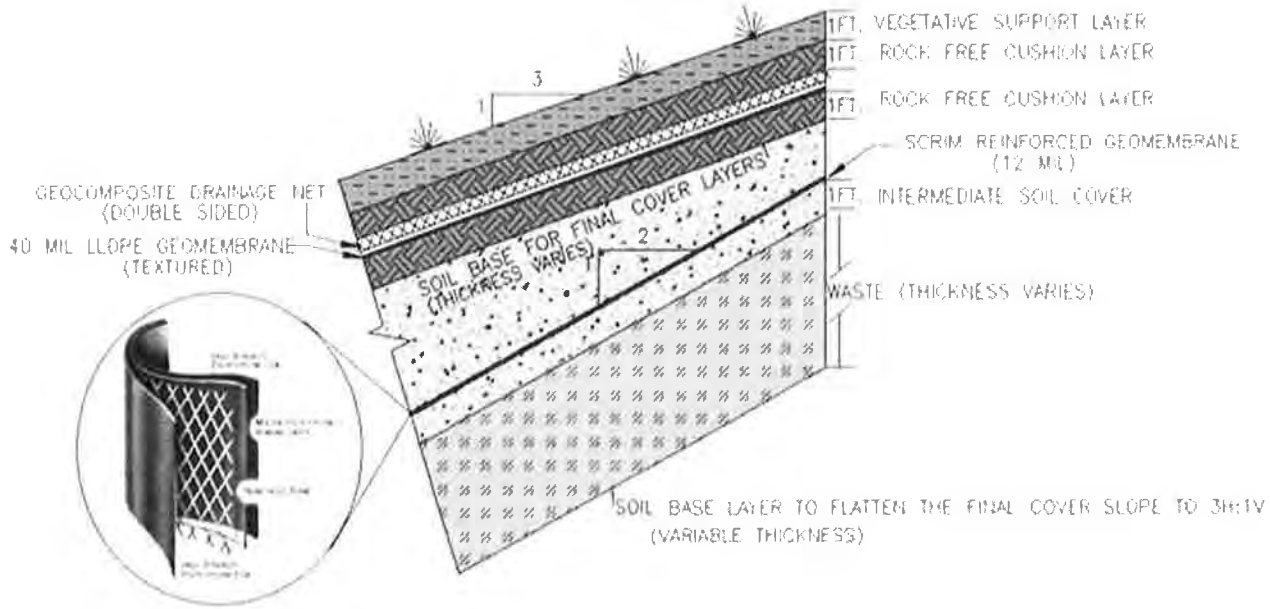


Figure 4 illustrates a typical final cover configuration for industrial wastes at the EWS Class II Landfill.

Figure 4 - Typical Final Cover Section for SAS Waste Phases



It should be noted that EWS completed construction of the final cover system for approximately 1.87 acres of the east and south slopes of Phase 2 Cell 1 on October 28, 2012 using an alternate cover system. The alternate final cover system used to construct the final cover over approximately 1.87 acres of the east and south slopes of Phase 2 Cell 1 which consisted of the use of the propriety product referred to as

Closure Turf ™. **Figure 5** illustrates a section of the Closure Turf™ final cover system used to close the east and south slopes of Phase 2 Cell 1. Phase 2 Cell 1 is comprised solely of SAS waste materials.

Figure 5 - Alternate Final Cover Sections

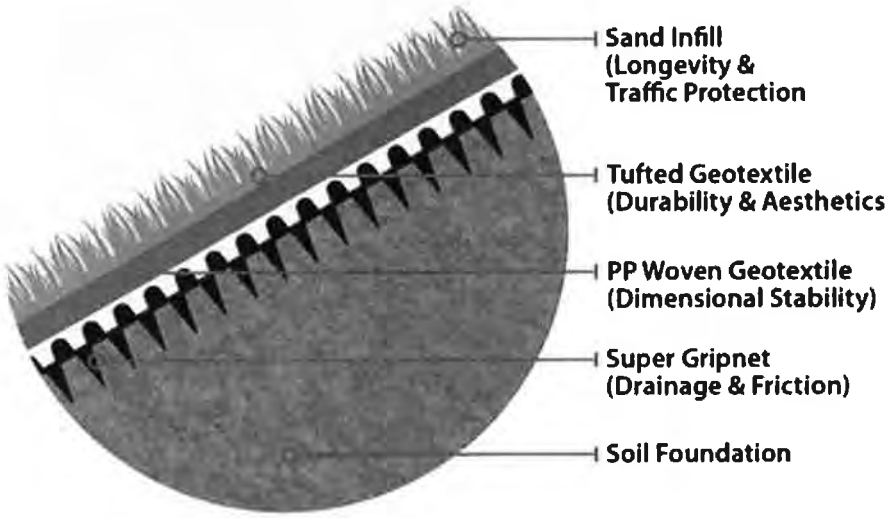


Table 2- Final Cover System Alternate Designs

Final Cover Components	Proposed TDSWM Regulatory Compliant Alternate Final Cover Sections Phase Designation Specific to Alternate Final Cover Sections Industrial Waste Phase 4 (Alternate 1)	Industrial Waste Phase 4 (Alternate 2)	Secondary Smelter Waste Phases 1,2,3 (Alternate 1)	Secondary Smelter Waste Phases 1,2,3 (Alternate 2)
Vegetative Support Layer	1.0 Ft. Vegetative Support	Closure Turf	1.0 Ft. Vegetative Support	Closure Turf
Low Permeabiltiy Soil Layer	2.0 Ft. Soil Infiltration Layer (6" Rock Free Soil Above Geosynthetics)		1.0 Ft. Soil Infiltration Layer (6" Rock Free Soil Above Geosynthetics)	
Geocomposite Drainage Net	Double Sided Geocomposite	NA	Double Sided Geocomposite	NA
Flexible Membrane Liner	40 mil LLDPE textured	50 mil Super Grip Net	40 mil LLDPE textured	50 mil Super Grip Net
Base Layer for Geosynthetics	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)

4. *The final surface of the disposal facility or disposal facility parcel shall be graded and/or provided with drainage facilities in a manner that:*
   - *(i) Minimizes precipitation run-on from adjacent areas onto the disposal facility parcel;*
   - *(ii) Minimizes erosion of cover material (e.g., no steep slopes);*
   - *(iii) Optimizes drainage of precipitation falling on the disposal facility or disposal facility parcel (e.g., prevent pooling); and*
   - *(iv) Provides a surface drainage system which is consistent with the surrounding area and in no way significantly adversely affects proper drainage from these adjacent lands.*

Drainage structures have been designed to minimize surface water run-on from areas adjacent to the disposal facility by channeling the surface water away from the disposal facility.

Erosion of soil material on the final cover system will be minimized through slope stabilization techniques. The final cover slopes will not exceed a 3H:1V slope. The cover system design optimizes drainage and precipitation run-off through minimum top slopes of 5% to prevent ponding on the cap. The surface drainage system has been designed to be consistent with the surrounding area and in no way significantly affects proper drainage from or to adjacent lands.

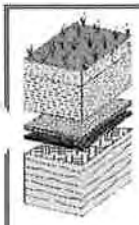
The maximum length of the steepest slope between tack-on benches ranges between 90 and 120 feet. Vegetation will be established on the cover system surface as the fill progresses for sections which will not incorporate the use of the Closure Turf™ final cover section. Temporary erosion control blankets will be used if necessary to provide seedbed protection and prevent the wash-out of seed and fertilizer during vegetation establishment. As the final cover system will be stabilized with vegetation and terraced by means of the tack-on benches, the development of gullies and rills is not expected on the final cover system.

Drainage structures designed on the site include existing stormwater conveyance channels, perimeter channels, culverts, and sediment ponds. Drainage structures have been designed to accommodate at least a 24-hour, 25 year storm. A discussion of the design for the drainage structures is included in **Section 14** of the **Operations Manual**.

The operator will be responsible for any additional erosion control measures, as needed, such as the installation of additional erosion control blankets, straw bales, silt fencing, straw wattles, or rip-rap. Any areas which will be unused for more than 30 days will be seeded to prevent erosion.

Borrow areas will be stabilized within 30 days of ceasing borrow activities through the establishment of vegetation. All borrow and stockpile areas will be graded to allow positive drainage off-site. In the case of severe slopes the borrow area shall be graded to a 3:1 slope and then seeded. Additional erosional problems will be addressed with appropriate structural or non-structural sediment and erosion control practices as prescribed within the plans or in the most recent edition of the Tennessee Erosion and Sediment Control Handbook.

5. *In order to minimize soil erosion, as soon as practicable after final grading, the operator shall take steps as necessary to establish a protective vegetative cover of acceptable grasses over disturbed areas of the site. These steps shall include seeding, mulching, and any necessary fertilization at a minimum, and may*



include additional activities such as sodding of steeper slopes and drainage ways if such are necessary

In order to minimize soil erosion, as soon as practical after final grading, the operator shall take steps necessary to establish a protective vegetative cover of acceptable grasses over disturbed areas of the site. These steps shall include seeding, mulching, and any necessary fertilization, at a minimum, and may include additional activities such as sodding of steeper slopes and drainage ways if necessary. The recommended type of seed mixtures are included in **Section 14** entitled **"Run-On, Run-Off, and Erosion Control"** of **Document I "Operations Manual"**.

6. *In addition to the drainage and grading requirements and vegetative cover requirements, the operator shall take other measures as may be necessary to minimize and control erosion and sedimentation (e.g., soil stabilization, sediment ponds) at the site.*

Presently a portion of one of the two permitted sediment basins at the site has been constructed. Each of the basins has been designed to accommodate at least a 24-hour, 25 year storm. Additional erosional problems will be addressed with appropriate structural or non-structural sediment and erosion control practices as prescribed within the plans or the most recent edition of the Tennessee Erosion and Sediment Control Handbook.

7. *As required in his permit, or as otherwise necessary to prevent threats to human health and the environment, the operator shall establish and/or complete a system for collecting, removing, and treating leachate generated by the disposal facility or disposal facility parcel.*

Leachate collection sumps have been designed to collect leachate from each of the four phases at the ES Class I landfill. The design of the LCS pipe sizes and spacing is based upon the regulatory requirement to maintain less than one foot of leachate head above the composite liner. Hydraulic analyses were performed using the HELP computer model developed by the Corps of Engineers (COE) to determine the pipe diameter and pipe spacing required to comply with the maximum of one foot of leachate above the liner requirement.

A force main pipe system has been designed to convey collected leachate to the leachate tank farm. The force main, which is constructed of HDPE pipe with a DR of 11, has been equipped with lift stations situated at critical locations to ensure proper conveyance to the leachate tank farm. The required nominal pipe diameter required for the force main system has been designed at 2 inches. It should also be noted that exposed piping has been insulated to inhibit freezing.

The existing leachate storage tank and any additional tanks is and will be glass-fused-to-steel or stainless steel (or equal) for protection against corrosion and all tanks will be situated inside a secondary containment area consisting of another larger diameter tank. The leachate storage tank facility has been sized to allow up to two leachate tanks to provide 30 days of storage for an average leachate generation rate of 2,150 gallons/day. This estimate of tank storage capacity is based upon empirically based calculations which may not be representative of actual leachate generation rates. Therefore, as the site is developed "actual leachate generation rates" will be evaluated and the number of tanks will be installed according to actual quantities of leachate generated. However, initially, one tank has been constructed along with a secondary containment tank. The initial tank has a total capacity of approximately 100,000 gallons. The

current tank is 28 feet in diameter with a 24.5 foot sidewall. The tank also has a glass fused to steel roof. The secondary containment tank has a capacity of at least 110,000 gallons (or 110% of the total capacity of any one of the main storage tanks when accounting for volume occupied by non-leaking tanks).

The City of Bruceton and Jackson, Tennessee are presently providing disposal for the leachate generated on-site. In the event that either of these leachate management options becomes inaccessible EWS will secure all applicable permits and minor modifications of the permit from the TDSWM prior to disposal.

8. *As required in his permit, or as otherwise necessary to prevent threats to human health and the environment, the operator shall establish and/or complete a system for collecting and venting or otherwise controlling the vertical and horizontal escape of gases generated in the disposal facility or disposal facility parcel.*

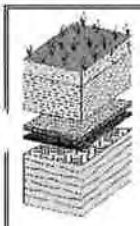
A landfill gas collection (LFG) and removal system has been designed and partially installed for this facility. The LFG system has been designed based upon the results of bench scale testing and a review of all available technical documents relative to the SAS waste generation of gas. The LFG system has been designed to accommodate between 5 and 200 standard cubic feet per minute. The LFG system will be modified as conditions warrant.

A treatment system has been designed that will convert the landfill gas to the liquid ammonium sulfate based upon available data. This system will also have to be modified as necessary to ensure the LFG is properly managed and controlled.

9. *The operator must notify the Division Director in writing of his completion of closure of the disposal facility parcel. Such notification must include a certification by the operator that the disposal facility or disposal facility parcel has been closed in accordance with the approved closure/post-closure care plan. Within 21 days of the receipt of such notice the Division Director shall inspect the facility to verify that closure has been completed and in accordance with the approved plan. Within 10 days such verification, the Commissioner shall approve the closure in writing to the operator. Closure shall not be considered final and complete until such approval has been made.*

EWS will notify the Division Director in writing of completion of closure of the disposal facility or disposal facility parcel. Such notification will include a certification by the operator that the disposal facility or disposal facility parcel has been closed in accordance with the approved closure/post-closure plan.

(d) Post-Closure Care Period – For Class I and Class II disposal facilities, post-closure care must continue for 30 years after the date of final completion of closure of the disposal facility or disposal facility or parcel unless a shorter period is established in the approved Closure/Post-Closure care plan. For Class III and IV disposal facilities, post-closure care must continue for 2 years after the date of final completion of closure of the facility or facility parcel. The post-closure care period may be reduced or extended based on cause by amendment of the approved closure/post-closure care plan as provided in Rule 0400-11-01-.03(2)(e).



Presently, the EWS Class II Landfill is required to provide for post-closure care for a period of thirty years after completion of final closure activities. However, the length of the post closure care period will be evaluated and modified as per **Chart One** of this document. The following paragraphs provide a detailed explanation of procedures that will be followed to evaluate and control potential impacts of the facility to human health and the environment. The installed groundwater wells will provide a system to help determine the actual period for post closure care.

D. Post-Closure Care Activities

The following pages provide a detailed explanation of the Post Closure Activities planned for the EWS Class II Landfill. The intent of the Post Closure Care Period is to maintain the final cover and geologic buffer barrier layers to prevent impacts to groundwater. The strategy to maintain the constructed barriers at the EWS Class II Landfill is detailed in the following sections.

The long term management strategy provides an explanation of the maintenance and monitoring of the following landfill systems:

Final Cover System (FCS)
Leachate Collection and Removal System (LCRS)
Landfill Gas Collection and Monitoring System (LFGS)
Groundwater Monitoring System (GWMS)
Institutional Controls (Site Access)

FINAL COVER SYSTEM POST CLOSURE CARE ACTIVITIES

TDSWM Regulation Specific to Post Closure Care Activities is as follows:

Rule 1200-7-.04(8)(e) Post Closure Care Activities – During the post-closure care period, the operator must, at a minimum, perform the following activities on closed portions of his facility:

1. Maintain the approved final contours and drainage system of the site such that the objectives of part (c)4 of this paragraph are continuously met;

The approved final contours and drainage system will be maintained at the site. If re-grading is required due to settlement or other structural problems with the final cover system, the problem area will be stripped of the vegetation layer, and fill dirt will be applied to the area. The disturbed area will be recovered with topsoil and seeded as specified in the design and covered with new erosion control matting. All drainage ditching will be inspected at least once a month. Any landfilled areas with excessive surface cracks in the soil cover will be corrected to prevent infiltration of surface water. The cracks will be properly graded with suitable soil and appropriate vegetative cover will be established. Maintenance of the final cover system will be performed while also ensuring that the integrity of the cover system is not compromised. In the event the final cover system is damaged, it will be repaired in a timely manner.

2. Ensure that a healthy vegetative cover is established and maintained over the site;

The vegetative cover will be inspected on a monthly basis so as to maintain a healthy stand of vegetation. Areas containing distressed vegetation will be reseeded as necessary.

3. Maintain the drainage facilities, sediment ponds, and other erosion/sedimentation control measures (if such are present at the landfill), at least until the vegetative cover is established sufficiently enough to render such maintenance unnecessary;

All sediment control structures and other erosion/sedimentation control facilities will be maintained on an as-required basis until the vegetative cover is sufficiently established to render such maintenance unnecessary.

Storm water conveyance channels will be constructed and lined to prevent erosion. The channels should be inspected monthly and after every major storm event for structure and erosion problems. Sediment will be removed from the channel and the channel inspected for damage. If damage to the channel is discovered, it will be repaired as appropriated.

LEACHATE COLLECTION SYSTEM POST CLOSURE ACTIVITIES

4. Maintain and monitor the leachate collection, removal, and treatment system (LCRS) (if such is present at the facility);

The LCRS at the EWS Landfill has been designed to contain and remove leachate from the landfill so that the depth of leachate over the composite liner system does not exceed one foot. The LCRS was designed for the worst case scenario which is during the operating life of the landfill.

It is recommended that LCRS be inspected on a semi-annual basis during the post-closure care period. All LCRS pumps, valves, control panels, leachate tanks and pump stations will be inspected at a minimum of every six months. However, the site may be equipped with an electronic system to notify the owner of pump malfunction and shutdown.

It is recommended that the inspection and cleaning of the leachate collection piping be conducted a minimum of once every 3 years initially during the post closure care period, when leachate levels in the system are low. Although leachate flows are continuous year round, the rates are lowest in late summer or early fall and this is the preferred time of year to clean the system. Although it is presently recommended to inspect and clean the leachate collection piping at least once every 3 years, the stress on cleaning the leachate collection system may change if the leachate quality changes over time. This cleaning frequency should be governed by the extent of encrustation and sediment buildup observed during each inspection event and, therefore, may be subject to change. The frequency of cleaning should be reviewed and discussed in each semi-annual report.

It is recommended that the inspection and cleaning of the LCRS be coordinated with maintenance of the leachate holding tank, and the semi-annual inspections of the various pumps and valving in the leachate collection system. The cleaning event will inevitable flush some sediments through the header pipes and into the pump station manhole. Pump inspections and maintenance would be best to follow the cleaning event for the reason noted above.

Numerous studies performed on leachate generation at closed landfills have been compiled by the Environmental Protection Agency (EPA) in the document titled "*Assessment and Recommendations for Improving the Performance of Waste Containment Systems*", EPA/600/R-02/099. Analysis of the data generated from the studies that are compiled and presented in the aforementioned document revealed negligible flow rates after the landfills had been closed for nine years.

LANDFILL GAS CONTROL SYSTEM POST CLOSURE CARE ACTIVITIES

5. *Maintain and monitor the gas collection and control system (if such is present at the facility).*

Rule 0400-11-01.04(5) Gas Migration Control Standards

(b) Class II and Class III Disposal Facilities must meet the standards for Class I disposal facilities in subparagraph (a) of this paragraph unless the operator demonstrates to the satisfaction of the Commissioner that due to nature of his solid wastes or operation no significant amounts of gas will be generated within his facility.

The Landfill Gas Collection and Control System (LFGS) will be monitored during the post-closure care period for maintenance issues. The basic LFGS generally includes at a minimum LFG wells, collection piping, condensate piping and knockouts, blowers, and flares. The conditions that present LFGS maintenance issues which will be monitored and evaluated are listed as follows:

a. Unusual settlement or subsidence,
b. Signs of subsurface fires,
c. Cracks and fissures,
d. Liquids ponding on the cover,
e. Condensate/leachate weeping from side slopes,
f. Surface emissions and hot spots, and
g. Liquid surging and blockage of the LFGS.

The actual frequency for monitoring the LFGS will vary depending upon site specific field requirements and conditions. Normal monitoring frequency for a complete field monitoring session with full field readings will typically vary from once a month to twice a week. *It should be noted that once the active LFGS system is installed a Landfill Gas Collection and Control System (GCCS) Plan and a Startup, Shutdown and Malfunction (SSM) Plan will be prepared as is required by the New Source Performance Standards (NSPS) regulations.* The SSM Plan will provide specific detail regarding the maintenance of the LFGS.

Rule 0400-11-01.04(5) Gas Migration Control Standards

(a) Class I Disposal Facilities must be designed, constructed, operated, and maintained such that any gases generated by decomposition or other reaction of solid waste are collected and vented, recovered, or otherwise managed such that:

1. *There is no buildup of gas pressure under the final cover such that the functions of such cover (including any cap) are comprised;*
2. *The concentration of explosive gases in facility structures (excluding gas control or recovery system components) does not exceed 25 percent of the lower explosive limit for the gases; and*
3. *The concentration of explosive gases at the property boundary does not exceed the lower explosive limit for the gases.*

4. *The minimum frequency of monitoring shall be quarterly and the operator shall keep records to comply with the monitoring and records requirements at Rule 0400-11-01-.05(4)(a)(9); and*
5. *Within 60 days of detection, above the limits set in parts 1, 2, and 3 of this subparagraph, implement a Department approved remediation plan for the methane gas releases.*

The aforementioned **"Landfill Gas Monitoring Plan" (Document V)** has been prepared to address each of the five requirements outlined above. Initially, the groundwater monitor wells will serve as landfill gas monitoring wells. Probes may also be included as necessary.

GROUNDWATER MONITORING SYSTEM POST CLOSURE ACTIVITIES

6. *Maintain and **monitor the ground and/or surface water monitoring system** (if such is present at the facility). The monitoring system and sampling and analysis program established in the permit shall be continued during the post-closure care period, unless the permit is modified to establish a different system or program. Monitoring data must be reported in writing to the Division Director within 30 days after the completion of the analyses; and*

Groundwater monitoring wells have been installed at this facility. A Groundwater Monitoring Plan, **Document IV** of this permit application provides a list of the specific chemical parameters that will be used to determine impacts to the groundwater, during the operational life of the facility and during the post-closure care period.

7. *Following completion of the post-closure care period for each SWLF unit, the owner or operator must file with the Department a certification signed by an independent registered professional engineer verifying that post-closure has been completed in accordance with the post- closure plan.*

EWS will notify the Division Director in writing of its completion of closure of the disposal facility within 60 days of final closure per Rule 0400-11-01-.04(8)(c)(9). Such notification must include a certification by and/or a Tennessee registered professional engineer that the disposal facility has been closed in accordance with the approved Closure/Post-Closure Plan. Within 21 days of the receipt of such notice the Division Director shall inspect the facility to verify that closure has been completed and in accordance with the approved Closure/Post-Closure Plan. Within 21 days of the receipt of such notice the Division Director shall inspect the facility to verify that closure has been completed and in accordance with the approved plan. Within 10 days of such verification, the Commissioner shall approve the closure in writing to the operator. Closure shall not be considered final and complete until such approval has been made. Any corrective work required by the Division shall be promptly undertaken. Cracked, uneven, and eroded areas in the final cover shall be repaired as soon as possible.

(f) Notice in Deed to Property - The operator must ensure that, within 90 days of completion of final closure of the facility and prior to sale or lease of the property on which the facility is located, there is recorded, in accordance with State law, a notation on the deed to the property or on some other instrument which is normally examined

during title search that the land has been used as a disposal facility and its use Is restricted in accordance with the approved closure/post-closure plan.

Within 90 days after final closure activities have been completed and prior to the sale or lease of the Property, EWS shall record a notation on the deed to the property stating that the land has been used as a Class II Industrial Waste Landfill facility and the use of the property is restricted in accordance with the approved closure/post-closure plan.

Post-Closure care will be provided at the site for a period of thirty (30) years after the facility is closed. During the post-closure care period, EWS will, at a minimum, perform the following activities:

EWS personnel will conduct inspections annually during the post-closure period. The inspections will be conducted to ensure compliance with all post-closure requirements. All inspection activities will be adequately documented and will include the date of inspection, the area undergoing inspection, and the results of each inspection. Documentation will be kept in a filing system that is readily accessible to the owner, engineer, and regulatory agency officials.

Groundwater and surface water monitoring will continue during the post-closure care period

III. PLANNED USE OF THE FACILITY AT THE END OF THE POST CLOSURE PERIOD

At the end of the post-closure care period, the operator of the facility will file a certification signed by a registered professional engineer verifying that post-closure has been completed in accordance with the post-closure plan. Tentative plans for the facility and adjoining properties after the post closure care period involve some sort of recreational type facility.

IV. CONTACT

Mr. Chris White - President
Environmental Waste Solutions, LLC
4521 Trousdale Drive,
Nashville, Tennessee 37204
Telephone (615) 277-5579, or
Contact: Landfill Operations Manager
Telephone: (731) 441-8009

V. COST ESTIMATE

1. Closure Costs

In accordance with this rule the following closure cost estimate is presented. The closure costs for Phase 1 of this facility are estimated to be **$853,788.72**. The total closure cost for the entire proposed footprint is **$1,660,838**. **Appendix II** provides a breakdown of the closure cost as estimated using "Work Sheet A" developed by the TDSWM.

2. Post-Closure Care Costs

In accordance with this rule the following post closure care costs are summarized in **Table 3**.

Table 3 - Summary of Post Closure Care Costs

Year(s)	Annual Post Closure Care Cost First Five Year Phase	Annual Post Closure Care Cost Total Site
1-30	$25,978.17	$42,648

"Work Sheet B" developed by the TDSWM is provided in **Appendix II** which details the list of the tasks and estimated costs for post-closure care.

APPENDIX I

MAP

ENVIRONMENTAL WASTE SOLUTIONS

Source: USGS Camden Quadrangle

NORTH

FIGURE 1: SITE LOCATION MAP

HE PROJECT 20114	DATE 05/24/11	HOUSE ENGINEERING LLC
SHEET 1 OF 1	DWN. BY: JKH	7308 River Park Drive
	CHKD. BY: JKH	Nashville, Tennessee 37221
	SCALE: Not To Scale	HOUSE ENGINEERING LLC

APPENDIX II

CLOSURE / POST CLOSURE COST ESTIMATES / WORKSHEETS

WORKSHEET A
Cost Estimate for Closure of the EWS CLASS II LANDFILL
CLOSURE CARE COSTS 5 YEAR PHASE

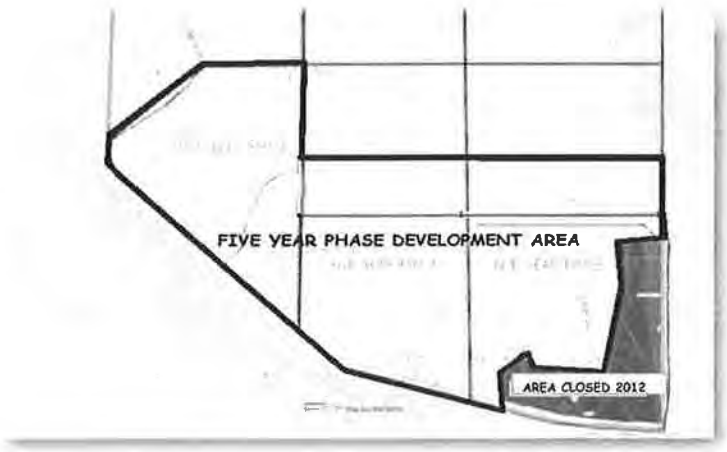
2015 Revision

HOUSE ENGINEERING LLC

Notes:
1. *This worksheet has been prepared for the 5 years of disposal capacity*
2. *A site plan is attached in Appendix 1 depicting the area this closure estimate encompasses.*
3. *This cost is based upon recent closure costs at the site.*

INPUT PARAMETERS

First Phase Smelter Waste Phase 2 Cell 1 and Phase 3 Cell 1	*8.3* ACRES
CLOSED AREA AS OF 2012	*1.9* ACRES
Additional Acreage to provide 5 yrs of disposal capacity for SAS wastes	*1.5* ACRES
First Phase Smelter Waste Requiring Closure	*7.9* ACRES
First Phase Industrial Waste Phase 4 Cell 1	*3* ACRES
AREA OF 5 YEAR PHASE REQUIRING FINANCIAL ASSURANCE FOR CLOSURE	***10.9* ACRES**
1 FT SOIL/1 ACRE	*1613* CU YDS
TOPSOIL THICKNESS	*1* FT
UPPER SOIL THICKNESS	*2* FT
INTERMEDIATE COVER	*1* FT
TOTAL CLOSURE AREA	*40.5* ACRES



1. *CONSTRUCTION OF THE FINAL COVER SYSTEM (TOTAL SITE)*

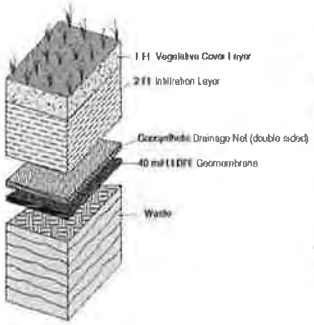
A. Top Soil Component of the Landfill Cover System

a. Quantity needed (yd^3)		17,582
b. Purchase of topsoil (yd^3)	(TOPSOIL IS ON-SITE)	$0.00
c. Transportation unit cost ($/$yd^3$)		$1.00
d. Total Costs of Soil (a. x (b.+ c.))		$17,581.70
e. Placement/spreading unit cost ($/$yd^3$)		$1.00
f Placement cost (a. x d.)		$17,581.70
Total Top Soil (c. + e.)		**$35,163.40**

B. Low Permeability Soil Component of the Landfill Cover System

1. On-Site Clay

a. Quantity needed (yd^3)	35,163
b. Excavation of Soil (yd^3)	$1.00
c. Excavation Costs (a. x b.)	$35,163.40
d. Transportation unit cost ($/$yd^3$)	$1.00
e. Transportation cost (a. x d.)	$35,163.40
f. Placement/spreading unit cost ($/$yd^3$)	$1.00
g. Placement cost (a. x f.)	$35,163.40
h. Compaction unit cost ($/$yd^3$)	$1.00
i Compaction cost (a. x h.)	$35,163.40
Total On-Site Clay (c. + e. + g. + i.)	**$140,653.60**



2. Quality Control/Testing of Low Permeability Clay

a. Number of Acres	10.9
b. Sampling and Testing costs per acre	$2,000.00
Total CQA Costs (a x b)	**$21,800.00**

Total Low Permeability Soil Component of the Landfill Cover System	**$197,617.00**
Total of Topsoil and Low Permeability Clay	**$232,780.40**

. Geosynthetic Component of the Landfill Cover System

1. Installation of Geosynthetic Components of Landfill Cover System

Geocomposite Drainage Net Installed Unit Cost /Square Foot	$0.63
40 Mil LLDPE Installed Unit Cost / Square Foot	$0.45
a. Number of Acres	10.90
b. Geocomposite Drainage Cost Per Acre (Installed)	$299,126.52
c. 40 mil LLDPE Cost Per Acre (installed)	$213,661.80
Total Geosynthetic Installation Costs	**$512,788.32**

2. Quality Control/Testing of Geosynthetic Components of Final Cover System

a. Number of Acres	10.90
b. Sampling and Testing costs per acre	$750.00
Total CQA Costs (a x b)	**$8,175.00**
TOTAL COSTS OF GEOSYNTHETICS (INSTALLATION AND CQA)	**$520,963.32**
TOTAL COST OF CONSTRUCTION OF FINAL COVER SYSTEM (A+B+C)	**$753,743.72**

WORKSHEET A (Continued)
House Engineering LLC
Cost Estimate for Closure of the EWS CLASS II LANDFILL
CLOSURE CARE COSTS 5 YEAR PHASE

2. ***ESTABLISHING VEGETATIVE COVER***

A. Labor ($/acre)	$100.00
B. Seeding ($/acre)	$100.00
C. Fertilizing ($/acre)	$100.00
D. Mulching ($/acre)	$100.00
E. Number of acres	10.90

TOTAL For Establ. Vegetative Cover: (A+B+C+D) **$4,360.00**

3. ***ESTABLISHING OR COMPLETING A SYSTEM TO MINIMIZE AND CONTROL EROSION/SEDIMENTATION***

A. Sediment Pond (WILL ALREADY BE CONSTRUCTED)

1. Excavation and/or Fill Quantity (cubic yards)	0
2. Cost per cubic yard ($)	$1.00
3. Principal Spillway and associated appurtenances ($)	$0.00

Total (1. + 2.) **$0.00**

B. Tack-on Benches **(INCLUDED IN ESTABLISHING FINAL COVER SECTION)**

1. Lineal feet of swale	470
2. Earthwork per foot ($)	$25.50
3. Turf Reinforcement Mat per foot ($)	$0.00

Total (1. x (2. + 3.)) **$11,985.00**

C. Enhanced Silt Fence

1. Lineal feet of boom (ft)	0
2. Cost per foot of boom ($)	$10.00

Total (1. + 2.) **$0.00**

D. Silt Fence

1. Lineal feet of boom (ft)	2,000
2. Cost per foot of boom ($)	$2.50

Total (1. + 2.) **$5,000.00**

E. Let Down Pipes

		Quantity	
1. 15" ADS Downchutes	$20 per lineal foot	270	$5,400.00
2. ADS Drop Inlets	$1,500 each	4	$6,000.00
3. Energy Dissipators	$850 each	4	$3,400.00

Total (1. + 2. +3.) x 4. **$14,800.00**

TOTAL for establishing or completing a system to minimize and control erosion and sedimentation (A. + B. + C.+ D.) **$31,785.00**

WORKSHEET A (Continued)
House Engineering LLC
Cost Estimate for Closure of the EWS CLASS II LANDFILL
CLOSURE CARE COSTS 5 YEAR PHASE

4. ***LEACHATE COLLECTION SYSTEM***

LEACHATE COLLECTION SYSTEM WILL HAVE BEEN INSTALLED PRIOR TO CLOSURE

5. ***ESTABLISHING OR COMPLETING A SYSTEM TO COLLECT OR VENT GASES***

LANDFILL GAS COLLECTION PARAMETERS

Mobilization/Demobilization		**$3,000**
Assemblies Required for Entire Landfill*		4
Number of LFG Well Heads Required for Last Phase Landfill		4
Cost per Well Head Assembly	$	450.00
Total Mob and Well Head Assembly Installation	**$**	**4,800.00**

LANDFILL GAS SYSTEM PIPE COSTS

Description		Subtitle D Landfill
1. Installation Cost - LFG Header (12" dia. SDR 17) ($/LF)	$	18.00
2. Length of LFG Header Pipe (FT)		1,100
3. Cost Installation - Header	**$**	**19,800.00**
1. Installation Cost - LFG Laterals (8" diameter SDR 17) ($/LF)	$	5.00
2. Length of LFG Lateral Pipe (Ft.)		6,500
3. Cost Installation - Laterals	**$**	**32,500.00**
TOTAL LFG PIPE COSTS	**$**	**52,300.00**

LANDFILL GAS FLARE SYSTEM COSTS

1. LFG Treatment System	$200,000
2. HOUSING	$50,000
	$250,000

INSTALLED 2012

LANDFILL GAS SYSTEM TOTAL COSTS **(A. + B. + C. + D.)** **$57,100**

*** Note: Most of the gas well heads are required to have already been installed as per NSPS.**

6 ***GROUNDWATER MONITORING SYSTEM (System is Presently In-Place)***

A. Installation

1. Number of wells	0.00
2. Drilling cost	0.00
3. Well installation oversight	0.00
4. Equipment (e.g., pumps)	0.00
5. Labor	0.00
6. Establish surface sampling points	0.00

TOTAL for establishing or completing groundwater monitoring system (1.) x (2. + 3. + 4. + 5. +6.) **$0.00**

7. ***Surveying inspections to confirm final grade.***

A. Transportation	$800
B. Labor	$6,000

TOTAL for surveying inspections (A. + B.) **$6,800.00**

8 ***TOTAL CLOSURE COSTS***

Sum of TOTALS For Sections (1. through 8.) **$853,788.72**

WORKSHEET B **2015 REVISION**

POST CLOSURE ACTIVITIES for the EWS CLASS II LANDFILL

House Engineering LLC

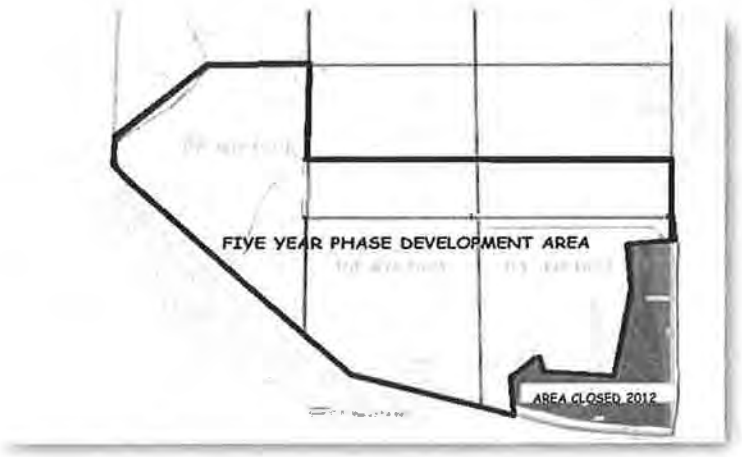
HOUSE ENGINEERING LLC

Cost Estimate - Post Closure Annual Costs Worksheet

POST CLOSURE CARE COSTS FOR FIRST 5 YR PHASE

INPUT PARAMETERS

First Phase Smelter Waste Phase 2 Cell 1 and Phase 3 Cell 1	*8.3*	ACRES
CLOSED AREA AS OF 2012	*1.9*	ACRES
Additional Acreage to provide 5 yrs of disposal capacity for SAS wastes	*1.5*	ACRES
First Phase Smelter Waste Requiring Closure	*7.9*	ACRES
First Phase Industrial Waste Phase 4 Cell 1	*3*	ACRES
AREA OF 5 YEAR PHASE REQUIRING FINANCIAL ASSURANCE FOR CLOSURE	***10.9***	**ACRES**
1 FT SOIL/1 ACRE	*1613*	CU YDS
TOPSOIL THICKNESS	*1*	FT
UPPER SOIL THICKNESS	*2*	FT
INTERMEDIATE COVER	*1*	FT
TOTAL CLOSURE AREA	*42.4*	ACRES
Volume of Leachate Generated per HELP Model	0.54	GAL/ACRE/DAY
TOTAL CLOSURE AREA	*40.5*	ACRES



Notes:

1. *This worksheet is to be submitted as part of the C/PC Plan*
2. *This facility will be maintained and monitored for a minimum of thirty years after final closure*
3. *Fill in blanks for all activities which apply.*
4. *All costs are to be calculated on an ANNUAL BASIS.*

1. *Surveying inspections to confirm final grade and drainage are maintained.*

A. Transportation	Previously confirmed
B. Labor	Previously Confirmed
TOTAL for surveying inspections (A. + B.)	**$0.00**

2. *Maintain healthy vegetation.*

A. Transportation	$0
B. Labor	$0
C. Seeding	$100
D. Fertilizing	$100
E. Mulching	$0
G. Mowing	$100
H. Number of Acres	10.9
TOTAL for maintaining healthy vegetation (A. + B. + C. + D. + E. + F. + G.) x (H.)	**$3,270.00**

3. *Maintain the drainage facilities, sediment ponds and erosion/sedimentation control measures.*

	Maintenance of Sediment Pond and Associated Erosion Control Structures	
A.	Trans/Equip Mob to Clean Ponds (4 Mob @ yr 5, 10, 20 & 30) 4 Mobs at $1500 ea broken into an annual cost basis	$200.00
B.	Labor for Sediment Pond Maintenance (4 major mtce. Mobs for 2 ponds at $3,000 ea broken into an annual cost.)Note 2 ponds are the most anticipated for a 5 year phase of development.	$800.00
C.	Cleaning of Sediment Control Pond & Drainage Structures. 4 Major Mtce. Operations for 2 ponds at $3,000 ea broken into an annual cost over the post care closure period.	$800.00
D.	Repair of gullies or rills	
	1. Soil acquisition	
	a. Quantity (yd^3)(estimated .5 ft of soil over 6 acres @ 4 mobs broken into an annual cost over 30 yrs)	700
	b. Purchase unit cost ($/$yd^3$)	$0.00
	c. Purchase cost (a. x b.)	$0.00
	d. Delivery unit cost ($/$yd^3$)	$0.50
	e. Deliver cost (a. x d.)	$350.00
	Total 1. (c. + e.)	**$350.00**
	2. Placement/spreading/compaction ($2.50/$yd^3$ @ 4 mobs broken into an annual cost over 30 yrs.)	$233.33
	3. Revegetation (vegetate 3 acres x 4 mobs x $500/acre broken into an annual cost over 30 yrs)	$200.00
	Total D (1. + 2. + 3.)	**$783.33**
TOTAL For Maintaining Drainage (A. + B. + C. + D.)		**$2,583.33**

WORKSHEET B **2015 REVISION**

POST CLOSURE ACTIVITIES for the EWS CLASS II LANDFILL

House Engineering LLC

Cost Estimate - Post Closure Annual Costs Worksheet

HOUSE ENGINEERING LLC

POST CLOSURE CARE COSTS FOR FIRST 5 YR PHASE

4 ***Maintain and monitor the leachate collection, removal, and treatment system***

The following equation was used to estimate the volume of leachate generation during Post Closure Care

GEOMEMBRANE plus Compacted Clay Liner $Q=0.21\ i_{ave}\ a^{0.1}\ h^{0.9}\ K^{0.74}$

A. Pre-Treatment of leachate

1. Off-site Disposal

a. Quantity (gal/acre/year)	197
b. Hauling unit cost ($/gal)	$0.05
c. Hauling cost (a.x b.)	$9.86
d. Disposal unit cost ($/gal)	$0.05
e. Disposal cost (a.x d.)	$9.86
PER ACRE TOTAL 2 (c. + e.)	**$19.71**
TOTAL	**$214.84**

B. Maintenance of leachate collection system

1. Transportation	$1,000.00
2. Labor	$1,000.00
3. Repairs/Materials (e.g. below)	$0.00
a. Pumps	$0.00
b. Cleaning out system	$1,000.00
c. Leak detection	$1,000.00
d. Other	$0.00
TOTAL 3 (a.+ b.+ c.+ d.)	**$2,000.00**
TOTAL (1.+ 2.+ 3.)	**$4,000.00**
TOTAL for monitoring and maintaining leachate system (A.+ B.)	**$4,214.84**

5 ***Maintain and monitor the gas collection or venting system***

8 Active Well Head Assemblies

A. Transportation (12 Trips to Site/Year)	**$1,200.00**
B. Labor / Well / Trip	$160.00
Total Labor for Monitoring and Maintenance for 13 Well Head Assemblies	**$1,280.00**
C. Repairs/Materials (e.g. below)	
1. Cleaning	$0.00
2. Caps	$0.00
3. Other	$0.00
TOTAL (1.+ 2.+ 3.)	**$0.00**
TOTAL for maintaining/monitoring LFG system (A.+ B.+ C.)	**$2,480.00**

6 ***Maintain and monitor the groundwater and/or surface water monitoring system.***

A. Monitoring of groundwater systems:

1. Number of wells/springs/blanks	3
2. Number of samples/well/year	2
3. Unit. cost of analysis	$1,450
4. Cost of sampling + analysis (1. x 2. x 3.)	$8,700
5. Labor cost per well	$90
6. Labor costs (1. x 5.)	$270
7. Report Preparation	$1,500
8. Statistical Analysis	$2,000
TOTAL A (4. + 6.+ 7. + 8.)	**$12,470.00**

B. Inspection and maintenance of system:

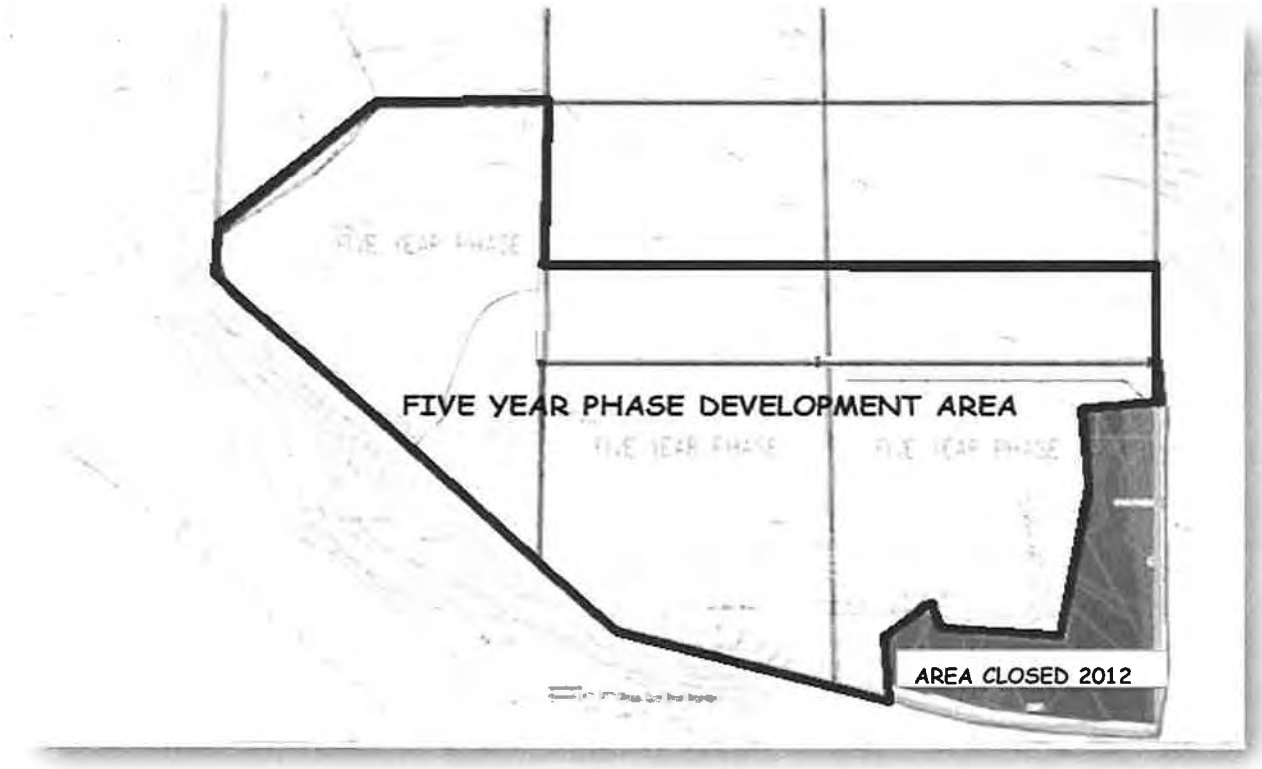
1. Transportation	50.00
2. Labor	300.00
3. Repairs/materials	
a. Caps	50.00
b. Tubing	50.00
c. Pumps	50.00
d. Well Redevelopment	400.00
e. Other	60.00
Total 3 (a. + b.+ c. + d. + e.)	**$610.00**
TOTAL B (1. + 2. + 3.)	**$960.00**
TOTAL For Maintaining and Monitoring Groundwater Systems (A+B)	**$13,430.00**

7 ***SUM OF ANNUAL POST CLOSURE CARE COSTS*** **$25,978.17**

SUMMARY OF CLOSURE/POST-CLOSURE FINANCIAL ASSURANCE REQUIREMENTS

LANDFILL AREA[1] FOR ESTIMATION OF C/PC CARE (ACRES)	CLOSURE COST ($)	POST CLOSURE CARE COST ($)
10.9	$853,789	$25,978.17

NOTE: [1] Subject area is for the first 5 year phase for post closure care.
[2] The subject area is outlined with a blue line in the illustrations provided below.
[3] Cost Estimates are calculated as present value (2015 $)

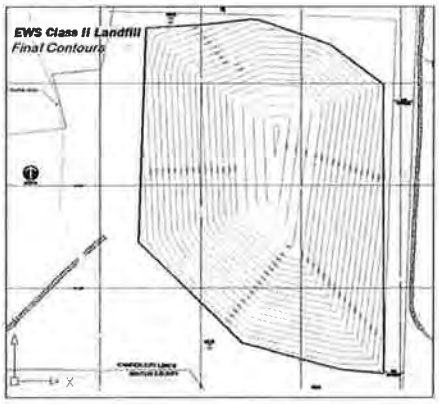


WORKSHEET A
House Engineering LLC
Cost Estimate for Closure of the EWS CLASS II LANDFILL
CLOSURE COSTS REQUIRED FOR THE ENTIRE SITE

2015 Revision

HOUSE ENGINEERING LLC

Notes:
1. *This worksheet has been prepared for the entire development in the 2007 Expansion*
2. *A site plan is attached in Appendix 1 depicting the area this closure estimate encompasses*
3. *This cost is based upon recent closure costs at the site*



INPUT PARAMETERS

First 5 Yr. Phase	*8.3*	ACRES
CLOSED AREA AS OF 2012	*1.9*	ACRES
1 FT SOIL/1 ACRE	*1613*	CU YDS
TOPSOIL THICKNESS	*1*	FT
UPPER SOIL THICKNESS	*2*	FT
INTERMEDIATE COVER	*1*	FT
TOTAL CLOSURE AREA	*40.5*	ACRES

1. *CONSTRUCTION OF THE FINAL COVER SYSTEM (TOTAL SITE)*

A. Top Soil Component of the Landfill Cover System

a. Quantity needed (yd^3)		65,327
b. Purchase of topsoil (yd^3)	(TOPSOIL IS ON-SITE)	$0.00
c. Transportation unit cost ($/$yd^3$)		$1.00
d. Total Costs of Soil (a. x (b.+ c.))		$65,326.50
e. Placement/spreading unit cost ($/$yd^3$)		$1.00
f Placement cost (a. x d.)		$65,326.50
Total Top Soil (c. + e.)		**$130,653.00**

B. Low Permeability Soil Component of the Landfill Cover System

1. On-Site Clay

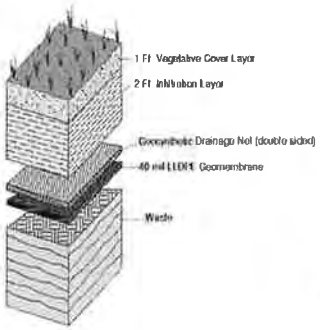
a. Quantity needed (yd^3)	26,776
b. Excavation of Soil (yd^3)	$1.00
c. Excavation Costs (a. x b.)	$26,775.80
d. Transportation unit cost ($/$yd^3$)	$1.00
e. Transportation cost (a. x d.)	$26,775.80
f. Placement/spreading unit cost ($/$yd^3$)	$1.00
g. Placement cost (a. x f.)	$26,775.80
h. Compaction unit cost ($/$yd^3$)	$1.00
i Compaction cost (a. x h.)	$26,775.80
Total On-Site Clay (c. + e. + g. + i.)	**$107,103.20**

2. Quality Control/Testing of Low Permeability Clay

a. Number of Acres	40.5
b. Sampling and Testing costs per acre	$2,000.00
Total CQA Costs (a x b)	**$81,000.00**

Total Low Permeability Soil Component of the Landfill Cover System	**$318,756.20**
Total of Topsoil and Low Permeability Clay	**$449,409.20**

C. Geosynthetic Component of the Landfill Cover System



1. Installation of Geosynthetic Components of Landfill Cover System

a. Number of Acres	40.50
b. Geocomposite Drainage Cost Per Acre (Installed)	$16,030.08
c. 40 mil LLDPE Cost Per Acre (installed)	$12,327.48
d. Geocomposite Clay Liner (GCL) cost per acre (Installed)	$18,000.00
Total Geosynthetic Installation Costs	**$729,000.00**

2. Quality Control/Testing of Geosynthetic Components of Final Cover System

a. Number of Acres	40.50
b. Sampling and Testing costs per acre	$750.00
Total CQA Costs (a x b)	**$30,375.00**
TOTAL COSTS OF GEOSYNTHETICS (INSTALLATION AND CQA)	**$759,375.00**

TOTAL COST OF CONSTRUCTION OF FINAL COVER SYSTEM (A+B+C)	**$1,208,784.20**

WORKSHEET A (Continued)
House Engineering LLC
Cost Estimate for Closure of the EWS CLASS II LANDFILL
CLOSURE COSTS REQUIRED FOR THE ENTIRE SITE

2. ***ESTABLISHING VEGETATIVE COVER***

A. Labor ($/acre)	$100.00
B. Seeding ($/acre)	$100.00
C. Fertilizing ($/acre)	$100.00
D. Mulching ($/acre)	$100.00
E. Number of acres	40.00
TOTAL For Establ. Vegetative Cover: (A+B+C+D)	**$16,000.00**

3. ***ESTABLISHING OR COMPLETING A SYSTEM TO MINIMIZE AND CONTROL EROSION/SEDIMENTATION***

A. Sediment Pond (WILL ALREADY BE CONSTRUCTED)

1. Excavation and/or Fill Quantity (cubic yards)	0
2. Cost per cubic yard ($)	$1.00
3. Principal Spillway and associated appurtenances ($)	$0.00
Total (1. + 2.)	**$0.00**

B. Tack-on Benches **(INCLUDED IN ESTABLISHING FINAL COVER SECTION)**

1. Lineal feet of swale	13,173
2. Earthwork per foot ($)	$25.50
3. Turf Reinforcement Mat per foot ($)	$0.00
Total (1. x (2. + 3.))	**$335,911.50**

C. Enhanced Silt Fence

1. Lineal feet of boom (ft)	0
2. Cost per foot of boom ($)	$10.00
Total (1. + 2.)	**$0.00**

D. Silt Fence

1. Lineal feet of boom (ft)	4525
2. Cost per foot of boom ($)	$2.50
Total (1. + 2.)	**$11,312.50**

E. Let Down Pipes

		Quantity	
1. 15" ADS Downchutes	$20 per lineal foot	2454	$49,080.00
2. ADS Drop Inlets	$1,500 each	18	$27,000.00
3. Energy Dissipators	$850 each	7	$5,950.00
Total (1. + 2. +3.) x 4.			**$82,030.00**

TOTAL for establishing or completing a system to minimize and control erosion and sedimentation (A. + B. + C.+ D.)	**$429,254.00**

WORKSHEET A (Continued)
House Engineering LLC
Cost Estimate for Closure of the EWS CLASS II LANDFILL
CLOSURE COSTS REQUIRED FOR THE ENTIRE SITE

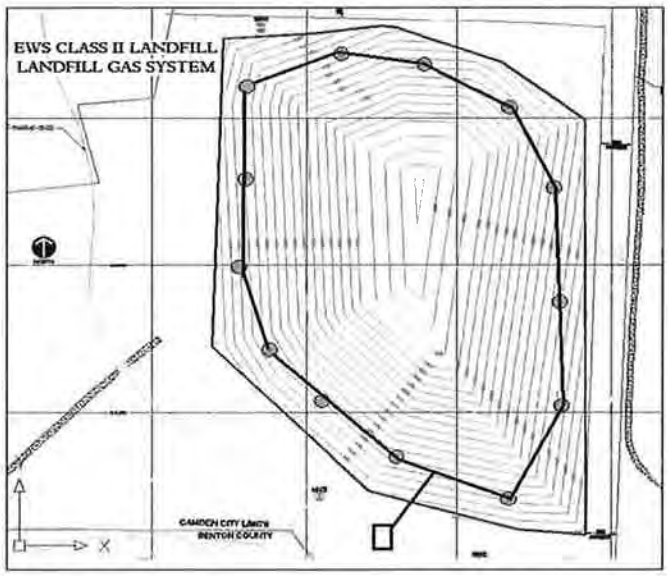
4. ***LEACHATE COLLECTION SYSTEM***

LEACHATE COLLECTION SYSTEM WILL HAVE BEEN INSTALLED PRIOR TO CLOSURE

5. ***ESTABLISHING OR COMPLETING A SYSTEM TO COLLECT OR VENT GASES***

LANDFILL GAS COLLECTION PARAMETERS

Mobilization/Demobilization	**$3,000**
Number of LFG Well Head Assemblies Required for	13
Number of LFG Well Heads Required for Last Phase Landfill	4
Cost per Well Head Assembly	$ 450.00
Total Mob and Well Head Assembly Installation	**$ 8,850.00**



LANDFILL GAS SYSTEM PIPE COSTS

Description	Subtitle D Landfill
1. Installation Cost - LFG Header (12" dia. SDR 17) ($/LF)	$ 18.00
Pipe (FT)	4,950
3. Cost Installation - Header	$ **89,100.00**
1. Installation Cost - LFG Laterals (8" diameter SDR 17) ($/LF)	$ 5.00
2. Length of LFG Lateral Pipe	26,000
3. Cost Installation - Laterals	$ **130,000.00**
TOTAL LFG PIPE COSTS	**$ 219,100.00**

LANDFILL GAS FLARE SYSTEM COSTS

1. FLARE	$200,000
2. HOUSING	$50,000
	$250,000

LANDFILL GAS SYSTEM TOTAL COSTS **(A. + B. + C. + D.)** **$477,950**

*** Note: Most of the gas wells are required to have already been installed as per NSPS.**

6 ***GROUNDWATER MONITORING SYSTEM (System is Presently In-Place)***

A. Installation

1. Number of wells	0.00
2. Drilling cost	0.00
3. Well installation oversight	0.00
4. Equipment (e.g., pumps)	0.00
5. Labor	0.00
6. Establish surface sampling points	0.00

TOTAL for establishing or completing groundwater monitoring system (1.) x (2. + 3. + 4. + 5. +6.) **$0.00**

7. ***Surveying inspections to confirm final grade.***

A. Transportation	$800
B. Labor	$6,000

TOTAL for surveying inspections (A. + B.) **$6,800.00**

8 ***TOTAL CLOSURE COSTS***

Sum of TOTALS For Sections (1. through 8.) **$1,660,838.20**

WORKSHEET B **2015 REVISION**

POST CLOSURE ACTIVITIES for the EWS CLASS II LANDFILL

House Engineering LLC

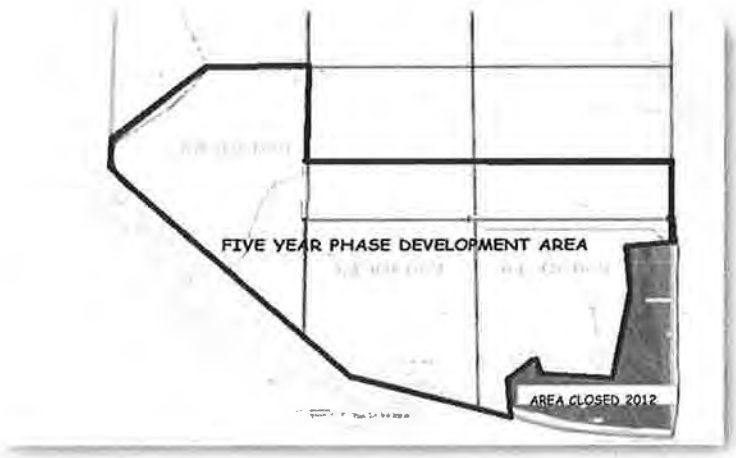
HOUSE ENGINEERING LLC

Cost Estimate - Post Closure Annual Costs Worksheet

POST CLOSURE CARE COSTS FOR TOTAL SITE

INPUT PARAMETERS

First Phase Smelter Waste Phase 2 Cell 1 and Phase 3 Cell 1	*8.3*	ACRES
CLOSED AREA AS OF 2012	*1.9*	ACRES
Additional Acreage to provide 5 yrs of disposal capacity for SAS wastes	*1.5*	ACRES
First Phase Smelter Waste Requiring Closure	*7.9*	ACRES
First Phase Industrial Waste Phase 4 Cell 1	*3*	ACRES
AREA OF 5 YEAR PHASE REQUIRING FINANCIAL ASSURANCE FOR CLOSURE	***10.9***	**ACRES**
1 FT SOIL/1 ACRE	*1613*	CU YDS
TOPSOIL THICKNESS	*1*	FT
UPPER SOIL THICKNESS	*2*	FT
INTERMEDIATE COVER	*1*	FT
TOTAL CLOSURE AREA	*42.4*	ACRES
Volume of Leachate Generated per HELP Model	0.54	GAL/ACRE/DAY
TOTAL CLOSURE AREA	*40.5*	ACRES



Notes:

1. *This worksheet is to be submitted as part of the C/PC Plan.*
2. *This facility will be maintained and monitored for a minimum of thirty years after final closure*
3. *Fill in blanks for all activities which apply.*
4. *All costs are to be calculated on an ANNUAL BASIS.*

1. ***Surveying inspections to confirm final grade and drainage are maintained.***

A. Transportation	Previously confirmed
B. Labor	Previously Confirmed
TOTAL for surveying inspections (A. + B.)	**$0.00**

2. ***Maintain healthy vegetation.***

A. Transportation	$0
B. Labor	$0
C. Seeding	$100
D. Fertilizing	$100
E. Mulching	$0
G. Mowing	$100
H. Number of Acres	40.5
TOTAL for maintaining healthy vegetation (A. + B. + C. + D. + E. + F. + G.) x (H.)	**$12,150.00**

3. ***Maintain the drainage facilities, sediment ponds and erosion/sedimentation control measures.***

	Maintenance of Sediment Pond and Associated Erosion Control Structures	
A.	Trans/Equip Mob to Clean Ponds (4 Mob @ yr 5, 10, 20 & 30) 4 Mobs at $1500 ea broken into an annual cost basis	$200.00
B.	Labor for Sediment Pond Maintenance (4 major mtce. Mobs for 2 ponds at $3,000 ea broken into an annual cost.)Note 2 ponds are the most anticipated for a 5 year phase of development.	$800.00
C.	Cleaning of Sediment Control Pond & Drainage Structures. 4 Major Mtce. Operations for 2 ponds at $3,000 ea broken into an annual cost over the post care closure period.	$800.00
D.	Repair of gullies or rills	
	1. Soil acquisition	
	Quantity (yd^3)(estimated .5 ft of soil over 12 acres @ 4 mobs a. broken into an annual cost over 30 yrs)	1,500
	b. Purchase unit cost ($/$yd^3$)	$1.00
	c. Purchase cost (a. x b.)	$1,500.00
	d. Delivery unit cost ($/$yd^3$)	$1.00
	e. Deliver cost (a. x d.)	$1,500.00
	Total 1. (c. + e.)	**$3,000.00**
	2. Placement/spreading/compaction ($2.50/$yd^3$ @ 4 mobs broken into an annual cost over 30 yrs.)	$500.00
	3. Revegetation (vegetate 3 acres x 4 mobs x $500/acre broken into an annual cost over 30 yrs)	$200.00
	Total D (1. + 2. + 3.)	**$3,700.00**
TOTAL For Maintaining Drainage (A. + B. + C. + D.)		**$5,500.00**

WORKSHEET B **2015 REVISION**

POST CLOSURE ACTIVITIES for the EWS CLASS II LANDFILL

House Engineering LLC

Cost Estimate - Post Closure Annual Costs Worksheet

HOUSE ENGINEERING LLC

POST CLOSURE CARE COSTS FOR TOTAL SITE

4 ***Maintain and monitor the leachate collection, removal, and treatment system***

The following equation was used to estimate the volume of leachate generation during Post Closure Care

GEOMEMBRANE plus Compacted Clay Liner $Q=0.21\ i_{ave}\ a^{0.1}\ h^{0.9}\ K^{0.74}$

A. Pre-Treatment of leachate

1. Off-site Disposal

a. Quantity (gal/acre/year)	197
b. Hauling unit cost ($/gal)	$0.05
c. Hauling cost (a.x b.)	$9.86
d. Disposal unit cost ($/gal)	$0.05
e. Disposal cost (a.x d.)	$9.86
PER ACRE TOTAL 2 (c. + e.)	**$19.71**
TOTAL	**$798.26**

B. Maintenance of leachate collection system

1. Transportation	$1,000.00
2. Labor	$2,500.00
3. Repairs/Materials (e.g. below)	$0.00
a. Pumps	$0.00
b. Cleaning out system	$1,000.00
c. Leak detection	$1,000.00
d. Other	$0.00
TOTAL 3 (a.+ b.+ c.+ d.)	**$2,000.00**
TOTAL (1.+ 2.+ 3.)	**$5,500.00**
TOTAL for monitoring and maintaining leachate system (A.+ B.)	**$6,298.26**

5 ***Maintain and monitor the gas collection or venting system***

24 Active Well Head Assemblies

A. Transportation (12 Trips to Site/Year)	**$1,200.00**
B. Labor / Well / Trip	$160.00
Total Labor for Monitoring and Maintenance for 13 Well Head Assemblies	**$3,840.00**
C. Repairs/Materials (e.g. below)	
1. Cleaning	$100.00
2. Caps	$30.00
3. Other	$100.00
TOTAL (1.+ 2.+ 3.)	**$230.00**
TOTAL for maintaining/monitoring LFG system (A.+ B.+ C.)	**$5,270.00**

6 ***Maintain and monitor the groundwater and/or surface water monitoring system.***

A. Monitoring of groundwater systems:

1. Number of wells/springs/blanks	3
2. Number of samples/well/year	2
3. Unit. cost of analysis	$1,450
4. Cost of sampling + analysis (1. x 2. x 3.)	$8,700
5. Labor cost per well	$90
6. Labor costs (1. x 5.)	$270
7. Report Preparation	$1,500
8. Statistical Analysis	$2,000
TOTAL A (4. + 6.+ 7. + 8.)	**$12,470.00**

B. Inspection and maintenance of system:

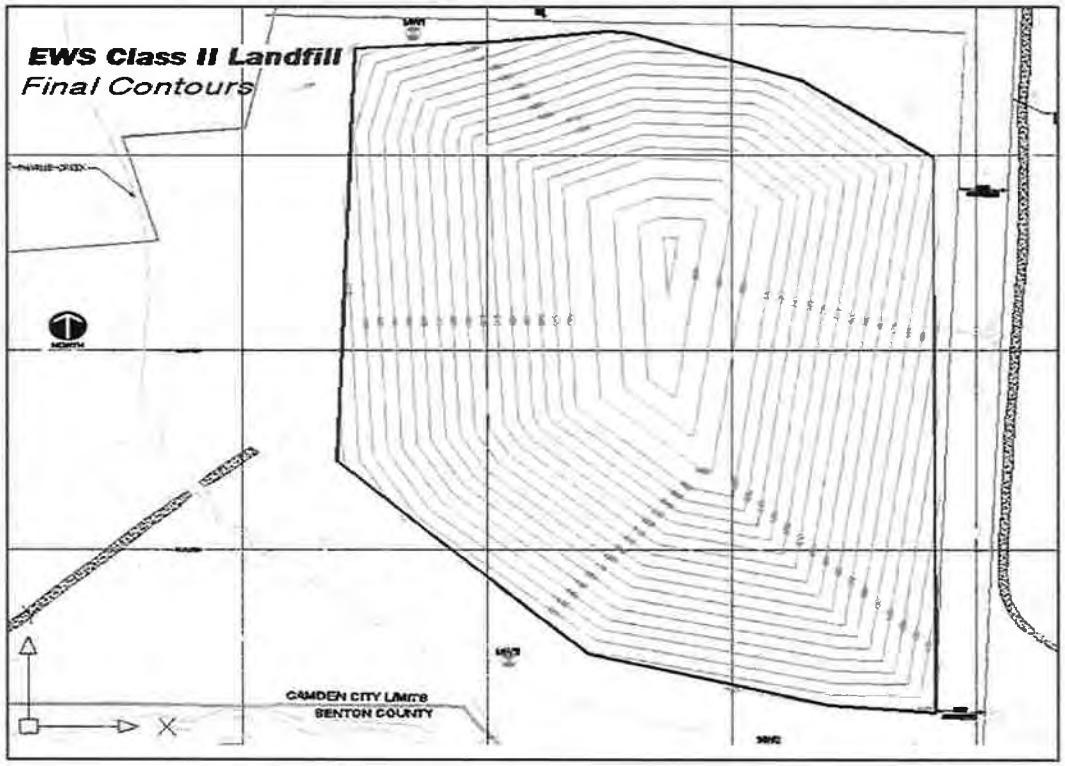
1. Transportation	50.00
2. Labor	300.00
3. Repairs/materials	
a. Caps	50.00
b. Tubing	50.00
c. Pumps	50.00
d. Well Redevelopment	400.00
e. Other	60.00
Total 3 (a. + b.+ c. + d. + e.)	**$610.00**
TOTAL B (1. + 2. + 3.)	**$960.00**
TOTAL For Maintaining and Monitoring Groundwater Systems (A+B)	**$13,430.00**

7 ***SUM OF ANNUAL POST CLOSURE CARE COSTS*** **$42,648.26**

SUMMARY OF CLOSURE/POST-CLOSURE FINANCIAL ASSURANCE REQUIREMENTS

LANDFILL AREA[1] FOR ESTIMATION OF C/PC CARE (ACRES)	CLOSURE COST ($)	ANNUAL POST CLOSURE CARE COST ($)
40.5	$1,660,838	$42,648.26

NOTE: [1] Subject area includes the original 42.4 acre footprint and the first 5 year phase of the 2008 expansion for post closure care.
[2] The subject area is outlined with a blue line in the illustrations provided below.
[3] Cost Estimates are calculated as present value (2015 $)



APPENDIX III

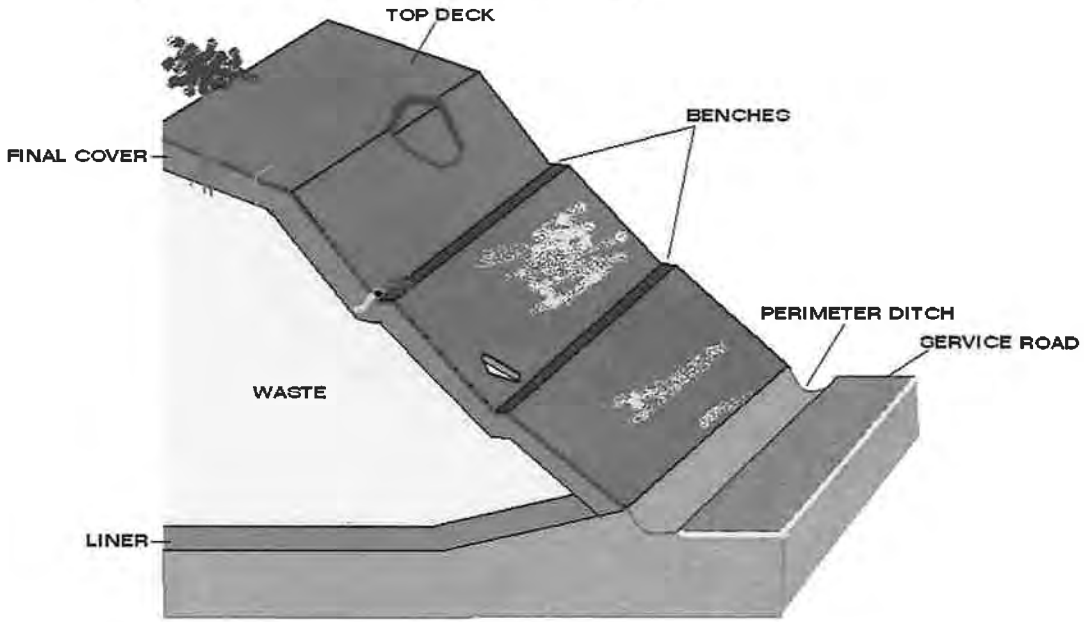
PROCEDURES FOR POST CLOSURE CARE COMPLETION

EVALUATE FINAL COVER IMPACTS AT CLOSURE AND POST CLOSURE

I. Final Cover Monitoring System

FINAL COVER MAINTENANCE TASKS DURING POST CLOSURE	DESCRIPTION OF TASKS
Step One	Inspect Final Cover at Closure for the following potential impacts: Erosional Rills, Animal Burrows, Desiccation Cracks, Stressed and/or Inappropriate Vegetation, Exposed Waste, Slope Failures,
Step Two	Enter Quarterly Post Closure Monitoring of the Final Cover for the Conditions Outlined in Step One and Perform Corrective Action if necessary
Step Three	If the results of groundwater monitoring performed for a period of time show no impact to water bodies in conjunction with computer modeling demonstration exit Post Closure Monitoring of the Final Cover.
Step Four	Begin Surveillance Monitoring of the Final Cover on an interval that is appropriate for the proposed End Use of the site.
Step Five	Demonstrate with historical data and computer modeling that there is no further threat to human health and the environment and discontinue monitoring.

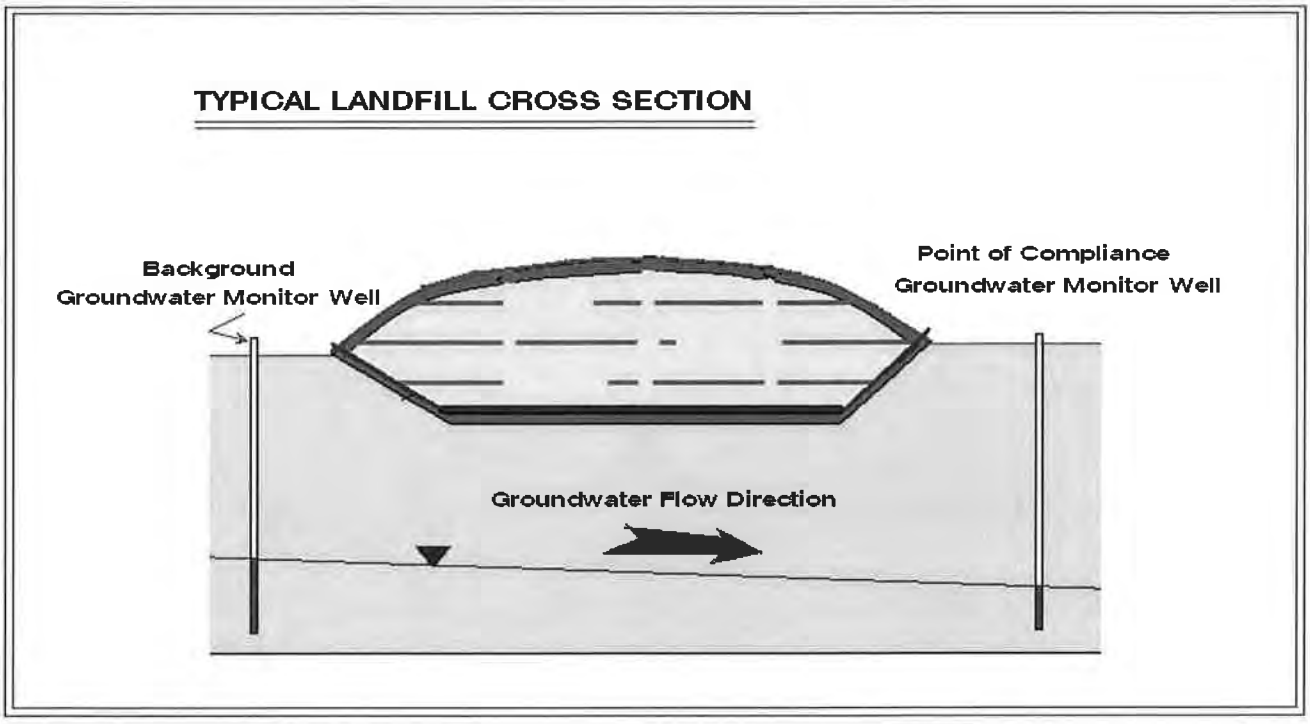
LANDFILL FINAL COVER SYSTEM



EVALUATE GROUNDWATER IMPACTS AT CLOSURE AND POST CLOSURE

II. Groundwater Monitoring System

GROUNDWATER MONITORING TASKS DURING POST CLOSURE	DESCRIPTION OF TASKS
Step One	Review Historical Groundwater Data for Compliance
Step Two	Enter Post Closure Groundwater Monitoring
Step Three	If the results of groundwater monitoring performed for a period of time show no impact to water bodies exit Post Closure Monitoring and begin Surveillance Monitoring.
Step Four	Perform surveillance monitoring program until no potential impacts are present.
Step Five	Demonstrate with historical data and computer modeling that there is no further threat to human health and the environment and discontinue monitoring.



SUMMARY OF PERFORMANCE BASED POST CLOSURE RESPONSIBILITIES

Post-Closure Care (PCC) Control System	*Purpose of PCC Control System*	*Criteria for Evaluation of Required Service Life of PCC System*	***Justification for Discontinuing PCC System Operation***
Final Cover System	Control of the following: ● Infiltration ● Direct Exposure to Waste ● Slope Stability ● Landfill Gas Emissions	Loss of, or changes to, cap integrity must not adversely affect any of the purposes listed. Long-term condition of cap must be compatible with end-use obligations for the site.	**Demonstrate Effectiveness of cap based on other PCC systems required use. i.e. no impacts to Groundwater or LFG Emissions.** **Perform sufficient monitoring for a period of time to demonstrate no further potential for releases to receiving water bodies.**
Leachate Collection and Recovery System (LCRS)	Contain, Collect and Treat Leachate to prevent adverse impacts of leachate to surface water and groundwater, or as seeps.	No risk of impacts from uncontrolled releases of leachate. In addition, operation of LCRS must not be necessary to maintain geotechnical stability.	
Landfill Gas Collection System (LFGCS)	Collect Landfill Gas to prevent impacts to Groundwater and the Atmosphere	The generation of LFG is no longer sufficient to operate the collection system.	
Groundwater Monitoring System	Demonstrate that there are no unacceptable impacts to groundwater.	Monitor groundwater quality for an exceedance of groundwater MCL's.	

APPENDIX IV

HELP MODEL COMPUTER OUTPUT FILE

EWS CLASS II LANDFILL HELP MODEL FOR CLOSURE

```
**************************************************************************
**************************************************************************
**                                                                      **
**                                                                      **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE            **
**                                                                      **
**              HELP Version 3.95 D          (10 August 2012)           **
**                              developed at                            **
**        Institute of Soil Science, University of Hamburg, Germany     **
**                                 based on                             **
**              US HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)           **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY               **
**                    USAE WATERWAYS EXPERIMENT STATION                 **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY          **
**                                                                      **
**                                                                      **
**************************************************************************
**************************************************************************
```

TIME: 9.14 DATE: 21.03.2015

```
PRECIPITATION DATA FILE:      C:\HELPMod\HELP395D\EWS\EWS precip.d4
TEMPERATURE DATA FILE:        C:\HELPMod\HELP395D\EWS\EWS LF Temp data.d7
SOLAR RADIATION DATA FILE:    C:\HELPMod\HELP395D\EWS\EWS LF Solar.d13
EVAPOTRANSPIRATION DATA F. 1: C:\HELPMod\HELP395D\EWS\EWS LANDFILL.d11
SOIL AND DESIGN DATA FILE  1: C:\HELPMod\HELP395D\EWS\EWS CLOSURE.d10
OUTPUT DATA FILE:             C:\HELPMod\HELP395D\EWS\EWS TOTAL SECTION.out
DAILY OUTPUT DATA FILE:       C:\HELPMod\HELP395D\EWS\EWS TOTAL SECTION.DAY
MONTHLY OUTPUT DATA FILE:     C:\HELPMod\HELP395D\EWS\EWS TOTAL SECTION.MON
YEARLY OUTPUT DATA FILE:      C:\HELPMod\HELP395D\EWS\EWS TOTAL SECTION.YR
```

COLUMNS OF DAILY OUTPUT DATA FILE:

```
    1    DATE (yyyymmdd, years 2101 to 2200 from weather generator)
    2    AIR TEMPERATURE  (* INDICATES FREEZING TEMPERATURES)
    3    FROZEN SOIL STATE (* INDICATES FROZEN SOIL)
    4    PRECIPITATION (INCH)
    5    RUNOFF (INCH)
    6    POTENTIAL EVAPOTRANSPIRATION (INCH)
    7    ACTUAL EVAPOTRANSPIRATION (INCH)
    8    WATER CONTENT OF THE EVAPORATIVE ZONE (INCH)
    9    HEAD  #1: AVERAGE HEAD ON TOP OF LAYER  2 (INCH)
   10    LEAK  #1: PERCOLATION/LEAKAGE THROUGH LAYER  2 (INCH)
   11    HEAD  #2: AVERAGE HEAD ON TOP OF LAYER  4 (INCH)
   12    DRAIN #2: LATERAL DRAINAGE FROM LAYER  3 (INCH)
   13    LEAK  #2: PERCOLATION/LEAKAGE THROUGH LAYER  5 (INCH)
   14    HEAD  #3: AVERAGE HEAD ON TOP OF LAYER  9 (INCH)
   15    DRAIN #3: LATERAL DRAINAGE FROM LAYER  8 (INCH)
   16    LEAK  #3: PERCOLATION/LEAKAGE THROUGH LAYER 10 (INCH)
```

COLUMNS OF MONTHLY OUTPUT DATA FILE:

```
    1    DATE OF ULTIMO (yyyymmdd, years 2101 to 2200 from weather generator)
    2    PRECIPITATION (INCH)
    3    RUNOFF (INCH)
    4    POTENTIAL EVAPOTRANSPIRATION (INCH)
    5    ACTUAL EVAPOTRANSPIRATION (INCH)
    6    HEAD  #1: AVERAGE HEAD ON TOP OF LAYER  2 (INCH)
    7    LEAK  #1: PERCOLATION/LEAKAGE THROUGH LAYER  2 (INCH)
    8    HEAD  #2: AVERAGE HEAD ON TOP OF LAYER  4 (INCH)
    9    DRAIN #2: LATERAL DRAINAGE FROM LAYER  3 (INCH)
   10    LEAK  #2: PERCOLATION/LEAKAGE THROUGH LAYER  5 (INCH)
   11    HEAD  #3: AVERAGE HEAD ON TOP OF LAYER  9 (INCH)
   12    DRAIN #3: LATERAL DRAINAGE FROM LAYER  8 (INCH)
   13    LEAK  #3: PERCOLATION/LEAKAGE THROUGH LAYER 10 (INCH)
```

COLUMNS OF YEARLY OUTPUT DATA FILE:

```
    1    DATE OF ULTIMO (yyyy1231, years 2101 to 2200 from weather generator)
    2    PRECIPITATION (INCH)
```

```
     3    RUNOFF (INCH)
     4    POTENTIAL EVAPOTRANSPIRATION (INCH)
     5    ACTUAL EVAPOTRANSPIRATION (INCH)
     6    LEAK  #1: PERCOLATION/LEAKAGE THROUGH LAYER  2 (INCH)
     7    DRAIN #2: LATERAL DRAINAGE FROM LAYER  3 (INCH)
     8    LEAK  #2: PERCOLATION/LEAKAGE THROUGH LAYER  5 (INCH)
     9    DRAIN #3: LATERAL DRAINAGE FROM LAYER  8 (INCH)
    10    LEAK  #3: PERCOLATION/LEAKAGE THROUGH LAYER 10 (INCH)
    11    CHANGE IN TOTAL WATER STORAGE (INCH)
    12    CHANGE IN SOIL WATER STORAGE (INCH)
    13    CHANGE IN INTERCEPTION WATER STORAGE (INCH)
    14    CHANGE IN SNOW WATER STORAGE (INCH)
    15    ANNUAL WATER BUDGET BALANCE (INCH)

********************************************************************************

     TITLE:  EWS CLASS II LANDFILL

********************************************************************************
```

WEATHER DATA SOURCES

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR NASHVILLE TENNESSEE

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.49	4.03	5.58	4.47	4.56	3.70
3.82	3.40	3.71	2.58	3.52	4.63

NOTE: TEMPERATURE DATA FOR NASHVILLE TENNESSEE
WAS ENTERED BY THE USER.

NOTE: SOLAR RADIATION DATA FOR NASHVILLE TENNESSEE
WAS ENTERED BY THE USER.

```
********************************************************************************
```

LAYER DATA 1

VALID FOR 5 YEARS

NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 12

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4710	VOL/VOL
FIELD CAPACITY	=	0.3420	VOL/VOL
WILTING POINT	=	0.2100	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3343	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.4200E-04	CM/SEC

EWS CLASS II LANDFILL HELP MODEL FOR CLOSURE
NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 3.00
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

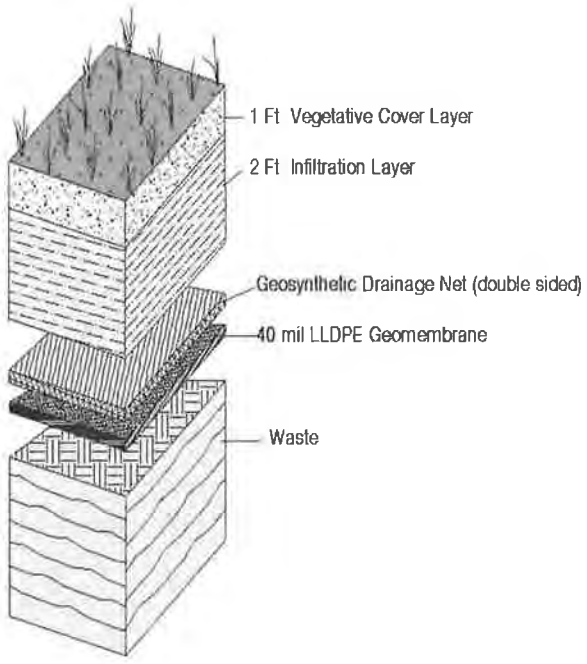
TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 13

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4300	VOL/VOL
FIELD CAPACITY	=	0.3210	VOL/VOL
WILTING POINT	=	0.2210	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4300	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.3300E-04	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	33.00	CM/SEC
SLOPE	=	33.00	PERCENT
DRAINAGE LENGTH	=	90.0	FEET



LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 36

THICKNESS	=	0.04	INCHES
EFFECTIVE SAT. HYD. CONDUCT.	=	0.4000E-12	CM/SEC
FML PINHOLE DENSITY	=	10.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 12

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4710	VOL/VOL
FIELD CAPACITY	=	0.3420	VOL/VOL
WILTING POINT	=	0.2100	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4710	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.4200E-04	CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 19

THICKNESS	=	1200.00	INCHES
POROSITY	=	0.1680	VOL/VOL
FIELD CAPACITY	=	0.0730	VOL/VOL
WILTING POINT	=	0.0190	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0730	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.1000E-02	CM/SEC

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 25

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4370	VOL/VOL
FIELD CAPACITY	=	0.3730	VOL/VOL
WILTING POINT	=	0.2660	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3730	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.3600E-05	CM/SEC

LAYER 8

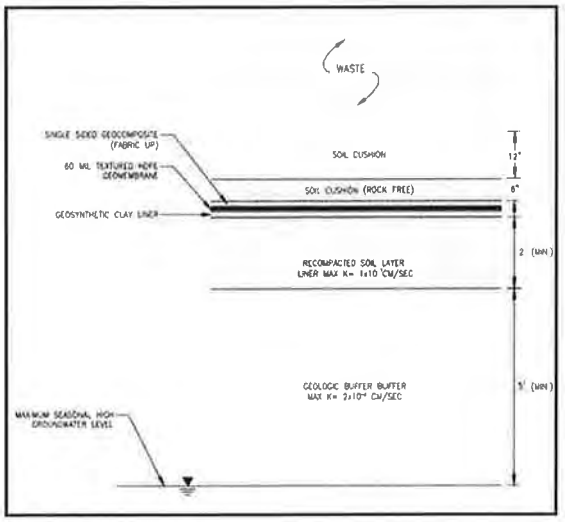
TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	33.00	CM/SEC
SLOPE	=	5.00	PERCENT
DRAINAGE LENGTH	=	200.0	FEET

LAYER 9

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
EFFECTIVE SAT. HYD. CONDUCT.	=	0.2000E-12	CM/SEC
FML PINHOLE DENSITY	=	10.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	



LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 51

THICKNESS	=	0.27	INCHES
POROSITY	=	0.5500	VOL/VOL
FIELD CAPACITY	=	0.4000	VOL/VOL
WILTING POINT	=	0.2000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.5500	VOL/VOL
EFFECTIVE SAT. HYD. CONDUCT.	=	0.1000E-08	CM/SEC

****

GENERAL DESIGN AND EVAPORATIVE ZONE DATA 1

VALID FOR 5 YEARS

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #12 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 50. FEET.

SCS RUNOFF CURVE NUMBER	=	84.80	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	4.012	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.652	INCHES
FIELD CAPACITY OF EVAPORATIVE ZONE	=	4.104	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.520	INCHES
SOIL EVAPORATION ZONE DEPTH	=	12.000	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL INTERCEPTION WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	116.688	INCHES
TOTAL INITIAL WATER	=	116.688	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

****

EVAPOTRANSPIRATION DATA 1

VALID FOR 5 YEARS

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
NASHVILLE TENNESSEE

STATION LATITUDE	=	36.12 DEGREES
MAXIMUM LEAF AREA INDEX	=	2.00
START OF GROWING SEASON (JULIAN DATE)	=	86
END OF GROWING SEASON (JULIAN DATE)	=	308
EVAPORATIVE ZONE DEPTH	=	12.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	8.00 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	68.0 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	69.0 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	75.0 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	71.0 %

****

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	2.29	4.89	3.05	2.17	3.41	4.53
	3.63	4.38	4.70	2.64	3.56	9.28
RUNOFF	0.005	0.100	0.067	0.000	0.000	0.009
	0.021	0.158	0.532	0.020	0.012	0.653
POTENTIAL EVAPOTRANSPIRATION	1.881	2.123	3.373	4.590	6.507	7.358
	7.021	6.051	4.723	3.458	2.588	1.606
ACTUAL EVAPOTRANSPIRATION	1.552	1.918	2.424	2.324	3.308	5.086
	2.504	4.667	2.210	1.771	1.495	1.182
PERCOLATION/LEAKAGE THROUGH	0.9382	2.2230	1.7474	0.0000	0.0000	0.0000
LAYER 2	0.0000	0.0000	1.3031	1.1072	0.9585	8.2325
LATERAL DRAINAGE COLLECTED	0.9382	2.2230	1.7474	0.0000	0.0000	0.0000
FROM LAYER 3	0.0000	0.0000	1.3030	1.1072	0.9585	8.2325
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.035	0.088	0.092	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.108	0.038	0.026	0.364
STD. DEVIATION OF DAILY	0.089	0.171	0.281	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.353	0.077	0.071	0.562
AVERAGE DAILY HEAD ON	0.001	0.002	0.001	0.000	0.000	0.000
TOP OF LAYER 4	0.000	0.000	0.001	0.001	0.001	0.006
STD. DEVIATION OF DAILY	0.002	0.003	0.003	0.000	0.000	0.000
HEAD ON TOP OF LAYER 4	0.000	0.000	0.003	0.002	0.002	0.005
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

****

****

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.53	176163.875	100.00
RUNOFF	1.578	5728.371	3.25
POTENTIAL EVAPOTRANSPIRATION	51.281	186148.234	
ACTUAL EVAPOTRANSPIRATION	30.442	110502.930	62.73
PERC./LEAKAGE THROUGH LAYER 2	16.509779	59930.500	34.02
AVG. HEAD ON TOP OF LAYER 2	0.0626		
DRAINAGE COLLECTED FROM LAYER 3	16.5098	59930.457	34.02
PERC./LEAKAGE THROUGH LAYER 5	0.000015	0.054	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0010		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.054	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.001	2.105	0.00
SOIL WATER AT START OF YEAR	116.688	423578.656	
SOIL WATER AT END OF YEAR	116.689	423580.781	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	

INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.033	0.00

****

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 2

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	2.55	5.21	5.62	8.23	7.53	3.26
	6.93	0.74	8.16	1.22	1.73	7.14
RUNOFF	0.000	0.475	1.117	0.660	0.700	0.030
	0.456	0.000	1.476	0.000	0.000	1.506
POTENTIAL EVAPOTRANSPIRATION	1.487	1.776	3.414	5.025	5.990	7.038
	7.693	6.810	4.964	3.480	2.214	1.335
ACTUAL EVAPOTRANSPIRATION	0.900	1.287	2.596	4.016	3.570	4.286
	5.915	1.243	1.988	1.696	1.499	0.809
PERCOLATION/LEAKAGE THROUGH	0.1233	4.4144	3.2802	2.6565	3.1778	0.6027
LAYER 2	0.0568	0.0000	3.6613	0.0000	0.0000	3.2075
LATERAL DRAINAGE COLLECTED	0.1233	4.4144	3.2802	2.6565	3.1778	0.6027
FROM LAYER 3	0.0568	0.0000	3.6613	0.0000	0.0000	3.2075
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.004	0.279	0.336	0.192	0.149	0.031
TOP OF LAYER 2	0.002	0.000	0.301	0.000	0.000	0.208
STD. DEVIATION OF DAILY	0.009	0.569	1.241	0.689	0.371	0.145
HEAD ON TOP OF LAYER 2	0.007	0.000	0.751	0.000	0.000	0.610
AVERAGE DAILY HEAD ON	0.000	0.003	0.002	0.002	0.002	0.000
TOP OF LAYER 4	0.000	0.000	0.003	0.000	0.000	0.002
STD. DEVIATION OF DAILY	0.000	0.004	0.005	0.005	0.005	0.002
HEAD ON TOP OF LAYER 4	0.000	0.000	0.006	0.000	0.000	0.006
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

****

****

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	58.32	211701.641	100.00
RUNOFF	6.420	23304.572	11.01
POTENTIAL EVAPOTRANSPIRATION	51.226	185951.688	
ACTUAL EVAPOTRANSPIRATION	29.803	108186.562	51.10
PERC./LEAKAGE THROUGH LAYER 2	21.180313	76884.539	36.32
AVG. HEAD ON TOP OF LAYER 2	0.1251		
DRAINAGE COLLECTED FROM LAYER 3	21.1803	76884.469	36.32
PERC./LEAKAGE THROUGH LAYER 5	0.000019	0.067	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0013		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.067	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.916	3325.968	1.57
SOIL WATER AT START OF YEAR	116.689	423580.781	
SOIL WATER AT END OF YEAR	117.605	426906.750	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.005	0.00

****

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 3

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	6.02	7.74	2.36	2.13	7.02	7.65
	7.64	2.17	5.87	1.17	3.40	3.54
RUNOFF	0.488	0.483	0.059	0.000	0.575	0.608
	1.616	0.088	0.462	0.000	0.004	0.000
POTENTIAL EVAPOTRANSPIRATION	1.846	2.126	3.311	5.012	6.608	7.266
	7.594	6.468	4.055	3.665	2.190	1.324

ACTUAL EVAPOTRANSPIRATION	1.555	1.863	1.669	2.778	4.238	6.643
	3.551	3.245	2.125	1.252	1.347	0.952
PERCOLATION/LEAKAGE THROUGH	5.2577	4.9999	0.5304	0.1212	1.3085	1.2758
LAYER 2	1.8041	0.3827	1.6634	0.4234	1.4569	0.9106
LATERAL DRAINAGE COLLECTED	5.2577	4.9999	0.5304	0.1212	1.3085	1.2758
FROM LAYER 3	1.8041	0.3827	1.6634	0.4234	1.4569	0.9106
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.241	0.264	0.026	0.004	0.044	0.098
TOP OF LAYER 2	0.300	0.007	0.079	0.018	0.062	0.031
STD. DEVIATION OF DAILY	0.388	0.488	0.088	0.014	0.177	0.310
HEAD ON TOP OF LAYER 2	1.299	0.020	0.284	0.051	0.100	0.066
AVERAGE DAILY HEAD ON	0.004	0.004	0.000	0.000	0.001	0.001
TOP OF LAYER 4	0.001	0.000	0.001	0.000	0.001	0.001
STD. DEVIATION OF DAILY	0.004	0.005	0.001	0.000	0.004	0.003
HEAD ON TOP OF LAYER 4	0.005	0.001	0.004	0.001	0.001	0.001
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

****

****

ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	56.71	205857.297	100.00
RUNOFF	4.382	15906.047	7.73
POTENTIAL EVAPOTRANSPIRATION	51.465	186816.391	
ACTUAL EVAPOTRANSPIRATION	31.218	113322.250	55.05
PERC./LEAKAGE THROUGH LAYER 2	20.134752	73089.148	35.50
AVG. HEAD ON TOP OF LAYER 2	0.0980		
DRAINAGE COLLECTED FROM LAYER 3	20.1347	73089.086	35.50
PERC./LEAKAGE THROUGH LAYER 5	0.000018	0.066	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0012		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.065	0.00

PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.975	3539.854	1.72
SOIL WATER AT START OF YEAR	117.605	426906.750	
SOIL WATER AT END OF YEAR	116.772	423880.906	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.809	6565.695	3.19
ANNUAL WATER BUDGET BALANCE	0.0000	-0.003	0.00

****

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 4

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	3.91	4.63	5.82	3.86	2.51	2.75
	4.36	4.00	4.39	2.91	1.44	1.68
RUNOFF	0.468	0.249	0.092	0.031	0.000	0.000
	0.056	0.066	0.302	0.007	0.000	0.000
POTENTIAL EVAPOTRANSPIRATION	1,650	2.181	2.885	4.732	7.171	7.229
	7.461	6.515	4.359	3.322	2.263	1.538
ACTUAL EVAPOTRANSPIRATION	0.937	1.605	2.324	3.600	3.726	2.793
	4.222	3.316	2.901	1.975	1.295	1.155
PERCOLATION/LEAKAGE THROUGH	4.5328	2.6546	2.7099	1.1142	0.0279	0.0000
LAYER 2	0.0000	0.0000	0.5687	1.2430	0.0000	0.2023
LATERAL DRAINAGE COLLECTED	4.5328	2.6546	2.7099	1.1142	0.0279	0.0000
FROM LAYER 3	0.0000	0.0000	0.5687	1.2430	0.0000	0.2023
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.343	0.208	0.128	0.060	0.001	0.000
TOP OF LAYER 2	0.000	0.000	0.018	0.035	0.000	0.006
STD. DEVIATION OF DAILY	0.784	0.604	0.303	0.190	0.005	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.071	0.084	0.000	0.017

AVERAGE DAILY HEAD ON	0.003	0.002	0.002	0.001	0.000	0.000
TOP OF LAYER 4	0.000	0.000	0.000	0.001	0.000	0.000
STD. DEVIATION OF DAILY	0.006	0.005	0.003	0.002	0.000	0.000
HEAD ON TOP OF LAYER 4	0.000	0.000	0.002	0.002	0.000	0.000
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

****

****

ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	42.26	153403.828	100.00
RUNOFF	1.271	4613.852	3.01
POTENTIAL EVAPOTRANSPIRATION	51.306	186242.359	
ACTUAL EVAPOTRANSPIRATION	29.849	108352.375	70.63
PERC./LEAKAGE THROUGH LAYER 2	13.053419	47383.910	30.89
AVG. HEAD ON TOP OF LAYER 2	0.0667		
DRAINAGE COLLECTED FROM LAYER 3	13.0534	47383.844	30.89
PERC./LEAKAGE THROUGH LAYER 5	0.000012	0.043	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0008		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.043	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-1.914	-6946.357	-4.53
SOIL WATER AT START OF YEAR	116.772	423880.906	
SOIL WATER AT END OF YEAR	116.667	423500.250	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	1.809	6565.695	4.28
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.065	0.00

****

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	8.75	6.05	3.21	6.05	2.72	5.02
	4.91	4.26	4.61	2.30	3.64	3.22
RUNOFF	1.518	0.481	0.047	0.473	0.076	0.080
	0.000	0.134	0.931	0.009	0.035	0.012
POTENTIAL EVAPOTRANSPIRATION	1.569	1.715	3.442	4.300	6.482	7.048
	7.760	6.326	4.521	3.390	2.467	1.643
ACTUAL EVAPOTRANSPIRATION	1.181	1.139	2.566	2.542	2.285	5.875
	4.301	4.094	1.254	1.554	1.553	1.165
PERCOLATION/LEAKAGE THROUGH	5.1052	5.2778	0.9313	3.3276	0.0000	0.3659
LAYER 2	0.0000	0.5182	1.3701	0.3826	2.1620	1.7562
LATERAL DRAINAGE COLLECTED	5.1052	5.2778	0.9313	3.3276	0.0000	0.3659
FROM LAYER 3	0.0000	0.5182	1.3701	0.3826	2.1620	1.7562
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.522	0.250	0.033	0.126	0.000	0.024
TOP OF LAYER 2	0.000	0.024	0.117	0.011	0.063	0.077
STD. DEVIATION OF DAILY	1.224	0.469	0.101	0.337	0.000	0.129
HEAD ON TOP OF LAYER 2	0.000	0.102	0.591	0.029	0.094	0.205
AVERAGE DAILY HEAD ON	0.004	0.004	0.001	0.002	0.000	0.000
TOP OF LAYER 4	0.000	0.000	0.001	0.000	0.002	0.001
STD. DEVIATION OF DAILY	0.007	0.006	0.002	0.004	0.000	0.001
HEAD ON TOP OF LAYER 4	0.000	0.001	0.004	0.001	0.003	0.003
AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

****

****

ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	54.74	198706.188	100.00
RUNOFF	3.795	13777.483	6.93
POTENTIAL EVAPOTRANSPIRATION	50.663	183906.688	

ACTUAL EVAPOTRANSPIRATION	29.508	107115.000	53.91
PERC./LEAKAGE THROUGH LAYER 2	21.197035	76945.234	38.72
AVG. HEAD ON TOP OF LAYER 2	0.1039		
DRAINAGE COLLECTED FROM LAYER 3	21.1970	76945.164	38.72
PERC./LEAKAGE THROUGH LAYER 5	0.000019	0.068	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0013		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.067	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.239	868.423	0.44
SOIL WATER AT START OF YEAR	116.667	423500.250	
SOIL WATER AT END OF YEAR	116.906	424368.656	
INTERCEPTION WATER AT START OF YEAR	0.000	0.000	
INTERCEPTION WATER AT END OF YEAR	0.000	0.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.050	0.00

****

****

FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	4.2295	0.3525
2	10.3200	0.4300
3	0.0020	0.0100
4	0.0000	0.0000
5	5.6520	0.4710
6	87.6000	0.0730
7	8.9520	0.3730
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1485	0.5500
TOTAL WATER IN LAYERS	116.906	
SNOW WATER	0.000	
INTERCEPTION WATER	0.000	
TOTAL FINAL WATER	116.906	

****

****

PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	3.95	14338.500
RUNOFF	1.493	5420.7700
PERCOLATION/LEAKAGE THROUGH LAYER 2	1.387175	5035.44678
AVERAGE HEAD ON TOP OF LAYER 2	6.916	
DRAINAGE COLLECTED FROM LAYER 3	1.38717	5035.44287
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000001	0.00386
AVERAGE HEAD ON TOP OF LAYER 4	0.029	
MAXIMUM HEAD ON TOP OF LAYER 4	0.065	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	0.0 FEET	
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00386
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00001
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	2.99	10869.1211
MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4710	
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.2100	

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

****

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	4.70	5.70	4.01	4.49	4.64	4.64
	5.49	3.11	5.55	2.05	2.75	4.97

STD. DEVIATIONS	2.70	1.26	1.59	2.63	2.44	1.92
	1.72	1.60	1.57	0.81	1.08	3.13

RUNOFF

TOTALS	0.495	0.358	0.276	0.233	0.270	0.145
	0.430	0.089	0.741	0.007	0.010	0.434
STD. DEVIATIONS	0.619	0.175	0.470	0.312	0.339	0.260
	0.689	0.062	0.472	0.008	0.015	0.662

POTENTIAL EVAPOTRANSPIRATION

TOTALS	1.687	1.984	3.285	4.732	6.552	7.188
	7.506	6.434	4.525	3.463	2.345	1.489
STD. DEVIATIONS	0.172	0.220	0.229	0.305	0.421	0.140
	0.293	0.277	0.346	0.129	0.175	0.150

ACTUAL EVAPOTRANSPIRATION

TOTALS	1.225	1.563	2.316	3.052	3.425	4.937
	4.098	3.313	2.096	1.649	1.438	1.053
STD. DEVIATIONS	0.319	0.344	0.378	0.724	0.722	1.486
	1.245	1.297	0.588	0.270	0.111	0.165

PERCOLATION/LEAKAGE THROUGH LAYER 2

TOTALS	3.1914	3.9140	1.8399	1.4439	0.9028	0.4489
	0.3722	0.1802	1.7133	0.6312	0.9155	2.8618
STD. DEVIATIONS	2.4608	1.3906	1.1598	1.4968	1.3907	0.5285
	0.8009	0.2513	1.1612	0.5254	0.9388	3.2041

LATERAL DRAINAGE COLLECTED FROM LAYER 3

TOTALS	3.1914	3.9140	1.8399	1.4439	0.9028	0.4489
	0.3722	0.1802	1.7133	0.6312	0.9155	2.8618
STD. DEVIATIONS	2.4608	1.3906	1.1597	1.4968	1.3907	0.5285
	0.8008	0.2513	1.1612	0.5254	0.9388	3.2041

PERCOLATION/LEAKAGE THROUGH LAYER 5

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LATERAL DRAINAGE COLLECTED FROM LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 10

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

AVERAGES	0.2288	0.2178	0.1232	0.0763	0.0390	0.0305
	0.0604	0.0063	0.1246	0.0204	0.0302	0.1373
STD. DEVIATIONS	0.2162	0.0770	0.1265	0.0822	0.0646	0.0400
	0.1342	0.0104	0.1057	0.0161	0.0312	0.1488

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0022	0.0030	0.0013	0.0010	0.0006	0.0003
	0.0003	0.0001	0.0012	0.0004	0.0006	0.0020
STD. DEVIATIONS	0.0017	0.0011	0.0008	0.0011	0.0010	0.0004
	0.0005	0.0002	0.0008	0.0004	0.0007	0.0022

DAILY AVERAGE HEAD ON TOP OF LAYER 9

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

****

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES		CU. FEET	PERCENT
PRECIPITATION	52.11	(6.642)	189166.6	100.00
RUNOFF	3.489	(2.1244)	12666.07	6.696
POTENTIAL EVAPOTRANSPIRATION	51.188	(0.3070)	185813.06	
ACTUAL EVAPOTRANSPIRATION	30.164	(0.6797)	109495.82	57.883
PERCOLATION/LEAKAGE THROUGH LAYER 2	18.41506	(3.56091)	66846.664	35.33747
AVERAGE HEAD ON TOP OF LAYER 2	0.091	(0.026)		
LATERAL DRAINAGE COLLECTED FROM LAYER 3	18.41504	(3.56091)	66846.602	35.33743
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00002	(0.00000)	0.059	0.00003
AVERAGE HEAD ON TOP OF LAYER 4	0.001	(0.000)		
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00002	(0.00000)	0.059	0.00003
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.044	(1.1726)	158.00	0.084

****
****

AGREEMENT

THIS AGREEMENT is made this 15th day of October, 2014 by and between Environmental Waste Solutions (hereinafter referred to as the *"Company"*), and the Town of Bruceton, Tennessee (hereinafter referred to as the *"Town"*).

WITNESSETH

WHEREAS, the Company owns and operates a class II industrial solid waste landfill located in Camden, Tennessee, known as the Camden Landfill (hereinafter referred to as the *"Landfill"*); and

WHEREAS, the Landfill generates a liquid waste commonly referred to as leachate (hereinafter referred to as *"Leachate"*); and

WHEREAS, the Company is in need of an environmentally sound method to process and dispose of Leachate generated at the Landfill; and

WHEREAS, the Town owns and operates a wastewater treatment plant located at Poplar Lane, Bruceton, Tennessee (hereinafter referred to as the *"Plant"*), which currently has the capacity, equipment and ability to receive and properly process and dispose of Leachate; and

WHEREAS, the Company and the Town wish to enter into a relationship by which the Town will process and dispose of Leachate generated at the Landfill in accordance with applicable laws, ordinances, rules and regulations.

NOW, THEREFORE, in consideration of the covenants, conditions and promises contained herein, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties do hereby agree as follows:

1. (A)The Company shall deliver to and deposit at a designated location for processing, treatment and disposal Leachate generated at the Landfill. The Company will conduct all tests and analysis of such Leachate required by applicable federal or state law, ordinance, rule or regulation, such test and/or analysis to be performed by a duly permitted and certified laboratory. The Company shall provide to the Town an assessment of the results of all such tests and/or analysis required hereunder at Exhibit "A" attached hereto and by this reference made a part hereof.

   (B) The Company covenants and agrees that the characteristics of the Leachate will not exceed the limits set forth on Exhibit "A" attached hereto and by this reference made a part hereof. Furthermore, the Company acknowledges and agrees to comply with the Industrial User Discharge Limitations, Monitoring Procedures, Maintenance of Records,

Industrial User Fees, Compliance Schedule and Sampling Point Location Description provided in Exhibit "A" and incorporated herein by reference.

(C) The Company covenants and agrees to assist the Town in acquiring the necessary permits to accept leachate and to pay any and all costs associated with the application process, including but not limited to testing and environmental studies.

2. The Town shall accept all Leachate generated at the Landfill and delivered by the Company to the Plant that is within the limits set out in Exhibit "A". The Town shall process, treat and dispose of such Leachate in accordance with all applicable laws, ordinances, rules and regulations.

3. Commencing on the Commencement Date (as defined below), the Company shall pay unto the Town the sum of five ($0.05) cents per gallon of Leachate delivered by the Company to the Plant (hereinafter referred to as the *"Tipping Fee"*). Payments will be made by the Company to the Town on a monthly basis within fifty-five (55) days of receipt of an invoice from the Town. Should the term of this agreement be extended pursuant to Paragraph 4 hereof, the Tipping fee shall be renegotiated between the parties at a mutually agreeable amount but in no event shall it be less than an amount adjusted and revised according to changes in the Consumer Price Index for Urban Wage Earners and Clerical Workers for All Items – U.S. city average, (published by the Bureau of Labor Statistics, U. S. Department of Labor, 1982084 – 100 ("C.P.I.")) over the twelve (12) month period immediately preceding the commencement of the renewal term.

4. The term of this Agreement shall begin on the date hereof (*"Commencement Date"*) and continue for a period of one (1) year, provided however, that the term of this Agreement may be extended by written agreement of the parties. However, the Town reserves the right to refuse to accept Leachate delivered to its facility at any time if the Leachate exceeds the limits set forth in Exhibit "A" or if the capacity of the lagoon facility has been or will be exceeded by the delivery or due to any other circumstance not controlled by the Town or the Company.

5. All costs of testing including labor, materials and technical required to be performed under this Agreement shall be paid by the Company. All costs of delivering the Leachate to the Plant shall be the exclusive responsibility of the Company.

6. The Company shall be liable for any damage done to the facilities or personnel of the Town, except to the extent such damage was caused by negligence or intentional misconduct of the Town, its employees, agents or contractors. The Company shall hold the Town harmless and indemnify it from any intentional or negligent act of the Company of malfeasance, or nonfeasance resulting in any loss, claim, liability or actual damage to the Town, from any private or governmental entity, including any penalties or punitive damages. This indemnification responsibility shall also include reimbursing the Town for any attorney's fees or court costs incurred or assessed in connection with any

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed as of the date above.

ENVIRONMENTAL WASTE SOLUTIONS

By: _____

Title: PRESIDENT

TOWN OF BRUCETON, TENNESSEE

By: _____
Robert N. Scott, Mayor

STATE OF Tennessee
COUNTY OF Davidson

Personally appeared before me, Polly Rembert (notary), a Notary Public in and for the aforesaid County and State, the within named Chris White (name), with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who, upon oath, acknowledged himself/herself to be the President (title) of ENVIRONMENTAL WASTE SOLUTIONS, the within Company, that he/she as President (title), being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing the name of Environmental Waste Solutions by himself as President.

Witness my hand and official seal this the 10th day of October, 2014.

Polly Rembert
Notary Public

POLLY REMBERT
STATE OF TENNESSEE NOTARY PUBLIC
DAVIDSON COUNTY, TENN.

My Commission Expires: 10/18/16

My Commission Expires OCT. 18, 2016

such claim, loss, damage or liability; however, the Company does not indemnify against, and shall not be liable for, any claim, loss, damage or liability resulting from the intentional or negligent act of the Town, or malfeasance, misfeasance or nonfeasance by the Town.

7. The Company shall maintain at all times during the term of this Agreement a liability policy in favor of the Town in an amount not less than five million dollars insuring against loss or damage resulting from the Leachate failing to meet the limits set forth on Exhibit "A" attached hereto and causing damage or requiring repairs or abatement of contamination to the lagoons or sewage treatment facility. The Company shall provide to the Town on or before the Commencement Date proof of coverage which is acceptable to the Town.

8. A letter addressed and sent by Certified United States Mail to either party at the business address specified shall be sufficient notice whenever required for any purpose in this Agreement. Also, the address designated as such address may be changed from time to time by written notice sent by Certified U. S. Mail as provided herein.

Town:	Town of Bruceton P. O. Box 136 Bruceton, Tennessee 38317 Attention: Kimberly Owens 731-586-2401
Company:	Environmental Waste Solutions 200 Omar Circle Camden, Tennessee 38320 Attention: Chris White (615) 333-3876

9. This Agreement constitutes the entire agreement and understanding between the parties hereto, and it shall not be considered modified, altered, changed or amended in any respect unless in writing and signed by the parties hereto.

10. This Agreement shall be governed by the laws of the State of Tennessee, both as to interpretation and as to performance.

11. This Agreement shall be binding upon and inure to the benefit of the successors and permitted assigns of the respective parties.

TOWN OF HUNTINGDON
Department of Public Utilities
P.O. Box 668
HUNTINGDON, TENNESSEE 38344
(731) 986-2900 Fax (731) 986-2919

STATEMENT

1998

RECEIVED
MAR 16 2015
BY

DATE 3/13/15 - date 2/28/15 in OR

TERMS

EWS
ATTENTION: CHRIS WHITE
4521 TROUSEDALE DR
NASHVILLE, TN 37204

3/17/15 DP

PAY LAST BALANCE IN THIS COLUMN

PLEASE DETACH AND RETURN WITH YOUR REMITTANCE

DATE AND DESCRIPTION	CHARGES	CREDITS	
Jan. 2015		PREVIOUS BALANCE →	1,358.50
Feb. 32,392 D	2¢		647.84
			2,006.34

TOWN OF HUNTINGDON

Thank You