Pasco County Use Case Scenarios to Examine the Recycling of Waste to Energy Bottom Ash in Road Construction Applications

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1.0 Overview

1.1 County Objectives

Pasco County, Florida is currently investigating the recycling of waste-to-energy bottom ash from the Pasco County Resource Recovery Facility (RRF), through use as road construction materials. A series of roadway test strips have been constructed at the facility under an FDEP research demonstration and development project (26254-004-SO-21). Through this process the County has developed construction specifications and techniques for utilizing the bottom ash, and has produced a large amount of analytical testing data. The County desires to continue its recycling efforts and to beneficially utilize bottom ash generated by the Pasco County Resource Recovery Facility in county-wide road construction projects.

Section 403.7045(5) of the Florida Statutes authorizes the Department to allow beneficial reuse of ash residue when an applicant demonstrates that "no significant threat to public health will result and that applicable Department standards and criteria will not be violated." This document provides a technical evaluation of the public health impacts of the proposed recycling program. This evaluation incorporates the results of leachate testing, hydrologic modeling, and pollutant fate and transport modeling. Where appropriate, the evaluation utilizes Pasco County-specific data.

1.2 Proposed Recycling Activities

The proposed bottom ash recycling is assumed to follow similar procedures and to be produced from similar materials as those used as part of the RD&D project. The analysis conducted herein is based on the data collected from samples of ash, concrete and asphalt pavement collected as part of this project. The results, conclusions, and recommendations provided in this report assume that ash will be utilized in a manner substantially similar to the following:

- Use as a road base course. WTE bottom ash from the RRF that has been screened to remove large pieces of waste materials (>3/4 inch) and that has been adequately cured by ageing (see next section)
- Use as an aggregate in Portland cement concrete pavement. WTE bottom ash from the RRF that has been screened to remove large pieces of waste materials (>3/4 inch) and the fine fraction of the ash (<3/8 inch), and that has been adequately cured by ageing (see next section). The aggregate will replace no more than 50 percent of the currently used aggregate.
- Use as an aggregate in hot mix asphalt pavement. WTE bottom ash from the RRF that has been screened to remove large pieces of waste materials (>3/4 inch) and the fine fraction of the ash (<3/8 inch), and that has been adequately cured

by ageing (see next section). The aggregate will replace no more than 50 percent of the currently used aggregate.

1.3 Proposed Controls

Underlying this evaluation of the public health impact of the proposed application is the understanding that WTE bottom ash will be recycled following a prescribed set of conditions. These are outlined below.

- Bottom ash will not placed within 3 feet of groundwater or 15 feet of wetlands or natural water bodies, or within 100 feet of a potable well that is being used or might be used for human or livestock water consumption
- When utilized as road base, the placement of the bottom ash will not extend beyond the outside edge of the pavement. Bottom ash remaining outside the edge of the pavement after construction will be removed and recycled consistent with the permitted activities or disposed of at the County's Class I landfill.
- When utilized as road base, placement of the pavement must be completed as soon as practicable after placement of the bottom ash
- The owner or duly authorized agent of the owner of the property where the product is placed has given the department written notice, which may be submitted electronically, of the dates, placement locations, and quantities of bottom ash used for structural fill or pavement aggregate.
- Prior to use in road base applications, ash will be aged for a minimum period of 3 months. Aging will be conducted on top of or in a lined Class I landfill cell. Piles will be no greater than 20 feet in height.
- When ash is utilized as a road base course, only dense graded asphalt mixes shall be placed as a pavement layer.
- The roadway shall be placed and maintained following generally accepted road construction practices currently utilized in Pasco County.
- When removed from service, asphalt or concrete products containing bottom ash as aggregates will be managed as construction and demolition debris.
- When removed from service, bottom ash that has been used as a base course will be used in a similar permitted construction application or placed in a Class I lined landfill.
- Fugitive dust emissions from the storage, processing, transport or placement of bottom ash will be controlled by wetting.
- Ash used as an aggregate in asphalt and concrete will be stored on site at batch plants for a period of no more than 120 hours. Loads will be tarped during transportation and ash will not be transported during periods of inclement weather. Following batching of the concrete or asphalt products, the unused ash shall be recovered and either used in a subsequent construction project or placed in a Class I lined landfill.

2.0 Approach

The approach used follows standard procedures for assessing the potential environmental and human health impact of beneficially used materials. Two pathways are assessed, direct human exposure and leaching to groundwater. The direct human exposure pathway is assessed by examining the potential direct exposure pathways (Section 3). The leaching-to-groundwater pathway is assessed by examining the leaching characteristics of the three construction products proposed, and estimating their fate and transport from the constructed roadway to a target compliance point away from the edge of the road. This is conceptually illustrated in Figure 2.1.

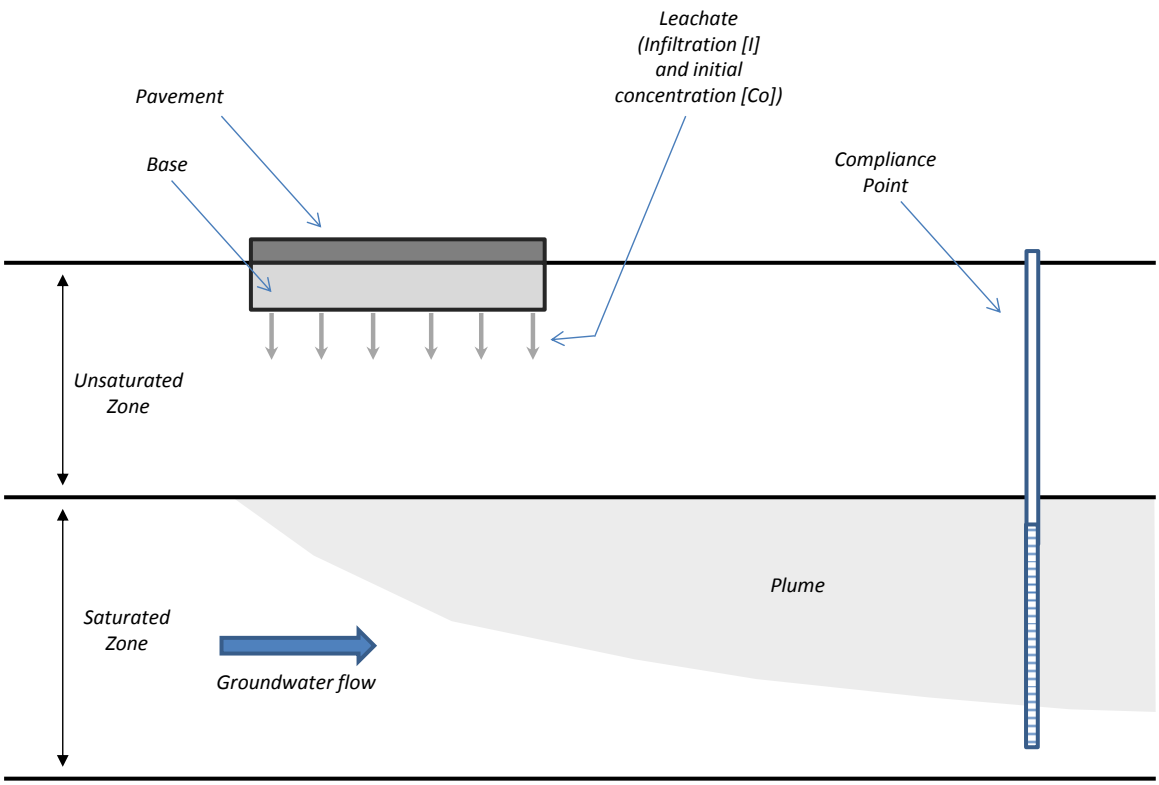

Figure 2-1. Conceptual Illustration of the WTE Bottom Ash Recycling Scenario Evaluated

The following steps are conducted in this report to assess the potential impact of the proposed activities on groundwater.

- Step 1. Leaching tests are conducted on samples of the three products proposed for use in road construction in Pasco County: ash as a road base course, ash-amended asphalt pavement, and ash-amended PCC pavement. The leaching test results are then used to determine an initial leachate concentration (C_o) for use in subsequent fate and transport modeling. The values determined for C_o and

the health-based groundwater cleanup target levels (GCTL) are used to calculate target dilution and attenuation factors (DAF), which can be defined as:

$$DAF = \frac{C_o}{GCTL}$$

This step is presented in Section 4 of this report.

- Step 2. The US-EPA's hydrologic evaluation of landfill performance (HELP) model is utilized to estimate a leachate infiltration rate (I_L) through the different road use scenarios. Pasco-County specific climate conditions are included in the model. The hydraulic conductivity of the construction materials plays a large role in determining the infiltration rate, and results from the literature, previous testing, and testing specific to this project are discussed. This step is presented in Section 5 of this report.

- Step 3. A range of likely DAF resulting from the infiltration rates modeled in step 2 and the likely groundwater conditions in Pasco County are calculated. These DAF do not include any pollutant removal through attenuation mechanisms and are intended to provide an understanding of the degree of dilution created by the expected hydrogeological and roadway conditions. This step is presented in Section 6 of this report.

- Step 4. The concentrations of the constituents of potential concern (COPC) at target compliance points are estimated using pollutant fate and transport modeling. COPC's are limited to metal constituents because of the low probability of the occurrence of organics in municipal waste combustion ash. The two models used are the US-EPA's Industrial Waste Management Evaluation Model (IWEM) and the Electric Power Research Institute's (EPRI) solute transport model MYGRT. IWEM provides a screening tool for assessing potential groundwater impacts from the disposal or reuse of industrial wastes and pulls from a large database of soil and aquifer characteristics to stochastically predict a conservative estimate (90th percentile) of groundwater concentrations. As IWEM does not provide for site-specific assessment, MYGRT was additionally used to model the ash base course scenario for a series of County-specific data sets. The results of this work are presented in Section 7 of this report.

3.0 Direct Exposure Assessment

When evaluating the potential for a beneficial use project to adversely affect human health and the environment, potential risks from direct human exposure are typically assessed. In the context presented here, direct exposure refers to the direct contact of a person with the beneficially used material, through the pathways of ingestion, inhalation and dermal contact. The County will recycle WTE bottom ash in a manner that eliminates the direct exposure pathway. The ash will be encapsulated in a Portland cement or asphalt concrete matrix, or in the case of road base course, it will be completely covered by a pavement layer. Thus, with respect to Section 403.7045(5) F.S., the requirement to demonstrate that no significant threat to public health will result from beneficial use, the direct human exposure concerns are satisfactorily addressed through the method in which the ash is recycled.

The potential for worker exposure during ash processing, transport, and recycling will be limited and controlled through proper construction techniques (e.g., wetting to control dust). In addition, the bottom ash was analyzed for total metals and limited organics concentrations and compared to Florida's risk-based commercial/industrial direct exposure soil cleanup target levels (SCTLs) found at 62-777, F.A.C.. A total environmentally available digestion (EPA Method 3050b) and analysis [Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES)] of five replicates of the composite sample, were conducted on the waste to energy ash utilized as a roadway base course. The results (mean and 95% UCL) are presented below.

Table 3-1. Total Concentration Analysis on Aged Ash Used as Base Course

Element	Mean (mg/kg)	95% UCL (mg/kg)	Commercial/Industrial Direct Exposure SCTL (mg/kg)
Ag	17	25	8,200
Al	55,400	81,800	-
As	3	4	12
B	181	207	430,000
Ba	391	432	130,000
Be	1	1	1,400
Ca	60,900	63,800	-
Cd	10	11	1,700
Cr	239	531	470
Cu	1,630	2,230	89,000
Fe	65,200	75,200	-
K	1,870	1,950	-
Mg	4,710	5,010	-
Mn	1,060	1,470	43,000
Mo	9	10	11,000
Na	7,50	7,960	-
Ni	104	133	35,000
Pb	488	502	1,400
Sb	18	23	370
Se	1	1	11,000
Sn	54	58	880,000
Sr	204	227	-
Ti	1,300	1,410	-
V	16	18	10,000
Zn	1,860	2,150	630,000

The mean concentration of every element presented above is below the commercial/industrial direct exposure SCTL. The only element for which the 95% UCL is elevated above the commercial/industrial SCTL is chromium (531 vs 470 mg/kg). It is important to note that 470 mg/kg refers to the SCTL for hexavalent chromium, while the measurements made with 3050B and ICP-AES are for total chromium (which does not have a commercial/industrial SCTL because the residential SCTL is so high). While hexavalent chromium was not measured, experience suggests that the great majority of chromium will be trivalent (not hexavalent); the leaching results in the next section support this conclusion, as chromium does not leach to any appreciable extent (hexavalent chromium would be likely to leach). Chromium is not viewed as a health concern.

In addition to the inorganic elements described above, one sample each of >3/8-inch bottom ash and <3/8-inch bottom ash from the facility were sent to a certified laboratory for dioxin analysis. The results (see Appendix J) found that the concentrations of dioxin (expressed as total 2, 3, 7, 8-TCDD equivalents) were 5.28 and 7.03 ng/kg for the >3/8-inch and <3/8-inch fractions, respectively. The commercial/industrial direct exposure SCTL for dioxin is 30 ng/kg. Because of these low dioxin concentrations, and because dioxins are not readily soluble in water, they were not examined in the leaching studies.

4.0 Leaching Test Results

4.1 Leaching Tests Methods

Several different leaching test methodologies were used to assess the potential chemical mobility of the WTE bottom ash, the ash-amended asphalt concrete, and the ash-amended PCC. The Synthetic Precipitation Leachate Procedure (SPLP; EPA method 1312) was used to test all three materials. The SPLP is a batch leaching tests conducted at a fixed liquid to solid ratio (20:1) for a specified time (18 hours). The SPLP leaching solution simulates acid rainfall. This test requires that the material be size reduced (as needed) to less than 0.95 cm (3/8 inch).

While the SPLP is commonly used when evaluating the potential for a beneficially used waste to impact groundwater, it does have limitations, and thus alternative leaching procedures have been developed to better represent specific reuse and disposal scenarios. EPA method 1314 is a column leaching test run under saturated conditions, which allows an examination of chemical leaching as a function of the liquid to solid ratio. For granular materials, this method provides a more realistic representation of the leachate concentrations that would result from infiltrating rainfall. Thus EPA method 1314 was conducted on the WTE bottom ash.

4.2 Health-Based Regulatory Thresholds

The leaching results in the following sub-sections include health-based regulatory thresholds to serve as a point of comparison. The Florida Groundwater Clean-up Target Levels (GCTLs) were used as the regulatory threshold. The GCTLs were developed for use in contaminated site remediation, and these thresholds are often used as part of the beneficial use assessment process.

The only health-based threshold not adopted directly from the GCTL list was the GCTL for aluminum. The GCTL for aluminum is based off the US-EPA's secondary drinking water standard, which can be defined as a non-mandatory water quality standard to serve "as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color and odor." A health-based GCTL was calculated using the oral reference dose used for aluminum found in F.A.C 62-777, the Florida Soil Cleanup Target Levels (SCTL). This approach is similar to that used by the UF Center for Environmental and Human Toxicology to develop human health-based GCTLs for iron and manganese. Further calculations and supporting information can be found in Appendix I.

4.3 Results for WTE Bottom Ash Base Course

Both the SPLP and method 1314 were used to test the WTE bottom ash material used as the base course in the Pasco County RD&D test strip project. The results of these tests are provided in Table 4-1 (SPLP), Table 4-2 (1314) and Figures 4-1 through 4-3. Included in these tables and plots are the appropriate GCTL.

Table 4-1. SPLP Leachate Concentrations for Pasco County WTE Bottom Ash

Element	Mean SPLP Concentration (mg/L)	Standard Deviation (mg/L)	GCTL (mg/L)
Ag	0.004	0.000	0.1
Al	44.3	3.72	7*
As	0.004	0.000	0.01
B	0.128	0.011	1.4
Ba	0.151	0.008	2
Be	0.001	0.000	0.004
Ca	124.2	5.63	-
Cd	0.002	0.000	0.005
Cr	0.006	0.002	0.1
Cu	0.198	0.007	1
Fe	0.052	0.011	0.3
Hg	0.0005	0	0.002
Mg	0.041	0.017	-
Mn	0.001	0.000	0.050
Mo	0.041	0.001	0.035
Na	75.7	1.32	160
Ni	0.002	0.000	0.1
Pb	0.005	0.002	0.015
Sb	0.051	0.020	0.006
Se	0.002	0.000	0.05
Sn	0.002	0.000	4.2
Sr	0.465	0.087	4.2
V	0.021	0.001	0.049
Zn	0.047	0.015	5
CL^-	96.6	27.5	250
SO_4^-	39.0	11.5	250

[#]Health-based GCTL (see Appendix I)

Table 4-2. Method 1314 Average Leachate Concentrations for Pasco County WTE Bottom Ash

Element	Mean Concentration of Individual 1314 Measurements (mg/L)	Standard Deviation (mg/L)	GCTL (mg/L)
Ag	0.0035	0.000	0.1
Al	34.2	5.86	7*
As	0.004	0.000	0.01
B	0.163	0.028	1.4
Ba	0.218	0.084	2
Be	0.0020	0.000	0.004
Ca	158	72.4	-
Cd	0.0020	0.000	0.005
Cr	0.011	0.012	0.1
Cu	0.795	0.757	1
Fe	0.013	0.007	0.3
Mg	0.011	0.009	-
Mn	0.001	0.000	0.050
Mo	0.201	0.158	0.035
Na	435	516	160
Ni	0.005	0.003	0.1
Pb	0.004	0.000	0.015
Sb	0.028	0.003	0.006
Se	0.006	0.000	0.05
Sn	0.003	0.000	4.2
Sr	1.44	0.798	4.2
V	0.007	0.001	0.049
Zn	0.023	0.007	5

[#]Health-based GCTL (see Appendix I)

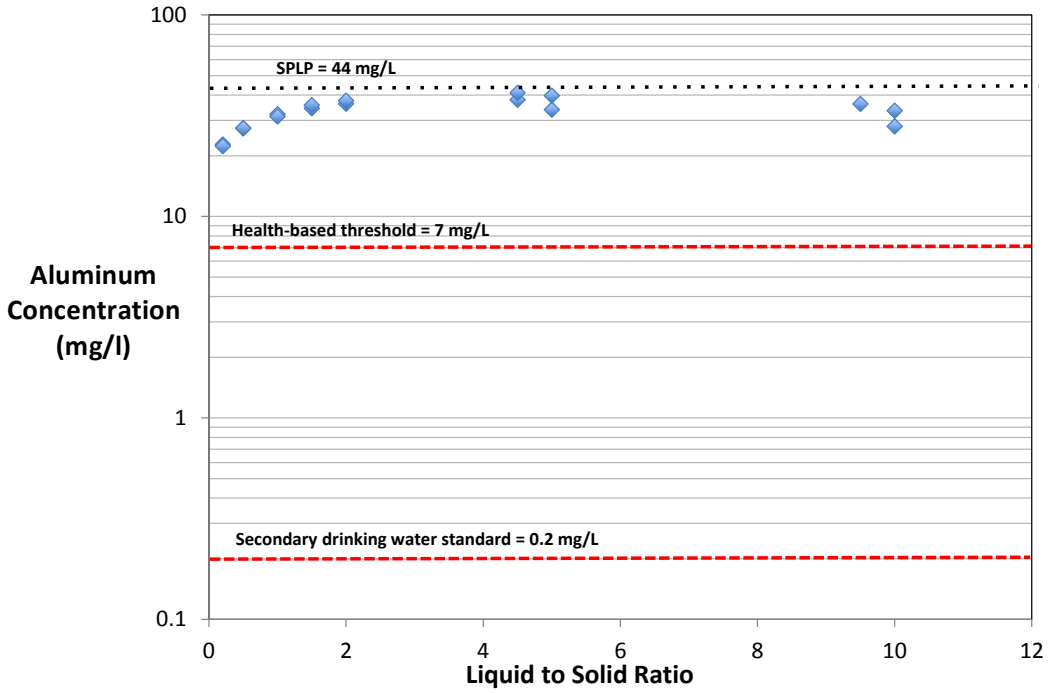

Figure 4.1. Method 1314 and SPLP Leaching Test Results for Aluminum; Bottom Ash Used as Base Course in RD&D Project

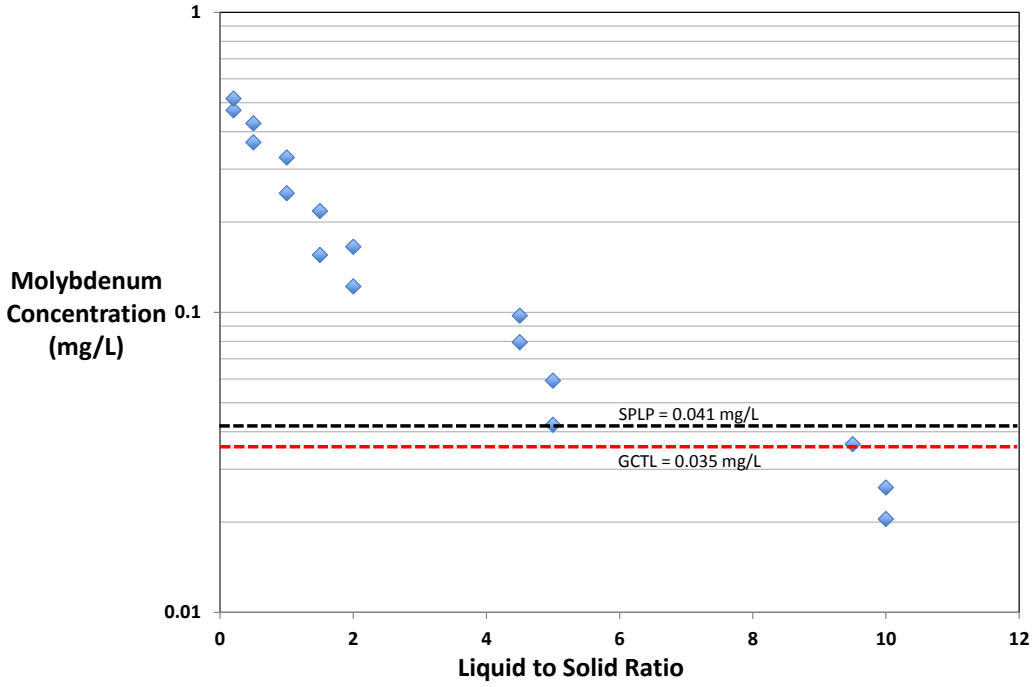

Figure 4.2. Method 1314 and SPLP Leaching Test Results for Molybdenum; Bottom Ash Used as Base Course in RD&D Project

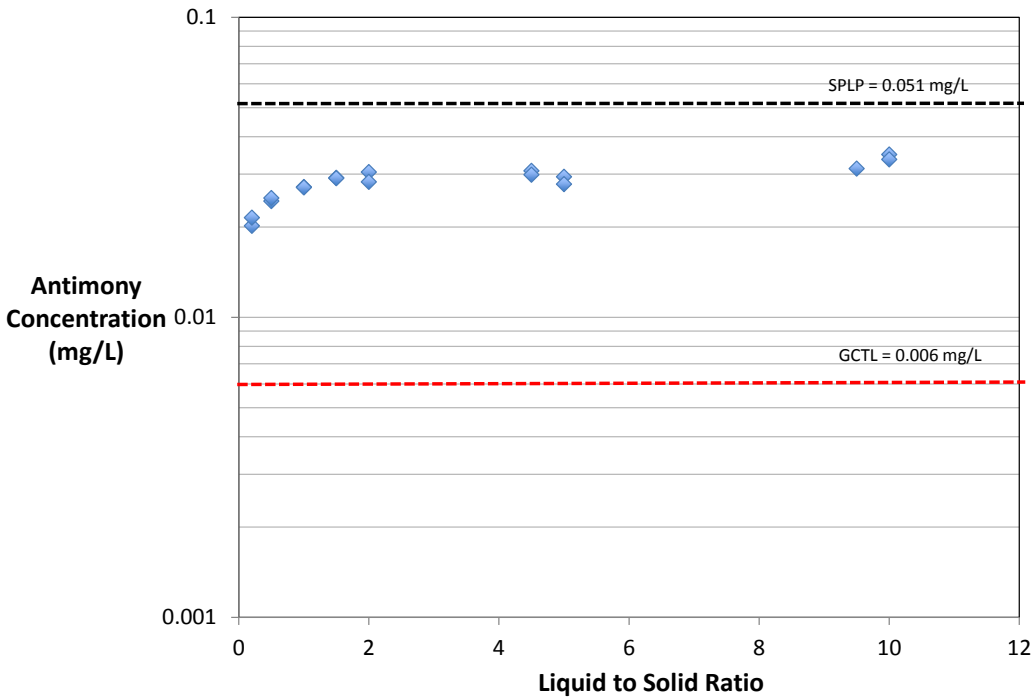

Figure 4.3. Method 1314 and SPLP Leaching Test Results for Antimony; Bottom Ash Used as Base Course in RD&D Project

4.4 Results for Asphalt and Concrete Pavement

The asphalt and PCC pavement samples (constructed with the coarse WTE bottom ash from the Pasco County RD&D test strip project) were sized reduced and tested using SPLP. Method 1314 was not performed, as it would not accurately represent the conditions of the materials, as they existed in the roadway.

Table 4-3. SPLP Leachate Concentrations for Ash-Amended Asphalt and Concrete

Element	Mean Concrete SPLP Concentration (mg/L)	Mean Asphalt SPLP Concentration (mg/L)	GCTL (mg/L)
Ag	0.004	0.004	0.1
Al	1.37	5.87	7*
As	0.004	0.004	0.01
B	0.007	0.044	1.4
Ba	0.697	0.028	2
Be	0.002	0.002	0.004
Ca	509	50.8	-
Cd	0.002	0.002	0.005
Cr	0.034	0.004	0.1
Cu	0.007	0.012	1
Fe	0.010	0.011	0.3
Mg	0.013	0.088	-
Mn	0.001	0.001	0.050
Mo	0.071	0.007	0.035
Na	14.6	11.6	160
Ni	0.002	0.002	0.1
Pb	0.008	0.004	0.015
Sb	0.003	0.035	0.006
Se	0.006	0.006	0.05
Sn	0.003	0.003	4.2
Sr	1.98	0.098	4.2
V	0.001	0.004	0.049
Zn	0.010	0.007	5

[#]Health-based GCTL (see Appendix I)

4.5 Identification of COPC and Target DAF

The majority of the elements measured in the SPLP and 1314 leachates were below their respective GCTLs. Elements above their GCTLs for each of the samples tested (asphalt, concrete, base course ash) are presented in Table 4-3. These elements are identified as the COPC and will be discussed in greater detail in the subsequent sections.

Table 4-4. Elements Exceeding GCTL in Leaching Test Results

WTE Bottom Ash (SPLP)	WTE Bottom Ash (1314)	Ash-Amended Concrete (SPLP)	Ash-Amended Asphalt (SPLP)
Al	Al	Mo	Sb
Mo	Mo		
Sb	Sb		

As described in the previous section, the approach being taken in this report requires an assumption of an initial leachate concentration (C_o) that emanates from the base of the road and moves into the unsaturated zone, and eventually into the groundwater. All subsequent pollutant attenuation models in this report utilize C_o values from the previous tables as follows:

- Ash-amended concrete C_o values → SPLP results from Table 4-3
- Ash-amended asphalt C_o values → SPLP results from Table 4-3
- WTE bottom ash base C_o value → 1314 results from Table 4-2

One exception is the WTE bottom ash base C_o values for Al, Mo and Sb. As these elements were identified as being the closest to their respective GCTL, a refined set of C_o values were developed by calculating the weighted average of the method 1314 concentrations, to better represent the average mass of the chemical that leached per mass of ash. Since method 1314 characterizes leaching as a function of time, and given that the collection time intervals vary as part of the procedure, this approach provides for a better estimate of the average. The C_o concentrations used for Al, Mo, and Sb leaching from the WTE bottom ash base were 37.9, 0.121, and 0.030 mg/L, respectively. Table 4-5 presents the DAF required to reduce the C_o values from the COPC to below their respect health-based GCTL.

Table 4-5. Calculated DAF

WTE Bottom Ash	Ash-Amended Concrete	Ash-Amended Asphalt
Al → 5.4	Mo → 2.0	Sb → 5.9
Mo →3.5		
Sb → 5.0		

The information presented in Table 4-5 indicates that if dilution and attenuation reduce the leachate concentrations by a factor of 5.9 or more, groundwater concentrations will be less than the threshold. The DAF values for the ash-amended concrete and asphalt are considered conservative as they represent results from size-reduced samples.

5.0 Infiltration Analysis

5.1 Approach

A critical component of this analysis is the estimated rate of water infiltration through the ash-containing roadway components, and the subsequent rate of leachate infiltration into the underlying soil and groundwater. The nature of the proposed recycling activities is one where the majority of the rainfall that hits the roadway will be shed as stormwater. Road pavements are by their very nature low in permeability and designed to shed water as rapidly as possible (e.g., they are sloped), to provide for safe driving conditions. Much of the remaining moisture will evaporate from the pavement surface. However, some small amount of moisture may infiltrate into pavement surface and migrate through the road into the subsurface environment.

To the authors' best knowledge, there are no established models for predicting the infiltration of moisture into pavements over time under varying climatic conditions. Most transportation engineers treat the pavement surface as impermeable. Several researchers who have examined the reuse of recycled materials in roadway construction have also treated pavement surfaces as impermeable. In Pasco County, WTE bottom ash will only be recycled in a manner where it is encapsulated in a pavement material or it is placed entirely below a paved surface. Thus some method for approximating infiltration through a paved roadway was necessary to successfully complete this analysis.

The HELP model was selected as the tool used to estimate infiltration into the paved roadway surfaces. HELP is a water balance model that was developed for landfill applications, but can be used to predict the moisture balance of any system consisting of horizontal layers subject to rainfall and evaporation. HELP is not designed, however, to model a paved road surface, so certain modifications or simplifications were required.

HELP allows for the modeling of the volume of water that runs off a surface after a rainfall event (using the common SCS curve number method), but this method does not provide a very accurate means to estimate infiltration. The curve number approach predicts stormwater runoff and routes the rest of the liquid as infiltration into the top layer; it does not take into account the depth of water built up on the road surface, which is the driving force for infiltration into the material. To better estimate infiltration, HELP was used to model the surface of the road as a sloped leachate collection layer [with the same slope as the proposed roadways to be constructed (2%)], thus simulating the water depth on the road and its subsequent infiltration. This set of HELP model runs is referred to as *HELP Set 1* and the details and results of this analysis are presented in section 5.4.

While the approach used in *HELP Set 1* provides a better estimate of infiltration into the pavement layer, it does not account for evaporation. Thus data from an additional set of HELP runs was used to provide a better understanding of the fraction of rainwater that evaporates instead of infiltrating through the pavement layer. This set of HELP model runs is referred to as *HELP Set 2* and the details and results of this analysis are presented in section 5.5. *HELP Set 2* was also used to produce a range of infiltration values that were used for the IWEM runs discussed in Section 7.

One key element of the HELP runs and the estimation of infiltration is the hydraulic conductivity (k) of the pavement layer. While pavement is considered by most to be impermeable, both concrete and asphalt pavement are porous and can transmit a small amount of moisture. The hydraulic conductivity of different pavement types are discussed in Section 5.2.

5.2 Hydraulic Conductivity of Pavement Materials

A range of hydraulic conductivity values were used for the pavement and base materials in *HELP Set 1* and *HELP Set 2*. As will be illustrated in the following sections, the hydraulic conductivity of the pavement layers plays the single largest role in determining infiltration through the road.

The hydraulic conductivity value for PCC that was used in the HELP model runs was 10^{-10} cm/s, based on the *Portland Cement Associations Design and Control of Concrete Mixtures* (Kosmatka and Panarese, 2001). To account for concrete age, poor quality, and damage over time, a value of 10^{-8} cm/sec was also used. Values reported for the permeability of the asphalt varied from 10^{-7} to 10^{-3} cm/sec (Kanitpong et al., 2001; Hainin et al., 2004).

Asphalt pavement is more permeable than PCC pavement. A review of the literature found that the hydraulic conductivity of asphalt pavement is largely controlled by the air voids content (Kanitpong et al., 2001; Hainin et al., 2004). Compacted laboratory samples typically target 3-5% air voids content, and hydraulic conductivity of asphalt of this nature is normally 10^{-5} cm/sec or less. The air void range of field-compacted samples is greater than laboratory-compacted samples, often in the range of 6-8%. Over time, the air voids content will reduce as the road is subject to loads, and begin to more closely approach laboratory conditions (Krishnan and Rao., 2000). Overall, the literature suggests that well-constructed asphalt roads will have a hydraulic conductivity of 10^{-4} cm/sec or less.

The FDOT state materials office (SMO) has developed a method for measuring the permeability of an asphalt core (FDOT, 2012; Choubane et al., 1998). The authors met with FDOT to find out typical hydraulic conductivities that they have measured, but they do not routinely run this procedure and when they do it is normally conducted on

samples where there is some type of construction or performance concern. A set of relatively recent hydraulic conductivity tests conducted in the FDOT SMO lab were obtained from a landfill closure project at the Brevard CDF Slurry Wall Landfill. Jones Edmunds and Associates examined the permeability of an on-site haul road by collecting and testing asphalt cores from different locations (documents are attached in Appendix B). The results of the test found one of the cores to have a permeability of $5x10^{-5}$ cm/s while the other two were below the method detection limit of $2.4x10^{-7}$ cm/s.

To assess the permeability of typical asphalt pavement mixes in Pasco County, two roadway cores were collected. One roadway core was taken near the intersection of Darby road and Old Darby road (paved fall 2013, limited traffic) and the other from Wesley Chapel Blvd north of State Road 54 (paved summer 2011) (see attached photos in Appendix B). The roadway core from Darby road was 3 inches in thickness and the Wesley Chapel Blvd core was 6 inches. Both roadways were placed by Pasco County Road and Bridge and utilized Marshal mix asphalt designs. These core samples were tested for permeability at the FDOT SMO. Since the Wesley Chapel Blvd core was over 5 inches it was cut in half to accommodate the test apparatus. The mean hydraulic conductivities reported for the Darby road, Wesley Chapel A (top half), and Wesley Chapel B (bottom half) cores were $9.83x10^{-5}$ cm/s, $2.88x10^{-7}$ cm/s, and below the detection limit of $1.72x10^{-7}$ cm/s. The Darby road core, was re-cored to 4" and tested in a modified falling head permeameter at the University of Florida Civil Engineering laboratories. The mean value recorded was $7.45x10^{-5}$ cm/s.

5.3 Climate Data Used for HELP Runs

Pasco county-specific precipitation data were generated by using previous rainfall data over a 10-year period from May 12, 2004 to May 12, 2014. This data was obtained from the Brooksville Airport weather station in Brooksville, Florida and reported to the National Oceanic and Atmospheric Administration. Detailed precipitation data can been seen in the HELP model output files found in Appendix E. Evapotranspiration, temperature, and solar radiation data were generated using the preprogramed data set for the city of Tampa, FL which was then adjusted to a latitude of 28.55 degrees to be representative of Pasco County.

5.4 Estimating Moisture Infiltration into Paved and Sloped Surfaces

HELP Set 1 consisted of eight separate HELP runs designed to assess the amount of infiltration that would occur into a paved surface as a function of the pavement hydraulic conductivity. A more detailed description of the HELP model is provided in Appendix A. The HELP layer configuration for Set 1 is shown in Figure 5.1. The paved surface of the road was treated as a sloped barrier layer (slope = 2%). Two "imaginary" layers were placed above the pavement layer (a vertical percolation layer and a lateral drainage layer); by doing this, HELP could be used to calculate the volume of water draining off the sloped surface and infiltrating into pavement layer. A second lateral

drainage layer was placed under the pavement to intercept the pavement leachate for quantification; this necessitated placing a geomembrane below the lateral drainage layer.

As indicated in Figure 5-1, the hydraulic conductivity of the top two "imaginary" layers were set very large to represent a condition of unrestricted liquid flow. Top two layers were necessary as HELP requires a liquids drainage layer to be overlain by a vertical drainage layer. Since HELP calculates evaporation only from the top layer, this method does not incorporate the reduction in infiltration as a result of evaporation from the pavement surface. The degree of likely evaporation (and the reduction in actual infiltration) is assessed in the next section.

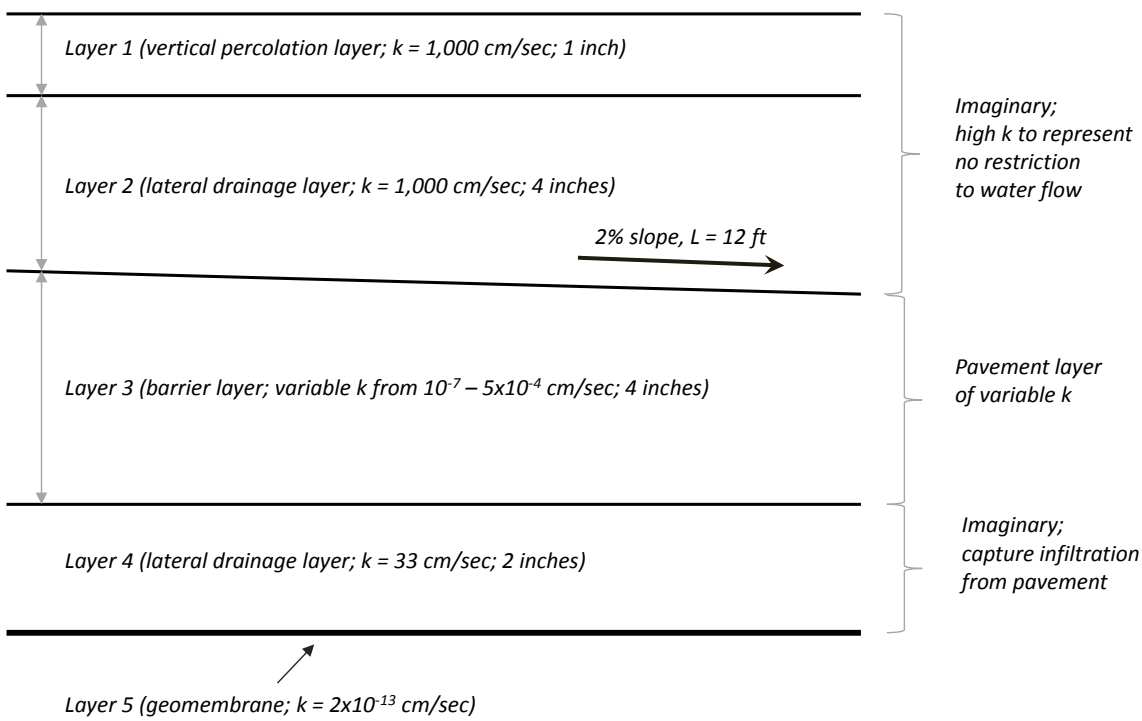

Figure 5.1. Layer Configuration for HELP Set 1

As described in Section 5.1, the methodology employed for *HELP Set 1* was viewed as the best method available to estimate pavement layer infiltration. The results of this analysis are presented in Table 5-1. Estimated infiltration ranged from 0.2% of the rainfall at a hydraulic conductivity of 10^{-7} cm/sec to 19% of rainfall for a hydraulic conductivity of $5x10^{-4}$ cm/sec. Again, these estimates do not include any evaporation; actual infiltration through the pavement layers would be lower.

Table 5-1. Infiltration through Paved Surfaces of Different Hydraulic Conductivities as Modeled using HELP Set 1 *(Total Rainfall = 48.0 inches)*

Pavement Permeability (cm/s)	Infiltration (in/yr)	Infiltration (%)
1.00E-07	0.0745	0.2%
5.00E-07	0.28	0.6%
1.00E-06	1.52	3.2%
5.00E-06	1.83	3.8%
1.00E-05	3.01	6.3%
5.00E-05	6.32	13.2%
1.00E-04	7.49	15.6%
5.00E-04	9.16	19.1%

5.5 Estimating Contribution of Evaporation

Since *HELP Set 1* did not account for evaporation from the pavement surface, additional HELP runs were used to assess how much of the water remaining on/in the pavement after a rainfall event (the percentage that did not runoff as stormwater) would evaporate and how much would infiltrate through the pavement layer. *HELP Set 2* consisted of 36 HELP runs that were conducted on a variety of different layer combinations, including 27 runs where asphalt was modeled as the pavement material and 9 runs where PCC was modeled as the pavement material. The detailed results of *HELP Set 2* are presented in Appendix E. The *HELP Set 2* runs were used to develop the infiltration ranges utilized in the IWEM screening analysis (see Section 7).

The layer set up for the *HELP Set 2* runs used to model asphalt as the pavement material is presented in Figure 5-2. A 4-inch layer of asphalt pavement was placed on top of a 10-inch base layer. Similar to *HELP Set 1*, an imaginary leachate collection layer was placed under the base layer to quantify leachate flow rates emanating from the bottom of the road. A series of runs were performed at different material hydraulic conductivities and curve numbers. The evaporative zone depth was set as the depth of the pavement layer. For the purpose of estimating the relative magnitude of evaporation compared to infiltration, the output from the 27 runs where asphalt was used as a paving layer was examined, and the percentage of evaporation compared to the sum of evaporation plus infiltration was calculated [E/(E+I)]. The results of this analysis are presented in Table 5-2. The percentage of evaporation relative to evaporation plus infiltration ranged from 76% to 98%.

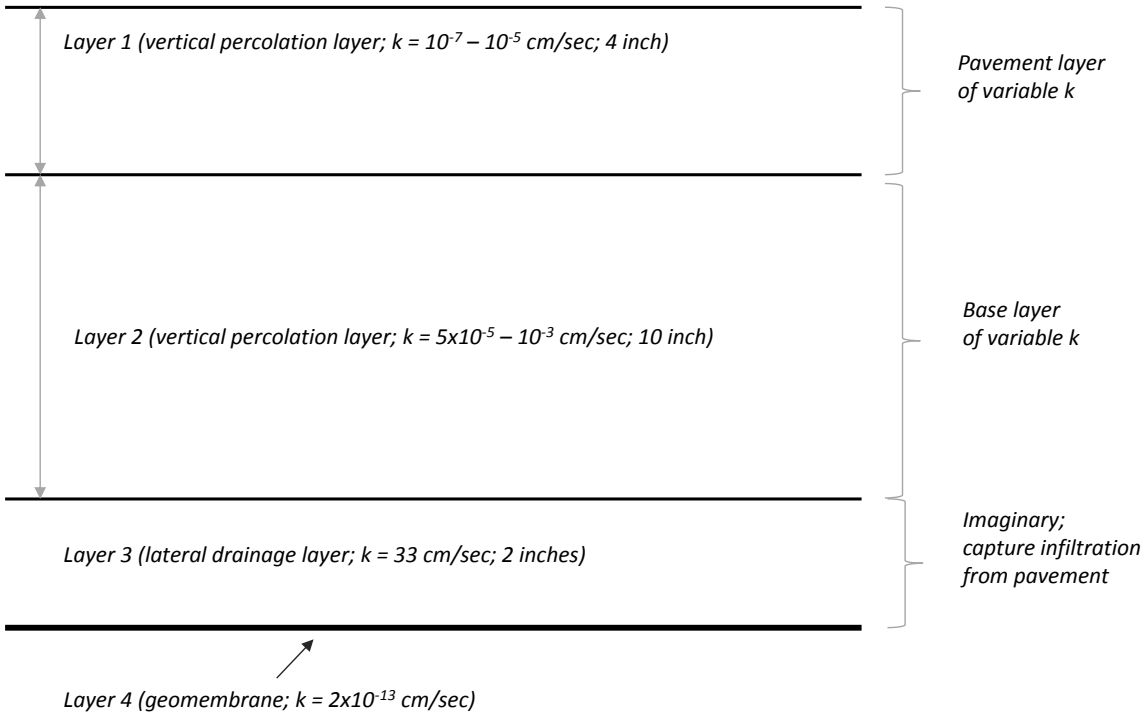

Figure 5.2. Layer Configuration for HELP Set 2

Table 5-2. The Fraction of Water Remaining On/In Asphalt Pavement after Runoff Represented by Evaporation *(Based on 27 different HELP Runs; HELP Set 2)*

Curve #	Base HC (cm/s)	Pavement HC (cm/s)	Evaporation, in. (%)	Infiltration, in. (%)	E/(E+I) Percent
88	$1 * 10^{-4}$	$1 * 10^{-7}$	8.56 (17.8)	0.351(0.73)	96%
88	$1 * 10^{-4}$	$1 * 10^{-6}$	10.5 (22.0)	0.232(0.48)	98%
88	$1 * 10^{-4}$	$1 * 10^{-5}$	11.7 (24.5)	3.54(7.39)	77%
88	$5 * 10^{-5}$	$1 * 10^{-7}$	8.56 (17.8)	0.351(0.73)	96%
88	$5 * 10^{-5}$	$1 * 10^{-6}$	10.5 (22.0)	0.232(0.48)	98%
88	$5 * 10^{-5}$	$1 * 10^{-5}$	11.7 (24.5)	3.54(7.39)	77%
88	$1 * 10^{-3}$	$1 * 10^{-7}$	8.56 (17.8)	0.351(0.73)	96%
88	$1 * 10^{-3}$	$1 * 10^{-6}$	10.5 (22.0)	0.232(0.48)	98%
88	$1 * 10^{-3}$	$1 * 10^{-5}$	11.7 (24.5)	3.54(7.39)	77%
94	$1 * 10^{-4}$	$1 * 10^{-7}$	8.43(17.6)	0.352(0.73)	96%
94	$1 * 10^{-4}$	$1 * 10^{-6}$	10.3(21.6)	0.232(0.48)	98%
94	$1 * 10^{-4}$	$1 * 10^{-5}$	11.07(23.1)	3.23(6.75)	77%
94	$5 * 10^{-5}$	$1 * 10^{-7}$	8.43(17.6)	0.353(0.73)	96%
94	$5 * 10^{-5}$	$1 * 10^{-6}$	10.3(21.6)	0.232(0.48)	98%
94	$5 * 10^{-5}$	$1 * 10^{-5}$	11.1(23.1)	3.24 (6.75)	77%
94	$1 * 10^{-3}$	$1 * 10^{-7}$	8.43(17.6)	0.353 (0.73)	96%
94	$1 * 10^{-3}$	$1 * 10^{-6}$	10.4(21.6)	0.231 (0.48)	98%
94	$1 * 10^{-3}$	$1 * 10^{-5}$	11.1(23.1)	3.24 (6.75)	77%
98	$1 * 10^{-4}$	$1 * 10^{-7}$	7.47(15.6)	0.372(0.78)	95%
98	$1 * 10^{-4}$	$1 * 10^{-6}$	8.19(17.1)	0.251(0.52)	97%
98	$1 * 10^{-4}$	$1 * 10^{-5}$	8.27(17.2)	2.56(5.34)	76%
98	$5 * 10^{-5}$	$1 * 10^{-7}$	7.47(15.6)	0.372(0.78)	95%
98	$5 * 10^{-5}$	$1 * 10^{-6}$	8.19(17.1)	0.251(0.52)	97%
98	$5 * 10^{-5}$	$1 * 10^{-5}$	8.27(17.2)	2.56(5.34)	76%
98	$1 * 10^{-3}$	$1 * 10^{-7}$	7.47 (15.6)	0.372 (0.78)	95%
98	$1 * 10^{-3}$	$1 * 10^{-6}$	8.19 (17.1)	0.251 (0.52)	97%
98	$1 * 10^{-3}$	$1 * 10^{-5}$	8.27 (17.2)	2.56 (5.34)	76%
Min			76%		
Max			98%		
Mean			90%		

5.6 Expected Infiltration Rates

The results from *HELP Set 1* found that infiltration rates into asphalt pavement exposed to Pasco County weather conditions ranged from 0.2% (k = 10^{-7} cm/sec) to 19% (k = $5x10^{-4}$ cm/sec). As one would expect, larger hydraulic conductivities result in larger infiltration amounts. The results from *HELP Set 2* found that 76% to 98% of the rainwater remaining after runoff would evaporate under Pasco County weather conditions. Figure 5-3 plots infiltration as a function of pavement hydraulic conductivity based on *HELP Set 1* and adjusted for different evaporation percentages found in *HELP Set 2.*

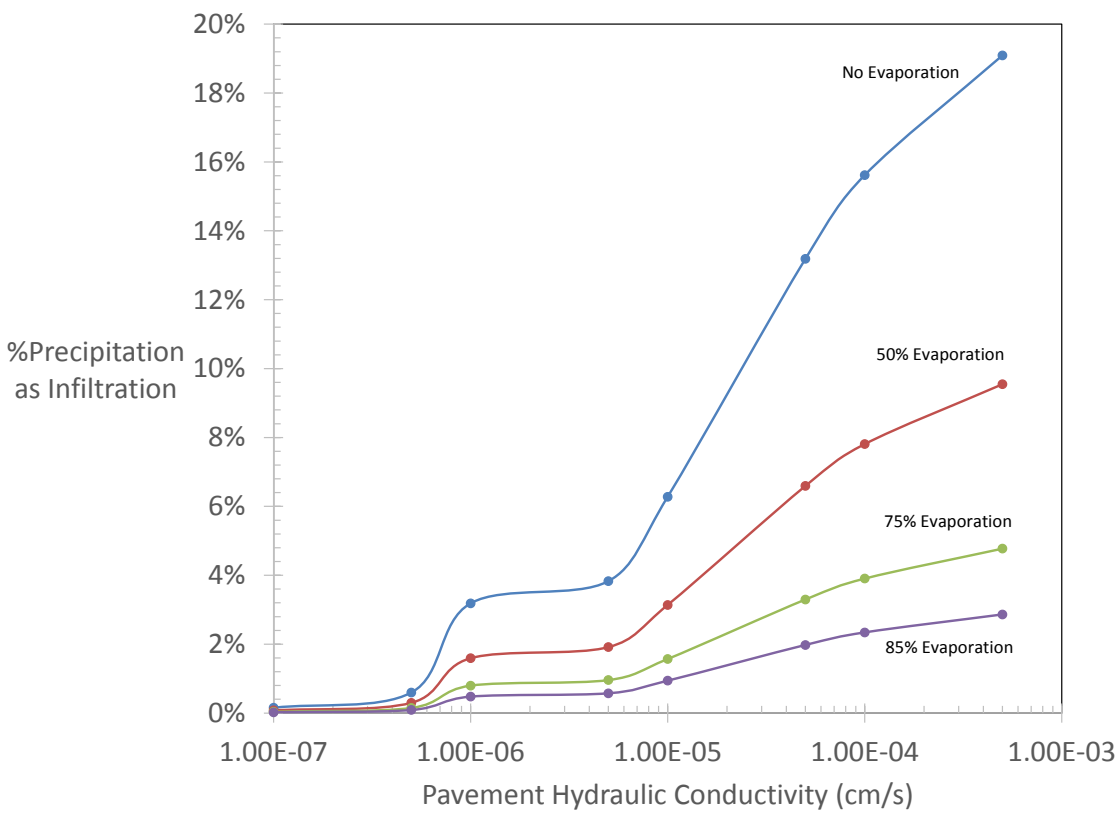

Figure 5.3. Percent Infiltration into Pasco County Roads as a Function of Pavement Hydraulic Conductivity and % Evaporation

The data shown in Figure 5-3 provide guidance for the range of infiltration rates that should be used as part of the modeling efforts presented in the subsequent chapters. As discussed in Section 5.2, PCC pavement surfaces should be very low in hydraulic conductivity, and thus the amount of infiltration should be very small (<1%) (Appendix E). Well-constructed asphalt pavement roads should have hydraulic conductivities less than 10^{-4} cm/sec (usually much less). From Figure 5-3, using 10^{-4} cm/sec as a likely high end of asphalt pavement hydraulic conductivity, and assuming 75% evaporation (the

low end of evaporation predicted), the amount of infiltration should be less than 4%. 10% infiltration represents a conservative high-end estimate of a value for an asphalt road, corresponding to a hydraulic conductivity of $5x10^{-4}$ cm/sec and an evaporation of 50%.

One additional consideration related to moisture infiltration through paved surfaces is the impact of defects (e.g., cracks, potholes). One of the original motivations behind *HELP Set 2* was to vary the curve numbers that HELP uses to predict stormwater runoff (SCS curve number method). Some researchers (e.g., Pandit et al., 2009) have tried to relate CNs to the condition of a roadway. The results of the CN analysis (see Table 5-2) found that the hydraulic conductivity of the paving layer had a much greater impact on infiltration than did the CN. While a lower CN (which represents conditions of cracking or damage) does result in an increase in infiltration, the hydraulic conductivity of the pavement layer plays a larger role. As the hydraulic conductivity of the surface layer increases, the relative additional moisture that can be introduced into the pavement surface becomes less. Thus the high-end infiltration assessment of 10%, described above, remains a valid estimate for a conservative input.

6.0 Dilution Factor Analysis

Any moisture that infiltrates through the roadway as leachate will eventually migrate through the soil and into the groundwater. Any chemicals in the leachate will be diluted by the underlying groundwater, and the degree of this dilution will depend on the infiltration rate and the groundwater flow properties. Methods have been developed to estimate the degree of dilution that will occur when an area source is added to a flow aquifer. The dilution factor is commonly described as:

$$Dilution\ Factor = 1 + \frac{K\ i\ d}{I\ L}$$

Where:

K ,saturated hydraulic conductivity of the aquifer, ft/yr.
i, hydraulic gradient, ft/ft.
d, mixing zone depth, ft.
I, infiltration rate, ft/yr.
L, source length parallel to groundwater flow, ft.

The mixing zone depth, d, is determined using the following equation:

$$d = (0.0112 X_r L)^{\ 0.5} + d_a \left(1 - \exp\left(-\frac{LI}{Kid_a}\right)\right)$$

Where:

L, source length parallel to groundwater flow, ft.
X_r, distance between source edge and point of observation, ft
K, saturated hydraulic conductivity of the aquifer, ft/yr.
I, infiltration rate, ft/yr.
i, hydraulic gradient, ft/ft.
d_a, actual depth of aquifer, ft

The above equation was used to calculate the dilution factor that would occur over a range of aquifer conditions for a range infiltration conditions. In all cases, the width of the road was set at 24 ft (the standard width for a two lane road) and the thickness of the aquifer was set at 10 ft. Because no attenuation occurs (only dilution), the thickness of the unsaturated does not enter into the equation.

Figure 6.1 shows the results of this analysis for 9 different aquifer conditions at a distance of 100 ft from the road. The conditions vary the aquifer gradient from 0.001 to 0.005 and the aquifer hydraulic conductivity from 5 ft/day to 20 ft/day. The range of hydraulic gradients corresponds to the range used in the range used in study that Dr.

John Garlinger conducted as part of the solute transport modeling done for the Department in 1993 (for surficial aquifers), and used in the Department's "unimpeded discharge" modeling exercise. The range of hydraulic conductivities cover the range used in these studies (10 – 20 ft/day) but were expanded downward to include 5 ft/day. The shaded area in Figure 6.1 reflects a range corresponding to a dilution attenuation factor of less than 6 and an infiltration rate of less than 10%. As identified in Section 4.5, the maximum dilution factor required to bring the laboratory measured C_o concentrations to less than their respective health-based threshold was 5.9. As identified in Section 5.6, the upper end of the conservative infiltration rate was 10%. Thus, only those aquifer conditions and infiltration rates present in the shaded area would have any potential for a groundwater exceedance at 100 ft from the road.

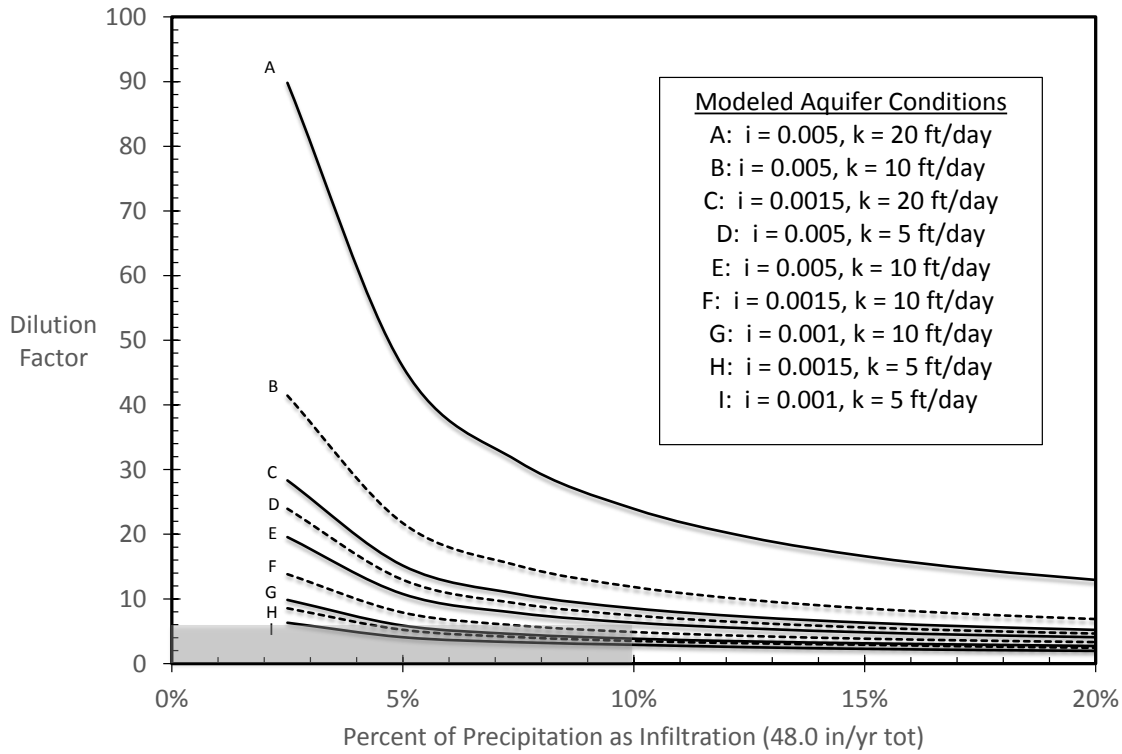

Figure 6-1. Dilution Factors at 100 ft from Edge of Road as a Function of Aquifer Conditions and Infiltration (Depth of Aquifer = 10 ft; Shaded Range Represents DAF < 6 and Infiltration < 10%)

As the shaded area in Figure 6-1 represents such a small part of the plot, Figure 6-2 magnifies the plot for the area of interest. This figure shows that only modeled aquifer conditions F, G, H and I would have the potential to exhibit a groundwater exceedance. If the infiltration rate was less than approximately 2.5%, all of the conditions modeled would provide sufficient dilution for the leachate concentrations to be reduced to less than the health-based threshold at a distance of 100 ft from the edge of the road.

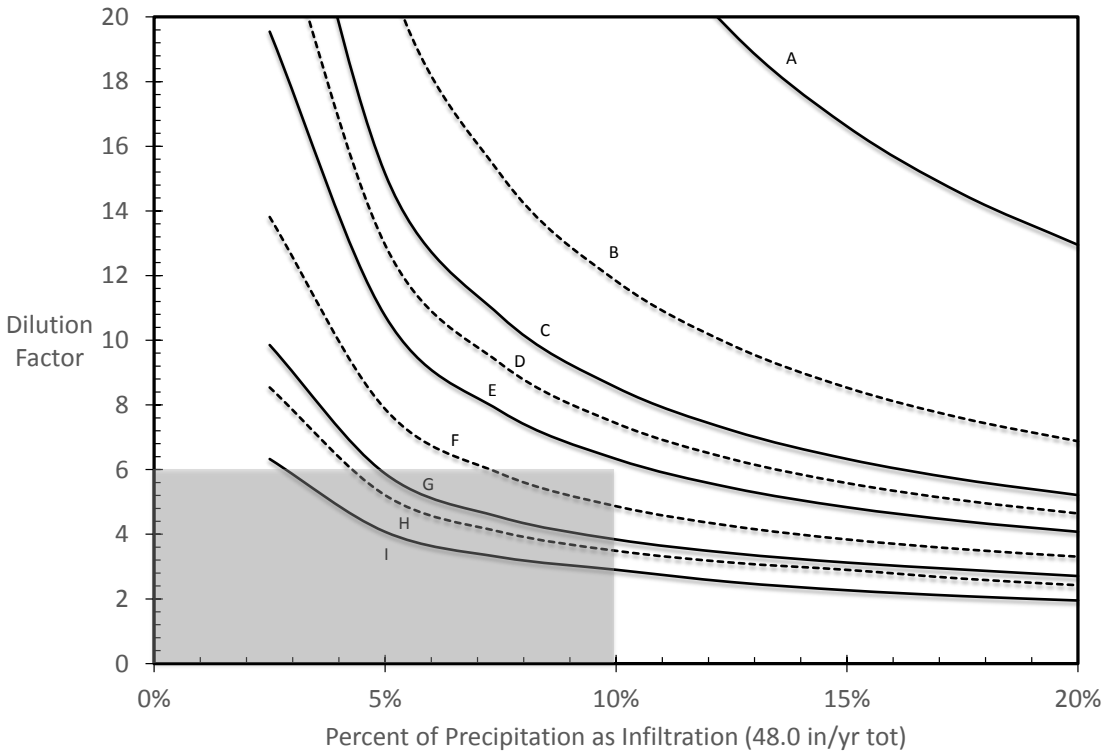

Figure 6.2. Magnified Dilution Factors at 100 ft from Edge of Road as a Function of Aquifer Conditions and Infiltration (Depth of Aquifer = 10 ft; Shaded Range Represents DAF < 6 and Infiltration < 10%

7.0 Pollutant Attenuation Analysis

7.1 Objectives and Approach

The dilution analysis demonstrates that for much of the range of expected infiltration rates and aquifer conditions, COPC concentrations resulting from WTE bottom ash in the proposed recycling applications will be less than the GCTL at a target point of compliance away from the road. However, a small set of conditions could theoretically exist where dilution alone will not sufficiently reduce concentrations. Thus additional pollutant attenuation modeling was conducted.

As a first approach, the US EPA's Industrial Waste Management Evaluation Model (IWEM) was used. IWEM allows the user to evaluate the potential impact to groundwater in variety of waste management scenarios, including the beneficial use of solid waste through land application (such as using ash in a roadway). IWEM is designed to be easy to use and serves as a screening tool. IWEM allows the input of some site-specific data, but it also pulls data from a larger nationwide database of information related to geologic and hydrogeologic conditions. IWEM relies on a powerful pollutant transport model (EPA-CMTP) and conducts a stochastic analysis. Simulations are conducted over a range of conditions that the model pulls from the database, and based on the distribution of results, it provides a conservative estimate of the expected groundwater concentration at a designated receptor location (the 90th percentile concentration). IWEM has the advantage of being a powerful tool that is relatively easy to run, and provides a conservative estimate of the potential impacts. IWEM has the disadvantage of limiting the user in terms of the specific input parameters entered and is limited with respect to site-specific analysis.

An alternative approach is to use a pollutant fate and transport model that does not rely on a stochastic analysis, but rather calculates groundwater concentrations for the exact inputs the modeler provides. A number of software packages are available to do this, some based on analytical solutions and others using numerical modeling. For this analysis, the model MRGYT, developed for the Electric Power Research Institute, was used to predict groundwater concentrations at a defined distance from the edge of a modeled road as function of the input conditions provided.

In this analysis, the screening evaluation conducted using IWEM is first presented. As will be shown, this conservative analysis provides results that demonstrate that some of the proposed reuse scenarios will never result in groundwater exceedances. Then modeling efforts using MYGRT are presented to provide a more focused assessment of expected concentrations that will occur using a set of groundwater conditions typical of a surficial aquifer in Pasco County.

7.2 IWEM Analysis

Further information about IWEM is provided in Appendix A. A series of 36 IWEM runs were conducted for a range of infiltration rates and receptor locations (see Appendix G). The infiltration rates used ranged from 0.2% to 10.2%; these ranges were selected based on the *HELP Set 2* runs initially conducted (see Appendix E), and correlate with the results presented in Section 5. The receptor distances (the distance from the roadway) modeled were 10, 35, 50 and 100 ft. The 10 and 35 ft distances correspond to the range of distances from the edge the pavement surface to the end of the County right-of-ways for road types in Pasco County, based on the *Pasco County Land Development Code* (see Appendix C). The 50 and 100 ft distances were examined to cover a range of anticipated distances to potable wells.

Based on the leaching test results presented in Section 4, the three elements that were predicted to possibly exceed their respective health-based threshold were Al, Mo and Sb. As proposed in Section 4.5, the base course C_o concentrations applied to Al, Mo and Sb for the IWEM input were 37.9, 0.121, and 0.030 mg/L, respectively. The C_o concentration used for the ash-amended PCC was 0.071 mg/L for Mo. The C_o concentration used for the ash-amended asphalt was 0.035 mg/L for Sb, these were the SPLP values measured in the laboratory testing of samples from the Pasco County roadway research project. A partitioning coefficient is used in the model to assess the degree of attenuation that will occur as the chemical moves through the unsaturated and the saturated zones. Partitioning coefficients for Sb and Mo are included in IWEM and generated using non-linear sorption isotherms with the geochemical speciation model MINTEQA2. Because IWEM does not provide a partitioning coefficient for Al, a partitioning coefficient for Al (K_d = 4 L/kg) was taken from the US-EPA *Risk-Screening Environmental Indicators – Appendix B: Model Physicochemical Properties for Toxics Release Inventory Chemicals and Chemical* Categories.

The aquifer type selected for the IWEM runs was the category "consolidated and semi-consolidated surficial aquifers", as this was determined to best represent the conditions occurring in Pasco County (see Appendix C). IWEM requires users to select one of three soil types: coarse grained soil (sandy loam), medium grained soil (silty loam), and fine grained soil (silty clay loam) for use in unsaturated zone modeling. For all simulations the coarse grained soil (sandy loam) was selected. The soil characteristics are coupled with local climatic data and used to determine aquifer recharge rates through use of the HELP model. Tampa, FL was used as the source of climatic data as it was the city in the database with closest proximity to Pasco County.

Each realization of the IWEM model results in a projected groundwater concentration at the modeled monitoring well distance. The 90th percentile of the 10,000 realizations are provided in Tables 7-1 through 7-3.

Table 7-1. IWEM 90th Percentile Concentration – Ash Amended Concrete

Molybdenum Concentration (ppm) as a Function of Infiltration and Receptor Location		
	Infiltration (in/yr)	
Receptor Location (ft)	**0.06 (0.13%)**	**1 (2.1%)**
10	0.0012	0.0179
35	0.001	0.0097
50	0.0008	0.0065
100	0.0005	0.0036

Table 7-2. IWEM 90th Percentile Concentration – Ash Amended Asphalt
Shaded area indicates exceedance above GCTL

Antimony Concentration (ppm) as a Function of Infiltration and Receptor Location				
	Infiltration (in/yr)			
Receptor Location (ft)	**0.23 (0.48%)**	**0.35 (0.73%)**	**1 (2.1%)**	**3.5 (7.3%)**
10	0.006	0.0025	0.0078	0.0215
35	0.0009	0.0013	0.0038	0.0105
50	0.0006	0.001	0.0027	0.0078
100	0.0003	0.0005	0.0013	0.0039

Table 7-3. IWEM 90th Percentile Concentration of Elements in IWEM Ash Used as Base

Shaded area indicates exceedance above GCTL

Leachate Concentration at a Receptor Location of 10ft (mg/L)				
Infiltration (in/yr) →	**0.1**	**0.5**	**1**	**5**
Molybdenum	0.0034	0.0131	0.0256	0.112
Antimony	9.41E-05	0.0034	0.0067	0.0218
Aluminum	0.0055	0.133	0.585	8.300
Leachate Concentration at a Receptor Location of 35ft (mg/L)				
Infiltration (in/yr) →	**0.1 (0.2%)**	**0.5 (1.0%)**	**1 (2.1 %)**	**5 (10.4%)**
Molybdenum	0.0026	0.0081	0.0145	0.0655
Antimony	0.0002	0.0018	0.0031	0.0112
Aluminum	0.0048	0.0858	0.300	4.13
Leachate Concentration at a Receptor Location of 50ft (mg/L)				
Infiltration (in/yr) →	**0.1**	**0.5**	**1**	**5**
Molybdenum	0.002	0.0066	0.0112	0.0479
Antimony	0.0001	0.0013	0.0022	0.0085
Aluminum	0.0041	0.0691	0.235	3.24
Leachate Concentration at a Receptor Location of 100ft (mg/L)				
Infiltration (in/yr) →	**0.1**	**0.5**	**1**	**5**
Molybdenum	0.0011	0.0037	0.0061	0.0256
Antimony	7.24E-05	0.0006	0.0011	0.0044
Aluminum	0.0025	0.04	0.130	1.47

In the tables above, the shaded areas represent those simulations where the 90th percentile concentration exceeds the heath-based GCTL. In the case of the ash-amended PCC pavement, the 90th percentile concentration for every simulation was below the GCTL. For the ash-amended asphalt and the ash base course IWEM runs, some simulations resulted in 90th percentile concentrations greater than the health-based GCTL, but at a distance of 100 ft from the edge of the road, all of the 90th percentile concentrations were below the necessary GCTL.

7.3 MYGRT Analysis

Additional details on MYGRT are provided in Appendix A. The model requires inputs on the dimensions of the source, the leachate discharge rate from the source, the leachate concentration, and information on both the unsaturated zone and the saturated zone. MYGRT was performed for aquifer condition "I" from Figure 6.1. This represented the aquifer condition with the lowest dilution factor (10 ft saturated zone depth, I = 0.001, k = 5 ft/day). The saturated zone depth was set to 3 ft (the minimum value that would be possible given the recommended location design and constraints outlined in Section 1). An infiltration rate of 5 inches/year was used (approximately 10%; this was the conservative maximum identified in Section 5). C_o values corresponding to the ash used as base course were set as 37.9, 0.121, and 0.030 mg/L, for Al, Mo and Sb, respectively. Partitioning coefficients from the literature were used, and where available, multiple partitioning coefficients were examined. Since only one element at a time can be run, three different MYGRT runs were performed. Details of the input parameters for each run are presented in Appendix H.

Figure 7.1 presents the results of the analysis for aluminum, showing Al concentrations as a function of distance from the edge of road after 100 years. A line corresponding to no attenuation is presented and shows a dilution factor of 3.6, which is close to the value in Figure 6-1. When a k_d of 4 L/kg is applied, the reduction in concentration is clearly observed. The concentration is reduced to less than the health based threshold of 7 mg/L in less than 20 ft from the edge of the road and to less than the secondary drinking water standard at approximately 70 ft from the edge of road (the background concentration Al concentration was set at 0 mg/L).

Figure 7.2 presents the MYGRT results for molybdenum, again showing concentrations as a function of distance from the edge of roadway after 100 years. The no-attenuation condition (DF = 3.6) sufficiently dilutes the concentration to less than the GCTL even at the edge of the road, and for the attenuating case, the concentration further drops at distances away from the road.

Figure 7.3 presents the results for antimony. In this case, three different k_d values were found from the literature and evaluated. For two of the cases (k_d = 9 L/kg and k_d = 45 L/kg), Sb was sufficiently attenuated that even at the edge of the road it was below the GCTL. For the smallest k_d (2.4 L/kg), the Sb concentration dropped to below the GCTL at just over 20 ft from the edge of the road.

The results demonstrate that even under the least-diluting set of aquifer conditions tested, the concentrations of the COPC at a distance 100 from the edge of the road were well below the health-based groundwater thresholds.

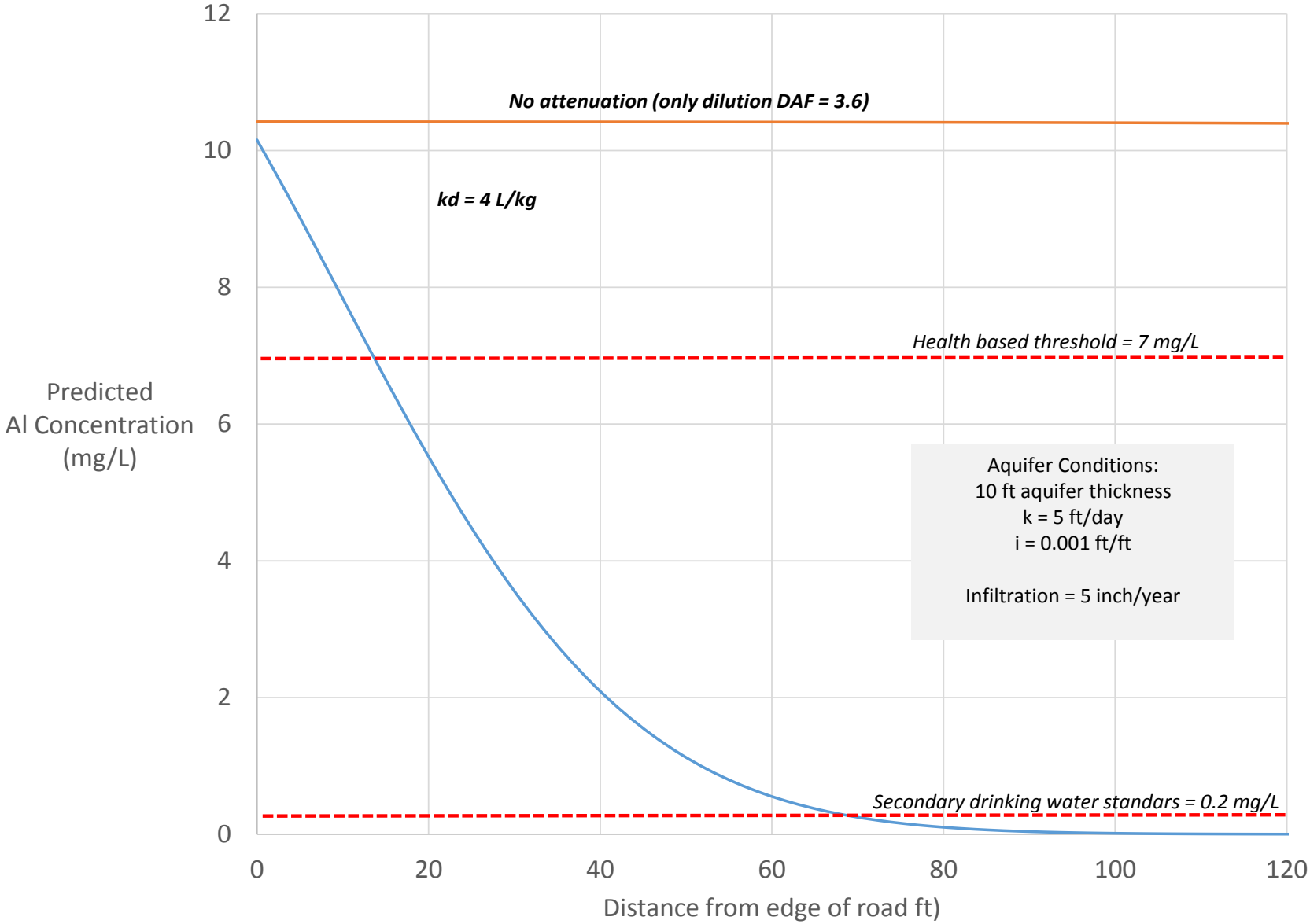

Figure 7-1. MYGRT Results for Aluminum at Year 100

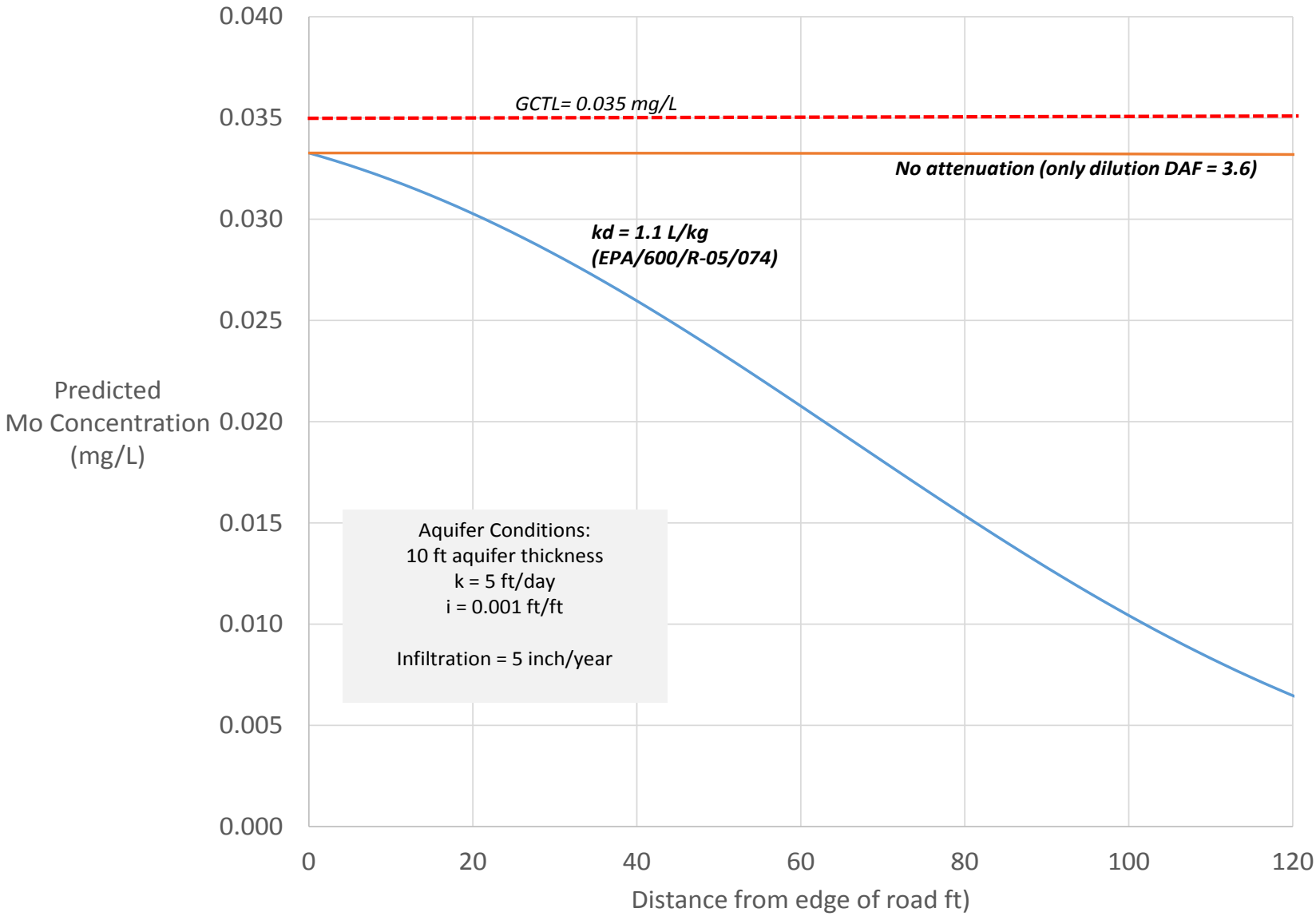

Figure 7-2. MYGRT Results for Molybdenum at Year 100

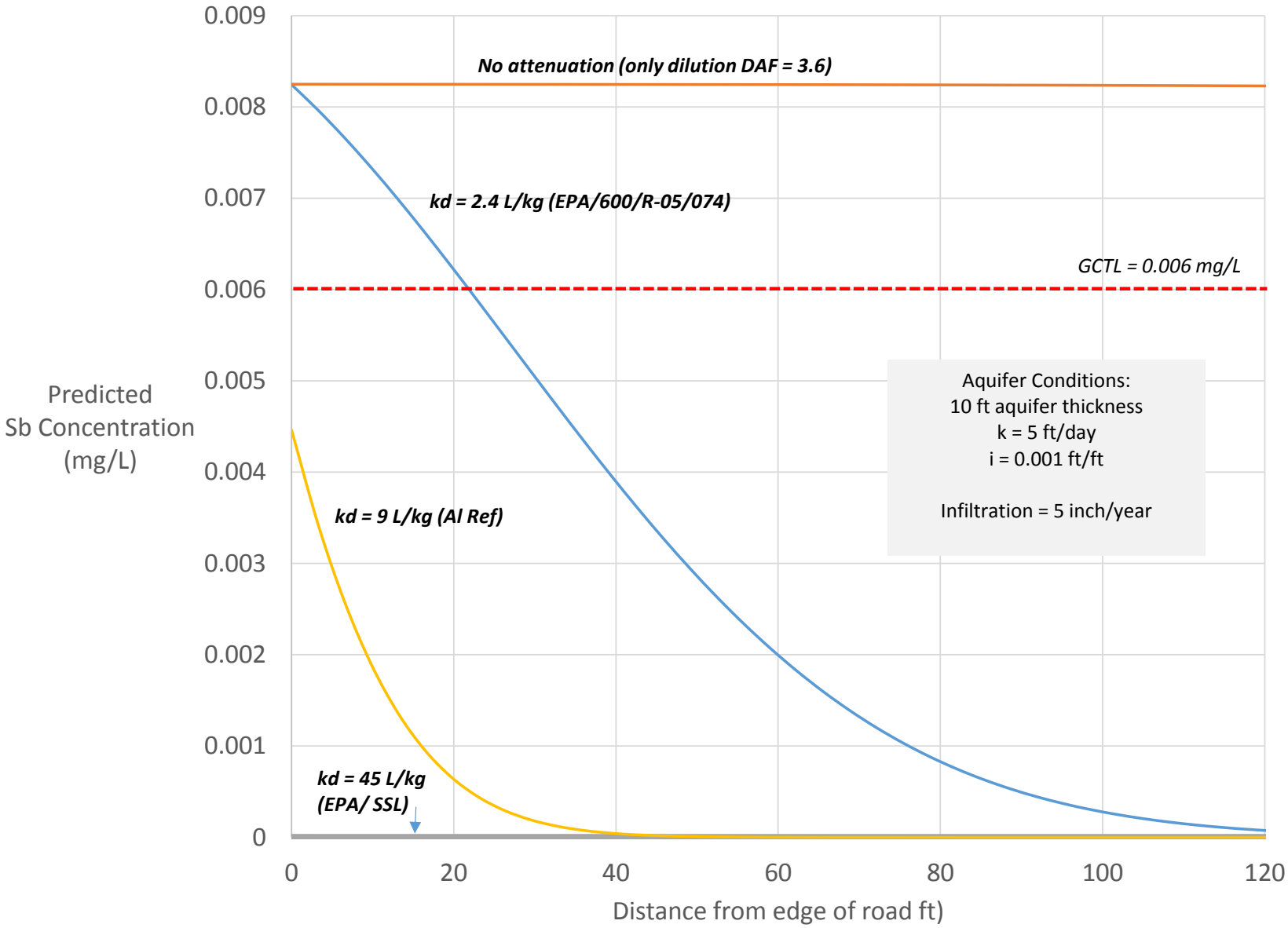

Figure 7-3. MYGRT Results for Antimony at Year 100

8.0 Summary

Pasco County proposes to recycle bottom ash from the Pasco County Resource Recovery Facility (RRF) through use in three different road construction applications. Specifically, the County proposes to use bottom ash as a base course material, an aggregate in asphalt pavement, and an aggregate in Portland cement concrete. The County recently constructed road segments at their facility using each of these methods, and through this process and with the assistance of the Florida Department of Transportation, developed construction specifications and techniques for utilizing the bottom ash, and produced a large amount of analytical testing data. In recognition that any ash beneficial use activity must be protective of human health and the environment, the County commissioned the University of Florida to provide a technical evaluation of the public health impacts of the proposed recycling program. This evaluation incorporates the results of leachate testing, hydrologic modeling, and pollutant fate and transport modeling. Where appropriate, the evaluation utilizes Pasco County-specific data.

The two primary pathways of potential public health impacts examined were direct human exposure and the contamination of groundwater. Direct human exposure is not viewed as a health concern as the ash will either be encapsulated in asphalt pavement or Portland cement concrete (PCC) as an aggregate, or placed underneath a paved surface. The average concentrations of all of the elements tested were below the FDEP direct exposure soil cleanup target levels for commercial and industrial settings.

Contamination of groundwater was evaluated using established laboratory leaching procedures. Leaching tests on the processed and aged bottom ash from the RRF found that the majority of chemicals leached at concentrations less than FDEP's risk-based groundwater cleanup target levels (GCTL). The three elements observed at concentrations above the GCTL are aluminum (Al), molybdenum (Mo), and antimony (Sb). Leaching of crushed asphalt and PCC pavement containing bottom ash presented reduced leaching concerns, but each exhibited an element that leached above a health based GCTL (Mo for PCC and Sb for asphalt). The dilution and attenuation factor (DAF) required to reduce leachate concentrations to below GCTLs was less than 6 in all instances.

Following standard practices for assessing the potential for a recycled material to impact groundwater, the fate and transport of the leached chemicals in the environment was evaluated. Hydrologic models were used to estimate the infiltration of rainwater that might occur through the surface of a paved road. For well-constructed and maintained roads, the fraction of rainfall that infiltrates through the road should be less than 5%; for conservative modeling purposes, a high-end value of 10% infiltration was selected. Under these conservative infiltration rates, the leachate emanating from the base of the

roadway will be diluted by a factor of six or more, under the majority of surficial aquifer conditions modeled for Pasco County.

Elements such as Al, Mo, and Sb will be attenuated to some degree in both the soil underneath the road and in the underlying aquifer as a result of interactions between these chemicals and the soil minerals. Fate and transport modeling for typical Pasco County surficial aquifer conditions found that combined factors of dilution and attenuation reduced concentrations to well below the risk thresholds utilized at a distance of 100 ft from the road edge, even after 100 years of continuous leaching.

The results of this analysis demonstrate that bottom ash, representative of the type tested here, when recycled in a manner consistent with the procedures and constraints identified in this report, will pose no significant threat to human health and the environment. Direct human exposure should not be a concern because the ash is encapsulated or covered with a paved surface. While a few elements leach above health-based thresholds, these elements should, in the vast majority of surficial aquifer conditions encountered, be diluted and attenuated to safe concentrations at distances of 100 ft or less from the roadway.

Appendix A: Description of Models Used in this Analysis

Hydrologic Evaluation of Landfill Performance (HELP) Model

The Hydrologic Evaluation of Landfill Performance (HELP) model was developed as a two dimensional model of water movement across, into, through and out of landfills (1). Its main intent is to simulate leachate production rates for landfills using inputs for precipitation, evaporation, soil characteristics, and design data. Climatic data can be generated from a prepopulated database of U.S cities or entered manually. Further information on the development and use of the HELP model can be found in *"The Hydrologic Evaluation of Landfill Performance (HELP) Model: User's Guide for Version 3".*

US-EPA: Industrial Waste Management Evaluation Model (IWEM)

The Industrial Waste Management Evaluation Model (IWEM) was developed for the U.S EPA to assess the groundwater impacts of different waste management scenarios.. The IWEM model uses the EPA's Composite Model for Leachate Migration with Transformation Products (EPACMTP) as the engine to model fate and transport through unsaturated and saturated zones. A Monte Carlo modeling approach is used with each simulation having 10,000 realizations. A probability distribution is assigned to a number of parameters within the model related to soil and aquifer properties. The 90th percentile exposure concentration is then used for comparison to preset or user defined standards. Additional information on IWEM and EPACMPT can be found in the *IWEM Technical Background Document* and the *EPA's Composite Model for Leachate Migration with Transformation Products (EPACMTP) Technical Background Document.*

EPACMPT uses the advection-dispersion equation with terms to account for equilibrium sorption and first-order transformation. The source of constituents is a waste management unit or WMU located at the ground surface overlying an unconfined aquifer. The base of the WMU can be below the actual ground surface. Waste constituents leach from the base of the WMU into the underlying soil. They migrate vertically downward until they reach the water table. As the leachate enters the ground water, it will mix with ambient ground water (which is assumed to be free of pollutants) and a ground-water plume will develop which extends in the direction of downgradient ground-water flow. EPACMTP accounts for the spreading of the plume in all three dimensions. Leachate generation is driven by the infiltration of precipitation that has percolated through the waste unit, from the base of the WMU into the soil. In the case of metals, EPACMTP accounts for more complex geochemical reactions by using effective sorption isotherms for a range of aquifer geochemical conditions, generated using EPA's geochemical equilibrium speciation model for dilute aqueous systems

(MINTEQA2). The output from EPACMTP is the predicted maximum ground-water exposure concentration, measured at a well situated down-gradient from a WMU (2).

A conceptual illustration of a subsurface system as simulated by EPACMPT is shown in Figure A-1.

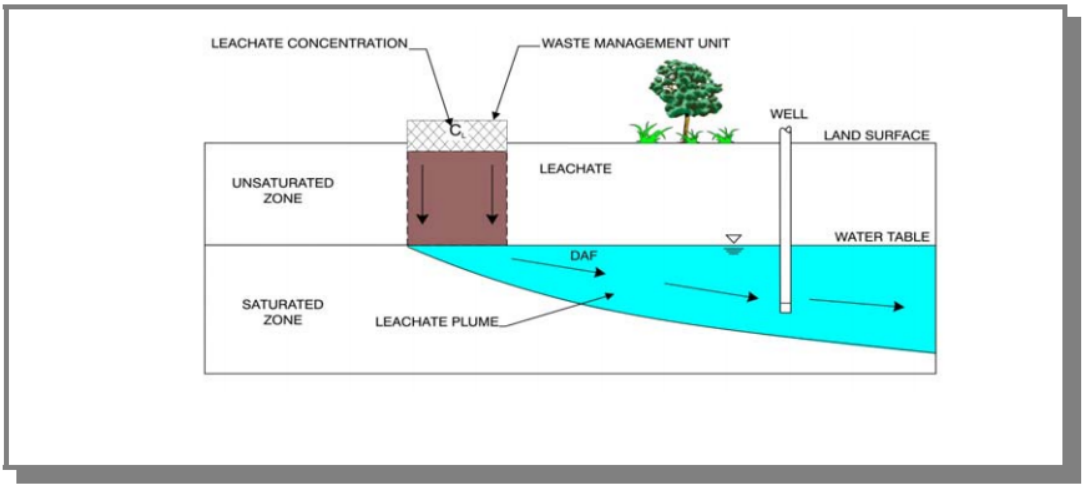

Figure A-1. Conceptual Cross-Section View of a Subsurface Simulation

IWEM requires a number of inputs in order to execute the fate and transport model. These include information on the waste area, infiltration rate, leachate concentrations, vadose zone characteristics, aquifer characteristics, target groundwater locations, chemical characteristics, and referenced groundwater concentrations. Infiltration rates were determined using the HELP model simulations and were run for a range of values to encompass a number of pavement quality scenarios. Leaching test done on ash and ash amended products from the Pasco County Resource Recovery Facility as well as prior data from the literature was used to determine the leachate concentrations used in the model. Aquifer and vadose zone characteristics were set based on an analysis of Pasco County hydrogeologly. Partitioning coefficients used in the model were developed from the equilibrium speciation model MINTEQA2; partitioning coefficients for elements not found in MINTEQA2 were taken from literature sources or assumed to be negligible. The distance to the target groundwater location was ranged from 10-100 feet. The Florida Groundwater Cleanup Target Levels (F.A.C 62-777) were used as the groundwater reference concentrations.

IWEM allows the user to select from four waste management unit types (WMU). For all of the simulations conducted the waste pile WMU was selected. A conceptual drawing of a waste pile WMU is shown in Figure 2. The waste pile is modeled as an area source

with a finite operating life. Contaminant release is modeled as a pulse type source with the pulse duration equal to the waste pile operating life. The operating life for all simulations was set at 50 years. In addition to the operating life, the waste pile area and the waste depth below the ground surface are required input parameters in IWEM. The limitations of IWEM only allow for waste areas be input as squares. An area of 24' x 24' (576 ft^2 or 53.5 m^2) was used for all of the IWEM simulations; 24' corresponds to the standard width of a two lane road.

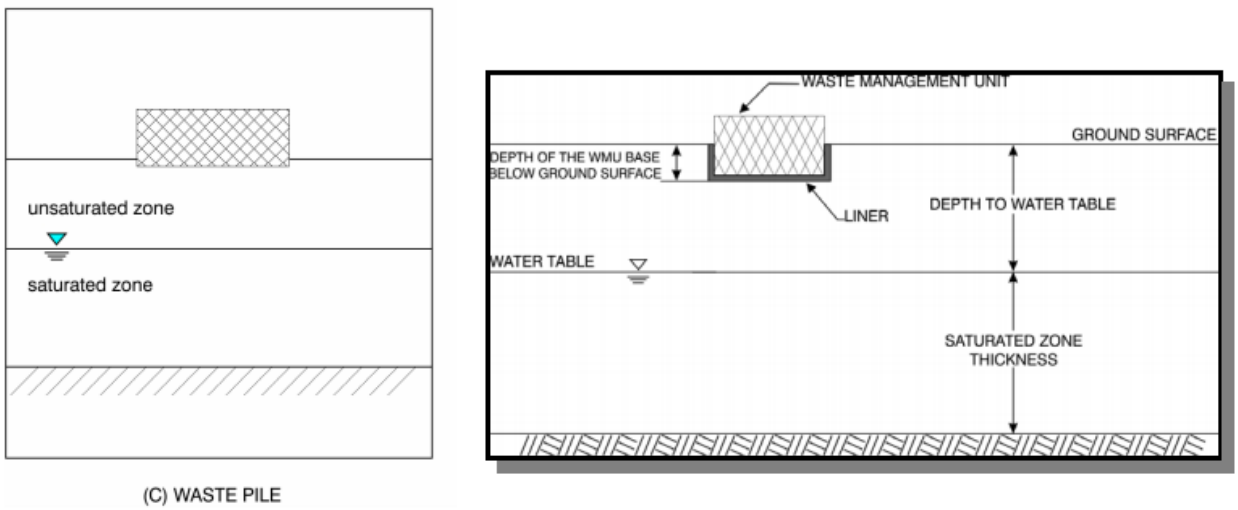

Figure A-2. Waste Pile Area Source

IWEM uses the groundwater pH value, depth to water table, aquifer hydraulic conductivity, regional hydraulic gradient, and aquifer thickness as subsurface parameter inputs. IWEM allows the option to select from one of the 13 preprogramed subsurface environments from the Hydrogeologic Database for Ground-Water Modeling (HGDB) (Newell et al., 1990), which contains correlated values for depth to water table, aquifer hydraulic conductivity, regional hydraulic gradient, and aquifer thickness for 400 hazardous waste sites. Based on the subsurface environment selected IWEM then assigns a probability distribution to each one of these parameters (IWEM Technical Background Doc), it also allows the option to input these parameters manually; pH has the option to be entered manually or assigned a probability distribution derived from the EPA STORET database.

The depth of the well below the water table is varied with a uniform probability distribution within the model from 0 to 10 meters. Well locations in IWEM are modeled in the center of the plume as shown in Figure 3. IWEM defines this as a protective assumption since the concentrations will always be highest in the center of the plume.

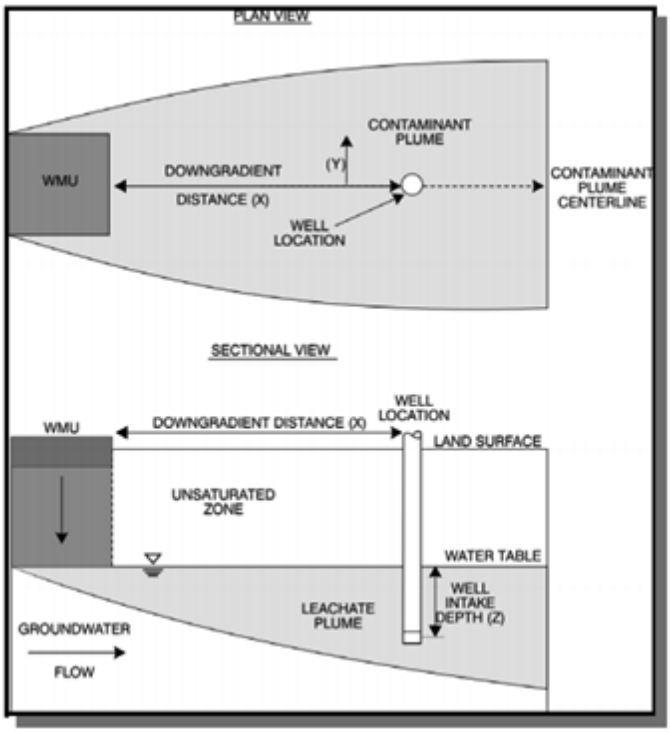

Figure A-3. Modeled Well Location in IWEM

Electric Power Research Institute (EPRI): MYGRT Model

MYGRT simulates a single contaminant, generated from a surface source, migrating downward through the unsaturated soil layer, mixing with the underlying groundwater, and then migrating horizontally downgradient through the aquifer. The software incorporates the processes of advection, dispersion, and retardation. The source (in this case, C&D debris landfill leachate concentration) is defined as a function of time. After the soil and chemical parameters of the unsaturated/saturated layers are input, the model predicts the contaminant concentration as a function of time at any specified location along its path (EPRI, 1998).

The MYGRT program consists of 22 analytical models based on analytical solutions to mass transport equations using the integral transform technique. The case of spatial averaging (e.g., well screen averages) is also solved. The integral transform method starts with the partial differential equation, boundary conditions, and initial conditions of a transport problem and proceeds to an exact solution of it. The aquifer can have a finite or semi-infinite thickness, and one, two, or three dimensions can be simulated in the saturated zone (EPRI, 1998). Model input information can be subdivided into four broad categories (described in detail in the next section): (1) source definition and description, (2) unsaturated zone characteristics, (3) saturated zone characteristics, and (4) solute plume properties.

The solute transport equation used by MYGRT is developed from differential equations representing water flow and the use of a partition coefficient as described previously. Steady water flow in saturated or uniformly saturated conditions in homogenous media is represented by

$$\frac{\partial C_w}{\partial t} + \frac{\rho}{\theta_w}\frac{\partial S}{\partial t} = D\frac{\partial^2 C_w}{\partial x^2} - v\frac{\partial C_w}{\partial x} \qquad (6.3)$$

Where,
C_w = solute concentration in the water (mass/volume)
ρ = dry bulk density of permeable material (soil) (mass/volume)
θ_w = volumetric water content
v = average pore water velocity (distance/time)
D = dispersion coefficient

In this equation, the left-hand side terms represent the rate of change of solute mass in the solution phase ($\frac{\partial C_w}{\partial t}$) and the rate of change if the solute mass in the sorbed phase ($\frac{\rho}{\theta_w}\frac{\partial S}{\partial t}$). The right-hand side terms represent the hydrodynamic dispersion flux component ($D\frac{\partial^2 C_w}{\partial x^2}$) and the advective flux component ($v\frac{\partial C_w}{\partial x}$). In the linear

isotherm case, with a partition coefficient as previously described (now in a differential equation):

$$\frac{\partial S}{\partial t} = K_d \frac{\partial C_w}{\partial t} \qquad (6.4)$$

Substituting equation (6.5) in equation (6.4) and rearranging terms gives:

$$[1 + \frac{\rho K_D}{\theta_w}] \frac{\partial C_w}{\partial t} = D \frac{\partial^2 C_w}{\partial x^2} - v \frac{\partial C_w}{\partial x} \qquad (6.5)$$

With retardation factor, R = $[1 + \frac{\rho K_D}{\theta_w}]$, the final transport equation is:

$$R \frac{\partial C_w}{\partial t} = D \frac{\partial^2 C_w}{\partial x^2} - v \frac{\partial C_w}{\partial x} \qquad (6.6)$$

This equation can then be expanded to three dimensions for dispersion in the saturated zone:

$$R \frac{\partial C_w}{\partial t} = D_x \frac{\partial^2 C_w}{\partial x^2} + D_y \frac{\partial^2 C_w}{\partial x^2} + D_z \frac{\partial^2 C_w}{\partial x^2} - v_x \frac{\partial C_w}{\partial x} \qquad (6.7)$$

where, horizontal dispersion (D_x) is calculated by ($\alpha_L Vx$), where α_L was equal to 1 as the model default. The transversal dispersion coefficient (D_y) is given as 0.1 times D_x and the vertical dispersion coefficient (D_z) is given as 0.01 times D_x (EPRI, 1998).

To calculate a concentration that represents the concentration observed at the edge of the source, a groundwater mixing equation is used in the model. This equation, (6.8), takes into account the flow and concentration of contaminants coming through the source, as well as the flow and concentration of the groundwater (EPRI, 1998).

$$C_{bc} = \frac{(C_{ic} Q_{gw} + C_{lcht} Q_{lcht})}{(Q_{gw} + Q_{lcht})} \qquad (6.8)$$

Where,

$Q_{gw} = V_x \theta W_{source} P_d$

$Q_{lecht} = I_{infl} A_{source}$

C_{bc} = initial concentration in the aquifer at the downgradient edge of the source (e.g., landfill) (mg/L).

C_{ic} = initial or background concentration in the aquifer

C_{lcht} = interstitial solution concentration entering from the unsaturated layer (mg/L). Generated from the model when the source is above the unsaturated zone.

Q_{gw} = groundwater volumetric flow rate at the upgradient edge of the source (m^3/yr)

Q_{lcht} = volumetric infiltration flow rate through the unsaturated layer (m^3/yr)

V_x = longitudinal seepage velocity in the aquifer (m/yr)

θ = porosity of aquifer (vol/vol)

W_{source} = width of source (m)
P_d = mixing depth, up to the thickness of the saturated zone (m)
I_{infl} = infiltration flux rate through the unsaturated layer (m/yr)
A_{source} = Area of the source (m^2)

As illustrated by equation 10, C_{bc} (the modeled concentration) would tend to increase if either the concentration of leachate (C_{lcht}) increased and/or the flow rate of leachate (Q_{lcht}) from the source increased. Also, C_{bc} would increase if the flow rate in the saturated zone decreased, which would occur if the horizontal seepage velocity, which is based upon the hydraulic conductivity, decreased.

Appendix B: Hydraulic Conductivity of Pavement Materials

Permeability Testing of Cores Taken from Roadways in Pasco County Conduced at the Florida Department of Transportation State Materials Office

Figures 1 and 2. Location of First Test Core; Intersection of Darby Road and Old Darby Road.

Figure 3. Core Rig

Figure 4. Test Core at Darby Road

Figure 5. Location of Second Core; Wesley Chapel Blvd North of State Road 54

Figures 6 and 7. Wesley Chapel Blvd core, as is, and cut into two pieces to accommodate testing apparatus

PERMEABILITY OF COMPACTED MIXTURE

USING FLEXIBLE WALL PERMEAMETER

Sample Information			
Project No.:	Wesley Chapel Blvd (Top)	Lab Number:	
Contractor:	University of Florida	No. of cores:	1
Sample Date:	8/5/14	Mix Design No.:	
Sampled by:	M. Hofmeister	Mix (mm):	
Received Date:	8/7/14	Lot:	
Test Date:	8/7/14	Target: Max K (x 10-5 cm/sec):	125
Tested by:	M. Barrs / M. Hofmeister		

Sample Data						
Core No.:	B Top	B Top	B Top	B Top		
Station	#1	#2	#3	#4		
Wt. in air (g)						
Wt. in water (g)						
SSD Wt. (g)						
VOLUME, cc						
Gmb						
Gmm						
% Air voids						
% Gmm						
Avg. Thickness (mm)	83.7	83.7	83.7	83.7		
Avg. Diameter (mm)	150.2	150.2	150.2	150.2		
Start Mark (cm)	67.50	67.40	67.30	67.10	63.15	63.15
End mark (cm)	67.4	67.3	67.1	67.0		
Final Time (sec.)	1800.0	1800.0	1800.0	1800.0		
Water Temp. (F)	70.5	70.5	70.5	70.5		
Temp. Correction Factor	0.97	0.97	0.97	0.97		
K (x 10^-5 cm/s)	0.023	0.023	0.046	0.023		
Average K (x 10^-5 cm/s)	**0.0288**					
<= 125 (x 10^-5 cm/s) ?	**Yes**					

Comments:

Technician:

Date: 08/07/14

PERMEABILITY OF COMPACTED MIXTURE

USING FLEXIBLE WALL PERMEAMETER

Sample Information			
Project No.:	Wesley Chapel Blvd (Bottom)	Lab Number:	
Contractor:	University of Florida	No. of cores:	1
Sample Date:	8/5/14	Mix Design No.:	
Sampled by:	M. Hofmeister	Mix (mm):	
Received Date:	8/7/14	Lot:	
Test Date:	8/7/14	Target: Max K (x 10-5 cm/sec):	125
Tested by:	M. Barrs / M. Hofmeister		

Sample Data						
Core No.:	B Bott	B Bott	B Bott	B Bott		
Station	#1	#2	#3	#4		
Wt. in air (g)						
Wt. in water (g)						
SSD Wt. (g)						
VOLUME, cc						
Gmb						
Gmm						
% Air voids						
% Gmm						
Avg. Thickness (mm)	58.9	58.9	58.9	58.9		
Avg. Diameter (mm)	150.2	150.2	150.2	150.2		
Start Mark (cm)	63.60	63.60	63.60	63.60	63.15	63.15
End mark (cm)	63.6	63.6	63.6	63.6		
Final Time (sec.)	1800.0	1800.0	1800.0	1800.0		
Water Temp. (F)	71.8	71.8	71.8	71.8		
Temp. Correction Factor	0.95	0.95	0.95	0.95		
K (x 10^-5 cm/s)	0	0	0	0		
Average K (x 10^-5 cm/s)	**0**					
<= 125 (x 10^-5 cm/s) ?	**Yes**					

Comments: No observed drop over two hours

Technician:

Date: 08/07/14

PERMEABILITY OF COMPACTED MIXTURE

USING FLEXIBLE WALL PERMEAMETER

Sample Information			
Project No.:	Darby Road	Lab Number:	
Contractor:	University of Florida	No. of cores:	1
Sample Date:	8/5/14	Mix Design No.:	
Sampled by:	M. Hofmeister	Mix (mm):	
Received Date:	8/7/14	Lot:	
Test Date:	8/7/14	Target: Max K (x 10-5 cm/sec):	125
Tested by:	M. Barrs / M. Hofmeister		

Sample Data						
Core No.:	A	A	A			
Station	#1	#2	#3			
Wt. in air (g)						
Wt. in water (g)						
SSD Wt. (g)						
VOLUME, cc						
Gmb						
Gmm						
% Air voids						
% Gmm						
Avg. Thickness (mm)	68.9	68.9	68.9			
Avg. Diameter (mm)	150.2	150.2	150.2			
Start Mark (cm)	63.15	63.15	63.15	63.15	63.15	63.15
End mark (cm)	25.6	23.4	31.9			
Final Time (sec.)	1800.0	1800.0	1800.0			
Water Temp. (F)	69.8	69.8	69.8			
Temp. Correction Factor	0.98	0.98	0.98			
K (x 10^-5 cm/s)	10	11	8			
Average K (x 10^-5 cm/s)	**9.83**					
<= 125 (x 10^-5 cm/s) ?	**Yes**					

Comments:

Technician:

Date: 08/07/14

PERMEABILITY OF COMPACTED MIXTURE

USING FLEXIBLE WALL PERMEAMETER

Sample Information			
Project No.:	Method Detection Limit	Lab Number:	
Contractor:	University of Florida	No. of cores:	1
Sample Date:	8/5/14	Mix Design No.:	
Sampled by:	M. Hofmeister	Mix (mm):	
Received Date:	8/7/14	Lot:	
Test Date:	8/7/14	Target: Max K (x 10-5 cm/sec):	125
Tested by:	M. Barrs / M. Hofmeister		

Sample Data						
Core No.:	B Bott	B Bott	B Bott	B Bott		
Station	#1	#2	#3	#4		
Wt. in air (g)						
Wt. in water (g)						
SSD Wt. (g)						
VOLUME, cc						
Gmb						
Gmm						
% Air voids						
% Gmm						
Avg. Thickness (mm)	58.9	58.9	58.9	58.9		
Avg. Diameter (mm)	150.2	150.2	150.2	150.2		
Start Mark (cm)	63.60	63.60	63.60	63.60	63.15	63.15
End mark (cm)	63.5	63.5	63.5	63.5		
Final Time (sec.)	1800.0	1800.0	1800.0	1800.0		
Water Temp. (F)	71.8	71.8	71.8	71.8		
Temp. Correction Factor	0.95	0.95	0.95	0.95		
K (x 10^-5 cm/s)	0	0	0	0		
Average K (x 10^-5 cm/s)	**0.0172**					
<= 125 (x 10^-5 cm/s) ?	**Yes**					

Comments: No observed drop over two hours

Technician:

Date: 08/07/14

Calculations from Permeability Testing of Darby Road Core at University of Florida Civil Engineering Materials Laboratories

UF UNIVERSITY of FLORIDA

College of Engineering
Engineering School of Sustianable Infastructure and the Environment
Civil Engineering Materials Labratories

Project Number:	107383	Sheet:	1/1
Project Name:	Falling Head Permeameter		
By:	C. Ferraro	Date:	8/12/14
Subject:	Test Data		
Checked By:	J. Roessler	Date:	8/13/14

k = aL/At ln (h1/h2) L (cm) = 6.88

		Time	Elapsed (sec)	h1(cm)	h2 (cm)	ln (h1/h2)	k (cm/S)
a	a area of the standpipe	2:55 P.M.	0.00				
L	Length of specimen	3:10 P.M.	900.00	60.325	60.0202	0.00507	3.87E-05
A	Area of the specimen	3:25 P.M.	900.00	60.0202	59.5376	0.00807	6.17E-05
t	time elapsed	3:45 P.M.	1200.00	59.5376	58.674	0.01461	8.38E-05
ho	initial height (cm)	4:15 P.M.	1800.00	58.674	57.3278	0.02321	8.88E-05
h1	final height (cm)	4:30 P.M.	900.00	57.3278	56.515	0.01428	1.09E-04
		4:50 P.M.	1200.00	56.515	55.88	0.01130	6.48E-05

a standpipe = A specimen

k = L/t ln (h1/h2)

min	3.87E-05
max	1.09E-04
average	**7.45E-05**

Jones Edmunds and Associates Permeability Testing Data Done as Part of Brevard Closure Permit

PART P
LANDFILL FINAL CLOSURE REQUIREMENTS

1. SCHEDULE REQUIREMENTS

This permit application pertains to the closure of the south face of the CDF Slurry Wall Landfill in accordance with Specific Condition 27 of the site's operation permit (No. SO05-0075133-010) that requires sequential final closure installation on a "close-as-you-go" basis. The final receipt of waste is not anticipated until 2013. As such, this closure construction permit application does not constitute a final closure of the landfill and the schedule requirements of 62-701.600(2), FAC are not applicable. When the landfill reaches capacity, the following closure schedule requirements will be fulfilled:

a. Written Notice to Department

Documentation that written notice, including closure schedule, will be provided to the Department at least 1 year before final receipt of wastes.

b. Notice to User Requirements

Notice to landfill users will be provided within 120 days of final receipt of wastes at the CDF.

c. Notice to Public Requirements

Notice to the public will be provided within 10 days of final receipt of wastes at the CDF.

2. PERMIT GENERAL REQUIREMENTS

a. Application

This closure permit application does not constitute a final closure application; however, it consists of a construction permit application to close a portion of the south slope of the landfill in accordance with 62-701.600(3), FAC. The application is included in the front of this document.

g. Final Cover Design Requirements

Permit Specific Condition No. 27 dictates the final cover design that meets the requirements of Rule 62-701.600(5)(g), FAC. This closure design will not change for the specified final cover design. All geosynthetic and soil components used in the final cover shall meet the standards and specifications contained in Rules 62-701.400(3)(d)1. and 3., (3)(d)5.11., (e), and (f), FAC. The technical specifications for the closure construction are provided in Appendix B.

- Twelve inches of soil-leveling course–intermediate cover that has been prepared and compacted.

(1) Protective Soil Layer Design

The protective soil layer shall include a minimum of 24 inches of soil with the upper 6 inches being able to sustain vegetative growth.

(2) Barrier Soil Layer Design

The closure uses a GCL in lieu of a barrier soil layer.

(3) Erosion Control Vegetation

The final cover design includes sod placement above the protective soil layer to control erosion.

(4) Geomembrane Barrier Layer Design

The closure does not include a geomembrane but uses a GCL as a barrier layer.

(5) Geosynthetic Clay Liner Design

The final cover will include a GCL as the barrier layer. Twelve inches of intermediate cover soil leveling course that has been prepared and compacted will underlie the GCL. Because the landfill is unlined, the barrier layer shall have a permeability of 1×10^{-7} cm/sec or less. An equivalency calculation to demonstrate that the GCL will meet or exceed this requirement is provided in Attachment P.4.g(5)-1. The calculations demonstrate that a typical GCL conductivity of 5×10^{-9} cm/sec allows less moisture than a prescriptive 1×10^{-7} cm/sec soil barrier layer.

The existing landfill access road traverses the south face of the landfill. Because of the impervious nature of the asphalt road, the County proposes

to not apply GCL over the roadway as a final cover barrier layer. The road construction consists of the following from top to bottom:

- ½ inch of friction course (FC3) applied in 2006
- ½ inch of friction course (FC3) applied in 2004
- 1½ inches of asphalt Type 3 base course
- 11 inches compacted, FDOT-certified lime rock
- 1 foot leveling sand
- 6 to 8 feet of compacted select C&DD

The access road has a minimum 7% slope and readily sheds all water that comes in contact with the surface. Any standing water that might occur would be in shallow puddles and would rapidly evaporate. Because water does not stand on the asphalt surface, the driving force of water through the asphalt is not present in contrast to saturated soil above a GCL that has a driving force of water through the GCL. Therefore, the flow of water through the asphalt road is negligible.

To demonstrate this, three asphalt core samples were obtained from the access road onsite and tested for permeability using a falling-head permeability test. The testing was conducted in a Florida Department of Transportation laboratory in accordance with FDOT test method FM 5-565. The test results indicate a low permeability in one sample and no permeability in the other two. The results are provided in Attachment P.4.g(5)-2.

(6) Stability Analysis of the Cover System and the Disposed Waste

A stability analysis was performed to verify the global and veneer slope stability of the final cover design are adequate. This analysis is presented in Part J.1.d.

h. Stormwater Control

The stormwater conveyance and treatment system for the facility has been designed, permitted, and constructed. The CDF facility operates under Environmental Resource Permit 052331579 and Multi-sector General Permit MS052386529. The stormwater system was designed and permitted for final buildout conditions. The stormwater occurring at the facility is prevented from coming onto or into waste-filled areas. Additionally, the closure design meets the requirements of 62-701.400(9), FAC concerning stormwater management.

A secondary stormwater management system was previously designed and submitted by WCG, Inc. in 2002 to manage stormwater that runs off of the landfill surface to the terraces. Each terrace was designed as a swale to convey

ATTACHMENT P.4.g(5)-2

ACCESS ROAD ASPHALT PERMEABILITY TEST RESULTS

Florida Department of Transportation

CHARLIE CRIST
GOVERNOR

STATE MATERIALS OFFICE
5007 Northeast 39th Avenue, Gainesville, Florida 32609
Telephone: (352) 955-6600, Fax: (352) 955-6613

STEPHANIE C. KOPELOUSOS
SECRETARY

June 18, 2008

Tobin McKnight
Jones Edmunds & Associates, Inc.
730 NE Waldo Road
Gainesville, FL 32641

Dear Tobin,

Permeability testing is complete for the three asphalt cores (C1, C2 and C3) that you delivered to our office. Testing was conducted per FDOT test method FM 5-565, which is a falling head permeability test specifically designed for asphalt samples. Core C1 had a permeability of 5 X 10^-5 cm/s. Cores C2 and C3 did not permeate at all. In terms of asphalt testing, the permeability value for core C1 is extremely low.

Following is a web link to the test method:

http://www.dot.state.fl.us/statematerialsoffice/administration/resources/library/publications/fstm/methods/fm5-565.pdf

Please contact me if there are any questions.

Gregory A. Sholar, P.E.
Bituminous Research Engineer
352.955.2920
gregory.sholar@dot.state.fl.us

Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

June 11, 2008
File No. 08-5248

Jones Edmunds & Associates, Inc.
730 NE Waldo Road
Gainesville, Florida 32641

Attention: Mr. Tobin McKnight

Subject: Asphalt Coring Services
Brevard County Central Disposal Facility
Cocoa, Florida

Dear Mr. McKnight:

As requested, an Ardaman & Associates representative was present at the project site on June 9, 2008, in order to perform asphaltic concrete and base coring services. Using a portable coring machine fitted with a six-inch diameter core barrel, the Ardaman representative cored the asphaltic concrete present in the roadway on the southwest portion of the landfill cells. A total of three cores were obtained at locations selected by a client representative present during the coring activities. The core locations are shown on the attached Figure 1.

At each location, the asphaltic concrete core was removed and the thicknesses of the core and base were measured. The base appeared to be cemented coquina. Upon completion of the coring, each of the core holes was patched with cold-patch asphalt.

The table below shows the encountered asphalt and base thicknesses on the south slope drive lane.

Core Designation	Asphalt Thickness (in)	Base Thickness (in)
C-1	3	15
C-2	2⅜	12
C-3	2	7

Please note that the results of this coring program are based on the test locations selected by the client representative in the field. Lesser or greater asphalt thicknesses may exist at unexplored locations.

We are pleased to be of service to you on this phase of the project. Should you have any questions concerning this report or the site, please contact us.

Very truly yours,

ARDAMAN & ASSOCIATES, INC.

David B. Fickey
Assistant Project Engineer

Jason P. Manning, P.E.
Branch Manager
Florida Registration No. 53265

DBF/JPM/sgw/msh
08-5248 (Reports)

Attachment – Figure 1 - Core Location Plan

LEGEND

C-1 ASPHALT CORE LOCATION

N

0 150 300

SCALE: 1"=300'

CORE LOCATION PLAN

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

ASPHALT CORING SERVICES
BREVARD COUNTY CDF
COCOA,BREVARD COUNTY, FLORIDA

DRAWN BY: TAT	CHECKED BY:	DATE: 5/30/08
FILE NO. 08-5248	APPROVED BY:	FIGURE: 1

PROTO FILE: 12000001.DWG

Appendix C: Pasco County Specific Data

Groundwater Information

Data from the United States Geological Survey (USGS) suggest that the surficial aquifer parameters vary throughout Pasco County. Tibbals et al., 1980 found that "the surficial aquifer thickness ranges from virtually zero near where the Withlacoochee River borders Hernando County to as much as 90 ft in the topographically-high sand hills northwest of Dade City."

Fretwell., 1988 also reported on the hydrogeology of Pasco county:

In Pasco County where limestone of the Upper Floridan aquifer is separated from the surficial sand by clay of very low permeability, the water table occurs in the surficial sand, and the sand constitutes the surficial aquifer. In some parts of the county, there are sufficient breaches in the clay layer to allow rapid percolation of water from the sand into the underlying limestone. Thus, the sand may not be saturated perennially. In areas where saturated sand lies directly above limestone (such as the northwestern coastal area and in the northeast where the Withlacoochee River borders Hernando County), water in the sand is hydraulically connected to the Upper Floridan aquifer and unconfined conditions occur in the Upper Floridan aquifer.

In some places, especially eastern Pasco County, the sand contains water only during the wet season. Water levels in the sand change rapidly, which suggests hydraulic connection with the limestone and leakage through clay layers where present. The depth to water in the surficial aquifer is generally less than 5 feet below land surface. Sand throughout much of the county yields insufficient quantities of water to wells to be of economic importance; however, water from the surficial aquifer is used for lawn irrigation in some areas and is a source of recharge to the underlying Upper Floridan aquifer.

Because of the variability of the hydrogeologic data in Pasco County and the number of iterations it would take to encompass all of the potential scenarios if manually entered one of the 13 HGDB subsurface environments was chosen. The HGDB environment chosen was the Unconsolidated and Semiconsolidated Aquifers environment, which was deemed the most representative based on the data reported by the USGS. The mean values of the Unconsolidated and Semiconsolidated Aquifers data set are shown in Table 6.

Table C-1. HGDB Subsurface Data

Unconsolidated and Semiconsolidated Aquifers (Newell et al., 1990)	
Parameter	Mean Value
Depth to Top of Aquifer (ft)	12.5
Saturated Thickness (ft)	23.8
Hydraulic Gradient (ft/ft)	0.005
Hydraulic Conductivity (cm/s)	.0010

Soil Information

A 1980 USGS report characterized the soils in the surficial aquifer of Pasco County as consisting of sedimentary deposits of white-to-tan, fine to medium-fine quartz sands that grade downward into orange-to-red clayey sand. At some depth below the water table the sand and clayey sand generally grade into a zone of blue or gray-green clay and sandy clay that acts as a confining bed for the underlying limestones that comprise the Floridan aquifer. (Tibbals et al., 1980)

Right of Way Distances

The down gradient distance to the well is a model input parameter: this parameter was varied from 10’ to 35’ in intervals of 6.25 ft. This was based on the *Pasco County Land Development Code Chapter 900, Section 901.6 Street Design and Dedication Requirements.* Section 901.6 provides minimum right of way distances, shown in Table C-2, these vary based on street type as well as for urban and rural roads (street type classifications can be found in Table C-3). Additionally minimum road way widths are provided, subtracting the minimum roadway width from the right of way width and diving this value in half generates the minimum distance from the roadway to the end of the right of way acquisition.

Table C-2. Minimum Right of Way and Roadway Lengths

Street Type	Minimum Right of Way and Road Width Urban (Width/Lanes)	Minimum Right of Way and Road Width Rural (Width/Lanes)	Remaining Distance after Roadway (Urban/Rural)
1A w/o Parking	100’ (48’/4)	120’ (50’/4)	26/35’
1B w/o Parking	60’ (24’/2)	80’ (26’/2)	18/27’
1B Parking One Side	72’ (32’2)	92’ (34’/2)	20/29’
1B Parking Both Sides	84’ (40’/2)	104’ (42’/2)	22/31’
2 Without Parking	50’ (24’/2)	70 (25’/2)	13’/22.5’
2 Parking One Side	58’ (31’/2)	78’ (32’/2)	13.5’/23’
2 Parking Both Sides	66’ (38’/2)	86’ (39’/2)	14’/23.5’
3 w/o Parking	50’ (22’/2)	70’ (23’/2)	14’/23.5’
3 Parking One Side	58’ (29’/2)	78’ (30’/2)	14.5’/24’
3 Parking Both Sides	68’ (36’/2)	86’ (37’/2)	16’/24.5’
Min	50’	70’	13’/22.5’
Max	100’	120’	26’/35’

Table C-3. Street Classifications

Classification	Sub-Classification	Definition	Equivalent Residential Units Served
Type 1		Type 1 streets are subdivision collectors connecting Types 2, 3, and 4 streets. Type 1 streets may carry traffic from one (1) development to another or from the development to streets functionally classified as Major County Roads. Driveway access to individual lots shall not be allowed, unless approved.	Greater than 200
	1B	Requires a minimum of two (2) thru lanes.	201-600
	1A	Requires a minimum of four (4) thru lanes.	Greater than 600
Type 2		Type 2 streets are streets providing two (2) thru lanes and may provide subdivision connections to streets functionally classified as Major County Roads.	101-200
Type 3		Type 3 streets are streets providing two (2) thru lanes and may provide connections to streets functionally classified as Major County Roads.	51-100

Appendix D: HELP Set 1

Table D-1. HELP Set 1 Summary Table

Scenario: Pavement Infiltration Model			
Avg. Annual Rainfall:		**47.99 in.**	
Thickness of Pavement Layer		**4 in.**	
Curve #	**Pavement Hydraulic Conductivity (cm/s)**	**Evaporation in. (%)**	**Infiltration in. (%)**
0	$5 * 10^{-4}$	0.06(0.13)	9.16 (19.1)
0	$1 * 10^{-4}$	0.06(0.13)	7.49 (15.6)
0	$5 * 10^{-5}$	0.06(0.13)	6.33 (13.2)
0	$1 * 10^{-5}$	0.06(0.13)	3.01 (6.28)
0	$5 * 10^{-6}$	0.06(0.13)	1.84 (3.83)
0	$1 * 10^{-6}$	0.06(0.13)	0.529(1.1)
0	$5 * 10^{-7}$	0.06(0.13)	0.286(0.6)
0	$1 * 10^{-7}$	0.06(0.13)	0.0745 (0.16)

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\DATA10.D10
OUTPUT DATA FILE:           C:\Help3\check5.OUT


TIME:  12:40     DATE:   8/ 8/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      1.00   INCHES
          POROSITY                   =      0.5000 VOL/VOL
          FIELD CAPACITY             =      0.0020 VOL/VOL
          WILTING POINT              =      0.0010 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0186 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =   1000.00000000     CM/SEC


                                  LAYER  2
                                  --------

                       TYPE 2 - LATERAL DRAINAGE LAYER
```

```
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0020 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   1000.00000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  3
                        --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.0500 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0500 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.500000024000E-03 CM/SEC


                        LAYER  4
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  5
                        --------

            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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	0.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	0.001	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.000	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	0.247	INCHES
TOTAL INITIAL WATER	=	0.247	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.32	3.11	2.14	4.99	5.81	7.52
	8.58	5.83	2.90	1.68	1.40	1.71
STD. DEVIATIONS	1.70	3.15	1.11	5.08	4.91	2.58
	3.70	3.22	3.25	0.77	1.10	1.34
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.005	0.003	0.003	0.004	0.006	0.008
	0.009	0.007	0.004	0.003	0.004	0.004
STD. DEVIATIONS	0.002	0.002	0.001	0.002	0.002	0.002
	0.002	0.004	0.002	0.001	0.002	0.002
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	1.9094	2.1406	1.7632	4.3039	4.9491	5.8968
	6.8484	4.6665	2.4169	1.3790	1.1667	1.3229
STD. DEVIATIONS	1.6239	2.0828	0.9309	4.4067	4.4860	1.9066
	3.2193	2.9629	2.7217	0.6567	0.9933	1.0330
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.3988	0.9688	0.3720	0.6708	0.8350	1.6401
	1.7203	1.1550	0.4830	0.2961	0.2344	0.3884
STD. DEVIATIONS	0.3573	1.8813	0.1951	0.6952	0.6176	0.9898
	1.0381	0.7990	0.5258	0.1551	0.1500	0.3252
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.3988	0.9688	0.3720	0.6708	0.8350	1.6401
	1.7203	1.1550	0.4830	0.2961	0.2344	0.3884
STD. DEVIATIONS	0.3573	1.8813	0.1951	0.6952	0.6176	0.9898
	1.0381	0.7990	0.5258	0.1551	0.1500	0.3252
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


  DAILY AVERAGE HEAD ON TOP OF LAYER  3
  -------------------------------------
    AVERAGES               0.0036   0.0042   0.0033   0.0081   0.0101   0.0112
                           0.0126   0.0086   0.0046   0.0026   0.0023   0.0025

    STD. DEVIATIONS        0.0029   0.0039   0.0017   0.0081   0.0110   0.0035
                           0.0058   0.0054   0.0050   0.0012   0.0018   0.0019

  DAILY AVERAGE HEAD ON TOP OF LAYER  5
  -------------------------------------
    AVERAGES               0.0003   0.0009   0.0003   0.0006   0.0007   0.0015
                           0.0015   0.0010   0.0004   0.0003   0.0002   0.0003

    STD. DEVIATIONS        0.0003   0.0018   0.0002   0.0006   0.0005   0.0009
                           0.0009   0.0007   0.0005   0.0001   0.0001   0.0003
*******************************************************************************


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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                             0.000   (  0.0000)          0.00      0.000

 EVAPOTRANSPIRATION                 0.060   (  0.0127)        219.34      0.126

 LATERAL DRAINAGE COLLECTED        38.76339 (  5.86458)    140711.109   80.78065
   FROM LAYER  2

 PERCOLATION/LEAKAGE THROUGH        9.16266 (  2.25940)     33260.473    19.09446
   LAYER  3

 AVERAGE HEAD ON TOP                0.006 (    0.001)
   OF LAYER  3

 LATERAL DRAINAGE COLLECTED         9.16266 (  2.25940)     33260.473   19.09446
   FROM LAYER  4

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.002     0.00000
   LAYER  5

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  5

 CHANGE IN WATER STORAGE            0.000   (  0.0039)         -1.73     -0.001
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            PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
  ------------------------------------------------------------------------
                                            (INCHES)      (CU. FT.)
                                           ----------    -------------
     PRECIPITATION                          10.20         37026.000

     RUNOFF                                  0.000            0.0000

     DRAINAGE COLLECTED FROM LAYER  2        9.08064      32962.71480

     PERCOLATION/LEAKAGE THROUGH LAYER  3    5.316220     19297.87700

     AVERAGE HEAD ON TOP OF LAYER  3         0.768

     MAXIMUM HEAD ON TOP OF LAYER  3         0.002

     LOCATION OF MAXIMUM HEAD IN LAYER  2
           (DISTANCE FROM DRAIN)             0.1 FEET

     DRAINAGE COLLECTED FROM LAYER  4        5.31622      19297.87700

     PERCOLATION/LEAKAGE THROUGH LAYER  5    0.000000         0.00001

     AVERAGE HEAD ON TOP OF LAYER  5         0.144

     MAXIMUM HEAD ON TOP OF LAYER  5         0.033

     LOCATION OF MAXIMUM HEAD IN LAYER  4
           (DISTANCE FROM DRAIN)             0.5 FEET

     SNOW WATER                              0.00             0.0000

     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.0259

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.0010

      ***  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           0.0138         0.0138

                    2           0.0080         0.0020
```

```
♀
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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\DATA10.D10
OUTPUT DATA FILE:           C:\Help3\check4.OUT


TIME:  12:40     DATE:   8/ 8/2014


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

     TITLE:  Pasco Road

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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   0
          THICKNESS                  =      1.00   INCHES
          POROSITY                   =      0.5000 VOL/VOL
          FIELD CAPACITY             =      0.0020 VOL/VOL
          WILTING POINT              =      0.0010 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0186 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =   1000.00000000     CM/SEC


                                  LAYER  2
                                  --------

                       TYPE 2 - LATERAL DRAINAGE LAYER
```

```
              MATERIAL TEXTURE NUMBER   0
THICKNESS                   =      4.00   INCHES
POROSITY                    =      0.4610 VOL/VOL
FIELD CAPACITY              =      0.0020 VOL/VOL
WILTING POINT               =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0020 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   1000.00000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =     12.0    FEET


                        LAYER  3
                        --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                   =      4.00   INCHES
POROSITY                    =      0.0500 VOL/VOL
FIELD CAPACITY              =      0.0020 VOL/VOL
WILTING POINT               =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0500 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-04 CM/SEC


                        LAYER  4
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                   =      2.00   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                       =      2.00   PERCENT
DRAINAGE LENGTH             =     12.0    FEET


                        LAYER  5
                        --------

            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         =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS    =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY       =  4 - POOR
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	0.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	0.001	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.000	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	0.247	INCHES
TOTAL INITIAL WATER	=	0.247	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.32	3.11	2.14	4.99	5.81	7.52
	8.58	5.83	2.90	1.68	1.40	1.71
STD. DEVIATIONS	1.70	3.15	1.11	5.08	4.91	2.58
	3.70	3.22	3.25	0.77	1.10	1.34
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.005	0.003	0.003	0.004	0.006	0.008
	0.009	0.007	0.004	0.003	0.004	0.004
STD. DEVIATIONS	0.002	0.002	0.001	0.002	0.002	0.002
	0.002	0.004	0.002	0.001	0.002	0.002
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	2.0000	2.6003	1.8356	4.3751	5.0872	6.0785
	7.0395	4.8188	2.5147	1.4488	1.2363	1.3964
STD. DEVIATIONS	1.6400	2.5056	0.9620	4.4426	4.5273	1.9162
	3.2484	3.0325	2.8139	0.6732	1.0113	1.0651
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.3082	0.5090	0.2996	0.5997	0.6968	1.4583
	1.5292	1.0026	0.3852	0.2263	0.1649	0.3149
STD. DEVIATIONS	0.3427	0.7199	0.1666	0.6590	0.5681	0.9909
	1.0424	0.7967	0.4351	0.1381	0.1308	0.2942
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.3082	0.5090	0.2996	0.5997	0.6968	1.4583
	1.5292	1.0026	0.3852	0.2263	0.1649	0.3149
STD. DEVIATIONS	0.3427	0.7199	0.1666	0.6590	0.5681	0.9909
	1.0424	0.7967	0.4351	0.1381	0.1308	0.2942
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

```
-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


  DAILY AVERAGE HEAD ON TOP OF LAYER  3
  -------------------------------------
    AVERAGES               0.0036   0.0043   0.0033   0.0079   0.0101   0.0112
                           0.0126   0.0086   0.0045   0.0026   0.0023   0.0025

    STD. DEVIATIONS        0.0029   0.0039   0.0017   0.0080   0.0110   0.0035
                           0.0058   0.0054   0.0047   0.0012   0.0018   0.0019

  DAILY AVERAGE HEAD ON TOP OF LAYER  5
  -------------------------------------
    AVERAGES               0.0006   0.0011   0.0006   0.0012   0.0013   0.0029
                           0.0029   0.0019   0.0008   0.0004   0.0003   0.0006

    STD. DEVIATIONS        0.0007   0.0015   0.0003   0.0013   0.0011   0.0020
                           0.0020   0.0015   0.0009   0.0003   0.0003   0.0006
*******************************************************************************


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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                             0.000   (  0.0000)          0.00      0.000

 EVAPOTRANSPIRATION                 0.060   (  0.0127)        219.34      0.126

 LATERAL DRAINAGE COLLECTED        40.43134 (  6.75817)    146765.750   84.25655
   FROM LAYER  2

 PERCOLATION/LEAKAGE THROUGH        7.49472 (  1.53950)     27205.830    15.61856
   LAYER  3

 AVERAGE HEAD ON TOP                0.006 (    0.001)
   OF LAYER  3

 LATERAL DRAINAGE COLLECTED         7.49472 (  1.53950)     27205.826   15.61856
   FROM LAYER  4

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  5

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  5

 CHANGE IN WATER STORAGE            0.000   (  0.0039)         -1.73     -0.001
*******************************************************************************


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            PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
  ------------------------------------------------------------------------
                                            (INCHES)      (CU. FT.)
                                           ----------    -------------
     PRECIPITATION                          10.20         37026.000

     RUNOFF                                  0.000            0.0000

     DRAINAGE COLLECTED FROM LAYER  2        9.15907      33247.41410

     PERCOLATION/LEAKAGE THROUGH LAYER  3    1.702403      6179.72314

     AVERAGE HEAD ON TOP OF LAYER  3         0.768

     MAXIMUM HEAD ON TOP OF LAYER  3         0.002

     LOCATION OF MAXIMUM HEAD IN LAYER  2
           (DISTANCE FROM DRAIN)             0.0 FEET

     DRAINAGE COLLECTED FROM LAYER  4        1.70240       6179.72314

     PERCOLATION/LEAKAGE THROUGH LAYER  5    0.000000         0.00001

     AVERAGE HEAD ON TOP OF LAYER  5         0.101

     MAXIMUM HEAD ON TOP OF LAYER  5         0.011

     LOCATION OF MAXIMUM HEAD IN LAYER  4
           (DISTANCE FROM DRAIN)             0.2 FEET

     SNOW WATER                              0.00             0.0000

     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.0259

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.0010

      ***  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           0.0138         0.0138

                    2           0.0080         0.0020
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\DATA10.D10
OUTPUT DATA FILE:           C:\Help3\check3.OUT


TIME:  12:39     DATE:   8/ 8/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      1.00   INCHES
          POROSITY                   =      0.5000 VOL/VOL
          FIELD CAPACITY             =      0.0020 VOL/VOL
          WILTING POINT              =      0.0010 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0186 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =   1000.00000000     CM/SEC


                                  LAYER  2
                                  --------

                       TYPE 2 - LATERAL DRAINAGE LAYER
```

```
              MATERIAL TEXTURE NUMBER   0
THICKNESS                   =      4.00   INCHES
POROSITY                    =      0.4610 VOL/VOL
FIELD CAPACITY              =      0.0020 VOL/VOL
WILTING POINT               =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0020 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   1000.00000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =     12.0    FEET


                        LAYER  3
                        --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                   =      4.00   INCHES
POROSITY                    =      0.0500 VOL/VOL
FIELD CAPACITY              =      0.0020 VOL/VOL
WILTING POINT               =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0500 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.499999987000E-04 CM/SEC


                        LAYER  4
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                   =      2.00   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                       =      2.00   PERCENT
DRAINAGE LENGTH             =     12.0    FEET


                        LAYER  5
                        --------

            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         =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS    =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY       =  4 - POOR
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	0.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	0.001	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.000	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	0.247	INCHES
TOTAL INITIAL WATER	=	0.247	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.32	3.11	2.14	4.99	5.81	7.52
	8.58	5.83	2.90	1.68	1.40	1.71
STD. DEVIATIONS	1.70	3.15	1.11	5.08	4.91	2.58
	3.70	3.22	3.25	0.77	1.10	1.34
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.005	0.003	0.003	0.004	0.006	0.008
	0.009	0.007	0.004	0.003	0.004	0.004
STD. DEVIATIONS	0.002	0.002	0.001	0.002	0.002	0.002
	0.002	0.004	0.002	0.001	0.002	0.002
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	2.0098	2.8198	1.8551	4.5270	5.2064	6.3373
	7.1848	4.9659	2.5585	1.4628	1.2583	1.4114
STD. DEVIATIONS	1.6184	2.8967	0.9747	4.6270	4.6525	2.2044
	3.4268	2.9142	2.9043	0.6765	1.0304	1.0716
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.2985	0.2895	0.2801	0.4477	0.5776	1.1995
	1.3839	0.8555	0.3414	0.2123	0.1429	0.2999
STD. DEVIATIONS	0.3431	0.2743	0.1603	0.4885	0.4209	0.5974
	1.0144	0.5890	0.3479	0.1346	0.1267	0.2881
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.2985	0.2895	0.2801	0.4477	0.5776	1.1995
	1.3839	0.8555	0.3414	0.2123	0.1429	0.2999
STD. DEVIATIONS	0.3431	0.2743	0.1603	0.4885	0.4209	0.5974
	1.0144	0.5890	0.3479	0.1346	0.1267	0.2881
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

```
-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


  DAILY AVERAGE HEAD ON TOP OF LAYER  3
  -------------------------------------
    AVERAGES               0.0036   0.0050   0.0033   0.0081   0.0101   0.0114
                           0.0123   0.0084   0.0045   0.0026   0.0023   0.0025

    STD. DEVIATIONS        0.0027   0.0047   0.0016   0.0082   0.0111   0.0037
                           0.0057   0.0052   0.0049   0.0012   0.0018   0.0019

  DAILY AVERAGE HEAD ON TOP OF LAYER  5
  -------------------------------------
    AVERAGES               0.0010   0.0010   0.0009   0.0015   0.0018   0.0040
                           0.0044   0.0027   0.0011   0.0007   0.0005   0.0010

    STD. DEVIATIONS        0.0011   0.0010   0.0005   0.0016   0.0013   0.0020
                           0.0032   0.0019   0.0012   0.0004   0.0004   0.0009
*******************************************************************************


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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                             0.000   (  0.0000)          0.00      0.000

 EVAPOTRANSPIRATION                 0.060   (  0.0127)        219.34      0.126

 LATERAL DRAINAGE COLLECTED        41.59718 (  7.19294)    150997.750   86.68610
   FROM LAYER  2

 PERCOLATION/LEAKAGE THROUGH        6.32887 (  1.27766)     22973.812    13.18901
   LAYER  3

 AVERAGE HEAD ON TOP                0.006 (    0.001)
   OF LAYER  3

 LATERAL DRAINAGE COLLECTED         6.32887 (  1.27767)     22973.811   13.18901
   FROM LAYER  4

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  5

 AVERAGE HEAD ON TOP                0.002 (    0.000)
   OF LAYER  5

 CHANGE IN WATER STORAGE            0.000   (  0.0039)         -1.73     -0.001
*******************************************************************************


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```

```
            PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
  ------------------------------------------------------------------------
                                            (INCHES)      (CU. FT.)
                                           ----------    -------------
     PRECIPITATION                          10.20         37026.000

     RUNOFF                                  0.000            0.0000

     DRAINAGE COLLECTED FROM LAYER  2        9.16926      33284.39840

     PERCOLATION/LEAKAGE THROUGH LAYER  3    1.265324      4593.12695

     AVERAGE HEAD ON TOP OF LAYER  3         0.768

     MAXIMUM HEAD ON TOP OF LAYER  3         0.002

     LOCATION OF MAXIMUM HEAD IN LAYER  2
           (DISTANCE FROM DRAIN)             0.0 FEET

     DRAINAGE COLLECTED FROM LAYER  4        1.26532       4593.12695

     PERCOLATION/LEAKAGE THROUGH LAYER  5    0.000000         0.00001

     AVERAGE HEAD ON TOP OF LAYER  5         0.126

     MAXIMUM HEAD ON TOP OF LAYER  5         0.008

     LOCATION OF MAXIMUM HEAD IN LAYER  4
           (DISTANCE FROM DRAIN)             0.2 FEET

     SNOW WATER                              0.00             0.0000


     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.0259

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.0010

      ***  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           0.0138         0.0138

                    2           0.0080         0.0020
```

```
♀
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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\DATA10.D10
OUTPUT DATA FILE:           C:\Help3\check2.OUT


TIME:  12:39     DATE:   8/ 8/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      1.00   INCHES
          POROSITY                   =      0.5000 VOL/VOL
          FIELD CAPACITY             =      0.0020 VOL/VOL
          WILTING POINT              =      0.0010 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0186 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =   1000.00000000     CM/SEC


                                  LAYER  2
                                  --------

                       TYPE 2 - LATERAL DRAINAGE LAYER
```

```
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0020 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   1000.00000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  3
                        --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.0500 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0500 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-05 CM/SEC


                        LAYER  4
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  5
                        --------

            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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	0.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	0.001	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.000	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	0.247	INCHES
TOTAL INITIAL WATER	=	0.247	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.32	3.11	2.14	4.99	5.81	7.52
	8.58	5.83	2.90	1.68	1.40	1.71
STD. DEVIATIONS	1.70	3.15	1.11	5.08	4.91	2.58
	3.70	3.22	3.25	0.77	1.10	1.34
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.005	0.003	0.003	0.004	0.006	0.008
	0.009	0.007	0.004	0.003	0.004	0.004
STD. DEVIATIONS	0.002	0.002	0.001	0.002	0.002	0.002
	0.002	0.004	0.002	0.001	0.002	0.002
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	2.1567	2.9288	1.9805	4.7014	5.4732	6.9799
	8.1371	5.4629	2.7120	1.5049	1.3058	1.5694
STD. DEVIATIONS	1.6460	3.0524	1.0438	4.7818	4.8015	2.5136
	3.6196	3.0386	3.1333	0.7096	1.0554	1.2408
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.1490	0.1831	0.1547	0.2734	0.3187	0.5508
	0.4280	0.3606	0.1879	0.1702	0.0953	0.1419
STD. DEVIATIONS	0.1134	0.1408	0.0979	0.2926	0.2337	0.1524
	0.1163	0.1840	0.1381	0.1157	0.0912	0.1024
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.1490	0.1831	0.1547	0.2734	0.3187	0.5508
	0.4280	0.3606	0.1879	0.1702	0.0953	0.1419
STD. DEVIATIONS	0.1134	0.1408	0.0979	0.2926	0.2337	0.1524
	0.1163	0.1840	0.1381	0.1157	0.0912	0.1024
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

```
-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


  DAILY AVERAGE HEAD ON TOP OF LAYER  3
  -------------------------------------
    AVERAGES               0.0037   0.0050   0.0033   0.0081   0.0100   0.0120
                           0.0139   0.0092   0.0047   0.0024   0.0023   0.0026

    STD. DEVIATIONS        0.0029   0.0050   0.0017   0.0083   0.0106   0.0043
                           0.0062   0.0051   0.0055   0.0012   0.0019   0.0020

  DAILY AVERAGE HEAD ON TOP OF LAYER  5
  -------------------------------------
    AVERAGES               0.0007   0.0010   0.0007   0.0014   0.0015   0.0027
                           0.0021   0.0017   0.0009   0.0008   0.0005   0.0007

    STD. DEVIATIONS        0.0005   0.0007   0.0005   0.0015   0.0011   0.0008
                           0.0006   0.0009   0.0007   0.0006   0.0005   0.0005
*******************************************************************************


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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                             0.000   (  0.0000)          0.00      0.000

 EVAPOTRANSPIRATION                 0.060   (  0.0127)        219.34      0.126

 LATERAL DRAINAGE COLLECTED        44.91247 (  7.61538)    163032.266   93.59498
   FROM LAYER  2

 PERCOLATION/LEAKAGE THROUGH        3.01359 (  0.46421)     10939.349     6.28016
   LAYER  3

 AVERAGE HEAD ON TOP                0.006 (    0.001)
   OF LAYER  3

 LATERAL DRAINAGE COLLECTED         3.01359 (  0.46421)     10939.349    6.28016
   FROM LAYER  4

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.000     0.00000
   LAYER  5

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  5

 CHANGE IN WATER STORAGE            0.000   (  0.0039)         -1.74     -0.001
*******************************************************************************


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```

```
            PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
  ------------------------------------------------------------------------
                                            (INCHES)      (CU. FT.)
                                           ----------    -------------
     PRECIPITATION                          10.20         37026.000

     RUNOFF                                  0.000            0.0000

     DRAINAGE COLLECTED FROM LAYER  2        9.16114      33254.92580

     PERCOLATION/LEAKAGE THROUGH LAYER  3    0.137849       500.39334

     AVERAGE HEAD ON TOP OF LAYER  3         0.690

     MAXIMUM HEAD ON TOP OF LAYER  3         0.002

     LOCATION OF MAXIMUM HEAD IN LAYER  2
           (DISTANCE FROM DRAIN)             0.0 FEET

     DRAINAGE COLLECTED FROM LAYER  4        0.13785        500.39334

     PERCOLATION/LEAKAGE THROUGH LAYER  5    0.000000         0.00000

     AVERAGE HEAD ON TOP OF LAYER  5         0.021

     MAXIMUM HEAD ON TOP OF LAYER  5         0.001

     LOCATION OF MAXIMUM HEAD IN LAYER  4
           (DISTANCE FROM DRAIN)             0.0 FEET

     SNOW WATER                              0.00             0.0000


     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.0259

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.0010

      ***  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           0.0138         0.0138

                    2           0.0080         0.0020
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\DATA10.D10
OUTPUT DATA FILE:           C:\Help3\check1.OUT


TIME:  12:38     DATE:   8/ 8/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      1.00   INCHES
          POROSITY                   =      0.5000 VOL/VOL
          FIELD CAPACITY             =      0.0020 VOL/VOL
          WILTING POINT              =      0.0010 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0186 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =   1000.00000000     CM/SEC


                                  LAYER  2
                                  --------

                       TYPE 2 - LATERAL DRAINAGE LAYER
```

```
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0020 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   1000.00000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  3
                        --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.0500 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0500 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-05 CM/SEC


                        LAYER  4
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  5
                        --------

            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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	0.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	0.001	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.000	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	0.247	INCHES
TOTAL INITIAL WATER	=	0.247	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.32	3.11	2.14	4.99	5.81	7.52
	8.58	5.83	2.90	1.68	1.40	1.71
STD. DEVIATIONS	1.70	3.15	1.11	5.08	4.91	2.58
	3.70	3.22	3.25	0.77	1.10	1.34
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.005	0.003	0.003	0.004	0.006	0.008
	0.009	0.007	0.004	0.003	0.004	0.004
STD. DEVIATIONS	0.002	0.002	0.001	0.002	0.002	0.002
	0.002	0.004	0.002	0.001	0.002	0.002
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	2.2114	3.0083	2.0403	4.8284	5.6078	7.2162
	8.2616	5.5965	2.7802	1.5904	1.3434	1.6038
STD. DEVIATIONS	1.6744	3.1364	1.0471	4.9103	4.8294	2.5355
	3.6575	3.1050	3.1834	0.7659	1.0756	1.2715
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.0934	0.1045	0.0950	0.1463	0.1835	0.3186
	0.3006	0.2253	0.1188	0.0865	0.0577	0.1075
STD. DEVIATIONS	0.0481	0.0929	0.0704	0.1608	0.1029	0.1018
	0.0961	0.1178	0.0859	0.0429	0.0485	0.0809
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.0934	0.1045	0.0950	0.1463	0.1835	0.3186
	0.3006	0.2253	0.1188	0.0865	0.0577	0.1075
STD. DEVIATIONS	0.0481	0.0929	0.0704	0.1608	0.1029	0.1018
	0.0961	0.1178	0.0859	0.0429	0.0485	0.0809
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

```
-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


  DAILY AVERAGE HEAD ON TOP OF LAYER  3
  -------------------------------------
    AVERAGES                0.0039   0.0053   0.0034   0.0085   0.0079   0.0128
                            0.0143   0.0096   0.0049   0.0027   0.0024   0.0027

    STD. DEVIATIONS         0.0030   0.0053   0.0017   0.0087   0.0043   0.0044
                            0.0063   0.0053   0.0057   0.0013   0.0019   0.0021

  DAILY AVERAGE HEAD ON TOP OF LAYER  5
  -------------------------------------
    AVERAGES                0.0004   0.0006   0.0005   0.0007   0.0009   0.0016
                            0.0014   0.0011   0.0006   0.0004   0.0003   0.0005

    STD. DEVIATIONS         0.0002   0.0005   0.0003   0.0008   0.0005   0.0005
                            0.0005   0.0006   0.0004   0.0002   0.0002   0.0004
*******************************************************************************


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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                             0.000   (  0.0000)          0.00      0.000

 EVAPOTRANSPIRATION                 0.060   (  0.0127)        219.34      0.126

 LATERAL DRAINAGE COLLECTED        46.08820 (  7.66885)    167300.172   96.04514
   FROM LAYER  2

 PERCOLATION/LEAKAGE THROUGH        1.83785 (  0.28593)      6671.387     3.82997
   LAYER  3

 AVERAGE HEAD ON TOP                0.007 (    0.001)
   OF LAYER  3

 LATERAL DRAINAGE COLLECTED         1.83785 (  0.28593)      6671.387    3.82997
   FROM LAYER  4

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.000     0.00000
   LAYER  5

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  5

 CHANGE IN WATER STORAGE            0.000   (  0.0039)         -1.74     -0.001
*******************************************************************************


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```

```
            PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
  ------------------------------------------------------------------------
                                            (INCHES)      (CU. FT.)
                                           ----------    -------------
     PRECIPITATION                          10.20         37026.000

     RUNOFF                                  0.000            0.0000

     DRAINAGE COLLECTED FROM LAYER  2       10.15893      36876.90230

     PERCOLATION/LEAKAGE THROUGH LAYER  3    0.068330       248.03773

     AVERAGE HEAD ON TOP OF LAYER  3         0.238

     MAXIMUM HEAD ON TOP OF LAYER  3         0.002

     LOCATION OF MAXIMUM HEAD IN LAYER  2
           (DISTANCE FROM DRAIN)             0.1 FEET

     DRAINAGE COLLECTED FROM LAYER  4        0.06833        248.03773

     PERCOLATION/LEAKAGE THROUGH LAYER  5    0.000000         0.00000

     AVERAGE HEAD ON TOP OF LAYER  5         0.010

     MAXIMUM HEAD ON TOP OF LAYER  5         0.000

     LOCATION OF MAXIMUM HEAD IN LAYER  4
           (DISTANCE FROM DRAIN)             1.8 FEET

     SNOW WATER                              0.00             0.0000


     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.0259

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.0010

      ***  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           0.0138         0.0138

                    2           0.0080         0.0020
```

```
♀
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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\DATA10.D10
OUTPUT DATA FILE:           C:\Help3\check6.OUT


TIME:  12:49     DATE:   8/ 8/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      1.00   INCHES
          POROSITY                   =      0.5000 VOL/VOL
          FIELD CAPACITY             =      0.0020 VOL/VOL
          WILTING POINT              =      0.0010 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0186 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =   1000.00000000     CM/SEC


                                  LAYER  2
                                  --------

                       TYPE 2 - LATERAL DRAINAGE LAYER
```

```
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0020 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   1000.00000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  3
                        --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.0500 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0500 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999997000E-06 CM/SEC


                        LAYER  4
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  5
                        --------

            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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	0.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	0.001	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.000	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	0.247	INCHES
TOTAL INITIAL WATER	=	0.247	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.32	3.11	2.14	4.99	5.81	7.52
	8.58	5.83	2.90	1.68	1.40	1.71
STD. DEVIATIONS	1.70	3.15	1.11	5.08	4.91	2.58
	3.70	3.22	3.25	0.77	1.10	1.34
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.005	0.003	0.003	0.004	0.006	0.008
	0.009	0.007	0.004	0.003	0.004	0.004
STD. DEVIATIONS	0.002	0.002	0.001	0.002	0.002	0.002
	0.002	0.004	0.002	0.001	0.002	0.002
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	2.2733	3.0847	2.1109	4.9462	5.7256	7.4453
	8.4827	5.7559	2.8634	1.6496	1.3759	1.6833
STD. DEVIATIONS	1.6892	3.1575	1.0975	5.0337	4.8862	2.5718
	3.6908	3.1759	3.2108	0.7728	1.0803	1.3213
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.0308	0.0288	0.0243	0.0340	0.0604	0.0843
	0.0840	0.0666	0.0356	0.0273	0.0221	0.0311
STD. DEVIATIONS	0.0155	0.0183	0.0137	0.0308	0.0325	0.0223
	0.0288	0.0369	0.0342	0.0126	0.0179	0.0249
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.0308	0.0288	0.0243	0.0340	0.0604	0.0843
	0.0840	0.0666	0.0356	0.0273	0.0221	0.0311
STD. DEVIATIONS	0.0155	0.0183	0.0137	0.0308	0.0325	0.0223
	0.0288	0.0369	0.0342	0.0126	0.0179	0.0249
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

```
-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


  DAILY AVERAGE HEAD ON TOP OF LAYER  3
  -------------------------------------
    AVERAGES               0.0041   0.0056   0.0037   0.0089   0.0082   0.0136
                           0.0148   0.0101   0.0052   0.0029   0.0025   0.0030

    STD. DEVIATIONS        0.0030   0.0054   0.0019   0.0091   0.0045   0.0046
                           0.0065   0.0056   0.0057   0.0014   0.0020   0.0023

  DAILY AVERAGE HEAD ON TOP OF LAYER  5
  -------------------------------------
    AVERAGES               0.0001   0.0002   0.0001   0.0002   0.0003   0.0004
                           0.0004   0.0003   0.0002   0.0001   0.0001   0.0001

    STD. DEVIATIONS        0.0001   0.0001   0.0001   0.0002   0.0002   0.0001
                           0.0001   0.0002   0.0002   0.0001   0.0001   0.0001
*******************************************************************************


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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                             0.000   (  0.0000)          0.00      0.000

 EVAPOTRANSPIRATION                 0.060   (  0.0127)        219.34      0.126

 LATERAL DRAINAGE COLLECTED        47.39672 (  7.76745)    172050.078   98.77201
   FROM LAYER  2

 PERCOLATION/LEAKAGE THROUGH        0.52934 (  0.09808)      1921.507     1.10312
   LAYER  3

 AVERAGE HEAD ON TOP                0.007 (    0.001)
   OF LAYER  3

 LATERAL DRAINAGE COLLECTED         0.52934 (  0.09808)      1921.506    1.10312
   FROM LAYER  4

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.000     0.00000
   LAYER  5

 AVERAGE HEAD ON TOP                0.000 (    0.000)
   OF LAYER  5

 CHANGE IN WATER STORAGE            0.000   (  0.0039)         -1.74     -0.001
*******************************************************************************


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```

```
            PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
  ------------------------------------------------------------------------
                                            (INCHES)      (CU. FT.)
                                           ----------    -------------
     PRECIPITATION                          10.20         37026.000

     RUNOFF                                  0.000            0.0000

     DRAINAGE COLLECTED FROM LAYER  2       10.19510      37008.21090

     PERCOLATION/LEAKAGE THROUGH LAYER  3    0.017045        61.87297

     AVERAGE HEAD ON TOP OF LAYER  3         0.240

     MAXIMUM HEAD ON TOP OF LAYER  3         0.002

     LOCATION OF MAXIMUM HEAD IN LAYER  2
           (DISTANCE FROM DRAIN)             0.2 FEET

     DRAINAGE COLLECTED FROM LAYER  4        0.01704         61.87297

     PERCOLATION/LEAKAGE THROUGH LAYER  5    0.000000         0.00000

     AVERAGE HEAD ON TOP OF LAYER  5         0.003

     MAXIMUM HEAD ON TOP OF LAYER  5         0.000

     LOCATION OF MAXIMUM HEAD IN LAYER  4
           (DISTANCE FROM DRAIN)             0.0 FEET

     SNOW WATER                              0.00             0.0000


     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.0259

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.0010

      ***  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           0.0138         0.0138

                    2           0.0080         0.0020
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\DATA10.D10
OUTPUT DATA FILE:           C:\Help3\check7.OUT


TIME:  12:50     DATE:   8/ 8/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      1.00   INCHES
          POROSITY                   =      0.5000 VOL/VOL
          FIELD CAPACITY             =      0.0020 VOL/VOL
          WILTING POINT              =      0.0010 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0186 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =   1000.00000000     CM/SEC


                                  LAYER  2
                                  --------

                       TYPE 2 - LATERAL DRAINAGE LAYER
```

```
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0020 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   1000.00000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  3
                        --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.0500 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0500 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999999000E-06 CM/SEC


                        LAYER  4
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  5
                        --------

            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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	0.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	0.001	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.000	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	0.247	INCHES
TOTAL INITIAL WATER	=	0.247	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.32	3.11	2.14	4.99	5.81	7.52
	8.58	5.83	2.90	1.68	1.40	1.71
STD. DEVIATIONS	1.70	3.15	1.11	5.08	4.91	2.58
	3.70	3.22	3.25	0.77	1.10	1.34
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.005	0.003	0.003	0.004	0.006	0.008
	0.009	0.007	0.004	0.003	0.004	0.004
STD. DEVIATIONS	0.002	0.002	0.001	0.002	0.002	0.002
	0.002	0.004	0.002	0.001	0.002	0.002
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	2.2833	3.0957	2.1225	4.9619	5.7552	7.4874
	8.5256	5.7887	2.8794	1.6605	1.3838	1.6964
STD. DEVIATIONS	1.6928	3.1646	1.1011	5.0493	4.9002	2.5814
	3.7011	3.1929	3.2266	0.7732	1.0855	1.3293
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.0207	0.0179	0.0128	0.0182	0.0307	0.0423
	0.0409	0.0340	0.0197	0.0162	0.0140	0.0182
STD. DEVIATIONS	0.0114	0.0131	0.0101	0.0135	0.0125	0.0060
	0.0131	0.0192	0.0171	0.0076	0.0110	0.0158
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.0207	0.0179	0.0128	0.0182	0.0307	0.0423
	0.0409	0.0340	0.0197	0.0162	0.0140	0.0182
STD. DEVIATIONS	0.0114	0.0131	0.0101	0.0135	0.0125	0.0060
	0.0131	0.0192	0.0171	0.0076	0.0110	0.0158
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

```
-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


  DAILY AVERAGE HEAD ON TOP OF LAYER  3
  -------------------------------------
    AVERAGES               0.0041   0.0056   0.0037   0.0089   0.0084   0.0137
                           0.0149   0.0103   0.0053   0.0029   0.0025   0.0030

    STD. DEVIATIONS        0.0030   0.0054   0.0019   0.0092   0.0046   0.0047
                           0.0065   0.0056   0.0058   0.0014   0.0020   0.0024

  DAILY AVERAGE HEAD ON TOP OF LAYER  5
  -------------------------------------
    AVERAGES               0.0001   0.0001   0.0001   0.0001   0.0001   0.0002
                           0.0002   0.0002   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS        0.0001   0.0001   0.0000   0.0001   0.0001   0.0000
                           0.0001   0.0001   0.0001   0.0000   0.0001   0.0001
*******************************************************************************


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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                             0.000   (  0.0000)          0.00      0.000

 EVAPOTRANSPIRATION                 0.060   (  0.0127)        219.34      0.126

 LATERAL DRAINAGE COLLECTED        47.64042 (  7.78605)    172934.719   99.27987
   FROM LAYER  2

 PERCOLATION/LEAKAGE THROUGH        0.28563 (  0.06055)      1036.836     0.59524
   LAYER  3

 AVERAGE HEAD ON TOP                0.007 (    0.001)
   OF LAYER  3

 LATERAL DRAINAGE COLLECTED         0.28563 (  0.06055)      1036.836    0.59524
   FROM LAYER  4

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.000     0.00000
   LAYER  5

 AVERAGE HEAD ON TOP                0.000 (    0.000)
   OF LAYER  5

 CHANGE IN WATER STORAGE            0.000   (  0.0039)         -1.74     -0.001
*******************************************************************************


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```

```
            PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
 ------------------------------------------------------------------------
                                            (INCHES)      (CU. FT.)
                                           ----------    -------------
   PRECIPITATION                            10.20         37026.000

   RUNOFF                                    0.000            0.0000

   DRAINAGE COLLECTED FROM LAYER  2         10.19644      37013.09370

   PERCOLATION/LEAKAGE THROUGH LAYER  3      0.008589        31.17967

   AVERAGE HEAD ON TOP OF LAYER  3           0.241

   MAXIMUM HEAD ON TOP OF LAYER  3           0.002

   LOCATION OF MAXIMUM HEAD IN LAYER  2
         (DISTANCE FROM DRAIN)               0.0 FEET

   DRAINAGE COLLECTED FROM LAYER  4          0.00859         31.17967

   PERCOLATION/LEAKAGE THROUGH LAYER  5      0.000000         0.00000

   AVERAGE HEAD ON TOP OF LAYER  5           0.001

   MAXIMUM HEAD ON TOP OF LAYER  5           0.000

   LOCATION OF MAXIMUM HEAD IN LAYER  4
         (DISTANCE FROM DRAIN)               0.0 FEET

   SNOW WATER                                0.00             0.0000


   MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0259

   MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0010

    ***  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           0.0138         0.0138

                   2           0.0080         0.0020
```

```
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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\DATA10.D10
OUTPUT DATA FILE:           C:\Help3\chec8.OUT


TIME:  12:51     DATE:   8/ 8/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      1.00   INCHES
          POROSITY                   =      0.5000 VOL/VOL
          FIELD CAPACITY             =      0.0020 VOL/VOL
          WILTING POINT              =      0.0010 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0186 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =   1000.00000000     CM/SEC


                                  LAYER  2
                                  --------

                       TYPE 2 - LATERAL DRAINAGE LAYER
```

```
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0020 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   1000.00000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  3
                        --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      4.00   INCHES
POROSITY                     =      0.0500 VOL/VOL
FIELD CAPACITY               =      0.0020 VOL/VOL
WILTING POINT                =      0.0010 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0500 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000001000E-06 CM/SEC


                        LAYER  4
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =     12.0    FEET


                        LAYER  5
                        --------

            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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	0.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	0.001	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.000	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	0.247	INCHES
TOTAL INITIAL WATER	=	0.247	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	0.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.32	3.11	2.14	4.99	5.81	7.52
	8.58	5.83	2.90	1.68	1.40	1.71
STD. DEVIATIONS	1.70	3.15	1.11	5.08	4.91	2.58
	3.70	3.22	3.25	0.77	1.10	1.34
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.005	0.003	0.003	0.004	0.006	0.008
	0.009	0.007	0.004	0.003	0.004	0.004
STD. DEVIATIONS	0.002	0.002	0.001	0.002	0.002	0.002
	0.002	0.004	0.002	0.001	0.002	0.002
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	2.2980	3.1091	2.1320	4.9755	5.7775	7.5200
	8.5568	5.8148	2.8932	1.6719	1.3934	1.7093
STD. DEVIATIONS	1.6925	3.1691	1.1072	5.0591	4.9037	2.5841
	3.7031	3.2053	3.2383	0.7765	1.0891	1.3386
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.0059	0.0046	0.0033	0.0046	0.0084	0.0096
	0.0097	0.0087	0.0051	0.0049	0.0044	0.0053
STD. DEVIATIONS	0.0031	0.0031	0.0025	0.0032	0.0034	0.0026
	0.0028	0.0040	0.0048	0.0023	0.0029	0.0041
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.0059	0.0046	0.0033	0.0046	0.0084	0.0096
	0.0097	0.0087	0.0051	0.0049	0.0044	0.0053
STD. DEVIATIONS	0.0031	0.0031	0.0025	0.0032	0.0034	0.0026
	0.0028	0.0040	0.0048	0.0023	0.0029	0.0041
PERCOLATION/LEAKAGE THROUGH LAYER 5						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

```
-------------------------------------------------------------------------------
              AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)
-------------------------------------------------------------------------------


  DAILY AVERAGE HEAD ON TOP OF LAYER  3
  -------------------------------------
    AVERAGES               0.0041   0.0057   0.0038   0.0090   0.0084   0.0138
                           0.0150   0.0103   0.0053   0.0030   0.0026   0.0031

    STD. DEVIATIONS        0.0030   0.0054   0.0019   0.0092   0.0046   0.0046
                           0.0066   0.0057   0.0058   0.0014   0.0020   0.0024

  DAILY AVERAGE HEAD ON TOP OF LAYER  5
  -------------------------------------
    AVERAGES               0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                           0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

    STD. DEVIATIONS        0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                           0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
*******************************************************************************


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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                             0.000   (  0.0000)          0.00      0.000

 EVAPOTRANSPIRATION                 0.060   (  0.0127)        219.34      0.126

 LATERAL DRAINAGE COLLECTED        47.85154 (  7.80869)    173701.078   99.71983
   FROM LAYER  2

 PERCOLATION/LEAKAGE THROUGH        0.07452 (  0.01694)       270.511     0.15530
   LAYER  3

 AVERAGE HEAD ON TOP                0.007 (    0.001)
   OF LAYER  3

 LATERAL DRAINAGE COLLECTED         0.07452 (  0.01694)       270.511    0.15530
   FROM LAYER  4

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.000     0.00000
   LAYER  5

 AVERAGE HEAD ON TOP                0.000 (    0.000)
   OF LAYER  5

 CHANGE IN WATER STORAGE            0.000   (  0.0039)         -1.74     -0.001
*******************************************************************************


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```

```
            PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
  ------------------------------------------------------------------------
                                            (INCHES)      (CU. FT.)
                                           ----------    -------------
     PRECIPITATION                          10.20         37026.000

     RUNOFF                                  0.000            0.0000

     DRAINAGE COLLECTED FROM LAYER  2       10.19905      37022.53910

     PERCOLATION/LEAKAGE THROUGH LAYER  3    0.001709         6.20460

     AVERAGE HEAD ON TOP OF LAYER  3         0.241

     MAXIMUM HEAD ON TOP OF LAYER  3         0.002

     LOCATION OF MAXIMUM HEAD IN LAYER  2
           (DISTANCE FROM DRAIN)             0.1 FEET

     DRAINAGE COLLECTED FROM LAYER  4        0.00171          6.20460

     PERCOLATION/LEAKAGE THROUGH LAYER  5    0.000000         0.00000

     AVERAGE HEAD ON TOP OF LAYER  5         0.000

     MAXIMUM HEAD ON TOP OF LAYER  5         0.000

     LOCATION OF MAXIMUM HEAD IN LAYER  4
           (DISTANCE FROM DRAIN)             0.0 FEET

     SNOW WATER                              0.00             0.0000


     MAXIMUM VEG. SOIL WATER (VOL/VOL)                 0.0259

     MINIMUM VEG. SOIL WATER (VOL/VOL)                 0.0010

      ***  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           0.0138         0.0138

                    2           0.0080         0.0020
```

Appendix E: HELP Set 2

Table E-1. HELP Set 2 Concrete Pavement Summary Table

Scenario: Concrete Pavement					
Avg. Annual Rainfall: 47.99 in					
Thickness of Pavement: 8 in					
Thickness of Base: 6 in					
Curve #	**Base HC (cm/s)**	**Pavement HC (cm/s)**	**Evaporation, in. (%)**	**Infiltration, in. (%)**	**E/(E+I) Percent**
92	$1 * 10^{-8}$	$1 * 10^{-4}$	8.82 (18.4)	0.0589 (0.1)	99%
92	$1 * 10^{-8}$	$5 * 10^{-5}$	8.82 (18.4)	0.0589 (0.1)	99%
92	$1 * 10^{-8}$	$1 * 10^{-3}$	8.82 (18.4)	0.0589 (0.1)	99%
94	$1 * 10^{-8}$	$1 * 10^{-4}$	8.73 (18.2)	0.0600 (0.1)	99%
94	$1 * 10^{-8}$	$5 * 10^{-5}$	8.73 (18.2)	0.0600 (0.1)	99%
94	$1 * 10^{-8}$	$1 * 10^{-3}$	8.73 (18.2)	0.0600 (0.1)	99%
98	$1 * 10^{-8}$	$1 * 10^{-4}$	7.67 (16.0)	0.0600 (0.1)	99%
98	$1 * 10^{-8}$	$5 * 10^{-5}$	7.67 (16.0)	0.0600 (0.1)	99%
98	$1 * 10^{-8}$	$1 * 10^{-3}$	7.67 (16.0)	0.0600 (0.1)	99%
Min					99%
Max					99%
Mean					99%

Table E-2. HELP Set 2 Asphalt Pavement Summary Table

Scenario: Asphalt Pavement					
Avg. Annual Rainfall: 47.99 in					
Thickness of Pavement: 4”					
Thickness of Base: 10”					
Curve #	**Base HC (cm/s)**	**Pavement HC (cm/s)**	**Evaporation, in. (%)**	**Infiltration, in. (%)**	**E/(E+I) Percent**
88	$1 * 10^{-4}$	$1 * 10^{-7}$	8.56 (17.8)	0.351(0.73)	96%
88	$1 * 10^{-4}$	$1 * 10^{-6}$	10.5 (22.0)	0.232(0.48)	98%
88	$1 * 10^{-4}$	$1 * 10^{-5}$	11.7 (24.5)	3.54(7.39)	77%
88	$5 * 10^{-5}$	$1 * 10^{-7}$	8.56 (17.8)	0.351(0.73)	96%
88	$5 * 10^{-5}$	$1 * 10^{-6}$	10.5 (22.0)	0.232(0.48)	98%
88	$5 * 10^{-5}$	$1 * 10^{-5}$	11.7 (24.5)	3.54(7.39)	77%
88	$1 * 10^{-3}$	$1 * 10^{-7}$	8.56 (17.8)	0.351(0.73)	96%
88	$1 * 10^{-3}$	$1 * 10^{-6}$	10.5 (22.0)	0.232(0.48)	98%
88	$1 * 10^{-3}$	$1 * 10^{-5}$	11.7 (24.5)	3.54(7.39)	77%
94	$1 * 10^{-4}$	$1 * 10^{-7}$	8.43(17.6)	0.352(0.73)	96%
94	$1 * 10^{-4}$	$1 * 10^{-6}$	10.3(21.6)	0.232(0.48)	98%
94	$1 * 10^{-4}$	$1 * 10^{-5}$	11.07(23.1)	3.23(6.75)	77%
94	$5 * 10^{-5}$	$1 * 10^{-7}$	8.43(17.6)	0.353(0.73)	96%
94	$5 * 10^{-5}$	$1 * 10^{-6}$	10.3(21.6)	0.232(0.48)	98%
94	$5 * 10^{-5}$	$1 * 10^{-5}$	11.1(23.1)	3.24 (6.75)	77%
94	$1 * 10^{-3}$	$1 * 10^{-7}$	8.43(17.6)	0.353 (0.73)	96%
94	$1 * 10^{-3}$	$1 * 10^{-6}$	10.4(21.6)	0.231 (0.48)	98%
94	$1 * 10^{-3}$	$1 * 10^{-5}$	11.1(23.1)	3.24 (6.75)	77%
98	$1 * 10^{-4}$	$1 * 10^{-7}$	7.47(15.6)	0.372(0.78)	95%
98	$1 * 10^{-4}$	$1 * 10^{-6}$	8.19(17.1)	0.251(0.52)	97%
98	$1 * 10^{-4}$	$1 * 10^{-5}$	8.27(17.2)	2.56(5.34)	76%
98	$5 * 10^{-5}$	$1 * 10^{-7}$	7.47(15.6)	0.372(0.78)	95%
98	$5 * 10^{-5}$	$1 * 10^{-6}$	8.19(17.1)	0.251(0.52)	97%
98	$5 * 10^{-5}$	$1 * 10^{-5}$	8.27(17.2)	2.56(5.34)	76%
98	$1 * 10^{-3}$	$1 * 10^{-7}$	7.47 (15.6)	0.372 (0.78)	95%
98	$1 * 10^{-3}$	$1 * 10^{-6}$	8.19 (17.1)	0.251 (0.52)	97%
98	$1 * 10^{-3}$	$1 * 10^{-5}$	8.27 (17.2)	2.56 (5.34)	76%
Min			76%		
Max			99%		
Mean			90%		

Asphalt HELP Model Outputs

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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              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:    C:\Help3\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f1.OUT


TIME:  15:49     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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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   0
          THICKNESS                   =      4.00   INCHES
          POROSITY                    =      0.0500 VOL/VOL
          FIELD CAPACITY              =      0.0002 VOL/VOL
          WILTING POINT               =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.100000001000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     88.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

     JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
     -------     -------     -------     -------     -------     -------
      59.80       60.80       66.20       71.60       77.10       80.90
      82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


   HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
   DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
   LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                      DAILY OUTPUT FOR YEAR    1
 -------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.959    2.806    1.799    4.342    4.823    5.739
                            6.677    4.474    2.444    1.416    1.161    1.430

    STD. DEVIATIONS         1.610    3.028    0.920    4.316    4.455    2.413
                            3.185    2.331    2.928    0.669    1.025    1.188

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.330    0.279    0.315    0.625    0.954    1.740
                            1.852    1.317    0.436    0.237    0.219    0.260

    STD. DEVIATIONS         0.140    0.184    0.251    0.780    0.799    0.513
                            0.658    0.992    0.397    0.167    0.163    0.198

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0297   0.0227   0.0225   0.0264   0.0347   0.0432
                            0.0450   0.0352   0.0211   0.0229   0.0245   0.0236

    STD. DEVIATIONS         0.0074   0.0097   0.0076   0.0145   0.0117   0.0078
                            0.0078   0.0140   0.0108   0.0074   0.0096   0.0104

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0002   0.0002
                            0.0002   0.0002   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0001   0.0001   0.0000
                            0.0000   0.0001   0.0001   0.0000   0.0001   0.0001

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.070   (  6.8328)     141824.33     81.420

 EVAPOTRANSPIRATION                 8.565   (  1.7664)      31089.43     17.848

 LATERAL DRAINAGE COLLECTED        0.35136 (  0.02894)      1275.427    0.73221
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0010)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.012        36343.1055

      DRAINAGE COLLECTED FROM LAYER  3           0.00340         12.34752

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f2.OUT


TIME:  15:52     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999997000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     88.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.832    2.693    1.696    4.202    4.613    5.418
                            6.421    4.274    2.335    1.313    1.064    1.316

    STD. DEVIATIONS         1.569    2.996    0.894    4.230    4.371    2.347
                            3.144    2.229    2.866    0.648    0.991    1.150

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.458    0.404    0.427    0.759    1.156    2.117
                            2.112    1.551    0.553    0.343    0.320    0.378

    STD. DEVIATIONS         0.186    0.254    0.319    0.839    0.881    0.574
                            0.712    1.092    0.474    0.208    0.194    0.273

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0250   0.0194   0.0169   0.0152   0.0189   0.0218
                            0.0243   0.0202   0.0133   0.0164   0.0233   0.0174

    STD. DEVIATIONS         0.0069   0.0078   0.0048   0.0078   0.0045   0.0084
                            0.0051   0.0037   0.0054   0.0070   0.0104   0.0086

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0001   0.0001
                            0.0001   0.0001   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0000   0.0000   0.0001
                            0.0000   0.0000   0.0000   0.0000   0.0001   0.0000

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            37.177   (  6.7154)     134952.25     77.475

 EVAPOTRANSPIRATION                10.577   (  2.0210)      38393.99     22.042

 LATERAL DRAINAGE COLLECTED         0.23222 (  0.02518)       842.942    0.48392
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE            0.000   (  0.0205)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.975        36210.6016

      DRAINAGE COLLECTED FROM LAYER  3           0.00979         35.55090

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.002

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0470

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f3.OUT


TIME:  15:54     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                   =      4.00   INCHES
          POROSITY                    =      0.0500 VOL/VOL
          FIELD CAPACITY              =      0.0002 VOL/VOL
          WILTING POINT               =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.0173 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-05 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     88.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.069  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.689  INCHES
TOTAL INITIAL WATER                  =      3.689  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.400    2.357    1.379    3.740    4.277    5.052
                            6.023    3.798    1.984    0.973    0.719    0.972

    STD. DEVIATIONS         1.487    2.945    0.780    3.997    4.632    2.305
                            3.106    2.170    2.762    0.631    0.884    0.956

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.652    0.583    0.525    0.958    1.176    1.973
                            2.027    1.649    0.687    0.525    0.477    0.540

    STD. DEVIATIONS         0.251    0.361    0.380    0.921    0.751    0.455
                            0.690    1.010    0.548    0.257    0.245    0.409

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.2435   0.2321   0.2329   0.2842   0.2762   0.5533
                            0.5196   0.4203   0.2080   0.1872   0.1882   0.2005

    STD. DEVIATIONS         0.1359   0.1362   0.1631   0.1616   0.1395   0.2325
                            0.1525   0.2420   0.1707   0.0768   0.1017   0.1415

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0013   0.0013   0.0012   0.0015   0.0014   0.0029
                            0.0026   0.0023   0.0010   0.0009   0.0010   0.0010

    STD. DEVIATIONS         0.0007   0.0008   0.0010   0.0009   0.0007   0.0011
                            0.0008   0.0014   0.0008   0.0004   0.0005   0.0007

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            32.674   (  7.0516)     118608.42     68.092

 EVAPOTRANSPIRATION                11.772   (  1.9366)      42733.36     24.533

 LATERAL DRAINAGE COLLECTED         3.54609 (  0.39267)     12872.295    7.38984
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.002 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           -0.007   (  0.0895)        -24.92     -0.014
*******************************************************************************


♀
*******************************************************************************

                PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.959        36152.7656

      DRAINAGE COLLECTED FROM LAYER  3           0.22471        815.68549

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.037

      MAXIMUM HEAD ON TOP OF LAYER  4            0.001

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0500

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f4.OUT


TIME:  15:59     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.100000001000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     88.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
           S
 DAY  A    O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I    I                      WATER     #1        #1        #1
      R    L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.959    2.806    1.799    4.342    4.823    5.739
                            6.677    4.474    2.444    1.416    1.161    1.430

    STD. DEVIATIONS         1.610    3.028    0.920    4.316    4.455    2.413
                            3.185    2.331    2.928    0.669    1.025    1.188

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.330    0.279    0.315    0.625    0.954    1.740
                            1.852    1.317    0.436    0.237    0.219    0.260

    STD. DEVIATIONS         0.140    0.184    0.251    0.780    0.799    0.513
                            0.658    0.992    0.397    0.167    0.163    0.198

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0297   0.0227   0.0225   0.0264   0.0347   0.0432
                            0.0450   0.0352   0.0211   0.0229   0.0245   0.0236

    STD. DEVIATIONS         0.0074   0.0097   0.0076   0.0145   0.0117   0.0078
                            0.0078   0.0140   0.0108   0.0074   0.0096   0.0104

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0002   0.0002
                            0.0002   0.0002   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0001   0.0001   0.0000
                            0.0000   0.0001   0.0001   0.0000   0.0001   0.0001

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.070   (  6.8328)     141824.33     81.420

 EVAPOTRANSPIRATION                 8.565   (  1.7664)      31089.43     17.848

 LATERAL DRAINAGE COLLECTED        0.35136 (  0.02894)      1275.427    0.73221
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0010)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.012        36343.1055

      DRAINAGE COLLECTED FROM LAYER  3           0.00340         12.34752

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f5.OUT


TIME:  15:59     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999997000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
               MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     88.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.832    2.693    1.696    4.202    4.613    5.418
                            6.421    4.274    2.335    1.313    1.064    1.316

    STD. DEVIATIONS         1.569    2.996    0.894    4.230    4.371    2.347
                            3.144    2.229    2.866    0.648    0.991    1.150

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.458    0.404    0.427    0.759    1.156    2.117
                            2.112    1.551    0.553    0.343    0.320    0.378

    STD. DEVIATIONS         0.186    0.254    0.319    0.839    0.881    0.574
                            0.712    1.092    0.474    0.208    0.194    0.273

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0250   0.0194   0.0169   0.0152   0.0189   0.0218
                            0.0243   0.0202   0.0133   0.0164   0.0233   0.0174

    STD. DEVIATIONS         0.0069   0.0078   0.0048   0.0078   0.0045   0.0084
                            0.0051   0.0037   0.0054   0.0070   0.0104   0.0086

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0001   0.0001
                            0.0001   0.0001   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0000   0.0000   0.0001
                            0.0000   0.0000   0.0000   0.0000   0.0001   0.0000

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            37.177   (  6.7154)     134952.25     77.475

 EVAPOTRANSPIRATION                10.577   (  2.0210)      38393.99     22.042

 LATERAL DRAINAGE COLLECTED         0.23222 (  0.02518)       842.942    0.48392
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE            0.000   (  0.0205)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.975        36210.6016

      DRAINAGE COLLECTED FROM LAYER  3           0.00979         35.55090

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.002

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0470

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f6.OUT


TIME:  16: 0     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0173 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999975000E-05 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     88.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.069  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.689  INCHES
TOTAL INITIAL WATER                  =      3.689  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.400    2.357    1.379    3.740    4.277    5.052
                            6.023    3.798    1.984    0.973    0.719    0.972

    STD. DEVIATIONS         1.487    2.945    0.780    3.997    4.632    2.305
                            3.106    2.170    2.762    0.631    0.884    0.956

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.652    0.583    0.525    0.958    1.176    1.973
                            2.027    1.649    0.687    0.525    0.477    0.540

    STD. DEVIATIONS         0.251    0.361    0.380    0.921    0.751    0.455
                            0.690    1.010    0.548    0.257    0.245    0.409

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.2435   0.2321   0.2329   0.2803   0.2797   0.5457
                            0.5203   0.4282   0.2074   0.1872   0.1882   0.2005

    STD. DEVIATIONS         0.1359   0.1362   0.1631   0.1617   0.1442   0.2360
                            0.1645   0.2483   0.1705   0.0768   0.1017   0.1415

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0013   0.0013   0.0012   0.0015   0.0015   0.0031
                            0.0028   0.0023   0.0012   0.0010   0.0010   0.0011

    STD. DEVIATIONS         0.0007   0.0008   0.0008   0.0009   0.0008   0.0012
                            0.0009   0.0013   0.0009   0.0004   0.0006   0.0007

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            32.674   (  7.0516)     118608.42     68.092

 EVAPOTRANSPIRATION                11.772   (  1.9366)      42733.36     24.533

 LATERAL DRAINAGE COLLECTED         3.54609 (  0.39267)     12872.294    7.38984
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.002 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           -0.007   (  0.0895)        -24.92     -0.014
*******************************************************************************


♀
*******************************************************************************

                PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.959        36152.7656

      DRAINAGE COLLECTED FROM LAYER  3           0.20165        731.97150

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.032

      MAXIMUM HEAD ON TOP OF LAYER  4            0.001

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0500

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f7.OUT


TIME:  16: 2     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                   =      4.00   INCHES
          POROSITY                    =      0.0500 VOL/VOL
          FIELD CAPACITY              =      0.0002 VOL/VOL
          WILTING POINT               =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.100000001000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     88.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
           S
 DAY  A    O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I    I                      WATER     #1        #1        #1
      R    L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.959    2.806    1.799    4.342    4.823    5.739
                            6.677    4.474    2.444    1.416    1.161    1.430

    STD. DEVIATIONS         1.610    3.028    0.920    4.316    4.455    2.413
                            3.185    2.331    2.928    0.669    1.025    1.188

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.330    0.279    0.315    0.625    0.954    1.740
                            1.852    1.317    0.436    0.237    0.219    0.260

    STD. DEVIATIONS         0.140    0.184    0.251    0.780    0.799    0.513
                            0.658    0.992    0.397    0.167    0.163    0.198

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0297   0.0227   0.0225   0.0264   0.0347   0.0432
                            0.0450   0.0352   0.0211   0.0229   0.0245   0.0236

    STD. DEVIATIONS         0.0074   0.0097   0.0076   0.0145   0.0117   0.0078
                            0.0078   0.0140   0.0108   0.0074   0.0096   0.0104

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0002   0.0002
                            0.0002   0.0002   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0001   0.0001   0.0000
                            0.0000   0.0001   0.0001   0.0000   0.0001   0.0001

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.070   (  6.8328)     141824.33     81.420

 EVAPOTRANSPIRATION                 8.565   (  1.7664)      31089.43     17.848

 LATERAL DRAINAGE COLLECTED        0.35136 (  0.02894)      1275.427    0.73221
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0010)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

                PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.012        36343.1055

      DRAINAGE COLLECTED FROM LAYER  3           0.00340         12.34752

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f8.OUT


TIME:  16: 2     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999997000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     88.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.832    2.693    1.696    4.202    4.613    5.418
                            6.421    4.274    2.335    1.313    1.064    1.316

    STD. DEVIATIONS         1.569    2.996    0.894    4.230    4.371    2.347
                            3.144    2.229    2.866    0.648    0.991    1.150

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.458    0.404    0.427    0.759    1.156    2.117
                            2.112    1.551    0.553    0.343    0.320    0.378

    STD. DEVIATIONS         0.186    0.254    0.319    0.839    0.881    0.574
                            0.712    1.092    0.474    0.208    0.194    0.273

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0250   0.0194   0.0169   0.0152   0.0189   0.0218
                            0.0243   0.0202   0.0133   0.0164   0.0233   0.0174

    STD. DEVIATIONS         0.0069   0.0078   0.0048   0.0078   0.0045   0.0084
                            0.0051   0.0037   0.0054   0.0070   0.0104   0.0086

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0001   0.0001
                            0.0001   0.0001   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0000   0.0000   0.0001
                            0.0000   0.0000   0.0000   0.0000   0.0001   0.0000

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            37.177   (  6.7154)     134952.25     77.475

 EVAPOTRANSPIRATION                10.577   (  2.0210)      38393.99     22.042

 LATERAL DRAINAGE COLLECTED         0.23222 (  0.02518)       842.942    0.48392
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE            0.000   (  0.0205)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.975        36210.6016

      DRAINAGE COLLECTED FROM LAYER  3           0.00979         35.55090

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.002

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0470

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f9.OUT


TIME:  16: 3     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0173 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999975000E-05 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0109 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   33.0000000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     88.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.069  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.691  INCHES
TOTAL INITIAL WATER                  =      3.691  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
            S
 DAY   A    O   RAIN   RUNOFF    ET    E. ZONE    HEAD       DRAIN      LEAK
       I    I                           WATER      #1         #1         #1
       R    L    IN.     IN.     IN.   IN./IN.     IN.        IN.        IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.400    2.357    1.378    3.740    4.278    5.052
                            6.023    3.798    1.984    0.973    0.719    0.972

    STD. DEVIATIONS         1.487    2.945    0.780    3.997    4.632    2.305
                            3.106    2.170    2.762    0.631    0.884    0.956

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.652    0.583    0.529    0.958    1.175    1.973
                            2.027    1.649    0.687    0.525    0.477    0.540

    STD. DEVIATIONS         0.251    0.361    0.384    0.920    0.749    0.455
                            0.690    1.010    0.548    0.257    0.245    0.409

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.2524   0.2233   0.2304   0.2841   0.3020   0.5454
                            0.5074   0.4156   0.2080   0.1872   0.2025   0.1860

    STD. DEVIATIONS         0.1322   0.1400   0.1627   0.1616   0.1183   0.2514
                            0.1457   0.2396   0.1707   0.0768   0.1120   0.1130

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0012   0.0011   0.0011   0.0013   0.0014   0.0022
                            0.0025   0.0020   0.0010   0.0007   0.0009   0.0009

    STD. DEVIATIONS         0.0007   0.0006   0.0010   0.0008   0.0006   0.0012
                            0.0007   0.0012   0.0010   0.0003   0.0005   0.0007

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            32.674   (  7.0509)     118605.76     68.090

 EVAPOTRANSPIRATION                11.775   (  1.9379)      42742.91     24.538

 LATERAL DRAINAGE COLLECTED         3.54438 (  0.39299)     12866.095    7.38628
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           -0.007   (  0.0897)        -25.60     -0.015
*******************************************************************************


♀
*******************************************************************************

                PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.959        36152.7656

      DRAINAGE COLLECTED FROM LAYER  3           0.26260        953.24103

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.031

      MAXIMUM HEAD ON TOP OF LAYER  4            0.001

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0500

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f10.OUT


TIME:  16: 8     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.100000001000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.960    2.807    1.807    4.382    4.830    5.731
                            6.709    4.506    2.447    1.417    1.168    1.431

    STD. DEVIATIONS         1.610    3.028    0.927    4.292    4.457    2.427
                            3.203    2.351    2.927    0.669    1.023    1.190

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.329    0.277    0.307    0.585    0.947    1.747
                            1.820    1.284    0.433    0.236    0.213    0.259

    STD. DEVIATIONS         0.141    0.183    0.247    0.801    0.786    0.458
                            0.640    0.958    0.398    0.167    0.159    0.198

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.0298   0.0228   0.0225   0.0264   0.0347   0.0429
                            0.0450   0.0360   0.0211   0.0232   0.0246   0.0237

    STD. DEVIATIONS         0.0074   0.0098   0.0078   0.0145   0.0114   0.0083
                            0.0079   0.0143   0.0108   0.0076   0.0095   0.0104

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0002   0.0002
                            0.0002   0.0002   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0001   0.0001   0.0000
                            0.0000   0.0001   0.0001   0.0000   0.0000   0.0001

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.195   (  6.8199)     142279.05     81.681

 EVAPOTRANSPIRATION                 8.438   (  1.7703)      30630.07     17.584

 LATERAL DRAINAGE COLLECTED        0.35263 (  0.03122)      1280.059    0.73487
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0012)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.012        36343.3750

      DRAINAGE COLLECTED FROM LAYER  3           0.00340         12.34752

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f11.OUT


TIME:  16: 9     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999997000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.833    2.701    1.703    4.245    4.637    5.462
                            6.461    4.328    2.329    1.312    1.070    1.314

    STD. DEVIATIONS         1.569    2.993    0.908    4.210    4.393    2.352
                            3.159    2.272    2.867    0.649    0.988    1.149

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.457    0.398    0.418    0.713    1.134    2.074
                            2.072    1.497    0.559    0.343    0.314    0.380

    STD. DEVIATIONS         0.184    0.259    0.311    0.858    0.835    0.574
                            0.702    1.043    0.481    0.207    0.186    0.273

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.0240   0.0197   0.0177   0.0163   0.0187   0.0205
                            0.0244   0.0204   0.0135   0.0175   0.0227   0.0167

    STD. DEVIATIONS         0.0068   0.0063   0.0061   0.0089   0.0056   0.0049
                            0.0044   0.0043   0.0063   0.0080   0.0104   0.0073

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0001   0.0001
                            0.0001   0.0001   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0001   0.0000

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            37.394   (  6.6525)     135741.45     77.928

 EVAPOTRANSPIRATION                10.360   (  2.0560)      37605.13     21.589

 LATERAL DRAINAGE COLLECTED         0.23211 (  0.02885)       842.574    0.48371
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE            0.000   (  0.0207)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.977        36215.5039

      DRAINAGE COLLECTED FROM LAYER  3           0.01071         38.87973

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.002

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0428

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f12.OUT


TIME:  16: 9     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0159 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999975000E-05 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.064  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.684  INCHES
TOTAL INITIAL WATER                  =      3.684  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.429    2.374    1.428    3.806    4.326    5.328
                            6.254    3.976    2.034    0.990    0.741    0.990

    STD. DEVIATIONS         1.516    2.965    0.805    4.000    4.547    2.352
                            3.171    2.248    2.757    0.635    0.887    0.959

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.627    0.549    0.504    0.935    1.167    1.861
                            1.893    1.506    0.582    0.491    0.443    0.520

    STD. DEVIATIONS         0.241    0.337    0.393    0.927    0.703    0.439
                            0.616    0.982    0.495    0.257    0.204    0.398

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.2464   0.2327   0.1985   0.2562   0.2716   0.3605
                            0.4220   0.3729   0.2686   0.2052   0.2043   0.1993

    STD. DEVIATIONS         0.1323   0.1365   0.1298   0.1402   0.1447   0.1634
                            0.1345   0.1812   0.1980   0.0926   0.1176   0.1305

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0012   0.0013   0.0010   0.0013   0.0014   0.0019
                            0.0020   0.0019   0.0014   0.0010   0.0011   0.0010

    STD. DEVIATIONS         0.0008   0.0009   0.0007   0.0007   0.0007   0.0009
                            0.0007   0.0011   0.0011   0.0005   0.0006   0.0008

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            33.677   (  6.9926)     122246.88     70.181

 EVAPOTRANSPIRATION                11.077   (  1.8167)      40210.76     23.085

 LATERAL DRAINAGE COLLECTED         3.23816 (  0.44656)     11754.504    6.74813
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           -0.006   (  0.0902)        -22.97     -0.013
*******************************************************************************


♀
*******************************************************************************

                PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.779        35498.4805

      DRAINAGE COLLECTED FROM LAYER  3           0.22795        827.46521

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.039

      MAXIMUM HEAD ON TOP OF LAYER  4            0.001

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0500

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f13.OUT


TIME:  16:10     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                   =      4.00   INCHES
          POROSITY                    =      0.0500 VOL/VOL
          FIELD CAPACITY              =      0.0002 VOL/VOL
          WILTING POINT               =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.100000001000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
               MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.960    2.807    1.807    4.382    4.830    5.731
                            6.709    4.506    2.447    1.417    1.168    1.431

    STD. DEVIATIONS         1.610    3.028    0.927    4.292    4.457    2.427
                            3.203    2.351    2.927    0.669    1.023    1.190

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.329    0.277    0.307    0.585    0.947    1.747
                            1.820    1.284    0.433    0.236    0.213    0.259

    STD. DEVIATIONS         0.141    0.183    0.247    0.801    0.786    0.458
                            0.640    0.958    0.398    0.167    0.159    0.198

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.0298   0.0228   0.0225   0.0264   0.0347   0.0429
                            0.0450   0.0360   0.0211   0.0232   0.0246   0.0237

    STD. DEVIATIONS         0.0074   0.0098   0.0078   0.0145   0.0114   0.0083
                            0.0079   0.0143   0.0108   0.0076   0.0095   0.0104

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0002   0.0002
                            0.0002   0.0002   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0001   0.0001   0.0000
                            0.0000   0.0001   0.0001   0.0000   0.0000   0.0001

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.195   (  6.8199)     142279.05     81.681

 EVAPOTRANSPIRATION                 8.438   (  1.7703)      30630.07     17.584

 LATERAL DRAINAGE COLLECTED        0.35263 (  0.03122)      1280.059    0.73487
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0012)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.012        36343.3750

      DRAINAGE COLLECTED FROM LAYER  3           0.00340         12.34752

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f14.OUT


TIME:  16:10     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999997000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
               MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.833    2.701    1.703    4.245    4.637    5.462
                            6.461    4.328    2.329    1.312    1.070    1.314

    STD. DEVIATIONS         1.569    2.993    0.908    4.210    4.393    2.352
                            3.159    2.272    2.867    0.649    0.988    1.149

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.457    0.398    0.418    0.713    1.134    2.074
                            2.072    1.497    0.559    0.343    0.314    0.380

    STD. DEVIATIONS         0.184    0.259    0.311    0.858    0.835    0.574
                            0.702    1.043    0.481    0.207    0.186    0.273

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.0240   0.0197   0.0177   0.0163   0.0187   0.0205
                            0.0244   0.0204   0.0135   0.0175   0.0227   0.0167

    STD. DEVIATIONS         0.0068   0.0063   0.0061   0.0089   0.0056   0.0049
                            0.0044   0.0043   0.0063   0.0080   0.0104   0.0073

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0001   0.0001
                            0.0001   0.0001   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0001   0.0000

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            37.394   (  6.6525)     135741.45     77.928

 EVAPOTRANSPIRATION                10.360   (  2.0560)      37605.13     21.589

 LATERAL DRAINAGE COLLECTED         0.23211 (  0.02885)       842.574    0.48371
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE            0.000   (  0.0207)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.977        36215.5039

      DRAINAGE COLLECTED FROM LAYER  3           0.01071         38.87973

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.002

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0428

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f15.OUT


TIME:  16:12     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0159 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999975000E-05 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.064  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.684  INCHES
TOTAL INITIAL WATER                  =      3.684  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.429    2.374    1.428    3.806    4.326    5.328
                            6.254    3.976    2.034    0.990    0.741    0.990

    STD. DEVIATIONS         1.516    2.965    0.805    4.000    4.547    2.352
                            3.171    2.248    2.757    0.635    0.887    0.959

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.627    0.549    0.504    0.935    1.167    1.861
                            1.893    1.506    0.582    0.491    0.443    0.520

    STD. DEVIATIONS         0.241    0.337    0.393    0.927    0.703    0.439
                            0.616    0.982    0.495    0.257    0.204    0.398

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.2464   0.2310   0.2002   0.2524   0.2730   0.3566
                            0.4218   0.3793   0.2686   0.2052   0.2043   0.1993

    STD. DEVIATIONS         0.1323   0.1329   0.1291   0.1406   0.1467   0.1615
                            0.1485   0.1877   0.1980   0.0926   0.1176   0.1305

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0013   0.0013   0.0011   0.0014   0.0014   0.0020
                            0.0022   0.0020   0.0015   0.0011   0.0011   0.0011

    STD. DEVIATIONS         0.0007   0.0008   0.0007   0.0008   0.0008   0.0008
                            0.0008   0.0010   0.0011   0.0004   0.0006   0.0007

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```

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            33.677   (  6.9929)     122247.44     70.181

 EVAPOTRANSPIRATION                11.077   (  1.8167)      40210.76     23.085

 LATERAL DRAINAGE COLLECTED         3.23800 (  0.44657)     11753.954    6.74781
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           -0.006   (  0.0902)        -22.97     -0.013
*******************************************************************************


♀
*******************************************************************************

                PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.779        35498.4805

      DRAINAGE COLLECTED FROM LAYER  3           0.18899        686.03772

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.031

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.1 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0500

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f16.OUT


TIME:  16:13     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.100000001000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.960    2.807    1.807    4.382    4.830    5.731
                            6.709    4.506    2.447    1.417    1.168    1.431

    STD. DEVIATIONS         1.610    3.028    0.927    4.292    4.457    2.427
                            3.203    2.351    2.927    0.669    1.023    1.190

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.329    0.277    0.307    0.585    0.947    1.747
                            1.820    1.284    0.433    0.236    0.213    0.259

    STD. DEVIATIONS         0.141    0.183    0.247    0.801    0.786    0.458
                            0.640    0.958    0.398    0.167    0.159    0.198

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.0298   0.0228   0.0225   0.0264   0.0347   0.0429
                            0.0450   0.0360   0.0211   0.0232   0.0246   0.0237

    STD. DEVIATIONS         0.0074   0.0098   0.0078   0.0145   0.0114   0.0083
                            0.0079   0.0143   0.0108   0.0076   0.0095   0.0104

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0002   0.0002
                            0.0002   0.0002   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0001   0.0001   0.0000
                            0.0000   0.0001   0.0001   0.0000   0.0000   0.0001

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.195   (  6.8199)     142279.05     81.681

 EVAPOTRANSPIRATION                 8.438   (  1.7703)      30630.07     17.584

 LATERAL DRAINAGE COLLECTED        0.35263 (  0.03122)      1280.059    0.73487
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0012)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.012        36343.3750

      DRAINAGE COLLECTED FROM LAYER  3           0.00340         12.34752

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f17.OUT


TIME:  16:13     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999997000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

     JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
     -------     -------     -------     -------     -------     -------
      59.80       60.80       66.20       71.60       77.10       80.90
      82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


   HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
   DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
   LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                      DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
         S
 DAY  A  O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I  I                      WATER     #1        #1        #1
      R  L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.833    2.701    1.703    4.245    4.637    5.462
                            6.461    4.328    2.329    1.312    1.070    1.314

    STD. DEVIATIONS         1.569    2.993    0.908    4.210    4.393    2.352
                            3.159    2.272    2.867    0.649    0.988    1.149

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.457    0.398    0.418    0.713    1.134    2.074
                            2.072    1.497    0.559    0.343    0.314    0.380

    STD. DEVIATIONS         0.184    0.259    0.311    0.858    0.835    0.574
                            0.702    1.043    0.481    0.207    0.186    0.273

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0240   0.0197   0.0177   0.0163   0.0187   0.0205
                            0.0244   0.0204   0.0135   0.0175   0.0227   0.0167

    STD. DEVIATIONS         0.0068   0.0063   0.0061   0.0089   0.0056   0.0049
                            0.0044   0.0043   0.0063   0.0080   0.0104   0.0073

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0001   0.0001
                            0.0001   0.0001   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0001   0.0000

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            37.394   (  6.6525)     135741.45     77.928

 EVAPOTRANSPIRATION                10.360   (  2.0560)      37605.13     21.589

 LATERAL DRAINAGE COLLECTED         0.23211 (  0.02885)       842.574    0.48371
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE            0.000   (  0.0207)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.977        36215.5039

      DRAINAGE COLLECTED FROM LAYER  3           0.01071         38.87973

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.002

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0428

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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♀
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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f18.OUT


TIME:  16:14     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0159 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999975000E-05 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
               MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0113 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   33.0000000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.064  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.686  INCHES
TOTAL INITIAL WATER                  =      3.686  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.429    2.374    1.428    3.806    4.326    5.328
                            6.254    3.976    2.034    0.990    0.741    0.990

    STD. DEVIATIONS         1.516    2.965    0.805    4.000    4.547    2.352
                            3.171    2.248    2.757    0.635    0.887    0.959

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.627    0.549    0.504    0.935    1.167    1.861
                            1.893    1.506    0.582    0.491    0.443    0.520

    STD. DEVIATIONS         0.241    0.337    0.393    0.927    0.703    0.439
                            0.616    0.982    0.495    0.257    0.204    0.398

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.2554   0.2234   0.1993   0.2562   0.2786   0.3535
                            0.4253   0.3695   0.2686   0.2052   0.2115   0.1919

    STD. DEVIATIONS         0.1279   0.1392   0.1305   0.1402   0.1347   0.1619
                            0.1329   0.1784   0.1980   0.0926   0.1193   0.1198

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0011   0.0012   0.0009   0.0011   0.0013   0.0017
                            0.0020   0.0015   0.0012   0.0008   0.0009   0.0010

    STD. DEVIATIONS         0.0006   0.0008   0.0007   0.0009   0.0007   0.0011
                            0.0007   0.0008   0.0011   0.0004   0.0005   0.0008

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            33.677   (  6.9926)     122246.88     70.181

 EVAPOTRANSPIRATION                11.077   (  1.8167)      40210.76     23.085

 LATERAL DRAINAGE COLLECTED         3.23842 (  0.44686)     11755.465    6.74868
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           -0.007   (  0.0904)        -23.93     -0.014
*******************************************************************************


♀
*******************************************************************************

                PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.779        35498.4805

      DRAINAGE COLLECTED FROM LAYER  3           0.27429        995.65875

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.031

      MAXIMUM HEAD ON TOP OF LAYER  4            0.001

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0500

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f19.OUT


TIME:  16:16     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                   =      4.00   INCHES
          POROSITY                    =      0.0500 VOL/VOL
          FIELD CAPACITY              =      0.0002 VOL/VOL
          WILTING POINT               =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.100000001000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.984    2.831    1.877    4.413    4.921    5.906
                            6.925    4.706    2.459    1.468    1.195    1.453

    STD. DEVIATIONS         1.628    3.031    0.972    4.351    4.537    2.323
                            3.251    2.437    2.949    0.691    1.035    1.223

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.301    0.253    0.235    0.553    0.854    1.572
                            1.600    1.082    0.418    0.183    0.185    0.237

    STD. DEVIATIONS         0.123    0.172    0.216    0.774    0.678    0.511
                            0.585    0.806    0.384    0.110    0.126    0.177

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0323   0.0235   0.0243   0.0277   0.0369   0.0435
                            0.0487   0.0371   0.0236   0.0250   0.0253   0.0245

    STD. DEVIATIONS         0.0082   0.0099   0.0100   0.0141   0.0109   0.0072
                            0.0057   0.0154   0.0129   0.0079   0.0103   0.0104

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0002   0.0001   0.0001   0.0001   0.0002   0.0002
                            0.0002   0.0002   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0001   0.0001   0.0000
                            0.0000   0.0001   0.0001   0.0000   0.0001   0.0001

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            40.139   (  6.7503)     145705.92     83.648

 EVAPOTRANSPIRATION                 7.474   (  1.5882)      27131.91     15.576

 LATERAL DRAINAGE COLLECTED        0.37227 (  0.03763)      1351.337    0.77579
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0005)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.013        36347.8125

      DRAINAGE COLLECTED FROM LAYER  3           0.00340         12.34752

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f20.OUT


TIME:  16:17     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999997000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.863    2.736    1.797    4.329    4.916    5.970
                            7.005    4.716    2.418    1.358    1.104    1.338

    STD. DEVIATIONS         1.589    2.997    0.960    4.347    4.542    2.416
                            3.328    2.519    2.898    0.688    1.005    1.181

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.428    0.363    0.316    0.633    0.859    1.553
                            1.532    1.101    0.468    0.294    0.277    0.362

    STD. DEVIATIONS         0.152    0.228    0.229    0.742    0.692    0.432
                            0.467    0.756    0.402    0.143    0.130    0.236

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0264   0.0201   0.0174   0.0167   0.0224   0.0242
                            0.0253   0.0228   0.0147   0.0193   0.0226   0.0192

    STD. DEVIATIONS         0.0083   0.0076   0.0057   0.0078   0.0087   0.0070
                            0.0069   0.0075   0.0068   0.0095   0.0112   0.0091

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0001   0.0001
                            0.0001   0.0001   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0001   0.0000

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.549   (  6.8717)     143562.94     82.418

 EVAPOTRANSPIRATION                 8.186   (  1.4734)      29714.48     17.059

 LATERAL DRAINAGE COLLECTED        0.25117 (  0.02986)       911.757    0.52343
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0416)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.018        36365.1523

      DRAINAGE COLLECTED FROM LAYER  3           0.00743         26.96318

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0421

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f21.OUT


TIME:  16:17     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0017 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999975000E-05 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0110 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   33.0000000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.007  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.629  INCHES
TOTAL INITIAL WATER                  =      3.629  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   4.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.572    2.509    1.511    4.125    4.742    5.987
                            7.003    4.471    2.227    1.087    0.853    1.064

    STD. DEVIATIONS         1.552    3.000    0.829    4.394    4.696    2.503
                            3.436    2.625    2.838    0.652    0.898    0.983

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.534    0.426    0.455    0.679    0.844    1.281
                            1.280    1.094    0.475    0.375    0.339    0.492

    STD. DEVIATIONS         0.212    0.248    0.373    0.652    0.436    0.269
                            0.418    0.606    0.407    0.196    0.145    0.349

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.1880   0.2075   0.1711   0.1653   0.2187   0.2640
                            0.2833   0.2986   0.1662   0.2118   0.2140   0.1721

    STD. DEVIATIONS         0.1356   0.1227   0.1154   0.0887   0.1422   0.0580
                            0.1307   0.1122   0.1004   0.1145   0.1288   0.0932

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0010   0.0012   0.0009   0.0009   0.0011   0.0013
                            0.0015   0.0016   0.0009   0.0011   0.0012   0.0009

    STD. DEVIATIONS         0.0007   0.0008   0.0007   0.0005   0.0007   0.0004
                            0.0008   0.0006   0.0006   0.0007   0.0007   0.0006

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            37.152   (  7.1933)     134862.95     77.423

 EVAPOTRANSPIRATION                 8.274   (  1.6193)      30034.42     17.242

 LATERAL DRAINAGE COLLECTED         2.56056 (  0.30457)      9294.832    5.33606
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           -0.001   (  0.0876)         -3.02     -0.002
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.934        36062.0156

      DRAINAGE COLLECTED FROM LAYER  3           0.18931        687.20148

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.034

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.1 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0500

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f22.OUT


TIME:  16:18     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                   =      4.00   INCHES
          POROSITY                    =      0.0500 VOL/VOL
          FIELD CAPACITY              =      0.0002 VOL/VOL
          WILTING POINT               =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.100000001000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.984    2.831    1.877    4.413    4.921    5.906
                            6.925    4.706    2.459    1.468    1.195    1.453

    STD. DEVIATIONS         1.628    3.031    0.972    4.351    4.537    2.323
                            3.251    2.437    2.949    0.691    1.035    1.223

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.301    0.253    0.235    0.553    0.854    1.572
                            1.600    1.082    0.418    0.183    0.185    0.237

    STD. DEVIATIONS         0.123    0.172    0.216    0.774    0.678    0.511
                            0.585    0.806    0.384    0.110    0.126    0.177

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0323   0.0235   0.0243   0.0277   0.0369   0.0435
                            0.0487   0.0371   0.0236   0.0250   0.0253   0.0245

    STD. DEVIATIONS         0.0082   0.0099   0.0100   0.0141   0.0109   0.0072
                            0.0057   0.0154   0.0129   0.0079   0.0103   0.0104

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0002   0.0001   0.0001   0.0001   0.0002   0.0002
                            0.0002   0.0002   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0001   0.0001   0.0000
                            0.0000   0.0001   0.0001   0.0000   0.0001   0.0001

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            40.139   (  6.7503)     145705.92     83.648

 EVAPOTRANSPIRATION                 7.474   (  1.5882)      27131.91     15.576

 LATERAL DRAINAGE COLLECTED        0.37227 (  0.03763)      1351.337    0.77579
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0005)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.013        36347.8125

      DRAINAGE COLLECTED FROM LAYER  3           0.00340         12.34752

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f23.OUT


TIME:  16:18     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999997000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.863    2.736    1.797    4.329    4.916    5.970
                            7.005    4.716    2.418    1.358    1.104    1.338

    STD. DEVIATIONS         1.589    2.997    0.960    4.347    4.542    2.416
                            3.328    2.519    2.898    0.688    1.005    1.181

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.428    0.363    0.316    0.633    0.859    1.553
                            1.532    1.101    0.468    0.294    0.277    0.362

    STD. DEVIATIONS         0.152    0.228    0.229    0.742    0.692    0.432
                            0.467    0.756    0.402    0.143    0.130    0.236

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0264   0.0201   0.0174   0.0167   0.0224   0.0242
                            0.0253   0.0228   0.0147   0.0193   0.0226   0.0192

    STD. DEVIATIONS         0.0083   0.0076   0.0057   0.0078   0.0087   0.0070
                            0.0069   0.0075   0.0068   0.0095   0.0112   0.0091

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0001   0.0001
                            0.0001   0.0001   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0001   0.0000

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.549   (  6.8717)     143562.94     82.418

 EVAPOTRANSPIRATION                 8.186   (  1.4734)      29714.48     17.059

 LATERAL DRAINAGE COLLECTED        0.25117 (  0.02986)       911.757    0.52343
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0416)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.018        36365.1523

      DRAINAGE COLLECTED FROM LAYER  3           0.00743         26.96318

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0421

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f24.OUT


TIME:  16:19     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                   =      4.00   INCHES
          POROSITY                    =      0.0500 VOL/VOL
          FIELD CAPACITY              =      0.0002 VOL/VOL
          WILTING POINT               =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.0017 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.999999975000E-05 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.007  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.627  INCHES
TOTAL INITIAL WATER                  =      3.627  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.572    2.509    1.511    4.125    4.742    5.987
                            7.003    4.471    2.227    1.087    0.853    1.064

    STD. DEVIATIONS         1.552    3.000    0.829    4.394    4.696    2.503
                            3.436    2.625    2.838    0.652    0.898    0.983

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.534    0.426    0.455    0.679    0.844    1.281
                            1.280    1.094    0.475    0.375    0.339    0.492

    STD. DEVIATIONS         0.212    0.248    0.373    0.652    0.436    0.269
                            0.418    0.606    0.407    0.196    0.145    0.349

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.1870   0.2073   0.1714   0.1643   0.2138   0.2682
                            0.2828   0.3008   0.1662   0.2120   0.2141   0.1726

    STD. DEVIATIONS         0.1351   0.1223   0.1153   0.0881   0.1280   0.0673
                            0.1305   0.1122   0.1004   0.1143   0.1284   0.0932

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0010   0.0012   0.0009   0.0009   0.0011   0.0015
                            0.0015   0.0016   0.0009   0.0011   0.0011   0.0009

    STD. DEVIATIONS         0.0007   0.0007   0.0006   0.0005   0.0006   0.0004
                            0.0007   0.0006   0.0005   0.0006   0.0007   0.0005

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            37.152   (  7.1933)     134862.95     77.423

 EVAPOTRANSPIRATION                 8.274   (  1.6193)      30034.42     17.242

 LATERAL DRAINAGE COLLECTED         2.56036 (  0.30413)      9294.122    5.33565
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           -0.001   (  0.0865)         -2.32     -0.001
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.934        36062.0156

      DRAINAGE COLLECTED FROM LAYER  3           0.12360        448.65457

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.019

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0500

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f25.OUT


TIME:  16:19     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.100000001000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
               MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.984    2.831    1.877    4.413    4.921    5.906
                            6.925    4.706    2.459    1.468    1.195    1.453

    STD. DEVIATIONS         1.628    3.031    0.972    4.351    4.537    2.323
                            3.251    2.437    2.949    0.691    1.035    1.223

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.301    0.253    0.235    0.553    0.854    1.572
                            1.600    1.082    0.418    0.183    0.185    0.237

    STD. DEVIATIONS         0.123    0.172    0.216    0.774    0.678    0.511
                            0.585    0.806    0.384    0.110    0.126    0.177

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0323   0.0235   0.0243   0.0277   0.0369   0.0435
                            0.0487   0.0371   0.0236   0.0250   0.0253   0.0245

    STD. DEVIATIONS         0.0082   0.0099   0.0100   0.0141   0.0109   0.0072
                            0.0057   0.0154   0.0129   0.0079   0.0103   0.0104

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0002   0.0001   0.0001   0.0001   0.0002   0.0002
                            0.0002   0.0002   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0001   0.0000   0.0001   0.0001   0.0000
                            0.0000   0.0001   0.0001   0.0000   0.0001   0.0001

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            40.139   (  6.7503)     145705.92     83.648

 EVAPOTRANSPIRATION                 7.474   (  1.5882)      27131.91     15.576

 LATERAL DRAINAGE COLLECTED        0.37227 (  0.03763)      1351.337    0.77579
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0005)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.013        36347.8125

      DRAINAGE COLLECTED FROM LAYER  3           0.00340         12.34752

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f26.OUT


TIME:  16:20     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999997000E-06 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.000  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.620  INCHES
TOTAL INITIAL WATER                  =      3.620  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.863    2.736    1.797    4.329    4.916    5.970
                            7.005    4.716    2.418    1.358    1.104    1.338

    STD. DEVIATIONS         1.589    2.997    0.960    4.347    4.542    2.416
                            3.328    2.519    2.898    0.688    1.005    1.181

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.428    0.363    0.316    0.633    0.859    1.553
                            1.532    1.101    0.468    0.294    0.277    0.362

    STD. DEVIATIONS         0.152    0.228    0.229    0.742    0.692    0.432
                            0.467    0.756    0.402    0.143    0.130    0.236

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0264   0.0201   0.0174   0.0167   0.0224   0.0242
                            0.0253   0.0228   0.0147   0.0193   0.0226   0.0192

    STD. DEVIATIONS         0.0083   0.0076   0.0057   0.0078   0.0087   0.0070
                            0.0069   0.0075   0.0068   0.0095   0.0112   0.0091

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0001   0.0001   0.0001   0.0001   0.0001   0.0001
                            0.0001   0.0001   0.0001   0.0001   0.0001   0.0001

    STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0001   0.0000

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.549   (  6.8717)     143562.94     82.418

 EVAPOTRANSPIRATION                 8.186   (  1.4734)      29714.48     17.059

 LATERAL DRAINAGE COLLECTED        0.25117 (  0.02986)       911.757    0.52343
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0416)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.018        36365.1523

      DRAINAGE COLLECTED FROM LAYER  3           0.00743         26.96318

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.001

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0421

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\f27.OUT


TIME:  16:20     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      4.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0017 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999975000E-05 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =     10.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
               MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0110 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   33.0000000000     CM/SEC
SLOPE                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      4.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.007  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.200  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.000  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      3.629  INCHES
TOTAL INITIAL WATER                  =      3.629  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	4.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.572    2.509    1.511    4.125    4.742    5.987
                            7.003    4.471    2.227    1.087    0.853    1.064

    STD. DEVIATIONS         1.552    3.000    0.829    4.394    4.696    2.503
                            3.436    2.625    2.838    0.652    0.898    0.983

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.534    0.426    0.455    0.679    0.844    1.281
                            1.280    1.094    0.475    0.375    0.339    0.492

    STD. DEVIATIONS         0.212    0.248    0.373    0.652    0.436    0.269
                            0.418    0.606    0.407    0.196    0.145    0.349

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  -----------------------------------------
    TOTALS                  0.1880   0.2072   0.1711   0.1656   0.2187   0.2640
                            0.2833   0.2986   0.1772   0.2006   0.2273   0.1589

    STD. DEVIATIONS         0.1356   0.1221   0.1155   0.0890   0.1422   0.0580
                            0.1307   0.1122   0.1071   0.0939   0.1456   0.0851

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0009   0.0010   0.0008   0.0008   0.0011   0.0014
                            0.0014   0.0014   0.0009   0.0010   0.0011   0.0007

    STD. DEVIATIONS         0.0006   0.0006   0.0005   0.0005   0.0007   0.0003
                            0.0008   0.0006   0.0006   0.0005   0.0007   0.0005
*******************************************************************************
```

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            37.152   (  7.1933)     134862.95     77.423

 EVAPOTRANSPIRATION                 8.274   (  1.6193)      30034.42     17.242

 LATERAL DRAINAGE COLLECTED         2.56056 (  0.30457)      9294.831    5.33606
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.00000 (  0.00000)         0.001     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP                0.001 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           -0.001   (  0.0876)         -3.02     -0.002
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                     9.934        36062.0156

      DRAINAGE COLLECTED FROM LAYER  3           0.19265        699.32391

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00002

      AVERAGE HEAD ON TOP OF LAYER  4            0.027

      MAXIMUM HEAD ON TOP OF LAYER  4            0.001

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0500

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

Concrete HELP Model Outputs

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\c1.OUT


TIME:  16:50     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      8.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999994000E-08 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      6.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     92.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      8.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.001  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.400  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.001  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      2.181  INCHES
TOTAL INITIAL WATER                  =      2.181  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   8.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.959    2.808    1.800    4.348    4.825    5.728
                            6.697    4.489    2.445    1.415    1.165    1.431

    STD. DEVIATIONS         1.612    3.029    0.918    4.322    4.459    2.408
                            3.185    2.326    2.926    0.672    1.028    1.186

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.351    0.298    0.332    0.641    0.979    1.793
                            1.871    1.333    0.452    0.254    0.234    0.278

    STD. DEVIATIONS         0.146    0.192    0.259    0.782    0.802    0.493
                            0.654    1.001    0.407    0.173    0.164    0.207

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0059   0.0049   0.0038   0.0050   0.0052   0.0047
                            0.0048   0.0043   0.0033   0.0054   0.0063   0.0053

    STD. DEVIATIONS         0.0013   0.0014   0.0008   0.0024   0.0012   0.0008
                            0.0006   0.0014   0.0017   0.0021   0.0018   0.0022

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

    STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
*******************************************************************************
```

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.110   (  6.8530)     141968.39     81.502

 EVAPOTRANSPIRATION                 8.817   (  1.7639)      32006.91     18.375

 LATERAL DRAINAGE COLLECTED        0.05893 (  0.00449)       213.904    0.12280
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0054)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.010        36337.0781

      DRAINAGE COLLECTED FROM LAYER  3           0.00034          1.23475

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.000

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\c2.OUT


TIME:  16:52     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      8.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999994000E-08 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      6.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     92.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      8.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.001  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.400  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.001  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      2.181  INCHES
TOTAL INITIAL WATER                  =      2.181  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   8.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.959    2.808    1.800    4.348    4.825    5.728
                            6.697    4.489    2.445    1.415    1.165    1.431

    STD. DEVIATIONS         1.612    3.029    0.918    4.322    4.459    2.408
                            3.185    2.326    2.926    0.672    1.028    1.186

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.351    0.298    0.332    0.641    0.979    1.793
                            1.871    1.333    0.452    0.254    0.234    0.278

    STD. DEVIATIONS         0.146    0.192    0.259    0.782    0.802    0.493
                            0.654    1.001    0.407    0.173    0.164    0.207

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0059   0.0049   0.0038   0.0050   0.0052   0.0047
                            0.0048   0.0043   0.0033   0.0054   0.0063   0.0053

    STD. DEVIATIONS         0.0013   0.0014   0.0008   0.0024   0.0012   0.0008
                            0.0006   0.0014   0.0017   0.0021   0.0018   0.0022

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

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

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.110   (  6.8530)     141968.39     81.502

 EVAPOTRANSPIRATION                 8.817   (  1.7639)      32006.91     18.375

 LATERAL DRAINAGE COLLECTED        0.05893 (  0.00449)       213.904    0.12280
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0054)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.010        36337.0781

      DRAINAGE COLLECTED FROM LAYER  3           0.00034          1.23475

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.000

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\c3.OUT


TIME:  16:52     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      8.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999994000E-08 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      6.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     92.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      8.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.001  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.400  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.001  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      2.181  INCHES
TOTAL INITIAL WATER                  =      2.181  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   8.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.959    2.808    1.800    4.348    4.825    5.728
                            6.697    4.489    2.445    1.415    1.165    1.431

    STD. DEVIATIONS         1.612    3.029    0.918    4.322    4.459    2.408
                            3.185    2.326    2.926    0.672    1.028    1.186

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.351    0.298    0.332    0.641    0.979    1.793
                            1.871    1.333    0.452    0.254    0.234    0.278

    STD. DEVIATIONS         0.146    0.192    0.259    0.782    0.802    0.493
                            0.654    1.001    0.407    0.173    0.164    0.207

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0059   0.0049   0.0038   0.0050   0.0052   0.0047
                            0.0048   0.0043   0.0033   0.0054   0.0063   0.0053

    STD. DEVIATIONS         0.0013   0.0014   0.0008   0.0024   0.0012   0.0008
                            0.0006   0.0014   0.0017   0.0021   0.0018   0.0022

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

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

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.110   (  6.8530)     141968.39     81.502

 EVAPOTRANSPIRATION                 8.817   (  1.7639)      32006.91     18.375

 LATERAL DRAINAGE COLLECTED        0.05893 (  0.00449)       213.904    0.12280
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0054)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.010        36337.0781

      DRAINAGE COLLECTED FROM LAYER  3           0.00034          1.23475

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.000

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\c4.OUT


TIME:  16:53     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      8.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999994000E-08 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      6.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      8.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.001  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.400  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.001  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      2.181  INCHES
TOTAL INITIAL WATER                  =      2.181  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	28.47	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	8.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	%

NOTE: PRECIPITATION DATA FOR Pasco County FL

WAS ENTERED BY THE USER.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
59.80	60.80	66.20	71.60	77.10	80.90
82.20	82.20	80.90	74.50	66.70	61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 28.47 DEGREES

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 4
DRAIN #1: LATERAL DRAINAGE FROM LAYER 3 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 4

****

DAILY OUTPUT FOR YEAR 1

DAY	AIR	SOIL	RAIN IN.	RUNOFF IN.	ET IN.	E. ZONE WATER IN./IN.	HEAD #1 IN.	DRAIN #1 IN.	LEAK #1 IN.

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.960    2.810    1.808    4.383    4.830    5.726
                            6.707    4.508    2.445    1.416    1.171    1.431

    STD. DEVIATIONS         1.612    3.029    0.925    4.299    4.462    2.412
                            3.203    2.350    2.926    0.671    1.026    1.188

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.351    0.296    0.324    0.606    0.974    1.795
                            1.860    1.314    0.452    0.253    0.228    0.277

    STD. DEVIATIONS         0.146    0.191    0.254    0.803    0.790    0.465
                            0.649    0.971    0.407    0.173    0.162    0.207

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0059   0.0049   0.0037   0.0050   0.0058   0.0046
                            0.0049   0.0044   0.0035   0.0055   0.0064   0.0053

    STD. DEVIATIONS         0.0013   0.0014   0.0007   0.0024   0.0009   0.0010
                            0.0006   0.0014   0.0017   0.0021   0.0016   0.0022

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

    STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
*******************************************************************************
```

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.197   (  6.8359)     142283.55     81.683

 EVAPOTRANSPIRATION                 8.729   (  1.7936)      31687.97     18.192

 LATERAL DRAINAGE COLLECTED        0.05996 (  0.00369)       217.666    0.12496
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0054)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.010        36337.2227

      DRAINAGE COLLECTED FROM LAYER  3           0.00034          1.23475

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.000

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\c5.OUT


TIME:  16:53     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                   =      8.00   INCHES
          POROSITY                    =      0.0500 VOL/VOL
          FIELD CAPACITY              =      0.0002 VOL/VOL
          WILTING POINT               =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.999999994000E-08 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      6.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      8.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.001  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.400  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.001  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      2.181  INCHES
TOTAL INITIAL WATER                  =      2.181  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   8.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.960    2.810    1.808    4.383    4.830    5.726
                            6.707    4.508    2.445    1.416    1.171    1.431

    STD. DEVIATIONS         1.612    3.029    0.925    4.299    4.462    2.412
                            3.203    2.350    2.926    0.671    1.026    1.188

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.351    0.296    0.324    0.606    0.974    1.795
                            1.860    1.314    0.452    0.253    0.228    0.277

    STD. DEVIATIONS         0.146    0.191    0.254    0.803    0.790    0.465
                            0.649    0.971    0.407    0.173    0.162    0.207

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0059   0.0049   0.0037   0.0050   0.0058   0.0046
                            0.0049   0.0044   0.0035   0.0055   0.0064   0.0053

    STD. DEVIATIONS         0.0013   0.0014   0.0007   0.0024   0.0009   0.0010
                            0.0006   0.0014   0.0017   0.0021   0.0016   0.0022

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

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

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.197   (  6.8359)     142283.55     81.683

 EVAPOTRANSPIRATION                 8.729   (  1.7936)      31687.97     18.192

 LATERAL DRAINAGE COLLECTED        0.05996 (  0.00369)       217.666    0.12496
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0054)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.010        36337.2227

      DRAINAGE COLLECTED FROM LAYER  3           0.00034          1.23475

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.000

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\c6.OUT


TIME:  16:54     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      8.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999994000E-08 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      6.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     94.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      8.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.001  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.400  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.001  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      2.181  INCHES
TOTAL INITIAL WATER                  =      2.181  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   8.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.960    2.810    1.808    4.383    4.830    5.726
                            6.707    4.508    2.445    1.416    1.171    1.431

    STD. DEVIATIONS         1.612    3.029    0.925    4.299    4.462    2.412
                            3.203    2.350    2.926    0.671    1.026    1.188

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.351    0.296    0.324    0.606    0.974    1.795
                            1.860    1.314    0.452    0.253    0.228    0.277

    STD. DEVIATIONS         0.146    0.191    0.254    0.803    0.790    0.465
                            0.649    0.971    0.407    0.173    0.162    0.207

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0059   0.0049   0.0037   0.0050   0.0058   0.0046
                            0.0049   0.0044   0.0035   0.0055   0.0064   0.0053

    STD. DEVIATIONS         0.0013   0.0014   0.0007   0.0024   0.0009   0.0010
                            0.0006   0.0014   0.0017   0.0021   0.0016   0.0022

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

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

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            39.197   (  6.8359)     142283.55     81.683

 EVAPOTRANSPIRATION                 8.729   (  1.7936)      31687.97     18.192

 LATERAL DRAINAGE COLLECTED        0.05996 (  0.00369)       217.666    0.12496
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0054)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.010        36337.2227

      DRAINAGE COLLECTED FROM LAYER  3           0.00034          1.23475

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.000

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\c7.OUT


TIME:  16:54     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      8.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999994000E-08 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      6.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      8.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.001  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.400  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.001  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      2.181  INCHES
TOTAL INITIAL WATER                  =      2.181  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   8.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.999    2.830    1.883    4.442    4.921    5.950
                            6.926    4.682    2.478    1.468    1.212    1.455

    STD. DEVIATIONS         1.631    3.033    0.960    4.385    4.519    2.349
                            3.215    2.461    2.950    0.691    1.046    1.224

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.309    0.276    0.248    0.546    0.884    1.569
                            1.641    1.140    0.418    0.199    0.187    0.254

    STD. DEVIATIONS         0.123    0.178    0.218    0.753    0.730    0.540
                            0.615    0.833    0.382    0.115    0.103    0.185

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0067   0.0054   0.0046   0.0059   0.0062   0.0049
                            0.0056   0.0046   0.0046   0.0065   0.0070   0.0060

    STD. DEVIATIONS         0.0016   0.0014   0.0015   0.0018   0.0018   0.0005
                            0.0010   0.0015   0.0021   0.0024   0.0017   0.0024

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

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

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            40.246   (  6.8033)     146092.81     83.870

 EVAPOTRANSPIRATION                 7.672   (  1.6008)      27849.73     15.988

 LATERAL DRAINAGE COLLECTED        0.06795 (  0.00287)       246.649    0.14160
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0047)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.012        36342.5078

      DRAINAGE COLLECTED FROM LAYER  3           0.00034          1.23475

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.000

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

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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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\c8.OUT


TIME:  16:55     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      8.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999994000E-08 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      6.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.499999987000E-04 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      8.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.001  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.400  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.001  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      2.181  INCHES
TOTAL INITIAL WATER                  =      2.181  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   8.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
            S
 DAY   A    O   RAIN   RUNOFF    ET    E. ZONE    HEAD       DRAIN      LEAK
       I    I                           WATER      #1         #1         #1
       R    L    IN.     IN.     IN.   IN./IN.     IN.        IN.        IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.999    2.830    1.883    4.442    4.921    5.950
                            6.926    4.682    2.478    1.468    1.212    1.455

    STD. DEVIATIONS         1.631    3.033    0.960    4.385    4.519    2.349
                            3.215    2.461    2.950    0.691    1.046    1.224

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.309    0.276    0.248    0.546    0.884    1.569
                            1.641    1.140    0.418    0.199    0.187    0.254

    STD. DEVIATIONS         0.123    0.178    0.218    0.753    0.730    0.540
                            0.615    0.833    0.382    0.115    0.103    0.185

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0067   0.0054   0.0046   0.0059   0.0062   0.0049
                            0.0056   0.0046   0.0046   0.0065   0.0070   0.0060

    STD. DEVIATIONS         0.0016   0.0014   0.0015   0.0018   0.0018   0.0005
                            0.0010   0.0015   0.0021   0.0024   0.0017   0.0024

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

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

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

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            40.246   (  6.8033)     146092.81     83.870

 EVAPOTRANSPIRATION                 7.672   (  1.6008)      27849.73     15.988

 LATERAL DRAINAGE COLLECTED        0.06795 (  0.00287)       246.649    0.14160
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0047)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.012        36342.5078

      DRAINAGE COLLECTED FROM LAYER  3           0.00034          1.23475

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.000

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

```
♀
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              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\Precip.D4
TEMPERATURE DATA FILE:      C:\Help3\DATA7.D7
SOLAR RADIATION DATA FILE:  C:\Help3\DATA13.D13
EVAPOTRANSPIRATION DATA:    C:\Help3\DATA11.D11
SOIL AND DESIGN DATA FILE:  C:\Help3\ASHBASE.D10
OUTPUT DATA FILE:           C:\Help3\c9.OUT


TIME:  16:55     DATE:   5/20/2014


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

     TITLE:  Pasco Road

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


     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   0
          THICKNESS                  =      8.00   INCHES
          POROSITY                   =      0.0500 VOL/VOL
          FIELD CAPACITY             =      0.0002 VOL/VOL
          WILTING POINT              =      0.0001 VOL/VOL
          INITIAL SOIL WATER CONTENT =      0.0001 VOL/VOL
          EFFECTIVE SAT. HYD. COND.  =  0.999999994000E-08 CM/SEC


                                  LAYER  2
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
```

```
                MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      6.00   INCHES
POROSITY                     =      0.4610 VOL/VOL
FIELD CAPACITY               =      0.3600 VOL/VOL
WILTING POINT                =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.3600 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                         LAYER  3
                         --------

             TYPE 2 - LATERAL DRAINAGE LAYER
                MATERIAL TEXTURE NUMBER  34
THICKNESS                    =      2.00   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                        =      2.00   PERCENT
DRAINAGE LENGTH              =      5.0    FEET


                         LAYER  4
                         --------

             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          =      0.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      0.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  4 - POOR


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =     98.00
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =      8.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      0.001  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      0.400  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =      0.001  INCHES
INITIAL SNOW WATER                   =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS     =      2.181  INCHES
TOTAL INITIAL WATER                  =      2.181  INCHES
TOTAL SUBSURFACE INFLOW              =      0.00   INCHES/YEAR
```

```
                    EVAPOTRANSPIRATION AND WEATHER DATA
                    -----------------------------------

          NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
                   TAMPA                  FLORIDA

              STATION LATITUDE                        =  28.47 DEGREES
              MAXIMUM LEAF AREA INDEX                 =   0.00
              START OF GROWING SEASON (JULIAN DATE)   =      0
              END OF GROWING SEASON (JULIAN DATE)     =    367
              EVAPORATIVE ZONE DEPTH                  =   8.0  INCHES
              AVERAGE ANNUAL WIND SPEED               =   8.60 MPH
              AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =  74.00 %
              AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =  72.00 %
              AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =  78.00 %
              AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =  76.00 %


          NOTE:  PRECIPITATION DATA FOR     Pasco County        FL

                   WAS ENTERED BY THE USER.


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

              NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

        JAN/JUL     FEB/AUG     MAR/SEP     APR/OCT     MAY/NOV     JUN/DEC
        -------     -------     -------     -------     -------     -------
         59.80       60.80       66.20       71.60       77.10       80.90
         82.20       82.20       80.90       74.50       66.70       61.30


          NOTE:  SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
                   COEFFICIENTS FOR    TAMPA                FLORIDA
                     AND STATION LATITUDE  =  28.47 DEGREES


      HEAD  #1:  AVERAGE HEAD ON TOP OF LAYER  4
      DRAIN #1:  LATERAL DRAINAGE FROM LAYER  3 (RECIRCULATION AND COLLECTION)
      LEAK  #1:  PERCOLATION OR LEAKAGE THROUGH LAYER  4

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

                        DAILY OUTPUT FOR YEAR    1
 ------------------------------------------------------------------
          S
 DAY  A   O  RAIN  RUNOFF   ET   E. ZONE   HEAD      DRAIN     LEAK
      I   I                      WATER     #1        #1        #1
      R   L   IN.    IN.    IN.  IN./IN.    IN.       IN.       IN.
```

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

         AVERAGE MONTHLY VALUES IN INCHES FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------

                          JAN/JUL  FEB/AUG  MAR/SEP  APR/OCT  MAY/NOV  JUN/DEC
                          -------  -------  -------  -------  -------  -------
  PRECIPITATION
  -------------
    TOTALS                  2.32     3.11     2.14     4.99     5.81     7.52
                            8.58     5.83     2.90     1.68     1.40     1.71

    STD. DEVIATIONS         1.70     3.15     1.11     5.08     4.91     2.58
                            3.70     3.22     3.25     0.77     1.10     1.34

  RUNOFF
  ------
    TOTALS                  1.999    2.830    1.883    4.442    4.921    5.950
                            6.926    4.682    2.478    1.468    1.212    1.455

    STD. DEVIATIONS         1.631    3.033    0.960    4.385    4.519    2.349
                            3.215    2.461    2.950    0.691    1.046    1.224

  EVAPOTRANSPIRATION
  ------------------
    TOTALS                  0.309    0.276    0.248    0.546    0.884    1.569
                            1.641    1.140    0.418    0.199    0.187    0.254

    STD. DEVIATIONS         0.123    0.178    0.218    0.753    0.730    0.540
                            0.615    0.833    0.382    0.115    0.103    0.185

  LATERAL DRAINAGE COLLECTED FROM LAYER  3
  ----------------------------------------
    TOTALS                  0.0067   0.0054   0.0046   0.0059   0.0062   0.0049
                            0.0056   0.0046   0.0046   0.0065   0.0070   0.0060

    STD. DEVIATIONS         0.0016   0.0014   0.0015   0.0018   0.0018   0.0005
                            0.0010   0.0015   0.0021   0.0024   0.0017   0.0024

  PERCOLATION/LEAKAGE THROUGH LAYER  4
  -------------------------------------
    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  4
  -------------------------------------
    AVERAGES                0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000

    STD. DEVIATIONS         0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
                            0.0000   0.0000   0.0000   0.0000   0.0000   0.0000
*******************************************************************************
```

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

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   10
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     47.99    (   7.824)     174189.1     100.00

 RUNOFF                            40.246   (  6.8033)     146092.81     83.870

 EVAPOTRANSPIRATION                 7.672   (  1.6008)      27849.73     15.988

 LATERAL DRAINAGE COLLECTED        0.06795 (  0.00287)       246.649    0.14160
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH       0.00000 (  0.00000)         0.000     0.00000
   LAYER  4

 AVERAGE HEAD ON TOP               0.000 (    0.000)
   OF LAYER  4

 CHANGE IN WATER STORAGE           0.000   (  0.0047)          0.00      0.000
*******************************************************************************


♀
*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   10
   ---------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                             10.20         37026.000

      RUNOFF                                    10.012        36342.5078

      DRAINAGE COLLECTED FROM LAYER  3           0.00034          1.23475

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.000000         0.00001

      AVERAGE HEAD ON TOP OF LAYER  4            0.000

      MAXIMUM HEAD ON TOP OF LAYER  4            0.000

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 0.00             0.0000


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0015

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0001

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

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
```

Appendix F: Dilution Factors as a Function of Infiltration Rate and Aquifer Depth Using the Equations Presented in EPAs Soil Screening Guidance: Technical Background Document

K ,saturated hydraulic conductivity of the aquifer, ft/yr.
i, hydraulic gradient, ft/ft.
d, mixing zone depth, ft.
I, infiltration rate, ft/yr.
L, source length parallel to groundwater flow, ft.

The mixing zone depth, d, is determined using the following equation:

$$d = (0.0112 X_r L)^{0.5} + d_a \left(1 - \exp\left(-\frac{LI}{Kid_a}\right)\right)$$

Where
L, source length parallel to groundwater flow, ft.
X_r, distance between source edge and point of observation, ft
K, saturated hydraulic conductivity of the aquifer, ft/yr.
I, infiltration rate, ft/yr.
i, hydraulic gradient, ft/ft.
d_a, actual depth of the aquifer, ft

Dilution Factors as Function of Infiltration at Select Gradients, Hydraulic Conductivities, and Aquifer Depths

K (ft/yr)	1825	**L (ft)**	24
i	0.0015	**Xr (ft)**	124

	Infiltration (%, ft/yr.)							
Aquifer Depth (ft)	**3%**	**5%**	**8%**	**10%**	**13%**	**15%**	**18%**	**20%**
	0.1	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**
10	8.54	5.21	4.07	3.49	3.13	2.90	2.63	2.43
20	8.56	5.25	4.13	3.56	3.22	2.98	2.80	2.67
30	8.57	5.26	4.15	3.59	3.25	3.01	2.85	2.71

K (ft/yr)	1825	**L (ft)**	24
i	0.005	**Xr (ft)**	124

	Infiltration (%, ft/yr.)							
Aquifer Depth (ft)	**3%**	**5%**	**8%**	**10%**	**13%**	**15%**	**18%**	**20%**
	0.1	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**
10	23.94	12.95	9.28	7.44	6.33	5.58	5.05	4.65
20	23.94	12.96	9.30	7.46	6.36	5.62	5.09	4.69
30	23.95	12.97	9.30	7.47	6.37	5.63	5.11	4.71

K (ft/yr)	3280	**L (ft)**	24
i	0.001	**Xr (ft)**	124

	Infiltration (%, ft/yr.)							
Aquifer Depth (ft)	**3%**	**5%**	**8%**	**10%**	**13%**	**15%**	**18%**	**20%**
	0.1	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**
10	9.85	5.88	4.53	3.84	3.42	3.12	2.91	2.71
20	9.87	5.91	4.58	3.90	3.49	3.21	3.01	2.85
30	9.88	5.92	4.59	3.93	3.52	3.25	3.05	2.89

K (ft/yr)	3280
i	0.0015

L (ft)	24
Xr (ft)	124

	Infiltration (%, ft/yr.)							
Aquifer Depth (ft)	**3%**	**5%**	**8%**	**10%**	**13%**	**15%**	**18%**	**20%**
	0.1	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**
10	13.81	7.87	5.88	4.87	4.25	3.84	3.54	3.31
20	13.82	7.89	5.91	4.91	4.31	3.90	3.61	3.39
30	13.83	7.90	5.92	4.93	4.33	3.93	3.64	3.42

K (ft/yr)	3280
i	0.005

L (ft)	24
Xr (ft)	124

	Infiltration (%, ft/yr.)							
Aquifer Depth (ft)	**3%**	**5%**	**8%**	**10%**	**13%**	**15%**	**18%**	**20%**
	0.1	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**
10	41.44	21.71	15.13	11.83	9.85	8.53	7.59	6.88
20	41.45	21.72	15.14	11.85	9.87	8.55	7.61	6.90
30	41.45	21.72	15.14	11.85	9.88	8.56	7.62	6.91

K (ft/yr)	7300
i	0.001

L (ft)	24
Xr (ft)	124

	Infiltration (%, ft/yr.)							
Aquifer Depth (ft)	**3%**	**5%**	**8%**	**10%**	**13%**	**15%**	**18%**	**20%**
	0.1	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**
10	19.54	10.75	7.81	6.33	5.43	4.83	4.40	4.07
20	19.55	10.76	7.83	6.36	5.47	4.88	4.45	4.13
30	19.56	10.77	7.84	6.37	5.49	4.89	4.47	4.15

K (ft/yr)	7300
i	0.0015

L (ft)	24
Xr (ft)	124

	Infiltration (%, ft/yr.)							
Aquifer Depth (ft)	**3%**	**5%**	**8%**	**10%**	**13%**	**15%**	**18%**	**20%**
	0.1	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**
10	28.33	15.15	10.75	8.54	7.22	6.33	5.69	5.21
20	28.34	15.16	10.76	8.56	7.24	6.36	5.73	5.25
30	28.34	15.16	10.77	8.57	7.25	6.37	5.74	5.26

K (ft/yr)	7300
i	0.005

L (ft)	24
Xr (ft)	124

	Infiltration (%, ft/yr.)							
Aquifer Depth (ft)	**3%**	**5%**	**8%**	**10%**	**13%**	**15%**	**18%**	**20%**
	0.1	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**
10	89.80	45.89	31.26	23.94	19.54	16.61	14.52	12.95
20	89.80	45.90	31.26	23.94	19.55	16.62	14.53	12.96
30	89.80	45.90	31.26	23.95	19.56	16.63	14.54	12.97

Appendix G: IWEM Model Outputs

Road Base IWEM Outputs

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	3.05	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.00
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	36	1.071	User Defined	0.035	0.0034	Yes
Antimony	0.03	320	1.632	MCL	0.006	9.41E-05	Yes
Aluminum	37.9	6900	1000 (B)	MCL	0.2	0.0055	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	10.67	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.00
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	47	1.3982	User Defined	0.035	0.0026	Yes
Antimony	0.03	170	0.867	MCL	0.006	0.0002	Yes
Aluminum	37.9	7900	1000 (B)	MCL	0.2	0.0048	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	15.24	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.00
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	61	1.8147	User Defined	0.035	0.002	Yes
Antimony	0.03	220	1.122	MCL	0.006	0.0001	Yes
Aluminum	37.9	9300	1000 (B)	MCL	0.2	0.0041	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	30.48	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.00
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	110	3.2725	User Defined	0.035	0.0011	Yes
Antimony	0.03	410	2.091	MCL	0.006	7.24E-05	Yes
Aluminum	37.9	1.50E+04	1000 (B)	MCL	0.2	0.0025	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	3.05	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	9.2	0.2737	User Defined	0.035	0.0131	Yes
Antimony	0.03	8.9	0.0454	MCL	0.006	0.0034	Yes
Aluminum	37.9	290	58	MCL	0.2	0.1329	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	10.67	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	15	0.4462	User Defined	0.035	0.0081	Yes
Antimony	0.03	17	0.0867	MCL	0.006	0.0018	Yes
Aluminum	37.9	440	88	MCL	0.2	0.0858	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	15.24	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	18	0.5355	User Defined	0.035	0.0066	Yes
Antimony	0.03	23	0.1173	MCL	0.006	0.0013	Yes
Aluminum	37.9	550	110	MCL	0.2	0.0691	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	30.48	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	33	0.9818	User Defined	0.035	0.0037	Yes
Antimony	0.03	46	0.2346	MCL	0.006	0.0006	Yes
Aluminum	37.9	950	190	MCL	0.2	0.04	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	3.05	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	4.7	0.1398	User Defined	0.035	0.0256	Yes
Antimony	0.03	4.5	0.0229	MCL	0.006	0.0067	No
Aluminum	37.9	65	13	MCL	0.2	0.5849	No

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	10.67	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	8.4	0.2499	User Defined	0.035	0.0145	Yes
Antimony	0.03	9.6	0.049	MCL	0.006	0.0031	Yes
Aluminum	37.9	130	26	MCL	0.2	0.2997	No

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	15.24	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	11	0.3273	User Defined	0.035	0.0112	Yes
Antimony	0.03	13	0.0663	MCL	0.006	0.0022	Yes
Aluminum	37.9	160	32	MCL	0.2	0.2346	No

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	30.48	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	20	0.595	User Defined	0.035	0.0061	Yes
Antimony	0.03	26	0.1326	MCL	0.006	0.0011	Yes
Aluminum	37.9	290	58	MCL	0.2	0.1301	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	3.05	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.13
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	1.1	0.0327	User Defined	0.035	0.1115	No
Antimony	0.03	1.4	0.0071	MCL	0.006	0.0218	No
Aluminum	37.9	4.6	0.92	MCL	0.2	8.299	No

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	10.67	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.13
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	1.8	0.0536	User Defined	0.035	0.0655	No
Antimony	0.03	2.7	0.0138	MCL	0.006	0.0112	No
Aluminum	37.9	9.2	1.84	MCL	0.2	4.127	No

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	15.24	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.13
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	2.5	0.0744	User Defined	0.035	0.0479	No
Antimony	0.03	3.5	0.0179	MCL	0.006	0.0085	No
Aluminum	37.9	12	2.4	MCL	0.2	3.241	No

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST (Al,Sb,Mo)
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0.25	est
Distance to well (m)	30.48	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.13
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.121
Antimony	0.006	MCL			0.03
Aluminum	0.2	MCL	4		37.9

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.121	4.7	0.1398	User Defined	0.035	0.0256	Yes
Antimony	0.03	6.8	0.0347	MCL	0.006	0.0044	Yes
Aluminum	37.9	26	5.2	MCL	0.2	1.472	No

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Constituent Name	CAS ID
Aluminum	7429-90-5

Physical Properties

Property	Value	Data Source
ChemicalType	Organic	
Molecule Weight (g/mol)		
Log Koc (distribution coefficient for organic carbon)		
Ka: acid-catalyzed hydrolysis rate constant (1/mol yr)		
Kn: neutral hydrolysis rate constant (1/yr)		
Kb: base-catalyzed hydrolysis rate constant (1/mol yr)		
Solubility (mg/L)		
Diffusivity in air (cm^2/sec)		
Diffusivity in water (m^2/yr)		
Henry's law constant (atm-m^3/mol)		

Reference Ground-water Concentration Values

Property	Value	Data Source
Maximum Contamination Level (mg/L)	0.2	GWCTL
HBN-Ingestion, Non-Cancer (mg/L)		
Reference Dose (mg/kg-day)		
HBN-Ingestion, Cancer (mg/L)		
Carcinogenic Slope Factor-Oral (1/mg/kg-day)		
HBN-Inhalation, Non-Cancer (mg/L)		
Reference Concentration (mg/m^3)		
HBN-Inhalation, Cancer (mg/L)		
Carcinogenic Slope Factor-Inhalation (1/mg/kg-day)		

Constituent Name	CAS ID
Molybdenum	7439-98-7

Physical Properties

Property	Value	Data Source
ChemicalType	Metal	
Molecule Weight (g/mol)	95.9	
Log Koc (distribution coefficient for organic carbon)		
Ka: acid-catalyzed hydrolysis rate constant (1/mol yr)		
Kn: neutral hydrolysis rate constant (1/yr)		
Kb: base-catalyzed hydrolysis rate constant (1/mol yr)		
Solubility (mg/L)		
Diffusivity in air (cm^2/sec)		
Diffusivity in water (m^2/yr)		
Henry's law constant (atm-m^3/mol)		

Reference Ground-water Concentration Values

Property	Value	Data Source
Maximum Contamination Level (mg/L)		
HBN-Ingestion, Non-Cancer (mg/L)	0.12	USEPA, 2001b
Reference Dose (mg/kg-day)	0.005	USEPA, 2001b
HBN-Ingestion, Cancer (mg/L)		
Carcinogenic Slope Factor-Oral (1/mg/kg-day)		
HBN-Inhalation, Non-Cancer (mg/L)		
Reference Concentration (mg/m^3)		
HBN-Inhalation, Cancer (mg/L)		
Carcinogenic Slope Factor-Inhalation (1/mg/kg-day)		

Constituent Name	CAS ID
Antimony	7440-36-0

Physical Properties

Property	Value	Data Source
ChemicalType	Metal	
Molecule Weight (g/mol)	121.76	
Log Koc (distribution coefficient for organic carbon)		
Ka: acid-catalyzed hydrolysis rate constant (1/mol yr)		
Kn: neutral hydrolysis rate constant (1/yr)		
Kb: base-catalyzed hydrolysis rate constant (1/mol yr)		
Solubility (mg/L)		
Diffusivity in air (cm^2/sec)		
Diffusivity in water (m^2/yr)		
Henry's law constant (atm-m^3/mol)		

Reference Ground-water Concentration Values

Property	Value	Data Source
Maximum Contamination Level (mg/L)	0.006	USEPA, 2000h
HBN-Ingestion, Non-Cancer (mg/L)	0.0098	USEPA, 2001b
Reference Dose (mg/kg-day)	0.0004	USEPA, 2001b
HBN-Ingestion, Cancer (mg/L)		
Carcinogenic Slope Factor-Oral (1/mg/kg-day)		
HBN-Inhalation, Non-Cancer (mg/L)		
Reference Concentration (mg/m^3)		
HBN-Inhalation, Cancer (mg/L)		
Carcinogenic Slope Factor-Inhalation (1/mg/kg-day)		

References

USEPA. 2000h. Code of Federal Regulations, National Primary Drinking Water Regulations, CFR 40, Part 141, Section 32. www.epa.gov/safewater/regs/cfr141.pdf.

USEPA. 2001b. Integrated Risk Information System (IRIS). National Center for Environmental Assessment, Office of Research and Development, Washington, DC. http://www.epa.gov/iris/

Ash Amended Asphalt IWEM Outputs

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	3.04	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.028
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.004
Copper	1	User Defined			0.012
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.007
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.004
Antimony	0.006	MCL			0.035
Vanadium	0.049	User Defined			0.004
Zinc	5	User Defined			0.007
Aluminum	0.2	MCL	4		5.866
Boron	1.4	MCL			0.044
Calcium	1000	MCL			50.79
Iron	0.3	MCL			0.011
Sodium	160	MCL			11.617
Strontium	4.2	MCL	30		0.098
Magnesium	1000	MCL			0.088

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	28	2.38	User Defined	0.1	0.0001	Yes
Arsenic	0.004	1.00E+30	5 (A)	User Defined	0.1	0	Yes
Barium	0.028	18	30.6	MCL	2	0.0015	Yes
Beryllium	0.002	1.00E+30	1000	MCL	2	0	Yes
Cadmium	0.002	130	0.5525	MCL	0.005	1.50E-05	Yes
Chromium (III) (Chromic Ion)	0.004	1.00E+30	1000	MCL	0.005	0	Yes
Copper	0.012	1.00E+30	1000	User Defined	0.005	0	Yes
Manganese	0.001	43	1.8275	User Defined	0.05	2.34E-05	Yes
Molybdenum	0.007	19	0.5652	User Defined	0.035	0.0004	Yes
Nickel	0.002	130	11.05	User Defined	0.1	1.58E-05	Yes
Lead	0.004	1.00E+30	5 (A)	MCL	0.1	0	Yes
Antimony	0.035	26	0.1326	MCL	0.006	0.0014	Yes
Vanadium	0.004	1.00E+30	1000	User Defined	0.006	0	Yes
Zinc	0.007	1.00E+30	1000	User Defined	0.006	0	Yes
Aluminum	5.866	1500	300	MCL	0.2	0.0039	Yes
Boron	0.044	41	57.4	MCL	1.4	0.0011	Yes
Calcium	50.79	41	1000 (B)	MCL	1000	1.233	Yes
Iron	0.011	41	12.3	MCL	0.3	0.0003	Yes
Sodium	11.617	41	1000 (B)	MCL	160	0.2823	Yes
Strontium	0.098	5.10E+08	1000 (B)	MCL	4.2	1.92E-10	Yes
Magnesium	0.088	41	1000 (B)	MCL	1000	0.0021	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	3.04	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.028
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.004
Copper	1	User Defined			0.012
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.007
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.004
Antimony	0.006	MCL			0.035
Vanadium	0.049	User Defined			0.004
Zinc	5	User Defined			0.007
Aluminum	0.2	MCL	4		5.866
Boron	1.4	MCL			0.044
Calcium	1000	MCL			50.79
Iron	0.3	MCL			0.011
Sodium	160	MCL			11.617
Strontium	4.2	MCL	30		0.098
Magnesium	1000	MCL			0.088

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	17	1.445	User Defined	0.1	0.0002	Yes
Arsenic	0.004	1.00E+30	5 (A)	User Defined	0.1	0	Yes
Barium	0.028	11	18.7	MCL	2	0.0026	Yes
Beryllium	0.002	1.00E+30	1000	MCL	2	0	Yes
Cadmium	0.002	56	0.238	MCL	0.005	3.59E-05	Yes
Chromium (III) (Chromic Ion)	0.004	1.00E+30	1000	MCL	0.005	0	Yes
Copper	0.012	2.50E+14	1000 (B)	User Defined	1	4.77E-17	Yes
Manganese	0.001	23	0.9775	User Defined	0.05	4.37E-05	Yes
Molybdenum	0.007	12	0.357	User Defined	0.035	0.0006	Yes
Nickel	0.002	58	4.93	User Defined	0.1	3.47E-05	Yes
Lead	0.004	1.00E+30	5 (A)	MCL	0.1	0	Yes
Antimony	0.035	14	0.0714	MCL	0.006	0.0025	Yes
Vanadium	0.004	1.00E+30	1000	User Defined	0.006	0	Yes
Zinc	0.007	1.10E+17	1000 (B)	User Defined	5	6.45E-20	Yes
Aluminum	5.866	620	124	MCL	0.2	0.0094	Yes
Boron	0.044	22	30.8	MCL	1.4	0.002	Yes
Calcium	50.79	22	1000 (B)	MCL	1000	2.279	Yes
Iron	0.011	22	6.6	MCL	0.3	0.0005	Yes
Sodium	11.617	22	1000 (B)	MCL	160	0.5187	Yes
Strontium	0.098	7.70E+04	1000 (B)	MCL	4.2	1.27E-06	Yes
Magnesium	0.088	22	1000 (B)	MCL	1000	0.0039	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	3.04	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.028
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.004
Copper	1	User Defined			0.012
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.007
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.004
Antimony	0.006	MCL			0.035
Vanadium	0.049	User Defined			0.004
Zinc	5	User Defined			0.007
Aluminum	0.2	MCL	4		5.866
Boron	1.4	MCL			0.044
Calcium	1000	MCL			50.79
Iron	0.3	MCL			0.011
Sodium	160	MCL			11.617
Strontium	4.2	MCL	30		0.098
Magnesium	1000	MCL			0.088

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	5	0.425	User Defined	0.1	0.0007	Yes
Arsenic	0.004	53	0.4505	User Defined	0.01	7.59E-05	Yes
Barium	0.028	4	6.8	MCL	2	0.007	Yes
Beryllium	0.002	1.00E+30	1000	MCL	2	0	Yes
Cadmium	0.002	12	0.051	MCL	0.005	0.0002	Yes
Chromium (III) (Chromic Ion)	0.004	1.00E+30	1000	MCL	0.005	0	Yes
Copper	0.012	1.70E+06	1000 (B)	User Defined	1	7.11E-09	Yes
Manganese	0.001	6.5	0.2763	User Defined	0.05	0.0002	Yes
Molybdenum	0.007	4.6	0.1368	User Defined	0.035	0.0015	Yes
Nickel	0.002	12	1.02	User Defined	0.1	0.0002	Yes
Lead	0.004	5100	5 (A)	MCL	0.015	7.86E-07	Yes
Antimony	0.035	4.5	0.0229	MCL	0.006	0.0078	No
Vanadium	0.004	1.00E+30	1000	User Defined	0.006	0	Yes
Zinc	0.007	51	216.75	User Defined	5	0.0001	Yes
Aluminum	5.866	66	13.2	MCL	0.2	0.089	Yes
Boron	0.044	5.1	7.14	MCL	1.4	0.0085	Yes
Calcium	50.79	5.1	1000 (B)	MCL	1000	9.941	Yes
Iron	0.011	5.1	1.53	MCL	0.3	0.0021	Yes
Sodium	11.617	5.1	816	MCL	160	2.256	Yes
Strontium	0.098	520	1000 (B)	MCL	4.2	0.0002	Yes
Magnesium	0.088	5.1	1000 (B)	MCL	1000	0.0171	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	3.04	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.09
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.028
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.004
Copper	1	User Defined			0.012
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.007
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.004
Antimony	0.006	MCL			0.035
Vanadium	0.049	User Defined			0.004
Zinc	5	User Defined			0.007
Aluminum	0.2	MCL	4		5.866
Boron	1.4	MCL			0.044
Calcium	1000	MCL			50.79
Iron	0.3	MCL			0.011
Sodium	160	MCL			11.617
Strontium	4.2	MCL	30		0.098
Magnesium	1000	MCL			0.088

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	1.6	0.136	User Defined	0.1	0.0022	Yes
Arsenic	0.004	2.5	0.0213	User Defined	0.01	0.0016	Yes
Barium	0.028	1.4	2.38	MCL	2	0.0201	Yes
Beryllium	0.002	1.60E+08	1000 (B)	MCL	0.004	1.22E-11	Yes
Cadmium	0.002	2.4	0.0102	MCL	0.005	0.0008	Yes
Chromium (III) (Chromic Ion)	0.004	5.50E+06	1000 (B)	MCL	0.1	7.27E-10	Yes
Copper	0.012	58	49.3	User Defined	1	0.0002	Yes
Manganese	0.001	1.9	0.0808	User Defined	0.05	0.0005	Yes
Molybdenum	0.007	1.2	0.0357	User Defined	0.035	0.0056	Yes
Nickel	0.002	2.4	0.204	User Defined	0.1	0.0008	Yes
Lead	0.004	10	0.1275	MCL	0.015	0.0004	Yes
Antimony	0.035	1.6	0.0082	MCL	0.006	0.0215	No
Vanadium	0.004	7.50E+05	1000 (B)	User Defined	0.049	5.36E-09	Yes
Zinc	0.007	5.1	21.675	User Defined	5	0.0014	Yes
Aluminum	5.866	6.9	1.38	MCL	0.2	0.8521	No
Boron	0.044	1.3	1.82	MCL	1.4	0.0333	Yes
Calcium	50.79	1.3	1000 (B)	MCL	1000	38.39	Yes
Iron	0.011	1.3	0.39	MCL	0.3	0.0083	Yes
Sodium	11.617	1.3	208	MCL	160	8.763	Yes
Strontium	0.098	49	205.8	MCL	4.2	0.002	Yes
Magnesium	0.088	1.3	1000 (B)	MCL	1000	0.0665	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	10.67	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.028
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.004
Copper	1	User Defined			0.012
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.007
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.004
Antimony	0.006	MCL			0.035
Vanadium	0.049	User Defined			0.004
Zinc	5	User Defined			0.007
Aluminum	0.2	MCL	4		5.866
Boron	1.4	MCL			0.044
Calcium	1000	MCL			50.79
Iron	0.3	MCL			0.011
Sodium	160	MCL			11.617
Strontium	4.2	MCL	30		0.098
Magnesium	1000	MCL			0.088

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Beryllium	0.002	1.00E+30	1000	MCL	2	0	Yes
Cadmium	0.002	110	0.4675	MCL	0.005	1.78E-05	Yes
Chromium (III) (Chromic Ion)	0.004	1.00E+30	1000	MCL	0.005	0	Yes
Copper	0.012	2.00E+25	1000 (B)	User Defined	1	5.94E-28	Yes
Manganese	0.001	68	2.89	User Defined	0.05	1.48E-05	Yes
Molybdenum	0.007	27	0.8033	User Defined	0.035	0.0003	Yes
Nickel	0.002	130	11.05	User Defined	0.1	1.49E-05	Yes
Lead	0.004	1.00E+30	5 (A)	MCL	0.1	0	Yes
Antimony	0.035	42	0.2142	MCL	0.006	0.0008	Yes
Vanadium	0.004	1.00E+30	1000	User Defined	0.006	0	Yes
Zinc	0.007	1.00E+30	1000	User Defined	0.006	0	Yes
Aluminum	5.866	2000	400	MCL	0.2	0.003	Yes
Boron	0.044	65	91	MCL	1.4	0.0007	Yes
Calcium	50.79	65	1000 (B)	MCL	1000	0.7778	Yes
Iron	0.011	65	19.5	MCL	0.3	0.0002	Yes
Sodium	11.617	65	1000 (B)	MCL	160	0.1783	Yes
Strontium	0.098	1.20E+06	1000 (B)	MCL	4.2	8.28E-08	Yes
Magnesium	0.088	65	1000 (B)	MCL	1000	0.0013	Yes
Silver	0.0035	41	3.485	User Defined	0.1	8.61E-05	Yes
Arsenic	0.004	1.00E+30	5 (A)	User Defined	0.1	0	Yes
Barium	0.028	28	47.6	MCL	2	0.001	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	10.67	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.028
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.004
Copper	1	User Defined			0.012
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.007
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.004
Antimony	0.006	MCL			0.035
Vanadium	0.049	User Defined			0.004
Zinc	5	User Defined			0.007
Aluminum	0.2	MCL	4		5.866
Boron	1.4	MCL			0.044
Calcium	1000	MCL			50.79
Iron	0.3	MCL			0.011
Sodium	160	MCL			11.617
Strontium	4.2	MCL	30		0.098
Magnesium	1000	MCL			0.088

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	27	2.295	User Defined	0.1	0.0001	Yes
Arsenic	0.004	1.00E+30	5 (A)	User Defined	0.1	0	Yes
Barium	0.028	18	30.6	MCL	2	0.0015	Yes
Beryllium	0.002	1.00E+30	1000	MCL	2	0	Yes
Cadmium	0.002	70	0.2975	MCL	0.005	2.86E-05	Yes
Chromium (III) (Chromic Ion)	0.004	1.00E+30	1000	MCL	0.005	0	Yes
Copper	0.012	3.80E+11	1000 (B)	User Defined	1	3.14E-14	Yes
Manganese	0.001	39	1.6575	User Defined	0.05	2.59E-05	Yes
Molybdenum	0.007	20	0.595	User Defined	0.035	0.0004	Yes
Nickel	0.002	76	6.46	User Defined	0.1	2.64E-05	Yes
Lead	0.004	1.00E+30	5 (A)	MCL	0.1	0	Yes
Antimony	0.035	26	0.1326	MCL	0.006	0.0013	Yes
Vanadium	0.004	1.00E+30	1000	User Defined	0.006	0	Yes
Zinc	0.007	2.40E+05	1000 (B)	User Defined	5	2.94E-08	Yes
Aluminum	5.866	910	182	MCL	0.2	0.0064	Yes
Boron	0.044	36	50.4	MCL	1.4	0.0012	Yes
Calcium	50.79	36	1000 (B)	MCL	1000	1.394	Yes
Iron	0.011	36	10.8	MCL	0.3	0.0003	Yes
Sodium	11.617	36	1000 (B)	MCL	160	0.319	Yes
Strontium	0.098	3.40E+04	1000 (B)	MCL	4.2	2.87E-06	Yes
Magnesium	0.088	36	1000 (B)	MCL	1000	0.0024	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	10.67	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.028
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.004
Copper	1	User Defined			0.012
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.007
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.004
Antimony	0.006	MCL			0.035
Vanadium	0.049	User Defined			0.004
Zinc	5	User Defined			0.007
Aluminum	0.2	MCL	4		5.866
Boron	1.4	MCL			0.044
Calcium	1000	MCL			50.79
Iron	0.3	MCL			0.011
Sodium	160	MCL			11.617
Strontium	4.2	MCL	30		0.098
Magnesium	1000	MCL			0.088

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	10	0.85	User Defined	0.1	0.0003	Yes
Arsenic	0.004	85	0.7225	User Defined	0.01	4.71E-05	Yes
Barium	0.028	8.1	13.77	MCL	2	0.0035	Yes
Beryllium	0.002	1.00E+30	1000	MCL	2	0	Yes
Cadmium	0.002	23	0.0978	MCL	0.005	8.78E-05	Yes
Chromium (III) (Chromic Ion)	0.004	1.00E+30	1000	MCL	0.005	0	Yes
Copper	0.012	1.50E+04	1000 (B)	User Defined	1	7.77E-07	Yes
Manganese	0.001	13	0.5525	User Defined	0.05	7.44E-05	Yes
Molybdenum	0.007	8.4	0.2499	User Defined	0.035	0.0008	Yes
Nickel	0.002	23	1.955	User Defined	0.1	8.76E-05	Yes
Lead	0.004	1700	5 (A)	MCL	0.015	2.39E-06	Yes
Antimony	0.035	9.3	0.0474	MCL	0.006	0.0038	Yes
Vanadium	0.004	3.50E+16	1000 (B)	User Defined	0.049	1.15E-19	Yes
Aluminum	5.866	130	26	MCL	0.2	0.0464	Yes
Boron	0.044	11	15.4	MCL	1.4	0.0041	Yes
Calcium	50.79	11	1000 (B)	MCL	1000	4.721	Yes
Iron	0.011	11	3.3	MCL	0.3	0.001	Yes
Sodium	11.617	11	1000 (B)	MCL	160	1.08	Yes
Strontium	0.098	980	1000 (B)	MCL	4.2	9.97E-05	Yes
Magnesium	0.088	11	1000 (B)	MCL	1000	0.0082	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	10.67	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.09
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.028
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.004
Copper	1	User Defined			0.012
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.007
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.004
Antimony	0.006	MCL			0.035
Vanadium	0.049	User Defined			0.004
Zinc	5	User Defined			0.007
Aluminum	0.2	MCL	4		5.866
Boron	1.4	MCL			0.044
Calcium	1000	MCL			50.79
Iron	0.3	MCL			0.011
Sodium	160	MCL			11.617
Strontium	4.2	MCL	30		0.098
Magnesium	1000	MCL			0.088

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	3.2	0.272	User Defined	0.1	0.0011	Yes
Arsenic	0.004	6.3	0.0536	User Defined	0.01	0.0006	Yes
Barium	0.028	2.8	4.76	MCL	2	0.0102	Yes
Beryllium	0.002	3.10E+08	1000 (B)	MCL	0.004	6.41E-12	Yes
Cadmium	0.002	5.8	0.0247	MCL	0.005	0.0003	Yes
Chromium (III) (Chromic Ion)	0.004	1.00E+07	1000 (B)	MCL	0.1	4.02E-10	Yes
Copper	0.012	190	161.5	User Defined	1	6.28E-05	Yes
Manganese	0.001	4	0.17	User Defined	0.05	0.0002	Yes
Molybdenum	0.007	2.4	0.0714	User Defined	0.035	0.0029	Yes
Nickel	0.002	5.5	0.4675	User Defined	0.1	0.0004	Yes
Lead	0.004	39	0.4972	MCL	0.015	0.0001	Yes
Antimony	0.035	3.3	0.0168	MCL	0.006	0.0105	No
Vanadium	0.004	5.50E+04	1000 (B)	User Defined	0.049	7.26E-08	Yes
Zinc	0.007	17	72.25	User Defined	5	0.0004	Yes
Aluminum	5.866	14	2.8	MCL	0.2	0.4051	No
Boron	0.044	2.7	3.78	MCL	1.4	0.0164	Yes
Calcium	50.79	2.7	1000 (B)	MCL	1000	18.9	Yes
Iron	0.011	2.7	0.81	MCL	0.3	0.0041	Yes
Sodium	11.617	2.7	432	MCL	160	4.322	Yes
Strontium	0.098	100	420	MCL	4.2	0.0009	Yes
Magnesium	0.088	2.7	1000 (B)	MCL	1000	0.0327	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	15.24	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Antimony	0.006	MCL			0.035

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Antimony	0.035	61	0.3111	MCL	0.006	0.0006	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	15.24	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Antimony	0.006	MCL			0.035

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Antimony	0.035	35	0.1785	MCL	0.006	0.001	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	15.24	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Antimony	0.006	MCL			0.035

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Antimony	0.035	13	0.0663	MCL	0.006	0.0027	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner Not Protective**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	15.24	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.09
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Antimony	0.006	MCL			0.035

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Antimony	0.035	4.5	0.0229	MCL	0.006	0.0078	No

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	30.48	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Antimony	0.006	MCL			0.035

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Antimony	0.035	120	0.612	MCL	0.006	0.0003	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	30.48	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.01
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Antimony	0.006	MCL			0.035

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Antimony	0.035	68	0.3468	MCL	0.006	0.0005	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	30.48	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Antimony	0.006	MCL			0.035

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Antimony	0.035	26	0.1326	MCL	0.006	0.0013	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	30.48	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.09
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Antimony	0.006	MCL			0.035

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Antimony	0.035	9	0.0459	MCL	0.006	0.0039	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Ash Amended Concrete IWEM Outputs

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	3.04	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.00
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.697
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.034
Copper	1	User Defined			0.007
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.071
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.008
Antimony	0.006	MCL			0.004
Vanadium	0.049	User Defined			0.001
Zinc	5	User Defined			0.01
Aluminum	0.2	MCL	4		1.369
Boron	1.4	MCL			0.007
Calcium	1000	MCL			510
Iron	0.3	MCL			0.01
Sodium	160	MCL			14.58
Strontium	4.2	MCL	30		1.981
Magnesium	1000	MCL			0.013

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	180	5 (A)	User Defined	0.1	1.96E-05	Yes
Arsenic	0.004	1.00E+30	5 (A)	User Defined	0.1	0	Yes
Barium	0.697	55	93.5	MCL	2	0.0127	Yes
Beryllium	0.002	1.00E+30	1000	MCL	2	0	Yes
Cadmium	0.002	4000	1 (A)	MCL	0.005	5.05E-07	Yes
Chromium (III) (Chromic Ion)	0.034	1.00E+30	1000	MCL	0.005	0	Yes
Copper	0.007	1.00E+30	1000	User Defined	0.005	0	Yes
Manganese	0.001	480	20.4	User Defined	0.05	2.09E-06	Yes
Molybdenum	0.071	58	1.7255	User Defined	0.035	0.0012	Yes
Nickel	0.002	2900	246.5	User Defined	0.1	6.81E-07	Yes
Lead	0.008	1.00E+30	5 (A)	MCL	0.1	0	Yes
Antimony	0.004	7800	39.78	MCL	0.006	5.15E-07	Yes
Vanadium	0.001	1.00E+30	1000	User Defined	0.006	0	Yes
Zinc	0.01	1.00E+30	1000	User Defined	0.006	0	Yes
Aluminum	1.369	2.60E+04	1000 (B)	MCL	0.2	5.32E-05	Yes
Boron	0.007	290	406	MCL	1.4	2.37E-05	Yes
Calcium	510	290	1000 (B)	MCL	1000	1.732	Yes
Iron	0.01	300	90	MCL	0.3	3.36E-05	Yes
Sodium	14.58	300	1000 (B)	MCL	160	0.0491	Yes
Strontium	1.981	1.00E+30	1000	MCL	160	0	Yes
Magnesium	0.013	290	1000 (B)	MCL	1000	4.41E-05	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	3.04	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.697
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.034
Copper	1	User Defined			0.007
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.071
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.008
Antimony	0.006	MCL			0.004
Vanadium	0.049	User Defined			0.001
Zinc	5	User Defined			0.01
Aluminum	0.2	MCL	4		1.369
Boron	1.4	MCL			0.007
Calcium	1000	MCL			510
Iron	0.3	MCL			0.01
Sodium	160	MCL			14.58
Strontium	4.2	MCL	30		1.981
Magnesium	1000	MCL			0.013

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	4.1	0.3485	User Defined	0.1	0.0009	Yes
Arsenic	0.004	21	0.1785	User Defined	0.01	0.0002	Yes
Barium	0.697	3.4	5.78	MCL	2	0.2022	Yes
Beryllium	0.002	1.00E+30	1000	MCL	2	0	Yes
Cadmium	0.002	8.9	0.0378	MCL	0.005	0.0002	Yes
Chromium (III) (Chromic Ion)	0.034	5.60E+14	1000 (B)	MCL	0.1	6.03E-17	Yes
Copper	0.007	4.30E+04	1000 (B)	User Defined	1	1.64E-07	Yes
Manganese	0.001	5.2	0.221	User Defined	0.05	0.0002	Yes
Molybdenum	0.071	4	0.119	User Defined	0.035	0.0179	Yes
Nickel	0.002	9.1	0.7735	User Defined	0.1	0.0002	Yes
Lead	0.008	39	0.4972	MCL	0.015	0.0002	Yes
Antimony	0.004	6.9	0.0352	MCL	0.006	0.0006	Yes
Vanadium	0.001	1.00E+30	1000	User Defined	0.006	0	Yes
Zinc	0.01	21	89.25	User Defined	5	0.0005	Yes
Aluminum	1.369	43	8.6	MCL	0.2	0.0316	Yes
Boron	0.007	4.2	5.88	MCL	1.4	0.0017	Yes
Calcium	510	4.1	1000 (B)	MCL	1000	122.9	Yes
Iron	0.01	4.1	1.23	MCL	0.3	0.0024	Yes
Sodium	14.58	4.1	656	MCL	160	3.514	Yes
Strontium	1.981	340	1000 (B)	MCL	4.2	0.0059	Yes
Magnesium	0.013	4.2	1000 (B)	MCL	1000	0.0031	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	10.67	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.00
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.697
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.034
Copper	1	User Defined			0.007
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.071
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.008
Antimony	0.006	MCL			0.004
Vanadium	0.049	User Defined			0.001
Zinc	5	User Defined			0.01
Aluminum	0.2	MCL	4		1.369
Boron	1.4	MCL			0.007
Calcium	1000	MCL			510
Iron	0.3	MCL			0.01
Sodium	160	MCL			14.58
Strontium	4.2	MCL	30		1.981
Magnesium	1000	MCL			0.013

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	180	5 (A)	User Defined	0.1	1.91E-05	Yes
Arsenic	0.004	1.00E+30	5 (A)	User Defined	0.1	0	Yes
Barium	0.697	63	100 (A)	MCL	2	0.011	Yes
Beryllium	0.002	1.00E+30	1000	MCL	2	0	Yes
Cadmium	0.002	690	1 (A)	MCL	0.005	2.91E-06	Yes
Chromium (III) (Chromic Ion)	0.034	1.00E+30	1000	MCL	0.005	0	Yes
Copper	0.007	1.00E+30	1000	User Defined	0.005	0	Yes
Manganese	0.001	340	14.45	User Defined	0.05	2.93E-06	Yes
Molybdenum	0.071	74	2.2015	User Defined	0.035	0.001	Yes
Nickel	0.002	840	71.4	User Defined	0.1	2.38E-06	Yes
Lead	0.008	1.00E+30	5 (A)	MCL	0.1	0	Yes
Antimony	0.004	630	3.213	MCL	0.006	6.34E-06	Yes
Vanadium	0.001	1.00E+30	1000	User Defined	0.006	0	Yes
Zinc	0.01	1.00E+30	1000	User Defined	0.006	0	Yes
Aluminum	1.369	2.10E+04	1000 (B)	MCL	0.2	6.37E-05	Yes
Boron	0.007	420	588	MCL	1.4	1.66E-05	Yes
Calcium	510	420	1000 (B)	MCL	1000	1.206	Yes
Iron	0.01	420	126	MCL	0.3	2.37E-05	Yes
Sodium	14.58	420	1000 (B)	MCL	160	0.0345	Yes
Strontium	1.981	1.00E+30	1000	MCL	160	0	Yes
Magnesium	0.013	420	1000 (B)	MCL	1000	3.07E-05	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	10.67	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Silver	0.1	User Defined			0.0035
Arsenic	0.01	User Defined			0.004
Barium	2	MCL			0.697
Beryllium	0.004	MCL			0.002
Cadmium	0.005	MCL			0.002
Chromium (III) (Chromic Ion)	0.1	MCL			0.034
Copper	1	User Defined			0.007
Manganese	0.05	User Defined			0.001
Molybdenum	0.035	User Defined			0.071
Nickel	0.1	User Defined			0.002
Lead	0.015	MCL			0.008
Antimony	0.006	MCL			0.004
Vanadium	0.049	User Defined			0.001
Zinc	5	User Defined			0.01
Aluminum	0.2	MCL	4		1.369
Boron	1.4	MCL			0.007
Calcium	1000	MCL			510
Iron	0.3	MCL			0.01
Sodium	160	MCL			14.58
Strontium	4.2	MCL	30		1.981
Magnesium	1000	MCL			0.013

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Silver	0.0035	8.5	0.7225	User Defined	0.1	0.0004	Yes
Arsenic	0.004	44	0.374	User Defined	0.01	9.03E-05	Yes
Barium	0.697	6.7	11.39	MCL	2	0.1039	Yes
Beryllium	0.002	1.00E+30	1000	MCL	2	0	Yes
Cadmium	0.002	19	0.0808	MCL	0.005	0.0001	Yes
Chromium (III) (Chromic Ion)	0.034	5.80E+11	1000 (B)	MCL	0.1	5.85E-14	Yes
Copper	0.007	3700	1000 (B)	User Defined	1	1.87E-06	Yes
Manganese	0.001	11	0.4675	User Defined	0.05	8.90E-05	Yes
Molybdenum	0.071	7.3	0.2172	User Defined	0.035	0.0097	Yes
Nickel	0.002	18	1.53	User Defined	0.1	0.0001	Yes
Lead	0.008	120	1.53	MCL	0.015	6.63E-05	Yes
Antimony	0.004	14	0.0714	MCL	0.006	0.0003	Yes
Vanadium	0.001	1.00E+30	1000	User Defined	0.006	0	Yes
Zinc	0.01	60	255	User Defined	5	0.0002	Yes
Aluminum	1.369	91	18.2	MCL	0.2	0.015	Yes
Boron	0.007	8.8	12.32	MCL	1.4	0.0008	Yes
Calcium	510	8.8	1000 (B)	MCL	1000	57.69	Yes
Iron	0.01	8.8	2.64	MCL	0.3	0.0011	Yes
Sodium	14.58	8.9	1000 (B)	MCL	160	1.646	Yes
Strontium	1.981	710	1000 (B)	MCL	4.2	0.0028	Yes
Magnesium	0.013	8.8	1000 (B)	MCL	1000	0.0015	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	15.24	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.00
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.071

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.071	89	2.6477	User Defined	0.035	0.0008	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	15.24	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.071

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.071	11	0.3273	User Defined	0.035	0.0065	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	30.48	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.00
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.071

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.071	160	4.76	User Defined	0.035	0.0005	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Tier 2 Evaluation Results

Recommendation: **User-defined Liner**

Facility Type	Waste Pile
Facility name	PASCO TEST 3
Street address	
City	
State	
Zip	
Date of sample analysis	
Name of user	
Additional information	

Waste Pile Parameters

Parameter	Value	Data Source
Area of waste pile (m^2) [requires site specific v	53.53	est
Depth of base of the WP below ground surface (m)	0	est
Distance to well (m)	30.48	est
Operational life (yr)	50	est

Subsurface Parameters

Subsurface Environment **Unconsolidated and Semiconsolidated Shallow Aquife**

Parameter	Value	Data Source
Ground-water pH value (metals only)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Depth to water table (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer hydraulic conductivity (m/yr)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Regional hydraulic gradient	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]
Aquifer thickness (m)	Distribution	Monte Carlo [See IWEM TBD 4.2.3.1]

Regional Soil and Climate Parameters

Parameter	Value
Soil Type	Coarse-grained soil(sandy loam)
Climate Center	Tampa FL
Site-specific Infiltration rate (m/yr)	0.03
Recharge Rate (m/yr)	0.1031

Constituent Reference Groundwater Concentrations and Constituent Properties

Constituent Name	RGC (mg/L)	RGC Based On	Kd* (L/kg)	Decay Coeff* (1/yr)	Leachate Conc. (mg/L)
Molybdenum	0.035	User Defined			0.071

*If a site-specific value was entered by the user, it will be displayed here; otherwise, the model used the constituent properties listed at the end of the report.

Detailed Results for Parent Constituents -- User Defined Liner

Constituent Name	Leachate Conc. (mg/L)	DAF (mg/L)	LCTV (mg/L)	Selected RGC	RGC (mg/L)	90th %tile Exp. Conc. (mg/L)	Protective?
Molybdenum	0.071	20	0.595	User Defined	0.035	0.0036	Yes

CAPS & WARNINGS

A - The LCTV is capped by the Toxicity Characteristic Rule Exit Level (TC LEVEL) of the constituent.

B - The LCTV is capped by 1000 mg/L (EPA Policy).

C - The LCTV exceeds the cited solubility for this constituent.

D - The parent constituent LCTV is derived from the LCTV of a more conservative toxic daughter product(s).

Appendix H: MYGRT Model Outputs

UF UNIVERSITY of FLORIDA
College of Engineering
Engineering School of Sustainable Infrastructure and the Environment
Solid and Hazardous Waste Engineering Program

Project Number:	107383	Sheet:	2/3
Project Name:	Pasco County		
By:	T. Townsend	Date:	8/11/14
Subject:	MYGRT Run Aluminum		
Checked By:	J. Roessler	Date:	8/13/14

MYGRT Run — Aluminum

Co =	37.9	mg/L		
Pulse =	100	yr		
Width of source =	100	m		
Length of source =	7.31	m		
Infiltration rate =	0.127	m/yr =	5.00	in/yr
Soil vol MC =	0.2			
Depth to water table below source =	0.914			
Vertical dispersion coefficient =	0.058	m2/yr		
Aquifer hydraulic gradient =	0.001	m/m		
Aquifer hydraulic conductivity =	556.2	m/yr =	5.00	ft/day
Aquifer porosity =	0.001	m/m		
Horizontal seepage velocity =	1.85	m/yr =		
Aquifer thickness =	3.048	m =	10.00	ft
Mixing Depth =	1.68	m		
Top of well screen =	0	m below water table		
Bottom of well screen =	3.048	m below water table		
Horizontal dispersion coefficient =	18.5	m2/yr		
Transverse dispersion coefficient =	1.85	m2/yr		
Vertical dispersion coefficient =	0.185	m2/yr		

		33	DF =	3.6365
	R=	33		1

Distance, m		Conc, mg/l at T = 100 yrs	Conc, mg/l at T = 100 yrs
0	0	10.1562	10.4222
3.281	1	9.41865	10.422
6.562	2	8.65176	10.4219
9.843	3	7.87105	10.4217
13.124	4	7.0917	10.4216
16.405	5	6.32763	10.4214
19.686	6	5.59107	10.4212
22.967	7	4.89221	10.4209
26.248	8	4.23908	10.4207
29.529	9	3.63745	10.4204
32.81	10	3.09091	10.4202
36.091	11	2.60103	10.4198
39.372	12	2.16762	10.4195
42.653	13	1.789	10.4192
45.934	14	1.4623	10.4188
49.215	15	1.18378	10.4184
52.496	16	0.949135	10.4179
55.777	17	0.753732	10.4174
59.058	18	0.592857	10.4169
62.339	19	0.46189	10.4164
65.62	20	0.356446	10.4158
68.901	21	0.272474	10.4152
72.182	22	0.206322	10.4145
75.463	23	0.154762	10.4138
78.744	24	0.114999	10.413
82.025	25	0.0846524	10.4122
85.306	26	0.0617325	10.4113
88.587	27	0.0445991	10.4104
91.868	28	0.0319215	10.4094
95.149	29	0.0226358	10.4084
98.43	30	0.0159027	10.4073
101.711	31	0.0110692	10.4061
104.992	32	0.0076338	10.4049
108.273	33	0.00521614	10.4036
111.554	34	0.00353143	10.4022
114.835	35	0.00236891	10.4007
118.116	36	1.57E-03	10.3992
121.397	37	1.04E-03	10.3975
124.678	38	6.77E-04	10.3958
127.959	39	4.38E-04	10.394
131.24	40	2.80E-04	10.3921
134.521	41	1.78E-04	10.39
137.802	42	1.12E-04	10.3879
141.083	43	6.98E-05	10.3857
144.364	44	4.31E-05	10.3833
147.645	45	2.64E-05	10.3808
150.926	46	1.60E-05	10.3782
154.207	47	9.63E-06	10.3755
157.488	48	5.74E-06	10.3726
160.769	49	3.39E-06	10.3696
164.05	50	1.98E-06	10.3664
167.331	51	1.15E-06	10.3631
170.612	52	6.60E-07	10.3596
173.893	53	3.76E-07	10.3559
177.174	54	2.12E-07	10.3521
180.455	55	1.18E-07	10.3481
183.736	56	6.57E-08	10.3439
187.017	57	3.60E-08	10.3396
190.298	58	1.96E-08	10.335

193.579	59	1.06E-08	10.3302
196.86	60	5.65E-09	10.3252
200.141	61	2.99E-09	10.32
203.422	62	1.57E-09	10.3146
206.703	63	8.18E-10	10.309
209.984	64	4.21E-10	10.3031
213.265	65	2.15E-10	10.2969
216.546	66	1.09E-10	10.2905
219.827	67	5.47E-11	10.2839
223.108	68	2.72E-11	10.2769
226.389	69	1.34E-11	10.2697
229.67	70	6.54E-12	10.2622
232.951	71	3.17E-12	10.2544
236.232	72	1.52E-12	10.2463
239.513	73	7.23E-13	10.2379
242.794	74	3.47E-13	10.2292
246.075	75	1.60E-13	10.2201
249.356	76	7.35E-14	10.2107
252.637	77	3.38E-14	10.2009
255.918	78	1.58E-14	10.1908
259.199	79	0.00E+00	10.1803
262.48	80	5.63E-16	10.1695
265.761	81	2.11E-15	10.1582
269.042	82	6.61E-15	10.1466
272.323	83	0.00E+00	10.1346
275.604	84	6.09E-16	10.1221
278.885	85	2.25E-15	10.1092
282.166	86	2.02E-15	10.0959
285.447	87	1.46E-15	10.0822
288.728	88	9.35E-16	10.068
292.009	89	5.17E-16	10.0533
295.29	90	2.34E-16	10.0381
298.571	91	9.83E-17	10.0225
301.852	92	4.06E-17	10.0064
305.133	93	1.66E-17	9.98978
308.414	94	6.73E-18	9.97265
311.695	95	2.70E-18	9.955
314.976	96	1.07E-18	9.93682
318.257	97	4.23E-19	9.9181
321.538	98	1.65E-19	9.89882
324.819	99	6.40E-20	9.879
328.1	100	2.45E-20	9.8586
331.381	101	9.32E-21	9.83762
334.662	102	3.51E-21	9.81606
337.943	103	1.31E-21	9.79391
341.224	104	4.83E-22	9.77115
344.505	105	1.77E-22	9.74777
347.786	106	6.42E-23	9.72378
351.067	107	2.31E-23	9.69916
354.348	108	8.22E-24	9.6739
357.629	109	2.90E-24	9.64799
360.91	110	1.01E-24	9.62143
364.191	111	3.52E-25	9.5942
367.472	112	1.21E-25	9.56631
370.753	113	4.11E-26	9.53774
374.034	114	1.39E-26	9.50849
377.315	115	4.63E-27	9.47856
380.596	116	1.53E-27	9.44792
383.877	117	5.03E-28	9.41658
387.158	118	1.63E-28	9.38454
390.439	119	5.27E-29	9.35178
393.72	120	1.68E-29	9.3183

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Engineering School of Sustainable Infrastructure and the Environment
Solid and Hazardous Waste Engineering Program

Project Number:	107383	Sheet:	1/3
Project Name:	Pasco County		
By:	T. Townsend	Date:	8/11/14
Subject:	MYGRT Run Molybdenum		
Checked By:	J. Roessler	Date:	8/13/14

MYGRT Run — Molybdenum

Co =	0.121	mg/L		
Pulse =	100	yr		
Width of source =	100	m		
Length of source =	7.31	m		
Infiltration rate =	0.127	m/yr =	5.00	in/yr
Soil vol MC =	0.2			
Depth to water table below source =	0.914			
Vertical dispersion coefficient =	0.058	m2/yr		
Aquifer hydraulic gradient =	0.001	m/m		
Aquifer hydraulic conductivity =	556.2	m/yr =	5.00	ft/day
Aquifer porosity =	0.001	m/m		
Horizontal seepage velocity =	1.85	m/yr =		
Aquifer thickness =	3.048	m =	10.00	ft
Mixing Depth =	1.68	m		
Top of well screen =	0	m below water table		
Bottom of well screen =	3.048	m below water table		
Horizontal dispersion coefficient =	18.5	m2/yr		
Transverse dispersion coefficient =	1.85	m2/yr		
Vertical dispersion coefficient =	0.185	m2/yr		

R= 33 DF = 3.6369

ft	Distance, m	Conc, mg/l at T = 100 yrs	Conc, mg/l at T = 100 yrs
0	0	0.033273	0.03327
3.281	1	0.0328774	0.0332697
6.562	2	0.0324441	0.0332692
9.843	3	0.031973	0.0332687
13.124	4	0.031464	0.0332682
16.405	5	0.0309175	0.0332676
19.686	6	0.030334	0.033267
22.967	7	0.0297143	0.0332663
26.248	8	0.0290596	0.0332656
29.529	9	0.0283714	0.0332648
32.81	10	0.0276514	0.0332639
36.091	11	0.0269015	0.0332629
39.372	12	0.0261241	0.0332619
42.653	13	0.0253216	0.0332608
45.934	14	0.0244966	0.0332596
49.215	15	0.0236521	0.0332583
52.496	16	0.0227911	0.0332569
55.777	17	0.0219167	0.0332553
59.058	18	0.0210322	0.0332537
62.339	19	0.0201409	0.033252
65.62	20	0.019246	0.0332501
68.901	21	0.018351	0.0332482
72.182	22	0.0174591	0.033246
75.463	23	0.0165735	0.0332438
78.744	24	0.0156974	0.0332414
82.025	25	0.0148336	0.0332388
85.306	26	0.013985	0.0332361
88.587	27	0.0131542	0.0332331
91.868	28	0.0123436	0.03323
95.149	29	0.0115555	0.0332268
98.43	30	0.0107919	0.0332233
101.711	31	0.0100544	0.0332196
104.992	32	0.0093445	0.0332156
108.273	33	0.0086635	0.0332115
111.554	34	0.00801235	0.0332071
114.835	35	0.00739177	0.0332024
118.116	36	6.80E-03	0.0331975
121.397	37	6.24E-03	0.0331923
124.678	38	5.72E-03	0.0331868
127.959	39	5.22E-03	0.033181
131.24	40	4.76E-03	0.0331749
134.521	41	4.32E-03	0.0331684
137.802	42	3.92E-03	0.0331616
141.083	43	3.54E-03	0.0331545
144.364	44	3.19E-03	0.033147
147.645	45	2.87E-03	0.0331391
150.926	46	2.58E-03	0.0331308
154.207	47	2.30E-03	0.033122
157.488	48	2.06E-03	0.0331128
160.769	49	1.83E-03	0.0331032
164.05	50	1.62E-03	0.0330931
167.331	51	1.44E-03	0.0330825
170.612	52	1.27E-03	0.0330714
173.893	53	1.12E-03	0.0330598
177.174	54	9.83E-04	0.0330476
180.455	55	8.61E-04	0.0330349
183.736	56	7.52E-04	0.0330216
187.017	57	6.55E-04	0.0330077
190.298	58	5.70E-04	0.0329931

193.579	59	4.94E-04	0.0329779
196.86	60	4.27E-04	0.032962
200.141	61	3.68E-04	0.0329454
203.422	62	3.16E-04	0.0329281
206.703	63	2.71E-04	0.0329101
209.984	64	2.32E-04	0.0328913
213.265	65	1.98E-04	0.0328717
216.546	66	1.68E-04	0.0328513
219.827	67	1.43E-04	0.03283
223.108	68	1.21E-04	0.0328079
226.389	69	1.02E-04	0.0327849
229.67	70	8.58E-05	0.032761
232.951	71	7.20E-05	0.0327361
236.232	72	6.03E-05	0.0327103
239.513	73	5.03E-05	0.0326835
242.794	74	4.19E-05	0.0326556
246.075	75	3.48E-05	0.0326267
249.356	76	2.88E-05	0.0325967
252.637	77	2.38E-05	0.0325655
255.918	78	1.96E-05	0.0325333
259.199	79	1.61E-05	0.0324998
262.48	80	1.32E-05	0.0324652
265.761	81	1.08E-05	0.0324293
269.042	82	8.78E-06	0.0323922
272.323	83	7.14E-06	0.0323538
275.604	84	5.78E-06	0.032314
278.885	85	4.67E-06	0.0322729
282.166	86	3.77E-06	0.0322305
285.447	87	3.03E-06	0.0321866
288.728	88	2.43E-06	0.0321412
292.009	89	1.94E-06	0.0320944
295.29	90	1.55E-06	0.0320461
298.571	91	1.23E-06	0.0319962
301.852	92	9.76E-07	0.0319448
305.133	93	7.72E-07	0.0318917
308.414	94	6.09E-07	0.0318371
311.695	95	4.79E-07	0.0317807
314.976	96	3.76E-07	0.0317227
318.257	97	2.94E-07	0.031663
321.538	98	2.30E-07	0.0316015
324.819	99	1.79E-07	0.0315382
328.1	100	1.39E-07	0.0314731
331.381	101	1.07E-07	0.0314061
334.662	102	8.29E-08	0.0313373
337.943	103	6.38E-08	0.0312666
341.224	104	4.90E-08	0.0311939
344.505	105	3.75E-08	0.0311193
347.786	106	2.86E-08	0.0310428
351.067	107	2.18E-08	0.0309642
354.348	108	1.66E-08	0.0308835
357.629	109	1.26E-08	0.0308008
360.91	110	9.49E-09	0.0307161
364.191	111	7.15E-09	0.0306292
367.472	112	5.37E-09	0.0305401
370.753	113	4.03E-09	0.030449
374.034	114	3.01E-09	0.0303556
377.315	115	2.24E-09	0.03026
380.596	116	1.67E-09	0.0301622
383.877	117	1.24E-09	0.0300622
387.158	118	9.14E-10	0.0299599
390.439	119	6.74E-10	0.0298554
393.72	120	4.96E-10	0.0297485

UF UNIVERSITY of FLORIDA
College of Engineering
Engineering School of Sustainable Infastructure and the Environment
Solid and Hazardous Waste Engineering Program

Project Number:	107383	Sheet:	3/3
Project Name:	Pasco County		
By:	T. Townsend	Date:	8/11/14
Subject:	MYGRT Run Antimony		
Checked By:	J. Roessler	Date:	8/13/14

MYGRT Run — Antimony

Co =	0.03	mg/L		
Pulse =	100	yr		
Width of source =	100	m		
Length of source =	7.31	m		
Infiltration rate =	0.127	m/yr =	5.00	in/yr
Soil vol MC =	0.2			
Depth to water table below source =	0.914			
Vertical dispersion coefficient =	0.058	m2/yr		
Aquifer hydraulic gradient =	0.001	m/m		
Aquifer hydraulic conductivity =	556.2	m/yr =	5.00	ft/day
Aquifer porosity =	0.001	m/m		
Horizontal seepage velocity =	1.85	m/yr =		
Aquifer thickness =	3.048	m =	10.00	ft
Mixing Depth =	1.68	m		
Top of well screen =	0	m below water table		
Bottom of well screen =	3.048	m below water table		
Horizontal dispersion coefficient =	18.5	m2/yr		
Transverse dispersion coefficient =	1.85	m2/yr		
Vertical dispersion coefficient =	0.185	m2/yr		

DF = 3.636905866

R=		20.2	1	361	73
ft	Distance, m	Conc, mg/l at T = 100 yrs	Conc, mg/l at T = 100 yrs	Conc, mg/l at T = 100 yrs	Conc, mg/l at T = 100 yrs
0	0	8.24E-03	8.25E-03	2.68E-07	4.46E-03
3.281	1	7.96E-03	8.25E-03	5.29E-08	3.42E-03
6.562	2	7.66E-03	8.25E-03	9.65E-09	2.57E-03
9.843	3	7.33E-03	8.25E-03	1.71E-09	1.89E-03
13.124	4	6.99E-03	8.25E-03	3.45E-10	1.36E-03
16.405	5	6.63E-03	8.25E-03	9.71E-11	9.58E-04
19.686	6	6.25E-03	8.25E-03	3.61E-11	6.61E-04
22.967	7	5.87E-03	8.25E-03	1.43E-11	4.46E-04
26.248	8	5.49E-03	8.25E-03	5.47E-12	2.95E-04
29.529	9	5.10E-03	8.25E-03	1.94E-12	1.91E-04
32.81	10	4.72E-03	8.25E-03	6.37E-13	1.21E-04
36.091	11	4.34E-03	8.25E-03	1.92E-13	7.50E-05
39.372	12	3.97E-03	8.25E-03	5.33E-14	4.56E-05
42.653	13	3.61E-03	8.25E-03	1.36E-14	2.72E-05
45.934	14	3.26E-03	8.25E-03	3.17E-15	1.59E-05
49.215	15	2.94E-03	8.25E-03	6.77E-16	9.10E-06
52.496	16	2.63E-03	8.25E-03	1.32E-16	5.10E-06
55.777	17	2.34E-03	8.25E-03	2.37E-17	2.81E-06
59.058	18	2.07E-03	8.24E-03	3.87E-18	1.51E-06
62.339	19	1.82E-03	8.24E-03	5.78E-19	7.99E-07
65.62	20	1.59E-03	8.24E-03	7.88E-20	4.14E-07
68.901	21	1.39E-03	8.24E-03	9.80E-21	2.10E-07
72.182	22	1.20E-03	8.24E-03	1.11E-21	1.05E-07
75.463	23	1.03E-03	8.24E-03	1.12E-22	5.11E-08
78.744	24	8.81E-04	8.24E-03	1.29E-23	2.44E-08
82.025	25	7.49E-04	8.24E-03	3.42E-24	1.15E-08
85.306	26	6.34E-04	8.24E-03	0	5.28E-09
88.587	27	5.33E-04	8.24E-03	0	2.38E-09
91.868	28	4.45E-04	8.24E-03	3.71E-25	1.05E-09
95.149	29	3.70E-04	8.24E-03	2.42E-26	4.57E-10
98.43	30	3.06E-04	8.24E-03	1.43E-27	1.95E-10
101.711	31	2.51E-04	8.24E-03	7.69E-29	8.12E-11
104.992	32	2.05E-04	8.24E-03	3.74E-30	3.32E-11
108.273	33	1.67E-04	8.23E-03	1.65E-31	1.33E-11
111.554	34	1.35E-04	8.23E-03	6.61E-33	5.25E-12
114.835	35	1.08E-04	8.23E-03	2.40E-34	2.03E-12
118.116	36	8.64E-05	8.23E-03	7.91E-36	7.66E-13
121.397	37	6.86E-05	8.23E-03	2.36E-37	2.84E-13
124.678	38	5.42E-05	8.23E-03	6.40E-39	1.03E-13
127.959	39	4.25E-05	8.23E-03	1.57E-40	3.67E-14
131.24	40	3.32E-05	8.23E-03	3.51E-42	1.28E-14
134.521	41	2.58E-05	8.22E-03	7.09E-44	4.39E-15
137.802	42	1.99E-05	8.22E-03	1.30E-45	1.47E-15
141.083	43	1.53E-05	8.22E-03	2.16E-47	4.83E-16
144.364	44	1.16E-05	8.22E-03	3.26E-49	1.57E-16
147.645	45	8.84E-06	8.22E-03	4.46E-51	5.03E-17
150.926	46	6.67E-06	8.21E-03	5.54E-53	1.70E-17
154.207	47	5.00E-06	8.21E-03	6.24E-55	4.86E-18
157.488	48	3.73E-06	8.21E-03	6.37E-57	1.70E-18
160.769	49	2.77E-06	8.21E-03	5.90E-59	8.09E-19
164.05	50	2.04E-06	8.20E-03	4.95E-61	5.10E-19
167.331	51	1.50E-06	8.20E-03	3.78E-63	5.83E-19
170.612	52	1.09E-06	8.20E-03	2.61E-65	3.00E-19
173.893	53	7.93E-07	8.20E-03	1.64E-67	0
177.174	54	5.72E-07	8.19E-03	9.30E-70	1.13E-19
180.455	55	4.10E-07	8.19E-03	4.80E-72	4.45E-20
183.736	56	2.92E-07	8.19E-03	2.24E-74	1.83E-20
187.017	57	2.07E-07	8.18E-03	9.52E-77	5.50E-21
190.298	58	1.46E-07	8.18E-03	3.66E-79	1.43E-21

193.579	59	1.03E-07	8.18E-03	1.28E-81	3.54E-22
196.86	60	7.15E-08	8.17E-03	4.05E-84	8.66E-23
200.141	61	4.96E-08	8.17E-03	1.16E-86	2.54E-23
203.422	62	3.42E-08	8.16E-03	3.03E-89	6.30E-24
206.703	63	2.35E-08	8.16E-03	7.16E-92	1.56E-24
209.984	64	1.60E-08	8.15E-03	1.53E-94	3.85E-25
213.265	65	1.08E-08	8.15E-03	2.98E-97	9.50E-26
216.546	66	7.32E-09	8.14E-03	5.26E-100	2.35E-26
219.827	67	4.91E-09	8.14E-03	8.41E-103	5.82E-27
223.108	68	3.27E-09	8.13E-03	0	1.45E-27
226.389	69	2.17E-09	8.13E-03	0	3.59E-28
229.67	70	1.43E-09	8.12E-03	0	8.90E-29
232.951	71	9.39E-10	8.12E-03	0	2.20E-29
236.232	72	6.12E-10	8.11E-03	0	5.38E-30
239.513	73	3.97E-10	8.10E-03	0	1.31E-30
242.794	74	2.56E-10	8.10E-03	0	3.13E-31
246.075	75	1.64E-10	8.09E-03	0	7.42E-32
249.356	76	1.05E-10	8.08E-03	0	1.73E-32
252.637	77	6.65E-11	8.07E-03	0	3.98E-33
255.918	78	4.20E-11	8.07E-03	0	8.99E-34
259.199	79	2.63E-11	8.06E-03	0	2.00E-34
262.48	80	1.64E-11	8.05E-03	0	4.35E-35
265.761	81	1.02E-11	8.04E-03	0	9.31E-36
269.042	82	6.29E-12	8.03E-03	0	1.96E-36
272.323	83	3.86E-12	8.02E-03	0	4.03E-37
275.604	84	2.36E-12	8.01E-03	0	8.15E-38
278.885	85	1.43E-12	8.00E-03	0	1.62E-38
282.166	86	8.63E-13	7.99E-03	0	3.14E-39
285.447	87	5.18E-13	7.98E-03	0	5.99E-40
288.728	88	3.09E-13	7.97E-03	0	1.12E-40
292.009	89	1.84E-13	7.96E-03	0	2.05E-41
295.29	90	1.08E-13	7.95E-03	0	3.69E-42
298.571	91	6.36E-14	7.93E-03	0	6.51E-43
301.852	92	3.72E-14	7.92E-03	0	1.13E-43
305.133	93	2.16E-14	7.91E-03	0	1.91E-44
308.414	94	1.25E-14	7.89E-03	0	3.17E-45
311.695	95	7.15E-15	7.88E-03	0	5.16E-46
314.976	96	4.09E-15	7.87E-03	0	8.25E-47
318.257	97	2.32E-15	7.85E-03	0	1.29E-47
321.538	98	1.31E-15	7.84E-03	0	1.98E-48
324.819	99	7.40E-16	7.82E-03	0	2.99E-49
328.1	100	4.19E-16	7.80E-03	0	4.41E-50
331.381	101	2.20E-16	7.79E-03	0	6.39E-51
334.662	102	1.22E-16	7.77E-03	0	9.06E-52
337.943	103	6.75E-17	7.75E-03	0	1.26E-52
341.224	104	3.67E-17	7.73E-03	0	1.72E-53
344.505	105	2.25E-17	7.72E-03	0	2.30E-54
347.786	106	1.48E-17	7.70E-03	0	3.02E-55
351.067	107	9.88E-18	7.68E-03	0	3.88E-56
354.348	108	5.43E-19	7.66E-03	0	4.89E-57
357.629	109	3.24E-18	7.64E-03	0	6.05E-58
360.91	110	1.60E-18	7.62E-03	0	7.33E-59
364.191	111	5.12E-19	7.59E-03	0	8.71E-60
367.472	112	2.25E-18	7.57E-03	0	1.01E-60
370.753	113	5.83E-18	7.55E-03	0	1.16E-61
374.034	114	0.00E+00	7.53E-03	0	1.30E-62
377.315	115	3.76E-18	7.50E-03	0	1.43E-63
380.596	116	2.86E-18	7.48E-03	0	1.54E-64
383.877	117	2.31E-18	7.45E-03	0	1.62E-65
387.158	118	1.38E-18	7.43E-03	0	1.68E-66
390.439	119	7.25E-19	7.40E-03	0	1.70E-67
393.72	120	3.71E-19	7.38E-03	0	1.69E-68

Appendix I: Risk-Based Groundwater Cleanup Target Level for Aluminum

Background

The current Florida groundwater cleanup target level (GCTL) for Aluminum is set as the US Federal secondary drinking water standard in Florida Administrative Code 62-777 (Table 1). Attachment A provides an excerpt from this table as included in the Technical Report on the Development of the CTLs for FAC 62-777[1], indicating the secondary drinking water standard concentration of 0.2 mg/L. The US Environmental Protection Agency established secondary maximum contaminant levels as non-mandatory water quality standards to serve "as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color and odor.[2]" The US EPA describes the aluminum standards as ones related to *color* and *scale and sediments*. The US EPA lists the secondary MCL for aluminum as 0.05 to 0.2 mg/L[2], and the FDEP lists 0.2 mg/L for the allowed level[3].

The GCTL are often used in Florida to assess potential risk from wastes that are beneficially used (recycled) in a manner where they are placed on the land and could possibly release chemicals to underlying groundwater. A common practice for evaluating this risk involves performing a leaching test (typically the Synthetic Precipitation Leaching Procedure (SPLP), EPA Method 1312) on a representative set of waste samples and comparing the resulting SPLP leachate concentrations to their respective GCTLs. Such assessments have been used in Florida as part of decision making for recovered screened materials[4], drinking water sludge[5], street sweepings[6] and waste-to-energy ash[7]. For several of these wastes, one chemical that has been observed in SPLP leachates to exceed the GCTL is aluminum.

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[1] Center for Environmental and Human Toxicology, University of Florida. "Technical report: Development of Cleanup Target Levels (CTLs) For Chapter 62-777, F.A.C." Prepared for the Division of Waste Management, Florida Department of Environmental Protection. February, 2005. http://www.dep.state.fl.us/waste/quick_topics/publications/wc/FinalGuidanceDocumentsFlowCharts_April2005/TechnicalReport2FinalFeb2005(Final3-28-05).pdf

[2] http://water.epa.gov/drink/contaminants/secondarystandards.cfm

[3] http://www.dep.state.fl.us/water/drinkingwater/sec_con.htm

[4] http://www.dep.state.fl.us/waste/quick_topics/publications/shw/solid_waste/RSMFINALTotal.pdf

[5] http://www.dep.state.fl.us/waste/quick_topics/publications/shw/solid_waste/6-12-06DWsludgeguidance.pdf

[6] http://www.dep.state.fl.us/waste/quick_topics/publications/shw/solid_waste/GuidanceForSt-Sweep050304Final.pdf

[7] http://www.dep.state.fl.us/waste/quick_topics/publications/shw/solid_waste/RTedderASH.pdf

The use of the aluminum secondary drinking water standard as the GCTL in beneficial use assessments has the potential to limit recycling of some wastes. Given that the secondary standard is not health-based, and given that aluminum is an extremely abundant natural material and has been found to leach using SPLP in excess of the GCTL in clean soils and construction materials (e.g., concrete), a proposed alternative risk-comparison would be one where the GCTL is based on human health risk. Here, a health-based GCTL is calculated using the oral reference dose used for the 62-777 soil cleanup target level (SCTL). This approach is similar that used by the UF Center for Environmental and Human Toxicology to develop human health-based GCTLs for iron and manganese[8].

Risk-Based GCTL Calculation

The direct exposure residential SCTL for aluminum is 80,000 mg/kg (see Attachment B); the toxicological effect is an impact on body weight (non-cancer effect). This was determined using the equation provided in 62-777 Figure 5 (model equation for developing acceptable risk-based concentrations in soil; acceptable soil cleanup target levels for non-carcinogens). Among the parameters used for the development of the SCTL is the oral reference does (RfD_o). The aluminum RfD_o used for the SCTL is 1 mg/kg-day; Attachment C provides the excerpt from the Table 5b of the CTL development report containing the RfD input values and sources.

The aluminum RfD_o of 1 mg/kg-day was applied to the equation used for developing CTLs for non-carcinogens in groundwater (62-777 Figure 2). This equation is:

$$GCTL\ \left(\frac{\mu g}{L}\right) = \frac{RfD_o\ x\ BW\ x\ RSC\ x\ CF}{WC}$$

where BW is body weight (kg), RSC is the relative source contribution (%), CF is a conversion factor, WC is average water consumption rate (L/day). A human health-based GCTL was calculated for aluminum using the input parameters used for the GCTL development as follows:

$$GCTL\ \left(\frac{\mu g}{L}\right) = \frac{\left(1\frac{mg}{kg\ day}\right)\ (70\ kg)\ (0.2)\ \left(1000\frac{\mu g}{mg}\right)}{2\frac{L}{day}}$$

The resulting human health-based GCTL for aluminum is 7,000 µg/L or 7 mg/L.

[8] Letter from Dr. B Gadagbui and S. Roberts (UF Center for Environmental and Human Toxicology) to Merlin Russell (Florida Department of Environmental Protection, Bureau of Solid and Hazardous Waste) date May 20, 2002.

Method Check

As a check of the approach, the same method was used to calculate human-health based GCTL for iron and manganese and check if they matched up with the values determined by Drs. Gadagbui and Roberts. Attachment D has the RfD_o input data from CTL report for iron and manganese. These RfD_o were used as follows:

$$Iron\ GCTL\ \left(\frac{\mu g}{L}\right) = \frac{\left(0.6\,\frac{mg}{kg\ day}\right)\ (70\ kg)\ (0.2)\ \left(1000\,\frac{\mu g}{mg}\right)}{2\,\frac{L}{day}}$$

$$Manganese\ GCTL\ \left(\frac{\mu g}{L}\right) = \frac{\left(0.047\,\frac{mg}{kg\ day}\right)\ (70\ kg)\ (0.2)\ \left(1000\,\frac{\mu g}{mg}\right)}{2\,\frac{L}{day}}$$

The calculations result in GCTL of 4,200 µg/L (4.2 mg/L) for iron and 330 µg/L (0.33 mg/L) for manganese. These are the same as reported in the Gadagbui and Roberts memo.

Attachment A.

Excerpt from 62-777 Table 1. GCTL for Aluminum

Table 1 - Technical Report

Groundwater and Surface Water Cleanup Target Levels

Contaminants	CAS #s	Groundwater Criteria (ug/L)	Freshwater Surface Water Criteria (ug/L)	Marine Surface Water Criteria (ug/L)	Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Non-Cancer Target Organs/Systems or Effects†	Carcinogen
Aldicarb sulfoxide	1646-87-3	7 *Minimum Criteria* *Systemic Toxicant*	4.2 *Toxicity Criteria*	4.2 *Toxicity Criteria*	70	-Neurological	
Aldrin	309-00-2	0.002 *Minimum Criteria* *Carcinogen*	0.00014 *62-302* *annual avg; 3.0 max*	0.00014 *62-302* *annual avg; 1.3 max*	0.02	-Liver	-yes
Ally [or Metsulfuron, methyl]	74223-64-6	1800 *Minimum Criteria* *Systemic Toxicant*	*NA*	*NA*	18000	-Body Weight	
Allyl alcohol	107-18-6	35 *Minimum Criteria* *Systemic Toxicant*	5 *Toxicity Criteria*	5 *Toxicity Criteria*	350	-Kidney -Liver	
Allyl chloride	107-05-1	35** *Minimum Criteria* *Systemic Toxicant*	*NA*	*NA*	350	-Neurological	
Aluminum	7429-90-5	200 *Secondary Standard* *Organoleptic*	13 *Toxicity Criteria*	1500 *62-302*	2000	-Body Weight	
Aluminum phosphide	20859-73-8	2.8 *Minimum Criteria* *Systemic Toxicant*	6.5 *Toxicity Criteria*	6.5 *Toxicity Criteria*	28	-Body Weight	
Ametryn	834-12-8	63 *Minimum Criteria* *Systemic Toxicant*	6.2 *Toxicity Criteria*	6.2 *Toxicity Criteria*	630	-Liver	
Ammonia (a)	7664-41-7	2800 *Minimum Criteria* *Systemic Toxicant*	20 *62-302*	*NA*	28000	-Body Weight	
Ammonium sulfamate	7773-06-0	1400 *Minimum Criteria* *Systemic Toxicant*	10000 *Toxicity Criteria*	10000 *Toxicity Criteria*	14000	-Body Weight	
Anilazine [or Dyrene]	101-05-3	2.8 *Minimum Criteria* *Systemic Toxicant*	*NA*	*NA*	28	-None Specified	
Aniline	62-53-3	6.1 *Minimum Criteria* *Carcinogen*	4 *Toxicity Criteria*	4 *Toxicity Criteria*	61	-Blood -Spleen	-yes
Anthracene	120-12-7	2100 *Minimum Criteria* *Systemic Toxicant*	0.3 *Toxicity Criteria*	0.3 *Toxicity Criteria*	21000	-None Specified	
Antimony	7440-36-0	6 *Primary Standard* *Systemic Toxicant*	4300 *62-302*	4300 *62-302*	60	-Blood	

DISCLAIMER - For matters affecting legal rights or for the official version of cleanup target levels for Chapter 62-777, F.A.C., please refer to the F.A.W. published version of Chapter 62-777, F.A.C.

Attachment B.

Excerpt from 62-777 Table 2. SCTL for Aluminum

Table II

Soil Cleanup Target Levels

Contaminants	CAS#s	Direct Exposure		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organs/Systems or Effects†
		Residential	Commercial/ Industrial					
		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Acenaphthene	83-32-9	2400	20000	2.1	0.3	0.3	21	-Liver
Acenaphthylene	208-96-8	1800	20000	27	NA	NA	270	-Liver
Acephate	30560-19-1	120	720	0.02	0.8	0.8	0.2	-Carcinogen -Neurological
Acetaldehyde	75-07-0	15	20	NA	NA	NA	NA	-Nasal
Acetone	67-64-1	11000	68000	25	6.8	6.8	250	-Kidney -Liver -Neurological
Acetophenone	98-86-2	3900	32000	3.9	44	44	39	-None Specified
Acifluorfen, sodium [or Blazer]	62476-59-9	28	140	0.1	25	25	1	-Kidney
Acrolein	107-02-8	0.05	0.3	0.01	0.002	0.002	0.1	-Nasal
Acrylamide	79-06-1	0.1	0.4	0.00003	0.001	0.001	0.0003	-Carcinogen -Neurological
Acrylic acid	79-10-7	48	250	14	NA	NA	140	-Developmental
Acrylonitrile	107-13-1	0.3	0.6	0.0003	0.001	0.001	0.003	-Carcinogen -Nasal -Reproductive
Alachlor	15972-60-8	11	44	0.02	0.005	0.005	0.2	-Blood -Carcinogen
Aldicarb [or Temik]	116-06-3	68	920	0.03	0.004	0.004	0.3	-Neurological
Aldrin	309-00-2	0.06	0.3	0.2	0.01	0.01	2	-Carcinogen -Liver
Ally [or Metsulfuron, methyl]	74223-64-6	19000	300000	12	NA	NA	120	-Body Weight
Allyl alcohol	107-18-6	140	970	0.1	0.02	0.02	1	-Kidney -Liver
Allyl chloride	107-05-1	0.5	2.7	0.2	NA	NA	2	-Neurological
Aluminum	7429-90-5	80000	*	***	***	***	***	-Body Weight

Attachment C.

Excerpt from Final CTL Development Report[9].

Sources and Derivation of Toxicity Values Used in Calculations for Non-Carcinogens

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Non-Carcinogens

Contaminants	GI Absorption	RfC (mg/m³)	RfDo (mg/kg-day)	RfDi (mg/kg-day)	RfDd (mg/kg-day)	Default Non-Cancer Target Organs/Systems or Effects†
Aldrin	1 *HSDB*	NA	3.000E-05 *IRIS* *Medium*	3.000E-05 *extrapolated*	3.000E-05 *extrapolated*	-Liver
Ally [or Metsulfuron, methyl]	1 *RAGS-E*	NA	2.500E-01 *IRIS* *High*	2.500E-01 *extrapolated*	2.500E-01 *extrapolated*	-Body Weight
Allyl alcohol	1 *RAGS-E*	NA	5.000E-03 *IRIS* *Low*	5.000E-03 *extrapolated*	5.000E-03 *extrapolated*	-Kidney -Liver
Allyl chloride	1 *RAGS-E*	1.000E-03 *IRIS* *Low*	5.000E-02 *HEAST*	2.857E-04 *extrapolated**	5.000E-02 *extrapolated*	-Neurological
Aluminum	0.04 *ATSDR*	NA	1.000E+00 *NCEA*	1.400E-03 *NCEA*	4.000E-02 *extrapolated*	-Body Weight
Aluminum phosphide	1 *RAGS-E*	NA	4.000E-04 *IRIS* *Medium*	4.000E-04 *extrapolated*	4.000E-04 *extrapolated*	-Body Weight
Ametryn	0.679 *HSDB*	NA	9.000E-03 *IRIS* *Low*	6.111E-03 *extrapolated*	6.111E-03 *extrapolated*	-Liver
Ammonia	1 *RAGS-E*	1.000E-01 *IRIS* *Medium*	4.000E-01 *ATSDR*	2.857E-02 *extrapolated**	NA	-Respiratory
Aniline	1 *RAGS-E*	1.000E-03 *IRIS* *Low*	7.000E-03 *NCEA*	2.857E-04 *extrapolated**	7.000E-03 *extrapolated*	-Blood -Spleen
Anthracene	0.5 *ATSDR*	NA	3.000E-01 *IRIS* *Low*	1.500E-01 *extrapolated*	1.500E-01 *extrapolated*	-None Specified
Antimony	0.01 *ATSDR*	NA	4.000E-04 *IRIS* *Low*	4.000E-06 *extrapolated*	4.000E-06 *extrapolated*	-Blood
Arsenic	0.95 *ATSDR*	NA	3.000E-04 *IRIS* *Medium*	2.850E-04 *extrapolated*	2.850E-04 *extrapolated*	-Cardiovascular -Skin
Atrazine	1 *RAGS-E*	NA	3.500E-02 *IRIS* *High*	3.500E-02 *extrapolated*	3.500E-02 *extrapolated*	-Cardiovascular

February 2005 Page 2 of 30

[9] Center for Environmental and Human Toxicology, University of Florida. "Technical report: Development of Cleanup Target Levels (CTLs) For Chapter 62-777, F.A.C." Prepared for the Division of Waste Management, Florida Department of Environmental Protection. February, 2005. http://www.dep.state.fl.us/waste/quick_topics/publications/wc/FinalGuidanceDocumentsFlowCharts_April2005/TechnicalReport2FinalFeb2005(Final3-28-05).pdf

Attachment C.

Excerpt from Final CTL Development Report.

Sources and Derivation of Toxicity Values Used in Calculations for Non-Carcinogens

Iron

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Non-Carcinogens

Contaminants	GI Absorption	RfC (mg/m³)	RfDo (mg/kg-day)	RfDi (mg/kg-day)	RfDd (mg/kg-day)	Default Non-Cancer Target Organs/Systems or Effects†
Hexachlorocyclohexane, gamma- [or Lindane or BHC, gamma-]	0.994 *ATSDR*	NA	3.000E-04 *IRIS Medium*	2.982E-04 *extrapolated*	2.982E-04 *extrapolated*	-Kidney -Liver
Hexachlorocyclopentadiene	0.9 *HSDB*	2.000E-04 *IRIS Medium*	6.000E-03 *IRIS Low*	5.714E-05 *extrapolated**	5.400E-03 *extrapolated*	-Gastrointestinal
Hexachloroethane	1 *RAGS-E*	NA	1.000E-03 *IRIS Medium*	1.000E-03 *extrapolated*	1.000E-03 *extrapolated*	-Kidney
Hexachlorophene	1 *RAGS-E*	NA	3.000E-04 *IRIS Medium*	NA	NA	-Neurological
Hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	1 *RAGS-E*	NA	3.000E-03 *IRIS High*	3.000E-03 *extrapolated*	3.000E-03 *extrapolated*	-Reproductive
Hexane, n-	1 *RAGS-E*	2.000E-01 *IRIS Medium*	6.000E-02 *HEAST*	5.714E-02 *extrapolated**	6.000E-02 *extrapolated*	-Neurological
Hexanone, 2- [or Methyl butyl ketone]	0.98 *ATSDR*	NA	4.000E-02 *NCEA*	1.400E-03 *NCEA*	3.920E-02 *extrapolated*	-None Specified
Hexazinone	1 *RAGS-E*	NA	3.300E-02 *IRIS Medium*	3.300E-02 *extrapolated*	3.300E-02 *extrapolated*	-Body Weight
Hydroquinone	1 *RAGS-E*	NA	4.000E-02 *HEAST*	4.000E-02 *extrapolated*	4.000E-02 *extrapolated*	-Blood
Iron	0.085 *Casarett 4th*	NA	6.000E-01 *NCEA*	NA	NA	-Gastrointestinal
Isobutyl alcohol	1 *RAGS-E*	NA	3.000E-01 *IRIS Low*	3.000E-01 *extrapolated*	3.000E-01 *extrapolated*	-Neurological
Isophorone	1 *RAGS-E*	NA	2.000E-01 *IRIS Low*	2.000E-01 *extrapolated*	2.000E-01 *extrapolated*	-None Specified
Limonene	1 *RAGS-E*	NA	1.000E-01 *CEHT*	1.000E-01 *extrapolated*	1.000E-01 *extrapolated*	-Kidney -Liver

Manganese

Table 5b - Technical Report

Sources and Derivation of Toxicity Values Used in Calculations for Non-Carcinogens

Contaminants	GI Absorption	RfC (mg/m³)	RfDo (mg/kg-day)	RfDi (mg/kg-day)	RfDd (mg/kg-day)	Default Non-Cancer Target Organs/Systems or Effects†
Linuron	1 *RAGS-E*	NA	2.000E-03 *IRIS* *High*	2.000E-03 *extrapolated*	2.000E-03 *extrapolated*	-Blood
Lithium	1 *RAGS-E*	NA	2.000E-02 *NCEA*	2.000E-02 *extrapolated*	2.000E-02 *extrapolated*	-None Specified
Malathion	0.47 *HSDB*	NA	2.000E-02 *IRIS* *Medium*	9.400E-03 *extrapolated*	9.400E-03 *extrapolated*	-Neurological
Maleic anhydride	1 *RAGS-E*	NA	1.000E-01 *IRIS* *Medium*	1.000E-01 *extrapolated*	1.000E-01 *extrapolated*	-Kidney
Maleic hydrazide	1 *RAGS-E*	NA	5.000E-01 *IRIS* *Medium*	5.000E-01 *extrapolated*	5.000E-01 *extrapolated*	-Kidney
Malonitrile	1 *RAGS-E*	NA	2.000E-05 *HEAST*	2.000E-05 *extrapolated*	2.000E-05 *extrapolated*	-Liver -Spleen
Maneb	1 *RAGS-E*	NA	5.000E-03 *IRIS* *Low*	5.000E-03 *extrapolated*	5.000E-03 *extrapolated*	-Thyroid
Manganese	0.04 *RAGS-E*	5.000E-05 *IRIS* *Medium*	4.700E-02 *IRIS02 Modified* *Medium*	1.429E-05 *extrapolated**	1.880E-03 *extrapolated*	-Neurological
Mercury	0.1 *ATSDR*	3.000E-04 *IRIS* *Medium*	3.000E-04 *HEAST*	8.571E-05 *extrapolated**	3.000E-05 *extrapolated*	-Neurological
Merphos	1 *RAGS-E*	NA	3.000E-05 *IRIS* *Low*	3.000E-05 *extrapolated*	3.000E-05 *extrapolated*	-Neurological
Merphos oxide	1 *RAGS-E*	NA	3.000E-05 *IRIS* *Low*	3.000E-05 *extrapolated*	3.000E-05 *extrapolated*	-Neurological
Methacrylonitrile	1 *RAGS-E*	7.000E-04 *HEAST*	1.000E-04 *IRIS* *Low*	2.000E-04 *extrapolated**	1.000E-04 *extrapolated*	-Liver
Methamidophos	1 *RAGS-E*	NA	5.000E-05 *IRIS* *Medium*	5.000E-05 *extrapolated*	5.000E-05 *extrapolated*	-Neurological

Appendix J: Results of Dioxin Analysis for WTE Bottom Ash Fractions Used in RD&D Permit

August 30, 2013 Service Request No: J1304530

Justin Roessler
University of Florida
218 AP Black Hall
Gainesville, FL 32611

Laboratory Results for: Dioxin Analysis

Dear Justin:

Enclosed are the results of the sample(s) submitted to our laboratory on August 6, 2013. For your reference, these analyses have been assigned our service request number **J1304530**.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. In accordance to the NELAC 2003 Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Please contact me if you have any questions. My direct number is 281-994-2970. You may also contact me via email at Nicole.Brown@alsglobal.com

Respectfully submitted,

ALS Group USA Corp. dba ALS Environmental

Nicole Brown
Project Manager

Nicole Brown

Digitally signed by Nicole Brown
Date: 2013.08.30 16:45:13 -05'00'

Page 1 of _____

ADDRESS 19408 Park Row, Houston Texas 77084 USA | PHONE +1 713 266 1599 | FAX +1 713 266 0130
ALS GROUP USA, CORP. Part of the ALS Group An ALS Limited Company
Environmental www.alsglobal.com
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Certificate of Analysis

ALS Environmental - Houston HRMS
19408 Park Row, Suite 320, Houston, TX 77084
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

ALS Environmental

Client:	ALS Environmental – Jacksonville, FL	**Service Request No.:**	J1304530
Project:	Dioxin Analysis / University of Florida	**Date Received:**	08/09/13
Sample Matrix:	Soil		

CASE NARRATIVE

All analyses were performed in adherence to the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Two soil samples were received for analysis at ALS Environmental on 08/09/13.

Please note the reporting forms are currently referencing the date ALS-Jacksonville received the samples (08/06/13) and not the date ALS-Houston received the samples (08/09/13).

The samples were received at 2°C in good condition and are consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Data Validation Notes and Discussion

V flags – Method Blanks

The Method Blank EQ1300480-01 contained low levels of OCDD, 1234678-HpCDF and OCDF below the Method Reporting Limit (MRL). The associated compounds in the samples are flagged with 'V' flags.

MS/MSD

EQ1300480: One Laboratory Control Spike (LCS) sample was analyzed and reported in addition to an MS/MSD for this extraction batch. The batch quality control criteria were met. The batch precision (MS/DMS) measurements were determined on another order in the extraction batch. The MS/DMS results are not included in this report.

2378-TCDF Confirmation

The samples had 2,3,7,8-TCDF detections above the MRL on the initial analysis on the DB-5 column. These results were confirmed on the DB-225 column. The valid result is reported from the confirmation column. The confirmation result was used in the final TEQ calculation.

J flags

EMPC - When the ion abundance ratios associated with a particular compound are outside the QC limits, samples are flagged with a 'J' flag. A 'J' flag indicates an estimated maximum possible concentration for the associated compound.

Detection Limits

Detection limits are calculated for each analyte in each sample by measuring the height of the noise level for each quantitation ion for the associated labeled standard. The concentration equivalent to 2.5 times the height of the noise is then calculated using the appropriate response factor and the weight of the sample. The calculated concentration equals the detection limit.

The TEQ Summary results for each sample have been calculated by ALS/Houston to include:

- WHO-1998 TEFs, for PCBs, PCDDs, 21 PCDFs for humans and wildlife. (M. Van den Berg, et al., Environ Health Perspect 106: 775-792, 1998)
- 2378-TCDF from the DB-225 column, when confirmation required
- Non-detected compounds reported as ND = ½ * Detection Limit

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS group USA Corp dba ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

Client: University of Florida **Service Request:** J1304530
Project: Dioxin Analysis

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
J1304530-001	WTE Ash Greater	7/2/13	12:30
J1304530-002	WTE Less Than	7/2/13	17:30

Laboratory Certifications
2012-2013

STATE/PROGRAM	AGENCY	CERT#	EXP DATE	CERTIFIED?
ARIZONA	AZ-DHS	AZ0725	05/27/14	Yes
ARKANSAS	ADEQ	12-035-0	06/16/14	Yes
CALIFORNIA	CA-ELAP	2452	02/28/15	Yes
DOD ELAP	A2LA	2897.01	11/30/13	Yes
FLORIDA/NELAP	FL-DOHS	E87611	06/30/14	Yes
HAWAII	HI-DOH	N/A	06/30/14	Yes
ILLINOIS/NELAP	IL-EPA	003004	10/06/13	Yes
ISO 17025	A2LA	2897.01	11/30/13	Yes
KANSAS	KS-DHE	E-10406	01/31/14	Yes
LOUISIANA/NELAP	LELAP	03048	06/30/14	Yes
LOUISIANA/NELAP	LDHH	LA120014	12/31/13	Yes
MAINE	ME-DOHS	2012017	06/05/14	Yes
MARYLAND	MDE	343	06/30/14	Yes
MICHIGAN	MIDEQ	9971	06/30/13	Yes
MINNESOTA	MDH	048-999-427	12/31/13	Yes
NEVADA	NDEP	TX014112013A	07/31/13	Yes
NEW JERSEY	NJDEP	TX008	06/30/14	Yes
NEW MEXICO	NMED-DWB	N/A	06/30/13	Yes
NEW YORK/NELAP	NY-DOH	11707	04/01/14	Yes
OKLAHOMA	OKDEQ	2012-133	08/31/13	Yes
OREGON/NELAP	ORELAP	TX200002-009	03/24/14	Yes
PENNSYLVANIA/NELAP	PLAP	68-03441	06/30/14	Yes
SOIL IMPORT PERMIT	USDA	P330-12-00002	01/13/15	Yes
TENNESSEE	TNDEC	TN04016	06/30/14	Yes
TEXAS/NELAP	TCEQ	T104704216-12-3	06/30/14	Yes
UTAH/NELAP	UTELCP	TX014112013-2	06/30/13	Yes
WASHINGTON/NELAP	WA-Ecology	C819-12	11/14/13	Yes
WEST VIRGINIA	WVDEP	347	07/31/13	Yes

Abbreviations, Acronyms & Definitions

Cal	Calibration
Conc	CONCentration
Dioxin(s)	Polychlorinated dibenzo-p-dioxin(s)
EDL	Estimated Detection Limit
EMPC	Estimated Maximum Possible Concentration
Flags	Data qualifiers
Furan(s)	Polychlorinated dibenzofuran(s)
g	Grams
ICAL	Initial CALibration
ID	IDentifier
Ions	Masses monitored for the analyte during data acquisition
L	Liter (s)
LCS	Laboratory Control Sample
DLCS	Duplicate Laboratory Control Sample
MB	Method Blank
MCL	Method Calibration Limit
MDL	Method Detection Limit
mL	Milliliters
MS	Matrix Spiked sample
DMS	Duplicate Matrix Spiked sample
NO	Number of peaks meeting all identification criteria
PCDD(s)	Polychlorinated dibenzo-p-dioxin(s)
PCDF(s)	Polychlorinated dibenzofuran(s)
ppb	Parts per billion
ppm	Parts per million
ppq	Parts per quadrillion
ppt	Parts per trillion
QA	Quality Assurance
QC	Quality Control
Ratio	Ratio of areas from monitored ions for an analyte
% Rec.	Percent recovery
RPD	Relative Percent Difference
RRF	Relative Response Factor
RT	Retention Time
SDG	Sample Delivery Group
S/N	Signal-to-noise ratio
TEF	Toxicity Equivalence Factor
TEQ	Toxicity Equivalence Quotient

Data Qualifier Flags – Florida DEP

- **V** Indicates the associated analyte is found in the method blank as well as in the sample

- **U** Indicates the compound was analyzed and not detected

- **N** Indicates 2378-TCDF was confirmed on a DB-225 column. Everytime 2378-TCDF is detected on the DB-5 column, confirmation analyses are performed on a second column (DB-225). The results from both the DB-5 column and the DB-225 column are included in this data package. The results from the DB-225 analyses should be used to evaluate the concentration of 2378-TCDF in the samples. The confirmed result should be used in determining the TEQ value for TCDF.

- **L** Indicates an estimated value and is used when the analyte concentration exceeds the upper end of the linear calibration range. The actual value is known to be greater than the reported value.

- **I** Indicates an estimated value and is used when the reported value is between the estimated detection limit (EDL) and the method reporting limit (MRL)

- **J** Indicates an estimated concentration and is used when the ion abundance ratios associated with a particular compound are outside their acceptance criteria. A 'J' flag indicates an estimated maximum possible concentration (EMPC) for the associated compound.

ALS ENVIRONMENTAL – Houston
Data Processing/Form Production and Peer Review Signatures

SR# Unique ID J1304530 (DB-5) DB-225 SPB-Octyl

First Level - Data Processing - to be filled by person generating the forms

Date:	Analyst:	Samples:
08/29/13	JC	001,002

Second Level - Data Review – to be filled by person doing peer review

Date:	Analyst:	Samples:
08/29/13	UU	001,002

ALS ENVIRONMENTAL – Houston
Data Processing/Form Production and Peer Review Signatures

SR# Unique ID J1304530 DB-5 DB-225 SPB-Octyl

First Level - Data Processing - to be filled by person generating the forms

Date:	Analyst:	Samples:
08/30/13		001

Second Level - Data Review – to be filled by person doing peer review

Date:	Analyst:	Samples:
08/30/13	UK	001

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Data Processing/Form Production and Peer Review Signatures

SR# Unique ID J1304530 DB-5 DB-225 SPB-Octyl

First Level - Data Processing - to be filled by person generating the forms

Date:	Analyst:	Samples:
08/29/13		002

Second Level - Data Review – to be filled by person doing peer review

Date:	Analyst:	Samples:
08/30/13		002

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Analytical Results

ALS Environmental - Houston HRMS
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ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	7/ 2/13 1230
Sample Matrix:	Soil	**Date Received:**	8/ 6/13
Sample Name:	WTE Ash Greater	**Units:**	ng/Kg
Lab Code:	J1304530-001	**Basis:**	Dry
		Percent Solids:	93.9

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method: 8290
Prep Method: Method

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor	Date Analyzed	Time Analyzed	Date Extracted
2,3,7,8-TCDD	**0.321**	I	0.118	0.518	0.65	1.001	1	8/28/13	0209	8/12/13
1,2,3,7,8-PeCDD	**0.795**	I	0.0585	2.59	1.35	1.001	1	8/28/13	0209	8/12/13
1,2,3,4,7,8-HxCDD	**0.704**	I	0.0579	2.59	1.37	1.000	1	8/28/13	0209	8/12/13
1,2,3,6,7,8-HxCDD	**1.25**	I	0.0630	2.59	1.41	1.000	1	8/28/13	0209	8/12/13
1,2,3,7,8,9-HxCDD	**2.03**	I	0.0595	2.59	1.26	1.008	1	8/28/13	0209	8/12/13
1,2,3,4,6,7,8-HpCDD	**11.5**		0.184	2.59	1.05	1.000	1	8/28/13	0209	8/12/13
OCDD	**126**	V	0.145	5.18	0.89	1.000	1	8/28/13	0209	8/12/13
2,3,7,8-TCDF	**2.57**		0.367	0.518	0.82	1.001	1	8/30/13	1450	8/12/13
1,2,3,7,8-PeCDF	**3.08**		0.0865	2.59	1.66	1.000	1	8/28/13	0209	8/12/13
2,3,4,7,8-PeCDF	**3.60**		0.0853	2.59	1.53	1.000	1	8/28/13	0209	8/12/13
1,2,3,4,7,8-HxCDF	**6.64**		0.108	2.59	1.31	1.000	1	8/28/13	0209	8/12/13
1,2,3,6,7,8-HxCDF	**2.83**		0.0917	2.59	1.29	1.000	1	8/28/13	0209	8/12/13
1,2,3,7,8,9-HxCDF	**0.271**	I	0.154	2.59	1.32	1.000	1	8/28/13	0209	8/12/13
2,3,4,6,7,8-HxCDF	**3.29**		0.105	2.59	1.38	1.000	1	8/28/13	0209	8/12/13
1,2,3,4,6,7,8-HpCDF	**10.6**	V	0.134	2.59	1.07	1.000	1	8/28/13	0209	8/12/13
1,2,3,4,7,8,9-HpCDF	**1.64**	I	0.198	2.59	1.12	1.000	1	8/28/13	0209	8/12/13
OCDF	**15.6**	V	0.155	5.18	0.89	1.004	1	8/28/13	0209	8/12/13
Total Tetra-Dioxins	**5.71**		0.118	0.518	0.76		1	8/28/13	0209	8/12/13
Total Penta-Dioxins	**6.14**		0.0585	2.59	1.38		1	8/28/13	0209	8/12/13
Total Hexa-Dioxins	**15.1**		0.0602	2.59	1.25		1	8/28/13	0209	8/12/13
Total Hepta-Dioxins	**23.8**		0.184	2.59	1.00		1	8/28/13	0209	8/12/13
Total Tetra-Furans	**53.4**		0.128	0.518	0.80		1	8/28/13	0209	8/12/13
Total Penta-Furans	**44.6**		0.0859	2.59	1.52		1	8/28/13	0209	8/12/13
Total Hexa-Furans	**26.7**		0.111	2.59	1.35		1	8/28/13	0209	8/12/13
Total Hepta-Furans	**17.7**		0.162	2.59	1.07		1	8/28/13	0209	8/12/13

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	7/ 2/13 1230
Sample Matrix:	Soil	**Date Received:**	8/ 6/13
Sample Name:	WTE Ash Greater	**Units:**	Percent
Lab Code:	J1304530-001	**Basis:**	Dry
		Percent Solids:	93.9

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method: 8290
Prep Method: Method

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
C13-2,3,7,8-TCDD	2000	1170.541	59		40-135	0.77	1.008
C13-1,2,3,7,8-PeCDD	2000	1083.443	54		40-135	1.54	1.183
C13-1,2,3,4,7,8-HxCDD	2000	1122.517	56		40-135	1.27	0.990
C13-1,2,3,6,7,8-HxCDD	2000	1218.874	61		40-135	1.26	0.992
C13-1,2,3,4,6,7,8-HpCDD	2000	1210.074	61		40-135	1.09	1.069
C13-OCDD	4000	2098.772	52		40-135	0.90	1.147
C13-2,3,7,8-TCDF	2000	1177.941	59		40-135	0.80	0.976
C13-1,2,3,7,8-PeCDF	2000	1070.626	54		40-135	1.60	1.143
C13-2,3,4,7,8-PeCDF	2000	1071.427	54		40-135	1.60	1.171
C13-1,2,3,4,7,8-HxCDF	2000	1138.134	57		40-135	0.55	0.970
C13-1,2,3,6,7,8-HxCDF	2000	1441.373	72		40-135	0.51	0.973
C13-1,2,3,7,8,9-HxCDF	2000	1186.989	59		40-135	0.53	1.006
C13-2,3,4,6,7,8-HxCDF	2000	1328.303	66		40-135	0.53	0.987
C13-1,2,3,4,6,7,8-HpCDF	2000	1188.127	59		40-135	0.44	1.045
C13-1,2,3,4,7,8,9-HpCDF	2000	1210.395	61		40-135	0.44	1.079
CL37-2,3,7,8-TCDD	800	553.738	69		40-135	NA	1.009

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	7/ 2/13 1230
Sample Matrix:	Soil	**Date Received:**	8/ 6/13
Sample Name:	WTE Ash Greater	**Units:**	ng/Kg
Lab Code:	J1304530-001	**Basis:**	Dry

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method: 8290
Prep Method: Method

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	**0.321**	0.118	0.518	1	1	0.321
1,2,3,7,8-PeCDD	**0.795**	0.0585	2.59	1	1	0.795
1,2,3,4,7,8-HxCDD	**0.704**	0.0579	2.59	1	0.1	0.0704
1,2,3,6,7,8-HxCDD	**1.25**	0.0630	2.59	1	0.1	0.125
1,2,3,7,8,9-HxCDD	**2.03**	0.0595	2.59	1	0.1	0.203
1,2,3,4,6,7,8-HpCDD	**11.5**	0.184	2.59	1	0.01	0.115
OCDD	**126**	0.145	5.18	1	0.0001	0.0126
2,3,7,8-TCDF	**2.57**	0.367	0.518	1	0.1	0.257
1,2,3,7,8-PeCDF	**3.08**	0.0865	2.59	1	0.05	0.154
2,3,4,7,8-PeCDF	**3.60**	0.0853	2.59	1	0.5	1.80
1,2,3,4,7,8-HxCDF	**6.64**	0.108	2.59	1	0.1	0.664
1,2,3,6,7,8-HxCDF	**2.83**	0.0917	2.59	1	0.1	0.283
1,2,3,7,8,9-HxCDF	**0.271**	0.154	2.59	1	0.1	0.0271
2,3,4,6,7,8-HxCDF	**3.29**	0.105	2.59	1	0.1	0.329
1,2,3,4,6,7,8-HpCDF	**10.6**	0.134	2.59	1	0.01	0.106
1,2,3,4,7,8,9-HpCDF	**1.64**	0.198	2.59	1	0.01	0.0164
OCDF	**15.6**	0.155	5.18	1	0.0001	0.00156
		Total TEQ				5.28

1998 WHO TEFs, ND = 0.5

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	7/ 2/13 1230
Sample Matrix:	Soil	**Date Received:**	8/ 6/13
Sample Name:	WTE Ash Greater	**Units:**	Percent
Lab Code:	J1304530-001	**Basis:**	As Received

Total Solids Run Create

Analytical Method: CAS SOP

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Total Solids	93.9				1	NA			353214	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	7/ 2/13 1730
Sample Matrix:	Soil	**Date Received:**	8/ 6/13
Sample Name:	WTE Less Than	**Units:**	ng/Kg
Lab Code:	J1304530-002	**Basis:**	Dry
		Percent Solids:	87.6

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method: 8290
Prep Method: Method

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor	Date Analyzed	Time Analyzed	Date Extracted
2,3,7,8-TCDD	**0.437**	I	0.140	0.546	0.73	1.002	1	8/28/13	0257	8/12/13
1,2,3,7,8-PeCDD	**0.987**	I	0.0665	2.73	1.67	1.001	1	8/28/13	0257	8/12/13
1,2,3,4,7,8-HxCDD	**0.812**	I	0.0721	2.73	1.33	1.000	1	8/28/13	0257	8/12/13
1,2,3,6,7,8-HxCDD	**1.32**	I	0.0804	2.73	1.27	1.000	1	8/28/13	0257	8/12/13
1,2,3,7,8,9-HxCDD	**2.28**	I	0.0750	2.73	1.37	1.008	1	8/28/13	0257	8/12/13
1,2,3,4,6,7,8-HpCDD	**9.95**		0.202	2.73	1.02	1.000	1	8/28/13	0257	8/12/13
OCDD	**47.6**	V	0.402	5.46	0.90	1.000	1	8/28/13	0257	8/12/13
2,3,7,8-TCDF	**3.42**		0.226	0.546	0.82	1.002	1	8/29/13	1409	8/12/13
1,2,3,7,8-PeCDF	**4.38**		0.141	2.73	1.47	1.000	1	8/28/13	0257	8/12/13
2,3,4,7,8-PeCDF	**5.02**		0.140	2.73	1.54	1.000	1	8/28/13	0257	8/12/13
1,2,3,4,7,8-HxCDF	**9.38**		0.0878	2.73	1.27	1.000	1	8/28/13	0257	8/12/13
1,2,3,6,7,8-HxCDF	**4.04**		0.0749	2.73	1.25	1.000	1	8/28/13	0257	8/12/13
1,2,3,7,8,9-HxCDF	**0.376**	IJ	0.128	2.73	1.00	1.000	1	8/28/13	0257	8/12/13
2,3,4,6,7,8-HxCDF	**4.34**		0.0871	2.73	1.29	1.000	1	8/28/13	0257	8/12/13
1,2,3,4,6,7,8-HpCDF	**14.5**	V	0.170	2.73	1.05	1.000	1	8/28/13	0257	8/12/13
1,2,3,4,7,8,9-HpCDF	**2.38**	I	0.245	2.73	0.95	1.000	1	8/28/13	0257	8/12/13
OCDF	**23.7**	V	0.491	5.46	0.88	1.004	1	8/28/13	0257	8/12/13
Total Tetra-Dioxins	**7.44**		0.140	0.546	0.83		1	8/28/13	0257	8/12/13
Total Penta-Dioxins	**9.52**		0.0665	2.73	1.61		1	8/28/13	0257	8/12/13
Total Hexa-Dioxins	**16.9**		0.0759	2.73	1.26		1	8/28/13	0257	8/12/13
Total Hepta-Dioxins	**19.8**		0.202	2.73	1.07		1	8/28/13	0257	8/12/13
Total Tetra-Furans	**92.6**		0.245	0.546	0.79		1	8/28/13	0257	8/12/13
Total Penta-Furans	**62.2**		0.140	2.73	1.51		1	8/28/13	0257	8/12/13
Total Hexa-Furans	**37.8**		0.0914	2.73	1.34		1	8/28/13	0257	8/12/13
Total Hepta-Furans	**24.4**		0.203	2.73	1.05		1	8/28/13	0257	8/12/13

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	7/ 2/13 1730
Sample Matrix:	Soil	**Date Received:**	8/ 6/13
Sample Name:	WTE Less Than	**Units:**	Percent
Lab Code:	J1304530-002	**Basis:**	Dry
		Percent Solids:	87.6

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method: 8290
Prep Method: Method

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
C13-2,3,7,8-TCDD	2000	1304.377	65		40-135	0.77	1.008
C13-1,2,3,7,8-PeCDD	2000	1187.511	59		40-135	1.57	1.183
C13-1,2,3,4,7,8-HxCDD	2000	1238.800	62		40-135	1.26	0.990
C13-1,2,3,6,7,8-HxCDD	2000	1313.400	66		40-135	1.25	0.992
C13-1,2,3,4,6,7,8-HpCDD	2000	1265.197	63		40-135	1.09	1.069
C13-OCDD	4000	2119.860	53		40-135	0.91	1.147
C13-2,3,7,8-TCDF	2000	1328.791	66		40-135	0.80	0.976
C13-1,2,3,7,8-PeCDF	2000	1172.188	59		40-135	1.59	1.143
C13-2,3,4,7,8-PeCDF	2000	1171.771	59		40-135	1.59	1.171
C13-1,2,3,4,7,8-HxCDF	2000	1303.147	65		40-135	0.52	0.970
C13-1,2,3,6,7,8-HxCDF	2000	1573.387	79		40-135	0.52	0.973
C13-1,2,3,7,8,9-HxCDF	2000	1298.925	65		40-135	0.52	1.006
C13-2,3,4,6,7,8-HxCDF	2000	1448.477	72		40-135	0.53	0.987
C13-1,2,3,4,6,7,8-HpCDF	2000	1252.063	63		40-135	0.45	1.045
C13-1,2,3,4,7,8,9-HpCDF	2000	1275.863	64		40-135	0.44	1.079
CL37-2,3,7,8-TCDD	800	586.806	73		40-135	NA	1.009

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	7/ 2/13 1730
Sample Matrix:	Soil	**Date Received:**	8/ 6/13
Sample Name:	WTE Less Than	**Units:**	ng/Kg
Lab Code:	J1304530-002	**Basis:**	Dry

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method: 8290
Prep Method: Method

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	**0.437**	0.140	0.546	1	1	0.437
1,2,3,7,8-PeCDD	**0.987**	0.0665	2.73	1	1	0.987
1,2,3,4,7,8-HxCDD	**0.812**	0.0721	2.73	1	0.1	0.0812
1,2,3,6,7,8-HxCDD	**1.32**	0.0804	2.73	1	0.1	0.132
1,2,3,7,8,9-HxCDD	**2.28**	0.0750	2.73	1	0.1	0.228
1,2,3,4,6,7,8-HpCDD	**9.95**	0.202	2.73	1	0.01	0.0995
OCDD	**47.6**	0.402	5.46	1	0.0001	0.00476
2,3,7,8-TCDF	**3.42**	0.226	0.546	1	0.1	0.342
1,2,3,7,8-PeCDF	**4.38**	0.141	2.73	1	0.05	0.219
2,3,4,7,8-PeCDF	**5.02**	0.140	2.73	1	0.5	2.51
1,2,3,4,7,8-HxCDF	**9.38**	0.0878	2.73	1	0.1	0.938
1,2,3,6,7,8-HxCDF	**4.04**	0.0749	2.73	1	0.1	0.404
1,2,3,7,8,9-HxCDF	**0.376**	0.128	2.73	1	0.1	0.0376
2,3,4,6,7,8-HxCDF	**4.34**	0.0871	2.73	1	0.1	0.434
1,2,3,4,6,7,8-HpCDF	**14.5**	0.170	2.73	1	0.01	0.145
1,2,3,4,7,8,9-HpCDF	**2.38**	0.245	2.73	1	0.01	0.0238
OCDF	**23.7**	0.491	5.46	1	0.0001	0.00237
		Total TEQ				7.03

1998 WHO TEFs, ND = 0.5

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	7/ 2/13 1730
Sample Matrix:	Soil	**Date Received:**	8/ 6/13
Sample Name:	WTE Less Than	**Units:**	Percent
Lab Code:	J1304530-002	**Basis:**	As Received

Total Solids Run Create

Analytical Method: CAS SOP

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Total Solids	87.6				1	NA			353214	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ng/Kg
Lab Code:	EQ1300480-01	**Basis:**	Dry

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method: 8290
Prep Method: Method

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor	Date Analyzed	Time Analyzed	Date Extracted
2,3,7,8-TCDD	ND	U	0.112	0.487			1	8/23/13	1613	8/12/13
1,2,3,7,8-PeCDD	ND	U	0.105	2.44			1	8/23/13	1613	8/12/13
1,2,3,4,7,8-HxCDD	ND	U	0.0820	2.44			1	8/23/13	1613	8/12/13
1,2,3,6,7,8-HxCDD	ND	U	0.0892	2.44			1	8/23/13	1613	8/12/13
1,2,3,7,8,9-HxCDD	ND	U	0.0813	2.44			1	8/23/13	1613	8/12/13
1,2,3,4,6,7,8-HpCDD	ND	U	0.147	2.44			1	8/23/13	1613	8/12/13
OCDD	**0.508**	IJ	0.263	4.87	0.74	1.000	1	8/23/13	1613	8/12/13
2,3,7,8-TCDF	ND	U	0.0744	0.487			1	8/23/13	1613	8/12/13
1,2,3,7,8-PeCDF	ND	U	0.0643	2.44			1	8/23/13	1613	8/12/13
2,3,4,7,8-PeCDF	ND	U	0.0638	2.44			1	8/23/13	1613	8/12/13
1,2,3,4,7,8-HxCDF	ND	U	0.0557	2.44			1	8/23/13	1613	8/12/13
1,2,3,6,7,8-HxCDF	ND	U	0.0462	2.44			1	8/23/13	1613	8/12/13
1,2,3,7,8,9-HxCDF	ND	U	0.0837	2.44			1	8/23/13	1613	8/12/13
2,3,4,6,7,8-HxCDF	ND	U	0.0517	2.44			1	8/23/13	1613	8/12/13
1,2,3,4,6,7,8-HpCDF	**0.270**	I	0.0797	2.44	1.05	1.000	1	8/23/13	1613	8/12/13
1,2,3,4,7,8,9-HpCDF	ND	U	0.130	2.44			1	8/23/13	1613	8/12/13
OCDF	**1.56**	I	0.284	4.87	0.93	1.004	1	8/23/13	1613	8/12/13
Total Tetra-Dioxins	ND	U	0.112	0.487			1	8/23/13	1613	8/12/13
Total Penta-Dioxins	ND	U	0.105	2.44			1	8/23/13	1613	8/12/13
Total Hexa-Dioxins	ND	U	0.0844	2.44			1	8/23/13	1613	8/12/13
Total Hepta-Dioxins	ND	U	0.147	2.44			1	8/23/13	1613	8/12/13
Total Tetra-Furans	ND	U	0.0744	0.487			1	8/23/13	1613	8/12/13
Total Penta-Furans	ND	U	0.0640	2.44			1	8/23/13	1613	8/12/13
Total Hexa-Furans	ND	U	0.0568	2.44			1	8/23/13	1613	8/12/13
Total Hepta-Furans	**0.270**	I	0.101	2.44	1.05		1	8/23/13	1613	8/12/13

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	Percent
Lab Code:	EQ1300480-01	**Basis:**	Dry

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method: 8290
Prep Method: Method

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
C13-2,3,7,8-TCDD	2000	1225.369	61		40-135	0.79	1.008
C13-1,2,3,7,8-PeCDD	2000	1242.971	62		40-135	1.54	1.165
C13-1,2,3,4,7,8-HxCDD	2000	1325.234	66		40-135	1.23	0.990
C13-1,2,3,6,7,8-HxCDD	2000	1339.688	67		40-135	1.24	0.992
C13-1,2,3,4,6,7,8-HpCDD	2000	1091.266	55		40-135	1.04	1.068
C13-OCDD	4000	1733.226	43		40-135	0.88	1.148
C13-2,3,7,8-TCDF	2000	1359.453	68		40-135	0.75	0.979
C13-1,2,3,7,8-PeCDF	2000	1166.965	58		40-135	1.51	1.128
C13-2,3,4,7,8-PeCDF	2000	1206.869	60		40-135	1.52	1.153
C13-1,2,3,4,7,8-HxCDF	2000	1129.959	56		40-135	0.52	0.972
C13-1,2,3,6,7,8-HxCDF	2000	1430.080	72		40-135	0.51	0.975
C13-1,2,3,7,8,9-HxCDF	2000	1163.949	58		40-135	0.51	1.006
C13-2,3,4,6,7,8-HxCDF	2000	1379.415	69		40-135	0.51	0.988
C13-1,2,3,4,6,7,8-HpCDF	2000	1055.795	53		40-135	0.45	1.044
C13-1,2,3,4,7,8,9-HpCDF	2000	1034.540	52		40-135	0.45	1.079
CL37-2,3,7,8-TCDD	800	588.223	74		40-135	NA	1.009

Accuracy and Precision

ALS Environmental - Houston HRMS
19408 Park Row, Suite 320, Houston, TX 77084
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

ALS Group USA, Corp. dba ALS Environmental

QA/QC Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Analyzed:**	8/23/13
Sample Matrix:	Soil		

Lab Control Sample Summary
Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method:	8290	**Units:**	ng/Kg
Prep Method:	Method	**Basis:**	Dry
		Extraction Lot:	189239

Lab Control Sample
EQ1300480-02

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
2,3,7,8-TCDD	20.3	19.1	106	67 - 158
1,2,3,7,8-PeCDD	98.1	95.4	103	70 - 142
1,2,3,4,7,8-HxCDD	92.5	95.4	97	70 - 164
1,2,3,6,7,8-HxCDD	97.7	95.4	102	76 - 134
1,2,3,7,8,9-HxCDD	99.5	95.4	104	64 - 162
1,2,3,4,6,7,8-HpCDD	88.8	95.4	93	70 - 140
OCDD	203	191	106	78 - 144
2,3,7,8-TCDF	17.8	19.1	93	75 - 158
1,2,3,7,8-PeCDF	101	95.4	105	80 - 134
2,3,4,7,8-PeCDF	98.5	95.4	103	68 - 160
1,2,3,4,7,8-HxCDF	94.8	95.4	99	72 - 134
1,2,3,6,7,8-HxCDF	86.0	95.4	90	84 - 130
1,2,3,7,8,9-HxCDF	97.3	95.4	102	78 - 130
2,3,4,6,7,8-HxCDF	91.2	95.4	96	70 - 156
1,2,3,4,6,7,8-HpCDF	87.8	95.4	92	82 - 122
1,2,3,4,7,8,9-HpCDF	92.1	95.4	97	78 - 138
OCDF	198	191	104	63 - 170

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	ng/Kg
Lab Code:	EQ1300480-02	**Basis:**	Dry

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method: 8290
Prep Method: Method

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor	Date Analyzed	Time Analyzed	Date Extracted
2,3,7,8-TCDD	**20.3**		0.105	0.477	0.74	1.001	1	8/23/13	2240	8/12/13
1,2,3,7,8-PeCDD	**98.1**		0.0742	2.39	1.56	1.000	1	8/23/13	2240	8/12/13
1,2,3,4,7,8-HxCDD	**92.5**		0.0852	2.39	1.24	1.000	1	8/23/13	2240	8/12/13
1,2,3,6,7,8-HxCDD	**97.7**		0.0898	2.39	1.24	1.000	1	8/23/13	2240	8/12/13
1,2,3,7,8,9-HxCDD	**99.5**		0.0830	2.39	1.25	1.008	1	8/23/13	2240	8/12/13
1,2,3,4,6,7,8-HpCDD	**88.8**		0.201	2.39	1.03	1.000	1	8/23/13	2240	8/12/13
OCDD	**203**		0.219	4.77	0.89	1.000	1	8/23/13	2240	8/12/13
2,3,7,8-TCDF	**17.8**		0.0682	0.477	0.72	1.001	1	8/23/13	2240	8/12/13
1,2,3,7,8-PeCDF	**101**		0.0739	2.39	1.53	1.001	1	8/23/13	2240	8/12/13
2,3,4,7,8-PeCDF	**98.5**		0.0685	2.39	1.51	1.000	1	8/23/13	2240	8/12/13
1,2,3,4,7,8-HxCDF	**94.8**		0.0573	2.39	1.22	1.000	1	8/23/13	2240	8/12/13
1,2,3,6,7,8-HxCDF	**86.0**		0.0503	2.39	1.23	1.000	1	8/23/13	2240	8/12/13
1,2,3,7,8,9-HxCDF	**97.3**		0.0822	2.39	1.23	1.000	1	8/23/13	2240	8/12/13
2,3,4,6,7,8-HxCDF	**91.2**		0.0553	2.39	1.20	1.000	1	8/23/13	2240	8/12/13
1,2,3,4,6,7,8-HpCDF	**87.8**		0.370	2.39	1.01	1.000	1	8/23/13	2240	8/12/13
1,2,3,4,7,8,9-HpCDF	**92.1**		0.545	2.39	0.97	1.000	1	8/23/13	2240	8/12/13
OCDF	**198**		0.140	4.77	0.89	1.004	1	8/23/13	2240	8/12/13
Total Tetra-Dioxins	**20.3**		0.105	0.477	0.74		1	8/23/13	2240	8/12/13
Total Penta-Dioxins	**98.1**		0.0742	2.39	1.56		1	8/23/13	2240	8/12/13
Total Hexa-Dioxins	**290**		0.0861	2.39	1.24		1	8/23/13	2240	8/12/13
Total Hepta-Dioxins	**89.6**		0.201	2.39	1.08		1	8/23/13	2240	8/12/13
Total Tetra-Furans	**18.2**		0.0682	0.477	0.70		1	8/23/13	2240	8/12/13
Total Penta-Furans	**202**		0.0711	2.39	1.44		1	8/23/13	2240	8/12/13
Total Hexa-Furans	**369**		0.0595	2.39	1.22		1	8/23/13	2240	8/12/13
Total Hepta-Furans	**180**		0.447	2.39	1.01		1	8/23/13	2240	8/12/13

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	University of Florida	**Service Request:**	J1304530
Project:	Dioxin Analysis	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	Percent
Lab Code:	EQ1300480-02	**Basis:**	Dry

Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans by HRGC/HRMS

Analytical Method: 8290
Prep Method: Method

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
C13-2,3,7,8-TCDD	2000	1102.610	55		40-135	0.79	1.008
C13-1,2,3,7,8-PeCDD	2000	1297.986	65		40-135	1.54	1.165
C13-1,2,3,4,7,8-HxCDD	2000	1328.863	66		40-135	1.23	0.990
C13-1,2,3,6,7,8-HxCDD	2000	1238.324	62		40-135	1.25	0.992
C13-1,2,3,4,6,7,8-HpCDD	2000	1302.729	65		40-135	1.07	1.068
C13-OCDD	4000	2126.053	53		40-135	0.90	1.148
C13-2,3,7,8-TCDF	2000	1186.567	59		40-135	0.76	0.980
C13-1,2,3,7,8-PeCDF	2000	1144.427	57		40-135	1.52	1.127
C13-2,3,4,7,8-PeCDF	2000	1232.487	62		40-135	1.52	1.153
C13-1,2,3,4,7,8-HxCDF	2000	1159.189	58		40-135	0.51	0.972
C13-1,2,3,6,7,8-HxCDF	2000	1321.971	66		40-135	0.52	0.975
C13-1,2,3,7,8,9-HxCDF	2000	1157.106	58		40-135	0.52	1.006
C13-2,3,4,6,7,8-HxCDF	2000	1283.851	64		40-135	0.52	0.987
C13-1,2,3,4,6,7,8-HpCDF	2000	1089.093	54		40-135	0.45	1.044
C13-1,2,3,4,7,8,9-HpCDF	2000	1179.322	59		40-135	0.44	1.079
CL37-2,3,7,8-TCDD	800	499.008	62		40-135	NA	1.009

Chain of Custody

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Intra-Network Chain of Custody

9143 Philips Highway, Suite 200 • Jacksonville, FL 32256 • 904-739-2277 • FAX 904-739-2011

ALS Contact: Craig Myers

Project Name: Dioxin Analysis
Project Number:
Project Manager: Justin Roessler
Company: University of Florida

Lab Code	Client Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Date Received	Send To	PCDD PCDF 8290	Total Solids 8290
J1304530-001	WTE Ash Greater	1	Soil	7/2/13	1230	8/6/13	HOUSTON	II	II
J1304530-002	WTE Less Than	1	Soil	7/2/13	1730	8/6/13	HOUSTON	II	II

Test Comments

PCDD PCDF - 8290 J1304530-001,2

Report full 8290 list
Use Florida TEQ reporting

Special Instructions/Comments

947 (scal)
1/2
SW: 122463441

Turnaround Requirements

____ **RUSH** (Surcharges Apply)

PLEASE CIRCLE WORK DAYS

1 2 3 4 5

✓ **STANDARD**

Requested FAX Date: _____

Requested Report Date 08/29/13

Report Requirements

____ I. Results Only

✓ II. Results + QC Summaries

____ III. Results + QC and Calibration Summaries

____ IV. Data Validation Report with Raw Data

PQL/MDL/J Y
EDD N

Invoice Information

PO# J1304530

Bill to

Relinquished By: 8/8/13

Received By: 8/9/13 940

Airbill Number:

Cooler Receipt Form

Project Chemist: NB

Client/Project: University of Florida; Dioxin Analysis

Service Request: J1304530

Date/Time Received: 8/9/13 09:40:00

Date/Time Logged in: 8/9/13 10:55:00

Technician: MR

Technician: MR

1. Method of delivery: ○ US Mail ◉ Fed Ex ○ UPS ○ DHL ○ Courier ○ Client

2. Samples received in: ◉ Cooler ○ Box ○ Envelope ○ Other

3. Were custody seals on coolers? ◉ Yes ○ No ○ N/A

Were they intact? ◉ Yes ○ No ○ N/A

Were they signed and dated? ◉ Yes ○ No ○ N/A

If yes, how many and where? 1

4. Method of delivery: ☑ Inserts ☑ Baggies ☑ Bubble Wrap ○ Gel Packs ☑ Wet Ice ☑ Sleeves ○ Other

5. Foreign or Regulated Soil? ○ Yes ○ No

Location of Sampling:

Cooler Tracking Number	COC ID	Date Opened	Time Opened	Opened By	Temp. °C	Temp Blank?	Filed
803689304006		Aug 9, 2013	0947	MR+	1/2	☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

6. Were custody papers properly filled out (ink, signed, dated, etc)? ◉ Yes ○ No ○ N/A

7. Did all bottles arrive in good condition (not broken, no signs of leakage)? ◉ Yes ○ No ○ N/A

8. Were all sample labels complete (i.e., sample ID, analysis, preservation, etc)? ◉ Yes ○ No ○ N/A

9. Were appropriate bottles/containers and volumes received for the requested tests? ◉ Yes ○ No ○ N/A

10. Did sample labels and tags agree with custody documents? ◉ Yes ○ No ○ N/A

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Broken	Date	Technician
			☐	☐		
			☐	☐		
			☐	☐		
			☐	☐		

Notes, Discrepancies, & Resolutions:

Print Form

Reset Form

SAMPLE ACCEPTANCE POLICY

This policy outlines the criteria samples must meet to be accepted by ALS Environmental – Houston HRMS.

Cooler Custody Seals (desirable, mandatory if specified in SAP):

- ✓ Intact on outside of cooler, signed and dated

Chain-of-Custody (COC) documentation (mandatory):

The following is required on each COC:

- ✓ Sample ID, the location, date and time of collection, collector's name, preservation type, sample type, and any other special remarks concerning the sample
- ✓ The COC must be completed in ink.
- ✓ Signature and date of relinquishing party.

In the absence of a COC at sample receipt, the COC will be requested from the client.

Sample Integrity (mandatory):

Samples are inspected upon arrival to ensure that sample integrity was not compromised during transfer to the laboratory.

- ✓ Sample containers must arrive in good condition (not broken or leaking).
- ✓ Samples must be labeled appropriately, including Sample IDs, and requested test using durable labels and indelible ink.
- ✓ The correct type of sample bottle must be used for the method requested.
- ✓ An appropriate sample volume, or weight, must be received.
- ✓ Sample IDs and number of containers must reconcile with the COC.
- ✓ Samples must be received within the method defined holding time.

Temperature Requirement (varies by sample matrix):

- ✓ Aqueous and Non-aqueous samples must be shipped and stored cold, at 0 to 6ºC.
- ✓ Tissue samples must be shipped and stored frozen, at -20 to -10ºC.
- ✓ Air samples are shipped and stored cold, at 0 to 6ºC
- ✓ The sample temperature must be recorded on the COC

All cooler inspections are documented on the Cooler Receipt Form (CRF). A separate CRF is completed for each service request. Any samples not meeting the above criteria are noted on the CRF and the Project Manager notified. The Project Manager must resolve any sample integrity issues with the client prior to proceeding with the analysis. Such resolutions are documented in writing and filed with the project folder. Data associated with samples received outside of this acceptance policy will be qualified on the case narrative of the final report.

Service Request Summary

Folder #: **J1304530**
Client Name: University of Florida
Project Name: Dioxin Analysis
Project Number:

Report To: Justin Roessler
University of Florida
218 AP Black Hall
Gainesville, FL 32611
Phone Number: 352-270-1454
Cell Number:
Fax Number:
E-mail: jroessler12@ufl.edu

Project Chemist: Nicole Brown
Originating Lab: JAX
Logged By: SLIGHTSEY
Date Received: 8/ 6/13
Internal Due Date: 8/29/13
QAP: LAB QAP
Qualifier Set: Florida-DEP
Formset: CAS Standard
Merged?: Y
Report to MDL?: Y
P.O. Number:
EDD: No EDD Specified

2 - 8 oz-Glass Jar WM CLEAR Teflon Liner Unpreserved
2 - -N/A N/A

Location: E-WIC-02 Box 51, E-WIC-02 Box 49, SMO

CAS Samp No	Client Samp No.	Matrix	Collected		SVM 8290/ PCDD PCDF	SVM CAS SOP/ Total Solids
J1304530-001	WTE Ash Greater	Soil	7/2/13	1230	II	II
J1304530-002	WTE Less Than	Soil	7/2/13	1730	II	II

Test Comments:

Group	Test/Method	Samples	Comments
Semivoa GCMS	PCDD PCDF/8290	1-2, 0	Report full 8290 list Use Florida TEQ reporting

Preparation Information Benchsheet

Prep Run#: 189239 **Prep WorkFlow:** OrgExtDioxS(30) **Status:** Prepped
Team: Semivoa GCMS/WMCDONOUGH **Prep Method:** Method **Prep Date/Time:** 8/12/13 09:30 AM

#	Lab Code	Client ID	B#	Method /Test	pH	Matrix	Amt. Ext.	Sample Description
1	E1301063-001	BN16PT03-1-3	.01	8290A/PCDD PCDF		Soil	10.149g	Dark Brown Soil
2	E1301063-002	BN16PT03-3-6	.01	8290A/PCDD PCDF		Soil	10.313g	Dark Brown Soil
3	E1301063-003	BN16PT03-3-6-D	.01	8290A/PCDD PCDF		Soil	10.507g	Dark Brown Soil
4	E1301063-004	BN16PT03-A	.01	8290A/PCDD PCDF		Soil	10.230g	Dark Brown Soil
5	E1301065-001	BO16PT03-1-3	.01	8290A/PCDD PCDF		Soil	10.093g	Light and Dark Brown Mud
6	E1301068-001	MF-DP-SB-13-20130807(1-3)	.02	8290A/PCDD PCDF		Soil	10.166g	Brown Soil With Rocks
7	E1301068-002	MF-DP-SB-14-20130807(1-3)	.02	8290A/PCDD PCDF		Soil	10.146g	Light and Dark Brown Soil with Rocks
8	E1301071-001	MF-DP-SB-11-20130808(1-3)	.01	8290A/PCDD PCDF		Soil	10.248g	Light Brown Soil with Rocks
9	E1301071-002	MF-DP-SB-3-20130808(1-3)	.02	8290A/PCDD PCDF		Soil	10.296g	Light Brown Soil with Rocks
10	E1301071-003	MF-DP-SB-16-20130808(1-3)	.02	8290A/PCDD PCDF		Soil	10.604g	Light Brown Soil with Rocks
11	E1301071-004	MF-DP-SB-18-20130808(1-3)	.02	8290A/PCDD PCDF		Soil	10.231g	Light Brown Soil with Rocks
12	E1301071-005	MF-DUP2-20130808	.02	8290A/PCDD PCDF		Soil	10.141g	Light Brown Soil with Rocks
13	E1301071-006	MF-DP-SB-6-20130808(1-3)	.02	8290A/PCDD PCDF		Soil	10.293g	Light Brown Soil with Rocks
14	E1301071-007	MF-DP-SB-21-20130808(1-3)	.02	8290A/PCDD PCDF		Soil	10.429g	Light Brown Soil with Rocks
15	EQ1300480-01	MB		8290A/PCDD PCDF		Solid	10.260g	
16	EQ1300480-02	LCS		8290A/PCDD PCDF		Solid	10.479g	
17	EQ1300480-03	BN16PT03-1-3 MS	.01	8290A/PCDD PCDF		Solid	10.427g	
18	EQ1300480-04	BN16PT03-1-3 DMS	.01	8290A/PCDD PCDF		Solid	10.288g	
19	J1304530-001	WTE Ash Greater	.01	8290/PCDD PCDF		Soil	10.284g	Dark Black Soil with Large Rocks
20	J1304530-002	WTE Less Than	.01	8290/PCDD PCDF		Soil	10.446g	Dark Black Soil

Preparation Information Benchsheet

Prep Run#: 189239 **Prep WorkFlow:** OrgExtDioxS(30) **Status:** Prepped
Team: Semivoa GCMS/WMCDONOUGH **Prep Method:** Method **Prep Date/Time:** 8/12/13 09:30 AM

Spiking Solutions

Name:	1613B Matrix Working Standard	Inventory ID	60793	Logbook Ref:	60793 HLEUNG 8/7/13 WT WM	Expires On:	08/07/2014

EQ1300480-02	100.00µL	EQ1300480-02	100.00µL	EQ1300480-03	100.00µL	EQ1300480-04	100.00µL

Name:	1613B Labeled Working Standard	Inventory ID	60871	Logbook Ref:	60871 WM 8/9/13 WT TL	Expires On:	08/05/2014

E1301063-001	1,000.00µL	E1301063-001.R	1,000.00µL	E1301063-002	1,000.00µL	E1301063-002.R	1,000.00µL	E1301063-003	1,000.00µL	E1301063-003.R	1,000.00µL
E1301063-004	1,000.00µL	E1301063-004.R	1,000.00µL	E1301065-001	1,000.00µL	E1301068-001	1,000.00µL	E1301068-002	1,000.00µL	E1301071-001	1,000.00µL
E1301071-002	1,000.00µL	E1301071-003	1,000.00µL	E1301071-004	1,000.00µL	E1301071-005	1,000.00µL	E1301071-006	1,000.00µL	E1301071-007	1,000.00µL
EQ1300480-01	1,000.00µL	EQ1300480-01	1,000.00µL	EQ1300480-02	1,000.00µL	EQ1300480-02	1,000.00µL	EQ1300480-03	1,000.00µL	EQ1300480-04	1,000.00µL
J1304530-001	1,000.00µL	J1304530-002	1,000.00µL								

Name:	8290/1613B Cleanup Working Standard	Inventory ID	60885	Logbook Ref:	60885 HLEUNG 8/9/13 WT WM	Expires On:	08/09/2014

E1301063-001	100.00µL	E1301063-001.R	100.00µL	E1301063-002	100.00µL	E1301063-002.R	100.00µL	E1301063-003	100.00µL	E1301063-003.R	100.00µL
E1301063-004	100.00µL	E1301063-004.R	100.00µL	E1301065-001	100.00µL	E1301068-001	100.00µL	E1301068-002	100.00µL	E1301071-001	100.00µL
E1301071-002	100.00µL	E1301071-003	100.00µL	E1301071-004	100.00µL	E1301071-005	100.00µL	E1301071-006	100.00µL	E1301071-007	100.00µL
EQ1300480-01	100.00µL	EQ1300480-01	100.00µL	EQ1300480-02	100.00µL	EQ1300480-02	100.00µL	EQ1300480-03	100.00µL	EQ1300480-04	100.00µL
J1304530-001	100.00µL	J1304530-002	100.00µL								

Preparation Materials

Carbon, High Purity	MR 7/8/13 (59697)	Glass Wool	MR 6/7/13 (58778)	Sulfuric Acid Reagent Grade H2SO4	AL 07/18/13 (60058)
Hexanes 95%	MR 8/2/13 (60683)	Dichloromethane (Methylene Chloride) 99.9% MeCl2	MR6/7/13 (58776)	Sodium Chloride Reagent Grade NaCl	C2-65-5 (38670)
Sodium Hydroxide Reagent Grade NaOH	C2-73-7 (53023)	Sodium Sulfate Anhydrous Reagent Grade Na2SO4	AL 6/19/13 (59243)	Tridecane (n-Tridecane)	MR7/29/13 (60418)
Silica Gel Reagent Grade	MR 7/8/13 (59698)	Toluene 99.9% Minimum	AL 07/30/13 (60473)		

Preparation Steps

Step:	Extraction	Step:	Acid Clean	Step:	Silica Gel Clean	Step:	Final Volume
Started:	8/12/13 09:30	Started:	8/16/13 06:20	Started:	8/16/13 10:10	Started:	8/19/13 17:00
Finished:	8/13/13 07:10	Finished:	8/16/13 07:10	Finished:	8/16/13 12:20	Finished:	8/19/13 17:35
By:	WMCDONOUGH	By:	CDIAZ	By:	CDIAZ	By:	HLEUNG
Comments		Comments		Comments		Comments	

Comments: _____

Preparation Information Benchsheet

Prep Run#: 189239
Team: Semivoa GCMS/WMCDONOUGH

Prep WorkFlow: OrgExtDioxS(30)
Prep Method: Method

Status: Prepped
Prep Date/Time: 8/12/13 09:30 AM

Reviewed By: _____ Date: _____

Chain of Custody

Relinquished By: _____ Date: _____

Received By: _____ Date: _____

Extracts Examined
Yes No

Appendix K: References

Choubane, Bouzid, Gale C. Page, and James A. Musselman. "Investigation of water permeability of coarse graded superpave pavements." *Journal of the Association of Asphalt Paving Technologists* 67 (1998).

FM 5-565, *Measurement of Water Permeability of Compacted Asphalt Paving Mixtures.* Florida Department of Transportation, 2012.

Fretwell, J. D. *Water resources and effects of development in Pasco County, Florida.* USGS Water-Resources Investigations Report (1988): 87-4188

Hainin, M. Rosli, Allen Cooley, and Graham Hurley. *Relationships of HMA in-place air voids, lift thickness, and permeability*. Transportation Research Board, National Research Council, 2004.

Kanitpong, Kunnawee, Craig H. Benson, and Hussain U. Bahia. "Hydraulic conductivity (permeability) of laboratory-compacted asphalt mixtures." *Transportation Research Record: Journal of the Transportation Research Board* 1767.1 (2001): 25-32.

Kosmatka, Steven H., and William C. Panarese. "Design and control of concrete mixtures." (2002).

Murali Krishnan, J., and C. Lakshmana Rao. "Mechanics of air voids reduction of asphalt concrete using mixture theory." *International Journal of Engineering Science* 38.12 (2000): 1331-1354.

Newell, Charles J., Philip B. Bedient, and Loren P. Hopkins. *Hydrogeologic Database for Ground Water Modeling*. Washington, DC: American Petroleum Institute, 1989.

Tibbals, C. H.; Anderson, Warren; Laughlin, Charles P. *Ground-water hydrology of the Dade City area, Pasco County, Florida : with emphasis on the hydrologic effects of pumping from the Floridan aquifer.* USGS Water-Resources Investigations Report (1980): 80-33

Ungs, M., K. Wilkinson, and K. Summers. "Users guide for MYGRT, Version 3.0: Software for simulating migration of organic and inorganic chemicals in groundwater." *EPRI Report TR* 111748 (1998).