PERMIT DOCUMENTS
FOR
TRAIL RIDGE LANDFILL
SECOND RAI RESPONSE

PREPARED FOR:

TRAIL RIDGE LANDFILL, INC.

PREPARED BY:

England-Thims & Miller, Inc.
Consulting & Design Engineers
14775 St. Augustine Road
Jacksonville, Florida 32258
Certificate of Authorization Number: 2584
Phone Number (904) 642-8990

March 17, 2003

PROJECT NUMBER: E 02-025

England-Thims & Miller, Inc.
ENGINEERS • PLANNERS • SURVEYORS • GIS • LANDSCAPE ARCHITECTS

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March 17, 2003

Ms. Mary C. Nogas, P.E.
Waste Management Section
Department of Environmental Protection
7825 Baymeadows Way, Suite 200B
Jacksonville, Florida 32256

RECEIVED
MAR 17 2003
STATE OF FLORIDA
DEPT. OF ENV. PROTECTION
NORTHEAST DISTRICT-JAX

Reference: Trail Ridge Landfill - Second Permit Renewal
FDEP Permit No. 0013493-001 and 0013493-002
FDEP File Numbers 13493-010 and 13493-011
ET&M No. E02-25-3

Dear Ms. Nogas:

We have received your letter dated January 15, 2003 regarding the referenced project. On behalf of Trail Ridge Landfill, Inc., please find the following response to your request for additional information. Please note that only the items for which the Department requested a response are included.

Attachment 1, Review Memorandum, dated January 15, 2003, prepared by Julia Boesch.

4. *Please note the department considers your response to be non-responsive; please respond to the original question.*

At least one trained spotter or one trained operator will be at the working face at all times when the landfill receives waste. The average number of trucks arriving at the site by hour was determined based upon a typical month (October 2002) with an average waste receipt of approximately 3,000 tons per day, which is provided in **Attachment A**. Based upon the number of trucks and the current waste receipt, a matrix was developed to determine the number of spotters, laborers and equipment operators required which is also provided in **Attachment A**. The facility will schedule personnel using the average daily tonnage received during the previous month

When a waste load is discharged, the spotter(s) observes the load, looks for unacceptable materials and directs the laborer(s) to remove the unacceptable materials. The equipment operator(s) also looks for unacceptable materials and directs the laborer(s) to remove unacceptable materials.

7 *Please note that with the exception of the adequacy of the equipment, the department considers your response to be non-responsive, please respond to the original question. Please note the department is interested in the minimum personnel that will be provided to handle the proposed waste amounts, including both spotters trained in accordance with FAC Chapter 62-701 as well as those interim spotters who have not received the official training.*

Please see the response to Item 4 above.

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9. *Please describe the existing concrete storage area where batteries and other prohibited waste will be stored. Is the storage area a building? If not how will you prevent rainwater from coming into contact with the materials? Please propose the minimum frequency at which batteries and white goods will be removed from the site, and indicate by whom they will be removed and to where they will be removed as previously requested. Please indicate where the roll off containers designated for only white good temporary storage will be maintained and if the containers will be covered to prevent rainwater from infiltrating in and potentially causing leachate to seep out the containers? Will the roll offs be stored on an impervious surface? What will be their capacity? Finally, please show and label the temporary storage areas on the site plan.*

The existing concrete storage area is an open concrete containment tank, which is approximately 28.5 feet long, 14 feet wide and 12 inches deep. The storage area is located on the paved area north of the waste tire storage area, which is shown on the revised Site Plan (Drawing No. 4). Within the storage area, the materials are place in a single layer on pallets, which lifts them off the containment floor. Although rainwater is allowed to fall into the containment area, the rainwater is not discharged but rather allowed to evaporate. The facility does not use this containment area for storage of hazardous waste discovered and removed from the waste stream, except household hazardous waste.

Batteries and white goods are removed from the site on an as needed basis, based upon the quantity received, and will be removed on a quarterly basis at a minimum Currently, batteries are removed by the City of Jacksonville Hazardous Waste Facility and taken to the City's Hazardous Waste Facility for disposal or recycling. Currently, white goods are removed by Recycling Center (700 Houston Avenue, W, Live Oak, Florida 32060) and taken to their facility for disposal or recycling. The roll-off containers for white goods are located to the east of the concrete storage area on a paved area. The roll-off containers are 30 cubic yard containers (approx. 7.5 feet wide x 23 feet long x 4.5 feet high). The location of the containers is shown on the revised Site Plan (Drawing No. 4). The City of Jacksonville has a collection program for white good and therefore, the facility does not receive many white good and does not accept bulk deliveries of white goods. The white good received at the facility are materials removed from the waste stream. Therefore, leakage from the white goods is discharged into the waste stream during the collection process.

14 *The Department encourages the reuse of impacted soils with appropriate environmental safeguards and provisions. In order to determine the adequacy of the safeguards please provide the following at a minimum: Please define the sampling protocols, including frequency and parameters, utilized to determine if soils are impacted and if they are hazardous Please provide the methodology utilized to determine if the soils are appropriate for usage as cover, based upon nuisance issues such as odor, moisture content, etc. Please provide a scaled drawing showing the location for storage of impacted soils prior to usage and a detailed description of signage and usage. Please list the procedures that will be followed at the facility to ensure the contaminated soil is only used on internal slopes of the lined area What safeguards will you have in place to prevent it from being inadvertently placed on an external slope? What documentation will you maintain concerning this materials application and temporary storage prior to application*

Prior to receipt of contaminated soils at the landfill, the facility reviews pertinent analytical test results (including TCLP for metals, volatiles, semi-volatiles, pesticides, herbicides and total PCBs) from the

source and these results must be from a Florida certified laboratory. If the results indicate that the material is not hazardous waste, then the material is approved for disposal at the site. Nevertheless, a five point composite sample is required for every 500 tons of soil. During disposal, random load visual inspections are conducted.

As a general rule, a company appointed special waste approvals person will evaluate each waste stream based on: 1) the type of material to be disposed (off specification product(s), contaminated media, contaminated soil, etc.), 2) the type of contamination expected to be present (inorganic, organic or both), and 3) the process generating the waste. For waste streams of known contamination, the approvals personnel can tailor the analytical requirements in order to focus on known contaminants. For example, if a waste stream is generated from the spill of used motor oil from a vehicle accident, then the analylites of concern could be isolated to the RCRA metals and benzene. However, the analytical requirements for waste streams where contamination was from an unknown source or from a broad spectrum of contaminants, will have to based on a case-by-case basis using generator knowledge, process generating the waste and the like. In these cases, the approvals person may choose to ensure that all of the characteristic analyses per 40 CFR 261.21, 261.22, 261.23, 261.24, and Total PCBs are met.

Depending upon the contaminant of concern and the Department's approval on a case-by-case basis, the contaminated soil may be used for initial cover on interior side slopes and not on exterior side slopes. If the constituents of concern exceed Rule 62-777, FAC, Soil Cleanup Target Levels for Direct Exposure Based Industrial/Commercial Levels, the soil will not be used for initial cover Further, if the soil has any visible organics or other material that may attract birds or vermin, has an odor or is saturated, it will not be utilized as initial cover. The facility will require that the generator/transporter certify that the material is non-hazardous.

Contaminated soils that are stored on the site for future use as initial cover will be stockpiled on top of the landfill (within the lined landfill footprint and on top of existing in-place waste) and will be surrounded by a silt fence. The stockpile will be located at a minimum of 20 feet from the adjacent side slopes. The current plan is to store the material on Phases VA and VB as shown on the drawing in **Attachment B**. However, when filling operations proceed into these phases (Fill Phase 8 on Drawing No. 12), the storage area will be moved to Phases IVC and VC as shown on the drawing in **Attachment B**. The storage area will be surrounded by a silt fence and a sign will be placed at each entrance. The sign will state that the material is initial cover storage area and that the material shall only be used on interior slopes. Further, the facility will keep records on the amount of material received, the amount used for cover, and the location of the placement. These records will be kept on site for review by the Department.

19. *Please note that your response does not address the concern as to whether or not the liner system is experiencing a problem that warrants resolutions, i e , flooding of the geonet, excess leachate head on the liner. Please propose an action leachate leakage rate which if triggered will warrant an evaluation of the system's effectiveness and remedial actions if necessary. Please base this action rate on that rate expected to leak through the primary liner to the leak detection layer as determined in your original liner design calculations for the installed system. Please provide all supporting calculations, documentations and references to documents previously provided, to justify the acceptable rate versus the unacceptable rate which warrants*

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action. Please note that your calculations shall be based on the leachate head determined in your design calculations.

Please see the requested analysis in **Attachment C**. Based upon the analysis, the maximum allowable leakage rate into the secondary liner is 6,417 gallons per day per cell. The facility is equipped with pumps (capable of pumping 35 gallons per minute) and flow meters at each pump station (for each cell) to monitor both the flow from the primary as well as the secondary The flow is recorded on a daily basis, Monday thru Friday. The facility will use the leakage rate as an action rate to determine when the leakage through the primary liner is too great and needs to be investigated The Department will be notified if the maximum leakage rate is exceeded for more than five consecutive days and the records will be available for Department review, upon request.

51. *Please address the Rule change that requires interface friction angle testing of the actual materials used for closure. Additionally, please clarify what minimum interface friction angles you are proposing to achieve in the field, and the assumptions used.*

Please see the design stability analysis in **Attachment D**. It is hereby agreed that testing will be conducted on the materials to be used for each closure to ensure that the materials meet the minimum design standards (a safety factor of 1.5). The proposed testing for side slope closures is presented in the revised Quality Assurance/Quality Control Plan, which is contained in **Attachment E**.

52. *Please note that the following comments (a) through (e) concern your water balance analysis; the remainder concerns the alternate closure design: (a) Please demonstrate that the top 24-inch layer will act as a lateral drainage layer as you indicate it will in the analysis. Please provide all calculations and documentations to support your demonstration. Also, please indicate and show and label on the drawing sheets, site plan and details, to where fluid that collects in this drainage layer will be conveyed to and how will it be managed from there Please provide supporting design calculations. Please note the department will request the top 24 inches be tested for hydraulic conductivity after installation to ensure the proposed minimum hydraulic conductivity is being satisfied since you are proposing the material as your lateral drainage layer in the final cover system Please revise your Quality Assurance/Quality Control Plan to include this testing. (b) Also since you are indicating that the top layer will act as a lateral drainage layer and not a vertical drainage layer, erosion is of concern and whether or not the material will support root growth? Please address these concerns. (c) Please run the Help model program utilizing precipitation data that represents a wet period in time as opposed to a dry period in time (d) Please justify an evaporative zone depth of 24 inches. (e) Please rerun the HELP model in accordance with the changes requested in comments 51 and 52. (f) Please confirm that the alternate closure design meets the equivalency requirements in the Rule.*

The side slope closure includes underdrains in all the terraces (as shown in the Typical Terrace Section on Drawing No. 21) and these underdrains discharge to the downcomer pipes at each terrace (as shown on the Intermediate Terrace Piping – Plan View on Drawing No. 21). These underdrains will provide lateral drainage from the vegetative cover layer to the downcomers. Nevertheless, in an effort to provide a more conservative water balance, the vegetative cover has been changed to a vertical percolation in the HELP Model (neglecting the underdrain effects). A revised HELP Model is provided in **Attachment F** including the revised vegetative cover layer (vertical percolation rather

than lateral drainage) and revised evaporative zone depth of 12 inches to match the anticipated maximum root depth.

Regarding the precipitation data used in the HELP model, the average monthly rainfall data was synthetically generated by using the Jacksonville, Florida data and generating ten years of data. Please note that in the model, the annual rainfall ranges from a low of 44.97 inches (Year 4) to a high of 62.56 (Year 5), with an average of 53.08 inches. According to the U.S. Department of Commerce, N.O.A.A., the average annual rainfall for Jacksonville, Florida from 1962 thru 1990 was 51.77 inches (Please see the attached table in **Attachment F**.).

In the First Permit Renewal (Attachment K to the RAI Response dated February 27, 1997), a demonstration was made to show that the Alternate Design of the side slope closure with 12" clay with a permeability of $6.67x10^{-8}$ cm/sec would provided protection within 10% of the protection provided by the Minimum Design, in accordance with the Municipal Solid Waste Landfill Alternate Design Closure Guidance, dated February 10, 1995 by the Florida Department of Environmental Protection. Further, an equivalency analysis was provided (Attachment L to the RAI Response dated February 27, 1997) to show that the proposed 12-inch thick $6.67x10^{-8}$ cm/sec barrier soil layer would minimize infiltration to a substantially equivalent degree as an 18-inch barrier soil layer with a permeability of $1x10^{-7}$ cm/sec. Please see the attached copies of these documents in **Attachment G**.

53. *Please provide a more detailed description of the temporary and permanent gas system, including sequencing of construction and submittals to the department Please include necessary repairs to the cover system due to installation or repair of the gas system in the CQAP*

In accordance with the Title V Permit for the facility, the facility must install a gas management system for all waste that has been in place for five years and for all waste that has been in place for two years, if the waste is at final grade. In accordance with 40 CFR Subpart WWW, the facility has submitted a NSPS design plan to the City of Jacksonville, Regulatory and Environmental Services Department (RESD). The plan depicts the gas management system design when the facility reaches final grades. When the facility is at intermediate grades and the in-place waste has met the year waste in-place rule, the facility will install temporary extraction wells and header system(s); these wells will form part of the interim gas management system until the facility installs the permanent wells or until the facility reaches final grades. During incremental closures in accordance with the Closure Phasing Plans, portions of the permanent gas management system will be installed. Therefore, the installation of the gas management system will not require repairs to the final cover system. Please note that the header pipes for the gas management system are installed above the barrier soil layer.

To date there have been two phases of construction associated with the gas management system and both phases were certified to the City of Jacksonville, Regulatory and Environmental Services Department (RESD) (the permitting agency for the Title V permit) and the Waste Management Section of the Department. The dates of these submittals were February 26, 1999 and July 31, 2002. Future expansion of the system will be certified in the same manner to both agencies.

The permanent Gas Collection System is shown in Drawing No. 9A and as stated above, will be installed in phases during the incremental closures. The temporary gas management systems are designed at the time of installation and must be based upon the in-place waste at the time of

installation. Since the temporary gas systems are installed to meet 40 CFR Subpart WWW requirements, we request that the Department defer to the RESD regarding this temporary system. The facility has submitted an application for renewal of its Title V permit.

57. *Please provide an inspection check list that will list the minimum items and conditions you will observe for during the routine inspections, i e., erosion, no spots, slope of the disposal area, ponding of leachate on disposal area, etc Also, please not only indicate that they will be conducted on a regular basis, but propose a minimum frequency at which the inspections will be conducted and justify the adequacy of that frequency. Please include in your response to inspect the facility after any major storm events in addition the routine inspections, for erosion and to also inspect the leachate collection storage tanks and containment area for integrity and leachate leaks. Please include the procedures that will be followed in maintaining and repairing damage to the leachate collection and gas collection systems at a minimum, and include the quality assurance plan you will implement in repairing damages to the system Additionally, please describe how repairs to the liner system will be conducted and documented.*

The gas management system is monitored on a monthly basis by an outside consultant who specializes in gas management systems. This inspection includes inspection of each well and calibration of the system as needed. These inspections are documented and the documentation is available for Department review upon request. The facility will be inspected on a quarterly basis using an inspection checklist such as the sample checklist contained in **Attachment H.** In addition, the facility will be inspected within 48 hours of a major storm event (a rain event of 2.5 inches or greater in a 24-hour period).

If during inspections, an item is found to need repair and or replacement, the work will be initiated within14 days, if possible. If the work cannot be initiated within 14 days, the Department will be notified and an action plan will be presented to the Department.

Regarding repair to the liner system, the entire liner system has been covered with waste and therefore, we do not anticipate the need for liner repairs. Nevertheless, the facility may have the need to repair the final cover on the side slopes. These repairs will be conducted in accordance with the Quality Assurance/Quality Control Plan for Long Term Care as provided in **Attachment I**.

59. *Please provide a more detailed description of the on-site surveying during operations that is conducted to ensure that design elevations and grades are met.*

Prior to waste placement, the landfill has surveyors stake the slopes and terraces at the high and low points in the terrace, at a minimum. Typically, based upon the survey staking, plastic pipes are installed to mark the grade breaks and extended up, if possible, above grade to the design grade for fill After waste has been placed and prior to final grading for closure, the landfill restakes the grades and final grades the slopes for final cover placement. Please keep in mind that this facility has plenty of capacity and it is not in the operator's interest to over fill a slope and have to remove waste and rebuild the slope.

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60. Please be more specific in your response.

Waste placement on the western portion of the landfill will be conducted starting at the northwest corner of a phase and proceed in a southeastern direction. Waste placement on the eastern portion of the landfill will be conducted starting at the northeast corner of a phase and proceed in a southwestern direction. Nevertheless, waste placement may have to vary somewhat on a daily basis based upon weather conditions and access. Typically, the facility has an area within the lined area for the placement of waste during wet weather This area is utilized when access to the regular working face is limited due to wet weather. The location of the wet weather area is typically based on the need for accessibility during wet weather.

61. The department understands that you are proposing to construct only access roads that are within the lined disposal area be constructed of slag Please confirm or deny. If this is a misunderstanding and you intend to utilize the slag outside the liner limits, please be reminded that the only slag to date, which the department district has approved for this use, would be that slag described in the attached letter Additionally, please note that the described slag shall only be utilized in accordance with said attached letter.

Slag from sources other than Ameristeel will be utilized for access road construction only within the liner limits. Slag from Ameristeel will be used for access road within the liner limits as well as for access roads and for stabilization of other areas such as parking lots, material storage areas, etc.

63. Please note that the department intends to include a condition indicating that facility shall be policed of litter by the end of each work day. What will be the source of the water you will use to control dust and how will you apply it? If you will use a water truck please indicate if water will be the only material used in the truck.

Water from the on-site wet detention pond is pumped into a water truck for use in dust control. The water truck sprays water from the back of the vehicle via spreader pipe onto the ground. The water truck is owned by the landfill operator and not used for any other material.

65. How will waste material excavated to control a fire be managed? Please address the handling of hot loads and specify where and how hot loads will be isolated

The waste will be stockpiled near the excavation and will be removed and placed into the active face, if it cannot be placed back into the excavation within 24 hours of removal.

Hot loads are handled by discharging the load in an area isolated from the current active face (but within the active landfill footprint), spreading the load and covering it with soil to extinguish the fire. The load will only be discharge onto an area that has a minimum of 12 inches of cover for separation purposes.

66. Please be more specific concerning the qualifications of the various CQA personnel

The CQA personnel shall be experienced in quality assurance procedures and the preparation of quality assurance documentation including quality assurance forms, reports, certification and manuals. The soils Quality Assurance Engineer shall hold a B.S., M.S., or Ph.D degree in civil engineering or

related fields, be a licensed Professional Engineer and have worked on at least two other closure projects. The soils Quality Control Monitor shall be specifically experience in the soil testing standards and procedures associated with the project and shall be certified by the Quality Assurance Engineer in the duties of the project. Please see the revised Quality Assurance/Quality Control Plan in **Attachment E**.

67. *Please propose a minimum frequency at which tires will be removed from the site and not only indicate on a regular basis.*

In accordance with Rule 62-711.530 (3), FAC, at least 75 percent of the whole tires, used tires and processed tires that are delivered to or are contained on the site at the beginning of the calendar year will be processed and removed for disposal or recycling from the site during a calendar year, or disposed of on the site.

68 *This appears to be non-responsive, please address the original question.*

The side slope closure includes underdrains in all the terraces (as shown in the Typical Terrace Section on Drawing No. 21) and these underdrains discharge to the downcomer pipes at each terrace (as shown on the Intermediate Terrace Piping – Plan View on Drawing No. 21). These underdrains will provide drainage from the vegetative cover layer to the downcomers. The 6" corrugated underdrain pipe at a 0.5% slope (allowing for settlement) can handle approximately 0.31 cubic feet per second. The largest terrace is 1.25 acres. Assuming a 25-year/24-hour storm event of 9.5 inches or 0.4 inches per hour, an infiltration rate of 50% (very conservative for a 3:1 slope) and instantaneous flow through the vegetative layer, there would be 0.25 cubic feet per second of flow from the entire terrace. Therefore, the underdrain is sufficient to handle the flow. Further, as shown in the Typical Terrace Section on Drawing No. 21, the underdrain is surrounded by sand that also serves as a drainage medium. As stated previously, the underdrains are provided to ensure the landfill terrace and top slopes do not become saturated for slope stability.

72. *Please breakdown the cost to remove the tires from the site. Please provide letters from third parties quoting the cost that will charge to remove whole tires from the site and to send them to a facility authorized to accept them as well as the costs a facility/entity will charge to process and manage them. The costs shall not reflect any reduced costs. Also, please note that unless the department has accepted in writing the certification of closure construction completion in writing, than the cost estimates to close that area are still required Please revise your estimates accordingly.*

Please see the letter from Wheelabrator Ridge Energy Inc. regarding disposal of waste tires in Attachment J. We were not able to get an estimate for transportation and disposal from any other facilities in Duval County. Since our cost estimate exceeds the estimate from Wheelabrator Ridge Energy Inc., there are no proposed changes to the estimates.

Based upon my conversation with Mary Nogas on February 18, 2003, it is my understanding that the Department has approved the first three incremental closures and will be reviewing the fourth incremental closure (the most recent). Therefore, we hereby respectfully request that the Department reconsider its request that the facility modify the closure cost estimates.

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I sincerely hope this response will provide the Department all the necessary information I would respectfully request that any questions regarding this application be directed to me.

Sincerely,

ENGLAND, THIMS & MILLER, INC.

Juanitta Bader Clem

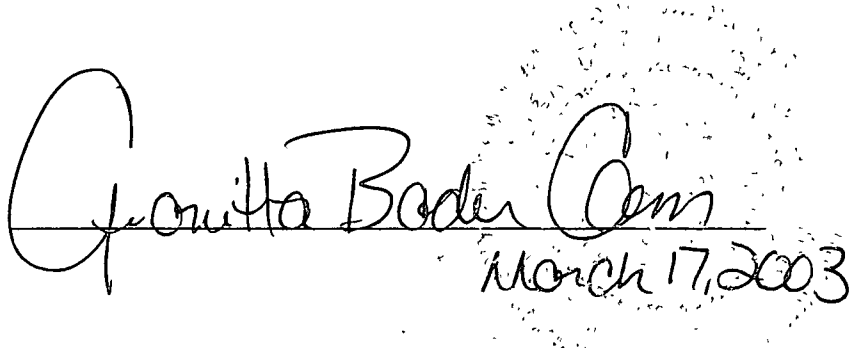
Juanitta Bader Clem, P.E.
Vice President

#43245

Attachments

cc: Greg Mathes
Achaya Kelpenda
Chris Pearson

LIST OF ATTACHMENTS



March 17, 2003

This certification does not include Attachment D, which is certified separately by MACTEC Engineering and Consulting, Inc.

ATTACHMENT A

Evaluation of Personnel Requirements

TRAIL RIDGE LANDFILL
EVALUATION OF PERSONNEL REQUIRMENTS

Time	Trucks/Hr [a] Current	Tons/Hr [b]	Tonnage Current	Proposed Tonnage	Proposed Tonnage	Proposed Tonnage	Proposed Tonnage	Spotter [c] Trucks/Hr	Laborer [d] Trucks/Hr	Equip. Op.[e] Trucks/Hr
				3,500/Day	4,000/Day	4,500/Day	5,000/Day			
6:00 - 7:00 AM	40.8	344.6	344 6	47.8	54 6	61.4	68 2	40	24	24
7:00 - 10:00 AM	25.3	213.7	641.0	29.6	33 8	38.1	42 3	40	24	24
10:00 AM - 3:00 PM	37.3	315.0	1575.1	43.7	49.9	56.1	62.4	40	24	24
3:00 - 5:00 PM	19 1	161.3	322.6	22.4	25.6	28.7	31.9	40	24	24
5:00 - 7:00 PM	6.3	53.2	106.4	7.4	8.4	9.5	10.5	40	24	24
			2989.7							

	3,000/Day			3,500/Day			4,000/Day		
Time	Spotters Required	Laborers Required	Equip. Op. Required	Spotters Required	Laborers Required	Equip Op. Required	Spotters Required	Laborers Required	Equip. Op. Required
6:00 - 7:00 AM	1.0	1.7	1.7	1.2	2 0	2.0	1.4	2.3	2.3
7:00 - 10:00 AM	0 6	1.1	1.1	0.7	1.2	1.2	0.8	1.4	1.4
10:00 AM - 3:00 PM	0.9	1.6	1.6	1.1	1 8	1 8	1.2	2.1	2.1
3:00 - 5:00 PM	0.5	0.8	0.8	0.6	0 9	0.9	0.6	1.1	1.1
5:00 - 7:00 PM	0 2	0.3	0 3	0.2	0.3	0.3	0.2	0.4	0 4

	4,500/Day			5,000/Day		
Time	Spotters Required	Laborers Required	Equip. Op. Required	Spotters Required	Laborers Required	Equip. Op. Required
6:00 - 7:00 AM	1 5	2.6	2.6	1.7	2.8	2.8
7:00 - 10:00 AM	1 0	1.6	1.6	1 1	1.8	1.8
10:00 AM - 3:00 PM	1.4	2.3	2.3	1.6	2 6	2 6
3:00 - 5:00 PM	0.7	1.2	1.2	0.8	1.3	1 3
5:00 - 7:00 PM	0.2	0.4	0.4	0.3	0 4	0 4

a Based upon facility records
b Based upon an average of 8 45 tons per truck
c Based upon 1 5 minutes per load
d Based upon 2 5 minutes per load
e Based upon 2 5 minutes per load

Note. Spotter means a trained spotter per Rule 62-701.320(15), FAC

DATE	TRUCK COUNT														TONS
	5-6 AM	6-7 AM	7-8 AM	8-9 AM	9-10 AM	10-11 AM	11-12 AM	12-1 PM	1-2 PM	2-3 PM	3-4 PM	4-5 PM	5-6 PM	6-7 PM	TOTAL	
Oct 1, 2002		50	20	22	22	30	44	38	39	33	24	16	10	2	350	3,094 75
Oct 2, 2002		40	21	31	23	34	34	30	46	44	21	16	9	5	354	2,844 20
Oct 3, 2002		46	28	22	16	50	37	40	35	40	30	17	9	3	373	2,926 03
Oct 4, 2002		45	26	25	29	34	46	39	56	25	15	17	9	0	366	2,839 72
Oct 5, 2002	5	20	17	19	19	19	18	9							126	739 57
Oct 6, 2002	Sunday															
Oct 7, 2002		44	27	27	24	34	44	39	44	30	29	22	8	10	382	3,401.90
Oct 8, 2002		57	18	25	20	29	35	37	46	29	28	12	19	5	360	2,941 01
Oct 9, 2002		41	28	24	20	23	42	45	42	27	26	17	6	3	344	2,817 35
Oct 10, 2002		33	32	20	38	27	34	30	44	29	31	20	13	2	353	3,025 25
Oct 11, 2002		32	32	26	22	37	33	44	36	21	27	17	6	3	336	2,811 26
Oct 12, 2002	1	13	20	22	16	25	16	12							125	739 72
Oct. 13, 2002	Sunday															
Oct 14, 2002		42	27	26	29	42	36	43	53	51	15	15	11	2	392	3,495 66
Oct 15, 2002		43	27	21	24	32	45	39	36	35	18	11	8	2	341	3,109 94
Oct 16, 2002		41	22	19	25	37	33	35	52	26	15	16	12	0	333	2,937 60
Oct 17, 2002		45	19	23	24	39	43	36	44	28	20	9	7	6	343	3,002 35
Oct 18, 2002		0	12	20	25	41	42	48	29	29	13	4	3	15	281	2,784 62
Oct 19, 2002	1	18	15	14	23	16	17	12							116	667 81
Oct 20, 2002	Sunday															
Oct 21, 2002		39	26	21	43	34	38	34	39	35	38	25	4	5	381	3,311 37
Oct 22, 2002		43	17	23	40	29	37	33	46	28	32	11	13	1	353	3,106.03
Oct 23, 2002		39	24	25	36	34	31	43	42	24	30	10	4	7	349	2,780 68
Oct 24, 2002		39	22	16	28	40	34	38	43	36	28	18	8	1	351	2,880 65
Oct 25, 2002		44	27	22	32	32	43	47	43	28	21	11	11	0	361	2,890 70
Oct 26, 2002	2	21	13	17	19	15	19	16	1						123	666 26
Oct 27, 2002	Sunday															
Oct 28, 2002		47	30	31	27	31	33	49	38	33	32	12	12	3	378	3,309 80
Oct. 29, 2002		48	21	39	32	36	36	40	33	51	23	10	9	3	381	3,067 06
Oct. 30, 2002		42	23	21	21	39	30	34	51	32	19	6	12	0	330	2,579 93
Oct. 31, 2002		39	20	31	38	32	36	52	36	32	25	7	10	1	359	2,881 55
Total		1,011	614	632	715	871	936	962	974	746	560	319	213	79	8,632	71,652 73
Average		37.4	22 7	23 4	26.5	32 3	34 7	35 6	36 1	32.4	24 3	13 9	9 3	3.4	25.5	2,653 80
Total (less Saturdays)		939	549	560	638	796	866	913	973	746	560	319	213	79	8,151	68,839 37
Average (less Saturdays)		40.8	23 9	24 3	27 7	34 6	37 7	39 7	42 3	32.4	24.3	13 9	9 3	3 4	27 3	2,993 02

Average Tonnage/Truck 8.45

ATTACHMENT B

Proposed Stockpile Plan

Say:

Q	=	3.17×10^{-6} m^3/sec (the flow per hole)
B	=	1 meter (conservatively, normally 1-5 meters)
θ	=	2.26×10^{-3} m^2/sec
Sin β	=	0.02
T	=	200 mil

Therefore:

$$\frac{D}{T} = \frac{3.17 \times 10^{-6} / 1}{(2.26 \times 10^{-3})\ (0.02)}$$

$$\frac{D}{T} \Rightarrow 0.07$$

$$D = 14 \text{ mil}$$

Since the geonet has a thickness of 200 mil, the geonet can handle the flow.

The smallest cell is 17.7 acres, so the flow per cell is:

$$Q_{Total} = 72.51 \frac{\text{gallons}}{\text{day} * \text{ac}} * 17.7 \text{ ac}$$

$$\Rightarrow 1{,}283.4 \frac{\text{gallons}}{\text{day}} \text{ per cell}$$

Assume the flow is at a failure rate at 5 times this rate.

$$Q_{Max} = 6{,}417 \frac{\text{gallons}}{\text{day}} \text{ per cell}$$

ATTACHMENT D

Sliding Stability Analysis

MACTEC

March 17, 2003

Ms. Juanitta Clem, P.E.
Vice President
England, Thims & Miller
14775 St. Augustine Road
Jacksonville, Florida 32258

Subject: **Report of Sliding Slope Stability Analysis**
Trail Ridge Landfill
City of Jacksonville
Jacksonville, Florida
MACTEC Project No. 6734-03-8666

Dear Ms. Clem:

MACTEC Engineering and Consulting of Georgia, Inc. (MACTEC), formerly known as Law Engineering and Environmental Services, Inc. has performed a sliding stability analysis for the subject project pursuant to your request made on January 31, 2003. In addition to the analysis, we have developed proposed language for use in the QA/QC document in support of the permit renewal for the subject project. Authorization for our services was provided by you on February 7, 2003.

MACTEC completed a Report of Geotechnical Engineering Evaluation for the subject project dated October 1, 1996. Included in the report was a Landfill Final Cover Sliding Stability analysis performed for the soil cover layers on the cell slopes. The stability analysis indicated factors of safety ranging from 1.5 (internal sliding of topsoil layer) to 4.0 (topsoil layer sliding on compacted clay). The safety factors were anticipated to improve once a vegetative cover was established on the slopes.

Recent permitting requirements have identified the need to establish minimum required cover material strength properties. Additionally, an assessment of the potential for sliding to occur along the weakest surface is required.

To address these concerns, MACTEC developed the following approach:

- Establish an industry standard minimum Factor of Safety (FS) to be used for calculating minimum strength properties for cover materials.
- Calculate minimum cover material strength properties based on the aforementioned FS for various cases.
- Perform a sensitivity analysis (where appropriate) on the strength property values.
- Draft associated language for use in the QA/QC plan in support of permit renewal.

To establish an industry standard Factor of Safety, we consulted several sources, both internal and external. Our research indicated that a value of 1.5 is appropriate for use in sliding stability analyses of 3H:1V side slopes for landfill facilities.

After establishing the minimum Factor of Safety, we calculated the corresponding material properties for the respective sliding scenarios in the side slope cover layers. These are summarized in Table 1 below.

Table 1 – Side Slope Cover Material Properties Required for a Factor of Safety equal to 1.5

Case	Angle of Internal Friction (ø)	Cohesion (c in psf)
Sand over Sand	27	0
Sand over Clay	0	190
Clay over Clay	0	122

To explore the case of Sand over Clayey Sand or Sandy Clay, Factors of Safety were calculated for various values of ø and c. Table 2 presents the results below.

Table 2 – Sand over Clayey Sand or Sandy Clay Case for various ø and c values

Angle of Internal Friction (ø)	Cohesion (c in psf)	Factor of Safety
27	0	1.5
28	0	1.6
30	0	1.7
0	180	1.4
0	185	1.5
0	190	1.5
25	150	2.6
28	175	3.0
30	200	3.3
25	200	3.0
28	225	3.4
30	250	3.7

As shown in the table above, typical ø values in the range of 25 to 30 degrees combined with c values in the range of 150 to 250 achieve factors of safety exceeding twice the minimum requirement.

The calculations for the analysis used to examine the effect of varying soil strength parameters on the Factor of Safety are attached. In addition to the analysis, we have developed proposed language for the QA/QC document which has been submitted under separate cover. Because of the multiple combination of strength parameters that could combine for the appropriate factor-of-safety, we recommend that the factor-of-safety be used as a compliance rather than a specific strength.

We have enjoyed assisting you and look forward to serving as your geotechnical and construction materials testing consultant on the remainder of this project and on future projects. If you have any questions concerning this report, please contact us.

Sincerely,

MACTEC ENGINEERING AND CONSULTING OF GEORGIA, INC.
f/k/a Law Engineering and Environmental Services, Inc.

Jeffrey S. Samuels, P.E.
Staff Geotechnical Engineer

James A. Horton, P.E.
Vice President
Registered, Florida 23315

3/17/03

:ag

Distribution: Ms. Juanitta Clem, P.E. (2)
File (1)

ATTACHMENT

LAW
RESOURCES CREATING SOLUTIONS
LAW Engineering and Environmental Services, Inc.
3901 Carmichael Avenue
Jacksonville, FL 32207

JOB NO _____ SHEET _____ OF _____

PHASE _____ TASK _____

JOB NAME TRAIL RIDGE LANDFILL - BACK CALCS.

BY JSS DATE 2-27-03

CHECKED BY MBW DATE 3/6/03

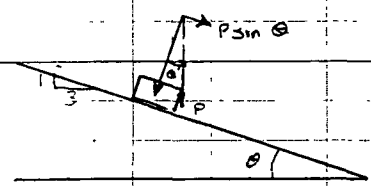
SAND OVER SAND CASE — USE F.S. = 1.5

SLOPE = 3 H:1 V, $\tan^{-1} 1/3 = 18.4^\circ = \theta$ ✓

PREVIOUS CALCULATIONS (SL 9-18-96) SHOW FOR FS = 1.5: $\phi = 26^\circ$ ✓ $c = 0$

FOR SAND OVER CLAY (BACK CALCULATING FROM PREVIOUS CALCS)

$\phi_{SAND/CLAY} = 0$



COHESION (c_{clay}) = 500 PSF

α = ADHESION FACTOR = .5

TOPSOIL γ = 100 PCF $P = 1^2 \cdot 2 \cdot 100 = 200$ lb FOR 1'x1'x2' BLOCK

DRIVING FORCE = P sin θ

= 200 · sin 18.4° = 63 ✓

RESISTING FORCE = $\alpha \cdot c = .5 \cdot 500 \cdot 1 \cdot 1 = 250$ lbs, FS = 250/63 = 3.96 ✓

FOR FS = 1.5 = $\frac{\alpha \cdot c}{63}$ $c = \frac{63 \cdot 1.5}{.5} = 189 \Rightarrow 190$ PSF ✓

FOR CLAY OVER CLAY

	TP #4*	TP #5*	TP #8*
γ: MAX. DRY DENSITY (PCF)	108.9	77.9	109.2
MOIST. CONTENT AT COMPACT.	21.3	44	20.9
COMPACTION	93%	91%	94%
γ (PCF)	122.8	102	124 → AVG. = 116 pcf

USE γ = 125 PCF $\alpha = 1$ FOR CLAY-CLAY

ASSUME BLOCK SLIDES @ MIDPOINT OF CLAY LAYER ✓

$P = .5 \cdot 1^2 \cdot 116 + P_{SAND} = 58 + 200 = 258$ lb

DRIVING FORCE = P sin θ = 258 · sin 18.4 = 81.4

RESISTING FORCE = $\alpha c = 1 \cdot 500 = 500$ pcf x 1' x 1' = 500 lbs

FS = 500/81.4 = 6.14 FOR FS = 1.5 = $\frac{c}{81.4}$ $c = 122.1$ psf ✓

* LETTER TO JUANITA CLEM, PE (ETM) DATED JANUARY 4, 2002, ATTACHED
SUBJECT: CLAY BORROW SOURCE PRE-QUALIFICATION

LAW
RESOURCES CREATING SOLUTIONS
LAW Engineering and Environmental Services, Inc.
3901 Carmichael Avenue
Jacksonville, FL 32207

JOB NO. _____ SHEET _____ OF _____

PHASE _____ TASK _____

JOB NAME TRAIL RIDGE LANDFILL

BY JSS DATE 2-27-03

CHECKED BY MSW DATE 3/6/03

FOR SAND OVER CLAYEY SAND $\phi = 25$ $\mu = \tan 25^\circ = .47$ $C = 250$ $\alpha = .5$

DRIVING FORCE = $200 \cdot \sin 18.4 = 63$ lb. ✓

RESISTING FORCE = $\alpha \cdot C + \mu 200 \cdot \cos 18.4 = 213.5$ → FORMULA USED IN SPREADSHEET SENSITIVITY

FS = $213.5/63 = 3.4$ → FORMULA USED IN SPREADSHEET SENSITIVITY

ATTACHMENT E

Quality Assurance/Quality Control Plan

For Side Slope Closure

TRAIL RIDGE LANDFILL
INCREMENTAL SIDE SLOPE CLOSURE
QUALITY ASSURANCE/QUALITY CONTROL PLAN

This plan addresses the quality assurance and quality control (QA/QC) for the incremental closure (close-as-you-go) of Trail Ridge Landfill. This program delineates the quality procedures and standards for the construction. This plan includes the closure of the side slopes only (including the reconstruction of final cover on side slopes). The top area closure has a separate QA/QC Plan.

In the context of this plan, quality assurance and quality control are defined as follows:

Quality Assurance - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service.

Quality Control - Those actions which provide a means to measure and regulate the characteristics of an item or service to contract and regulatory requirements.

The City of Jacksonville, Florida is the owner of Trail Ridge Landfill. Trail Ridge Landfill, Inc. is the permittee and operates the landfill. England, Thims & Miller, Inc. is the design engineer. The name of the Contractor for each incremental closure shall be provided to the Department of Environmental Protection (DEP), prior to construction.

All QA/QC activities (including monitoring, sampling and testing) shall be directed and conducted by third parties, whom are independent of the Contractor.

The QA/QC Plan for this project includes General QA/QC and Soils QA/QC. The General QA/QC includes full-time services to periodically observe the contractor's work to verify substantial compliance with permits, plans, specifications and design concepts. These services will include the following:

General Quality Control Monitor - shall monitor the construction for compliance with the permits, plans, specifications and design including construction to proper lines and grades, maintain daily logs and weekly progress reports of the construction (including observation data sheets, problem identification and correction logs), make note of any construction deviations, coordinate qualifying and testing of materials, monitor any waste excavation, and monitor filling. This individual shall be experienced in civil site construction and solid waste regulations.

General Quality Assurance Engineer - shall supervise the construction monitoring and waste removal to verify compliance with permits, plans, specification and design concepts. This individual shall be experienced in civil site construction and solid waste regulations and shall be a registered Professional Engineer.

The General QA/QC Program includes monitoring the following activities:

1. General Earthwork
2. Storm Drainage Installation
3. General Construction Quality Control

The Soils QA/QC for this project includes soil material qualifying, sampling and testing to verify substantial compliance with the material standards. This work will include the following:

Soils Quality Control Monitor - shall pre-qualify soil materials, monitor the installation of soil materials, determine where in-place soil materials shall be tested, and test the in-place soil materials. This individual shall be responsible for assuring that all soil materials have been pre-qualified and have a chain-of-custody from the pre-qualified source to the project site, prior to installation. This individual shall be experienced in quality assurance of soil materials and the preparation of quality assurance documentation including quality assurance forms, reports, certification and manuals. This individual shall be experienced in civil site construction and soil testing standards and procedures and shall be certified by the Quality Assurance Engineer in the duties of the project.

Soils Quality Assurance Engineer - shall supervise the soil material pre-qualifying and testing of in-place soil materials to assure compliance with the test standards and testing frequency requirements, and verify compliance with the plans, specification and design. This individual shall be experienced in quality assurance of soil materials and the preparation of quality assurance documentation including quality assurance forms, reports, certification and manuals. This individual shall hold a B.S., M.S., or Ph.D degree in civil engineering or related fields, be experienced in civil site construction and soil testing procedures, be a registered Professional Engineer, and have worked on at least two other closure projects.

The QA/QC Plan including monitoring construction of the following:

A. Final Cover (Intermediate Cover, Compacted Clay Layer and Vegetative Cover (Top Soil))

Incremental side slope closure of Trail Ridge Landfill includes a final cover consisting of 12" of intermediate cover, 12" of clay, and 24" of vegetative cover. The clay layer of the final cover must be placed in two 6" (minimum) lifts. The Soils Quality Control Monitor shall observe the clay layer construction on a full-time (on-site) basis. The QA/QC for the final cover is as follows:

1. Intermediate Cover

a. Location - The fill material shall come from an off-site source. The Soils Quality Control Monitor shall visually inspect the fill material.

b. Standard - Soil shall be free of brush, weeds, and other litter; and free of roots, stumps, stones and any other extraneous or toxic matter.

The intermediate cover shall be a minimum of 12" thick.

Compacted to 90% of Modified Proctor maximum dry density (ASTM D 1557), unless the soil material contains 30.0% or greater passing the No. 200 sieve, then compacted to 90% of Standard Proctor maximum dry density (ASTM D-698).

c. Frequency - Depth measurements and density tests shall be conducted at the frequency of four per acre.

2. Clay Layer (referred to as Barrier Layer in Chapter 62-701, F.A.C.)

a. Borrow Source - Prior to clay layer installation, an appropriate borrow source shall be located. Suitability of the clay layer construction materials from that source shall be determined in accordance with the following:

(1) If demonstrated field experience is available from at least three prior successful projects of five or more acres each to document that a given borrow source can meet the requirements of the project specifications, then extensive laboratory testing of the borrow source will not be required. However, the source of material shall be geologically similar to and the methods of excavating and stockpiling the material shall be consistent with those used on the prior projects. Furthermore, a minimum of three representative samples from the appropriate thickness of the in-situ stratum or from stockpiles of the borrow material proposed for clay layer construction shall be submitted to the Owner's independent soil testing laboratory to document through index testing and shear strength testing that the proposed material is consistent with the material used on prior successful projects. At a minimum, index testing shall consist of percent fines, Atterberg limits and moisture content determinations and the shear testing shall consist of triaxial testing of the clay soil and direct shear testing of the interface between the clay and the proposed vegetative cover material.

(2) If demonstrated field experience as defined above is not available or cannot be documented, then the following requirements shall be met.

(a) A field exploration and laboratory testing program shall be conducted by the Owner's independent soil testing laboratory to document the horizontal and vertical extent and the homogeneity of the soil strata proposed for use as clay layer material. A sufficient number of index tests from each potential borrow stratum shall be performed to quantify the variability of the borrow materials and to document that the proposed borrow material complies with specifications. At a minimum, the index tests shall consist of percent fines, Atterberg limits and moisture content determinations.

(b) Sufficient laboratory hydraulic conductivity tests shall be conducted on samples representative of the range invariability of the proposed borrow source (ASTM D-5084). For each such sample, test specimens shall be prepared and tested to cover the range of molding conditions (moisture content and dry density) required by project specifications. The hydraulic conductivity tests shall be conducted in triaxial type permeameters. The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured (ASTM D-5084). The borrow source will only be considered suitable if the hydraulic conductivity of the material, as documented on laboratory test specimens, can be shown to meet the requirements of the project specifications at the 98 percent confidence level.

(c) Sufficient shear strength testing of the clay material (ASTM D-4767) and direct shear testing of the interface between the clay and the proposed vegetative cover material (ASTM D-3080) shall be conducted on samples representative of the range in variability of the proposed borrow source. For each such sample, test specimens shall be prepared and tested to cover the range of molding conditions (moisture content and dry density) required by project specifications. The borrow source will only be considered suitable if the material, as documented on laboratory test specimens, can be shown to provide a minimum safety factor of 1.5 against sliding.

(3) The Soils Quality Assurance Engineer shall review the pre-qualification data and shall approve or reject the clay layer material for use.

b. Test Strip - Prior to full-scale clay layer installation, a field test section or test strip shall be constructed at the site above a prepared subbase. The test strip shall be considered acceptable if the measured hydraulic conductivities of undisturbed samples from the test strip meet the requirements of the project specifications at the 98 percent confidence level. If the test section fails to achieve the desired results, additional test sections shall be constructed in accordance with the following requirements:

(1) The test section shall be of sufficient size (40' wide x 60' long, at a minimum) such that full-scale clay layer installation procedures can be duplicated within the test section;

(2) The test section shall be constructed using the same equipment for spreading, kneading and compaction and the same construction procedures (e.g., number of passes, moisture addition and homogenization, if needed) that are anticipated for use during full-scale clay layer installation;

(3) At a minimum, the clay layer test section shall be subject to the following field and laboratory testing requirements by Soils Quality Control Monitor:

(a) A minimum of five random samples of the clay layer construction material delivered to the site during test section installation shall be tested for moisture content (ASTM D-2216), percent fines (ASTM D-1140) and Atterberg limits (ASTM D-4318);

(b) At least five field density and moisture determinations shall be performed on each lift of the compacted clay layer test section;

(c) Upon completion of the test section lift, the thickness of the lift shall be measured at a minimum of five random locations to check for thickness adequacy; and

(d) A minimum of five Shelby tube or drive cylinder (ASTM D-2937) samples shall be obtained from each lift of the test section for laboratory hydraulic conductivity testing. Laboratory hydraulic conductivity testing shall be conducted in triaxial type permeameters (ASTM D-5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured (ASTM D-5084).

(e) The test strip shall meet or exceed the standards established below except the field density which shall be established by the QA Engineer, based upon the test strip results. If the test strip fails to meet these standards, the construction methods and/or material will be rejected and the test strip shall be performed again.

c. Final Cover Installation - Full scale final cover installation may begin only after completion of a successful test section. During clay layer construction, quality control testing shall be provided to document that the installed clay layer conforms to project specifications. The testing frequency for quality control testing is specified below; however, during construction of the first five acres, the frequencies

shall be doubled. The clay layer shall be installed in two 6" lifts for a total minimum thickness of 12".

(1) Location - The clay layer shall be tested in place. The locations of testing shall be random locations as determined by the Soils Quality Control Monitor. If there are indications of a change in product quality or construction procedures during final cover construction, additional tests shall be performed to determine compliance.

(2) Standard

(a) Clay Layer Subgrade - Compacted to 90% of Modified Proctor maximum dry density (ASTM D-1557)D 1557), unless the soil material contains 30.0% or greater passing the No. 200 sieve, then compacted to 90% of Standard Proctor maximum dry density (ASTM D-698). (See Intermediate Cover above).

(b) Field Density - The field density shall be established by the QA Engineer based upon the test strip results and shall be determined by Standard Proctor Density (ASTM D-698). In no case shall the field density be less than 80% of Standard Proctor Density (ASTM D-698).

(c) Thickness - Each lift (two total) shall be a minimum of 6" thick.

(d) Hydraulic Conductivity - The compacted clay layer shall have an in-place hydraulic conductivity no greater than 6.67×10^{-8} cm/sec (ASTM D-5084).

(3) Field Testing Frequency

(a) Prior to the laying of the clay layer materials, the clay layer subgrade shall be compacted to the specified density. Density tests shall be conducted at a minimum rate of two tests per acre;

(b) A minimum of two moisture content and field density determinations shall be conducted per acre per lift of the compacted clay layer. The degree of compaction shall be checked using the one-point field Proctor test or other appropriate test procedures; and

(c) A minimum of four thickness measures shall be conducted per acre per lift of the compacted clay layer.

(4) Laboratory Testing Frequency

(a) Percent fines (ASTM D-1140) of the clay layer material shall be determined at a minimum frequency of two tests per acre per lift of installed clay layer;

(b) Atterberg limits determinations shall be performed on one sample per acre per lift of installed clay layer; and

(c) Hydraulic conductivity testing of Shelby tube or drive cylinder (ASTM D-2937) samples of the compacted clay layer shall be performed at a minimum frequency of one test per acre per lift. Laboratory hydraulic conductivity tests shall be conducted in triaxial type permeameters (ASTM D-5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured.

(5) Deficiency - If the test data from a clay layer section does not meet the requirements of the project specifications, additional random samples shall be tested from that clay layer section. If such additional testing demonstrates that the thickness and hydraulic conductivity meet the requirements of the project specifications at the 95 percent confidence level, that clay layer section will be considered acceptable. If not, that clay layer section shall be reworked or reconstructed so that it does meet these requirements.

3. Clay Layer Tie-In (To Existing Clay Layer, Where Applicable)

a. Location - The edge of any existing final cover adjacent to the proposed final cover area.

b. Standard - The compacted clay layer of any existing final cover and the proposed final cover must be tied together to form one continuous seamless layer. At the interface, the existing and new clay layers shall be compacted to form a seamless connection.

c. Frequency - The Soils Quality Control Monitor shall monitor the tie-in by visual inspection on a continuous basis.

4. Vegetative Cover (Top Soil)

a. Location - The vegetative cover shall be tested in place. The location of testing shall be determined by the Soils Quality Control Monitor.

b. Standard - Top soil which is reasonably free of brush, weeds, and other litter; and relatively free of roots, stumps, stones and any other extraneous or toxic matter harmful to plant growth. Roots with a diameter greater than 3/8" shall be hand picked and removed.

The vegetative cover shall be at least 24" thick.

c. Frequency - Depth measurements shall be taken at the frequency of four per acre. The soil shall be monitored on a continuous basis for extraneous matter.

5. Final Cover Repairs (When Applicable)

If, during construction of the final cover system, damage is sustained on the final cover system (including the intermediate cover, clay layer and vegetative cover), the areas of damage shall be reconstructed and retested in accordance with corresponding section described above. All repair areas shall be tested at the frequencies prescribed above, unless more frequent testing is required at the discretion of the Soils Quality Assurance Engineer.

B. Downcomer Pipes

Downcomer pipes shall be installed in the final cover at the low point of the terraces, to intercept the stormwater between terraces. The downcomer pipes shall include the terrace side drains and terrace underdrain piping.

The downcomer pipes shall be constructed as shown on the Construction Drawings. The clay around the pipes shall be compacted into a uniform homogeneous material. Prior to placement of vegetative cover over the downcomer pipes, the pipe shall be inspected by the General Quality Control Monitor.

1. Location - The compacted clay layer shall be tested in place. The locations of testing shall be determined by the Soils Quality Control Monitor. If there are indications of a change in product quality or construction procedures during construction, additional tests shall be performed to determine compliance.

2. Standard -

a. Clay Layer Subgrade - Compacted to 90% of Modified Proctor maximum dry density (ASTM D 1557)D 1557), unless the soil material contains 30.0% or greater

passing the No. 200 sieve, then compacted to 90% of Standard Proctor maximum dry density (ASTM D-698) (12" thick minimum).

b. Field Density - The field density of the clay layer shall be as established in Section A.2.c.(2)(b) above and shall be determined by Standard Proctor Density (ASTM D 698).

c. Thickness - Twelve inches minimum below pipe.

d. Hydraulic Conductivity - The compacted clay layer shall have an in-place hydraulic conductivity no greater than 6.67×10^{-8} cm/sec (ASTM D 5084).

3. Field Testing Frequency -

a. Prior to the laying of the compacted clay materials, the subbase shall be compacted to the specified density. Density tests and thickness shall be conducted at a minimum rate of one per 75 linear feet of pipe. (Minimum of one test between terraces).

b. A minimum of one moisture content and field density determination of the compacted clay layer shall be conducted per 75 linear feet of pipe.

c. A minimum of two thickness measures of the compacted clay layer shall be conducted per 75 linear feet of pipe.

4. Laboratory Testing Frequency -

a. Hydraulic conductivity testing of Shelby tube or drive cylinder (ASTM D 2937) samples of the compacted clay layer shall be performed at a minimum frequency of one test per 75 linear feet of pipe (at least once between terraces). Laboratory hydraulic conductivity tests shall be conducted in triaxial type permeameters (ASTM D 5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured.

5. Deficiency - If the test data from a compacted clay layer section does not meet the requirements of the project specifications, that section shall be reworked or reconstructed so that it does meet these requirements.

C. Underdrain Filter Sand

The underdrains in the terraces shall be surrounded by filter sand as shown on the Contract Drawings. The QA/QC for the filter sand is as follows:

1. Filter Sand

a. Location - The material shall be pre-qualified prior to installation.

If the testing is done at the borrow source, a chain of custody shall be provided.

b. Standard - Clean, uniformly graded sand with a uniformity coefficient of 1.5 or greater and an effective grain size of 0.2 mm to 0.5 mm. Grain size distribution shall be conducted as part of pre-qualification.

The sand shall have a hydraulic conductivity no less than 1.0×10^{-3} cm/sec at a density of 100 percent Modified Proctor. The hydraulic conductivity testing shall be by Constant Head method (ASTM D2434).

c. Frequency - The hydraulic conductivity of the sand shall be tested once per 500 cubic yards of sand material.

ATTACHMENT F

HELP Model Results for Water Balance

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**********************************************************************************
**********************************************************************************
**                                                                              **
**                                                                              **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                   **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                    **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                       **
**                    USAE WATERWAYS EXPERIMENT STATION                         **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY                  **
**                                                                              **
**                                                                              **
**********************************************************************************
**********************************************************************************

PRECIPITATION DATA FILE:    C:\HELP3~1.07\DATA4.D4
TEMPERATURE DATA FILE:      C:\HELP3~1.07\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\HELP3~1.07\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\HELP3~1.07\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\HELP3~1.07\DATA10.D10
OUTPUT DATA FILE:           C:\HELP3~1.07\OPERATIO.OUT

TIME:  11:28     DATE:   2/17/2003

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     TITLE:  TRAIL RIDGE LANDFILL - SIDE SLOPE CLOSURE

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     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   8
          THICKNESS                     =     24.00   INCHES
          POROSITY                      =      0.4630 VOL/VOL
          FIELD CAPACITY                =      0.2320 VOL/VOL
          WILTING POINT                 =      0.1160 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.4243 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.369999994000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  4.63
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
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LAYER 2

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 7

THICKNESS	=	18.00	INCHES
POROSITY	=	0.4730	VOL/VOL
FIELD CAPACITY	=	0.2220	VOL/VOL
WILTING POINT	=	0.1040	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2481	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.520000001000E-03	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	240.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1769	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 6

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. COND.	=	33.0000000000	CM/SEC
SLOPE	=	1.93	PERCENT
DRAINAGE LENGTH	=	200.0	FEET

LAYER 7

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	1.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

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. COND.	=	33.0000000000	CM/SEC
SLOPE	=	1.93	PERCENT
DRAINAGE LENGTH	=	200.0	FEET

LAYER 9

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	1.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 16

THICKNESS	=	6.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 8 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 33.% AND A SLOPE LENGTH OF 67. FEET.

SCS RUNOFF CURVE NUMBER	=	76.70	
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	=	4.628	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.556	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.392	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	96.666	INCHES
TOTAL INITIAL WATER	=	96.666	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
JACKSONVILLE FLORIDA

STATION LATITUDE	=	30.50 DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50
START OF GROWING SEASON (JULIAN DATE)	=	0
END OF GROWING SEASON (JULIAN DATE)	=	367
EVAPORATIVE ZONE DEPTH	=	12.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	8.20 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	73.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	79.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	78.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR JACKSONVILLE FLORIDA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.07	3.48	3.72	3.32	4.91	5.37
6.54	7.15	7.26	3.41	1.94	2.59

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR JACKSONVILLE FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
53.20	55.10	61.30	67.70	74.10	79.00
81.30	81.00	78.20	69.50	60.80	54.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR JACKSONVILLE FLORIDA
AND STATION LATITUDE = 30.50 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.19	171299.687	100.00
RUNOFF	6.847	24855.437	14.51
EVAPOTRANSPIRATION	37.427	135860.812	79.31
PERC./LEAKAGE THROUGH LAYER 2	2.915251	10582.361	6.18
AVG. HEAD ON TOP OF LAYER 2	16.1591		
DRAINAGE COLLECTED FROM LAYER 6	2.2518	8174.006	4.77
PERC./LEAKAGE THROUGH LAYER 7	0.094171	341.839	0.20
AVG. HEAD ON TOP OF LAYER 7	0.0010		
DRAINAGE COLLECTED FROM LAYER 8	0.0942	341.838	0.20
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.002	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.570	2067.603	1.21
SOIL WATER AT START OF YEAR	96.668	350906.000	
SOIL WATER AT END OF YEAR	97.238	352973.594	
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	-0.012	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	58.69	213044.672	100.00
RUNOFF	6.215	22561.277	10.59
EVAPOTRANSPIRATION	49.702	180416.672	84.68
PERC./LEAKAGE THROUGH LAYER 2	2.939485	10670.330	5.01
AVG. HEAD ON TOP OF LAYER 2	16.4449		
DRAINAGE COLLECTED FROM LAYER 6	2.9942	10868.850	5.10
PERC./LEAKAGE THROUGH LAYER 7	0.117482	426.460	0.20
AVG. HEAD ON TOP OF LAYER 7	0.0013		
DRAINAGE COLLECTED FROM LAYER 8	0.1175	426.458	0.20
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.002	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.338	-1228.537	-0.58
SOIL WATER AT START OF YEAR	97.238	352973.594	
SOIL WATER AT END OF YEAR	96.899	351745.062	
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	-0.049	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.32	186291.578	100.00
RUNOFF	5.619	20396.697	10.95
EVAPOTRANSPIRATION	43.386	157489.859	84.54
PERC./LEAKAGE THROUGH LAYER 2	2.867075	10407.483	5.59
AVG. HEAD ON TOP OF LAYER 2	15.7245		
DRAINAGE COLLECTED FROM LAYER 6	2.7687	10050.250	5.39
PERC./LEAKAGE THROUGH LAYER 7	0.112718	409.165	0.22
AVG. HEAD ON TOP OF LAYER 7	0.0012		
DRAINAGE COLLECTED FROM LAYER 8	0.1127	409.163	0.22
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.002	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.566	-2054.421	-1.10
SOIL WATER AT START OF YEAR	96.899	351745.062	
SOIL WATER AT END OF YEAR	96.334	349690.656	
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	0.037	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.97	163241.047	100.00
RUNOFF	0.138	501.169	0.31
EVAPOTRANSPIRATION	44.186	160395.453	98.26
PERC./LEAKAGE THROUGH LAYER 2	2.754910	10000.325	6.13
AVG. HEAD ON TOP OF LAYER 2	14.5736		
DRAINAGE COLLECTED FROM LAYER 6	2.6835	9740.989	5.97
PERC./LEAKAGE THROUGH LAYER 7	0.111217	403.718	0.25
AVG. HEAD ON TOP OF LAYER 7	0.0011		
DRAINAGE COLLECTED FROM LAYER 8	0.1112	403.716	0.25
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.002	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-2.149	-7800.157	-4.78
SOIL WATER AT START OF YEAR	96.334	349690.656	
SOIL WATER AT END OF YEAR	94.185	341890.500	
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	-0.116	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	62.56	227092.766	100.00
RUNOFF	9.343	33913.547	14.93
EVAPOTRANSPIRATION	50.215	182281.328	80.27
PERC./LEAKAGE THROUGH LAYER 2	3.046324	11058.157	4.87
AVG. HEAD ON TOP OF LAYER 2	17.4944		
DRAINAGE COLLECTED FROM LAYER 6	2.8273	10263.218	4.52
PERC./LEAKAGE THROUGH LAYER 7	0.113889	413.416	0.18
AVG. HEAD ON TOP OF LAYER 7	0.0012		
DRAINAGE COLLECTED FROM LAYER 8	0.1139	413.414	0.18
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.002	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.061	221.336	0.10
SOIL WATER AT START OF YEAR	94.185	341890.500	
SOIL WATER AT END OF YEAR	94.246	342111.812	
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	-0.077	0.00

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	59.32	215331.578	100.00
RUNOFF	5.419	19670.518	9.13
EVAPOTRANSPIRATION	47.603	172798.359	80.25
PERC./LEAKAGE THROUGH LAYER 2	2.866055	10403.780	4.83
AVG. HEAD ON TOP OF LAYER 2	15.7108		
DRAINAGE COLLECTED FROM LAYER 6	2.6601	9656.258	4.48
PERC./LEAKAGE THROUGH LAYER 7	0.110494	401.094	0.19
AVG. HEAD ON TOP OF LAYER 7	0.0011		
DRAINAGE COLLECTED FROM LAYER 8	0.1105	401.093	0.19
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.002	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	3.528	12805.338	5.95
SOIL WATER AT START OF YEAR	94.246	342111.812	
SOIL WATER AT END OF YEAR	97.773	354917.156	
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	0.011	0.00

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	54.32	197181.656	100.00
RUNOFF	10.066	36538.969	18.53
EVAPOTRANSPIRATION	41.840	151880.156	77.03
PERC./LEAKAGE THROUGH LAYER 2	2.897314	10517.249	5.33
AVG. HEAD ON TOP OF LAYER 2	16.0168		
DRAINAGE COLLECTED FROM LAYER 6	2.8430	10320.171	5.23
PERC./LEAKAGE THROUGH LAYER 7	0.114238	414.682	0.21
AVG. HEAD ON TOP OF LAYER 7	0.0012		
DRAINAGE COLLECTED FROM LAYER 8	0.1142	414.680	0.21
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.002	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.543	-1972.389	-1.00
SOIL WATER AT START OF YEAR	97.773	354917.156	
SOIL WATER AT END OF YEAR	97.230	352944.781	
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	0.063	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.29	178922.687	100.00
RUNOFF	3.122	11333.605	6.33
EVAPOTRANSPIRATION	43.067	156334.250	87.38
PERC./LEAKAGE THROUGH LAYER 2	2.909062	10559.894	5.90
AVG. HEAD ON TOP OF LAYER 2	16.0617		
DRAINAGE COLLECTED FROM LAYER 6	2.7218	9880.071	5.52
PERC./LEAKAGE THROUGH LAYER 7	0.112014	406.611	0.23
AVG. HEAD ON TOP OF LAYER 7	0.0012		
DRAINAGE COLLECTED FROM LAYER 8	0.1120	406.609	0.23
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.002	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.267	968.207	0.54
SOIL WATER AT START OF YEAR	97.230	352944.781	
SOIL WATER AT END OF YEAR	97.497	353912.969	
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	-0.058	0.00

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	55.61	201864.328	100.00
RUNOFF	5.346	19406.684	9.61
EVAPOTRANSPIRATION	49.387	179276.109	88.81
PERC./LEAKAGE THROUGH LAYER 2	3.034679	11015.885	5.46
AVG. HEAD ON TOP OF LAYER 2	17.3599		
DRAINAGE COLLECTED FROM LAYER 6	2.9740	10795.653	5.35
PERC./LEAKAGE THROUGH LAYER 7	0.117095	425.054	0.21
AVG. HEAD ON TOP OF LAYER 7	0.0013		
DRAINAGE COLLECTED FROM LAYER 8	0.1171	425.052	0.21
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.002	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-2.215	-8039.163	-3.98
SOIL WATER AT START OF YEAR	97.497	353912.969	
SOIL WATER AT END OF YEAR	95.282	345873.812	
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	0.000	0.00

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.57	172679.062	100.00
RUNOFF	0.450	1634.616	0.95
EVAPOTRANSPIRATION	44.449	161349.906	93.44
PERC./LEAKAGE THROUGH LAYER 2	2.757773	10010.716	5.80
AVG. HEAD ON TOP OF LAYER 2	14.6637		
DRAINAGE COLLECTED FROM LAYER 6	2.6990	9797.399	5.67
PERC./LEAKAGE THROUGH LAYER 7	0.111425	404.472	0.23
AVG. HEAD ON TOP OF LAYER 7	0.0011		
DRAINAGE COLLECTED FROM LAYER 8	0.1114	404.470	0.23
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.002	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.140	-507.284	-0.29
SOIL WATER AT START OF YEAR	95.282	345873.812	
SOIL WATER AT END OF YEAR	95.142	345366.531	
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	-0.049	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.03	3.37	3.01	3.71	4.10	5.78
	7.51	7.10	7.11	3.41	1.53	3.44
STD. DEVIATIONS	1.25	1.37	2.16	2.31	2.70	2.21
	2.02	2.53	2.58	1.93	1.27	1.94
RUNOFF						
TOTALS	0.209	0.428	0.198	0.326	0.402	0.252
	0.284	0.867	1.149	0.475	0.094	0.571
STD. DEVIATIONS	0.505	0.927	0.392	0.972	1.208	0.458
	0.568	1.382	2.378	0.994	0.293	1.022
EVAPOTRANSPIRATION						
TOTALS	2.117	3.000	3.696	3.810	3.744	5.095
	6.130	5.443	4.845	3.799	1.934	1.513
STD. DEVIATIONS	0.451	0.191	0.772	2.168	1.727	1.713
	1.063	1.150	0.463	0.341	0.690	0.463
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.2616	0.2504	0.2520	0.2212	0.2147	0.2191
	0.2320	0.2496	0.2644	0.2646	0.2288	0.2404
STD. DEVIATIONS	0.0354	0.0203	0.0266	0.0256	0.0206	0.0325
	0.0243	0.0342	0.0238	0.0265	0.0257	0.0353
LATERAL DRAINAGE COLLECTED FROM LAYER 6						
TOTALS	0.2195	0.1923	0.2290	0.2491	0.2596	0.2382
	0.2207	0.2143	0.2043	0.2157	0.2347	0.2650
STD. DEVIATIONS	0.0794	0.0662	0.0398	0.0310	0.0244	0.0217
	0.0164	0.0304	0.0257	0.0298	0.0331	0.0223
PERCOLATION/LEAKAGE THROUGH LAYER 7						
TOTALS	0.0088	0.0080	0.0094	0.0097	0.0101	0.0095
	0.0093	0.0091	0.0088	0.0092	0.0094	0.0102
STD. DEVIATIONS	0.0031	0.0023	0.0009	0.0006	0.0005	0.0004
	0.0004	0.0007	0.0006	0.0006	0.0007	0.0004

LATERAL DRAINAGE COLLECTED FROM LAYER 8

TOTALS	0.0088	0.0080	0.0094	0.0097	0.0101	0.0095
	0.0093	0.0091	0.0088	0.0092	0.0094	0.0102
STD. DEVIATIONS	0.0031	0.0023	0.0009	0.0006	0.0005	0.0004
	0.0004	0.0007	0.0006	0.0006	0.0007	0.0004

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	17.7731	19.3233	16.6814	14.0067	12.4349	13.7641
	14.3996	16.4048	19.0898	18.1089	14.9080	15.3567
STD. DEVIATIONS	4.0280	2.4298	3.0287	3.0131	2.3406	3.8246
	2.7635	3.8906	2.7939	3.0106	3.0267	4.0175

DAILY AVERAGE HEAD ON TOP OF LAYER 7

AVERAGES	0.0011	0.0011	0.0011	0.0013	0.0013	0.0012
	0.0011	0.0011	0.0011	0.0011	0.0012	0.0013
STD. DEVIATIONS	0.0004	0.0004	0.0002	0.0002	0.0001	0.0001
	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001

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

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 10

	INCHES		CU. FEET	PERCENT
PRECIPITATION	53.08	(5.930)	192694.9	100.00
RUNOFF	5.257	(3.2879)	19081.25	9.902
EVAPOTRANSPIRATION	45.126	(4.0798)	163808.30	85.009
PERCOLATION/LEAKAGE THROUGH LAYER 2	2.89879	(0.09714)	10522.617	5.46077
AVERAGE HEAD ON TOP OF LAYER 2	16.021	(0.959)		
LATERAL DRAINAGE COLLECTED FROM LAYER 6	2.74234	(0.20772)	9954.686	5.16603
PERCOLATION/LEAKAGE THROUGH LAYER 7	0.11147	(0.00653)	404.651	0.21000
AVERAGE HEAD ON TOP OF LAYER 7	0.001	(0.000)		
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.11147	(0.00653)	404.649	0.20999
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.002	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	-0.153	(1.5945)	-553.95	-0.287

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 10

	(INCHES)	(CU. FT.)
PRECIPITATION	4.47	16226.100
RUNOFF	2.748	9975.3271
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.010205	37.04235
AVERAGE HEAD ON TOP OF LAYER 2	24.000	
DRAINAGE COLLECTED FROM LAYER 6	0.01156	41.97521
PERCOLATION/LEAKAGE THROUGH LAYER 7	0.000385	1.39675
AVERAGE HEAD ON TOP OF LAYER 7	0.002	
MAXIMUM HEAD ON TOP OF LAYER 7	0.001	
LOCATION OF MAXIMUM HEAD IN LAYER 6 (DISTANCE FROM DRAIN)	0.0 FEET	
DRAINAGE COLLECTED FROM LAYER 8	0.00038	1.39675
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.003	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.19	690.8433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4630
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1160

*** 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.

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FINAL WATER STORAGE AT END OF YEAR 10

LAYER	(INCHES)	(VOL/VOL)
1	8.2077	0.3420
2	5.1240	0.4270
3	4.3715	0.2429
4	70.0800	0.2920
5	4.7889	0.1995
6	0.0042	0.0209
7	0.0000	0.0000
8	0.0020	0.0100
9	0.0000	0.0000
10	2.5620	0.4270
SNOW WATER	0.000	

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AVERAGE MONTHLY RAINFALL
1962 - 1990

	YEARS																												
MONTHS	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	AVERAGE RAINFALL
1-JAN.	2.16	5.39	7.29	.65	4.56	3.05	.82	.84	4.18	2.01	5.77	4.64	.28	3.48	2.29	2.96	4.64	6.28	2.61	.92	3.00	7.19	2.13	1.05	4.19	4.09	6.36	1.73	1.84	3.32
2-FEB.	.52	6.93	6.55	5.50	5.97	4.35	3.05	3.39	8.85	2.55	3.48	5.07	1.28	2.58	1.05	3.24	4.17	3.75	1.06	4.53	1.67	4.27	4.67	1.45	4.72	6.47	6.08	1.77	4.07	3.90
3-MAR.	3.10	2.23	1.76	3.91	.71	.81	1.20	4.23	9.98	2.41	4.43	10.18	3.47	2.46	3.41	1.03	2.83	1.00	6.83	5.41	4.26	8.46	5.77	1.26	5.44	6.27	2.65	2.14	1.59	3.77
4-APRIL	2.36	1.75	4.65	.95	2.25	2.00	.99	.54	1.77	4.07	2.98	11.61	1.53	5.78	.63	1.76	2.24	4.18	3.91	.32	3.60	4.65	3.14	2.76	93	.14	3.44	2.79	1.34	2.72
5-MAY	1.12	1.74	4.80	94	10.43	1.18	2.17	3.78	1.84	1.90	8.26	5.33	4.14	7.00	10.02	3.07	9.18	7.54	3.02	1.48	3.55	1.38	1.46	2.08	2.13	.75	1.55	1.55	.18	3.56
6-JUNE	8.22	12.49	4.67	9.79	7.74	12.90	12.25	5.12	2.65	5.52	6.75	4.10	5.53	5.21	4.26	2.65	2.62	5.91	4.59	3.31	8.06	6.86	4.76	3.71	2.53	4.18	3.71	3.66	1.59	5.70
7-JULY	6.31	6.47	6.12	2.71	11.09	5.22	6.84	5.89	7.60	5.07	3.15	5.45	9.83	6.36	5.41	1.97	6.67	4.67	5.29	2.46	3.81	6.11	6.01	6.33	3.27	4.40	4.50	8.98	6.53	5.67
8-AUG.	10.07	4.95	5.63	9.58	3.88	12.31	16.24	15.10	10.96	12.83	9.76	7.49	11.23	6.23	6.37	7.26	2.39	4.78	3.97	6.47	6.93	4.63	3.78	8.93	9.60	4.48	8.48	9.16	3.81	7.84
9-SEPT.	4.37	4.91	10.31	11.02	5.94	1.80	2.68	10.33	3.20	4.17	2.60	7.86	8.13	5.24	8.56	7.45	4.40	17.75	3.03	1.22	9.32	4.61	12.28	16.82	1.99	7.13	16.36	14.37	2.60	7.26
10-OCT.	1.13	1.53	5.09	1.75	1.38	1.13	5.09	9.81	3.95	6.46	4.46	4.08	.34	3.63	1.63	1.68	1.26	.25	2.69	1.35	3.37	4.29	1.53	8.34	1.80	.30	2.35	1.39	4.54	2.99
11-NOV.	2.08	2.70	3.33	1.92	.21	.24	1.30	4.56	T	.83	4.22	.44	1.03	.39	2.43	3.11	.80	3.64	2.32	4.92	1.93	3.32	3.30	2.07	2.85	5.02	4.27	.51	1.17	2.24
12-DEC.	2.46	3.60	4.83	3.75	1.14	4.69	1.09	3.87	1.57	5.87	1.43	4.32	1.73	1.79	4.81	3.38	1.84	2.01	.21	3.38	2.02	6.42	.13	3.59	4.65	.16	1.13	3.40	1.94	2.80
																														51.77

*INFORMATION TAKEN FROM THE MICROPRINT ANNUAL CLIMATOLOGICAL SUMMARY, JACKSONVILLE, FLORIDA 62 THROUGH 90
OBTAINED FROM U.S. DEPARTMENT OF COMMERCE; N.D.A.A.

ATTACHMENT G

Alternate Closure Design Evaluation

ATTACHMENT K

TRAIL RIDGE LANDFILL
SIDE SLOPE CLOSURE
ALTERNATE CLOSURE DESIGN DEMONSTRATION

This analysis is based upon "Municipal Solid Waste Alternate Design Closure Guidance" Document dated February 10, 1995, prepared by the Department of Environmental Protection, Solid Waste Section.

A. FINAL CLOSURE - MINIMUM DESIGN

1. DETERMINE IMPINGEMENT RATE

Use the HELP Model, Version 3 and the following:

a. Default Rainfall and Temperature Data for Jacksonville
b. Maximum Leaf Area Index of 2.0 - Fair Gross
c. Evaporative Zone Depth at 22 Inches
d. Growing Season - 365 Days.

From the HELP Model Results - Average Annual
Precipitation - 46.43 IN
Runoff - 0.179 IN
Evapotranspiration - 36.93 IN

Thus:

IMPINGEMENT RATE (e) = Precipitation - Runoff - Evapotranspiration
= 46.34 IN - 0.179 IN - 36.93 IN/YR
= 9.23 IN/YR
= 0.025 IN/DAY = 7.44×10^{-9} m/sec

2. DETERMINE MAXIMUM HEAD OVER LINER - T_{MAX}

Moore's Equation:

$$T_{MAX} = C \times L[(4(e/k)+(\tan B)^2)^{1/2} - \tan B] / 2\cos B$$

Where:

L	=	Length of horizontal projection of the leachate collection layer from top to collector, m
e	=	Impingement rate, m/sec
k	=	Saturated hydraulic conductivity of the drainage layer, m/sec
tanB	=	Slope to collection pipe, dimensionless
C	=	Constant, 39.37 in/m

Therefore:

L	=	110 FT	=	33.52 m
e	=	7.44×10^{-9} m/sec		
k	=	1×10^{-3} cm/sec	=	1×10^{-5} m/sec
tanB	=	0.04		

Thus:

T_{MAX} = $39.37 \times 33.52[(4(7.44 \times 10^{-9}/1 \times 10^{-5}) + (0.04)^2)^{1/2} - 0.04] / 2 \times 0.999$

T_{MAX} = 18.25 IN = 0.46 m

3. DETERMINE LEAKAGE RATE - Q

$Q = 0.6 \times C \times a^{0.1} \times h^{0.9} \times k^{0.74}$

Where:

Q	=	Leakage rate, gal/acre/day
a	=	Area of hole for leakage, $0.0001 m^2$
h	=	Head of liquid over hole, m
k	=	Hydraulic conductivity of soil under liner, m/sec
C	=	Constant, 2.282×10^7 gal-sec/day/m^3

Therefore:

h	=	T_{MAX} = ~~2.32 m~~ 0.46 m	
k	=	1×10^{-4} cm/sec	= 1×10^{-6} m/sec

Thus:

$Q = 0.6 \times 2.282 \times 10^7 \times (0.0001)^{0.1} \times (0.46)^{0.9} \times (1 \times 10^{-6})^{0.74}$

Q = 99.1 gal/acre/day

B. FINAL CLOSURE - ALTERNATE DESIGN

1. DETERMINE IMPINGEMENT RATE

e = 7.44×10^{-9} m/sec (Same as minimum design, See Page 1)

2. DETERMINE MAXIMUM HEAD OVER LINER - T_{MAX}

Moore's Equation:

$$T_{MAX} = C \times L[(4(e/k)+(\tan B)^2)^{1/2} - \tan B] / 2\cos B$$

Where:

L = 67.5 FT = 20.57 m
k = 1×10^{-5} m/sec
tanB = 0.333
cosB = 0.9487

Thus:

$T_{MAX} = 39.37 \times 20.57[(4(7.44 \times 10^{-9}/1 \times 10^{-5})+(0.333)^2)^{1/2} - 0.333] / 2 \times 0.9487$

T_{MAX} = 1.88 IN = 0.157 FT

3. DETERMINE LEAKAGE RATE - Q

Using Darcy's Law:

$$Q = C \times k\,(h+H)/H$$

Where:

h = Head of liquid above soil liner, ft
H = Thickness of soil liner, ft
k = Hydraulic conductivity of soil liner, cm/sec
C = Constant, 9.239×10^{8} gal-sec/cm/acre/day

Therefore:

h = T_{MAX} = 0.157 FT
H = 1 FT
k = 6.67×10^{-8} cm/sec

Thus:

Q = $9.239 \times 10^{8} \times 6.67 \times 10^{-8} \times (0.157+1)/1$
Q = 71.3 gal/acre/day

Since the leakage rate for alternate design (71.3 gal/acre/day) is less than the leakage rate for the minimum design (99.1 gal/acre/day), the alternate design is acceptable based on "Municipal Solid Waste Alternate Design Closure Guidance" Document dated February 10, 1995 prepared by the Department of Environmental Protection, Solid Waste Section.

Juanita Bader Cam 2/26/97

I certify that this analysis is in accordance with "Municipal Solid Waste Alternate Design Closure Guidance" Document dated February 10, 1995 as prepared by the Department of Environmental Protection, Solid Waste Section.

MUNICIPAL SOLID WASTE
LANDFILL ALTERNATE DESIGN
CLOSURE GUIDANCE

IMPLEMENTING THE PROVISIONS OF
RULE 62-701.600(5)(g)4,
FLORIDA ADMINISTRATIVE CODE

FINAL GUIDANCE

Prepared by:

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
SOLID WASTE SECTION
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399

February 10, 1995

ATTACHMENT L

TRAIL RIDGE LANDFILL
ALTERNATE BARRIER SOIL LAYER
Equivalency Analysis

In accordance with Rule 62-701.600(5)(g)4., F.A.C., the proposed barrier layer must minimize infiltration to a substantially equivalent degree as an 18-inch layer of barrier soil with a permeability of 1×10^{-7} cm/sec.

The travel time allowed by rule with the 18-inch thick layer of barrier soil with a permeability of 1×10^{-5} cm/sec is determined as follows:

$$\text{Time of Travel (t)} = \frac{\text{Thickness (s)}}{\text{Velocity of Travel (k)}}$$

Where:

$s =$ 18 inches $= 45.7$ cm

$k = 1 \times 10^{-7}$ cm/sec

Thus:

$$t = \frac{45.7 \text{ cm}}{1 \times 10^{-7} \text{ cm/sec}} = 4.57 \times 10^{8} \text{ sec}$$

The proposed equivalent barrier soil layer will be 12 inches thick. Using the same travel time as determined by rule above, the equivalent permeability is determined as follows:

$$\text{Velocity of Travel (k)} = \frac{\text{Thickness (s)}}{\text{Time of Travel (k)}}$$

Where:

$s =$ 12 inches $= 30.5$ cm

$t = 4\ 57 \times 10^{8}$ sec

Thus:

$$k = \frac{30\ 5 \text{ cm}}{4.57 \times 10^{8} \text{ sec}} = 6.67 \times 10^{-8} \text{ cm/sec}$$

Therefore, the permeability of the 12-inch thick barrier soil layer used in the closure of this facility shall have a maximum permeability of 6.67×10^{-8} cm/sec

ATTACHMENT H

Sample Landfill Inspection Checklist

Trail Ridge Landfill
Landfill Inspection Checklist

Name of Inspector: _____ Date of Inspection: _____

If answered yes, attach additional comment pages or site plan as needed.

Section A: Fencing and Security	Yes	No	Not Applicable
1. Damage to fences, gates, or locks			
2. Gates unlocked/locks missing			
3. Signs of forced entry detected			

Section B: Access Roads	Yes	No	Not Applicable
1. Access and site roads in poor condition			

Section C: Final Cover System	Yes	No	Not Applicable
1. Settlement of cover			
2. Evidence of erosion, cracks, gullies			
3. Holes or damage to cover			
4. Patches of dead grass on cover			
5. Evidence of leachate seeps			
6. Impacts due to settlement			
7. Ponding of water in terraces			

Section D: Gas Management System	Yes	No	Not Applicable
1. Visible damage to system components			
2. Excessive release of odors			
3. Gas flare operating			

Trail Ridge Landfill
Landfill Inspection Checklist

Section E: Stormwater Management System	Yes	No	Not Applicable
1. Ponding of water			
2. Excessive silting due to lack of vegetation			
3. Inlets repair required			
4. Perimeter ditch or swale			
5. Retention pond damage			
6. Downcomer pipe repair required			
7. Leachate breakouts affecting water quality			
8. Ditches/Inlets/Culverts need cleaning			

Section F: Monitoring Devices	Yes	No	Not Applicable
1. Damage to groundwater monitoring wells			
2. Damage to gas wells			
3. Locks missing			
4. Damage to gas monitor probes			

Section G: Leachate Collection and Storage	Yes	No	Not Applicable
1. Leachate pumps operating			
2. Leachate flow meters operating			
3. Leachate control panels operating			
4. Control panel alarms operating			
5. Leachate storage tanks leaking			
6. Leachate containment area leaking			

Signature of Inspector:_____ Date:_____

ATTACHMENT I

Quality Assurance/Quality Control Plan

For Long Term Care

TRAIL RIDGE LANDFILL
LONG TERM CARE
QUALITY ASSURANCE/QUALITY CONTROL PLAN

This plan addresses the quality assurance and quality control (QA/QC) for the monitoring and repair of the final cover on the landfill after closure. This plan delineates the procedures and standards for the monitoring and repairs.

The City of Jacksonville is the owner of Trial Ridge Landfill and Trail Ridge Landfill, Inc. is the operator/permittee of the landfill. If erosion penetrates the compacted clay layer (barrier soil layer), an independent third party soils consultant shall be obtained for the QA/QC for the compacted soil layer repair. If erosion does not penetrate the compacted soil layer, the operator's personnel shall provide the QA/QC for the repair.

A. Monitoring

After every major storm event or at least on a quarterly basis, Trial Ridge Landfill, Inc. shall inspect the incremental closure areas and prepare an inspection report. The report shall include the status of the following: the final cover, terraces, downcomer pipes, perimeter ditches, and the grass cover.

Any noticeable erosion of 6" or greater shall be documented. The documentation shall include; the location of the erosion on a drawing, the approximate size (length and width), the depth (in inches), and the thickness of the compacted clay layer (if the erosion is greater than 18").

If the depth of erosion is determined to be 18" or greater, the thickness of the compacted clay layer shall be checked. The compacted clay layer was designed with a 12" thickness (minimum) and therefore, the thickness must be 12" or greater.

B. Repairing

After the inspection, any erosion of 6" or greater shall be repaired unless the compacted clay layer thickness was determined to be less than 12", whereas the compacted clay layer must also be repaired. The repair of erosion that is less than 12" in depth shall include replacement of soil and sodding. The operator's personnel shall monitor the repair. The soil used for repairs shall be topsoil, which is reasonably free of brush, weeds, roots, stumps, stone and any other extraneous or toxic matter.

The repair of erosion that is determined to penetrate the compacted clay layer (i.e. the compacted clay layer thickness is less than 12 inches), shall be monitored/tested by a qualified soils technician (the "Monitor") under the direction of a Professional Engineer. The monitor shall be experienced in civil site construction and soil testing standards and procedures. Following the repairs, a QA report including test results and daily logs shall be prepared by the Professional Engineer.

The compacted clay layer replacement shall be tested by the Monitor, in-place at a frequency of once per erosion area or once per 20,000 square feet which ever is more often. The testing shall include:

1. Hydraulic Conductivity by falling head permeameter (ASTM D-5084);

2. Field density by Standard Proctor (ASTM D-698); and

3. Thickness.

The standards for the in-place compacted soil material are as follows:

1. Hydraulic Conductivity - The compacted clay layer shall have a maximum hydraulic conductivity of 6.67×10^{-8} cm/sec.

2. Density - The compacted soil layer shall be compacted to 80 percent of Standard Proctor density.

3. Thickness - The compacted soil layer shall have a minimum thickness of 12 inches. The vegetative cover over the compacted soil layer shall have a minimum thickness of 24 inches.

The Monitor shall be on-site to observe the repairing operation, take samples/tests, and prepare a daily log. After all repairs are completed, a report shall be prepared which documents the repair(s) and the area shall be sodded.

C. Recordkeeping

The operator shall compile the monthly monitoring reports and any QA reports into an annual summary and shall submit the annual summary to the Department.

ATTACHMENT J

Letter from Wheelabrator Ridge Energy Inc.

Wheelabrator Ridge Energy Inc.
A Waste Management Company

3131 K-Ville Avenue
Auburndale, FL 33823
(863) 665-2255

February 15, 2003

Wheelabrator Ridge Energy, Inc.
3131 K-Ville Avenue
Auburndale, FL 33823

Trail Ridge Landfill Inc.
Attn: Linda Hair
5110 US Highway 301
Baldwin, FK 32234

Re: Tire Disposal Fees

Dear Linda,

Per our conversation on Friday, February 14, 2003, the purpose of this letter is to verify the disposal fee charged to Trail Ridge Landfill for waste tires delivered to Ridge. Trail Ridge Landfill is charged $68.00 per ton of tires. This price includes the transportation to our facility and the disposal of the tires.

If you have any questions, please feel free to call me at (863) 665-2255 ext. 116.

Sincerely,

Jerry Klepaczyk
Plant Accountant

WASTE MANAGEMENT

Boesch, Julia

From: Nogas, Mary
Sent: Friday, May 02, 2003 6:56 AM
To: 'Juanitta Clem'
Cc: Greg Mathes (E-mail); Boesch, Julia; Achaya Kelapanda (E-mail)
Subject: RE: TRLF Permit Renewal

Not a problem --

-----Original Message-----
From: Juanitta Clem [mailto:ClemJ@etminc.com]
Sent: Thursday, May 01, 2003 3:30 PM
To: Nogas, Mary
Cc: Greg Mathes (E-mail); Boesch, Julia; Achaya Kelapanda (E-mail)
Subject: TRLF Permit Renewal

Dear Mary:

Based upon our meeting on Monday, April 28, we need to provide the Department a response regarding the global stability of the landfill. Due to that analysis, we hereby request an extension of two weeks to respond to the RAI (from May 5 to May 19). If we are able to respond earlier, we will do so.

Juanitta Clem
ENGLAND, THIMS & MILLER, INC.

Department of Environmental Protection

Jeb Bush
Governor

Northeast District
7825 Baymeadows Way, Suite B200
Jacksonville, Florida 32256-7590

David B. Struhs
Secretary

January 15, 2003

Mr Greg Mathis
General Manager
Trail Ridge Landfill Inc
5110 U S. Highway 301
Jacksonville, Florida 32234

Dear Mr. Mathis:

Trail Ridge Landfill, Inc
Permit renewal and modification request
FDEP File Number 13493-010 and 13493-011
Second Request for Additional Information
Duval County - Solid Waste

The department has reviewed your submittal, received December 16, 2002 The following review is enclosed

Attachment 1, Review Memorandum, dated January 15, 2003, prepared by Julia Boesch.

The information requested in this review is required for the department to proceed with the processing of your permit application Please provide the requested information by February 24, 2003 Action on the application will be delayed until the requested information is received in this office. Please reference the associated DEP file number in all written correspondence concerning this project

If you have any comments concerning this matter, please contact Julia Boesch at the letterhead address or telephone number (904) 807-3356.

Sincerely,

Mary C Nogas, P. E.
Solid Waste Supervisor

MCN:jbl

cc: Juanitta Bader-Clem, P.E., England, Thims, and Miller, Inc.

Florida Department of
Memorandum **Environmental Protection**

Northeast District – Jacksonville

TO: Files

THROUGH: Mary C. Nogas, P. E.
Solid Waste Section Supervisor

FROM: Julia Boesch

DATE: January 15, 2003

SUBJECT: Trail Ridge Landfill
Permit renewal and leachate recirculation
FDEP File Numbers 13493-010 and 13493-011
Second Request for Additional Information
Duval County- Solid Waste

The Department has reviewed your submittal received on December 16, 2003, and requests the following information:

1. Comment number 1 is no longer applicable since you have withdrawn your proposal to recirculate leachate.

2. Response is adequate.

3. Response is adequate to develop specific conditions to the permit.

4. Please note the department considers your response to be non-responsive; please respond to the original question.

5. Response is adequate to develop a specific permit condition.

6. Please note that the department intends to include the following as a specific condition to the permit. a spotter shall inspect each load of waste as it is being discharged and spread.

7. Please note that with the exception of the adequacy of the equipment, the department considers your response to be non-responsive; please respond to the original question. Please note the department is interested in the minimum personnel that will be provided to handle the proposed waste amounts, including both spotters trained in accordance with FAC Chapter 62-701 as well as those interim spotters who have not received the official training.

8. Response is adequate.

9. Please describe the existing concrete storage area where batteries and other prohibited waste will be stored Is the storage area a building? If not how will you prevent rainwater from coming into contact with the materials? Please propose the minimum frequency at which batteries and whitegoods will be removed from the site, and indicate by whom they will be removed and to where they will be removed as previously requested. Please indicate where the roll off containers designated for only white good temporary storage will be maintained and if the containers will be covered to prevent rainwater from infiltrating in and potentially causing leachate to seep out the containers? Will the roll offs be stored on an impervious surface? What will be there capacity? Finally, please show and label the temporary storage areas on the site plan.

10. Responses are adequate to develop specific conditions to the permit.

11. Responses are adequate to develop specific conditions to the permit.

12. Responses are adequate to develop specific conditions to the permit.

13. Responses are adequate to develop specific conditions to the permit.

14. The Department encourages the reuse of impacted soils with appropriate environmental safeguards and provisions. In order to determine the adequacy of the safeguards please provide the following at a minimum: Please define the sampling protocols, including frequency and parameters, utilized to determine if soils are impacted and if they are hazardous. Please provide the methodology utilized to determine if the soils are appropriate for usage as cover, based upon nuisance issues such as odor, moisture content, etc Please provide a scaled drawing showing the location for storage of impacted soils prior to usage and a detailed description of signage and usage. Please list the procedures that will be followed at the facility to ensure the contaminated soil is only used on internal slopes of the lined area. What safeguards will you have in place to prevent it from being inadvertently placed on an external slope? What documentation will you maintain concerning this materials application and temporary storage prior to application?

15. Responses are adequate to develop specific conditions to the permit.

16. Responses are adequate to develop specific conditions to the permit.

17. Responses are adequate to develop specific conditions to the permit.

18. Responses are adequate to develop specific conditions to the permit.

19. Please note that your response does not address the concern as to whether or not the liner system is experiencing a problem that warrants resolutions, i.e., flooding of the geonet, excess leachate head on the liner. Please propose an action leachate leakage rate which if triggered will warrant an evaluation of the system's effectiveness and remedial actions if necessary. Please base this action rate on that rate expected to leak through the primary liner to the leak detection layer as determined in your original liner design calculations for the installed system. Please provide all supporting calculations, documentations and

references to documents previously provided, to justify the acceptable rate versus the unacceptable rate which warrants action. Please note that your calculations shall be based on the leachate head determined in your design calculations.

20. Response is noted.

21. Responses are adequate to develop specific conditions to the permit.

22. Responses are adequate to develop specific conditions to the permit.

Comment Numbers 23-44 are no longer applicable since the applicant has withdrawn the request to recirculate leachate.

45 through 50. Response is adequate to develop specific conditions to the permit.

51. Please address the Rule change that requires interface friction angle testing of the actual materials used for closure. Additionally, please clarify what minimum interface friction angles you are proposing to achieve in the field, and the assumptions used.

52. Please note that the following comments (a) through (e) concern your water balance analysis; the remainder concerns the alternate closure design: (a) Please demonstrate that the top 24-inch layer will act as a lateral drainage layer as you indicate it will in the analysis Please provide all calculations and documentations to support your demonstration. Also, please indicate and show and label on the drawing sheets, site plan and details, to where fluid that collects in this drainage layer will be conveyed to and how will it be managed from there. Please provide supporting design calculations. Please note the department will request the top 24 inches be tested for hydraulic conductivity after installation to ensure the proposed minimum hydraulic conductivity is being satisfied since you are proposing the material as your lateral drainage layer in the final cover system. Please revise your Quality Assurance/Quality Control Plan to include this testing. (b) Also since your are indicating that the top layer will act as a lateral drainage layer and not a vertical drainage layer, erosion is of concern and whether or not the material will support root growth? Please address these concerns. (c) Please run the Help model program utilizing precipitation data that represents a wet period in time as opposed to a dry period in time. (d) Please justify an evaporative zone depth of 24 inches (e) Please rerun the HELP model in accordance with the changes requested in comments 51 and 52 (f) Please confirm that the alternate closure design meets the equivalency requirements in the Rule.

53. Response is noted.

54. Please provide a more detailed description of the temporary and permanent gas system, including sequencing of construction and submittals to the department. Please include necessary repairs to the cover system due to installation or repair of the gas system in the CQAP.

55 &56. Comments no longer applicable as applicant has withdrawn the leachate recirculation proposal.

57. Please provide an inspection check list that will list the minimum items and conditions you will observe for during the routine inspections, i.e., erosion, hot spots, slope of the disposal area, ponding of leachate on disposal area, etc. Also, please not only indicate that they will be conducted on a regular basis, but propose a minimum frequency at which the inspections will be conducted and justify the adequacy of that frequency. Please include in your response to inspect the facility after any major storm events in addition to the routine inspections, for erosion and to also inspect the leachate collection storage tanks and containment area for integrity and leachate leaks. Please include the procedures that will be followed in maintaining and repairing damage to the leachate collection and gas collection systems at a minimum, and include the quality assurance plan you will implement in repairing damages to the system. Additionally, please describe how repairs to the liner system will be conducted and documented.

58. Response is adequate.

59. Please provide a more detailed description of the on-site surveying during operations that is conducted to ensure that design elevations and grades are met.

60. Please be more specific in your response.

61. The department understands that you are proposing to construct only access roads that are within the lined disposal area be constructed of slag. Please confirm or deny. If this is a misunderstanding and you intend to utilize the slag outside the liner limits, please be reminded that the only slag to date, which the department district has approved for this use, would be that slag described in the attached letter. Additionally, please note that the described slag shall only be utilized in accordance with the said attached letter.

62 Response is adequate to develop specific conditions to the permit.

63. Please note that the department intends to include a condition indicating that facility shall be policed of litter by the end of each work day. What will be the source of the water you will use to control dust and how will you apply it? If you will use a water truck please indicate if water will be the only material used in the truck.

64. Response is adequate to develop specific conditions to the permit.

65 How will waste material excavated to control a fire be managed? Please address the handling of hot loads and specify where and how hot loads will be isolated.

66. Please be more specific concerning the qualifications of the various CQA personnel.

67. Please propose a minimum frequency at which tires will be removed from the site and not only indicate on a regular basis.

68. This appears to be non-responsive; please address the original question.

69 - 71. Responses are noted.

72. Please breakdown the cost to remove the tires from the site. Please provide letters from third parties quoting the cost that will charge to remove whole tires from the site and to send them to a facility authorized to accept them as well as the costs a facility/entity will charge to process and manage them. The costs shall not reflect any reduced costs. Also, please note that unless the department has accepted in writing the certification of closure construction completion in writing, than the cost estimates to close that area are still required. Please revise your estimates accordingly.

FLORIDA

Department of
Environmental Protection

Lawton Chiles
Governor

Northeast District
7825 Baymeadows Way, Suite B200
Jacksonville, Florida 32256-7590

Virginia B. Wetherell
Secretary

May 17, 1996

Mr. Robert E. Hice
Environmental Coordinator
Ameristeel
Jacksonville Steel Mill Division
Post Office Box 518
Baldwin, Florida 32234

Dear Mr. Hice:

Ameristeel Slag Disposal
Duval County - Solid Waste

The Department has reviewed your May 16 submittal of the results of the slag column leaching test designed to demonstrate whether or not your mill's processed slag meets the requirements of Section 403.7045(1)(g)(2), Florida Statutes.

These results, in combination with previous results and your confirmation that slag that is collected during furnace maintenance or Melt Shop clean-up or might otherwise be contaminated will continue to be transported to a properly permitted TSDF, provide adequate assurance for the Department to reach the determination that your processed slag may be considered an industrial byproduct under Florida Statutes, and therefore not regulated as solid waste, provided that:

a majority of the processed slag is demonstrated to be sold, used, or reused within one year;

the slag is not utilized in such a manner that it is placed in the environment in a greater than six-foot thickness; and

neither the slag nor your processing operation is found to be a source of pollution.

Thank you very much for your cooperation in this matter. The Department appreciates the responsible and professional manner in which you approached this issue. If you have any questions

concerning the Department's determination, please do not hesitate to contact me at (904)448-4320, extension 355.

Sincerely,

Michael J. Fitzsimmons

Michael J. Fitzsimmons
Waste Program Administrator

MJF:mn

cc: Chris McGuire, Office of General Counsel, DEP

Boesch, Julia

From: Boesch, Julia
Sent: Tuesday, December 17, 2002 10:22 AM
To: Kohn, Kenneth
Subject: Trail Ridge sw

We received a response to our rai. There are a couple of responses, numbers 12 and 68 that pertain to stormwater management. I will place a copy of the submittals (1) dated September 25, 2002 2) dated December 13, 2002) in your in box for your review. Please review and send us your comments by January 7, 2003. If you need additional information, please let me know.
Thanks for your assistance,
Julia

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
7825 Baymeadows Way, Suite B200
Jacksonville, FL 32256-7590

Interoffice Memorandum

TO: Julia Boesch
Solid Waste

THROUGH: Ken Kohn
Industrial Wastewater

FROM: Dean Setiono
Industrial Wastewater

DATE: January 10, 2003

SUBJECT: Duval County – Stormwater Review
Trail Ridge Landfill – First RAI Response

My stormwater review of the First RAI Response for Trail Ridge Landfill is complete, based upon the information provided on December 16, 2002. Based on my review, comments number 12 in the First RAI Response adequately addressed the capacity, flow rate and velocity for the terrace swales. Therefore additional stormwater RAI regarding the terrace swales will not be necessary.

If you have any questions concerning this matter, please feel free to contact me.

Florida Department of State, Division of Corporations

www.sunbiz.org

Public Inquiry

Foreign Profit

TRAIL RIDGE LANDFILL, INC.

PRINCIPAL ADDRESS
1001 FANNIN SUITE 4000
HOUSTON TX 77002 US
Changed 04/14/1999

MAILING ADDRESS
1001 FANNIN SUITE 4000
HOUSTON TX 77002 US
Changed 04/14/1999

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Document Images

Listed below are the images available for this filing.

09/16/2002 -- COR - ANN REP/UNIFORM BUS REP
02/28/2002 -- COR - ANN REP/UNIFORM BUS REP
04/30/2001 -- ANN REP/UNIFORM BUS REP
05/11/2000 -- ANN REP/UNIFORM BUS REP
04/14/1999 -- ANNUAL REPORT
04/29/1998 -- ANNUAL REPORT
05/02/1997 -- ANNUAL REPORT
04/09/1996 -- 1996 ANNUAL REPORT

THIS IS NOT OFFICIAL RECORD; SEE DOCUMENTS IF QUESTION OR CONFLICT

Corporations Inquiry **Corporations Help**

England-Thims & Miller, Inc.
ENGINEERS • PLANNERS • SURVEYORS • LANDSCAPE ARCHITECTS

Principals
James E England, P E , CEO
Douglas C Miller, P E , President
N Hugh Mathews, P E , Exec , V P
Joseph A Tarver, Exec , V P
Juanitta Bader Clem, P E V P
Scott A Wild P E , PSM, V P
Samuel R Crissinger CPA V P
Robert A Mizell, Jr , P E , V P
Bryan R Stewart, V P

August 7, 2003

Ms. Julia Boesch
Waste Management Section
Department of Environmental Protection
7825 Baymeadows Way, Suite 200B
Jacksonville, Florida 32256

RECEIVED
AUG 08 2003
STATE OF FLORIDA
DEPT. OF ENV. PROTECTION
NORTHEAST DISTRICT-JAX

RE: Trail Ridge Landfill – Second Permit Renewal
FDEP Permit Numbers 0013493-001 and 0013493-002
FDEP File Numbers 13493-010 and 13493-011
ETM No. 02-025-3

Dear Ms. Boesch:

Please find herewith the revised Primary Liner Leakage calculations for the referenced project. I apologize for the conversion error in the previous calculations.

Please feel free to give me a call if you have any questions or require any additional information.

Sincerely,

ENGLAND, THIMS & MILLER, INC.

Juanitta Bader Clem, P.E.
Vice President

Attachment

cc: Greg Mathes
Achaya Kelpenda
Chris Pearson

Trail Ridge Landfill
Primary Liner Leakage

Although geomembranes have very low permeability, they still allow some leakage. Leakage through geomembranes can occur due to pinholes and larger holes (holes larger than the geomembrane thickness). The leakage due to pinholes is negligible compared to the larger holes and is therefore ignored. The leakage due to large holes can be calculated by Bernoulli's equation for flow through an aperture, as follows:

$$Q = 0.6\ a\ \sqrt{2gh}$$

Where:
- Q = Leakage rate through one geomembrane hole
- a = Area of geomembrane hole
- g = Acceleration of gravity = 9.81 m/s^2
- h = Head of liquid on top of geomembrane

Say:

a = 1 cm^2 (per acre) = 1 x 10^{-4} m^2

h = 5.6 mil* = 0.0056 in = 1.42 x 10^{-4} m

* The maximum head on the liner as determined in the First Permit Renewal, Appendix E, October 28, 1996.

Therefore:

$$Q = (0.6)\ (1 \times 10^{-4}\ m^2) \sqrt{\ 2\ (9.81\ m/s^2)\ (1.42 \times 10^{-4}\ m)}$$

$$Q = 3.17 \times 10^{-6}\ m^3/sec\ (\text{per acre})$$

$$Q = 72.51\ \frac{\text{gallons}}{\text{day}}\ (\text{per acre})$$

Assume a trigger rate at 3.5 times this rate.

$$Q_{Max} = 253.8\ \frac{\text{gallons}}{\text{day}}\ (\text{per acre}) = 1.11 \times 10^{-5}\ m^3/sec\ (\text{per acre})$$

Check to make sure the geonet can handle the trigger rate leakage.

$t_{LCL} = (Q / k)^{1/2}$ (J.P. Giroud, 1997)

Where:

k	=	θ/t
t_{LCL}	=	Minimum Thickness of Secondary Geonet
Q	=	Maximum Flow Rate for Secondary Geonet
k	=	Hydraulic Conductivity of Secondary Geonet
θ	=	Hydraulic Transmissivity of the Secondary Geonet (m^2/sec)
t	=	Thickness of Secondary Geonet

Say:

θ	=	2.26×10^{-3} m^2/sec
t	=	200 mil = 0.2 inches = 5.1×10^{-3} m
Q	=	1.11×10^{-5} m^3/sec

Therefore:

$k = (2.26 \times 10^{-3} \text{ m}^2/\text{sec}) / (5.1 \times 10^{-3} \text{ m}) = 0.44$ m/sec

$t_{LCL} = (1.11 \times 10^{-5} \text{ m}^3/\text{sec} / 0.44 \text{ m/sec})^{1/2} = 5.02 \times 10^{-3}$ m

$= 197.7$ mil

Since the geonet has a minimum thickness of 200 mil, the geonet can handle the flow.

The smallest cell is 17.7 acres, so the flow per cell is:

$$Q_{Total} = 253.8 \frac{\text{gallons}}{\text{day} * \text{ac}} * 17.7 \text{ ac}$$

$$\Rightarrow 4{,}492.3 \frac{\text{gallons}}{\text{day}} \text{ per cell}$$

Cynthia Bode Com
8/7/03

Department of Environmental Protection

Jeb Bush
Governor

Northeast District
7825 Baymeadows Way, Suite B200
Jacksonville, Florida 32256-7590

David B. Struhs
Secretary

April 4, 2003

Mr. Greg Mathis
General Manager
Trail Ridge Landfill Inc.
5110 U.S. Highway 301
Jacksonville, Florida 32234

Dear Mr. Mathis:

Trail Ridge Landfill, Inc
Permit renewal and modification request
FDEP File Number 13493-010 and 13493-011
Third Request for Additional Information
Duval County - Solid Waste

The department has reviewed your submittal, received March 17, 2003. The following review is enclosed:

Attachment 1, Review Memorandum, dated April 3, 2003, prepared by Julia Boesch.

The information requested in this review is required for the department to proceed with the processing of your permit application. Please provide the requested information by May 5, 2003. Action on the application will be delayed until the requested information is received in this office. Please reference the associated DEP file number in all written correspondence concerning this project.

If you have any comments concerning this matter, please contact Julia Boesch at the letterhead address or telephone number (904) 807-3356.

Sincerely,

Mary C. Nogas, P. E.
Solid Waste Supervisor

MCN:jbl

cc: Juanitta Bader-Clem, P.E., England, Thims, and Miller, Inc.

Memorandum **Florida Department of Environmental Protection**

Northeast District – Jacksonville

TO: Files

THROUGH: Mary C. Nogas, P. E.
Solid Waste Section Supervisor

FROM: Julia Boesch

DATE: April 3, 2003

SUBJECT: Trail Ridge Landfill
Permit renewal and leachate recirculation
FDEP File Numbers 13493-010 and 13493-011
Third Request for Additional Information
Duval County- Solid Waste

The Department has reviewed your submittal received on March 17, 2003, and requests the following information:

4. & 7. According to your submittal, one spotter can inspect forty 8.45-ton trucks per hour, while a laborer can manage waste (remove) from 24 trucks each hour. This appears to be an extremely high amount of waste for one individual to be able to effectively spot. Please provide documentation to support your numbers, or revise your matrix.

   In your comment number 4, you indicate that the matrix was developed based upon the number of trucks and waste received, while the number of spotters and laborers that are currently being provided appear to not be included in its development. Please address.

   In your response when you indicate that the number of spotters and laborers needed are to one decimal point, i.e., 1.2, will you provide the minimum number of people rounded up, i.e., 2 people? Please address.

9. Please clarify if batteries received at the site will be stored on pallets in the existing concrete storage area.

   In the event that more water is collecting than evaporating, what measures will you implement to prevent water from reaching the elevation of the pallets?

   Please note, drawing sheet 4 reflects various future areas. Please note that those areas were not reviewed in this application.

14. In your response, you indicate that contaminated soil you will use as initial cover will be stored within the landfill lined area on top of existing in-place waste. Please clarify if you intend to store this material in waste areas that have received initial, intermediate and/or final cover on it and address. How will you remove the soil for initial cover without also removing waste or portions of the existing in-place underlying cover material?

    Please note, your proposal is not acceptable, as you are not proposing to provide the department with analytics of contaminated soil prior to its disposal or reuse, i.e., as initial cover, at the facility. Please propose to do so. Please develop and provide a soil-screening matrix that will reflect the cases in which you will or will not provide the department with analytical results prior to its use or disposal at the facility.

19. You indicate that leachate flows will be recorded Monday through Friday. Please note that they also should be recorded on Saturday and Sunday. Please propose to provide and maintain recording flow meters and address. Please show in the site plan their location. Please note your proposal to not notify the department of an exceedance unless the maximum rate is exceeded for more than 5 consecutive days is not acceptable. Please propose to notify the department if the maximum rate is ever exceeded and to notify the department by telephone within 24 hours of the discovery and in a follow-up report within 7 days. Additionally, if the allowable rate is exceeded even on just one day, please propose to conduct an investigation and implement remedial actions if warranted.

    What is the storage capacity of the sumps and can they handle the proposed leachate action rate? Please address. Please confirm that the pumps are operated automatically. Also, please propose to maintain logs recording when a pump is out of service for repairs/maintenance and when replaced. Please propose to provide such logs to the department.

    Please clarify what you mean by "cell" in Attachment C.

    Are you able to measure the leachate flow from each cell? Please address.

    Please provide all supporting calculations including those you conducted to determine Q. Also, please indicate and justify how you determined each of the values factored into the equations, i.e., h, B, beta, geonet thickness, and etc. Please also clarify what each factor represents. For example Q stands for flow rate. Additionally, please justify all equations used. Finally, please note that a trigger rate 5 times the determined rate appears excessive. Please either justify that rate or propose a new one.

    Do you have backup pumps at each of the pumping stations? If a pump is out for service, how does that affect the system?

51. Please note that the department does not find a factor of safety of 1.5 acceptable for this site. In evaluating whether a factor of safety is adequate for a site, various factors should be considered. Two of which are 1) the potential consequence of a slope failure, and 2) the confidence of the selected values. Both of these factors appear to have not been considered in your selection of the factor of safety thereby indicating it is too low. Regarding the selected values, it appears that neither the impact of seepage on the driving force or the long-term condition cohesion was accounted for in your evaluation, which reduces the department's confidence in them. Please either select a higher factor of safety in which these factors are accounted for and provide a discussion on your selection, or propose additional testing to determine these values and address.

    Please revise the Quality Assurance/Quality Control Plan For Side Slope Closure, Attachment E, page 4, in which you propose to provide a factor of safety of 1.5, considering the department's concern and provide.

    Also, please propose and revise the plan to indicate that all interfaces of the final cover system, including the clay with the intermediate cover, will be tested for shear strength. Please address and revise the plan to include the internal friction angle tests that will be conducted on the other materials of the final cover system as well.

    Please revise the Quality Assurance/Quality Control Plan For Side Slope Closure, Attachment E, page 4, to indicate that the shear testing will be conducted in wetted/saturated and unconfined conditions by an approved third party qualified laboratory. In other words, testing shall be conducted in a manner that will allow the clay to swell in submerged, close to saturated conditions, to emulate conditions similar to that of a long storm.

    Please also amend the QA/QC plan to indicate that the clay and other material, if applicable, will be tested for its cohesion as well as adhesion values and what values they must exhibit to be considered acceptable. Please also describe and identify the testing that will be conducted.

    Your table 2 lists the angle of internal friction but does not also list the interface friction angle; please address.

    Please identify and justify the equations used.

    In your analysis please also evaluate the potential for deep-seated rotational or translational failures through the final cover system and waste.

    Please show the surface boundary you are modeling. Also, please show the failure surfaces and the points of convergence at a minimum.

    How will the gas management system, especially the header pipes you are proposing to install above grade, impact slope stability?

52. Response is noted.

54. Drawing sheets 14 and 15, provided September 2003, reflect gas wells but do not appear to reflect the header pipes you refer to. Please clarify when the header pipes will be constructed. Furthermore, it is not clear what you mean by temporary extraction wells and headers. Will they be removed or will they remain and become part of the permanent gas management system? Please clarify. Are you still proposing interim wells? If so, please address. If the header pipes will not be installed until after the final cover system is in place, impact to the cover system is of concern. What vehicles, if any, will be allowed to drive over the cover system during header pipe construction? What measures will you implement during their installation to minimize final cover system impact? Please address. Also, neither the Quality Assurance/Quality Control Plan for Side Slope Closure or the Quality Assurance/Quality Control Plan for Long-term care includes the construction or repairs to the temporary nor permanent gas management system, respectively. Please include and provide.

    Furthermore, please note that the design for the temporary system will need to be provided to the department's solid waste section and approval obtained by the permittee prior to installation. Please provide details of both the temporary and proposed systems and how they will be installed relative to the final cover system.

    Finally, please note that the department understands that you are proposing to install the gas collection system and manage the gas condensate as permitted in accordance with specific condition number 17 of the existing system. Please confirm or deny. If this assumption is incorrect, please address.

    Please revise the Quality Assurance/Quality Control Plan for Long-term care to include how the horizontal extent of impact to the cover system in addition to the vertical extent of impact will be determined.

57. Please note that quarterly inspections are too infrequent while 14 days to initiate repairs is too excessive. Also, the inspection checklist did not include a category for the active areas. Please note erosion, ponding of leachate, hot spots, etc. are some of the conditions the facility shall inspect for.

59. You indicate that you may use plastic pipes to stake the grades and slopes. Will they have elevations marked on them? Will the field personnel be trained to know how to read the stakes and to know when waste is placed at its final grade? Please address. What measures will the facility employ to maintain these stakes at their staked location?

    If the facility discovers during the re-staking that its slopes and grades allow for additional waste placement, please address the measures the facility will implement in re-contouring the slopes and ensuring they will be stable.

60. You indicate that during wet weather an area within the lined area that is accessible will be used. Will you limit yourself to interior slopes? How will you minimize the ponding of leachate in waste and also prevent the mixing of leachate in stormwater if you continue to operate during wet weather? Who will select the area? Will you limit yourself to areas that have initial but not intermediate cover? How will you manage the wet weather area; will you apply initial cover; intermediate cover?

61. Please note that the department intends to include a specific condition to the permit that will require the facility to record the sources from where slag is accepted and the location where slag from a specific source is used.

63. Response is adequate to develop specific conditions to the permit.

65. Please clarify that the waste excavated to control a fire will be replaced after it is extinguished and any waste on fire will not be placed in contact with other waste. Additionally, you propose to discharge a hot load within the active lined area where there is a minimum of 12 inches of cover. Are you referring to areas that have intermediate cover? If so, how will that impact the intermediate cover and grade of slope? Will you remove the waste once extinguished to the active area? Will you repair the intermediate cover where needed? Please further address the managing of hot loads and address these comments at a minimum in your response.

66. Response is adequate to develop specific conditions to the permit.

67. Response is noted

68. Response is noted.

72. Response is noted.

MAPS

AND

CD'S

SCANNED

SEPARATELY