

# **ALTERNATIVE FINAL COVER SYSTEM EQUIVALENCY DEMONSTRATION**

## **Pickles Butte Sanitary Landfill Facility**

*Prepared for:*

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## 1.0 INTRODUCTION

### 1.1 Purpose

The current approved PBSL Operation and Maintenance Manual allows for the use of the prescriptive cover or an alternative cover design per Idaho Solid Waste Facilities Act 39-7415. The purpose of this Alternative Final Cover System Equivalency Demonstration (AFCD) is to evaluate the performance of both the prescriptive and alternative landfill final cover systems and define the cover that will be installed at the Pickles Butte Sanitary Landfill (PBSL). The performance evaluation of each final cover system is based on computer infiltration simulations that calculate, given site specific inputs, the amount of surface water runoff, evapo-transpiration, and percolation that can be expected to occur. The performance of the prescriptive Environmental Protection Agency (EPA) Subtitle D final cover system is compared with the performance of an alternative final cover system using the EPA Hydrologic Evaluation of Landfill Performance (HELP) Model version 3.07 and Soil-Water and Heat Flow Model (UNSAT-H) version 3.01.

Laboratory testing of the borrow source material was conducted. The testing consisted of capillary rise (ASTM D3152 & D2325), permeability (ASTM D5084), compaction (ASTM D1557), Atterburg Limits (ASTM 4318), and particle size distribution (ASTM D422).

### 1.2 Background

The Idaho Department of Environmental Quality (DEQ) approved the original design and operating plan in June 1973, and reconfirmed approval in May 1975 (Holladay, 1994). The Southwest District Health Department approved the landfill in December 1979 (ibid). The landfill initially began accepting waste in April 1983. The Landfill has been operated by Canyon County (County) since it was opened. With the implementation of Subtitle D, the County obtained site certification for the landfill from the DEQ in August 1993. The PBSL currently services the residents of Canyon and Owyhee Counties. During the last complete fiscal year of October 2014 - September 2015, the PBSL landfilled 218,249 tons of waste. Waste dumped at the PBSL consists primarily of residential municipal solid waste, but includes commercial waste and green waste.

The site certification boundary encompasses approximately 490 acres. The current waste disposal area occupies approximately 74.2 acres and for the final build-out of the landfill will be 116 acres. The current waste footprint and final build-out of the landfill is underlain by a laterally extensive confining layer, the Glenns Ferry Formation, at depths ranging from 150 to 500 feet. This layer provides a natural soil liner at the site. A lateral expansion of the PBSL is planned.

### 1.3 Regulatory Basis

Approval of an alternative final cover design is regulated under Sections 39-7413 (Operations Plan Review) and 39-7415 (Standards for Closure) of the Idaho Solid Waste Facilities Act. The PBSL is an unlined facility and is currently in an "open" configuration because it is still in operation. Under Idaho Solid Waste Facilities Act 39-7415(2)(b) the alternate final cover shall:

- (2)(b) The cover material must be fine-grained with intrinsic permeability no greater than  $1 \times 10^{-3}$  cm/sec and a minimum thickness of twenty-four (24) inches; and
  - (i) Have capillary holding capacity greater than the projected maximum accumulated volume of water as determined by utilization of accepted water balance methodology based on local or regional twenty-five (25) year climatic records;

- (ii) Annual precipitation is less than twenty-five (25) inches with net evaporative losses greater than thirty (30) inches annually;
- (iii) The top six (6) inches of the cover shall be capable of sustaining shallow rooted native plant growth; and
- (iv) This design shall demonstrate consideration of site specific factors as provided in 40 CFR 258.60(b).

This AFCD shows that the PBSL meets these requirements. Based on the design and operation of the PBSL, the facility can receive approval of an alternative monolithic final cover design under the provisions of Section 39-7413(3) of the Idaho Solid Waste Facilities Act.

As required by Section 39-7416 (Standards for Post Closure Care) of the Idaho Solid Waste Facilities Act must be maintained. Therefore, both prescriptive and alternative final cover sections as shown in **Figure 1** will be vegetated and receive a layer of processed green waste to control soil loss. It is anticipated that this erosion control will be constructed with similar material as the infiltration control layer, but the surface of the final cover will not have the same compaction requirements. The surface will be prepared to enhance vegetative growth by using a bull dozer to track-walk up and down the slope. This will create ribs that slows the velocity of water run-off, and allows vegetation to be established. The site will then be seeded with a site appropriate mixture to promote vegetative growth.

## 1.4 Borrow Source Investigation

The hydrologic parameters used in the HELP and UNSAT-H models for the alternate cover design are anticipated to be similar to those of the prospective borrow source soils near the PBSL. The County retained Tetra Tech, Inc. to conduct a borrow source investigation. The PBSL has an on-site borrow source area that can be used for borrow material that is located north and east of the current waste footprint (**Figure 2**). Tests conducted included capillary rise (ASTM D3152 & D2325), permeability (ASTM D5084), compaction (ASTM D1557), Atterburg Limits (ASTM 4318), and particle size distribution (ASTM D422). The borrow source investigation results are contained in Appendix A of this AFCD.

The borrow source area generally contains sandy Silt (ML) and silty Sand (SM). These results are consistent with the investigation of borrow source material presented in the 1994 *Hydrogeologic Characterization, Ground Water Monitoring, and Facility Design* report (Holladay, 1994a). The sieve data collected as part of this investigation and as part of the 1994 report show that there is some variability for each type of material, but that each soil classification is distinct. Based on the laboratory testing conducted, the ML material would be the optimum material for the cover because the soil has a moisture retention capacity that is higher and it has a lower hydraulic conductivity. Section 2.0 evaluates the volume of ML material available based on test pits from this investigation.

## 2.0 FINAL COVER SYSTEM DESIGN

This section describes the basis for evaluating the final cover design for closure of the PBSL. The evaluation and demonstration is structured in accordance with the guidance provided in the Solid Waste Disposal Facility Criteria Technical Manual (EPA, 1993). This document assesses the performance of an alternative final cover system by comparing its performance to that of the Subtitle D prescriptive final cover system. The performance of the proposed alternative final cover system was simulated using two computer models that quantify infiltration rates.

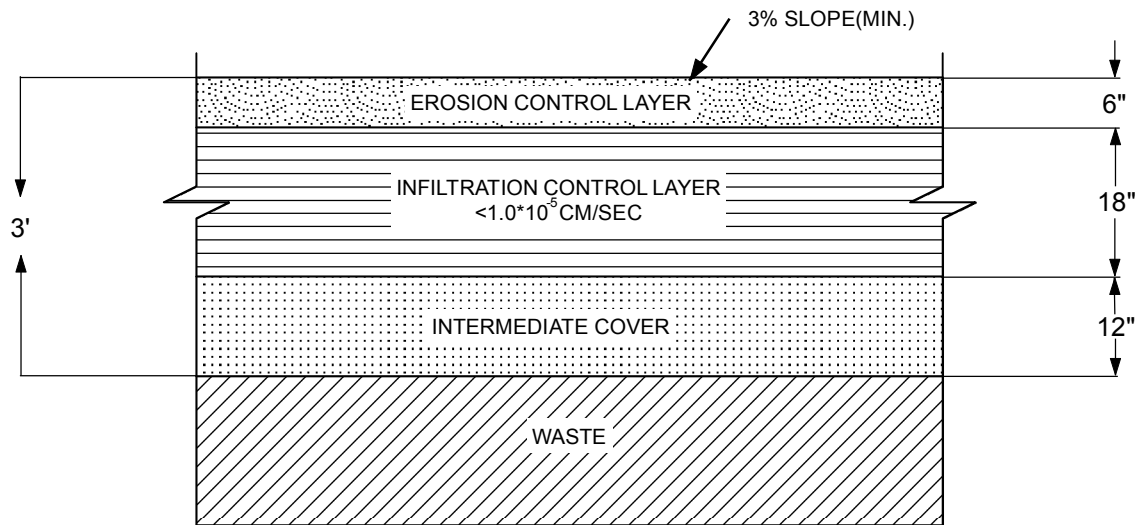


There are two scenarios presented, as shown in Figure 1. The final cover systems are summarized as follows:

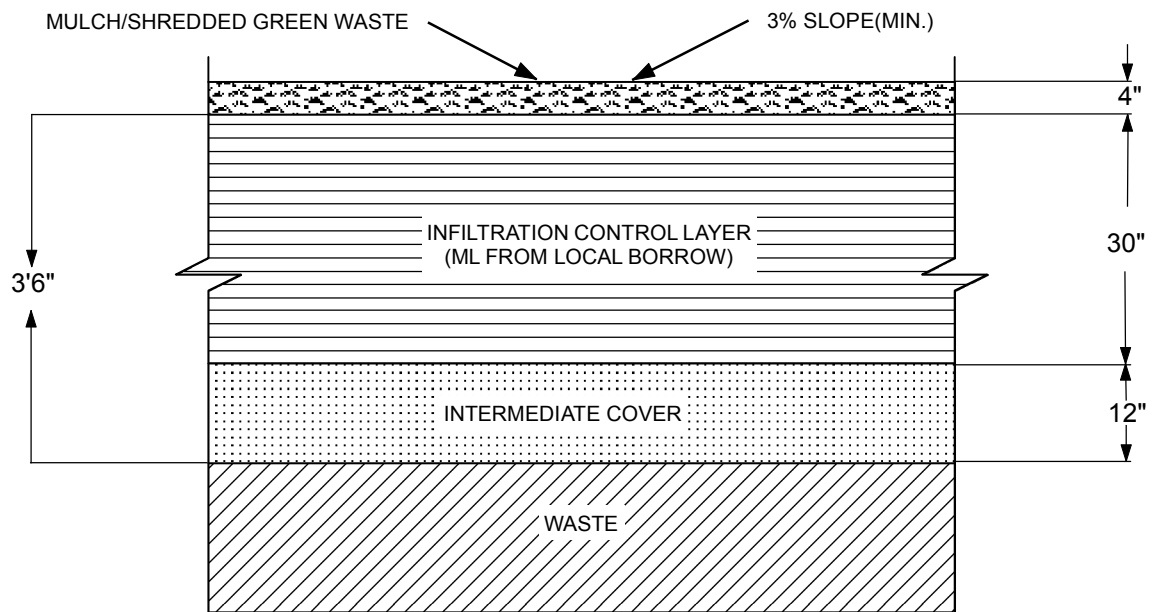
- EPA Subtitle D prescriptive final cover system – The prescriptive cover system consisting of a 6 inch thick erosion control layer, an 18 inch thick infiltration control layer, and a 12 inch intermediate cover layer. This system overlies the in-place waste.
- Alternative final cover system – This alternative final cover system consists of a 4 inch mulch layer (erosion control), a 30 inch thick infiltration control layer, and a 12 inch intermediate cover layer. This system would also be placed over the in place waste.

Tetra Tech believes that the alternative final cover system presented in **Figure 1** will provide a higher level of environmental protection compared to the EPA subtitle D prescriptive final cover system based on computer modeling. The mulch layer on top of the alternative final cover was not modeled, but will provide some additional protection against infiltration, making the alternative slightly more protective than stated based on modeling. In addition, the ease of construction and maintenance will help improve the effectiveness of the cover. In addition, Tetra Tech believes that the Subtitle D final cover system shown in **Figure 1** would not provide the equivalent environmental protection based on modeling of the cover options.

The analyses included have been completed using Boise, Idaho climatological data, some site specific soil test data for the alternative cover, estimated soil properties for sandy silt materials that met the hydraulic conductivity requirements for the prescriptive cover, and vegetative data typical of the natural environment adjacent to the PBSL. The volume of soil available in a preferred borrow area has also been calculated to verify that enough soil is present to construct the alternative system.



SUBTITLE D FINAL COVER SECTION



ALTERNATIVE FINAL COVER SECTION

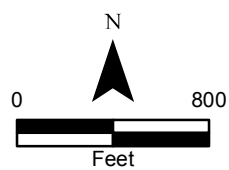
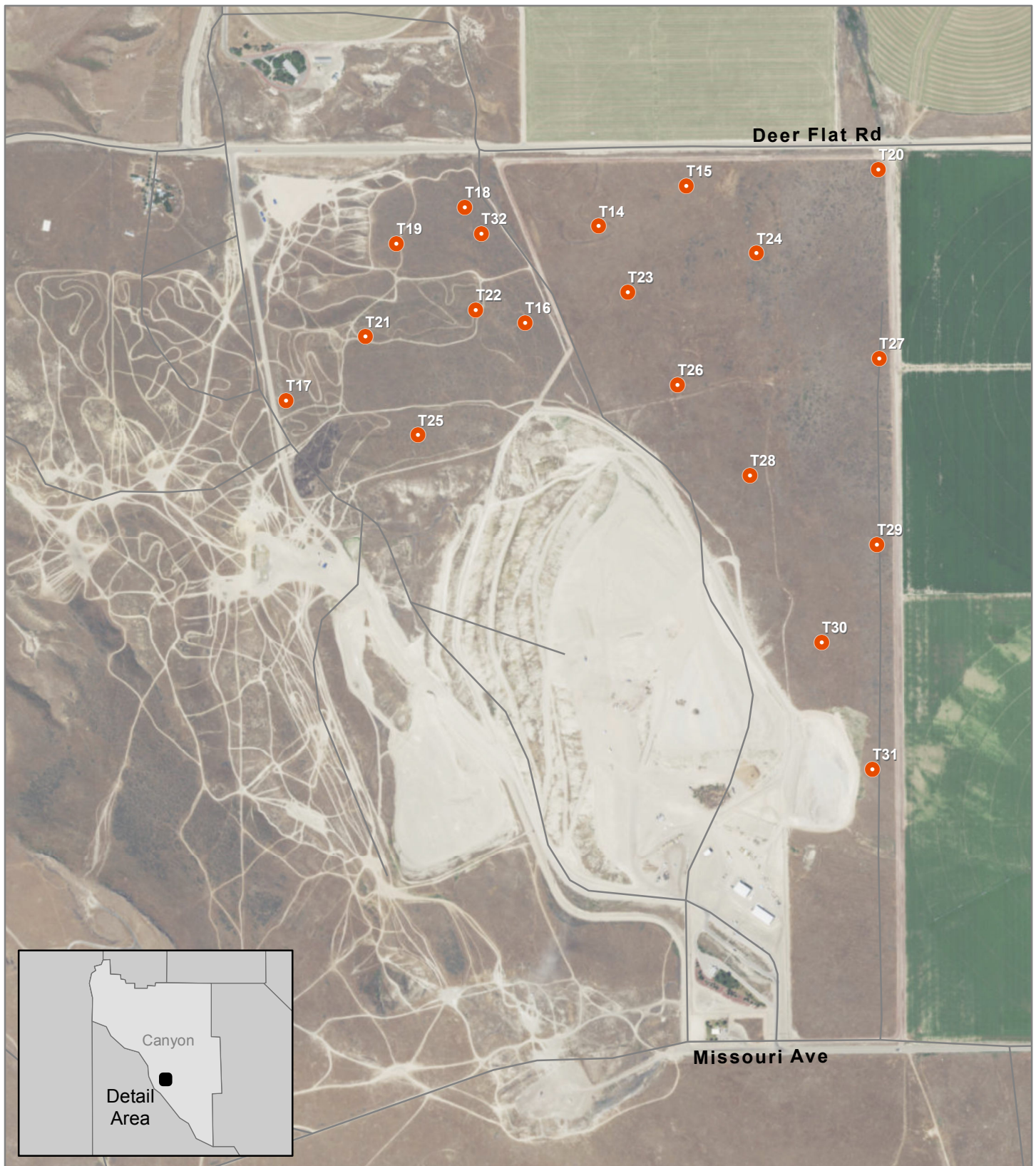
Figure1  
Final Cover Sections  
Modeled with HELP and Unsath  
(waste was modeled with HELP)  
Pickles Butte Landfill  
Canyon County, ID

## 2.1 Borrow Source Investigation

About 100 acres of County owned property north and east of the existing landfill footprint has been identified as a feasible and preferred borrow area, see **Figure 2**. Soil information gathered to assess the suitability of the soil in the proposed borrow source included geotechnical parameters of soil, and an estimate of the volume of suitable soil available. This information was collected through a series of test pits and analysis of selected soil samples. Holladay Engineering Company conducted a similar investigation in 1994; their results indicated that a layer of silt loam was present that had the appropriate geotechnical properties to use as a final cover (Holladay, 1994). Their investigation however was limited to an area of about 40 acres, did not include laboratory testing of the hydrologic properties, and the presentation of their results did not include a discussion of the thickness of the layer. Therefore, the volume of suitable material present in the area they investigated could not be calculated.

Tetra Tech's 2016 investigation covered the entire proposed borrow area, extending to Deer Flat Road to the north, Perch Road to the west, and Canyon County's property boundary to the east. The investigation was conducted in two phases; in each phase the County provided a John Deere 410J Backhoe/Loader and an operator to excavate the test pits at the direction of Tetra Tech. The first phase of the investigation was conducted on April 8, 2016 and included five test pit locations. These locations were selected to provide general coverage of the study area, and were marked on an aerial image. The process at each of the five locations (designated as T14 through T18) was similar. The test pit location was identified using site features that could be identified on the aerial imagery. The test pit was then excavated to a depth of up to four feet and a registered Professional Geologist created a lithologic log from observations of the soil in the sidewalls of the excavation. Samples were collected of the various soils encountered, either in one-gallon plastic bags or five gallon buckets for laboratory analysis. The test pit was then deepened to the maximum depth explored. Observations of the soil types and properties below four feet deep were made as the soil was removed from the pit and placed at the ground surface. Additional soil samples were collected as appropriate. The test pits were generally extended until several feet of sand were encountered, or until the maximum depth of the backhoe was reached. A Juniper Mesa Global Positioning Receiver (GPS) was used to electronically record the coordinates and surface elevation at each test pit location. The spatial accuracy of these receivers is 3 to 5 meters. Each test pit was then backfilled with the material removed from it.

The second phase of the 2016 investigation was conducted on July 5 and 6 2016. Thirteen additional test pit locations (T19 through T31) were selected to provide more detailed spatial coverage of the area. These locations were programmed into the Juniper GPS receiver, and a map on the GPS unit was used to identify the location of the points in the field. The locations of a few of the points were moved slightly based on access constraints caused by topography or dense stands of sagebrush. An additional test pit location (T32) was added based on field observations to further define soil conditions in one area of the property. The July field activity was similar to the April investigation, including using the GPS receiver to record the coordinates and elevation of each test pit location. Lithologic observations were concentrated on identifying the upper and lower bounds of the silt loam layer, and a lithologic log was created for each test pit. Soil samples for geotechnical analysis were not collected.



- Test Pit Location
- ~ Road

Figure 2  
Test Pit Locations  
Pickles Butte Landfill  
Canyon County, ID

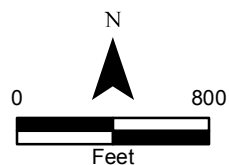
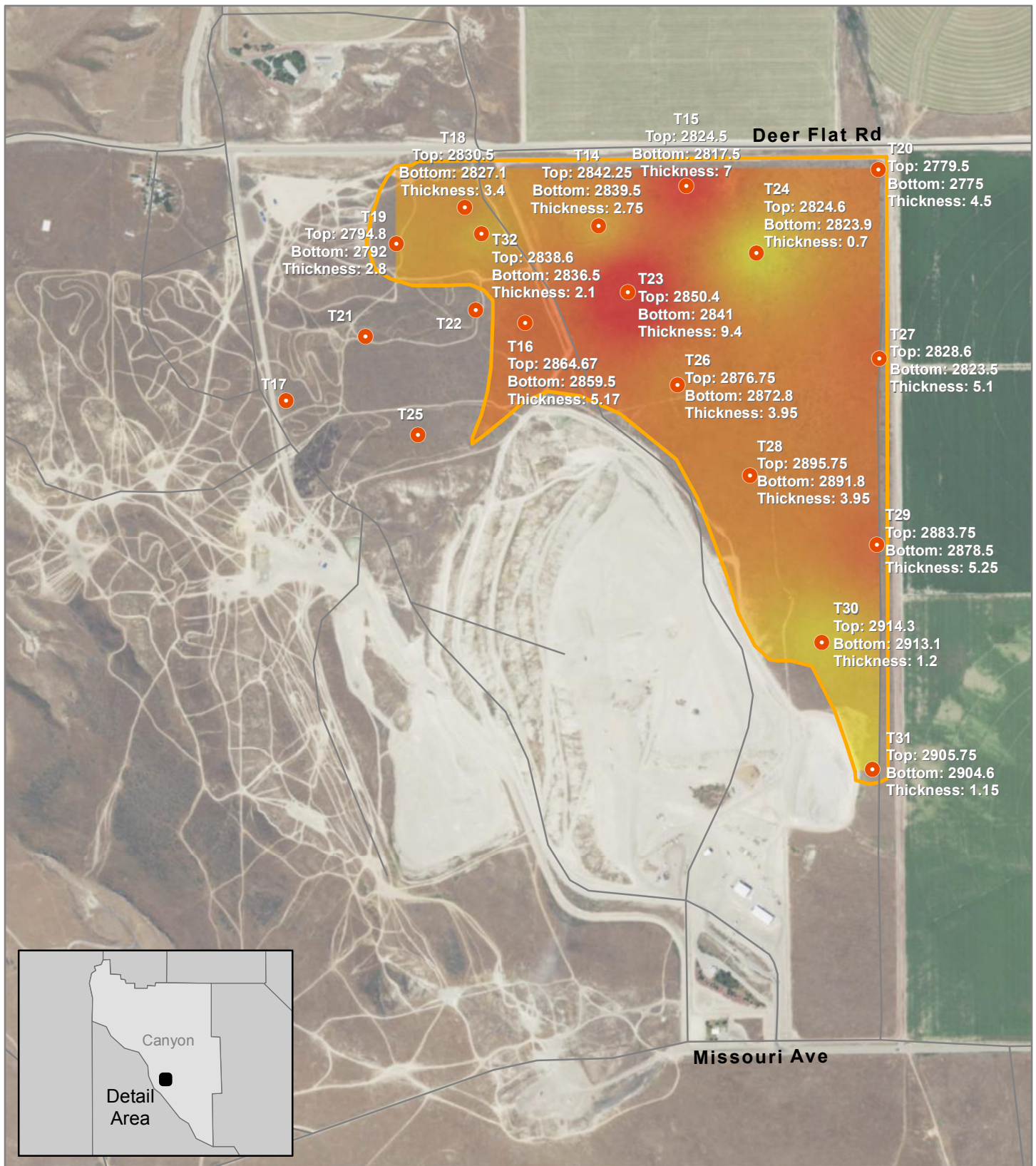
The method used to estimate the volume of suitable borrow material included ESRI's ArcGIS for Desktop version 10.3 and Juniper Mesa GPS units running ArcPad 10.2. ArcGIS was used to incorporate the field data from the GPS receiver into a shapefile with attributes denoting the name of the test pit, the elevation of the test pit based on a site aerial survey, the top and bottom elevations of the silt loam soil, and the material thickness, all in feet. If the material was strongly cemented, it was not included as usable material (e.g. below 3.9 feet) for the analysis because it would require mechanical crushing to make it suitable for cover material. These fields were duplicated in meters to match the measurement type as the shapefile coordinate system (UTM zone 11N). ArcGIS was used for its spatial interpolation, raster masking, and cut/fill tools.

Inverse Distance Weighting (IDW) interpolation was used in ArcGIS to interpolate the point data into a raster graphical image. IDW is a deterministic interpolation method that uses a linearly weighted combination of sample points where the weight is a function of inverse distance (source: IDW tool description in ArcGIS).

After the top and bottom of material were interpolated using IDW, the rasters were then clipped to the area available for sourcing the borrow material. This area was determined to be the best on-site location to source borrow material. The suitable silt loam was not identified in the field at test pits TP17, TP21, TP22, and TP25, so the area used to estimate the volume of material available for the cover was changed to remove these four test pit locations. The modified cover area was then used to clip the top and bottom material rasters to remove the data outside the cover area.

The Cut Fill tool in ArcGIS was used to find the volume of borrow material once the top and bottom material rasters were masked to the cover area. The Cut Fill tool takes the surface of a location at two different time periods and identifies the difference (source: Cut Fill tool description in ArcGIS). In the case of this borrow material volume analysis the top of material raster was used as the "before" and the bottom of material raster was used as the "after." The final output of this analysis is a raster showing the removed volume difference between the top of material and the bottom of material, as shown in **Figures 3**. Combining the spatial area containing the suitable material and the thickness of the sandy Silt, the IDW method gave a volume 21,137,179 cubic feet. Based on the final build-out area for land fill of 116 acres and a cover thickness of 30 inches, 12,632,400 cubic feet of material would be required for construction of the final cover. These values indicate that more than enough of the suitable material is available to construct the alternative final cover from material available on site.





- Test Pit Location
  - Monolithic Cover
  - Borrow Location
  - ~ Road
- Thickness of Borrow Material**
- 9.4ft  
0.7ft

**Figure 3**  
Inverse Distance Weight(IDW)  
Analysis for Calculating  
Borrow Volume  
Pickles Butte Landfill  
Canyon County, ID

## 2.2 Regulatory Requirements

Federal Regulation 40 CFR 258.60(b) addresses the design of an alternative final cover system:

*An infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (a)(1) and (a)(2) of this section (prescriptive design), and an erosion layer that provides equivalent protection from wind and water erosion as the erosion layer specified in (a)(3) of this section (prescriptive design).*

The regulations allow the use of native soils that may have permeabilities greater than the prescriptive final cover system soils if the performance of the final cover system is equivalent. This regulatory flexibility is necessary at the PBSL due to the lack of low permeability soils to construct a prescriptive final cover system.

The surface water percolation rate (inches per year) through an EPA Subtitle D final cover system provides a “baseline” for comparison to the percolation rate produced by the alternative final cover system. This demonstration evaluates the surface water percolation rate through the alternative final cover system shown in **Figure 1**, which must be equal to or less than the percolation rate through the Subtitle D final cover system. Any alternative cover design approved by the Southwest District Health will be incorporated into the site operation plan.

## 2.3 Temporary Discharge Control Technologies

Currently the PBSL is in an “open” configuration. The thickness of the soil layer over the existing waste varies due to erosion and variability of thickness during placement. The current landfill surface has top deck slopes of at least 3 percent to promote surface water drainage away from the active disposal area. Also, the PBSL has drainage controls in place to channel surface water away from the in place waste. Implementation of final closure will involve installation of additional surface water controls in order to promote storm water run-off from the alternative final cover system, which will minimize infiltration. These surface water controls are depicted in the 2015 Landfill Status Report Update.

Minimizing surface water infiltration serves as a discharge control technology by minimizing the potential for leachate generation. The surface of the inactive landfill must be graded to drain to the perimeter or to areas that do not contain waste. Positive surface gradients promote surface water runoff and decrease the potential for ponding and surface water infiltration. However, some minor ponding on inactive areas may be unavoidable due to continuing settlement of the waste.

Inactive areas of the PBSL will receive intermediate cover. Intermediate cover is compacted earthen material of at least 12 inches placed on the surface of a fill where no additional solid waste will be deposited within 180 days. The application of intermediate cover (an additional 6” of soil on top of daily cover soil) also serves as a temporary discharge control. In areas of the intermediate cover where waste will not be added for an extended period of time, the intermediate cover will be seeded to help create vegetative cover and reduce erosion. When landfiling resumes in an area, a portion of the intermediate cover will be removed and the soil set aside for daily cover. In addition, the surface will be track-walked to maintain hydraulic conductivity between lifts.

Prior to placement of any final cover on top of existing intermediate cover, the surface of the intermediate cover will be track-walked with a dozer. Track-walking the surface of the intermediate cover serves to compact the soil, test for soft spots, and to prepare the surface to receive additional fill. After track-walking, the thickness of the intermediate cover will be verified by potholing by a qualified professional. Areas with less than 12 inches of soil thickness shall

have additional soil placed to achieve a minimum thickness of 12 inches. Then the surface of the intermediate cover shall be surveyed to document surface elevations before placement of any final cover soil commences. After the final cover has been placed, the surface will also be surveyed to provide verification that the cover has the appropriate thickness.

## **2.4 Permanent Discharge Control Technologies**

The final cover surface configuration of the closed PBSL is designed to quickly conduct surface water runoff away from the waste footprint. Stormwater downdrains channel storm water off of the top deck quickly and in a controlled manner. The PBSL is currently above grade and the proposed closure configuration will have top deck slopes of approximately 3 percent with 3:1 (horizontal to vertical) side slopes. Final cover grades and mid-slope berms are designed to minimize the potential for erosion of the final cover on the side slopes. Soil loss at landfills should be less than two tons per acre per year (EPA, 1982). The soil loss for the proposed PBSL surface configuration with 3 percent top deck and 3:1 side slopes is less than 2.0 tons/acre/year (Appendix B).

## **3.0 FINAL COVER SYSTEM**

Tetra Tech proposes that the PBSL instead be closed with an engineered alternative final cover system that consists of an erosion control layer over 30-inch thick infiltration control layer and a 12-inch intermediate cover layer. The erosion control layer will consist of a 4 inch layer of organic mulch/shredded green waste, however the entire final cover section may host vegetation (i.e., the entire section will perform as an ET layer). The effective specific retention capacity of the proposed sandy silt infiltration control layer material is a relatively high 13.47% by volume (field capacity – wilting point). The bottom 12 inches of the final cover system is composed of the required thickness of intermediate cover that will also serve as the foundation layer for placement of the final cover system.

### **3.1 Site Characteristics Contributing to Discharge Control**

The final cover system design for the PBSL involves consideration of site-specific characteristics that decrease or eliminate the probability of pollutants reaching the groundwater. In addition to the final cover system, the geology underlying the site serves as a significant discharge control. Lower permeability soils underlying the PBSL, and the thickness of the vadose zone below the natural soil liner are additional discharge controls and serve to further reduce the probability of pollutants reaching the groundwater.

## **4.0 MODELING**

### **4.1 Models Used**

The analysis contained in this AFCD utilizes the HELP Model developed by the U.S. Army Engineer Waterways Experiment Station for the EPA. HELP is a quasi-two-dimensional hydrologic model of water movement across, into, through, and out of a landfill. The model accepts weather, soil, and design data and uses solution techniques that account for the effects of surface storage, snowmelt, runoff, infiltration, evapotranspiration, vegetative growth, soil moisture storage, lateral subsurface drainage, leachate recirculation, unsaturated vertical drainage, and leakage through soil, geomembranes, or composite liners. The program was developed to conduct water balance analyses of landfills, cover systems, and solid waste disposal and containment facilities.



A HELP model analysis for the recommended alternative final cover section shown in **Figure 1** was performed. To verify the modeling results obtained for the proposed alternative final cover system using the HELP model, Tetra Tech used the model UNSAT-H to estimate the amount of percolation allowed by the proposed alternative cover design. UNSAT-H is a one-dimensional finite-difference water balance model developed at the Pacific Northwest Laboratory. The water balance within the soil profile is governed in the model by a finite difference solution of the Richard's partial differential equation. The finite difference grid is set up by using nodes located in the center of several horizontal layers, and the user must specify initial and boundary conditions. The model does not calculate surface runoff directly, but assumes that any precipitation in excess of the infiltration capacity of the soil is shed as runoff.

## 4.2 HELP Input

The following discussion addresses the selection of input variables used in the HELP model for the evaluation of the prescriptive and alternative final covers. **Table 1** lists all of the variables included in the selection of the materials to be used. HELP model simulations were run for a 30-year period.

**Table 1. HELP Model Input Parameters**

Parameters	Prescriptive Cover Section (1)				Alternative Final Cover Section		
	Topsoil	Final Cover	Int. Cover	Solid Waste	Final Cover	Int. Cover	Solid Waste
Thickness (inches)	6	18	12	1440 (2)	30	12	1440 (2)
Sample #	T16B	HELP	T16B	HELP	T15A	T16B	HELP
Material No.	0 (User Defined)	23 (ML)	0 (User Defined)	18 (MSW)	0 (User Defined)	0 (User Defined)	18 (MSW)
Layer Type	Vertical Percolation	Vertical Percolation	Vertical Percolation	Vertical Percolation	Vertical Percolation	Vertical Percolation	Vertical Percolation
Porosity (v/v)	0.3	0.461	0.3	0.671	0.3	0.3	0.671
Field Capacity (v/v)	0.1153	0.36	0.1153	0.292	0.1784	0.1153	0.292
Wilting Point (v/v)	0.0609	0.203	0.0609	0.077	0.0437	0.0609	0.077
Ksaturated (cm/sec)	1.70E-04	9.00E-06	1.70E-04	0.001	4.24E-05	1.70E-04	0.001

Note:

(1) Required per 40 CFR 258.21

(2) With height increase

**Soil Profile for Prescriptive Cover** – The soil profile section presented in **Figure 1** was used in modeling the prescriptive cover. Site specific material properties for the silty Sand (SM) available in the borrow area (i.e. Sample 16B) were assigned to the 6-inch topsoil/vegetative layer, and the average material properties of a representative sandy Silt (HELP Material No. 23) were assigned to the infiltration control layer (see **Table 1**). The 18-inch infiltration control layer was assigned a permeability of  $9.0 \times 10^{-6}$  cm/sec.

**Soil Profile for Alternative Cover** – A soil profile consisting of two layers was used for the alternative final cover: a 30-inch infiltration control layer and a 12-inch intermediate cover layer. The silty Sand available from the on-site borrow material (i.e. Sample 16B) was used for intermediate cover layers. The on-site sandy Silt (ML) material characterized in the borrow

source investigation was used for the 30-inch infiltration control layer, and has a permeability of  $4.24 \times 10^{-5}$  cm/sec based on the laboratory results for sample 15A. A comparison of the sieve data for the ML material from both the 1994 investigation and the current investigation shows that sample 15A is representative of the middle of the range of the non-cemented ML material evaluated at the site (see Figure at end of Appendix B).

Precipitation –The HELP model requires precipitation data to generate daily estimates of water movement across, into, through, and out of the landfill. Within HELP, the user may either enter daily precipitation data manually (from 1 to 100 years' worth), allow the HELP model to synthetically generate precipitation data for the selected location, or use default precipitation made available by the program. The synthetic option for daily precipitation for a period of 30 years was selected for this evaluation. Precipitation data for Boise, Idaho were used for modeling the PBSL.

Temperature –The HELP model requires temperature data to generate daily estimates of water movement across, into, through, and out of the landfill. The HELP program allows for daily synthetic temperature data generation. This option was used to generate the daily temperature data for 30 years. Temperature data for Boise, Idaho were used for modeling the PBSL.

Solar Radiation –The HELP model requires solar radiation data to generate daily estimates of water movement across, into, through, and out of the landfill. The HELP program allows for daily synthetic solar radiation data generation as well. This option was used to generate the daily solar radiation data for 30 years. Solar radiation data for Boise, Idaho were used for modeling the PBSL.

Evapotranspiration –The HELP model also requires ET data to generate daily estimates of water movement across, into, through, and out of the landfill. Within HELP the user may enter the required information either manually or use a default option. The default option for Boise, Idaho was selected for the evapotranspiration data.

Evaporative Zone Depth – In the HLP model both the prescriptive final cover and alternative final cover systems used an evaporative zone depth of 32 inches. The HELP program suggests that for bare ground, an evaporative zone depth of 18 inches should be used, and that for a fair stand of vegetation 40 inches should be used. A fair stand of vegetation was modeled; therefore an evaporative zone depth between 18 and 40 inches was selected.

Maximum Leaf Area Index – For the vegetative cover representative of the field conditions a value for the Leaf Area Index (LAI) must be selected. The program suggests that for poor vegetation a LAI value of one is representative. The PBSL is located in an area that will support a fair stand of vegetation and was assigned a LAI value of 1.6 as recommended by the HELP model.

Landfill General Information – Within the soil and design data requirement for HELP, general information about the specific landfill is required such as: project title, landfill area, percentage of landfill area where runoff is possible, method of initialization of moisture storage and initial snow water storage. A calculated value of 74.6 acres for the current footprint was assumed for the larger landfill unit, with all that area allowed to runoff. For selection of the initial moisture storage the program specifies a near steady-state moisture content. No snow water storage was assumed for any of the cases. The model results are in inches of infiltration and are valid for all 74.6 acres of the current landfill footprint. The UNSAT-H model is a one dimensional model through a representative section of the cover and does not model the waste layer.

**Layer Data** – In the HELP model, the prescriptive cover design, the 6-inch erosion protection layer was designated as a vertical percolation layer with site-specific soil properties consistent with sandy Silt. Similarly, the 18-inch low permeability layer was designated as a barrier soil layer with vertical percolation and designated soil texture typical of sandy Silt. For the alternative cover design, site-specific soil properties for the borrow source material were used. See Table 1 for the prescriptive and alternative soil parameters. The existing PBSL waste was assigned the default values of municipal solid waste (Material No. 18). All of the layers were designated as vertical percolation layers. No rate of subsurface inflow to a layer was designated for any of the cases.

**Lateral Drainage Layer Design Data** – No lateral drainage layer design data was selected for modeling of the prescriptive or alternative final cover designs.

**Geomembrane Liner Data** – No geomembrane liner data was selected for modeling of the prescriptive or alternative final cover designs.

**Runoff Curve Number** – For the runoff curve number, the HELP program was allowed to compute the value for both the prescriptive and alternative final cover designs. The Curve number computed by HELP is based on surface slope (3 percent) and slope length (800 feet). A designated soil texture of 22 was selected for the prescriptive and alternative cover design. The HELP program calculated a runoff curve value of 93.3 for both the prescriptive cover and alternative final cover systems.

### 4.3 UNSAT-H Input

The following discussion addresses the selection of input variables used in the UNSAT-H model for modeling the prescriptive and alternative final covers. **Table 2** lists all of the variables included in the selection of the materials to be used in modeling. **Figure 1** shows the final cover system that was modeled with UNSAT-H. The waste material was not included in the modeling. For computational reasons the UNSAT-H model was set up to run for one year. Due to the number of iterations involved with this model, it is assumed that a steady state is reached after one year.

**Table 2. UNSAT-H Model Input Parameters**

Parameters	Prescriptive Cover Section			Alternative Final Cover Section	
	Topsoil	Final Cover	Int. Cover	Final Cover	Int. Cover
Layer Thickness (inches)	6	18	12	30	12
Number of Nodes	15	26	17	37	16
Node Spacing	≤1 inch	≤1 inch	≤1 inch	≤1 inch	≤1 inch
Saturated Water Content (v/v)	0.1186	0.184	0.1186	0.1907	0.1186
Residual Water Content (v/v)	5.88E-02	8.46E-02	5.88E-02	8.83E-07	5.88E-02
Van Genuchten Coefficient (1/cm)	3.99E-04	1.14E-03	3.99E-04	4.69E-04	3.99E-04
The "n" Exponent	2.8521	1.27	2.8521	1.6676	2.8521
Saturated Hydraulic Conductivity (cm/hr)	6.26E-01	3.26E-02	6.26E-01	1.53E-01	6.26E-01
Initial Suction Head (cm)	1.50E+04	1.50E+04	1.50E+04	1.50E+04	1.50E+04
Field Capacity Head (cm)	341	341	341	341	341

Soil Profile – The first step in using the UNSAT-H model involves definition of the soil profile. This is accomplished by defining the total thickness of the profile and a nodal or profile segment thickness. A total profile thickness for the prescriptive final cover section of 30 inches with a maximum nodal frequency of 1 inch was used. At the top and bottom of each layer the distance between nodes was smaller. This yields a total of 58 profile segments or nodes and the analysis assessed water flux at each of these nodes. A total profile thickness for the alternative final cover section of 48 inches with a maximum nodal frequency of 1 inch. At the top and bottom of each layer the distance between nodes was smaller. This yields a total of 53 profile segments or nodes and the analysis assessed water flux at each of these nodes.

Bottom Boundary Condition – One of the most critical parameters included in the analysis is definition of the bottom boundary condition of the final cover section. For the purposes of this study, this boundary condition was specified as a unit gradient draining condition, yielding one directional flow under an applied suction gradient at the bottom of the profile.

Soil Properties – UNSAT-H requires input of specific soils properties including: saturated water content, residual water content, the “alpha” and “n” parameters of the van Genuchten function, and the saturated hydraulic conductivity. The values for these parameters were calculated based on the laboratory analysis done for the borrow source investigation based on sample 15A for the sandy Silt for the infiltration control layer and 16B for the intermediate cover material with the help of the SWRC Fit software version 3.0 (Seki, 2007). These are described in **Table 2**. Soil properties unique to the UNSAT-H model were obtained from previous work in the Boise area, or from literature, and are considered to reflect the soil properties for nearby soils.

Precipitation – Another critical element in modeling cover performance using UNSAT-H involves identification of total daily precipitation and irrigation. Water that has not entered the soil profile at the end of the application period is assigned to an excess runoff term and included in the mass balance calculations. Infiltration into the profile is thus limited by the matric potential of the soil and the unsaturated hydraulic conductivity of the soil at the time of water application. In other words, infiltration is limited by the ability of the soil to take water, and if precipitation during any time-step exceeds the infiltration capacity of the soil, the extra water is shed as runoff.

Since positive drainage will always be maintained on the PBSL surface, no ponding of rain or irrigation waters was included in the analyses.

The daily meteorological data was obtained for the Boise area from <http://www.usclimatedata.com/climate/boise/idaho/united-states/usid0025>. Note that this may result in precipitation values that are slightly different for the HELP and UNSAT-H model simulations. This difference may account for some of the variability between the two models.

Evapotranspiration – In the UNSAT-H model, it is assumed that the soil is isothermal, and that evaporation can be represented by a diffusion equation based on solar radiation.

Vegetation – Vegetation input parameters for UNSAT-H includes rooting depth, leaf area index (LAI), growing season, percent bare area and parameters describing the root length density function. The growing season for the Boise area was obtained from the HELP climatic database, and it was assumed that the site was completely vegetated. No site-specific rooting depth information was available, so default values were used based on an exponential relationship.

## 5.0 CONCLUSION

### 5.1 Performance of the Covers Evaluated

The performance of both the prescriptive and alternative final cover systems are consistent with the performance goals contained in Subtitle D. The alternative final cover system yielded superior protection against water quality impairment that would result from solute transport through the waste mass to groundwater.

**Table 3** presents a summary of the results obtained from the modeling. Both HELP model simulations were run for a period of 30 years. The complete HELP model results are presented in Appendix C of this document.

Results of the HELP modeling indicate that the 24-inch thick prescriptive design for the PBSL (6" of erosion control material overlying 18" of on site barrier soils with a hydraulic conductivity of  $9.0 \times 10^{-6}$  cm/second) would result in an average percolation of about 0.2797 inches/year through the bottom of the final cover section. The percolation through the bottom of the final cover section was 0.0944 inches/year for the proposed alternative final cover, using a monolithic 30-inch thick infiltration control layer with a hydraulic conductivity of  $4.2 \times 10^{-5}$  cm/second.

**Table 3. Summary of Model Results**

Modeled Scenarios	Average Annual Totals (Values In Inches)				
	Precipitation	Runoff	Evapotranspiration	Percolation Thru Final Cover	Percolation Thru The Bottom
<b>30 Year Simulation</b>					
<b>Prescriptive Final Cover (HELP)(1)</b>					
6" Erosion Layer, 18" Infiltration Layer, 12" Intermediate Cover, 1440" Waste	11.5	1.069	10.147	-	0.27954
<b>Prescriptive Final Cover (HELP)(2)</b>					
6" Erosion Layer, 18" Infiltration Layer, 12" Intermediate Cover	11.5	1.069	10.147	0.27972	-
<b>Alternative Final Cover (HELP)(1)</b>					
30" Monolithic Final Cover, 12" Intermediate Cover, 1440" Waste	11.5	0.972	10.443	-	0.09409
<b>Alternative Final Cover (HELP)(2)</b>					
30" Monolithic Final Cover, 12" Intermediate Cover	11.5	0.972	10.443	0.09441	-
<b>1 Year Simulation</b>					
<b>Prescriptive Final Cover (UNSAT-H)(3)</b>					
6" Erosion Layer, 18" Infiltration Layer, 12" Intermediate Cover	11.66	-	8.5027	1.8787	-
<b>Alternative Final Cover (UNSAT-H)(3)</b>					
30" Infiltration Layer, 12" Intermediate Cover	11.66	-	9.1138	0.2790	-

Note 1: HELP simulation determines the percolation value thru the bottom of the landfill

Note 2: HELP simulation determines the percolation value thru the bottom of the final cover section

Note 3: UNSAT-H simulation determines the percolation value thru the bottom of the final cover section

Results of the HELP modeling through the bottom of the PBSL are slightly less than through the final cover section itself. The prescriptive design allows 0.2795 inches/year through the bottom of the PBSL while the alternative final cover design allows 0.0941 inches/year through the bottom of the PBSL. This slight decrease in infiltration is due to some moisture storage in the waste itself.

Results of the UNSAT-H modeling (Appendix D) indicate that the prescriptive final cover resulted in approximately 1.88 inches/year of percolation through the bottom of the final cover system. The UNSAT-H results for the prescriptive final cover generally yield higher results than the HELP model. The alternative final cover system was much more effective in reducing water percolation. The UNSAT-H modeling indicated that the alternative final cover resulted in approximately 0.28 inches/year of percolation through the bottom of the final cover system. This value is less than the UNSAT-H percolation value for the prescriptive cover.

On the basis of these evaluations, Tetra Tech recommends that the final closure of the PBSL be completed by using an alternative final cover system constructed of soils from the proposed borrow area. The percolation rates for the alternative final cover system are less than the EPA Subtitle D Cover System, based on HELP modeling. Additional modeling will not be necessary if the material excavated from the designated borrow area has a saturated hydraulic conductivity that does not exceed of  $4.24 \times 10^{-5}$  cm/sec or less (the hydraulic conductivity value used in this study). As discussed in Section 4.2, sieve data from eleven different samples of the on-site sandy Silt (ML) indicate that the sample used for modeling is in the middle of the samples examined, and therefore can be considered representative of the average soil material properties. Given the lower percolation rate through the cover for the alternative covers in both the HELP model and UNSAT-H, even the naturally occurring variability in the soil should not impact the ability of the alternative cover to perform better than the prescriptive cover for this facility.

Tetra Tech recommends that the alternative final cover layer be covered with a layer of mulch/shredded green waste that is produced on site. This material generally contains some seeds and organic matter, which would promote the growth of the final cover vegetation. In addition, the site will be seeded to enhance the establishment of a vegetative cover. It is important to the overall effectiveness of the alternative final cover system that revegetation of the PBSL surface occur after construction.

## **5.2 Landfill Gas Management**

Landfill gas (LFG) is a typical by-product of anaerobic decomposition of waste. LFG emissions through the final cover section may hinder the growth of vegetation on the final cover, and it is understood that a LFG collection system may be necessary in order to promote the growth of vegetation. PBSL performed a Tier II calculation in 2014 to document that the landfill has not exceeded the non-methane organic compounds (NMOC) required by regulations. PBSL will continue to monitor emission rates as required by Code of Federal Regulations 40 Part 60 (40 CFR 60), Subpart XXX, and will install a landfill gas collection and control system (GCCS) when the emissions rate at the landfill exceed the regulatory threshold.

## **5.3 Surface Water Control**

The slope of the final cover on the closed PBSL should direct storm water run-off to the perimeter of the landfill (off the waste footprint) and convey the stormwater to the stormwater control basins. The surface water controls have been designed to discharge/contain runoff from a 25-year, 24-hour storm. Stormwater control basins have been designed to empty by means of infiltration and evaporation.

## 5.4 PBSL Final Grading Plan

The grading plan for the PBSL is being prepared by Tetra Tech and Great West Engineering as part of the Cut and Fill plan. When completed, the Cut and Fill plan will be submitted to the SWDH and DEQ for approval. The current draft version of the final grading plan is included in Appendix E. Maintenance of the positive surface gradients shown on this final grading plan are critical to the long term performance of the alternative final cover system.

## 5.5 Soil Erosion Control

### 5.5.1 Introduction

The final cover of the PBSL has been designed to minimize soil erosion. Regional soil conditions and site climatology should allow a vegetative cover to be established on the surface of the landfill to prevent soil erosion. A discrete erosion control layer has not been planned. The infiltration control layer will also serve as the erosion control layer. The surface of the infiltration control layer may be augmented with a layer of organic mulch/shredded green waste that will allow infiltration and evapotranspiration of rain water but retard erosion due to water and wind. In addition, final slopes must be designed to reduce soil erosion losses to an acceptable annual rate. The Universal Soil Loss Equation (USLE) was employed with soil and climatological parameters specific to the site to calculate the slope length and angle permissible on the landfill.

#### Climate

Climatological information was obtained from usclimatedata.com, Boise Air Terminal weather station. Annual precipitation from usclimatedata.com for the Boise area is 11.66 inches. The EPA HELP model used an annual precipitation value of 11.71 inches.

#### Soils

The soil types near the PBSL are primarily sandy Silt and silty Sand. Permeability of these soils is moderate and the available water capacity is relatively high. The effective rooting depth is 6 inches or more and the evaporation zone depth is 32 inches. Runoff is slow to moderate and the estimated hazard of water erosion is moderate. The final cover system will consist of 30 inches of sandy Silt, with an estimated permeability of  $4.23 \times 10^{-5}$  cm/sec, over 12 inches of foundation layer soil.

#### Soil Loss

Soil loss at this facility should be less than 2 tons per acre per year to minimize the possibility of gullyng (EPA, 1982). In order to minimize the potential future maintenance requirements of the final cover, this standard was set as the maximum allowable rate of soil erosion at the landfill.

The USDA Universal Soil Loss Equation (USLE) provides average soil loss as the product of four quantitative factors (slope length, slope-percent, soil-erodibility, and rainfall-erosivity) and two qualitative factors (cover/management, and practice). The USLE was designed to calculate average soil loss due to rainfall runoff episodes. The USLE was developed for use on agricultural lands, and only estimates sheet and rill erosion from initial mobilization; it does not account for soil losses due to gullyng. The USLE does not consider the effects of soil re-deposition.

The Universal Soil Loss Equation is defined as:

$$A = RKLSCP$$

Where:

A = The computed soil loss per unit area, expressed in the units selected for K and for the period selected for R. R and K have been selected so that A is expressed in tons per acre per year.

R = The rainfall and runoff factor. R is the rainfall erosion index.

K = The soil erodibility factor. K is the soil loss rate per erosion index unit for a specified soil as measured on a unit plot, which is defined as a 72.6-foot length of uniform 9 percent slope in clean tilled continuous fallow.

L = The slope length factor. L is the ratio of soil loss from the field slope length to that from a 72.6-foot length under identical conditions.

S = The slope percent factor. S is the ratio of soil loss from the field slope gradient to that from a 9 percent slope under otherwise identical conditions.

C = The cover and management factor. C is the ratio of soil loss from an area with specified cover and management to that from an identical area in tilled continuous fallow.

P = The support practice factor. P is the ratio of soil loss with a farming support practice like contouring, strip cropping, or terracing to that with straight-row farming up and down the slope.

The values and sources for the specific terms of the USLE are presented below:

#### Target Value for A:

The target value for A was set at 2 tons per acre per year, or less, pursuant to previously referenced guidelines (EPA, 1982).

#### Determination of R

The R value can be calculated using the equation for Zone 2 arid regions;

$$R = 27 P^{(2.17)}$$

Where P is the total rainfall resulting from a 2-year return period, 6-hour duration storm.

Based on information obtained from the NOAA Atlas 14, the 2-year, 6-hour precipitation depth was estimated to be 0.68 inches. So for the PBSL:

$$R = 27 (0.68)^{(2.17)}$$

$$R = 27 (0.4331)$$

$$R = 11.7 \text{ (round to 12)}$$

Alternatively, Figure 1 of the USDA Handbook #537, "Predicting Rainfall Erosion Losses" (USDA, 1978) can be used. For the PBSL location the R value would be <20, which may be appropriate for this area. For the soil loss calculation an average value of 16 will be used.

#### Determination of K

The permeability of the infiltration soil, based on soil laboratory results, is  $1.7 \times 10^{-5}$  inches/hr. ( $4.2 \times 10^{-5}$  cm/sec). The U.S. Department of Agriculture Erosion and Sediment Control manual classifies this permeability rate as slow to moderate. The percentage silt and very fine sand is approximately 90% (25% fine sand + 65% fines), and the estimated percentage of coarse sand (0.10 - 2.0 mm) is 10%. Organic matter percent is estimated to be less than 1%, therefore 1% will be used. From the soil erodibility nomograph, the value for K was determined to be approximately 0.6. This is a reasonable value for the soil type anticipated to be used for construction of the proposed alternative final cover section.

#### Determination of C

Currently, the facility's open configuration slopes consist of a continuous bare soil surface (untilled) with a C value of 0.70. The final closure condition would have a continuous



mulch/shredded green waste layer over the entire surface of the landfill. The estimated C value for this condition is 0.10. A C value of 0.08 was used for the PBSL (USDA Handbook #537, Table 9). This value assumes very little bare soil areas will be present after final closure, and the entire area will be augmented with mulch/shredded green waste to reduce the erosion potential of the sandy silt. As stated in the USDA Handbook #537, page 19, "Mulches intercept falling raindrops so near the surface that the drops regain no fall velocity, and they also obstruct runoff flow and thereby reduce its velocity and transport capacity."

#### Determination of P

A P value of 1.0 reflects a no cultivation scenario. The value of 1.0 also reflects a loose, disked plow layer, therefore for the PBSL the P value will be less than 1.0. For the PBSL top deck slope of 3% to 5% a P value of 0.50 is listed (USDA Handbook #537, Table 9).

#### Computation of LS

Of the terms in the USLE, only the slope length factor, L, and the slope percent factor, S, remain as unknowns. The LS factor was calculated using USDA Handbook #537, **Figure 4**.

For the landfill final cover conceptual design, values contributing to the potential for the most erosion (combination of slope length and percent slope) were used for a conservative prediction of the maximum erosion losses from the final cover for the entire landfill site. The design slope for the initial closure condition is 3 percent. Long term settlement may reduce this slope somewhat. Values used from **Figure 4** were:

$$\lambda = \lambda_{\max} = 800 \text{ feet maximum}$$

$$\theta = 1.72 \text{ (3 percent maximum slope)}$$

$$M = 0.5 \text{ on slopes of 5 percent (conservative, actually 3 percent slopes)}$$

Therefore,  $LS = 0.55$

#### **5.5.2 Computation of Loss**

Employing the USLE with the terms of the values given above:

$$A = R K L S C P$$

$$A = (16)(0.6)(0.55)(0.08)(0.5)$$

$$A = 0.2 \text{ ton/acre/year soil loss (with the application of mulch/shredded green waste).}$$

The value of A computed for the landfill is less than the 2 tons/acre/year guideline set by EPA, so the rate of soil erosion from the landfill closure design is acceptable by the EPA standard.

## 6.0 REFERENCES

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## **APPENDIX A TEST PIT LOGS**



## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T14

Legal				Descriptive	
Location:	T	R	S	Tract	Location:
					North of active landfill

<b>Date Started:</b>	<u>4/8/2016</u>	<b>Date Completed:</b>	<u>4/8/2016</u>	<b>Excavation Company/Operator:</b>	<u>Canyon County Solid Waste / Randy</u>
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<b>Excavation</b>	<b>Test Pit</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>size (ft.)</b> <u>3 x 12</u>	<b>Excavated (ft.):</b> <u>12.5</u>
		<b>Logged by:</b> <u>R. Phillips</u>

**Groundwater Encountered?** N      **Approx. Depth:** NA      **Groundwater Samples Collected?** NA

**REMARKS:** Depth to top of usable material = 0.75 feet. Depth to bottom of usable material = 3.5 feet.

[illegible]

### TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040      **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design  
**City:** South of Nampa      **State:** ID      **County:** Canyon      **Test Pit No.:** T15  
**Legal**      **Descriptive**  
**Location:**    **T**        **R**        **S**        **Tract**                           **Location:** North of active landfill, close to Deer Flat Road  
**Date**      **Date**      **Excavation Company/**  
**Started:** 4/8/2016 **Completed:** 4/8/2016      **Operator:** Canyon County Solid Waste / Randy  
**Excavation**      **Test Pit**      **Total Depth**  
**Method:** Backhoe      **size (ft.)** 3 x 16      **Excavated (ft.):** 13.5      **Logged by:** R. Phillips  
**Groundwater Encountered?** N      **Approx. Depth:** NA      **Groundwater Samples Collected?** NA  
**REMARKS:** Depth to top of usable material = 0.5 feet. Depth to bottom of usable material = 7.5 feet.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Sample Collected
0	Topsoil, organic material (roots)	
0.5	SILT with sand; stiff to hard at 12", moist, non plastic. Trace clay, sand is fine	15A (5 gallon bucket)
	grained, a few cemented nodules and layers beginning at about 12", cementation is	
	moderate, then out of the harder cementation by 3.8 feet. Weaker cementation below	
	that (ML)	
5.0	SILT; hard, slightly moist, non-plastic, moderately to weakly cemented. Most	15B (1 gallon bag of
	cemented pieces crumble with moderate to firm thumb pressure. However there are	cemented pieces)
	layers, usually ~1" thick, that are strongly cemented and cannot be broken by hand.(ML)	
7.5	SILT with sand; as above, but there has been a gradual increase in fine sand. (ML)	
9.5	Silty SAND; dense, slightly moist, poorly graded, fine grained. Cementation present,	15C (5 gallon bucket)
	~10% to 15% of spoils are cemented pieces, usually strong, very light brown (SM)	
12.0	Sand/silt ratio increases with depth, by ~12 feet I would classify as Poorly Graded	
	SAND with silt. Still fine grained, but grain size has increased. Cementation still	
	present as described in the layer from 9.5 to 12 feet.	
13.5	Bottom of Hole	

**TEST PIT LITHOLOGIC LOG**

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design  
**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T16  
**Legal** **Descriptive**  
**Location:** **T**        **R**        **S**        **Tract**                      **Location:** North of landfill, near top of slope to west  
**Date** **Date** **Excavation Company/**  
**Started:** 4/8/2016 **Completed:** 4/8/2016 **Operator:** Canyon County Solid Waste / Randy  
**Excavation** **Test Pit** **Total Depth**  
**Method:** Backhoe **size (ft.)** 3 x 16 **Excavated (ft.):** 12.5 **Logged by:** R. Phillips  
**Groundwater Encountered?** N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

**REMARKS:** Depth to top of usable material = 0.33 feet. Depth to bottom of usable material = 5.5 feet.

The material from 8.5 to 10.5 could also be useful, but it is under 3 feet of unusable material.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Sample Collected
0	Topsoil, organic material (roots)	
0.33	SILT with sand and clay; firm to stiff, moist, non plastic, medium to dark brown	16A (5 gallon bucket)
	(ML)	(from 6 to 18")
	some cementation beginning at 1.5 feet, then stronger at 2 feet	
	Lighter color (medium brown) below 3.5 feet but still similar material. Sand content	
	probably increases at that depth. Moderately hard to dig, but cemented pieces break	16B (5 gallon bucket)
	with moderate to firm thumb pressure	(from 4 to 5.5')
5.5	Silty SAND: loose to medium dense, slightly moist, fine grained, poorly graded, some	
	cementation, light brown (SM)	
7.3	Cemented SILT; hard, dry, very light brown (typical SW Idaho 'hardpan')	
8.5	Back into Sandy SILT. Quite similar to the material from 3.5 to 5.5, with smaller	16C (4 - 1 gallon bags)
	blocks in the spoils, and a lighter color. Blocks crumble easily. Silt/Sand ratio	(8.5 to 9.5)
	increases with depth, becoming SILT with sand then SILT	
	Stronger cementation again below 10.5 feet, continues to bottom of hole	
12.5	Bottom of Hole	

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T17

Legal					Descriptive	
Location:	T	R	S	Tract	Location:	
					Northwest of Landfill, near Perch Road	

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> 4/8/2016	<b>Completed:</b> 4/8/2016	<b>Operator:</b> Canyon County Solid Waste / Randy

<b>Excavation</b>	<b>Test Pit</b>	<b>Total Depth</b>
<b>Method:</b> Backhoe	<b>size (ft.)</b> 3 x 16	<b>Excavated (ft.):</b> 9.5
		<b>Logged by:</b> R. Phillips

Groundwater Encountered?     N          Approx. Depth:     NA          Groundwater Samples Collected?     NA    

**REMARKS:** Depth to top of usable material = 0.5 feet. Depth to bottom of usable material = 5.5 feet.

[illegible]



## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T18

Legal				Descriptive
Location:	T _____	R _____	S _____	Tract _____ Location: N. of LF, near top of slope to W and Deer Flat Rd.

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>4/8/2016</u>	<b>Completed:</b> <u>4/8/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Randy</u>

<b>Excavation</b>	<b>Test Pit</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>size (ft.)</b> <u>3 x 16</u>	<b>Excavated (ft.):</b> <u>10</u>
<b>Logged by:</b> <u>R. Phillips</u>		

Groundwater Encountered? N      Approx. Depth: NA      Groundwater Samples Collected? NA

**REMARKS:** Depth to top of usable material = 0.5 feet. Depth to bottom of usable material = 3.9 feet.

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T19

**Legal** **Descriptive**  
**Location:** T \_\_\_\_\_ R \_\_\_\_\_ S \_\_\_\_\_ Tract \_\_\_\_\_ **Location:** North of LF, NW part of potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>7/6/2016</u>	<b>Completed:</b> <u>7/6/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Daniel</u>

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>Pit size (ft.)</b> <u>3 x 15</u>	<b>Excavated (ft.):</b> <u>10.6</u>
		<b>Logged by:</b> <u>R. Phillips</u>

**Groundwater Encountered?**     N          **Approx. Depth:**     NA          **Groundwater Samples Collected?**     NA    

**REMARKS:** Depth to top of usable material = 1.2 feet. Depth to bottom of usable material = 4 feet.

---

Material from 4 to 6.7 may also be usable.

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T20

Legal				Descriptive
Location:	T _____	R _____	S _____	Tract _____
				Location: NE corner of potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>7/5/2016</u>	<b>Completed:</b> <u>7/5/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Daniel</u>

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>Pit size (ft.)</b> <u>3 x 15</u>	<b>Excavated (ft.):</b> <u>13.3</u>
		<b>Logged by:</b> <u>R. Phillips</u>

Groundwater Encountered? N      Approx. Depth: NA      Groundwater Samples Collected? NA

**REMARKS:** Depth to top of usable material = 0.5 feet. Depth to bottom of usable material = 5 feet.

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T21

Legal					Descriptive	
Location:	T	R	S	Tract	Location:	
					Western part of potential borrow area	

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> 7/6/2016	<b>Completed:</b> 7/6/2016	<b>Operator:</b> Canyon County Solid Waste / Daniel

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> Backhoe	<b>Pit size (ft.)</b> 3 x 15	<b>Excavated (ft.):</b> 9
		<b>Logged by:</b> R. Phillips

Groundwater Encountered?     N          Approx. Depth:     NA          Groundwater Samples Collected?     NA    

**REMARKS:** The good usable material was not found at this location. The material from 5 to 7.5 may be usable.

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T22

Legal				Descriptive
Location:	T	R	S	Tract
				Location: W-Central part of northern potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> 7/6/2016	<b>Completed:</b> 7/6/2016	<b>Operator:</b> Canyon County Solid Waste / Daniel

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> Backhoe	<b>Pit size (ft.)</b> 3 x 15	<b>Excavated (ft.):</b>
		<b>Logged by:</b> R. Phillips

Groundwater Encountered?     N          Approx. Depth:     NA          Groundwater Samples Collected?     NA    

**REMARKS:** The good usable material was not found at this location.

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T23

Legal				Descriptive
Location:	T _____	R _____	S _____	Tract _____
				Location: Center of northern part of potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> 7/5/2016	<b>Completed:</b> 7/5/2016	<b>Operator:</b> Canyon County Solid Waste / Daniel

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> Backhoe	<b>Pit size (ft.)</b> 3 x 15	<b>Excavated (ft.):</b> 10.8
		<b>Logged by:</b> R. Phillips

Groundwater Encountered?     N          Approx. Depth:     NA          Groundwater Samples Collected?     NA    

**REMARKS:** Depth to top of usable material = 0.6 feet. Depth to bottom of usable material = 10 feet.

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T24

Legal				Descriptive	
Location:	T	R	S	Tract	Location:
					W Central part of northern potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>7/5/2016</u>	<b>Completed:</b> <u>7/5/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Daniel</u>

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>Pit size (ft.)</b> <u>3 x 15</u>	<b>Excavated (ft.):</b> <u>6</u>
		<b>Logged by:</b> <u>R. Phillips</u>

Groundwater Encountered? N      Approx. Depth: NA      Groundwater Samples Collected? NA

**REMARKS:** Depth to top of usable material = 0.4 feet. Depth to bottom of usable material = 1.1 feet.

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T25

Legal				Descriptive	
Location:	T	R	S	Tract	Location:
					SW corner of northern potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>7/6/2016</u>	<b>Completed:</b> <u>7/6/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Daniel</u>

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>Pit size (ft.)</b> <u>3 x 15</u>	<b>Excavated (ft.):</b> <u>7.5</u>
		<b>Logged by:</b> <u>R. Phillips</u>

Groundwater Encountered? N      Approx. Depth: NA      Groundwater Samples Collected? NA

**REMARKS:** Good usable material not found. Material from 2 feet to 6.7 *may* be usable.

[illegible]



## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T26

**Legal** **Descriptive**  
**Location:** T \_\_\_\_\_ R \_\_\_\_\_ S \_\_\_\_\_ Tract \_\_\_\_\_ **Location:** Near the middle of the potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>7/5/2016</u>	<b>Completed:</b> <u>7/5/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Daniel</u>

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>Pit size (ft.)</b> <u>3 x 15</u>	<b>Excavated (ft.):</b> <u>5.6</u>
		<b>Logged by:</b> <u>R. Phillips</u>

Groundwater Encountered?     N          Approx. Depth:     NA          Groundwater Samples Collected?     NA    

**REMARKS:** Depth to top of usable material = 0.25 feet. Depth to bottom of usable material = 4.2 feet.

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T27

Legal				Descriptive
Location:	T	R	S	Tract
				Location: Eastern edge of potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>7/5/2016</u>	<b>Completed:</b> <u>7/5/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Daniel</u>

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>Pit size (ft.)</b> <u>3 x 15</u>	<b>Excavated (ft.):</b> <u>8.3</u>
		<b>Logged by:</b> <u>R. Phillips</u>

**Groundwater Encountered?**     N          **Approx. Depth:**     NA          **Groundwater Samples Collected?**     NA    

**REMARKS:** Depth to top of usable material = 0.4 feet. Depth to bottom of usable material = 5.5 feet.

[illegible]

## TEST PIT LITHOLOGIC LOG

<b>Project No.</b>	114-571040		<b>Project Name:</b>	Pickles Butte Sanitary Landfill Monolithic Cover Design			
<b>City:</b>	South of Nampa	<b>State:</b>	ID	<b>County:</b>	Canyon	<b>Test Pit No.:</b>	T28
<b>Legal Location:</b>	T	R	S	<b>Tract</b>	<b>Descriptive Location:</b> Near the middle of the potential borrow area		
<b>Date Started:</b>	7/5/2016	<b>Date Completed:</b>	7/5/2016	<b>Excavation Company/Operator:</b> Canyon County Solid Waste / Daniel			
<b>Excavation Method:</b>	Backhoe	<b>Approx. Test Pit size (ft.)</b>	3 x 15	<b>Total Depth Excavated (ft.):</b>	10.5	<b>Logged by:</b>	R. Phillips
<b>Groundwater Encountered?</b>	N	<b>Approx. Depth:</b>	NA	<b>Groundwater Samples Collected?</b>	NA		
<b>REMARKS:</b> Depth to top of usable material = 0.25 feet. Depth to bottom of usable material = 4.2 feet.							

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T29

**Legal** **Descriptive**  
**Location:** T \_\_\_\_\_ R \_\_\_\_\_ S \_\_\_\_\_ Tract \_\_\_\_\_ **Location:** Eastern edge of potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>7/5/2016</u>	<b>Completed:</b> <u>7/5/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Daniel</u>

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>Pit size (ft.)</b> <u>3 x 15</u>	<b>Excavated (ft.):</b> <u>8.5</u>
		<b>Logged by:</b> <u>R. Phillips</u>

Groundwater Encountered?     N          Approx. Depth:     NA          Groundwater Samples Collected?     NA    

**REMARKS:** Depth to top of usable material = 0.25 feet. Depth to bottom of usable material = 5.5 feet.

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T30

Legal				Descriptive
Location:	T _____	R _____	S _____	Tract _____
				Location: Southern part of potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>7/5/2016</u>	<b>Completed:</b> <u>7/5/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Daniel</u>

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>Pit size (ft.)</b> <u>3 x 15</u>	<b>Excavated (ft.):</b> <u>5.8</u>
		<b>Logged by:</b> <u>R. Phillips</u>

**Groundwater Encountered?**     N          **Approx. Depth:**     NA          **Groundwater Samples Collected?**     NA    

**REMARKS:** Depth to top of usable material = 0.7 feet. Depth to bottom of usable material = 1.9 feet.

---

Material from 1.9 to 3 feet *may* be usable.

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T31

Legal				Descriptive
Location:	T	R	S	Tract
				Location: Southern extent of potential borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>7/5/2016</u>	<b>Completed:</b> <u>7/5/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Daniel</u>

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>Pit size (ft.)</b> <u>3 x 15</u>	<b>Excavated (ft.):</b> <u>2</u> <b>Logged by:</b> <u>R. Phillips</u>

**Groundwater Encountered?**     N          **Approx. Depth:**     NA          **Groundwater Samples Collected?**     NA    

**REMARKS:** Depth to top of usable material = 0.25 feet. Depth to bottom of usable material = 1.4 feet.

Excavation was moved north of proposed location due to topography

[illegible]

## TEST PIT LITHOLOGIC LOG

**Project No.** 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

**City:** South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T32

Legal				Descriptive
Location:	T _____	R _____	S _____	Tract _____
				Location: Northwest central part of borrow area

<b>Date</b>	<b>Date</b>	<b>Excavation Company/</b>
<b>Started:</b> <u>7/6/2016</u>	<b>Completed:</b> <u>7/6/2016</u>	<b>Operator:</b> <u>Canyon County Solid Waste / Daniel</u>

<b>Excavation</b>	<b>Approx. Test</b>	<b>Total Depth</b>
<b>Method:</b> <u>Backhoe</u>	<b>Pit size (ft.)</b> <u>3 x 15</u>	<b>Excavated (ft.):</b> <u>7.7</u>
		<b>Logged by:</b> <u>R. Phillips</u>

Groundwater Encountered?     N          Approx. Depth:     NA          Groundwater Samples Collected?     NA    

**REMARKS:** Depth to top of usable material = 0.4 feet. Depth to bottom of usable material = 2.5 feet.

---

Material from 2.5 to 6.8 feet *may* be usable.

[illegible]





## **APPENDIX B**

### **LABORATORY RESULTS**





## IAS Laboratories

2515 East University Drive  
Phoenix, Arizona 85034  
(602) 273-7248  
Fax (602) 275-3836

**Date:** April 28, 2016

**Submitted by:** Tetra Tech

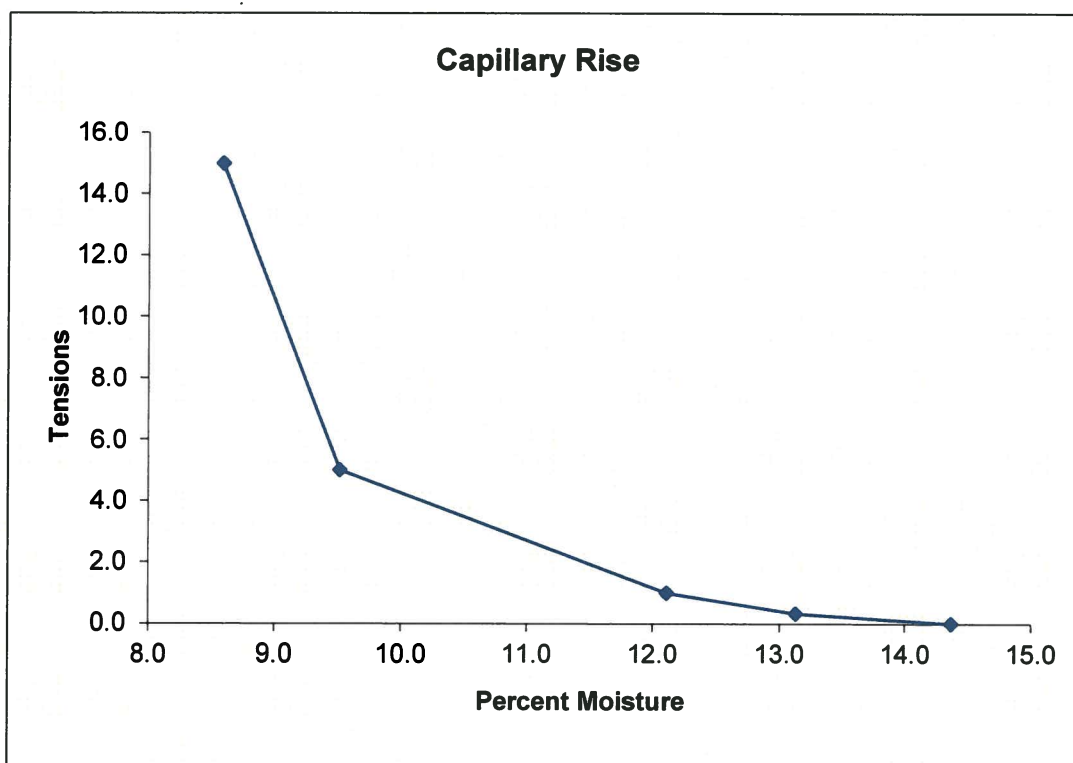
**Report to:** Keith A. Johnson

**Report #:** 6652671

**Date Received:** April 18, 2016

**Lab#:** 884

**Sender ID:** T14B



Moisture %	Equivalent Pressure		Tension Bars	
	psi	mmHg		
14.37	1.5	76	0.0	<i>Field Capacity</i>
13.13	4.9	251	0.33	
12.11	29.4	1520	1.0	
9.52	73.5	3800	5.0	<i>Wilting Point</i>
8.59	220.5	11400	15.0	

Analysis modified ASTM D3152 and ASTM D2325



## IAS Laboratories

2515 East University Drive  
Phoenix, Arizona 85034  
(602) 273-7248  
Fax (602) 275-3836

**Date:** April 28, 2016

**Submitted by:** Tetra Tech

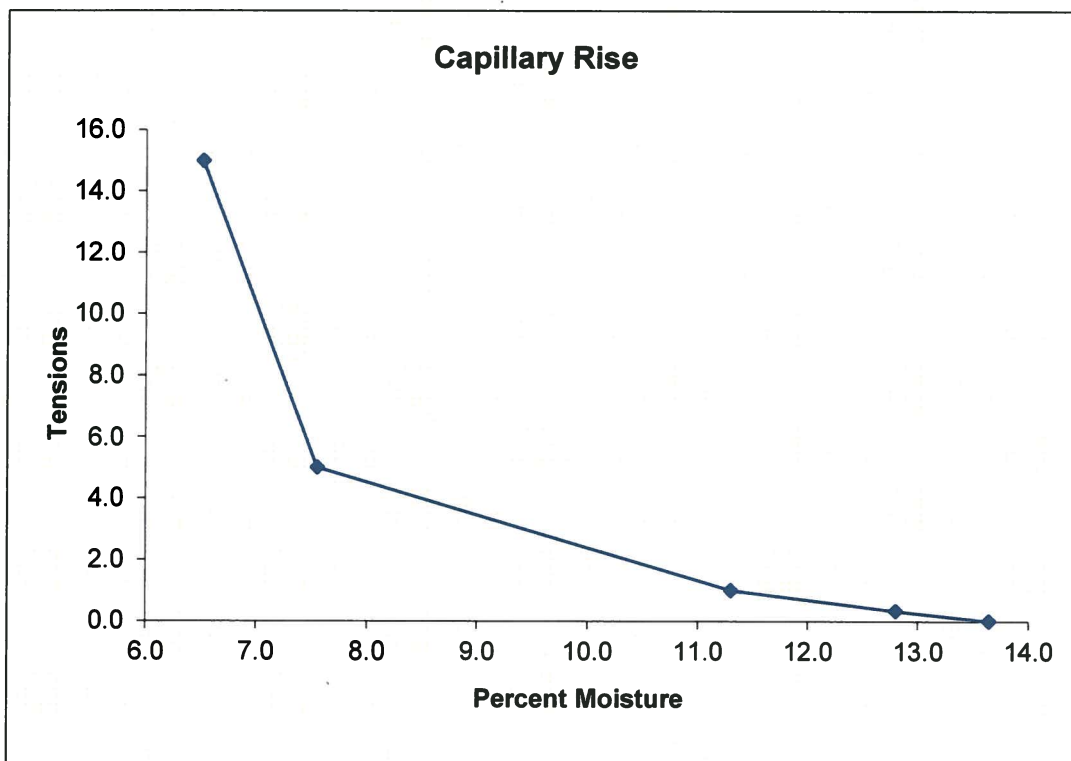
**Report to:** Keith A. Johnson

**Report #:** 6652671

**Date Received:** April 18, 2016

**Lab#:** 887

**Sender ID:** T17A



Moisture %	Equivalent Pressure		Tension Bars	
	psi	mmHg		
13.64	1.5	76	0.0	<b>Field Capacity</b>
12.80	4.9	251	0.33	
11.30	29.4	1520	1.0	
7.55	73.5	3800	5.0	<b>Wilting Point</b>
6.52	220.5	11400	15.0	

Analysis modified ASTM D3152 and ASTM D2325



## IAS Laboratories

2515 East University Drive  
Phoenix, Arizona 85034  
(602) 273-7248  
Fax (602) 275-3836

**Date:** April 28, 2016

**Submitted by:** Tetra Tech

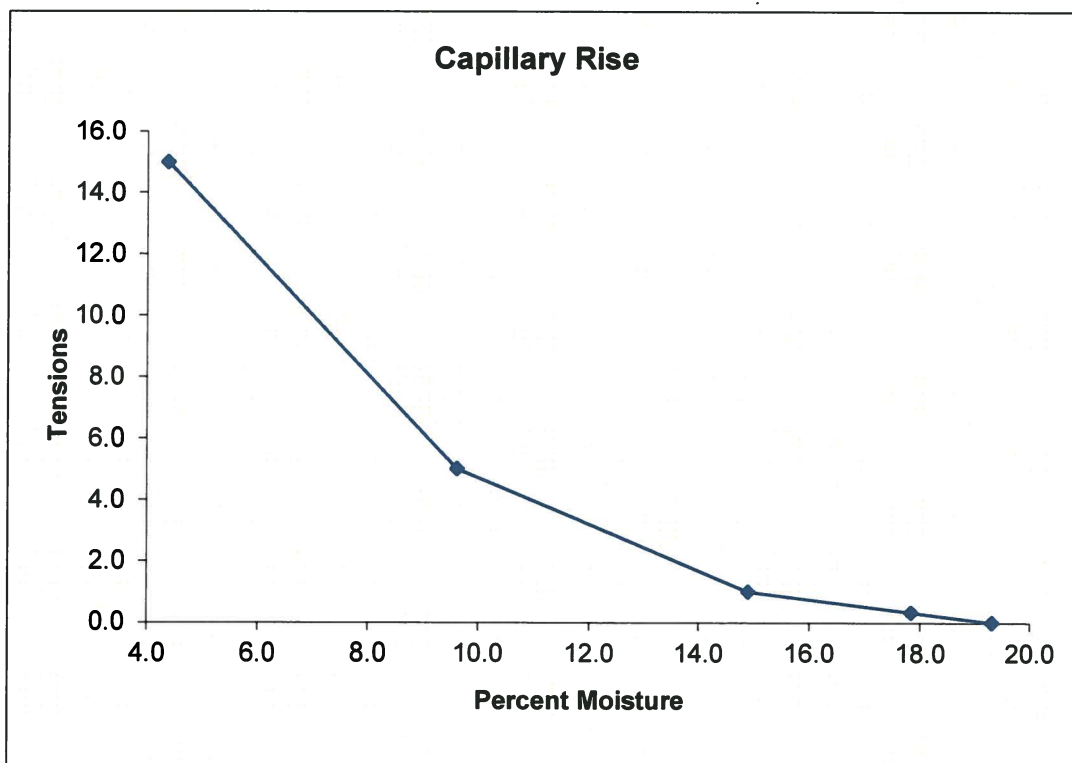
**Report to:** Keith A. Johnson

**Report #:** 6652671

**Date Received:** April 18, 2016

**Lab#:** 885

**Sender ID:** T15A



Moisture %	Equivalent Pressure		Tension Bars	
	psi	mmHg		
19.31	1.5	76	0.0	<b>Field Capacity</b>
17.84	4.9	251	0.33	
14.90	29.4	1520	1.0	
9.62	73.5	3800	5.0	<b>Wilting Point</b>
4.37	220.5	11400	15.0	

Analysis modified ASTM D3152 and ASTM D2325



## IAS Laboratories

2515 East University Drive  
Phoenix, Arizona 85034  
(602) 273-7248  
Fax (602) 275-3836

**Date:** April 28, 2016

**Submitted by:** Tetra Tech

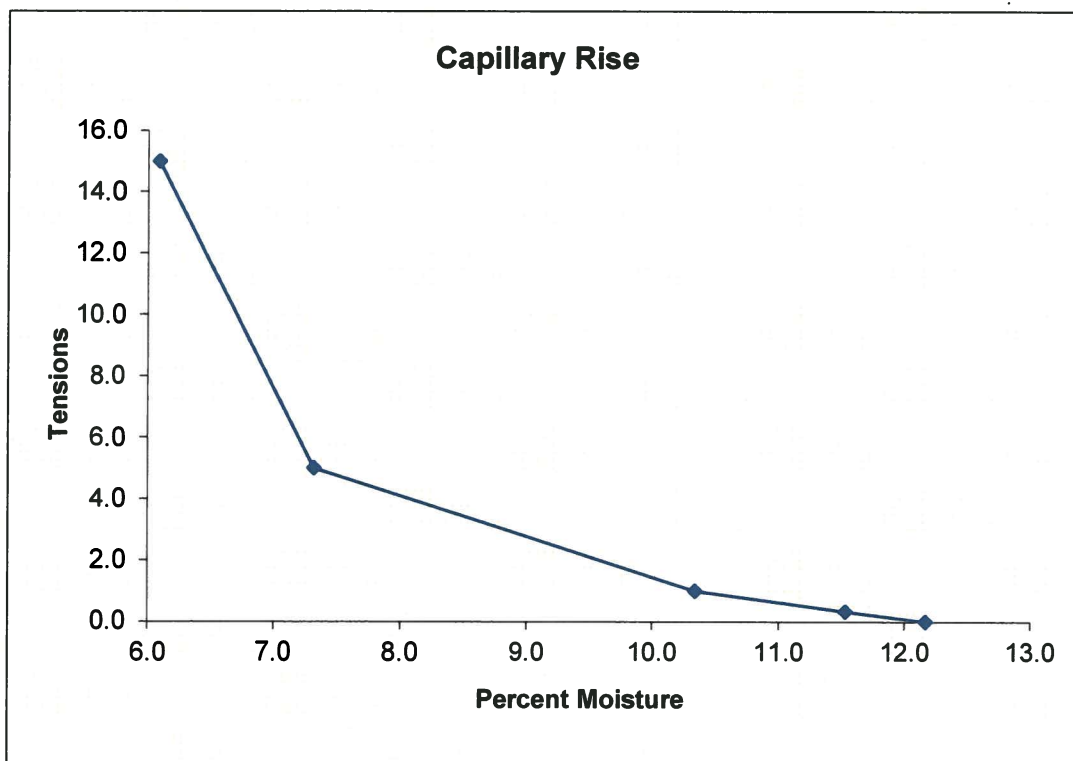
**Report to:** Keith A. Johnson

**Report #:** 6652671

**Date Received:** April 18, 2016

**Lab#:** 886

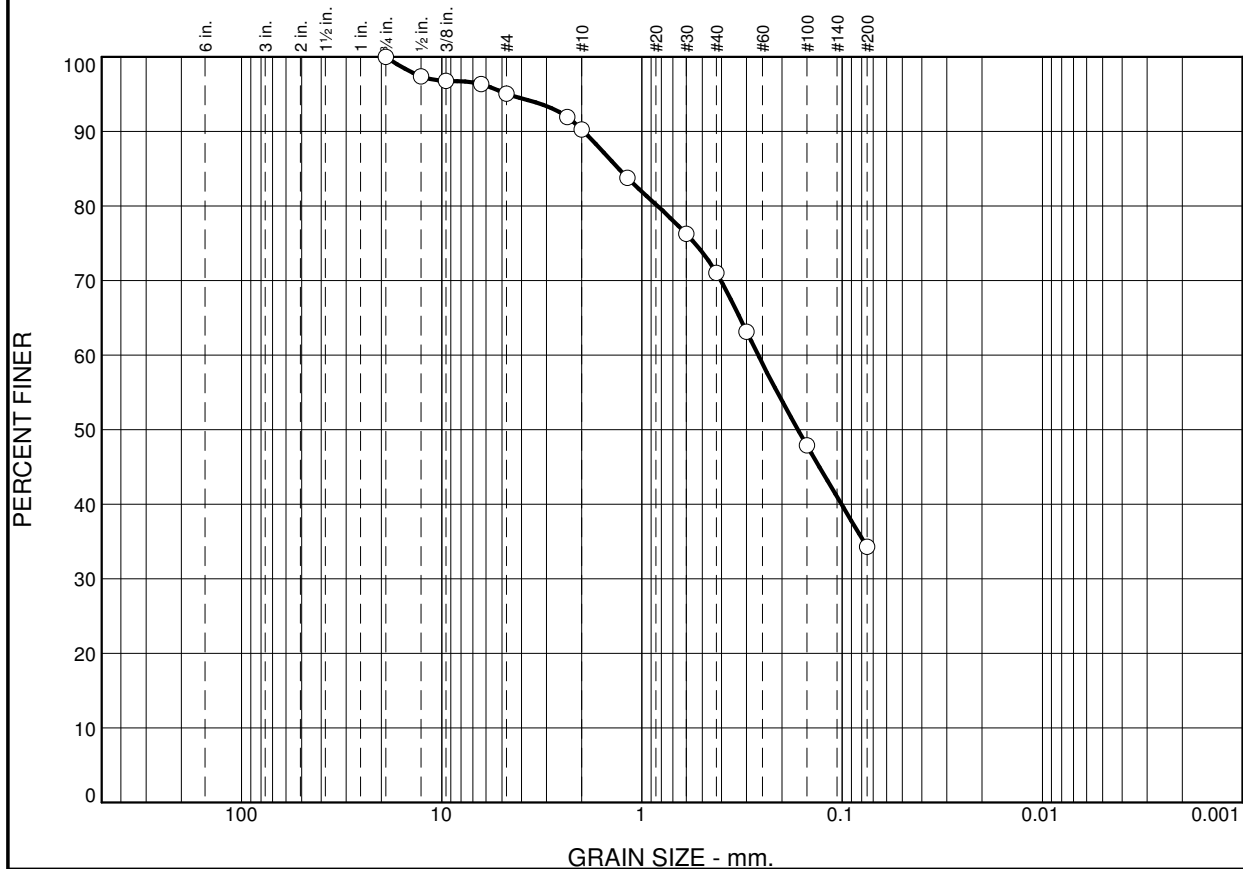
**Sender ID:** T16B



Moisture %	Equivalent Pressure		Tension Bars	
	psi	mmHg		
12.17	1.5	76	0.0	<b>Field Capacity</b>
11.53	4.9	251	0.33	
10.34	29.4	1520	1.0	
7.32	73.5	3800	5.0	<b>Wilting Point</b>
6.09	220.5	11400	15.0	

Analysis modified ASTM D3152 and ASTM D2325

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	5	5	19	37	34	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	97		
3/8"	96		
1/4"	95		
#4	92		
#8	90		
#10	84		
#16	76		
#30	71		
#40	63		
#50	48		
#100	34		
#200			

\* (no specification provided)

**Soil Description**

**Atterberg Limits**  
 PL=      LL=      PI=

**Coefficients**  
 D<sub>90</sub>= 1.9557      D<sub>85</sub>= 1.3048      D<sub>60</sub>= 0.2628  
 D<sub>50</sub>= 0.1663      D<sub>30</sub>=      D<sub>15</sub>=  
 D<sub>10</sub>=      C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS=      AASHTO=

**Remarks**

Location: T14A  
Sample Number: 16L0094

Date: 4-16-16

**Hoque & Associates, Inc.**  
**4325 South 34th Street**  
**Phoenix, Arizona 85040**

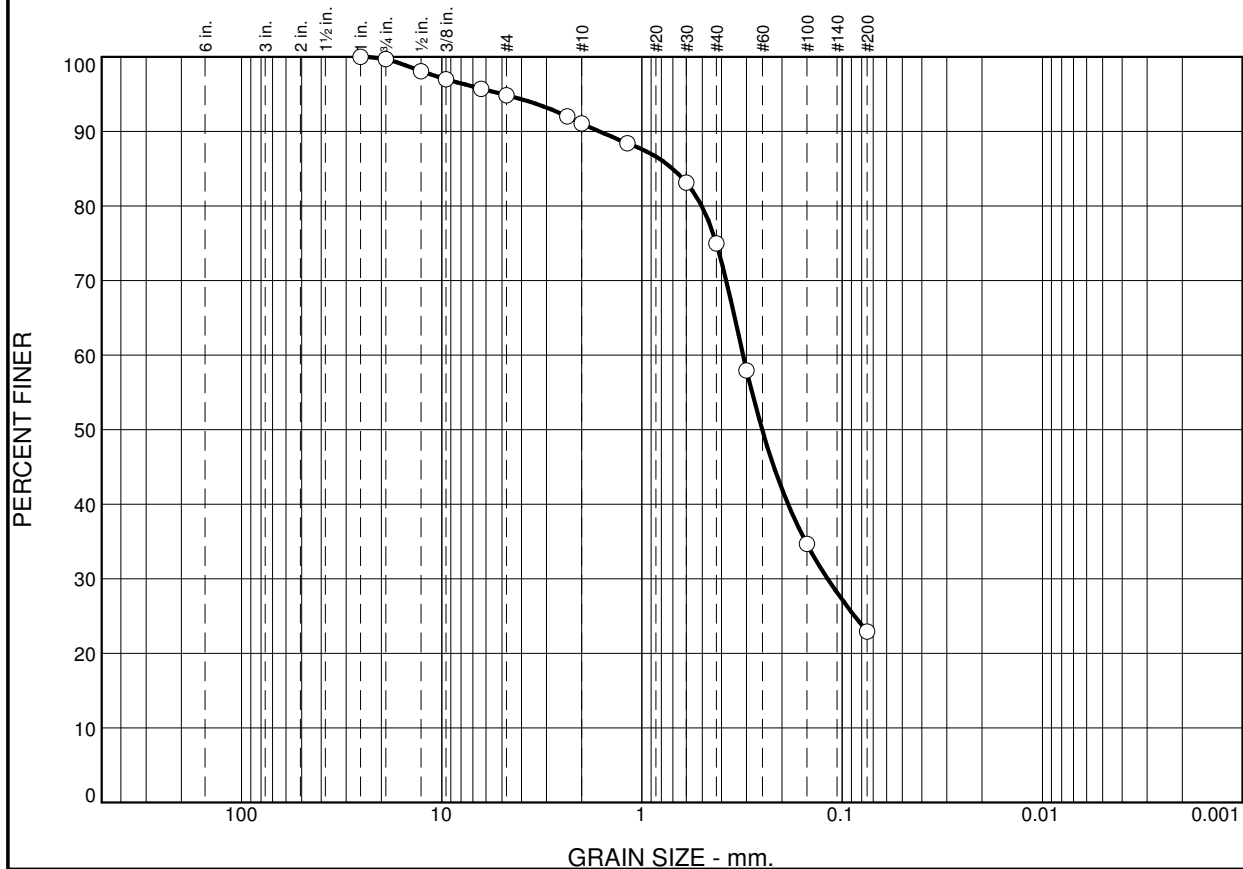
Client: Tetra Tech  
Project: Pickles Butte Landfill

Project No: 16042

Lab Number 16L0094

Tested By: AJ      Checked By: TT

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	5	4	16	52	23	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100		
3/4"	100		
1/2"	98		
3/8"	97		
1/4"	96		
#4	95		
#8	92		
#10	91		
#16	88		
#30	83		
#40	75		
#50	58		
#100	35		
#200	23		

\* (no specification provided)

<b><u>Soil Description</u></b>		
silty sand		
<b><u>Atterberg Limits</u></b>		
PL= NP	LL= NV	PI= NP
<b><u>Coefficients</u></b>		
D <sub>90</sub> = 1.6326	D <sub>85</sub> = 0.7020	D <sub>60</sub> = 0.3125
D <sub>50</sub> = 0.2508	D <sub>30</sub> = 0.1185	D <sub>15</sub> =
D <sub>10</sub> =	C <sub>u</sub> =	C <sub>c</sub> =
<b><u>Classification</u></b>		
USCS= SM	AASHTO= A-2-4(0)	
<b><u>Remarks</u></b>		

Location: T14B  
Sample Number: 16L0095

Date: 4-16-16

**Hoque & Associates, Inc.**  
4325 South 34th Street  
Phoenix, Arizona 85040

Client: Tetra Tech  
Project: Pickles Butte Landfill

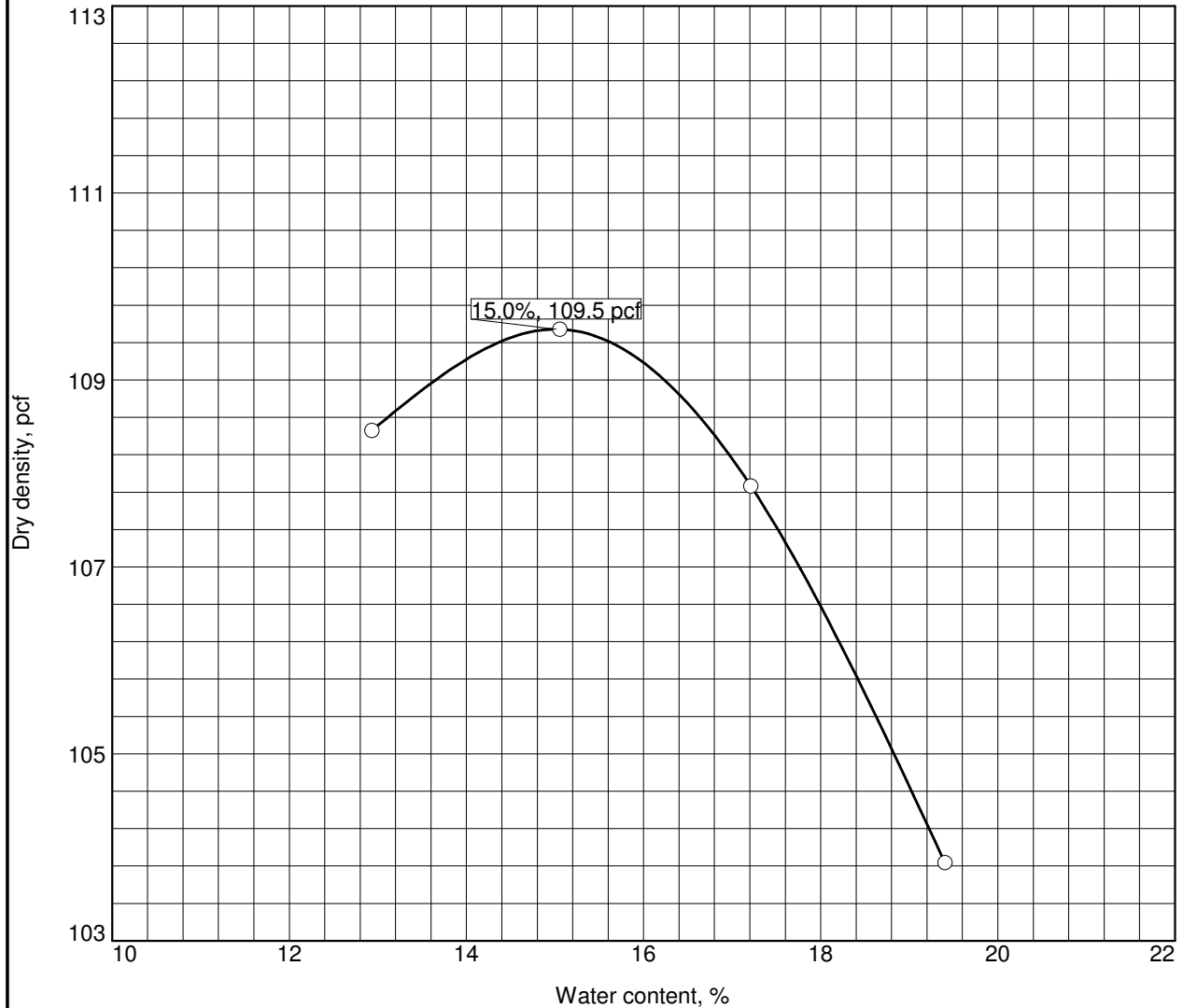
Project No: 16042

Lab Number 16L0095

Tested By: AJ Checked By: TT



# COMPACTION TEST REPORT



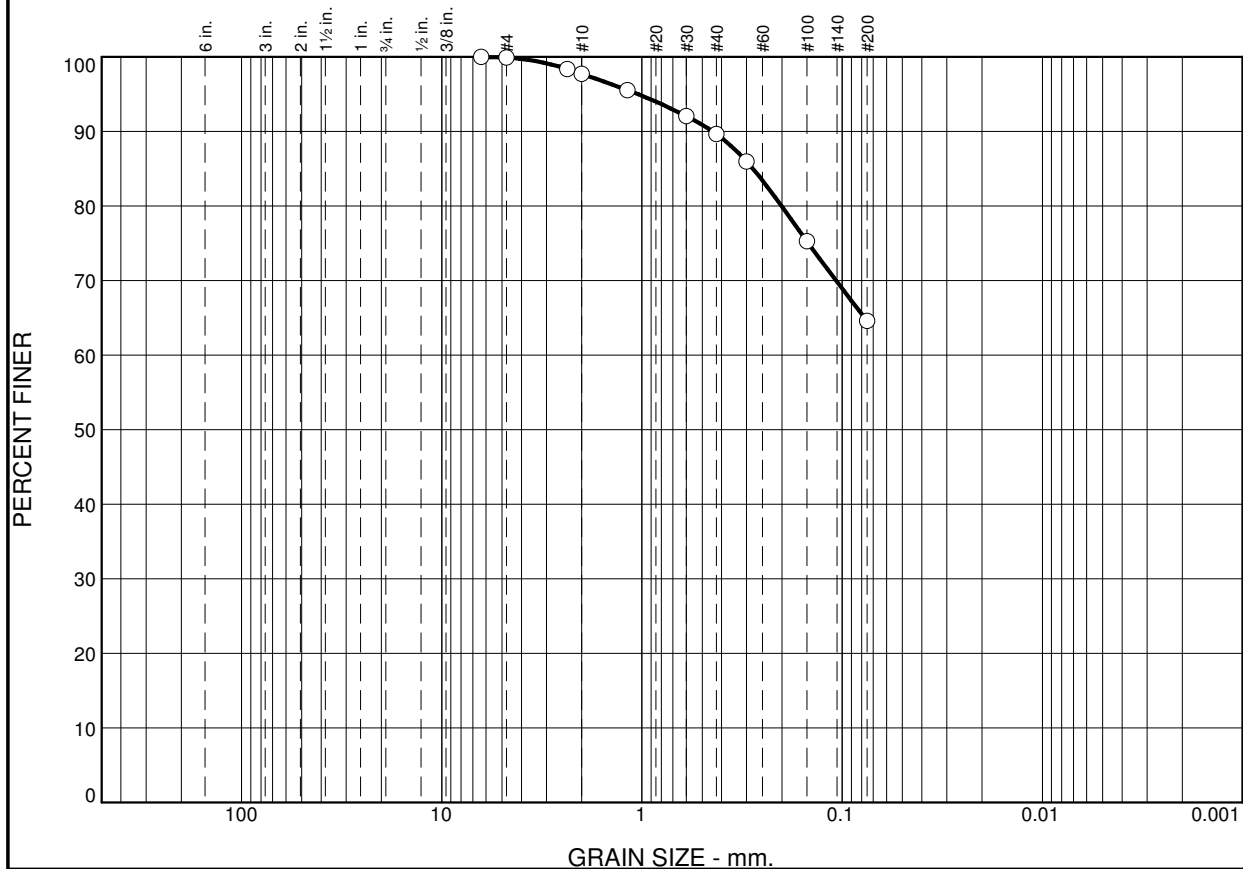
Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SM	A-2-4(0)			NV	NP	5	23

TEST RESULTS		MATERIAL DESCRIPTION	
Maximum dry density = 109.5 pcf		silty sand	
Optimum moisture = 15.0 %			
Project No. 16042      Client: Tetra Tech		Remarks:	
Project: Pickles Butte Landfill			
Location: T14B      Sample Number: 16L0095			
Hoque & Associates, Inc. 4325 South 34th Street Phoenix, Arizona 85040		Lab Number 16L0095	

Tested By: AJ      Checked By: TT

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	2	8	25	65	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/4"	100		
#4	100		
#8	98		
#10	98		
#16	96		
#30	92		
#40	90		
#50	86		
#100	75		
#200	65		

\* (no specification provided)

## Soil Description

sandy silt

## Atterberg Limits

PL= NP

LL= NV

PI= NP

## Coefficients

D<sub>90</sub>= 0.4430

D<sub>85</sub>= 0.2793

D<sub>60</sub>=

D<sub>50</sub>=

D<sub>30</sub>=

D<sub>15</sub>=

D<sub>10</sub>=

C<sub>u</sub>=

C<sub>c</sub>=

## Classification

USCS= ML

AASHTO= A-4(0)

## Remarks

Location: T15A  
Sample Number: 16L0096

Date: 4-16-16

**Hoque & Associates, Inc.**  
4325 South 34th Street  
Phoenix, Arizona 85040

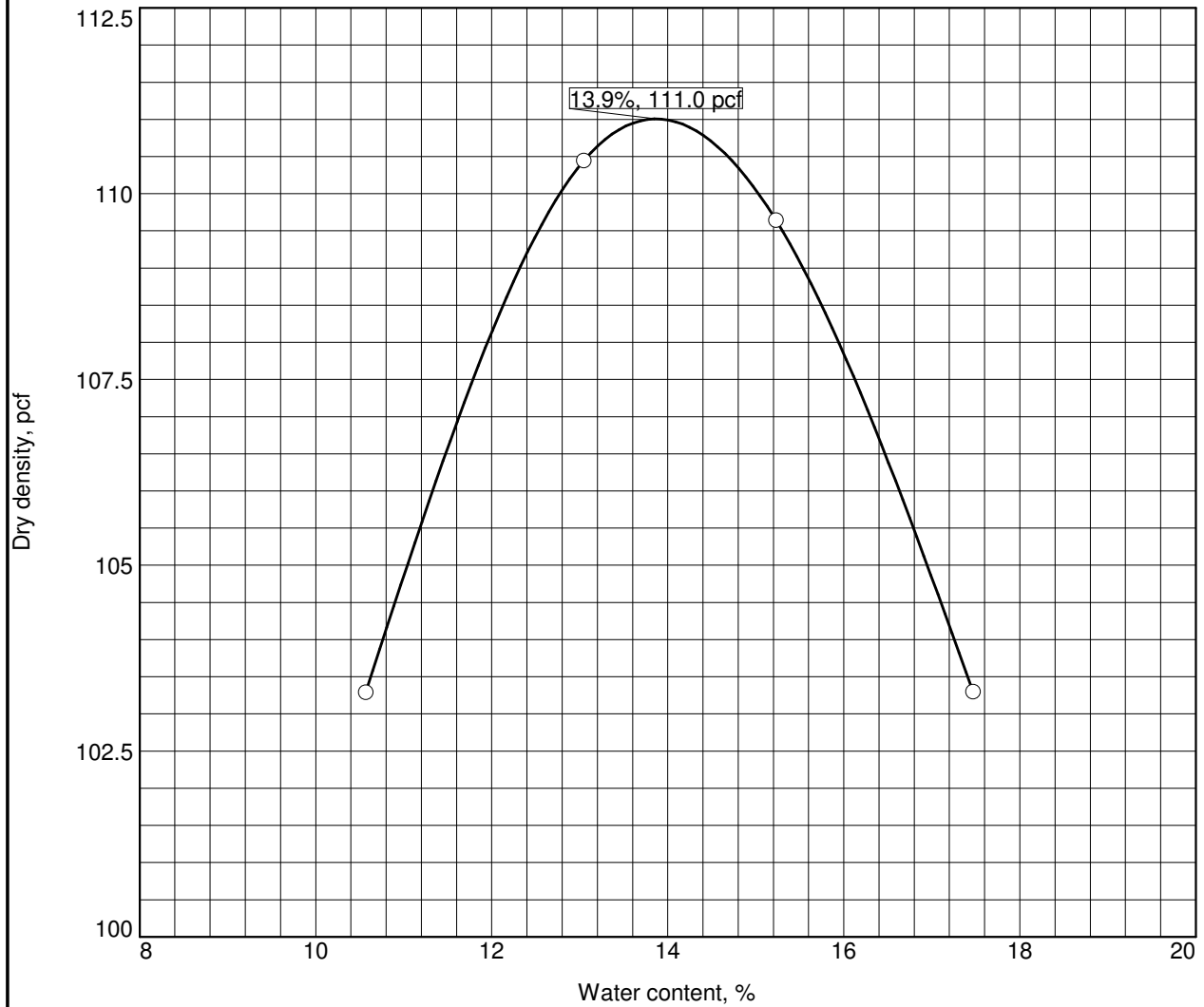
Client: Tetra Tech  
Project: Pickles Butte Landfill

Project No: 16042

Lab Number 16L0096

Tested By: AJ Checked By: TT

# COMPACTION TEST REPORT



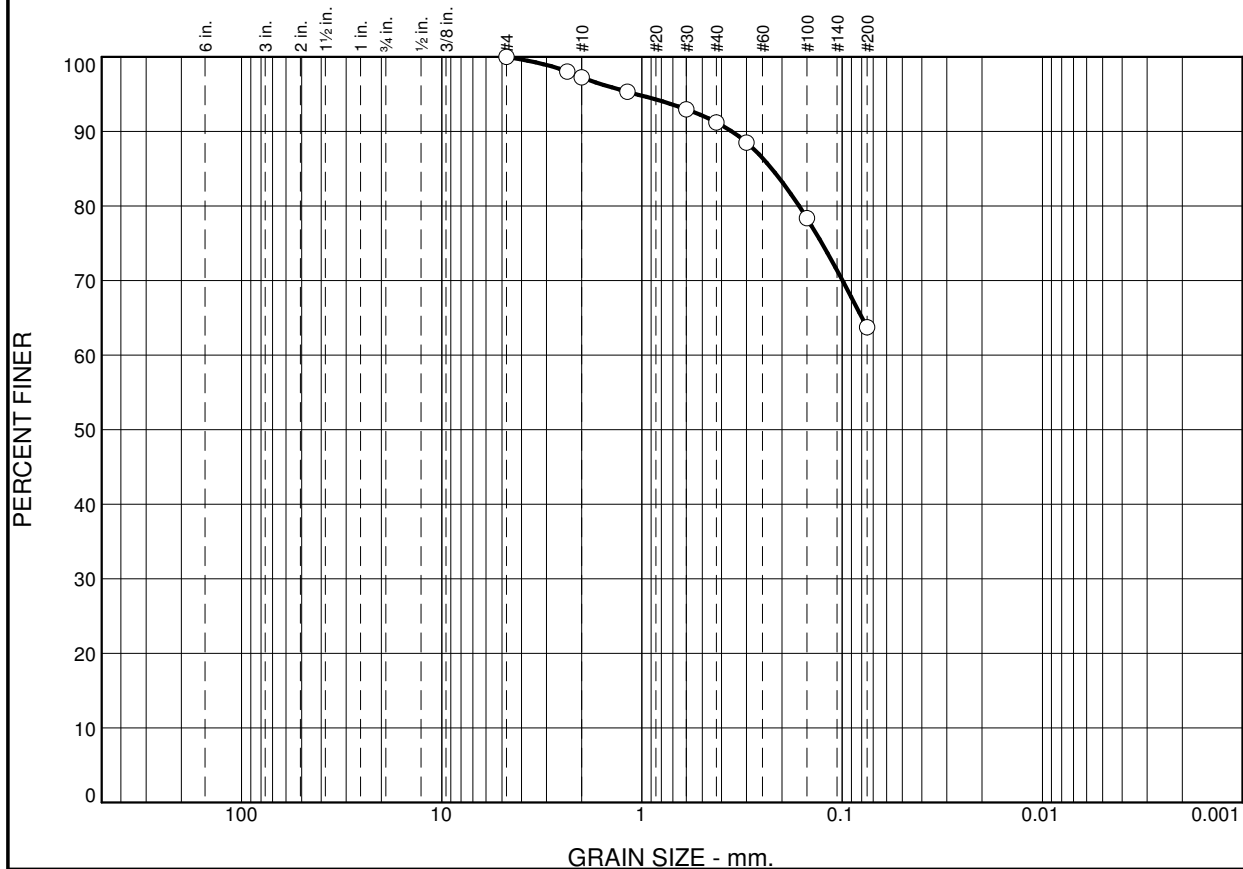
Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	ML	A-4(0)			NV	NP	0	65

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 111.0 pcf Optimum moisture = 13.9 %	sandy silt
<b>Project No.</b> 16042 <b>Client:</b> Tetra Tech <b>Project:</b> Pickles Butte Landfill  <b>Location:</b> T15A <b>Sample Number:</b> 16L0096 <b>Hoque &amp; Associates, Inc.</b> <b>4325 South 34th Street</b> <b>Phoenix, Arizona 85040</b>	<b>Remarks:</b>          <div style="text-align: right;"><b>Lab Number</b> 16L0096</div>

Tested By: AJ      Checked By: TT

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	3	6	27	64	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	98		
#10	97		
#16	95		
#30	93		
#40	91		
#50	88		
#100	78		
#200	64		

\* (no specification provided)

## Soil Description

### Atterberg Limits

PL= LL= PI=

### Coefficients

D<sub>90</sub>= 0.3558 D<sub>85</sub>= 0.2245 D<sub>60</sub>=  
D<sub>50</sub>= D<sub>30</sub>= D<sub>15</sub>=  
D<sub>10</sub>= C<sub>u</sub>= C<sub>c</sub>=

### Classification

USCS= AASHTO=

### Remarks

Location: T16A  
Sample Number: 16L0097

Date: 4-16-16

**Hoque & Associates, Inc.**  
**4325 South 34th Street**  
**Phoenix, Arizona 85040**

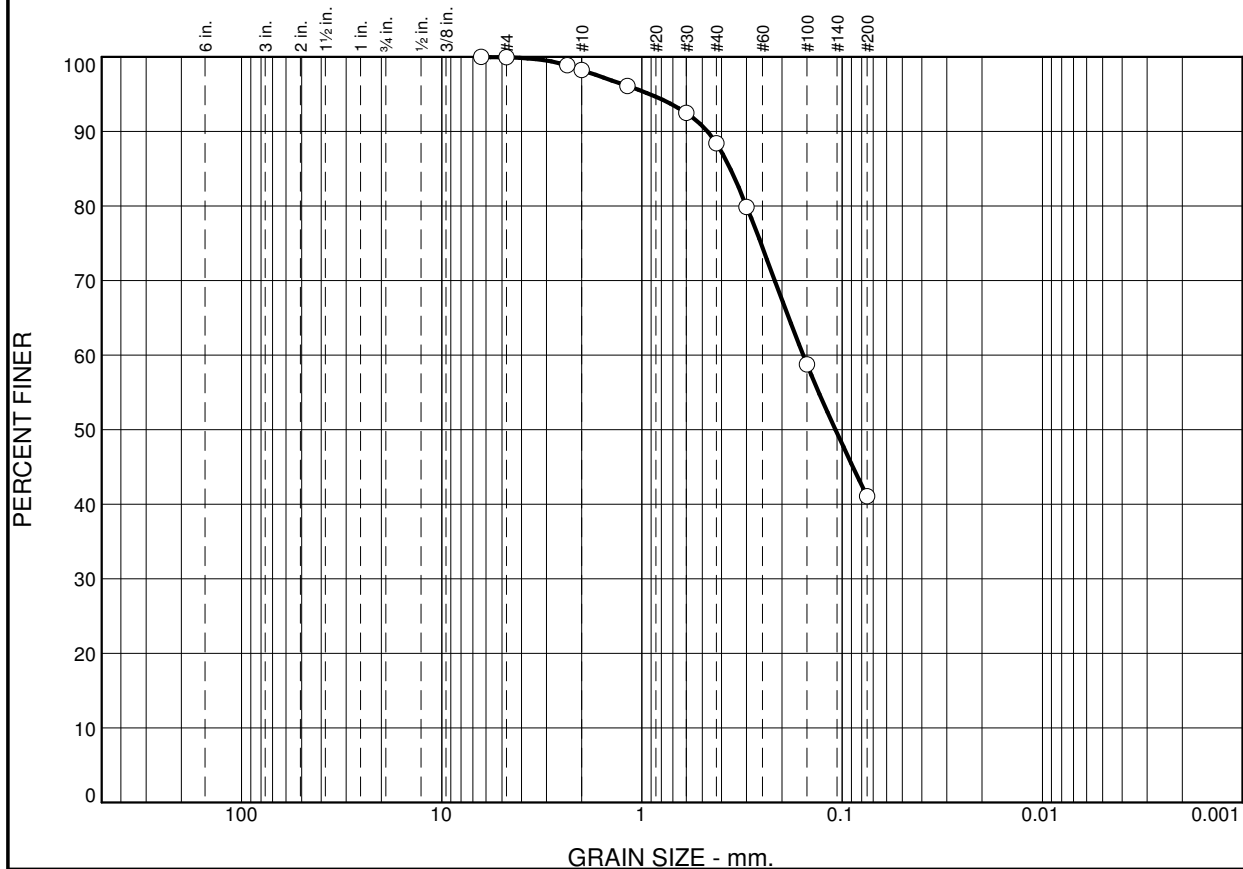
Client: Tetra Tech  
Project: Pickles Butte Landfill

Project No: 16042

Lab Number 16L0097

Tested By: AJ Checked By: TT

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	2	10	47	41	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/4"	100		
#4	100		
#8	99		
#10	98		
#16	96		
#30	92		
#40	88		
#50	80		
#100	59		
#200	41		

\* (no specification provided)

**Soil Description**  
silty sand

**Atterberg Limits**  
 PL= NP      LL= NV      PI= NP

**Coefficients**  
 D<sub>90</sub>= 0.4697      D<sub>85</sub>= 0.3623      D<sub>60</sub>= 0.1565  
 D<sub>50</sub>= 0.1082      D<sub>30</sub>=      D<sub>15</sub>=  
 D<sub>10</sub>=      C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS= SM      AASHTO= A-4(0)

**Remarks**

Location: T16B  
Sample Number: 16L0098

Date: 4-16-16

**Hoque & Associates, Inc.**  
4325 South 34th Street  
Phoenix, Arizona 85040

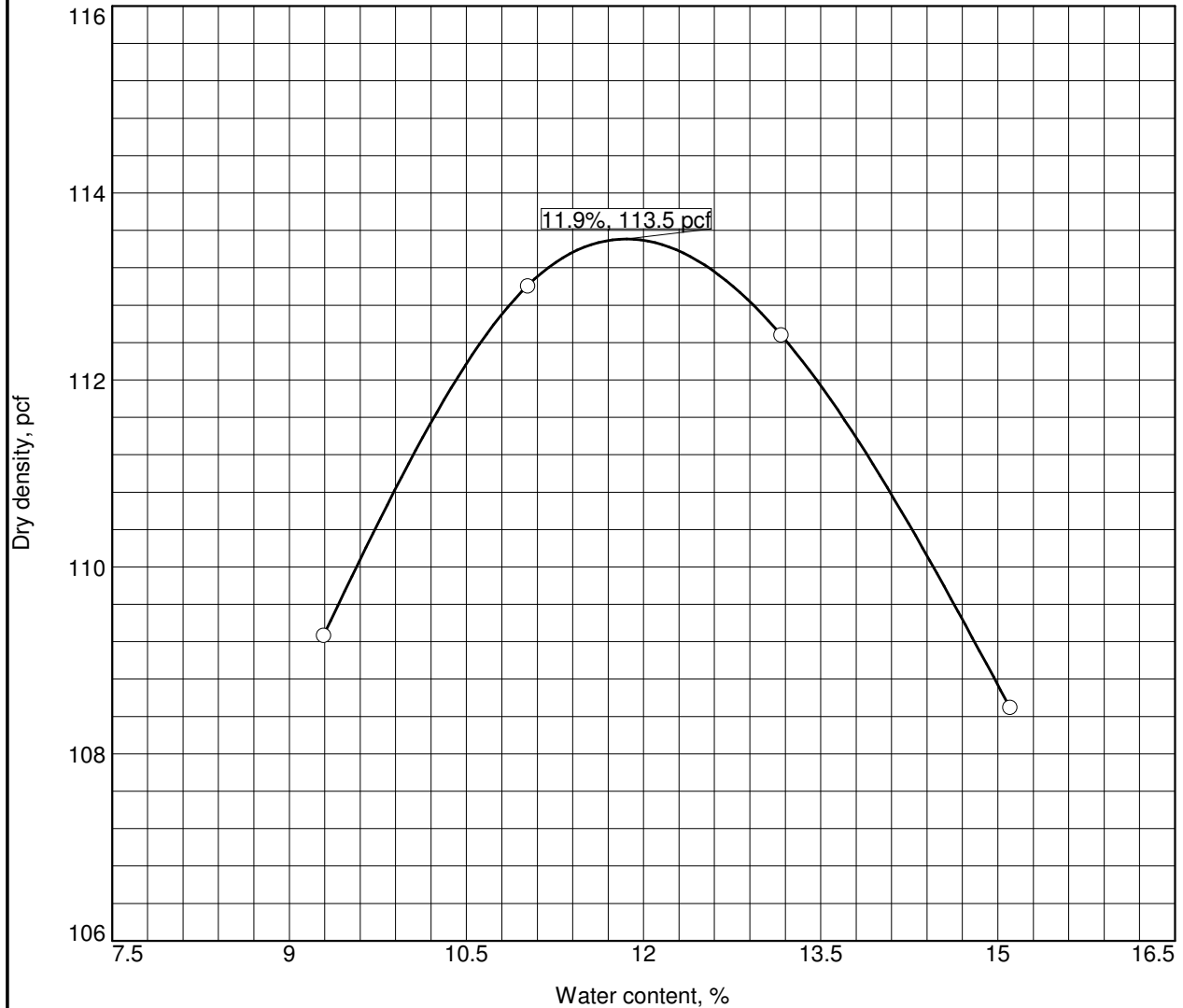
Client: Tetra Tech  
Project: Pickles Butte Landfill

Project No: 16042

Lab Number 16L0098

Tested By: AJ      Checked By: TT

# COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SM	A-4(0)			NV	NP	0	41

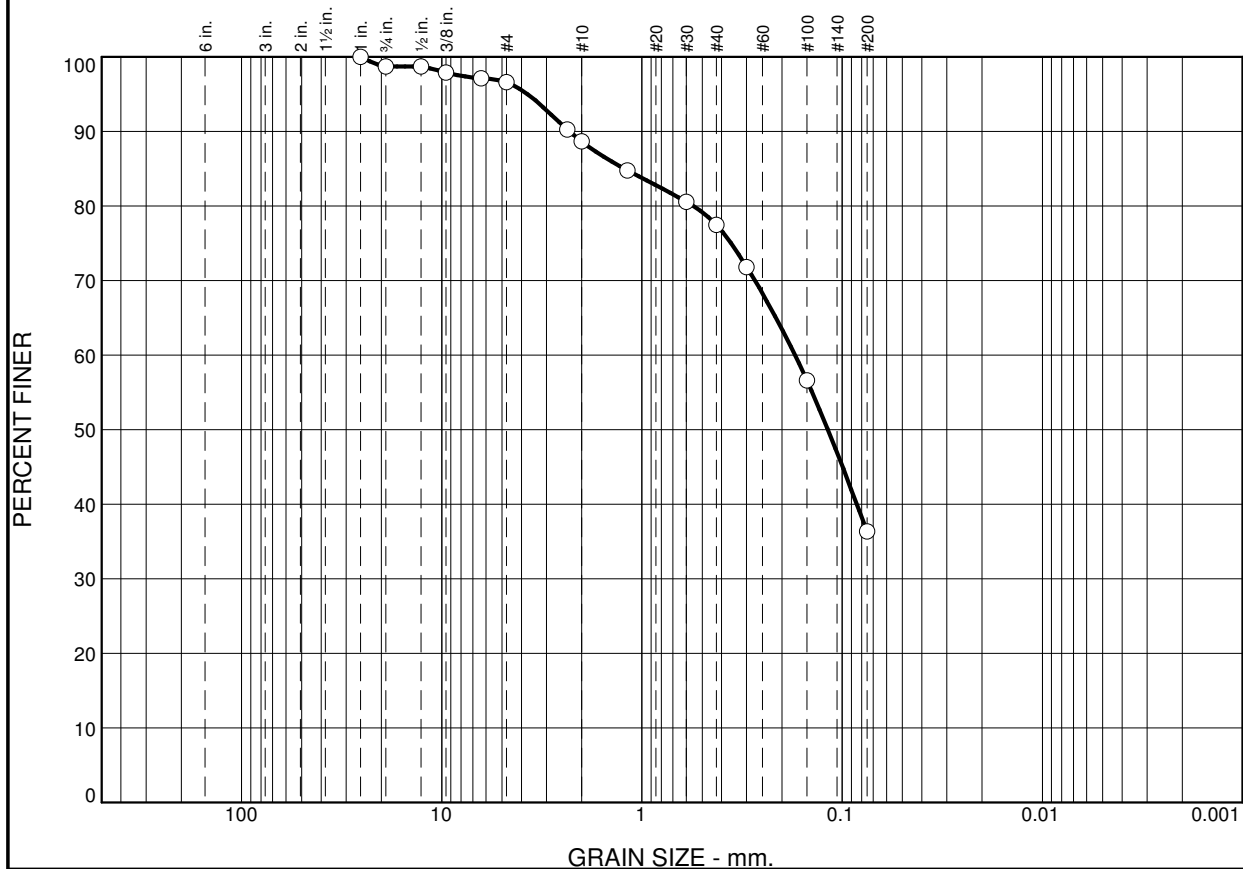
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 113.5 pcf Optimum moisture = 11.9 %	silty sand

<b>Project No.</b> 16042 <b>Client:</b> Tetra Tech <b>Project:</b> Pickles Butte Landfill  <b>Location:</b> T16B <b>Sample Number:</b> 16L0098	<b>Remarks:</b>
<b>Hoque &amp; Associates, Inc.</b> 4325 South 34th Street Phoenix, Arizona 85040	

**Lab Number** 16L0098

Tested By: AJ      Checked By: TT

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	1	2	8	12	41	36	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100		
3/4"	99		
1/2"	99		
3/8"	98		
1/4"	97		
#4	97		
#8	90		
#10	89		
#16	85		
#30	81		
#40	77		
#50	72		
#100	57		
#200	36		

\* (no specification provided)

**Soil Description**

**Atterberg Limits**  
 PL=      LL=      PI=

**Coefficients**  
 D<sub>90</sub>= 2.2967      D<sub>85</sub>= 1.2234      D<sub>60</sub>= 0.1719  
 D<sub>50</sub>= 0.1180      D<sub>30</sub>=      D<sub>15</sub>=  
 D<sub>10</sub>=      C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS=      AASHTO=

**Remarks**

Location: T16C  
Sample Number: 16L0099

Date: 4-16-16

**Hoque & Associates, Inc.**  
4325 South 34th Street  
Phoenix, Arizona 85040

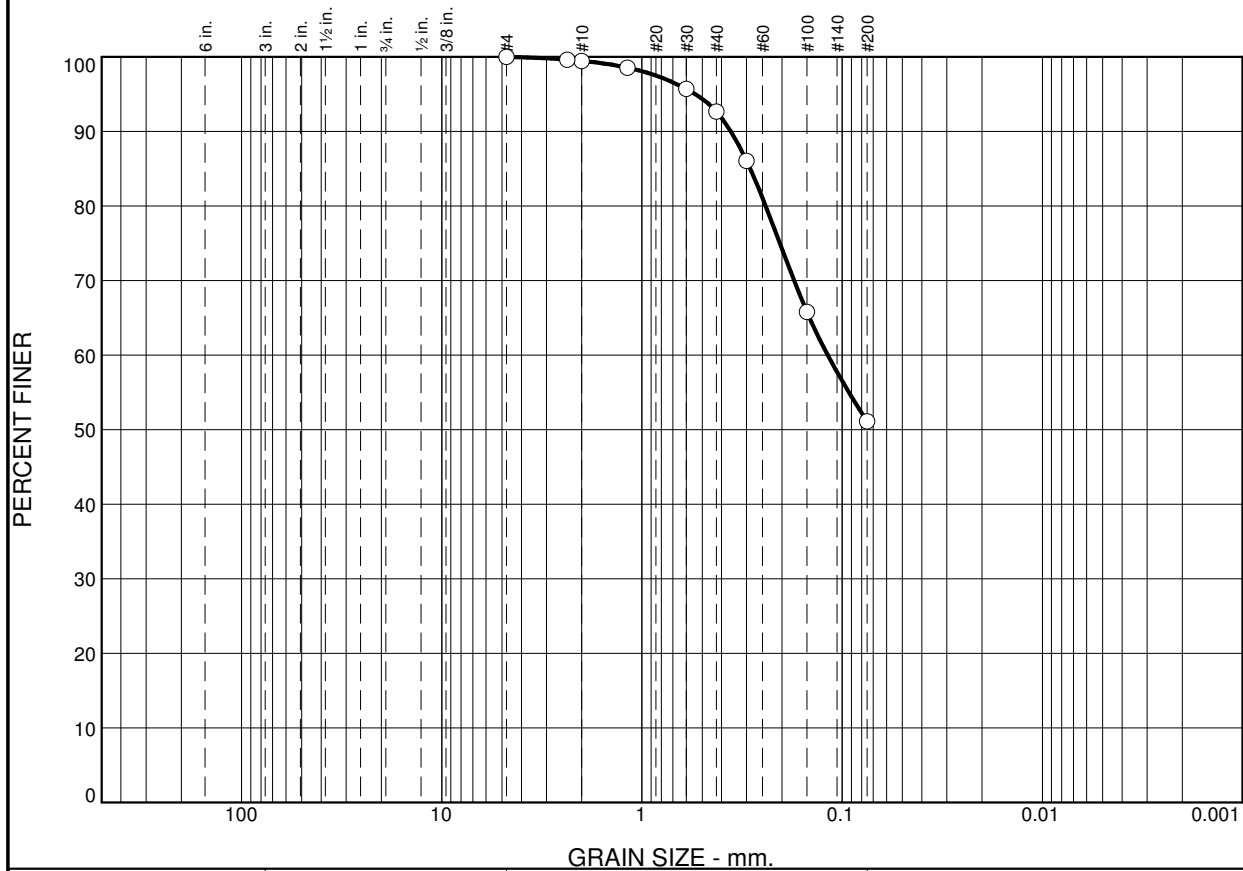
Client: Tetra Tech  
Project: Pickles Butte Landfill

Project No: 16042

Lab Number 16L0099

Tested By: AJ      Checked By: TT

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	6	42	51	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	100		
#10	99		
#16	99		
#30	96		
#40	93		
#50	86		
#100	66		
#200	51		

\* (no specification provided)

**Soil Description**

**Atterberg Limits**  
 PL=      LL=      PI=

**Coefficients**  
 D<sub>90</sub>= 0.3599      D<sub>85</sub>= 0.2880      D<sub>60</sub>= 0.1182  
 D<sub>50</sub>=      D<sub>30</sub>=      D<sub>15</sub>=  
 D<sub>10</sub>=      C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS=      AASHTO=

**Remarks**

Location: T17A  
 Sample Number: 16L0100

Date: 4-16-16

**Hoque & Associates, Inc.**  
 4325 South 34th Street  
 Phoenix, Arizona 85040

Client: Tetra Tech  
 Project: Pickles Butte Landfill

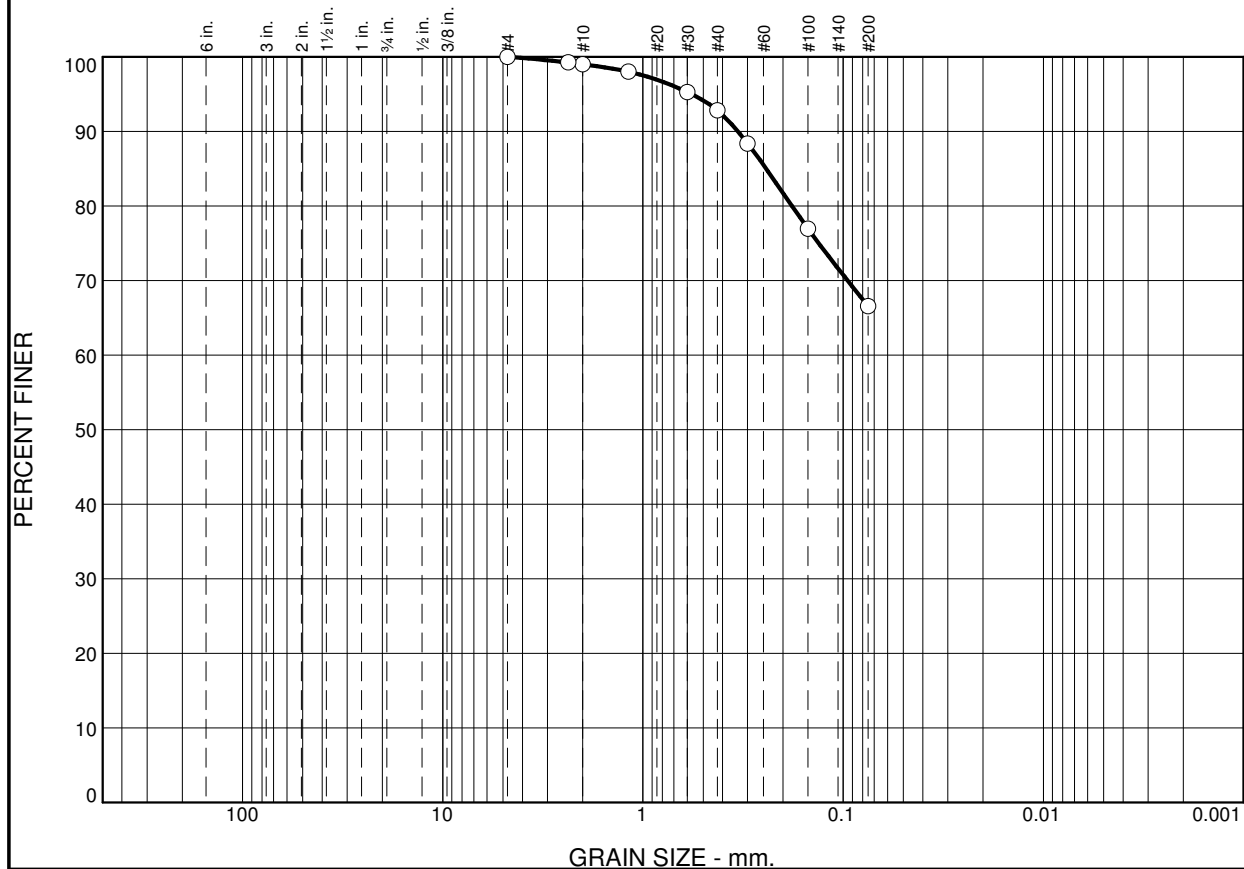
Project No: 16042

Lab Number 16L0100

Tested By: AJ      Checked By: TT



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	6	26	67	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	99		
#10	99		
#16	98		
#30	95		
#40	93		
#50	88		
#100	77		
#200	67		

\* (no specification provided)

**Soil Description**

**Atterberg Limits**  
 PL=      LL=      PI=

**Coefficients**  
 D<sub>90</sub>= 0.3360      D<sub>85</sub>= 0.2425      D<sub>60</sub>=  
 D<sub>50</sub>=      D<sub>30</sub>=      D<sub>15</sub>=  
 D<sub>10</sub>=      C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
 USCS=      AASHTO=

**Remarks**

Location: T18A  
 Sample Number: 16L0101

Date: 4-16-16

**Hoque & Associates, Inc.**  
 4325 South 34th Street  
 Phoenix, Arizona 85040

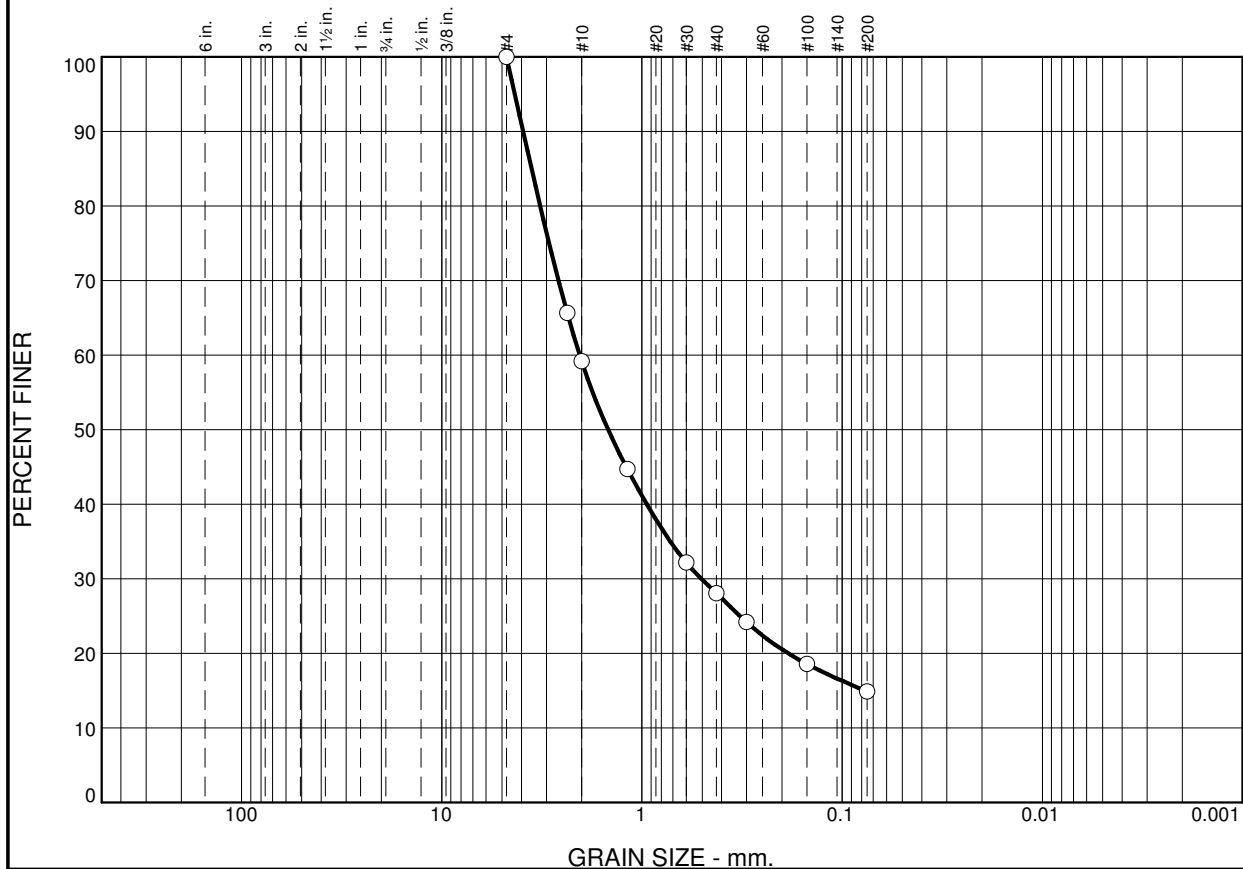
Client: Tetra Tech  
 Project: Pickles Butte Landfill

Project No: 16042

Lab Number 16L0101

Tested By: AJ      Checked By: TT

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	41	31	13	15	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	66		
#10	59		
#16	45		
#30	32		
#40	28		
#50	24		
#100	19		
#200	15		

\* (no specification provided)

## Soil Description

silty sand

## Atterberg Limits

PL= 42

LL= 64

PI= 22

## Coefficients

D<sub>90</sub>= 3.9244

D<sub>85</sub>= 3.5604

D<sub>60</sub>= 2.0461

D<sub>50</sub>= 1.4768

D<sub>30</sub>= 0.5046

D<sub>15</sub>= 0.0768

D<sub>10</sub>=

C<sub>u</sub>=

C<sub>c</sub>=

## Classification

USCS= SM

AASHTO= A-2-7(0)

## Remarks

Location: T18B  
Sample Number: 16L0102

Date: 4-16-16

**Hoque & Associates, Inc.**  
4325 South 34th Street  
Phoenix, Arizona 85040

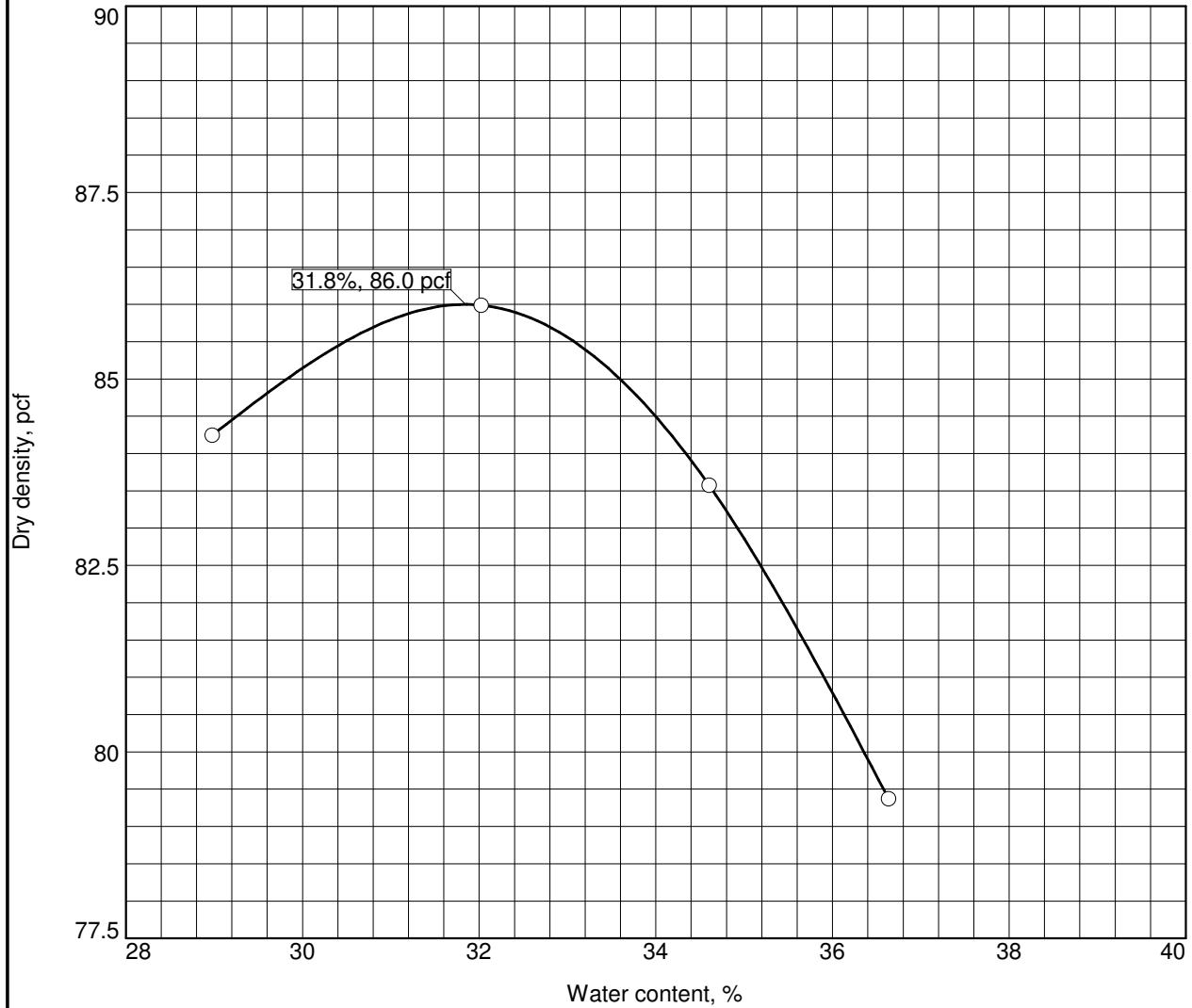
Client: Tetra Tech  
Project: Pickles Butte Landfill

Project No: 16042

Lab Number 16L0102

Tested By: AJ Checked By: TT

# COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SM	A-2-7(0)			64	22	0	15

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 86.0 pcf	silty sand
Optimum moisture = 31.8 %	

<b>Project No.</b> 16042 <b>Client:</b> Tetra Tech <b>Project:</b> Pickles Butte Landfill  <b>Location:</b> T18B <b>Sample Number:</b> 16L0102	<b>Remarks:</b>          
<b>Hoque &amp; Associates, Inc.</b> 4325 South 34th Street Phoenix, Arizona 85040	

**Lab Number** 16L0102

Tested By: AJ      Checked By: TT

# PERMEABILITY



4325 South 34th Street  
Phoenix, Arizona 85040  
Tel : 480-921-1368  
Fax : 480-921-0194

Client :	Tetra Tech BAS	HA Project No. :	16042
Project :	Pickles Butte Sanitary Landfill	HA Lab No.:	16L0095
Location:	Nampa, ID	Date Received :	4/16/16
		Test Type:	
Material :	Silty Sand	Method:	ASTM D5084
Mat. Source :	T14B	Tested By :	AJ/TT
Sampled By :	Client	Test Dates :	4/28/2016
Sampled Date :		Notes:	
Submitted by :	Client		

Sample No.:	16L0095
Dry density (pcf):	96.3
Moisture Content:	15.6%

Cell Pressure (psi):	66.0
Top Pressure (psi):	60.0
Bottom Pressure (psi):	61.0
Bias Pressure (psi):	1.0

Volume of flow (cm <sup>3</sup> ):	24.3
Length of sample (cm):	11.7
Area of sample (cm <sup>2</sup> ):	41.5
Time of flow (sec):	173.0

Permeability, k = 7.98E-01 in/hr 5.63E-04 cm/sec)

# PERMEABILITY



4325 South 34th Street  
Phoenix, Arizona 85040  
Tel : 480-921-1368  
Fax : 480-921-0194

Client :	Tetra Tech BAS	HA Project No. :	16042
Project :	Pickles Butte Sanitary Landfill	HA Lab No.:	16L0096
Location:	Nampa, ID	Date Received :	4/16/16
		Test Type:	
Material :	Sandy Silt	Method:	ASTM D5084
Mat. Source :	T15A	Tested By :	AJ/TT
Sampled By :	Client	Test Dates :	5/10/2016
Sampled Date :		Notes:	
Submitted by :	Client		

Sample No.:	16L0096
Dry density (pcf):	96.3
Moisture Content:	14.6%

Cell Pressure (psi):	67.0
Top Pressure (psi):	60.0
Bottom Pressure (psi):	62.0
Bias Pressure (psi):	2.0

Volume of flow (cm <sup>3</sup> ):	23.7
Length of sample (cm):	12.2
Area of sample (cm <sup>2</sup> ):	40.2
Time of flow (sec):	1200.0

Permeability, k = 6.01E-02 in/hr 4.24E-05 cm/sec)

# PERMEABILITY



4325 South 34th Street  
Phoenix, Arizona 85040  
Tel : 480-921-1368  
Fax : 480-921-0194

Client :	Tetra Tech BAS	HA Project No. :	16042
Project :	Pickles Butte Sanitary Landfill	HA Lab No.:	16L0098
Location:	Nampa, ID	Date Received :	4/16/16
		Test Type:	
Material :	Silty Sand	Method:	ASTM D5084
Mat. Source :	T16B	Tested By :	AJ/TT
Sampled By :	Client	Test Dates :	5/12/2016
Sampled Date :		Notes:	
Submitted by :	Client		

Sample No.:	16L0098
Dry density (pcf):	95.3
Moisture Content:	12.0%

Cell Pressure (psi):	67.0
Top Pressure (psi):	60.0
Bottom Pressure (psi):	62.0
Bias Pressure (psi):	2.0

Volume of flow (cm <sup>3</sup> ):	24.0
Length of sample (cm):	12.5
Area of sample (cm <sup>2</sup> ):	40.8
Time of flow (sec):	300.0

Permeability, k = 2.46E-01 in/hr 1.74E-04 cm/sec)

# PERMEABILITY



4325 South 34th Street  
Phoenix, Arizona 85040  
Tel : 480-921-1368  
Fax : 480-921-0194

Client :	Tetra Tech BAS	HA Project No. :	16042
Project :	Pickles Butte Sanitary Landfill	HA Lab No.:	16L0102
Location:	Nampa, ID	Date Received :	4/16/16
		Test Type:	
Material :	Silty Sand	Method:	ASTM D5084
Mat. Source :	T18B	Tested By :	AJ/TT
Sampled By :	Client	Test Dates :	5/13/2016
Sampled Date :		Notes:	
Submitted by :	Client		

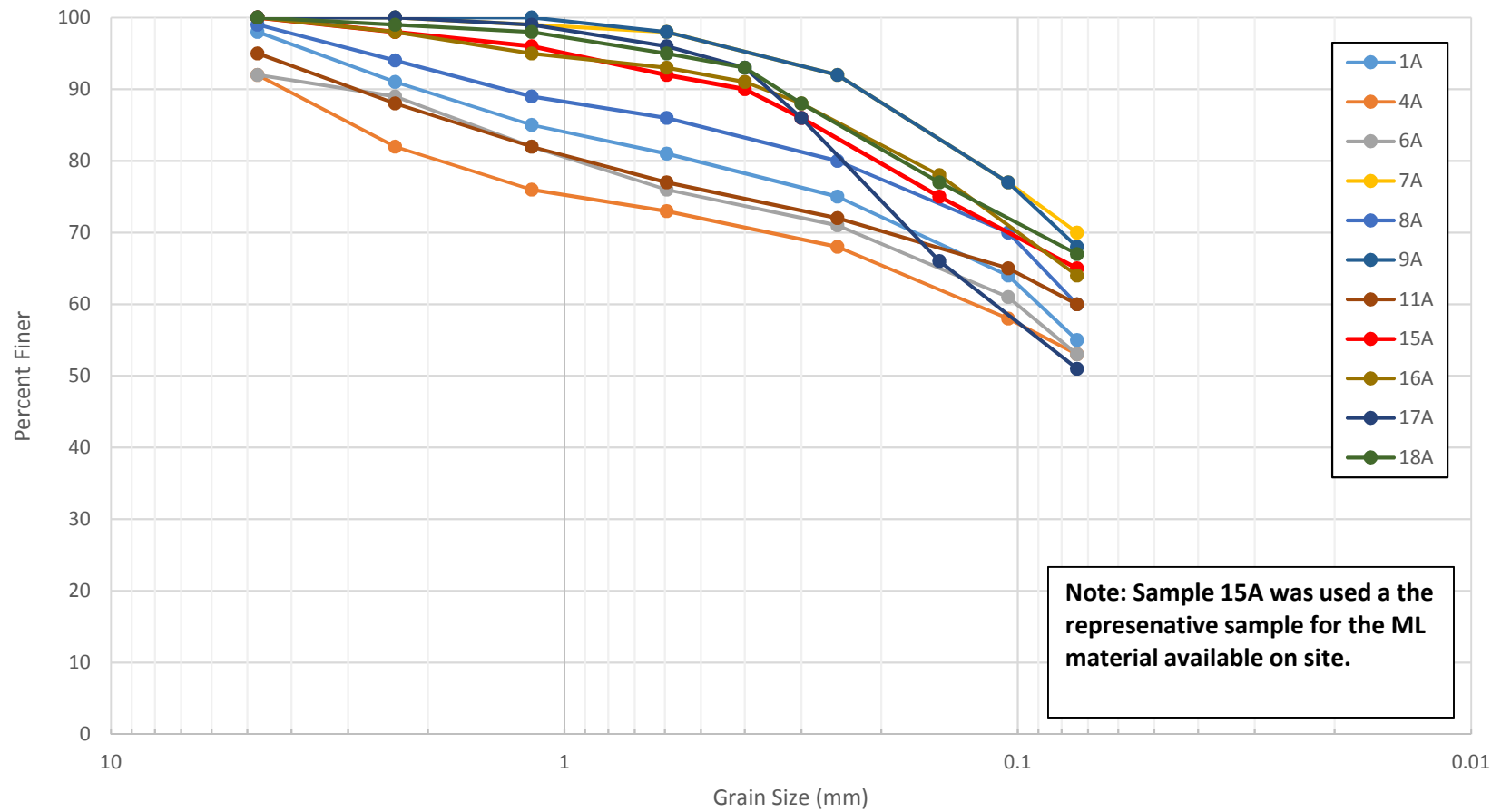
Sample No.:	16L0102
Dry density (pcf):	79.6
Moisture Content:	32.6%

Cell Pressure (psi):	68.0
Top Pressure (psi):	60.0
Bottom Pressure (psi):	63.0
Bias Pressure (psi):	3.0

Volume of flow (cm <sup>3</sup> ):	16.1
Length of sample (cm):	12.2
Area of sample (cm <sup>2</sup> ):	41.0
Time of flow (sec):	1860.0

Permeability, k = 1.73E-02 in/hr 1.22E-05 cm/sec)

Test Pit Sieve Data





## **APPENDIX C**

### **HELP MODEL**



SUB. V FC ONLY

```
*****
*****
**
**
**
**      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:\HELP3.7\pblf4.D4  
TEMPERATURE DATA FILE: C:\HELP3.7\pblf7.D7  
SOLAR RADIATION DATA FILE: C:\HELP3.7\pblf13.D13  
EVAPOTRANSPIRATION DATA: C:\HELP3.7\pblf11.D11  
SOIL AND DESIGN DATA FILE: C:\HELP3.7\pblf10d.D10  
OUTPUT DATA FILE: C:\HELP3.7\pblfoutd.OUT

TIME: 10:53      DATE: 5/27/2016

\*\*\*\*\*

TITLE: Pickles Butte Landfill HELP Model

\*\*\*\*\*

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	=	6.00	INCHES
POROSITY	=	0.3000	VOL/VOL
FIELD CAPACITY	=	0.1153	VOL/VOL
WILTING POINT	=	0.0609	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2147	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.174000001000E-03	CM/SEC

LAYER 2

-----

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 23

THICKNESS	=	18.00	INCHES
POROSITY	=	0.4610	VOL/VOL
FIELD CAPACITY	=	0.3600	VOL/VOL
WILTING POINT	=	0.2030	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2272	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.900000032000E-05	CM/SEC

LAYER 3

-----

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	12.00	INCHES
POROSITY	=	0.3000	VOL/VOL
FIELD CAPACITY	=	0.1153	VOL/VOL
WILTING POINT	=	0.0609	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0975	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.174000001000E-03	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

-----

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT  
SOIL DATA BASE USING SOIL TEXTURE #22 WITH A  
POOR STAND OF GRASS, A SURFACE SLOPE OF 3.0%  
AND A SLOPE LENGTH OF 800. FEET.

SCS RUNOFF CURVE NUMBER	=	93.30	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	74.200	ACRES
EVAPORATIVE ZONE DEPTH	=	32.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	6.055	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	12.498	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	4.507	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	6.548	INCHES
TOTAL INITIAL WATER	=	6.548	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

# EVAPOTRANSPIRATION AND WEATHER DATA

-----

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM  
BOISE IDAHO

STATION LATITUDE	=	43.57 DEGREES
MAXIMUM LEAF AREA INDEX	=	1.60
START OF GROWING SEASON (JULIAN DATE)	=	120
END OF GROWING SEASON (JULIAN DATE)	=	286
EVAPORATIVE ZONE DEPTH	=	32.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	8.90 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	51.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	40.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	66.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING  
COEFFICIENTS FOR BOISE IDAHO

## NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
1.64	1.07	1.03	1.19	1.21	0.95
0.26	0.40	0.58	0.75	1.29	1.34

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING  
COEFFICIENTS FOR BOISE IDAHO

## NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
29.90	36.10	41.40	48.60	57.40	65.80
74.60	72.00	63.20	51.90	39.70	32.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING  
COEFFICIENTS FOR BOISE IDAHO  
AND STATION LATITUDE = 43.57 DEGREES

\*\*\*\*\*

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	8.87	2389099.250	100.00
RUNOFF	0.122	32814.137	1.37
EVAPOTRANSPIRATION	8.542	2300750.000	96.30
PERC./LEAKAGE THROUGH LAYER 3	0.055903	15057.125	0.63
CHANGE IN WATER STORAGE	0.150	40477.312	1.69
SOIL WATER AT START OF YEAR	6.548	1763791.250	
SOIL WATER AT END OF YEAR	6.699	1804268.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.522	0.00

\*\*\*\*\*

\*\*\*\*\*

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	12.50	3366825.500	100.00
RUNOFF	2.202	593175.062	17.62
EVAPOTRANSPIRATION	11.072	2982311.500	88.58
PERC./LEAKAGE THROUGH LAYER 3	0.071692	19309.900	0.57
CHANGE IN WATER STORAGE	-0.846	-227972.328	-6.77
SOIL WATER AT START OF YEAR	6.699	1804268.620	
SOIL WATER AT END OF YEAR	5.852	1576296.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	1.013	0.00
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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	10.37	2793118.250	100.00
RUNOFF	0.471	126986.992	4.55
EVAPOTRANSPIRATION	8.657	2331760.500	83.48
PERC./LEAKAGE THROUGH LAYER 3	0.055279	14889.308	0.53
CHANGE IN WATER STORAGE	1.186	319481.687	11.44
SOIL WATER AT START OF YEAR	5.852	1576296.250	
SOIL WATER AT END OF YEAR	5.870	1581001.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.169	314777.031	11.27
ANNUAL WATER BUDGET BALANCE	0.0000	-0.367	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.09	2987047.500	100.00
RUNOFF	2.415	650378.437	21.77
EVAPOTRANSPIRATION	9.626	2592801.250	86.80
PERC./LEAKAGE THROUGH LAYER 3	0.049116	13229.138	0.44
CHANGE IN WATER STORAGE	-1.000	-269363.437	-9.02

SOIL WATER AT START OF YEAR	5.870	1581001.000	
SOIL WATER AT END OF YEAR	5.964	1606339.870	
SNOW WATER AT START OF YEAR	1.169	314777.031	10.54
SNOW WATER AT END OF YEAR	0.075	20074.695	0.67
ANNUAL WATER BUDGET BALANCE	0.0000	2.007	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	10.81	2911631.000	100.00
RUNOFF	0.771	207770.125	7.14
EVAPOTRANSPIRATION	9.041	2435242.000	83.64
PERC./LEAKAGE THROUGH LAYER 3	0.037338	10056.896	0.35
CHANGE IN WATER STORAGE	0.960	258561.094	8.88
SOIL WATER AT START OF YEAR	5.964	1606339.870	
SOIL WATER AT END OF YEAR	6.905	1859911.000	
SNOW WATER AT START OF YEAR	0.075	20074.695	0.69
SNOW WATER AT END OF YEAR	0.093	25064.602	0.86
ANNUAL WATER BUDGET BALANCE	0.0000	0.690	0.00

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	12.72	3426081.000	100.00



RUNOFF	1.390	374270.625	10.92
EVAPOTRANSPIRATION	11.459	3086372.500	90.08
PERC./LEAKAGE THROUGH LAYER 3	0.442056	119065.891	3.48
CHANGE IN WATER STORAGE	-0.570	-153628.109	-4.48
SOIL WATER AT START OF YEAR	6.905	1859911.000	
SOIL WATER AT END OF YEAR	6.428	1731347.500	
SNOW WATER AT START OF YEAR	0.093	25064.602	0.73
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.024	0.00

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# ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	13.14	3539207.250	100.00
RUNOFF	0.742	199955.609	5.65
EVAPOTRANSPIRATION	12.016	3236565.250	91.45
PERC./LEAKAGE THROUGH LAYER 3	0.076854	20700.316	0.58
CHANGE IN WATER STORAGE	0.304	81986.211	2.32
SOIL WATER AT START OF YEAR	6.428	1731347.500	
SOIL WATER AT END OF YEAR	6.732	1813333.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.371	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	11.65	3137881.750	100.00
RUNOFF	0.329	88492.320	2.82
EVAPOTRANSPIRATION	10.712	2885319.500	91.95
PERC./LEAKAGE THROUGH LAYER 3	0.820723	221058.469	7.04
CHANGE IN WATER STORAGE	-0.212	-56989.195	-1.82
SOIL WATER AT START OF YEAR	6.732	1813333.750	
SOIL WATER AT END OF YEAR	6.521	1756344.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.610	0.00

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	11.69	3148655.000	100.00
RUNOFF	2.643	711910.500	22.61
EVAPOTRANSPIRATION	9.629	2593408.750	82.37
PERC./LEAKAGE THROUGH LAYER 3	0.113877	30672.377	0.97
CHANGE IN WATER STORAGE	-0.696	-187337.031	-5.95
SOIL WATER AT START OF YEAR	6.521	1756344.500	
SOIL WATER AT END OF YEAR	5.825	1569007.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00

SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.273	0.00

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.07	3520352.500	100.00
RUNOFF	0.656	176705.781	5.02
EVAPOTRANSPIRATION	9.591	2583417.000	73.39
PERC./LEAKAGE THROUGH LAYER 3	0.068576	18470.771	0.52
CHANGE IN WATER STORAGE	2.754	741759.125	21.07
SOIL WATER AT START OF YEAR	5.825	1569007.500	
SOIL WATER AT END OF YEAR	7.448	2005971.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.132	304795.594	8.66
ANNUAL WATER BUDGET BALANCE	0.0000	-0.155	0.00

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ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.79	3175590.000	100.00
RUNOFF	2.169	584272.937	18.40
EVAPOTRANSPIRATION	10.103	2721161.250	85.69
PERC./LEAKAGE THROUGH LAYER 3	0.668952	180179.406	5.67

CHANGE IN WATER STORAGE	-1.151	-310024.281	-9.76
SOIL WATER AT START OF YEAR	7.448	2005971.000	
SOIL WATER AT END OF YEAR	7.317	1970814.250	
SNOW WATER AT START OF YEAR	1.132	304795.594	9.60
SNOW WATER AT END OF YEAR	0.111	29928.123	0.94
ANNUAL WATER BUDGET BALANCE	0.0000	0.578	0.00

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# ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	10.87	2927791.750	100.00
RUNOFF	0.926	249296.953	8.51
EVAPOTRANSPIRATION	9.921	2672258.750	91.27
PERC./LEAKAGE THROUGH LAYER 3	0.261589	70457.828	2.41
CHANGE IN WATER STORAGE	-0.238	-64223.773	-2.19
SOIL WATER AT START OF YEAR	7.317	1970814.250	
SOIL WATER AT END OF YEAR	7.190	1936518.500	
SNOW WATER AT START OF YEAR	0.111	29928.123	1.02
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	1.878	0.00

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# ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	9.94	2677299.500	100.00
RUNOFF	1.198	322810.375	12.06
EVAPOTRANSPIRATION	9.078	2445192.500	91.33
PERC./LEAKAGE THROUGH LAYER 3	0.429435	115666.703	4.32
CHANGE IN WATER STORAGE	-0.766	-206370.344	-7.71
SOIL WATER AT START OF YEAR	7.190	1936518.500	
SOIL WATER AT END OF YEAR	6.424	1730148.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.281	0.00

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ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	7.60	2047030.120	100.00
RUNOFF	0.791	212979.672	10.40
EVAPOTRANSPIRATION	7.583	2042554.250	99.78
PERC./LEAKAGE THROUGH LAYER 3	0.067967	18306.516	0.89
CHANGE IN WATER STORAGE	-0.842	-226810.125	-11.08
SOIL WATER AT START OF YEAR	6.424	1730148.250	
SOIL WATER AT END OF YEAR	5.581	1503338.120	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.263	0.00

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ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	11.59	3121720.500	100.00
RUNOFF	0.872	234904.312	7.52
EVAPOTRANSPIRATION	7.601	2047275.250	65.58
PERC./LEAKAGE THROUGH LAYER 3	0.045876	12356.621	0.40
CHANGE IN WATER STORAGE	3.071	827183.750	26.50
SOIL WATER AT START OF YEAR	5.581	1503338.120	
SOIL WATER AT END OF YEAR	8.113	2185306.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.539	145215.094	4.65
ANNUAL WATER BUDGET BALANCE	0.0000	0.561	0.00

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	10.93	2943952.250	100.00
RUNOFF	0.691	186116.141	6.32
EVAPOTRANSPIRATION	11.126	2996762.750	101.79
PERC./LEAKAGE THROUGH LAYER 3	0.066110	17806.449	0.60
CHANGE IN WATER STORAGE	-0.953	-256733.453	-8.72
SOIL WATER AT START OF YEAR	8.113	2185306.750	
SOIL WATER AT END OF YEAR	7.699	2073788.370	
SNOW WATER AT START OF YEAR	0.539	145215.094	4.93

SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.275	0.00

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ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.76	2898163.750	100.00
RUNOFF	2.110	568383.562	19.61
EVAPOTRANSPIRATION	8.327	2242764.750	77.39
PERC./LEAKAGE THROUGH LAYER 3	0.723350	194831.328	6.72
CHANGE IN WATER STORAGE	-0.400	-107816.508	-3.72
SOIL WATER AT START OF YEAR	7.699	2073788.370	
SOIL WATER AT END OF YEAR	7.299	1965971.870	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.433	0.00

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.93	2943951.750	100.00
RUNOFF	0.924	248821.531	8.45
EVAPOTRANSPIRATION	10.121	2726115.000	92.60
PERC./LEAKAGE THROUGH LAYER 3	0.175659	47313.098	1.61

CHANGE IN WATER STORAGE	-0.291	-78298.570	-2.66
SOIL WATER AT START OF YEAR	7.299	1965971.870	
SOIL WATER AT END OF YEAR	6.753	1818850.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.256	68822.648	2.34
ANNUAL WATER BUDGET BALANCE	0.0000	0.630	0.00

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# ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	9.00	2424114.250	100.00
RUNOFF	1.150	309728.625	12.78
EVAPOTRANSPIRATION	8.695	2341990.750	96.61
PERC./LEAKAGE THROUGH LAYER 3	0.164064	44189.949	1.82
CHANGE IN WATER STORAGE	-1.009	-271797.062	-11.21
SOIL WATER AT START OF YEAR	6.753	1818850.620	
SOIL WATER AT END OF YEAR	5.999	1615876.250	
SNOW WATER AT START OF YEAR	0.256	68822.648	2.84
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	1.850	0.00

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# ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	13.60	3663105.750	100.00
RUNOFF	0.767	206569.297	5.64
EVAPOTRANSPIRATION	10.457	2816442.250	76.89
PERC./LEAKAGE THROUGH LAYER 3	0.107298	28900.414	0.79
CHANGE IN WATER STORAGE	2.269	611192.937	16.69
SOIL WATER AT START OF YEAR	5.999	1615876.250	
SOIL WATER AT END OF YEAR	8.268	2227069.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.855	0.00

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# ANNUAL TOTALS FOR YEAR 21

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.43	2809279.000	100.00
RUNOFF	0.521	140218.187	4.99
EVAPOTRANSPIRATION	12.097	3258206.750	115.98
PERC./LEAKAGE THROUGH LAYER 3	0.594536	160135.906	5.70
CHANGE IN WATER STORAGE	-2.782	-749282.500	-26.67
SOIL WATER AT START OF YEAR	8.268	2227069.250	
SOIL WATER AT END OF YEAR	5.487	1477786.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.658	0.00

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ANNUAL TOTALS FOR YEAR 22

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	12.29	3310262.250	100.00
RUNOFF	0.281	75723.773	2.29
EVAPOTRANSPIRATION	9.590	2582943.250	78.03
PERC./LEAKAGE THROUGH LAYER 3	0.054511	14682.395	0.44
CHANGE IN WATER STORAGE	2.365	636912.375	19.24
SOIL WATER AT START OF YEAR	5.487	1477786.620	
SOIL WATER AT END OF YEAR	7.554	2034751.120	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.297	79947.797	2.42
ANNUAL WATER BUDGET BALANCE	0.0000	0.345	0.00

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ANNUAL TOTALS FOR YEAR 23

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.78	3172895.750	100.00
RUNOFF	0.561	151163.609	4.76
EVAPOTRANSPIRATION	11.446	3083013.500	97.17
PERC./LEAKAGE THROUGH LAYER 3	0.679910	183131.141	5.77
CHANGE IN WATER STORAGE	-0.907	-244411.500	-7.70
SOIL WATER AT START OF YEAR	7.554	2034751.120	
SOIL WATER AT END OF YEAR	6.757	1819895.500	

SNOW WATER AT START OF YEAR	0.297	79947.797	2.52
SNOW WATER AT END OF YEAR	0.187	50392.031	1.59
ANNUAL WATER BUDGET BALANCE	0.0000	-1.172	0.00

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# ANNUAL TOTALS FOR YEAR 24

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	13.23	3563448.250	100.00
RUNOFF	1.170	315244.406	8.85
EVAPOTRANSPIRATION	10.870	2927879.500	82.16
PERC./LEAKAGE THROUGH LAYER 3	0.272058	73277.734	2.06
CHANGE IN WATER STORAGE	0.917	247044.687	6.93
SOIL WATER AT START OF YEAR	6.757	1819895.500	
SOIL WATER AT END OF YEAR	7.861	2117332.250	
SNOW WATER AT START OF YEAR	0.187	50392.031	1.41
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	2.007	0.00

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# ANNUAL TOTALS FOR YEAR 25

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.39	3067851.250	100.00
RUNOFF	1.650	444373.750	14.48
EVAPOTRANSPIRATION	10.177	2741246.750	89.35

PERC./LEAKAGE THROUGH LAYER 3	0.338643	91212.172	2.97
CHANGE IN WATER STORAGE	-0.776	-208981.703	-6.81
SOIL WATER AT START OF YEAR	7.861	2117332.250	
SOIL WATER AT END OF YEAR	6.712	1807793.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.373	100556.844	3.28
ANNUAL WATER BUDGET BALANCE	0.0000	0.032	0.00

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ANNUAL TOTALS FOR YEAR 26

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.66	3140574.250	100.00
RUNOFF	0.962	259144.969	8.25
EVAPOTRANSPIRATION	10.217	2752023.750	87.63
PERC./LEAKAGE THROUGH LAYER 3	0.220196	59308.832	1.89
CHANGE IN WATER STORAGE	0.260	70097.492	2.23
SOIL WATER AT START OF YEAR	6.712	1807793.620	
SOIL WATER AT END OF YEAR	7.345	1978448.000	
SNOW WATER AT START OF YEAR	0.373	100556.844	3.20
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.931	0.00

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ANNUAL TOTALS FOR YEAR 27

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	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	13.52	3641558.250	100.00
RUNOFF	0.371	99814.758	2.74
EVAPOTRANSPIRATION	10.927	2943238.000	80.82
PERC./LEAKAGE THROUGH LAYER 3	0.588352	158470.266	4.35
CHANGE IN WATER STORAGE	1.634	440033.844	12.08
SOIL WATER AT START OF YEAR	7.345	1978448.000	
SOIL WATER AT END OF YEAR	8.979	2418481.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	1.108	0.00

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ANNUAL TOTALS FOR YEAR 28

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	16.06	4325696.500	100.00
RUNOFF	0.704	189702.687	4.39
EVAPOTRANSPIRATION	15.723	4235008.500	97.90
PERC./LEAKAGE THROUGH LAYER 3	0.751339	202370.266	4.68
CHANGE IN WATER STORAGE	-1.119	-301384.031	-6.97
SOIL WATER AT START OF YEAR	8.979	2418481.750	
SOIL WATER AT END OF YEAR	7.391	1990834.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.469	126263.078	2.92
ANNUAL WATER BUDGET BALANCE	0.0000	-0.995	0.00

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ANNUAL TOTALS FOR YEAR 29

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	12.88	3469176.750	100.00
RUNOFF	1.995	537381.687	15.49
EVAPOTRANSPIRATION	11.455	3085472.000	88.94
PERC./LEAKAGE THROUGH LAYER 3	0.290774	78318.930	2.26
CHANGE IN WATER STORAGE	-0.861	-231996.656	-6.69
SOIL WATER AT START OF YEAR	7.391	1990834.620	
SOIL WATER AT END OF YEAR	6.761	1821134.500	
SNOW WATER AT START OF YEAR	0.469	126263.078	3.64
SNOW WATER AT END OF YEAR	0.237	63966.609	1.84
ANNUAL WATER BUDGET BALANCE	0.0000	0.602	0.00

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ANNUAL TOTALS FOR YEAR 30

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	8.89	2394486.250	100.00
RUNOFF	0.519	139710.703	5.83
EVAPOTRANSPIRATION	8.560	2305513.000	96.28
PERC./LEAKAGE THROUGH LAYER 3	0.099665	26844.312	1.12
CHANGE IN WATER STORAGE	-0.288	-77583.344	-3.24
SOIL WATER AT START OF YEAR	6.761	1821134.500	
SOIL WATER AT END OF YEAR	6.504	1751890.620	

SNOW WATER AT START OF YEAR	0.237	63966.609	2.67
SNOW WATER AT END OF YEAR	0.207	55627.137	2.32
ANNUAL WATER BUDGET BALANCE	0.0000	1.357	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

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	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
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PRECIPITATION

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TOTALS	1.70	1.16	0.97	1.08	0.99	0.84
	0.27	0.51	0.55	0.76	1.28	1.39

STD. DEVIATIONS	0.68	0.44	0.44	0.56	0.53	0.40
	0.25	0.52	0.70	0.50	0.57	0.78

RUNOFF

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TOTALS	0.345	0.477	0.107	0.015	0.026	0.007
	0.002	0.011	0.030	0.003	0.013	0.034

STD. DEVIATIONS	0.463	0.489	0.181	0.026	0.062	0.016
	0.010	0.022	0.117	0.007	0.023	0.054

EVAPOTRANSPIRATION

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TOTALS	0.515	0.486	1.183	1.634	1.287	1.931
	0.744	0.473	0.434	0.497	0.461	0.502

STD. DEVIATIONS	0.133	0.212	0.247	0.426	0.477	0.587
	0.508	0.476	0.454	0.236	0.162	0.187

PERCOLATION/LEAKAGE THROUGH LAYER 3

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TOTALS	0.0097	0.0107	0.0298	0.0569	0.0380	0.0302
	0.0515	0.0189	0.0118	0.0090	0.0071	0.0061

STD. DEVIATIONS	0.0252	0.0289	0.0738	0.0896	0.0538	0.0319
	0.0447	0.0107	0.0053	0.0034	0.0023	0.0018

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	11.50	( 1.712)	3097928.5	100.00
RUNOFF	1.069	( 0.6917)	287960.75	9.295
EVAPOTRANSPIRATION	10.147	( 1.6215)	2733166.50	88.226
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.27972	( 0.25767)	75342.344	2.43202
CHANGE IN WATER STORAGE	0.005	( 1.3447)	1457.55	0.047

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PEAK DAILY VALUES FOR YEARS	1 THROUGH	30
	(INCHES)	(CU. FT.)
PRECIPITATION	1.68	452501.250
RUNOFF	0.946	254912.5620
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.029614	7976.34912
SNOW WATER	2.62	704739.1870
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.2818
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.1408

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.2072	0.2012
2	4.1248	0.2292
3	1.1722	0.0977
SNOW WATER	0.207	

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SUB. D COVER

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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:\HELP3.7\pblf4.D4  
TEMPERATURE DATA FILE: C:\HELP3.7\pblf7.D7  
SOLAR RADIATION DATA FILE: C:\HELP3.7\pblf13.D13  
EVAPOTRANSPIRATION DATA: C:\HELP3.7\pblf11.D11  
SOIL AND DESIGN DATA FILE: C:\HELP3.7\pblf10a.D10  
OUTPUT DATA FILE: C:\HELP3.7\pblfouta.OUT

TIME: 10:13 DATE: 5/27/2016

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TITLE: Pickles Butte Landfill HELP Model

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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

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TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	6.00	INCHES
POROSITY	=	0.3000	VOL/VOL
FIELD CAPACITY	=	0.1153	VOL/VOL
WILTING POINT	=	0.0609	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2147	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.174000001000E-03	CM/SEC

LAYER 2

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TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 23

THICKNESS	=	18.00	INCHES
POROSITY	=	0.4610	VOL/VOL
FIELD CAPACITY	=	0.3600	VOL/VOL
WILTING POINT	=	0.2030	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2272	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.900000032000E-05	CM/SEC

LAYER 3

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TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	12.00	INCHES
POROSITY	=	0.3000	VOL/VOL
FIELD CAPACITY	=	0.1153	VOL/VOL
WILTING POINT	=	0.0609	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0975	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.174000001000E-03	CM/SEC

LAYER 4

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TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1440.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

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NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT

SOIL DATA BASE USING SOIL TEXTURE #22 WITH A  
POOR STAND OF GRASS, A SURFACE SLOPE OF 3. %  
AND A SLOPE LENGTH OF 800. FEET.

SCS RUNOFF CURVE NUMBER	=	93.30	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	74.200	ACRES
EVAPORATIVE ZONE DEPTH	=	32.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	6.055	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	12.498	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	4.507	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	427.013	INCHES
TOTAL INITIAL WATER	=	427.013	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

#### EVAPOTRANSPIRATION AND WEATHER DATA

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NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM  
BOISE IDAHO

STATION LATITUDE	=	43.57 DEGREES
MAXIMUM LEAF AREA INDEX	=	1.60
START OF GROWING SEASON (JULIAN DATE)	=	120
END OF GROWING SEASON (JULIAN DATE)	=	286
EVAPORATIVE ZONE DEPTH	=	32.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	8.90 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	51.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	40.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	66.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING  
COEFFICIENTS FOR BOISE IDAHO

#### NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
1.64	1.07	1.03	1.19	1.21	0.95
0.26	0.40	0.58	0.75	1.29	1.34

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING  
COEFFICIENTS FOR BOISE IDAHO

#### NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
29.90	36.10	41.40	48.60	57.40	65.80
74.60	72.00	63.20	51.90	39.70	32.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING  
 COEFFICIENTS FOR BOISE IDAHO  
 AND STATION LATITUDE = 43.57 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
-----	-----	-----	-----
PRECIPITATION	8.87	2389099.250	100.00
RUNOFF	0.122	32814.137	1.37
EVAPOTRANSPIRATION	8.542	2300750.000	96.30
PERC./LEAKAGE THROUGH LAYER 4	0.047872	12894.003	0.54
CHANGE IN WATER STORAGE	0.158	42636.035	1.78
SOIL WATER AT START OF YEAR	427.013	115014200.000	
SOIL WATER AT END OF YEAR	427.171	115056832.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	4.923	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	12.50	3366825.500	100.00

RUNOFF	2.202	593175.062	17.62
EVAPOTRANSPIRATION	11.072	2982311.500	88.58
PERC./LEAKAGE THROUGH LAYER 4	0.071760	19328.338	0.57
CHANGE IN WATER STORAGE	-0.846	-227992.234	-6.77
SOIL WATER AT START OF YEAR	427.171	115056832.000	
SOIL WATER AT END OF YEAR	426.325	114828840.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	2.482	0.00

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# ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	10.37	2793118.250	100.00
RUNOFF	0.471	126986.992	4.55
EVAPOTRANSPIRATION	8.657	2331760.500	83.48
PERC./LEAKAGE THROUGH LAYER 4	0.047901	12901.983	0.46
CHANGE IN WATER STORAGE	1.194	321476.156	11.51
SOIL WATER AT START OF YEAR	426.325	114828840.000	
SOIL WATER AT END OF YEAR	426.350	114835544.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.169	314777.031	11.27
ANNUAL WATER BUDGET BALANCE	0.0000	-7.497	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.09	2987047.500	100.00
RUNOFF	2.415	650378.437	21.77
EVAPOTRANSPIRATION	9.626	2592801.250	86.80
PERC./LEAKAGE THROUGH LAYER 4	0.071855	19353.916	0.65
CHANGE IN WATER STORAGE	-1.023	-275492.719	-9.22
SOIL WATER AT START OF YEAR	426.350	114835544.000	
SOIL WATER AT END OF YEAR	426.421	114854752.000	
SNOW WATER AT START OF YEAR	1.169	314777.031	10.54
SNOW WATER AT END OF YEAR	0.075	20074.695	0.67
ANNUAL WATER BUDGET BALANCE	0.0000	6.492	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	10.81	2911631.000	100.00
RUNOFF	0.771	207770.125	7.14
EVAPOTRANSPIRATION	9.041	2435242.000	83.64
PERC./LEAKAGE THROUGH LAYER 4	0.023959	6453.201	0.22
CHANGE IN WATER STORAGE	0.973	262162.375	9.00
SOIL WATER AT START OF YEAR	426.421	114854752.000	
SOIL WATER AT END OF YEAR	427.376	115111920.000	
SNOW WATER AT START OF YEAR	0.075	20074.695	0.69
SNOW WATER AT END OF YEAR	0.093	25064.602	0.86



ANNUAL WATER BUDGET BALANCE	0.0000	3.090	0.00
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# ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	12.72	3426081.000	100.00
RUNOFF	1.390	374270.625	10.92
EVAPOTRANSPIRATION	11.459	3086372.500	90.08
PERC./LEAKAGE THROUGH LAYER 4	0.435700	117354.031	3.43
CHANGE IN WATER STORAGE	-0.564	-151912.359	-4.43
SOIL WATER AT START OF YEAR	427.376	115111920.000	
SOIL WATER AT END OF YEAR	426.905	114985072.000	
SNOW WATER AT START OF YEAR	0.093	25064.602	0.73
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-3.917	0.00

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# ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	13.14	3539207.250	100.00
RUNOFF	0.742	199955.609	5.65
EVAPOTRANSPIRATION	12.016	3236565.250	91.45
PERC./LEAKAGE THROUGH LAYER 4	0.095736	25786.098	0.73
CHANGE IN WATER STORAGE	0.285	76896.109	2.17

SOIL WATER AT START OF YEAR	426.905	114985072.000	
SOIL WATER AT END OF YEAR	427.190	115061968.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	3.951	0.00

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# ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.65	3137881.750	100.00
RUNOFF	0.329	88492.320	2.82
EVAPOTRANSPIRATION	10.712	2885319.500	91.95
PERC./LEAKAGE THROUGH LAYER 4	0.810339	218261.562	6.96
CHANGE IN WATER STORAGE	-0.201	-54184.836	-1.73
SOIL WATER AT START OF YEAR	427.190	115061968.000	
SOIL WATER AT END OF YEAR	426.989	115007784.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-6.855	0.00

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# ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.69	3148655.000	100.00

RUNOFF	2.643	711910.500	22.61
EVAPOTRANSPIRATION	9.629	2593408.750	82.37
PERC./LEAKAGE THROUGH LAYER 4	0.119618	32218.520	1.02
CHANGE IN WATER STORAGE	-0.701	-188890.703	-6.00
SOIL WATER AT START OF YEAR	426.989	115007784.000	
SOIL WATER AT END OF YEAR	426.288	114818896.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	7.798	0.00

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# ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	13.07	3520352.500	100.00
RUNOFF	0.656	176705.781	5.02
EVAPOTRANSPIRATION	9.591	2583417.000	73.39
PERC./LEAKAGE THROUGH LAYER 4	0.071794	19337.432	0.55
CHANGE IN WATER STORAGE	2.751	740896.375	21.05
SOIL WATER AT START OF YEAR	426.288	114818896.000	
SOIL WATER AT END OF YEAR	427.907	115255000.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.132	304795.594	8.66
ANNUAL WATER BUDGET BALANCE	0.0000	-4.122	0.00

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ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.79	3175590.000	100.00
RUNOFF	2.169	584272.937	18.40
EVAPOTRANSPIRATION	10.103	2721161.250	85.69
PERC./LEAKAGE THROUGH LAYER 4	0.657228	177021.641	5.57
CHANGE IN WATER STORAGE	-1.139	-306867.125	-9.66
SOIL WATER AT START OF YEAR	427.907	115255000.000	
SOIL WATER AT END OF YEAR	427.788	115223000.000	
SNOW WATER AT START OF YEAR	1.132	304795.594	9.60
SNOW WATER AT END OF YEAR	0.111	29928.123	0.94
ANNUAL WATER BUDGET BALANCE	0.0000	1.172	0.00

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ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	10.87	2927791.750	100.00
RUNOFF	0.926	249296.953	8.51
EVAPOTRANSPIRATION	9.921	2672258.750	91.27
PERC./LEAKAGE THROUGH LAYER 4	0.275191	74121.484	2.53
CHANGE IN WATER STORAGE	-0.252	-67887.102	-2.32
SOIL WATER AT START OF YEAR	427.788	115223000.000	
SOIL WATER AT END OF YEAR	427.647	115185040.000	
SNOW WATER AT START OF YEAR	0.111	29928.123	1.02

SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	1.549	0.00

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# ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	9.94	2677299.500	100.00
RUNOFF	1.198	322810.375	12.06
EVAPOTRANSPIRATION	9.078	2445192.500	91.33
PERC./LEAKAGE THROUGH LAYER 4	0.420962	113384.383	4.24
CHANGE IN WATER STORAGE	-0.758	-204089.094	-7.62
SOIL WATER AT START OF YEAR	427.647	115185040.000	
SOIL WATER AT END OF YEAR	426.889	114980952.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	1.357	0.00

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# ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	7.60	2047030.120	100.00
RUNOFF	0.791	212979.672	10.40
EVAPOTRANSPIRATION	7.583	2042554.250	99.78
PERC./LEAKAGE THROUGH LAYER 4	0.071805	19340.443	0.94

CHANGE IN WATER STORAGE	-0.846	-227844.281	-11.13
SOIL WATER AT START OF YEAR	426.889	114980952.000	
SOIL WATER AT END OF YEAR	426.043	114753104.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.038	0.00

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ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.59	3121720.500	100.00
RUNOFF	0.872	234904.312	7.52
EVAPOTRANSPIRATION	7.601	2047275.250	65.58
PERC./LEAKAGE THROUGH LAYER 4	0.047874	12894.790	0.41
CHANGE IN WATER STORAGE	3.069	826643.687	26.48
SOIL WATER AT START OF YEAR	426.043	114753104.000	
SOIL WATER AT END OF YEAR	428.573	115434536.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.539	145215.094	4.65
ANNUAL WATER BUDGET BALANCE	0.0000	2.457	0.00

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT

PRECIPITATION	10.93	2943952.250	100.00
RUNOFF	0.691	186116.141	6.32
EVAPOTRANSPIRATION	11.126	2996762.750	101.79
PERC./LEAKAGE THROUGH LAYER 4	0.047864	12892.110	0.44
CHANGE IN WATER STORAGE	-0.935	-251817.516	-8.55
SOIL WATER AT START OF YEAR	428.573	115434536.000	
SOIL WATER AT END OF YEAR	428.178	115327928.000	
SNOW WATER AT START OF YEAR	0.539	145215.094	4.93
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-1.333	0.00

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ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	10.76	2898163.750	100.00
RUNOFF	2.110	568383.562	19.61
EVAPOTRANSPIRATION	8.327	2242764.750	77.39
PERC./LEAKAGE THROUGH LAYER 4	0.724837	195231.984	6.74
CHANGE IN WATER STORAGE	-0.402	-108213.492	-3.73
SOIL WATER AT START OF YEAR	428.178	115327928.000	
SOIL WATER AT END OF YEAR	427.776	115219720.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-3.243	0.00

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.93	2943951.750	100.00
RUNOFF	0.924	248821.531	8.45
EVAPOTRANSPIRATION	10.121	2726115.000	92.60
PERC./LEAKAGE THROUGH LAYER 4	0.190744	51376.262	1.75
CHANGE IN WATER STORAGE	-0.306	-82363.898	-2.80
SOIL WATER AT START OF YEAR	427.776	115219720.000	
SOIL WATER AT END OF YEAR	427.215	115068528.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.256	68822.648	2.34
ANNUAL WATER BUDGET BALANCE	0.0000	2.793	0.00

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ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	9.00	2424114.250	100.00
RUNOFF	1.150	309728.625	12.78
EVAPOTRANSPIRATION	8.695	2341990.750	96.61
PERC./LEAKAGE THROUGH LAYER 4	0.153999	41479.113	1.71
CHANGE IN WATER STORAGE	-0.999	-269089.531	-11.10
SOIL WATER AT START OF YEAR	427.215	115068528.000	
SOIL WATER AT END OF YEAR	426.471	114868264.000	
SNOW WATER AT START OF YEAR	0.256	68822.648	2.84



SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	5.165	0.00

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# ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.60	3663105.750	100.00
RUNOFF	0.767	206569.297	5.64
EVAPOTRANSPIRATION	10.457	2816442.250	76.89
PERC./LEAKAGE THROUGH LAYER 4	0.119784	32263.312	0.88
CHANGE IN WATER STORAGE	2.257	607836.812	16.59
SOIL WATER AT START OF YEAR	426.471	114868264.000	
SOIL WATER AT END OF YEAR	428.728	115476104.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-5.930	0.00

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# ANNUAL TOTALS FOR YEAR 21

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.43	2809279.000	100.00
RUNOFF	0.521	140218.187	4.99
EVAPOTRANSPIRATION	12.097	3258206.750	115.98
PERC./LEAKAGE THROUGH LAYER 4	0.580092	156245.578	5.56

CHANGE IN WATER STORAGE	-2.767	-745394.937	-26.53
SOIL WATER AT START OF YEAR	428.728	115476104.000	
SOIL WATER AT END OF YEAR	425.960	114730704.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	3.404	0.00

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# ANNUAL TOTALS FOR YEAR 22

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.29	3310262.250	100.00
RUNOFF	0.281	75723.773	2.29
EVAPOTRANSPIRATION	9.590	2582943.250	78.03
PERC./LEAKAGE THROUGH LAYER 4	0.071836	19348.830	0.58
CHANGE IN WATER STORAGE	2.347	632243.562	19.10
SOIL WATER AT START OF YEAR	425.960	114730704.000	
SOIL WATER AT END OF YEAR	428.011	115283000.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.297	79947.797	2.42
ANNUAL WATER BUDGET BALANCE	0.0000	2.749	0.00

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# ANNUAL TOTALS FOR YEAR 23

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	11.78	3172895.750	100.00
RUNOFF	0.561	151163.609	4.76
EVAPOTRANSPIRATION	11.446	3083013.500	97.17
PERC./LEAKAGE THROUGH LAYER 4	0.664541	178991.453	5.64
CHANGE IN WATER STORAGE	-0.892	-240270.016	-7.57
SOIL WATER AT START OF YEAR	428.011	115283000.000	
SOIL WATER AT END OF YEAR	427.229	115072288.000	
SNOW WATER AT START OF YEAR	0.297	79947.797	2.52
SNOW WATER AT END OF YEAR	0.187	50392.031	1.59
ANNUAL WATER BUDGET BALANCE	0.0000	-2.970	0.00
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# ANNUAL TOTALS FOR YEAR 24

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.23	3563448.250	100.00
RUNOFF	1.170	315244.406	8.85
EVAPOTRANSPIRATION	10.870	2927879.500	82.16
PERC./LEAKAGE THROUGH LAYER 4	0.266548	71793.672	2.01
CHANGE IN WATER STORAGE	0.923	248528.750	6.97
SOIL WATER AT START OF YEAR	427.229	115072288.000	
SOIL WATER AT END OF YEAR	428.338	115371208.000	
SNOW WATER AT START OF YEAR	0.187	50392.031	1.41
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	2.015	0.00

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ANNUAL TOTALS FOR YEAR 25

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.39	3067851.250	100.00
RUNOFF	1.650	444373.750	14.48
EVAPOTRANSPIRATION	10.177	2741246.750	89.35
PERC./LEAKAGE THROUGH LAYER 4	0.359036	96704.930	3.15
CHANGE IN WATER STORAGE	-0.796	-214474.719	-6.99
SOIL WATER AT START OF YEAR	428.338	115371208.000	
SOIL WATER AT END OF YEAR	427.169	115056176.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.373	100556.844	3.28
ANNUAL WATER BUDGET BALANCE	0.0000	0.273	0.00

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ANNUAL TOTALS FOR YEAR 26

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.66	3140574.250	100.00
RUNOFF	0.962	259144.969	8.25
EVAPOTRANSPIRATION	10.217	2752023.750	87.63
PERC./LEAKAGE THROUGH LAYER 4	0.212044	57113.156	1.82
CHANGE IN WATER STORAGE	0.268	72297.055	2.30
SOIL WATER AT START OF YEAR	427.169	115056176.000	
SOIL WATER AT END OF YEAR	427.810	115229032.000	

SNOW WATER AT START OF YEAR	0.373	100556.844	3.20
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-4.820	0.00

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# ANNUAL TOTALS FOR YEAR 27

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	13.52	3641558.250	100.00
RUNOFF	0.371	99814.758	2.74
EVAPOTRANSPIRATION	10.927	2943238.000	80.82
PERC./LEAKAGE THROUGH LAYER 4	0.591302	159264.734	4.37
CHANGE IN WATER STORAGE	1.631	439232.531	12.06
SOIL WATER AT START OF YEAR	427.810	115229032.000	
SOIL WATER AT END OF YEAR	429.441	115668264.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	7.931	0.00

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# ANNUAL TOTALS FOR YEAR 28

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	16.06	4325696.500	100.00
RUNOFF	0.704	189702.687	4.39
EVAPOTRANSPIRATION	15.723	4235008.500	97.90

PERC./LEAKAGE THROUGH LAYER 4	0.756902	203868.562	4.71
CHANGE IN WATER STORAGE	-1.124	-302875.562	-7.00
SOIL WATER AT START OF YEAR	429.441	115668264.000	
SOIL WATER AT END OF YEAR	427.848	115239128.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.469	126263.078	2.92
ANNUAL WATER BUDGET BALANCE	0.0000	-7.786	0.00

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# ANNUAL TOTALS FOR YEAR 29

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	12.88	3469176.750	100.00
RUNOFF	1.995	537381.687	15.49
EVAPOTRANSPIRATION	11.455	3085472.000	88.94
PERC./LEAKAGE THROUGH LAYER 4	0.281518	75825.609	2.19
CHANGE IN WATER STORAGE	-0.852	-229503.375	-6.62
SOIL WATER AT START OF YEAR	427.848	115239128.000	
SOIL WATER AT END OF YEAR	427.227	115071920.000	
SNOW WATER AT START OF YEAR	0.469	126263.078	3.64
SNOW WATER AT END OF YEAR	0.237	63966.609	1.84
ANNUAL WATER BUDGET BALANCE	0.0000	0.626	0.00

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# ANNUAL TOTALS FOR YEAR 30

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	INCHES	CU. FEET	PERCENT
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PRECIPITATION	8.89	2394486.250	100.00
RUNOFF	0.519	139710.703	5.83
EVAPOTRANSPIRATION	8.560	2305513.000	96.28
PERC./LEAKAGE THROUGH LAYER 4	0.095640	25760.238	1.08
CHANGE IN WATER STORAGE	-0.284	-76506.164	-3.20
SOIL WATER AT START OF YEAR	427.227	115071920.000	
SOIL WATER AT END OF YEAR	426.974	115003752.000	
SNOW WATER AT START OF YEAR	0.237	63966.609	2.67
SNOW WATER AT END OF YEAR	0.207	55627.137	2.32
ANNUAL WATER BUDGET BALANCE	0.0000	8.254	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30						
	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION						
TOTALS	1.70 0.27	1.16 0.51	0.97 0.55	1.08 0.76	0.99 1.28	0.84 1.39
STD. DEVIATIONS	0.68 0.25	0.44 0.52	0.44 0.70	0.56 0.50	0.53 0.57	0.40 0.78
RUNOFF						
TOTALS	0.345 0.002	0.477 0.011	0.107 0.030	0.015 0.003	0.026 0.013	0.007 0.034
STD. DEVIATIONS	0.463 0.010	0.489 0.022	0.181 0.117	0.026 0.007	0.062 0.023	0.016 0.054
EVAPOTRANSPIRATION						

TOTALS	0.515	0.486	1.183	1.634	1.287	1.931
	0.744	0.473	0.434	0.497	0.461	0.502

STD. DEVIATIONS	0.133	0.212	0.247	0.426	0.477	0.587
	0.508	0.476	0.454	0.236	0.162	0.187

PERCOLATION/LEAKAGE THROUGH LAYER 4

TOTALS	0.0109	0.0084	0.0304	0.0578	0.0397	0.0267
	0.0538	0.0183	0.0104	0.0072	0.0088	0.0072

STD. DEVIATIONS	0.0338	0.0293	0.0728	0.0910	0.0581	0.0302
	0.0466	0.0149	0.0121	0.0112	0.0117	0.0112

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	11.50	( 1.712)	3097928.5	100.00
RUNOFF	1.069	( 0.6917)	287960.75	9.295
EVAPOTRANSPIRATION	10.147	( 1.6215)	2733166.50	88.226
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.27954	( 0.25460)	75293.719	2.43045
CHANGE IN WATER STORAGE	0.006	( 1.3416)	1506.00	0.049

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PEAK DAILY VALUES FOR YEARS	1 THROUGH	30
	(INCHES)	(CU. FT.)
PRECIPITATION	1.68	452501.250
RUNOFF	0.946	254912.5620
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.047008	12661.28320
SNOW WATER	2.62	704739.1870
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.2818
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.1408

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.2072	0.2012
2	4.1248	0.2292
3	1.1722	0.0977
4	420.4698	0.2920
SNOW WATER	0.207	

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ALT. COVER 30"  
FC ONLY

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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:\HELP3.7\pblf4.D4  
TEMPERATURE DATA FILE: C:\HELP3.7\pblf7.D7  
SOLAR RADIATION DATA FILE: C:\HELP3.7\pblf13.D13  
EVAPOTRANSPIRATION DATA: C:\HELP3.7\pblf11.D11  
SOIL AND DESIGN DATA FILE: C:\HELP3.7\pblf10e.D10  
OUTPUT DATA FILE: C:\HELP3.7\pblfoute.OUT

TIME: 10:57      DATE: 5/27/2016

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TITLE: Pickles Butte Landfill HELP Model

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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

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TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	30.00	INCHES
POROSITY	=	0.3000	VOL/VOL
FIELD CAPACITY	=	0.1784	VOL/VOL
WILTING POINT	=	0.0437	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1062	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.423999991000E-04	CM/SEC

LAYER 2

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TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	12.00	INCHES
POROSITY	=	0.3000	VOL/VOL
FIELD CAPACITY	=	0.1153	VOL/VOL
WILTING POINT	=	0.0609	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1177	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.174000001000E-03	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

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NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT  
SOIL DATA BASE USING SOIL TEXTURE #22 WITH A  
POOR STAND OF GRASS, A SURFACE SLOPE OF 3.0%  
AND A SLOPE LENGTH OF 800. FEET.

SCS RUNOFF CURVE NUMBER	=	93.30	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	74.200	ACRES
EVAPORATIVE ZONE DEPTH	=	32.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.285	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.600	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.433	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	4.597	INCHES
TOTAL INITIAL WATER	=	4.597	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

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NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM  
BOISE IDAHO

STATION LATITUDE	=	43.57	DEGREES
MAXIMUM LEAF AREA INDEX	=	1.60	
START OF GROWING SEASON (JULIAN DATE)	=	120	
END OF GROWING SEASON (JULIAN DATE)	=	286	
EVAPORATIVE ZONE DEPTH	=	32.0	INCHES

AVERAGE ANNUAL WIND SPEED = 8.90 MPH  
 AVERAGE 1ST QUARTER RELATIVE HUMIDITY = 68.00 %  
 AVERAGE 2ND QUARTER RELATIVE HUMIDITY = 51.00 %  
 AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 40.00 %  
 AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 66.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING  
 COEFFICIENTS FOR BOISE IDAHO

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.64	1.07	1.03	1.19	1.21	0.95
0.26	0.40	0.58	0.75	1.29	1.34

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING  
 COEFFICIENTS FOR BOISE IDAHO

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
29.90	36.10	41.40	48.60	57.40	65.80
74.60	72.00	63.20	51.90	39.70	32.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING  
 COEFFICIENTS FOR BOISE IDAHO  
 AND STATION LATITUDE = 43.57 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	8.87	2389099.250	100.00
RUNOFF	0.110	29709.484	1.24
EVAPOTRANSPIRATION	8.578	2310419.250	96.71
PERC./LEAKAGE THROUGH LAYER 2	0.087403	23541.756	0.99
CHANGE IN WATER STORAGE	0.094	25428.811	1.06

SOIL WATER AT START OF YEAR	4.597	1238200.370	
SOIL WATER AT END OF YEAR	4.691	1263629.120	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.249	0.00

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# ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.50	3366825.500	100.00
RUNOFF	2.164	582735.437	17.31
EVAPOTRANSPIRATION	10.744	2893950.500	85.95
PERC./LEAKAGE THROUGH LAYER 2	0.045429	12236.112	0.36
CHANGE IN WATER STORAGE	-0.453	-122096.328	-3.63
SOIL WATER AT START OF YEAR	4.691	1263629.120	
SOIL WATER AT END OF YEAR	4.238	1141532.870	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.381	0.00

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# ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.37	2793118.250	100.00

RUNOFF	0.479	128983.156	4.62
EVAPOTRANSPIRATION	9.353	2519106.000	90.19
PERC./LEAKAGE THROUGH LAYER 2	0.030310	8163.906	0.29
CHANGE IN WATER STORAGE	0.508	136865.203	4.90
SOIL WATER AT START OF YEAR	4.238	1141532.870	
SOIL WATER AT END OF YEAR	3.578	963621.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.169	314777.031	11.27
ANNUAL WATER BUDGET BALANCE	0.0000	-0.268	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	11.09	2987047.500	100.00
RUNOFF	2.392	644141.562	21.56
EVAPOTRANSPIRATION	9.526	2565901.500	85.90
PERC./LEAKAGE THROUGH LAYER 2	0.023086	6218.071	0.21
CHANGE IN WATER STORAGE	-0.851	-229214.453	-7.67
SOIL WATER AT START OF YEAR	3.578	963621.000	
SOIL WATER AT END OF YEAR	3.821	1029108.870	
SNOW WATER AT START OF YEAR	1.169	314777.031	10.54
SNOW WATER AT END OF YEAR	0.075	20074.695	0.67
ANNUAL WATER BUDGET BALANCE	0.0000	0.760	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	10.81	2911631.000	100.00
RUNOFF	0.769	207161.078	7.11
EVAPOTRANSPIRATION	9.314	2508740.250	86.16
PERC./LEAKAGE THROUGH LAYER 2	0.001108	298.555	0.01
CHANGE IN WATER STORAGE	0.726	195430.562	6.71
SOIL WATER AT START OF YEAR	3.821	1029108.870	
SOIL WATER AT END OF YEAR	4.528	1219549.500	
SNOW WATER AT START OF YEAR	0.075	20074.695	0.69
SNOW WATER AT END OF YEAR	0.093	25064.602	0.86
ANNUAL WATER BUDGET BALANCE	0.0000	0.362	0.00

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	12.72	3426081.000	100.00
RUNOFF	1.260	339244.312	9.90
EVAPOTRANSPIRATION	11.259	3032642.500	88.52
PERC./LEAKAGE THROUGH LAYER 2	0.461796	124382.867	3.63
CHANGE IN WATER STORAGE	-0.261	-70188.406	-2.05
SOIL WATER AT START OF YEAR	4.528	1219549.500	
SOIL WATER AT END OF YEAR	4.360	1174425.750	
SNOW WATER AT START OF YEAR	0.093	25064.602	0.73



SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.466	0.00

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.14	3539207.250	100.00
RUNOFF	0.680	183081.203	5.17
EVAPOTRANSPIRATION	12.332	3321627.500	93.85
PERC./LEAKAGE THROUGH LAYER 2	0.089088	23995.533	0.68
CHANGE IN WATER STORAGE	0.039	10501.934	0.30
SOIL WATER AT START OF YEAR	4.360	1174425.750	
SOIL WATER AT END OF YEAR	4.399	1184927.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.883	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.65	3137881.750	100.00
RUNOFF	0.217	58580.500	1.87
EVAPOTRANSPIRATION	10.509	2830687.500	90.21
PERC./LEAKAGE THROUGH LAYER 2	0.569753	153460.656	4.89

CHANGE IN WATER STORAGE	0.353	95152.641	3.03
SOIL WATER AT START OF YEAR	4.399	1184927.620	
SOIL WATER AT END OF YEAR	4.753	1280080.370	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.209	0.00

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# ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.69	3148655.000	100.00
RUNOFF	2.697	726428.375	23.07
EVAPOTRANSPIRATION	9.971	2685694.750	85.30
PERC./LEAKAGE THROUGH LAYER 2	0.096339	25948.574	0.82
CHANGE IN WATER STORAGE	-1.075	-289415.281	-9.19
SOIL WATER AT START OF YEAR	4.753	1280080.370	
SOIL WATER AT END OF YEAR	3.678	990665.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-1.403	0.00

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# ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	13.07	3520352.500	100.00
RUNOFF	0.643	173308.406	4.92
EVAPOTRANSPIRATION	9.772	2631936.250	74.76
PERC./LEAKAGE THROUGH LAYER 2	0.049077	13218.731	0.38
CHANGE IN WATER STORAGE	2.606	701891.000	19.94
SOIL WATER AT START OF YEAR	3.678	990665.000	
SOIL WATER AT END OF YEAR	5.152	1387760.370	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.132	304795.594	8.66
ANNUAL WATER BUDGET BALANCE	0.0000	-2.004	0.00

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# ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.79	3175590.000	100.00
RUNOFF	2.061	555151.375	17.48
EVAPOTRANSPIRATION	10.829	2916685.000	91.85
PERC./LEAKAGE THROUGH LAYER 2	0.206999	55754.250	1.76
CHANGE IN WATER STORAGE	-1.307	-352001.062	-11.08
SOIL WATER AT START OF YEAR	5.152	1387760.370	
SOIL WATER AT END OF YEAR	4.866	1310626.870	
SNOW WATER AT START OF YEAR	1.132	304795.594	9.60
SNOW WATER AT END OF YEAR	0.111	29928.123	0.94
ANNUAL WATER BUDGET BALANCE	0.0000	0.237	0.00

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ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	10.87	2927791.750	100.00
RUNOFF	0.800	215360.703	7.36
EVAPOTRANSPIRATION	10.895	2934427.000	100.23
PERC./LEAKAGE THROUGH LAYER 2	0.085586	23052.363	0.79
CHANGE IN WATER STORAGE	-0.910	-245049.578	-8.37
SOIL WATER AT START OF YEAR	4.866	1310626.870	
SOIL WATER AT END OF YEAR	4.067	1095505.370	
SNOW WATER AT START OF YEAR	0.111	29928.123	1.02
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	1.098	0.00

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ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	9.94	2677299.500	100.00
RUNOFF	0.942	253723.734	9.48
EVAPOTRANSPIRATION	9.259	2493998.250	93.15
PERC./LEAKAGE THROUGH LAYER 2	0.043366	11680.343	0.44
CHANGE IN WATER STORAGE	-0.305	-82103.789	-3.07
SOIL WATER AT START OF YEAR	4.067	1095505.370	
SOIL WATER AT END OF YEAR	3.762	1013401.560	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00

SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.970	0.00

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# ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	7.60	2047030.120	100.00
RUNOFF	0.713	192036.656	9.38
EVAPOTRANSPIRATION	7.424	1999516.120	97.68
PERC./LEAKAGE THROUGH LAYER 2	0.029336	7901.473	0.39
CHANGE IN WATER STORAGE	-0.566	-152423.625	-7.45
SOIL WATER AT START OF YEAR	3.762	1013401.560	
SOIL WATER AT END OF YEAR	3.197	860977.937	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.540	0.00

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# ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.59	3121720.500	100.00
RUNOFF	0.800	215517.672	6.90
EVAPOTRANSPIRATION	7.926	2134864.000	68.39
PERC./LEAKAGE THROUGH LAYER 2	0.012286	3309.210	0.11

CHANGE IN WATER STORAGE	2.851	768029.437	24.60
SOIL WATER AT START OF YEAR	3.197	860977.937	
SOIL WATER AT END OF YEAR	5.509	1483792.370	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.539	145215.094	4.65
ANNUAL WATER BUDGET BALANCE	0.0000	0.121	0.00

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.93	2943952.250	100.00
RUNOFF	0.570	153645.703	5.22
EVAPOTRANSPIRATION	11.250	3030070.000	102.93
PERC./LEAKAGE THROUGH LAYER 2	0.032505	8755.047	0.30
CHANGE IN WATER STORAGE	-0.923	-248518.672	-8.44
SOIL WATER AT START OF YEAR	5.509	1483792.370	
SOIL WATER AT END OF YEAR	5.125	1380488.750	
SNOW WATER AT START OF YEAR	0.539	145215.094	4.93
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.010	0.00

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ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	10.76	2898163.750	100.00
RUNOFF	1.918	516599.344	17.83
EVAPOTRANSPIRATION	9.377	2525754.250	87.15
PERC./LEAKAGE THROUGH LAYER 2	0.047269	12731.642	0.44
CHANGE IN WATER STORAGE	-0.583	-156921.891	-5.41
SOIL WATER AT START OF YEAR	5.125	1380488.750	
SOIL WATER AT END OF YEAR	4.543	1223566.870	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.167	0.00

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.93	2943951.750	100.00
RUNOFF	0.794	213753.219	7.26
EVAPOTRANSPIRATION	9.949	2679619.250	91.02
PERC./LEAKAGE THROUGH LAYER 2	0.035086	9450.342	0.32
CHANGE IN WATER STORAGE	0.153	41129.156	1.40
SOIL WATER AT START OF YEAR	4.543	1223566.870	
SOIL WATER AT END OF YEAR	4.440	1195873.370	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.256	68822.648	2.34
ANNUAL WATER BUDGET BALANCE	0.0000	-0.292	0.00

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ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	9.00	2424114.250	100.00
RUNOFF	1.062	285964.437	11.80
EVAPOTRANSPIRATION	9.122	2456839.500	101.35
PERC./LEAKAGE THROUGH LAYER 2	0.025775	6942.321	0.29
CHANGE IN WATER STORAGE	-1.209	-325632.594	-13.43
SOIL WATER AT START OF YEAR	4.440	1195873.370	
SOIL WATER AT END OF YEAR	3.486	939063.375	
SNOW WATER AT START OF YEAR	0.256	68822.648	2.84
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.325	0.00

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ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	13.60	3663105.750	100.00
RUNOFF	0.674	181528.812	4.96
EVAPOTRANSPIRATION	10.720	2887355.250	78.82
PERC./LEAKAGE THROUGH LAYER 2	0.008834	2379.453	0.06
CHANGE IN WATER STORAGE	2.197	591843.062	16.16
SOIL WATER AT START OF YEAR	3.486	939063.375	
SOIL WATER AT END OF YEAR	5.684	1530906.500	



SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.997	0.00

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# ANNUAL TOTALS FOR YEAR 21

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.43	2809279.000	100.00
RUNOFF	0.419	112933.656	4.02
EVAPOTRANSPIRATION	12.677	3414381.000	121.54
PERC./LEAKAGE THROUGH LAYER 2	0.113015	30440.014	1.08
CHANGE IN WATER STORAGE	-2.779	-748477.312	-26.64
SOIL WATER AT START OF YEAR	5.684	1530906.500	
SOIL WATER AT END OF YEAR	2.905	782429.125	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	1.439	0.00

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# ANNUAL TOTALS FOR YEAR 22

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.29	3310262.250	100.00
RUNOFF	0.230	61873.785	1.87
EVAPOTRANSPIRATION	9.491	2556478.250	77.23

PERC./LEAKAGE THROUGH LAYER 2	0.065631	17677.523	0.53
CHANGE IN WATER STORAGE	2.503	674231.625	20.37
SOIL WATER AT START OF YEAR	2.905	782429.125	
SOIL WATER AT END OF YEAR	5.111	1376713.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.297	79947.797	2.42
ANNUAL WATER BUDGET BALANCE	0.0000	0.787	0.00

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# ANNUAL TOTALS FOR YEAR 23

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.78	3172895.750	100.00
RUNOFF	0.471	126876.062	4.00
EVAPOTRANSPIRATION	12.614	3397445.000	107.08
PERC./LEAKAGE THROUGH LAYER 2	0.069503	18720.240	0.59
CHANGE IN WATER STORAGE	-1.374	-370144.781	-11.67
SOIL WATER AT START OF YEAR	5.111	1376713.000	
SOIL WATER AT END OF YEAR	3.847	1036124.000	
SNOW WATER AT START OF YEAR	0.297	79947.797	2.52
SNOW WATER AT END OF YEAR	0.187	50392.031	1.59
ANNUAL WATER BUDGET BALANCE	0.0000	-0.967	0.00

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# ANNUAL TOTALS FOR YEAR 24

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	INCHES	CU. FEET	PERCENT
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PRECIPITATION	13.23	3563448.250	100.00
RUNOFF	0.967	260518.844	7.31
EVAPOTRANSPIRATION	11.046	2975273.500	83.49
PERC./LEAKAGE THROUGH LAYER 2	0.051638	13908.436	0.39
CHANGE IN WATER STORAGE	1.165	313745.750	8.80
SOIL WATER AT START OF YEAR	3.847	1036124.000	
SOIL WATER AT END OF YEAR	5.199	1400261.870	
SNOW WATER AT START OF YEAR	0.187	50392.031	1.41
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	1.788	0.00

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ANNUAL TOTALS FOR YEAR 25

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.39	3067851.250	100.00
RUNOFF	1.522	410005.125	13.36
EVAPOTRANSPIRATION	10.347	2787025.000	90.85
PERC./LEAKAGE THROUGH LAYER 2	0.079192	21330.059	0.70
CHANGE IN WATER STORAGE	-0.559	-150509.484	-4.91
SOIL WATER AT START OF YEAR	5.199	1400261.870	
SOIL WATER AT END OF YEAR	4.267	1149195.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.373	100556.844	3.28
ANNUAL WATER BUDGET BALANCE	0.0000	0.241	0.00

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ANNUAL TOTALS FOR YEAR 26

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.66	3140574.250	100.00
RUNOFF	0.867	233615.203	7.44
EVAPOTRANSPIRATION	10.687	2878553.250	91.66
PERC./LEAKAGE THROUGH LAYER 2	0.052582	14162.668	0.45
CHANGE IN WATER STORAGE	0.053	14243.270	0.45
SOIL WATER AT START OF YEAR	4.267	1149195.500	
SOIL WATER AT END OF YEAR	4.693	1263995.620	
SNOW WATER AT START OF YEAR	0.373	100556.844	3.20
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.280	0.00

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ANNUAL TOTALS FOR YEAR 27

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	13.52	3641558.250	100.00
RUNOFF	0.179	48079.746	1.32
EVAPOTRANSPIRATION	11.756	3166540.750	86.96
PERC./LEAKAGE THROUGH LAYER 2	0.033628	9057.652	0.25
CHANGE IN WATER STORAGE	1.551	417878.562	11.48
SOIL WATER AT START OF YEAR	4.693	1263995.620	
SOIL WATER AT END OF YEAR	6.244	1681874.120	

SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	1.424	0.00

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# ANNUAL TOTALS FOR YEAR 28

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	16.06	4325696.500	100.00
RUNOFF	0.561	151231.156	3.50
EVAPOTRANSPIRATION	16.674	4491072.500	103.82
PERC./LEAKAGE THROUGH LAYER 2	0.248213	66855.305	1.55
CHANGE IN WATER STORAGE	-1.424	-383464.000	-8.86
SOIL WATER AT START OF YEAR	6.244	1681874.120	
SOIL WATER AT END OF YEAR	4.352	1172147.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.469	126263.078	2.92
ANNUAL WATER BUDGET BALANCE	0.0000	1.096	0.00

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# ANNUAL TOTALS FOR YEAR 29

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	12.88	3469176.750	100.00
RUNOFF	1.713	461354.531	13.30
EVAPOTRANSPIRATION	10.974	2955925.500	85.21

PERC./LEAKAGE THROUGH LAYER 2	0.088406	23811.678	0.69
CHANGE IN WATER STORAGE	0.104	28085.354	0.81
SOIL WATER AT START OF YEAR	4.352	1172147.000	
SOIL WATER AT END OF YEAR	4.687	1262528.870	
SNOW WATER AT START OF YEAR	0.469	126263.078	3.64
SNOW WATER AT END OF YEAR	0.237	63966.609	1.84
ANNUAL WATER BUDGET BALANCE	0.0000	-0.604	0.00

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ANNUAL TOTALS FOR YEAR 30

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	8.89	2394486.250	100.00
RUNOFF	0.479	129040.406	5.39
EVAPOTRANSPIRATION	8.925	2403814.250	100.39
PERC./LEAKAGE THROUGH LAYER 2	0.050027	13474.662	0.56
CHANGE IN WATER STORAGE	-0.564	-151844.625	-6.34
SOIL WATER AT START OF YEAR	4.687	1262528.870	
SOIL WATER AT END OF YEAR	4.155	1119023.750	
SNOW WATER AT START OF YEAR	0.237	63966.609	2.67
SNOW WATER AT END OF YEAR	0.207	55627.137	2.32
ANNUAL WATER BUDGET BALANCE	0.0000	1.386	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----	-----
PRECIPITATION						
-----						
TOTALS	1.70	1.16	0.97	1.08	0.99	0.84
	0.27	0.51	0.55	0.76	1.28	1.39
STD. DEVIATIONS	0.68	0.44	0.44	0.56	0.53	0.40
	0.25	0.52	0.70	0.50	0.57	0.78
RUNOFF						
-----						
TOTALS	0.318	0.444	0.094	0.008	0.022	0.007
	0.002	0.011	0.029	0.002	0.011	0.025
STD. DEVIATIONS	0.454	0.466	0.168	0.014	0.055	0.015
	0.010	0.022	0.111	0.006	0.019	0.039
EVAPOTRANSPIRATION						
-----						
TOTALS	0.539	0.489	1.642	1.605	1.115	1.941
	0.653	0.453	0.393	0.420	0.562	0.631
STD. DEVIATIONS	0.146	0.251	0.291	0.612	0.460	0.610
	0.421	0.467	0.514	0.295	0.206	0.146
PERCOLATION/LEAKAGE THROUGH LAYER 2						
-----						
TOTALS	0.0046	0.0039	0.0078	0.0157	0.0142	0.0101
	0.0088	0.0074	0.0062	0.0057	0.0050	0.0048
STD. DEVIATIONS	0.0036	0.0029	0.0126	0.0363	0.0288	0.0161
	0.0111	0.0081	0.0061	0.0052	0.0042	0.0038

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES	CU. FEET	PERCENT
-----	-----	-----	-----
PRECIPITATION	11.50 ( 1.712)	3097928.5	100.00
RUNOFF	0.972 ( 0.6896)	261739.44	8.449
EVAPOTRANSPIRATION	10.443 ( 1.7323)	2812878.00	90.799

PERCOLATION/LEAKAGE THROUGH LAYER 2	0.09441 ( 0.12680)	25428.652	0.82083
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CHANGE IN WATER STORAGE	-0.008 ( 1.3230)	-2118.32	-0.068
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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	1.68	452501.250
RUNOFF	0.950	255877.6250
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.010944	2947.68750
SNOW WATER.	2.62	704739.1870
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.1901
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0448

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	2.8561	0.0952
2	1.2985	0.1082
SNOW WATER	0.207	

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ALT. COVER  
30"

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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:\HELP3.7\pblf4.D4  
TEMPERATURE DATA FILE: C:\HELP3.7\pblf7.D7  
SOLAR RADIATION DATA FILE: C:\HELP3.7\pblf13.D13  
EVAPOTRANSPIRATION DATA: C:\HELP3.7\pblf11.D11  
SOIL AND DESIGN DATA FILE: C:\HELP3.7\pblf10c.D10  
OUTPUT DATA FILE: C:\HELP3.7\pblfoutc.OUT

TIME: 10:30 DATE: 5/27/2016

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TITLE: Pickles Butte Landfill HELP Model

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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

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TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	30.00	INCHES
POROSITY	=	0.3000	VOL/VOL
FIELD CAPACITY	=	0.1784	VOL/VOL
WILTING POINT	=	0.0437	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1062	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.423999991000E-04	CM/SEC

LAYER 2

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TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	12.00	INCHES
POROSITY	=	0.3000	VOL/VOL
FIELD CAPACITY	=	0.1153	VOL/VOL
WILTING POINT	=	0.0609	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1177	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.174000001000E-03	CM/SEC

LAYER 3

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TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1440.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

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NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT  
SOIL DATA BASE USING SOIL TEXTURE #22 WITH A  
POOR STAND OF GRASS, A SURFACE SLOPE OF 3. %  
AND A SLOPE LENGTH OF 800. FEET.

SCS RUNOFF CURVE NUMBER	=	93.30	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	74.200	ACRES
EVAPORATIVE ZONE DEPTH	=	32.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.285	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.600	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.433	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	425.060	INCHES
TOTAL INITIAL WATER	=	425.060	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

# EVAPOTRANSPIRATION AND WEATHER DATA

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NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM  
BOISE IDAHO

STATION LATITUDE	=	43.57 DEGREES
MAXIMUM LEAF AREA INDEX	=	1.60
START OF GROWING SEASON (JULIAN DATE)	=	120
END OF GROWING SEASON (JULIAN DATE)	=	286
EVAPORATIVE ZONE DEPTH	=	32.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	8.90 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	51.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	40.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	66.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING  
COEFFICIENTS FOR BOISE IDAHO

## NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
1.64	1.07	1.03	1.19	1.21	0.95
0.26	0.40	0.58	0.75	1.29	1.34

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING  
COEFFICIENTS FOR BOISE IDAHO

## NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
29.90	36.10	41.40	48.60	57.40	65.80
74.60	72.00	63.20	51.90	39.70	32.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING  
COEFFICIENTS FOR BOISE IDAHO  
AND STATION LATITUDE = 43.57 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	8.87	2389099.250	100.00
RUNOFF	0.110	29709.484	1.24
EVAPOTRANSPIRATION	8.578	2310419.250	96.71
PERC./LEAKAGE THROUGH LAYER 3	0.071829	19346.898	0.81
CHANGE IN WATER STORAGE	0.110	29624.111	1.24
SOIL WATER AT START OF YEAR	425.060	114488248.000	
SOIL WATER AT END OF YEAR	425.170	114517872.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.694	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	12.50	3366825.500	100.00
RUNOFF	2.164	582735.437	17.31
EVAPOTRANSPIRATION	10.744	2893950.500	85.95
PERC./LEAKAGE THROUGH LAYER 3	0.047901	12901.906	0.38
CHANGE IN WATER STORAGE	-0.456	-122762.516	-3.65
SOIL WATER AT START OF YEAR	425.170	114517872.000	
SOIL WATER AT END OF YEAR	424.714	114395112.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	0.013	0.00
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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	10.37	2793118.250	100.00
RUNOFF	0.479	128983.156	4.62
EVAPOTRANSPIRATION	9.353	2519106.000	90.19
PERC./LEAKAGE THROUGH LAYER 3	0.047921	12907.362	0.46
CHANGE IN WATER STORAGE	0.491	132125.141	4.73
SOIL WATER AT START OF YEAR	424.714	114395112.000	
SOIL WATER AT END OF YEAR	424.036	114212456.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.169	314777.031	11.27
ANNUAL WATER BUDGET BALANCE	0.0000	-3.669	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.09	2987047.500	100.00
RUNOFF	2.392	644141.562	21.56
EVAPOTRANSPIRATION	9.526	2565901.500	85.90
PERC./LEAKAGE THROUGH LAYER 3	0.023960	6453.423	0.22
CHANGE IN WATER STORAGE	-0.852	-229453.672	-7.68

SOIL WATER AT START OF YEAR	424.036	114212456.000	
SOIL WATER AT END OF YEAR	424.278	114277704.000	
SNOW WATER AT START OF YEAR	1.169	314777.031	10.54
SNOW WATER AT END OF YEAR	0.075	20074.695	0.67
ANNUAL WATER BUDGET BALANCE	0.0000	4.617	0.00

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ANNUAL TOTALS FOR YEAR 5			
	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.81	2911631.000	100.00
RUNOFF	0.769	207161.078	7.11
EVAPOTRANSPIRATION	9.314	2508740.250	86.16
PERC./LEAKAGE THROUGH LAYER 3	0.000000	0.000	0.00
CHANGE IN WATER STORAGE	0.727	195730.062	6.72
SOIL WATER AT START OF YEAR	424.278	114277704.000	
SOIL WATER AT END OF YEAR	424.987	114468448.000	
SNOW WATER AT START OF YEAR	0.075	20074.695	0.69
SNOW WATER AT END OF YEAR	0.093	25064.602	0.86
ANNUAL WATER BUDGET BALANCE	0.0000	-0.592	0.00

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ANNUAL TOTALS FOR YEAR 6			
	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.72	3426081.000	100.00



RUNOFF	1.260	339244.312	9.90
EVAPOTRANSPIRATION	11.259	3032642.500	88.52
PERC./LEAKAGE THROUGH LAYER 3	0.443981	119584.375	3.49
CHANGE IN WATER STORAGE	-0.243	-65390.879	-1.91
SOIL WATER AT START OF YEAR	424.987	114468448.000	
SOIL WATER AT END OF YEAR	424.837	114428120.000	
SNOW WATER AT START OF YEAR	0.093	25064.602	0.73
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.490	0.00

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# ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	13.14	3539207.250	100.00
RUNOFF	0.680	183081.203	5.17
EVAPOTRANSPIRATION	12.332	3321627.500	93.85
PERC./LEAKAGE THROUGH LAYER 3	0.095734	25785.592	0.73
CHANGE IN WATER STORAGE	0.032	8712.975	0.25
SOIL WATER AT START OF YEAR	424.837	114428120.000	
SOIL WATER AT END OF YEAR	424.869	114436832.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.215	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.65	3137881.750	100.00
RUNOFF	0.217	58580.500	1.87
EVAPOTRANSPIRATION	10.509	2830687.500	90.21
PERC./LEAKAGE THROUGH LAYER 3	0.560647	151008.047	4.81
CHANGE IN WATER STORAGE	0.362	97609.969	3.11
SOIL WATER AT START OF YEAR	424.869	114436832.000	
SOIL WATER AT END OF YEAR	425.232	114534440.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-4.511	0.00

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.69	3148655.000	100.00
RUNOFF	2.697	726428.375	23.07
EVAPOTRANSPIRATION	9.971	2685694.750	85.30
PERC./LEAKAGE THROUGH LAYER 3	0.095719	25781.453	0.82
CHANGE IN WATER STORAGE	-1.074	-289254.312	-9.19
SOIL WATER AT START OF YEAR	425.232	114534440.000	
SOIL WATER AT END OF YEAR	424.158	114245184.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00

SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	4.726	0.00

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.07	3520352.500	100.00
RUNOFF	0.643	173308.406	4.92
EVAPOTRANSPIRATION	9.772	2631936.250	74.76
PERC./LEAKAGE THROUGH LAYER 3	0.071883	19361.344	0.55
CHANGE IN WATER STORAGE	2.583	695753.312	19.76
SOIL WATER AT START OF YEAR	424.158	114245184.000	
SOIL WATER AT END OF YEAR	425.609	114636144.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.132	304795.594	8.66
ANNUAL WATER BUDGET BALANCE	0.0000	-6.939	0.00

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ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.79	3175590.000	100.00
RUNOFF	2.061	555151.375	17.48
EVAPOTRANSPIRATION	10.829	2916685.000	91.85
PERC./LEAKAGE THROUGH LAYER 3	0.191326	51532.926	1.62

CHANGE IN WATER STORAGE	-1.291	-347785.219	-10.95
SOIL WATER AT START OF YEAR	425.609	114636144.000	
SOIL WATER AT END OF YEAR	425.339	114563224.000	
SNOW WATER AT START OF YEAR	1.132	304795.594	9.60
SNOW WATER AT END OF YEAR	0.111	29928.123	0.94
ANNUAL WATER BUDGET BALANCE	0.0000	5.711	0.00

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# ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.87	2927791.750	100.00
RUNOFF	0.800	215360.703	7.36
EVAPOTRANSPIRATION	10.895	2934427.000	100.23
PERC./LEAKAGE THROUGH LAYER 3	0.095751	25790.018	0.88
CHANGE IN WATER STORAGE	-0.920	-247785.344	-8.46
SOIL WATER AT START OF YEAR	425.339	114563224.000	
SOIL WATER AT END OF YEAR	424.530	114345368.000	
SNOW WATER AT START OF YEAR	0.111	29928.123	1.02
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.781	0.00

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# ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT

PRECIPITATION	9.94	2677299.500	100.00
RUNOFF	0.942	253723.734	9.48
EVAPOTRANSPIRATION	9.259	2493998.250	93.15
PERC./LEAKAGE THROUGH LAYER 3	0.047891	12899.302	0.48
CHANGE IN WATER STORAGE	-0.309	-83323.977	-3.11
SOIL WATER AT START OF YEAR	424.530	114345368.000	
SOIL WATER AT END OF YEAR	424.220	114262048.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	2.200	0.00

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# ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	7.60	2047030.120	100.00
RUNOFF	0.713	192036.656	9.38
EVAPOTRANSPIRATION	7.424	1999516.120	97.68
PERC./LEAKAGE THROUGH LAYER 3	0.023954	6451.877	0.32
CHANGE IN WATER STORAGE	-0.561	-150972.828	-7.38
SOIL WATER AT START OF YEAR	424.220	114262048.000	
SOIL WATER AT END OF YEAR	423.660	114111072.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-1.736	0.00

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ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.59	3121720.500	100.00
RUNOFF	0.800	215517.672	6.90
EVAPOTRANSPIRATION	7.926	2134864.000	68.39
PERC./LEAKAGE THROUGH LAYER 3	0.000000	0.000	0.00
CHANGE IN WATER STORAGE	2.864	771340.937	24.71
SOIL WATER AT START OF YEAR	423.660	114111072.000	
SOIL WATER AT END OF YEAR	425.984	114737200.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.539	145215.094	4.65
ANNUAL WATER BUDGET BALANCE	0.0000	-2.151	0.00

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	10.93	2943952.250	100.00
RUNOFF	0.570	153645.703	5.22
EVAPOTRANSPIRATION	11.250	3030070.000	102.93
PERC./LEAKAGE THROUGH LAYER 3	0.047902	12902.185	0.44
CHANGE IN WATER STORAGE	-0.938	-252664.141	-8.58
SOIL WATER AT START OF YEAR	425.984	114737200.000	
SOIL WATER AT END OF YEAR	425.586	114629752.000	
SNOW WATER AT START OF YEAR	0.539	145215.094	4.93

SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-1.678	0.00

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ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.76	2898163.750	100.00
RUNOFF	1.918	516599.344	17.83
EVAPOTRANSPIRATION	9.377	2525754.250	87.15
PERC./LEAKAGE THROUGH LAYER 3	0.047894	12900.025	0.45
CHANGE IN WATER STORAGE	-0.583	-157096.562	-5.42
SOIL WATER AT START OF YEAR	425.586	114629752.000	
SOIL WATER AT END OF YEAR	425.002	114472656.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	6.454	0.00

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.93	2943951.750	100.00
RUNOFF	0.794	213753.219	7.26
EVAPOTRANSPIRATION	9.949	2679619.250	91.02
PERC./LEAKAGE THROUGH LAYER 3	0.023946	6449.776	0.22

CHANGE IN WATER STORAGE	0.164	44130.406	1.50
SOIL WATER AT START OF YEAR	425.002	114472656.000	
SOIL WATER AT END OF YEAR	424.911	114447960.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.256	68822.648	2.34
ANNUAL WATER BUDGET BALANCE	0.0000	-0.975	0.00

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# ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	9.00	2424114.250	100.00
RUNOFF	1.062	285964.437	11.80
EVAPOTRANSPIRATION	9.122	2456839.500	101.35
PERC./LEAKAGE THROUGH LAYER 3	0.023949	6450.526	0.27
CHANGE IN WATER STORAGE	-1.207	-325140.250	-13.41
SOIL WATER AT START OF YEAR	424.911	114447960.000	
SOIL WATER AT END OF YEAR	423.959	114191640.000	
SNOW WATER AT START OF YEAR	0.256	68822.648	2.84
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.232	0.00

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# ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	13.60	3663105.750	100.00
RUNOFF	0.674	181528.812	4.96
EVAPOTRANSPIRATION	10.720	2887355.250	78.82
PERC./LEAKAGE THROUGH LAYER 3	0.023963	6454.208	0.18
CHANGE IN WATER STORAGE	2.182	587772.312	16.05
SOIL WATER AT START OF YEAR	423.959	114191640.000	
SOIL WATER AT END OF YEAR	426.141	114779416.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-4.966	0.00

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# ANNUAL TOTALS FOR YEAR 21

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.43	2809279.000	100.00
RUNOFF	0.419	112933.656	4.02
EVAPOTRANSPIRATION	12.677	3414381.000	121.54
PERC./LEAKAGE THROUGH LAYER 3	0.095631	25757.920	0.92
CHANGE IN WATER STORAGE	-2.762	-743800.312	-26.48
SOIL WATER AT START OF YEAR	426.141	114779416.000	
SOIL WATER AT END OF YEAR	423.380	114035616.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	6.538	0.00

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ANNUAL TOTALS FOR YEAR 22

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	12.29	3310262.250	100.00
RUNOFF	0.230	61873.785	1.87
EVAPOTRANSPIRATION	9.491	2556478.250	77.23
PERC./LEAKAGE THROUGH LAYER 3	0.071833	19347.814	0.58
CHANGE IN WATER STORAGE	2.497	672561.562	20.32
SOIL WATER AT START OF YEAR	423.380	114035616.000	
SOIL WATER AT END OF YEAR	425.580	114628232.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.297	79947.797	2.42
ANNUAL WATER BUDGET BALANCE	0.0000	0.590	0.00

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ANNUAL TOTALS FOR YEAR 23

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.78	3172895.750	100.00
RUNOFF	0.471	126876.062	4.00
EVAPOTRANSPIRATION	12.614	3397445.000	107.08
PERC./LEAKAGE THROUGH LAYER 3	0.071788	19335.732	0.61
CHANGE IN WATER STORAGE	-1.377	-370759.156	-11.69
SOIL WATER AT START OF YEAR	425.580	114628232.000	
SOIL WATER AT END OF YEAR	424.313	114287024.000	

SNOW WATER AT START OF YEAR	0.297	79947.797	2.52
SNOW WATER AT END OF YEAR	0.187	50392.031	1.59
ANNUAL WATER BUDGET BALANCE	0.0000	-2.095	0.00

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ANNUAL TOTALS FOR YEAR 24

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.23	3563448.250	100.00
RUNOFF	0.967	260518.844	7.31
EVAPOTRANSPIRATION	11.046	2975273.500	83.49
PERC./LEAKAGE THROUGH LAYER 3	0.047899	12901.399	0.36
CHANGE IN WATER STORAGE	1.169	314755.562	8.83
SOIL WATER AT START OF YEAR	424.313	114287024.000	
SOIL WATER AT END OF YEAR	425.669	114652176.000	
SNOW WATER AT START OF YEAR	0.187	50392.031	1.41
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.989	0.00

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ANNUAL TOTALS FOR YEAR 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.39	3067851.250	100.00
RUNOFF	1.522	410005.125	13.36
EVAPOTRANSPIRATION	10.347	2787025.000	90.85

PERC./LEAKAGE THROUGH LAYER 3	0.071757	19327.348	0.63
CHANGE IN WATER STORAGE	-0.551	-148510.922	-4.84
SOIL WATER AT START OF YEAR	425.669	114652176.000	
SOIL WATER AT END OF YEAR	424.744	114403104.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.373	100556.844	3.28
ANNUAL WATER BUDGET BALANCE	0.0000	4.389	0.00

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ANNUAL TOTALS FOR YEAR 26

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	11.66	3140574.250	100.00
RUNOFF	0.867	233615.203	7.44
EVAPOTRANSPIRATION	10.687	2878553.250	91.66
PERC./LEAKAGE THROUGH LAYER 3	0.071843	19350.730	0.62
CHANGE IN WATER STORAGE	0.034	9062.234	0.29
SOIL WATER AT START OF YEAR	424.744	114403104.000	
SOIL WATER AT END OF YEAR	425.151	114512728.000	
SNOW WATER AT START OF YEAR	0.373	100556.844	3.20
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-7.307	0.00

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ANNUAL TOTALS FOR YEAR 27

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	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	13.52	3641558.250	100.00
RUNOFF	0.179	48079.746	1.32
EVAPOTRANSPIRATION	11.756	3166540.750	86.96
PERC./LEAKAGE THROUGH LAYER 3	0.023966	6455.154	0.18
CHANGE IN WATER STORAGE	1.561	420474.969	11.55
SOIL WATER AT START OF YEAR	425.151	114512728.000	
SOIL WATER AT END OF YEAR	426.712	114933200.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	7.497	0.00

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ANNUAL TOTALS FOR YEAR 28

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	16.06	4325696.500	100.00
RUNOFF	0.561	151231.156	3.50
EVAPOTRANSPIRATION	16.674	4491072.500	103.82
PERC./LEAKAGE THROUGH LAYER 3	0.238269	64176.930	1.48
CHANGE IN WATER STORAGE	-1.414	-380782.687	-8.80
SOIL WATER AT START OF YEAR	426.712	114933200.000	
SOIL WATER AT END OF YEAR	424.830	114426152.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.469	126263.078	2.92
ANNUAL WATER BUDGET BALANCE	0.0000	-1.846	0.00

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ANNUAL TOTALS FOR YEAR 29

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	12.88	3469176.750	100.00
RUNOFF	1.713	461354.531	13.30
EVAPOTRANSPIRATION	10.974	2955925.500	85.21
PERC./LEAKAGE THROUGH LAYER 3	0.095740	25787.236	0.74
CHANGE IN WATER STORAGE	0.097	26107.340	0.75
SOIL WATER AT START OF YEAR	424.830	114426152.000	
SOIL WATER AT END OF YEAR	425.158	114514560.000	
SNOW WATER AT START OF YEAR	0.469	126263.078	3.64
SNOW WATER AT END OF YEAR	0.237	63966.609	1.84
ANNUAL WATER BUDGET BALANCE	0.0000	1.852	0.00

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ANNUAL TOTALS FOR YEAR 30

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	8.89	2394486.250	100.00
RUNOFF	0.479	129040.406	5.39
EVAPOTRANSPIRATION	8.925	2403814.250	100.39
PERC./LEAKAGE THROUGH LAYER 3	0.047889	12898.628	0.54
CHANGE IN WATER STORAGE	-0.562	-151265.125	-6.32
SOIL WATER AT START OF YEAR	425.158	114514560.000	
SOIL WATER AT END OF YEAR	424.627	114371632.000	

SNOW WATER AT START OF YEAR	0.237	63966.609	2.67
SNOW WATER AT END OF YEAR	0.207	55627.137	2.32
ANNUAL WATER BUDGET BALANCE	0.0000	-2.075	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION						
-----						
TOTALS	1.70 0.27	1.16 0.51	0.97 0.55	1.08 0.76	0.99 1.28	0.84 1.39
STD. DEVIATIONS	0.68 0.25	0.44 0.52	0.44 0.70	0.56 0.50	0.53 0.57	0.40 0.78
RUNOFF						
-----						
TOTALS	0.318 0.002	0.444 0.011	0.094 0.029	0.008 0.002	0.022 0.011	0.007 0.025
STD. DEVIATIONS	0.454 0.010	0.466 0.022	0.168 0.111	0.014 0.006	0.055 0.019	0.015 0.039
EVAPOTRANSPIRATION						
-----						
TOTALS	0.539 0.653	0.489 0.453	1.642 0.393	1.605 0.420	1.115 0.562	1.941 0.631
STD. DEVIATIONS	0.146 0.421	0.251 0.467	0.291 0.514	0.612 0.295	0.460 0.206	0.610 0.146
PERCOLATION/LEAKAGE THROUGH LAYER 3						
-----						
TOTALS	0.0064 0.0104	0.0024 0.0072	0.0077 0.0048	0.0157 0.0056	0.0133 0.0072	0.0103 0.0032
STD. DEVIATIONS	0.0108 0.0150	0.0073 0.0112	0.0160 0.0097	0.0422 0.0103	0.0257 0.0112	0.0193 0.0083

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	11.50 ( 1.712)		3097928.5	100.00
RUNOFF	0.972 ( 0.6896)		261739.44	8.449
EVAPOTRANSPIRATION	10.443 ( 1.7323)		2812878.00	90.799
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.09409 ( 0.12254)		25343.338	0.81807
CHANGE IN WATER STORAGE	-0.008 ( 1.3197)		-2032.90	-0.066

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	1.68	452501.250
RUNOFF	0.950	255877.6250
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.044750	12053.28030
SNOW WATER	2.62	704739.1870
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.1901
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0448

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	2.8561	0.0952
2	1.2985	0.1082
3	420.4726	0.2920
SNOW WATER	0.207	

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## **APPENDIX D**

### **UNSAT-H MODEL**





0.0,		prescover36_110916
3,		BARE
120, 1.6, 286, 1.6, 287, 0,		NDLAI
1.163, 0.129, 0.020,		IDLAI, VLAI
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,		AA, B1, B2
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,		NTROOT
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,		
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,		
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,		
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,		
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,		
15498.00, 341.00, 10.00,		HW, HD, HN Material 1
15498.00, 341.00, 10.00,		HW, HD, HN Material 2
15498.00, 341.00, 10.00,		HW, HD, HN Material 3
0.0, 0.52, 0.5, 0.1, 2.7,		PETPC(1),PETPC(2),PETPC(3),PETPC(4),PETPC(5)
0.37, 832.1, 10.0, 1020.0,		ALBEDDO, ALT, ZU, PMB
1.0, 36.3, 23.2, 27.0, 137.6, 3.0, 0.71, 0.04,		
2.0, 36.4, 23.2, 27.0, 137.6, 3.0, 0.71, 0.04,		
3.0, 36.4, 23.3, 27.0, 137.6, 3.0, 0.71, 0.08,		
4.0, 36.5, 23.4, 27.0, 137.6, 3.0, 0.71, 0.04,		
5.0, 36.5, 23.5, 27.0, 137.6, 3.0, 0.71, 0.04,		
6.0, 36.6, 23.6, 27.0, 137.6, 3.0, 0.71, 0.04,		
7.0, 36.7, 23.7, 27.0, 137.6, 3.0, 0.71, 0.03,		
8.0, 36.7, 23.8, 27.0, 137.6, 3.0, 0.71, 0.04,		
9.0, 36.8, 23.9, 27.0, 137.6, 3.0, 0.71, 0.04,		
10.0, 36.9, 24.0, 27.0, 137.6, 3.0, 0.71, 0.08,		
11.0, 37.0, 24.2, 27.0, 137.6, 3.0, 0.71, 0.04,		
12.0, 37.1, 24.3, 27.0, 137.6, 3.0, 0.71, 0.04,		
13.0, 37.2, 24.4, 27.0, 137.6, 3.0, 0.71, 0.04,		
14.0, 37.3, 24.5, 27.0, 137.6, 3.0, 0.71, 0.04,		
15.0, 37.4, 24.6, 27.0, 137.6, 3.0, 0.71, 0.04,		
16.0, 37.6, 24.7, 27.0, 137.6, 3.0, 0.71, 0.04,		
17.0, 37.7, 24.8, 27.0, 137.6, 3.0, 0.71, 0.04,		
18.0, 37.8, 24.9, 27.0, 137.6, 3.0, 0.71, 0.04,		
19.0, 38.0, 25.0, 27.0, 137.6, 3.0, 0.71, 0.04,		
20.0, 38.1, 25.2, 27.0, 137.6, 3.0, 0.71, 0.04,		
21.0, 38.3, 25.3, 27.0, 137.6, 3.0, 0.71, 0.04,		
22.0, 38.4, 25.4, 27.0, 137.6, 3.0, 0.71, 0.03,		
23.0, 38.6, 25.5, 27.0, 137.6, 3.0, 0.71, 0.04,		
24.0, 38.8, 25.6, 27.0, 137.6, 3.0, 0.71, 0.00,		
25.0, 38.9, 25.7, 27.0, 137.6, 3.0, 0.71, 0.04,		
26.0, 39.1, 25.8, 27.0, 137.6, 3.0, 0.71, 0.04,		
27.0, 39.3, 25.9, 27.0, 137.6, 3.0, 0.71, 0.04,		
28.0, 39.5, 26.0, 27.0, 137.6, 3.0, 0.71, 0.04,		
29.0, 39.7, 26.1, 27.0, 137.6, 3.0, 0.71, 0.04,		
30.0, 40.0, 26.2, 27.0, 137.6, 3.0, 0.71, 0.00,		
31.0, 40.2, 26.3, 27.0, 137.6, 3.0, 0.71, 0.04,		
32.0, 40.4, 26.4, 31.0, 215.0, 7.0, 0.62, 0.04,		
33.0, 40.7, 26.5, 31.0, 215.0, 7.0, 0.62, 0.04,		
34.0, 40.9, 26.6, 31.0, 215.0, 7.0, 0.62, 0.04,		
35.0, 41.2, 26.7, 31.0, 215.0, 7.0, 0.62, 0.04,		
36.0, 41.5, 26.8, 31.0, 215.0, 7.0, 0.62, 0.00,		
37.0, 41.8, 26.9, 31.0, 215.0, 7.0, 0.62, 0.04,		
38.0, 42.1, 27.0, 31.0, 215.0, 7.0, 0.62, 0.04,		
39.0, 42.4, 27.2, 31.0, 215.0, 7.0, 0.62, 0.04,		
40.0, 42.7, 27.3, 31.0, 215.0, 7.0, 0.62, 0.03,		
41.0, 43.0, 27.4, 31.0, 215.0, 7.0, 0.62, 0.04,		
42.0, 43.3, 27.6, 31.0, 215.0, 7.0, 0.62, 0.04,		
43.0, 43.7, 27.7, 31.0, 215.0, 7.0, 0.62, 0.04,		
44.0, 44.0, 27.9, 31.0, 215.0, 7.0, 0.62, 0.00,		
45.0, 44.3, 28.0, 31.0, 215.0, 7.0, 0.62, 0.04,		
46.0, 44.7, 28.2, 31.0, 215.0, 7.0, 0.62, 0.04,		
47.0, 45.1, 28.4, 31.0, 215.0, 7.0, 0.62, 0.04,		
48.0, 45.4, 28.5, 31.0, 215.0, 7.0, 0.62, 0.04,		

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49.0,	45.8,	28.7,	31.0,	215.0,	7.0,	0.62,	0.04,
50.0,	46.2,	28.9,	31.0,	215.0,	7.0,	0.62,	0.04,
51.0,	46.5,	29.1,	31.0,	215.0,	7.0,	0.62,	0.04,
52.0,	46.9,	29.3,	31.0,	215.0,	7.0,	0.62,	0.04,
53.0,	47.3,	29.5,	31.0,	215.0,	7.0,	0.62,	0.00,
54.0,	47.7,	29.7,	31.0,	215.0,	7.0,	0.62,	0.04,
55.0,	48.0,	30.0,	31.0,	215.0,	7.0,	0.62,	0.04,
56.0,	48.4,	30.2,	31.0,	215.0,	7.0,	0.62,	0.04,
57.0,	48.8,	30.4,	31.0,	215.0,	7.0,	0.62,	0.04,
58.0,	49.2,	30.7,	31.0,	215.0,	7.0,	0.62,	0.03,
59.0,	49.6,	30.9,	31.0,	215.0,	7.0,	0.62,	0.04,
60.0,	49.7,	31.0,	31.0,	215.0,	7.0,	0.62,	0.00,
61.0,	49.9,	31.1,	30.0,	326.7,	7.0,	0.58,	0.04,
62.0,	50.3,	31.4,	30.0,	326.7,	7.0,	0.58,	0.04,
63.0,	50.7,	31.6,	30.0,	326.7,	7.0,	0.58,	0.04,
64.0,	51.0,	31.8,	30.0,	326.7,	7.0,	0.58,	0.04,
65.0,	51.4,	32.1,	30.0,	326.7,	7.0,	0.58,	0.04,
66.0,	51.7,	32.3,	30.0,	326.7,	7.0,	0.58,	0.04,
67.0,	52.1,	32.6,	30.0,	326.7,	7.0,	0.58,	0.04,
68.0,	52.4,	32.8,	30.0,	326.7,	7.0,	0.58,	0.07,
69.0,	52.7,	33.0,	30.0,	326.7,	7.0,	0.58,	0.04,
70.0,	53.1,	33.3,	30.0,	326.7,	7.0,	0.58,	0.04,
71.0,	53.4,	33.5,	30.0,	326.7,	7.0,	0.58,	0.04,
72.0,	53.7,	33.7,	30.0,	326.7,	7.0,	0.58,	0.04,
73.0,	54.0,	34.0,	30.0,	326.7,	7.0,	0.58,	0.04,
74.0,	54.3,	34.2,	30.0,	326.7,	7.0,	0.58,	0.04,
75.0,	54.6,	34.4,	30.0,	326.7,	7.0,	0.58,	0.04,
76.0,	54.9,	34.6,	30.0,	326.7,	7.0,	0.58,	0.08,
77.0,	55.1,	34.8,	30.0,	326.7,	7.0,	0.58,	0.04,
78.0,	55.4,	35.0,	30.0,	326.7,	7.0,	0.58,	0.04,
79.0,	55.7,	35.2,	30.0,	326.7,	7.0,	0.58,	0.04,
80.0,	55.9,	35.4,	30.0,	326.7,	7.0,	0.58,	0.04,
81.0,	56.2,	35.5,	30.0,	326.7,	7.0,	0.58,	0.04,
82.0,	56.4,	35.7,	30.0,	326.7,	7.0,	0.58,	0.07,
83.0,	56.6,	35.9,	30.0,	326.7,	7.0,	0.58,	0.04,
84.0,	56.9,	36.0,	30.0,	326.7,	7.0,	0.58,	0.04,
85.0,	57.1,	36.2,	30.0,	326.7,	7.0,	0.58,	0.04,
86.0,	57.3,	36.3,	30.0,	326.7,	7.0,	0.58,	0.04,
87.0,	57.6,	36.5,	30.0,	326.7,	7.0,	0.58,	0.08,
88.0,	57.8,	36.6,	30.0,	326.7,	7.0,	0.58,	0.04,
89.0,	58.0,	36.8,	30.0,	326.7,	7.0,	0.58,	0.04,
90.0,	58.2,	36.9,	30.0,	326.7,	7.0,	0.58,	0.04,
91.0,	58.4,	37.0,	30.0,	326.7,	7.0,	0.58,	0.04,
92.0,	58.6,	37.1,	28.0,	455.7,	8.0,	0.50,	0.04,
93.0,	58.9,	37.3,	28.0,	455.7,	8.0,	0.50,	0.04,
94.0,	59.1,	37.4,	28.0,	455.7,	8.0,	0.50,	0.04,
95.0,	59.3,	37.5,	28.0,	455.7,	8.0,	0.50,	0.04,
96.0,	59.5,	37.6,	28.0,	455.7,	8.0,	0.50,	0.04,
97.0,	59.8,	37.8,	28.0,	455.7,	8.0,	0.50,	0.04,
98.0,	60.0,	37.9,	28.0,	455.7,	8.0,	0.50,	0.04,
99.0,	60.2,	38.0,	28.0,	455.7,	8.0,	0.50,	0.03,
100.0,	60.5,	38.1,	28.0,	455.7,	8.0,	0.50,	0.04,
101.0,	60.7,	38.3,	28.0,	455.7,	8.0,	0.50,	0.04,
102.0,	60.9,	38.4,	28.0,	455.7,	8.0,	0.50,	0.04,
103.0,	61.2,	38.6,	28.0,	455.7,	8.0,	0.50,	0.04,
104.0,	61.5,	38.7,	28.0,	455.7,	8.0,	0.50,	0.04,
105.0,	61.7,	38.8,	28.0,	455.7,	8.0,	0.50,	0.04,
106.0,	62.0,	39.0,	28.0,	455.7,	8.0,	0.50,	0.04,
107.0,	62.3,	39.2,	28.0,	455.7,	8.0,	0.50,	0.04,
108.0,	62.5,	39.3,	28.0,	455.7,	8.0,	0.50,	0.04,
109.0,	62.8,	39.5,	28.0,	455.7,	8.0,	0.50,	0.04,
110.0,	63.1,	39.7,	28.0,	455.7,	8.0,	0.50,	0.08,
111.0,	63.4,	39.9,	28.0,	455.7,	8.0,	0.50,	0.04,

112.0, 63.7, 40.1, 28.0, 455.7, 8.0, 0.50, 0.04,  
 113.0, 64.0, 40.3, 28.0, 455.7, 8.0, 0.50, 0.04,  
 114.0, 64.3, 40.5, 28.0, 455.7, 8.0, 0.50, 0.03,  
 115.0, 64.6, 40.7, 28.0, 455.7, 8.0, 0.50, 0.04,  
 116.0, 64.9, 40.9, 28.0, 455.7, 8.0, 0.50, 0.04,  
 117.0, 65.2, 41.2, 28.0, 455.7, 8.0, 0.50, 0.04,  
 118.0, 65.6, 41.4, 28.0, 455.7, 8.0, 0.50, 0.04,  
 119.0, 65.9, 41.7, 28.0, 455.7, 8.0, 0.50, 0.04,  
 120.0, 66.2, 41.9, 28.0, 455.7, 8.0, 0.50, 0.04,  
 121.0, 66.5, 42.2, 28.0, 455.7, 8.0, 0.50, 0.04,  
 122.0, 66.9, 42.4, 41.0, 558.9, 7.0, 0.42, 0.04,  
 123.0, 67.2, 42.7, 41.0, 558.9, 7.0, 0.42, 0.04,  
 124.0, 67.5, 43.0, 41.0, 558.9, 7.0, 0.42, 0.08,  
 125.0, 67.9, 43.2, 41.0, 558.9, 7.0, 0.42, 0.04,  
 126.0, 68.2, 43.5, 41.0, 558.9, 7.0, 0.42, 0.04,  
 127.0, 68.5, 43.8, 41.0, 558.9, 7.0, 0.42, 0.04,  
 128.0, 68.8, 44.1, 41.0, 558.9, 7.0, 0.42, 0.03,  
 129.0, 69.2, 44.4, 41.0, 558.9, 7.0, 0.42, 0.04,  
 130.0, 69.5, 44.6, 41.0, 558.9, 7.0, 0.42, 0.04,  
 131.0, 69.8, 44.9, 41.0, 558.9, 7.0, 0.42, 0.08,  
 132.0, 70.1, 45.2, 41.0, 558.9, 7.0, 0.42, 0.04,  
 133.0, 70.4, 45.5, 41.0, 558.9, 7.0, 0.42, 0.04,  
 134.0, 70.8, 45.8, 41.0, 558.9, 7.0, 0.42, 0.04,  
 135.0, 71.1, 46.0, 41.0, 558.9, 7.0, 0.42, 0.04,  
 136.0, 71.4, 46.3, 41.0, 558.9, 7.0, 0.42, 0.08,  
 137.0, 71.7, 46.6, 41.0, 558.9, 7.0, 0.42, 0.04,  
 138.0, 72.0, 46.9, 41.0, 558.9, 7.0, 0.42, 0.04,  
 139.0, 72.3, 47.1, 41.0, 558.9, 7.0, 0.42, 0.04,  
 140.0, 72.6, 47.4, 41.0, 558.9, 7.0, 0.42, 0.04,  
 141.0, 72.9, 47.7, 41.0, 558.9, 7.0, 0.42, 0.04,  
 142.0, 73.2, 47.9, 41.0, 558.9, 7.0, 0.42, 0.03,  
 143.0, 73.5, 48.2, 41.0, 558.9, 7.0, 0.42, 0.04,  
 144.0, 73.8, 48.4, 41.0, 558.9, 7.0, 0.42, 0.08,  
 145.0, 74.1, 48.7, 41.0, 558.9, 7.0, 0.42, 0.04,  
 146.0, 74.3, 48.9, 41.0, 558.9, 7.0, 0.42, 0.04,  
 147.0, 74.6, 49.1, 41.0, 558.9, 7.0, 0.42, 0.04,  
 148.0, 74.9, 49.4, 41.0, 558.9, 7.0, 0.42, 0.04,  
 149.0, 75.2, 49.6, 41.0, 558.9, 7.0, 0.42, 0.04,  
 150.0, 75.5, 49.8, 41.0, 558.9, 7.0, 0.42, 0.04,  
 151.0, 75.8, 50.1, 41.0, 558.9, 7.0, 0.42, 0.04,  
 152.0, 76.1, 50.3, 41.0, 558.9, 7.0, 0.42, 0.04,  
 153.0, 76.4, 50.5, 43.0, 619.1, 7.0, 0.27, 0.04,  
 154.0, 76.7, 50.7, 43.0, 619.1, 7.0, 0.27, 0.04,  
 155.0, 77.0, 50.9, 43.0, 619.1, 7.0, 0.27, 0.04,  
 156.0, 77.3, 51.1, 43.0, 619.1, 7.0, 0.27, 0.04,  
 157.0, 77.6, 51.3, 43.0, 619.1, 7.0, 0.27, 0.00,  
 158.0, 77.9, 51.6, 43.0, 619.1, 7.0, 0.27, 0.04,  
 159.0, 78.2, 51.8, 43.0, 619.1, 7.0, 0.27, 0.04,  
 160.0, 78.6, 52.0, 43.0, 619.1, 7.0, 0.27, 0.04,  
 161.0, 78.9, 52.2, 43.0, 619.1, 7.0, 0.27, 0.00,  
 162.0, 79.2, 52.4, 43.0, 619.1, 7.0, 0.27, 0.03,  
 163.0, 79.5, 52.6, 43.0, 619.1, 7.0, 0.27, 0.04,  
 164.0, 79.9, 52.8, 43.0, 619.1, 7.0, 0.27, 0.00,  
 165.0, 80.2, 53.1, 43.0, 619.1, 7.0, 0.27, 0.04,  
 166.0, 80.6, 53.3, 43.0, 619.1, 7.0, 0.27, 0.00,  
 167.0, 81.0, 53.5, 43.0, 619.1, 7.0, 0.27, 0.04,  
 168.0, 81.3, 53.7, 43.0, 619.1, 7.0, 0.27, 0.00,  
 169.0, 81.7, 54.0, 43.0, 619.1, 7.0, 0.27, 0.04,  
 170.0, 82.1, 54.2, 43.0, 619.1, 7.0, 0.27, 0.00,  
 171.0, 82.4, 54.4, 43.0, 619.1, 7.0, 0.27, 0.04,  
 172.0, 82.8, 54.7, 43.0, 619.1, 7.0, 0.27, 0.00,  
 173.0, 83.2, 54.9, 43.0, 619.1, 7.0, 0.27, 0.04,  
 174.0, 83.6, 55.1, 43.0, 619.1, 7.0, 0.27, 0.00,



175.0	84.0	55.4	43.0	619.1	7.0	0.27	0.04
176.0	84.4	55.6	43.0	619.1	7.0	0.27	0.00
177.0	84.8	55.9	43.0	619.1	7.0	0.27	0.04
178.0	85.2	56.1	43.0	619.1	7.0	0.27	0.00
179.0	85.6	56.4	43.0	619.1	7.0	0.27	0.04
180.0	86.0	56.7	43.0	619.1	7.0	0.27	0.00
181.0	86.3	56.9	43.0	619.1	7.0	0.27	0.00
182.0	86.7	57.2	43.0	619.1	7.0	0.27	0.04
183.0	87.1	57.4	46.0	653.5	7.0	0.13	0.00
184.0	87.5	57.7	46.0	653.5	7.0	0.13	0.04
185.0	87.9	57.9	46.0	653.5	7.0	0.13	0.00
186.0	88.2	58.2	46.0	653.5	7.0	0.13	0.00
187.0	88.6	58.4	46.0	653.5	7.0	0.13	0.04
188.0	89.0	58.7	46.0	653.5	7.0	0.13	0.00
189.0	89.3	58.9	46.0	653.5	7.0	0.13	0.00
190.0	89.6	59.2	46.0	653.5	7.0	0.13	0.04
191.0	90.0	59.4	46.0	653.5	7.0	0.13	0.00
192.0	90.3	59.6	46.0	653.5	7.0	0.13	0.00
193.0	90.6	59.9	46.0	653.5	7.0	0.13	0.04
194.0	90.8	60.1	46.0	653.5	7.0	0.13	0.00
195.0	91.1	60.3	46.0	653.5	7.0	0.13	0.00
196.0	91.4	60.5	46.0	653.5	7.0	0.13	0.00
197.0	91.6	60.6	46.0	653.5	7.0	0.13	0.04
198.0	91.8	60.8	46.0	653.5	7.0	0.13	0.00
199.0	92.0	61.0	46.0	653.5	7.0	0.13	0.00
200.0	92.2	61.1	46.0	653.5	7.0	0.13	0.00
201.0	92.4	61.3	46.0	653.5	7.0	0.13	0.04
202.0	92.6	61.4	46.0	653.5	7.0	0.13	0.00
203.0	92.7	61.5	46.0	653.5	7.0	0.13	0.00
204.0	92.8	61.6	46.0	653.5	7.0	0.13	0.00
205.0	92.9	61.7	46.0	653.5	7.0	0.13	0.04
206.0	93.0	61.8	46.0	653.5	7.0	0.13	0.00
207.0	93.1	61.8	46.0	653.5	7.0	0.13	0.00
208.0	93.1	61.9	46.0	653.5	7.0	0.13	0.00
209.0	93.1	61.9	46.0	653.5	7.0	0.13	0.00
210.0	93.1	61.9	46.0	653.5	7.0	0.13	0.03
211.0	93.1	61.9	46.0	653.5	7.0	0.13	0.00
212.0	93.1	61.9	46.0	653.5	7.0	0.13	0.00
213.0	93.0	61.9	46.0	653.5	7.0	0.13	0.00
214.0	93.0	61.9	41.0	567.5	7.0	0.13	0.00
215.0	92.9	61.8	41.0	567.5	7.0	0.13	0.04
216.0	92.8	61.8	41.0	567.5	7.0	0.13	0.00
217.0	92.7	61.7	41.0	567.5	7.0	0.13	0.00
218.0	92.5	61.6	41.0	567.5	7.0	0.13	0.00
219.0	92.4	61.5	41.0	567.5	7.0	0.13	0.00
220.0	92.2	61.4	41.0	567.5	7.0	0.13	0.00
221.0	92.0	61.3	41.0	567.5	7.0	0.13	0.04
222.0	91.8	61.1	41.0	567.5	7.0	0.13	0.00
223.0	91.6	61.0	41.0	567.5	7.0	0.13	0.00
224.0	91.4	60.8	41.0	567.5	7.0	0.13	0.00
225.0	91.1	60.7	41.0	567.5	7.0	0.13	0.00
226.0	90.9	60.5	41.0	567.5	7.0	0.13	0.04
227.0	90.6	60.3	41.0	567.5	7.0	0.13	0.00
228.0	90.4	60.1	41.0	567.5	7.0	0.13	0.00
229.0	90.1	59.9	41.0	567.5	7.0	0.13	0.00
230.0	89.8	59.7	41.0	567.5	7.0	0.13	0.00
231.0	89.5	59.5	41.0	567.5	7.0	0.13	0.00
232.0	89.2	59.3	41.0	567.5	7.0	0.13	0.04
233.0	88.9	59.0	41.0	567.5	7.0	0.13	0.00
234.0	88.6	58.8	41.0	567.5	7.0	0.13	0.00
235.0	88.2	58.6	41.0	567.5	7.0	0.13	0.00
236.0	87.9	58.3	41.0	567.5	7.0	0.13	0.00
237.0	87.5	58.1	41.0	567.5	7.0	0.13	0.00

238.0	87.2	57.8	41.0	567.5	7.0	0.13	0.04
239.0	86.8	57.5	41.0	567.5	7.0	0.13	0.00
240.0	86.5	57.3	41.0	567.5	7.0	0.13	0.00
241.0	86.1	57.0	41.0	567.5	7.0	0.13	0.00
242.0	85.8	56.7	41.0	567.5	7.0	0.13	0.04
243.0	85.4	56.4	41.0	567.5	7.0	0.13	0.00
244.0	85.0	56.1	41.0	567.5	7.0	0.13	0.00
245.0	84.6	55.8	38.0	438.5	5.0	0.20	0.00
246.0	84.2	55.5	38.0	438.5	5.0	0.20	0.04
247.0	83.9	55.2	38.0	438.5	5.0	0.20	0.00
248.0	83.5	54.9	38.0	438.5	5.0	0.20	0.00
249.0	83.1	54.6	38.0	438.5	5.0	0.20	0.04
250.0	82.7	54.3	38.0	438.5	5.0	0.20	0.00
251.0	82.3	53.9	38.0	438.5	5.0	0.20	0.04
252.0	81.9	53.6	38.0	438.5	5.0	0.20	0.00
253.0	81.5	53.3	38.0	438.5	5.0	0.20	0.00
254.0	81.1	53.0	38.0	438.5	5.0	0.20	0.04
255.0	80.7	52.6	38.0	438.5	5.0	0.20	0.00
256.0	80.3	52.3	38.0	438.5	5.0	0.20	0.04
257.0	79.9	51.9	38.0	438.5	5.0	0.20	0.00
258.0	79.5	51.6	38.0	438.5	5.0	0.20	0.04
259.0	79.1	51.3	38.0	438.5	5.0	0.20	0.00
260.0	78.7	50.9	38.0	438.5	5.0	0.20	0.04
261.0	78.3	50.6	38.0	438.5	5.0	0.20	0.00
262.0	77.8	50.2	38.0	438.5	5.0	0.20	0.03
263.0	77.4	49.8	38.0	438.5	5.0	0.20	0.00
264.0	77.0	49.5	38.0	438.5	5.0	0.20	0.04
265.0	76.6	49.1	38.0	438.5	5.0	0.20	0.04
266.0	76.2	48.8	38.0	438.5	5.0	0.20	0.00
267.0	75.7	48.4	38.0	438.5	5.0	0.20	0.04
268.0	75.3	48.1	38.0	438.5	5.0	0.20	0.00
269.0	74.9	47.7	38.0	438.5	5.0	0.20	0.04
270.0	74.4	47.3	38.0	438.5	5.0	0.20	0.00
271.0	74.0	47.0	38.0	438.5	5.0	0.20	0.04
272.0	73.6	46.6	38.0	438.5	5.0	0.20	0.00
273.0	73.1	46.3	38.0	438.5	5.0	0.20	0.04
274.0	72.7	45.9	38.0	438.5	5.0	0.20	0.04
275.0	72.2	45.6	40.0	292.3	6.0	0.35	0.04
276.0	71.8	45.2	40.0	292.3	6.0	0.35	0.00
277.0	71.3	44.9	40.0	292.3	6.0	0.35	0.04
278.0	70.8	44.5	40.0	292.3	6.0	0.35	0.00
279.0	70.4	44.2	40.0	292.3	6.0	0.35	0.04
280.0	69.9	43.9	40.0	292.3	6.0	0.35	0.00
281.0	69.4	43.5	40.0	292.3	6.0	0.35	0.04
282.0	68.9	43.2	40.0	292.3	6.0	0.35	0.00
283.0	68.5	42.9	40.0	292.3	6.0	0.35	0.04
284.0	68.0	42.6	40.0	292.3	6.0	0.35	0.00
285.0	67.5	42.3	40.0	292.3	6.0	0.35	0.04
286.0	67.0	42.0	40.0	292.3	6.0	0.35	0.00
287.0	66.5	41.7	40.0	292.3	6.0	0.35	0.04
288.0	66.0	41.4	40.0	292.3	6.0	0.35	0.00
289.0	65.5	41.1	40.0	292.3	6.0	0.35	0.03
290.0	65.0	40.8	40.0	292.3	6.0	0.35	0.04
291.0	64.5	40.5	40.0	292.3	6.0	0.35	0.00
292.0	63.9	40.2	40.0	292.3	6.0	0.35	0.04
293.0	63.4	39.9	40.0	292.3	6.0	0.35	0.00
294.0	62.9	39.6	40.0	292.3	6.0	0.35	0.04
295.0	62.3	39.4	40.0	292.3	6.0	0.35	0.04
296.0	61.8	39.1	40.0	292.3	6.0	0.35	0.00
297.0	61.3	38.8	40.0	292.3	6.0	0.35	0.04
298.0	60.7	38.5	40.0	292.3	6.0	0.35	0.04
299.0	60.2	38.3	40.0	292.3	6.0	0.35	0.00
300.0	59.6	38.0	40.0	292.3	6.0	0.35	0.04

301.0	59.0	37.7	40.0	292.3	6.0	0.35	0.04
302.0	58.5	37.5	40.0	292.3	6.0	0.35	0.04
303.0	57.9	37.2	40.0	292.3	6.0	0.35	0.00
304.0	57.4	36.9	40.0	292.3	6.0	0.35	0.04
305.0	56.8	36.6	40.0	292.3	6.0	0.35	0.04
306.0	56.2	36.4	27.0	163.4	7.0	0.60	0.04
307.0	55.6	36.1	27.0	163.4	7.0	0.60	0.04
308.0	55.1	35.8	27.0	163.4	7.0	0.60	0.04
309.0	54.5	35.5	27.0	163.4	7.0	0.60	0.04
310.0	53.9	35.2	27.0	163.4	7.0	0.60	0.04
311.0	53.3	35.0	27.0	163.4	7.0	0.60	0.04
312.0	52.8	34.7	27.0	163.4	7.0	0.60	0.04
313.0	52.2	34.4	27.0	163.4	7.0	0.60	0.03
314.0	51.6	34.1	27.0	163.4	7.0	0.60	0.04
315.0	51.0	33.8	27.0	163.4	7.0	0.60	0.04
316.0	50.5	33.4	27.0	163.4	7.0	0.60	0.04
317.0	49.9	33.1	27.0	163.4	7.0	0.60	0.04
318.0	49.3	32.8	27.0	163.4	7.0	0.60	0.04
319.0	48.8	32.5	27.0	163.4	7.0	0.60	0.08
320.0	48.2	32.2	27.0	163.4	7.0	0.60	0.04
321.0	47.7	31.8	27.0	163.4	7.0	0.60	0.04
322.0	47.1	31.5	27.0	163.4	7.0	0.60	0.04
323.0	46.6	31.2	27.0	163.4	7.0	0.60	0.08
324.0	46.1	30.8	27.0	163.4	7.0	0.60	0.04
325.0	45.6	30.5	27.0	163.4	7.0	0.60	0.04
326.0	45.1	30.1	27.0	163.4	7.0	0.60	0.04
327.0	44.6	29.8	27.0	163.4	7.0	0.60	0.03
328.0	44.1	29.5	27.0	163.4	7.0	0.60	0.08
329.0	43.6	29.1	27.0	163.4	7.0	0.60	0.04
330.0	43.2	28.8	27.0	163.4	7.0	0.60	0.04
331.0	42.7	28.5	27.0	163.4	7.0	0.60	0.04
332.0	42.3	28.1	27.0	163.4	7.0	0.60	0.04
333.0	41.9	27.8	27.0	163.4	7.0	0.60	0.08
334.0	41.5	27.5	27.0	163.4	7.0	0.60	0.04
335.0	41.1	27.2	27.0	163.4	7.0	0.60	0.04
336.0	40.7	26.8	26.0	120.4	9.0	0.65	0.04
337.0	40.3	26.5	26.0	120.4	9.0	0.65	0.08
338.0	40.0	26.2	26.0	120.4	9.0	0.65	0.04
339.0	39.7	26.0	26.0	120.4	9.0	0.65	0.04
340.0	39.3	25.7	26.0	120.4	9.0	0.65	0.04
341.0	39.1	25.4	26.0	120.4	9.0	0.65	0.07
342.0	38.8	25.2	26.0	120.4	9.0	0.65	0.04
343.0	38.5	24.9	26.0	120.4	9.0	0.65	0.04
344.0	38.3	24.7	26.0	120.4	9.0	0.65	0.04
345.0	38.0	24.5	26.0	120.4	9.0	0.65	0.08
346.0	37.8	24.3	26.0	120.4	9.0	0.65	0.04
347.0	37.6	24.1	26.0	120.4	9.0	0.65	0.04
348.0	37.4	23.9	26.0	120.4	9.0	0.65	0.04
349.0	37.2	23.7	26.0	120.4	9.0	0.65	0.08
350.0	37.1	23.6	26.0	120.4	9.0	0.65	0.04
351.0	36.9	23.4	26.0	120.4	9.0	0.65	0.04
352.0	36.8	23.3	26.0	120.4	9.0	0.65	0.04
353.0	36.7	23.2	26.0	120.4	9.0	0.65	0.08
354.0	36.6	23.1	26.0	120.4	9.0	0.65	0.03
355.0	36.5	23.1	26.0	120.4	9.0	0.65	0.04
356.0	36.4	23.0	26.0	120.4	9.0	0.65	0.08
357.0	36.4	22.9	26.0	120.4	9.0	0.65	0.04
358.0	36.3	22.9	26.0	120.4	9.0	0.65	0.04
359.0	36.3	22.9	26.0	120.4	9.0	0.65	0.04
360.0	36.3	22.9	26.0	120.4	9.0	0.65	0.08
361.0	36.2	22.9	26.0	120.4	9.0	0.65	0.04
362.0	36.2	22.9	26.0	120.4	9.0	0.65	0.08
363.0	36.2	22.9	26.0	120.4	9.0	0.65	0.04

prescover36\_110916  
364.0, 36.2, 23.0, 26.0, 120.4, 9.0, 0.65, 0.04,  
365.0, 36.3, 23.0, 26.0, 120.4, 9.0, 0.65, 0.04,  
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0, NDAY

prescover36\_110916

UNSAT-H Version 3.01  
INITIAL CONDITIONS

Input File: C:\Unsat\_V30\Pickles\_Butte\prescover36\_110916.inp  
Results File: C:\Unsat\_V30\Pickles\_Butte\prescover36\_110916.res  
Date of Run: 09 Nov 2016  
Time of Run: 13:34:12.76  
Title:  
Monolithihic Cover with vegetation and vertical infiltration 100516

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	0.000E+00	1.540E+04	0.0609	288.46	2	2.500E-01	1.540E+04	0.0609	288.46
3	7.500E-01	1.540E+04	0.0609	288.46	4	1.500E+00	1.540E+04	0.0609	288.46
5	2.500E+00	1.540E+04	0.0609	288.46	6	4.000E+00	1.540E+04	0.0609	288.46
7	6.000E+00	1.540E+04	0.0609	288.46	8	8.500E+00	1.540E+04	0.0609	288.46
9	1.050E+01	1.540E+04	0.0609	288.46	10	1.200E+01	1.540E+04	0.0609	288.46
11	1.300E+01	1.540E+04	0.0609	288.46	12	1.375E+01	1.540E+04	0.0609	288.46
13	1.450E+01	1.540E+04	0.0609	288.46	14	1.500E+01	1.540E+04	0.0609	288.46
15	1.525E+01	1.540E+04	0.0609	288.46	16	1.550E+01	1.540E+04	0.1302	288.46
17	1.600E+01	1.540E+04	0.1302	288.46	18	1.675E+01	1.540E+04	0.1302	288.46
19	1.775E+01	1.540E+04	0.1302	288.46	20	1.900E+01	1.540E+04	0.1302	288.46
21	2.050E+01	1.540E+04	0.1302	288.46	22	2.250E+01	1.540E+04	0.1302	288.46
23	2.500E+01	1.540E+04	0.1302	288.46	24	2.750E+01	1.540E+04	0.1302	288.46
25	3.000E+01	1.540E+04	0.1302	288.46	26	3.250E+01	1.540E+04	0.1302	288.46
27	3.500E+01	1.540E+04	0.1302	288.46	28	3.750E+01	1.540E+04	0.1302	288.46
29	4.000E+01	1.540E+04	0.1302	288.46	30	4.250E+01	1.540E+04	0.1302	288.46
31	4.500E+01	1.540E+04	0.1302	288.46	32	4.750E+01	1.540E+04	0.1302	288.46
33	5.000E+01	1.540E+04	0.1302	288.46	34	5.250E+01	1.540E+04	0.1302	288.46
35	5.500E+01	1.540E+04	0.1302	288.46	36	5.700E+01	1.540E+04	0.1302	288.46
37	5.850E+01	1.540E+04	0.1302	288.46	38	5.950E+01	1.540E+04	0.1302	288.46
39	6.025E+01	1.540E+04	0.1302	288.46	40	6.075E+01	1.540E+04	0.1302	288.46
41	6.100E+01	1.540E+04	0.1302	288.46	42	6.125E+01	1.540E+04	0.0609	288.46
43	6.175E+01	1.540E+04	0.0609	288.46	44	6.250E+01	1.540E+04	0.0609	288.46
45	6.350E+01	1.540E+04	0.0609	288.46	46	6.500E+01	1.540E+04	0.0609	288.46
47	6.700E+01	1.540E+04	0.0609	288.46	48	6.950E+01	1.540E+04	0.0609	288.46
49	7.200E+01	1.540E+04	0.0609	288.46	50	7.450E+01	1.540E+04	0.0609	288.46
51	7.700E+01	1.540E+04	0.0609	288.46	52	7.950E+01	1.540E+04	0.0609	288.46
53	8.200E+01	1.540E+04	0.0609	288.46	54	8.450E+01	1.540E+04	0.0609	288.46
55	8.700E+01	1.540E+04	0.0609	288.46	56	8.900E+01	1.540E+04	0.0609	288.46
57	9.050E+01	1.540E+04	0.0609	288.46	58	9.150E+01	1.540E+04	0.0609	288.46

Initial Water Storage = 8.7431 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number	=	15	16	41	42	58
Depth (cm)	=	15.25000	15.50000	61.00000	61.25000	91.50000
Water (cm <sup>3</sup> /cm <sup>3</sup> )	=	0.06393	0.13653	0.13023	0.06087	0.06087
Head (cm)	=	9.36501E+03	9.37613E+03	1.54035E+04	1.54035E+04	1.54003E+04
LiqWater Flow (cm)	=	4.57647E-02	4.33973E-02	2.75100E-05	2.78393E-05	3.70830E-05
IsoVapor Flow (cm)	=	1.09775E-06	4.18798E-06	9.08212E-10	-1.86654E-09	0.00000E+00
Plant Sink (cm)	=	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00

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PRESTOR	INFIL	RUNOFF	EVAP0	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
8.7431+	0.1016+	0.0000	- 0.0000-	0.0000-	0.0000 =	8.8447 vs.	8.8370

Mass Balance = 7.6795E-03 cm; Time step attempts = 47 and successes = 47  
 Evaporation: Potential = 0.0000 cm, Actual = 0.0000 cm  
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm  
 RHMEAN = 89.8 %; TMEAN = 271.9 K; HDRY = 1.5000E+04 cm; DAYUBC = 0

DAILY SUMMARY: Day = 366, Simulated Time = 24.0000 hr

Node Number	=	15	16	41	42	58
Depth (cm)	=	15.25000	15.50000	61.00000	61.25000	91.50000
Water (cm3/cm3)	=	0.10995	0.16266	0.14763	0.07812	0.07812
Head (cm)	=	1.58792E+03	1.58763E+03	4.30834E+03	4.31205E+03	4.31132E+03
LiqWater Flow (cm)	=	1.02419E-01	1.02512E-01	1.13938E-01	1.14022E-01	1.20818E-01
IsoVapor Flow (cm)	=	-8.28267E-10	3.96835E-08	7.43505E-08	-2.91696E-10	0.00000E+00
Plant Sink (cm)	=	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAP0	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
11.2987+	0.1016+	0.0000	- 0.0046-	0.0000-	0.1208 =	11.2748 vs.	11.2748

Mass Balance = -3.8260E-05 cm; Time step attempts = 47 and successes = 47  
 Evaporation: Potential = 0.0047 cm, Actual = 0.0046 cm  
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm  
 RHMEAN = 86.5 %; TMEAN = 271.9 K; HDRY = 1.5000E+04 cm; DAYUBC = 0

1

UNSAT-H Version 3.01  
SIMULATION SUMMARY

Title:  
Monolithihic Cover with vegetation and vertical infiltration 100516

Transpiration Scheme is:	=	1	
Potential Evapotranspiration	=	1.2029E+02	[cm]
Potential Transpiration	=	6.1362E+01	[cm]
Actual Transpiration	=	2.0204E+00	[cm]
Potential Evaporation	=	5.8923E+01	[cm]
Actual Evaporation	=	2.1597E+01	[cm]
Evaporation during Growth	=	7.8271E+00	[cm]
Total Runoff	=	1.7043E-03	[cm]
Total Infiltration	=	2.9615E+01	[cm]
Total Basal Liquid Flux (drainage)	=	4.7719E+00	[cm]
Total Basal Vapor Flux (temp-grad)	=	0.0000E+00	[cm]
Total Applied Water	=	2.9616E+01	[cm]
Actual Rainfall	=	2.9616E+01	[cm]
Actual Irrigation	=	0.0000E+00	[cm]
Total Final Moisture Storage	=	1.1275E+01	[cm]
Mass Balance Error	=	-1.3066E+00	[cm]
Total Successful Time Steps	=	15367	
Total Attempted Time Steps	=	15424	
Total Time Step Reductions (DHMAX)	=	0	
Total Changes in Surface Boundary	=	4126	
Total Time Actually Simulated	=	3.6600E+02	[days]

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Total liquid water flow (cm) across different depths at the end of 3.6600E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.000	8.0175E+00	0.125	8.1702E+00	0.500	8.4347E+00
1.125	9.4202E+00	2.000	9.7608E+00	3.250	9.6622E+00
5.000	9.2595E+00	7.250	8.7103E+00	9.500	8.2690E+00
11.250	7.9850E+00	12.500	7.8188E+00	13.375	7.7102E+00
14.125	7.6230E+00	14.750	7.5558E+00	15.125	7.5174E+00
15.375	7.4924E+00	15.750	7.4489E+00	16.375	7.3790E+00
17.250	7.2871E+00	18.375	7.1785E+00	19.750	7.0588E+00
21.500	6.9240E+00	23.750	6.7744E+00	26.250	6.6311E+00
28.750	6.5030E+00	31.250	6.3858E+00	33.750	6.2767E+00
36.250	6.1737E+00	38.750	6.0758E+00	41.250	5.9822E+00
43.750	5.8922E+00	46.250	5.8057E+00	48.750	5.7226E+00
51.250	5.6428E+00	53.750	5.5667E+00	56.000	5.5016E+00
57.750	5.4534E+00	59.000	5.4203E+00	59.875	5.3979E+00
60.500	5.3823E+00	60.875	5.3731E+00	61.125	5.3672E+00
61.500	5.3598E+00	62.125	5.3476E+00	63.000	5.3304E+00
64.250	5.3059E+00	66.000	5.2715E+00	68.250	5.2274E+00
70.750	5.1784E+00	73.250	5.1294E+00	75.750	5.0805E+00
78.250	5.0315E+00	80.750	4.9825E+00	83.250	4.9335E+00
85.750	4.8846E+00	88.000	4.8405E+00	89.750	4.8062E+00
91.000	4.7817E+00	91.500	4.7719E+00		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.000	0.0000E+00	0.250	3.8600E-02	0.750	7.0901E-02
1.500	9.5386E-02	2.500	1.2940E-01	4.000	1.6334E-01
6.000	1.8225E-01	8.500	1.4609E-01	10.500	9.3459E-02
12.000	5.7296E-02	13.000	3.6144E-02	13.750	2.8630E-02
14.500	2.2036E-02	15.000	1.2537E-02	15.250	8.1384E-03
15.500	2.9923E-02	16.000	4.7862E-02	16.750	6.2347E-02
17.750	7.1804E-02	19.000	7.5335E-02	20.500	7.8944E-02
22.500	7.8411E-02	25.000	6.5133E-02	27.500	5.0815E-02
30.000	4.1121E-02	32.500	3.4327E-02	35.000	2.9482E-02
37.500	2.6000E-02	40.000	2.3488E-02	42.500	2.1668E-02
45.000	2.0346E-02	47.500	1.9380E-02	50.000	1.8671E-02
52.500	1.8149E-02	55.000	1.5986E-02	57.000	1.2268E-02
58.500	8.6906E-03	59.500	6.0545E-03	60.250	4.3109E-03
60.750	2.5815E-03	61.000	1.7194E-03	61.250	8.9334E-04
61.750	1.4871E-03	62.500	2.0784E-03	63.500	2.9631E-03
65.000	4.1378E-03	67.000	5.3057E-03	69.500	5.8806E-03
72.000	5.8703E-03	74.500	5.8630E-03	77.000	5.8579E-03
79.500	5.8544E-03	82.000	5.8519E-03	84.500	5.8502E-03
87.000	5.2640E-03	89.000	4.0936E-03	90.500	2.9238E-03
91.500	1.1694E-03				





120, 1.6, 286, 1.6, 287, 0,	monocover_101216
1.163, 0.129, 0.020,	IDLAI, VLAI
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	AA, B1, B2
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	NTROOT
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	
0, 0, 0, 0, 0, 0, 0, 0, 0, 0,	
15498.00, 341.00, 10.00,	HW, HD, HN Material 1
15498.00, 341.00, 10.00,	HW, HD, HN Material 2
0.0, 0.52, 0.5, 0.1, 2.7,	PETPC(1),PETPC(2),PETPC(3),PETPC(4),PETPC(5)
0.37, 832.1, 10.0, 1020.0,	ALBEDDO, ALT, ZU, PMB
1.0, 36.3, 23.2, 27.0, 137.6, 3.0, 0.71, 0.04,	
2.0, 36.4, 23.2, 27.0, 137.6, 3.0, 0.71, 0.04,	
3.0, 36.4, 23.3, 27.0, 137.6, 3.0, 0.71, 0.08,	
4.0, 36.5, 23.4, 27.0, 137.6, 3.0, 0.71, 0.04,	
5.0, 36.5, 23.5, 27.0, 137.6, 3.0, 0.71, 0.04,	
6.0, 36.6, 23.6, 27.0, 137.6, 3.0, 0.71, 0.04,	
7.0, 36.7, 23.7, 27.0, 137.6, 3.0, 0.71, 0.03,	
8.0, 36.7, 23.8, 27.0, 137.6, 3.0, 0.71, 0.04,	
9.0, 36.8, 23.9, 27.0, 137.6, 3.0, 0.71, 0.04,	
10.0, 36.9, 24.0, 27.0, 137.6, 3.0, 0.71, 0.08,	
11.0, 37.0, 24.2, 27.0, 137.6, 3.0, 0.71, 0.04,	
12.0, 37.1, 24.3, 27.0, 137.6, 3.0, 0.71, 0.04,	
13.0, 37.2, 24.4, 27.0, 137.6, 3.0, 0.71, 0.04,	
14.0, 37.3, 24.5, 27.0, 137.6, 3.0, 0.71, 0.04,	
15.0, 37.4, 24.6, 27.0, 137.6, 3.0, 0.71, 0.04,	
16.0, 37.6, 24.7, 27.0, 137.6, 3.0, 0.71, 0.04,	
17.0, 37.7, 24.8, 27.0, 137.6, 3.0, 0.71, 0.04,	
18.0, 37.8, 24.9, 27.0, 137.6, 3.0, 0.71, 0.04,	
19.0, 38.0, 25.0, 27.0, 137.6, 3.0, 0.71, 0.04,	
20.0, 38.1, 25.2, 27.0, 137.6, 3.0, 0.71, 0.04,	
21.0, 38.3, 25.3, 27.0, 137.6, 3.0, 0.71, 0.04,	
22.0, 38.4, 25.4, 27.0, 137.6, 3.0, 0.71, 0.03,	
23.0, 38.6, 25.5, 27.0, 137.6, 3.0, 0.71, 0.04,	
24.0, 38.8, 25.6, 27.0, 137.6, 3.0, 0.71, 0.00,	
25.0, 38.9, 25.7, 27.0, 137.6, 3.0, 0.71, 0.04,	
26.0, 39.1, 25.8, 27.0, 137.6, 3.0, 0.71, 0.04,	
27.0, 39.3, 25.9, 27.0, 137.6, 3.0, 0.71, 0.04,	
28.0, 39.5, 26.0, 27.0, 137.6, 3.0, 0.71, 0.04,	
29.0, 39.7, 26.1, 27.0, 137.6, 3.0, 0.71, 0.04,	
30.0, 40.0, 26.2, 27.0, 137.6, 3.0, 0.71, 0.00,	
31.0, 40.2, 26.3, 27.0, 137.6, 3.0, 0.71, 0.04,	
32.0, 40.4, 26.4, 31.0, 215.0, 7.0, 0.62, 0.04,	
33.0, 40.7, 26.5, 31.0, 215.0, 7.0, 0.62, 0.04,	
34.0, 40.9, 26.6, 31.0, 215.0, 7.0, 0.62, 0.04,	
35.0, 41.2, 26.7, 31.0, 215.0, 7.0, 0.62, 0.04,	
36.0, 41.5, 26.8, 31.0, 215.0, 7.0, 0.62, 0.00,	
37.0, 41.8, 26.9, 31.0, 215.0, 7.0, 0.62, 0.04,	
38.0, 42.1, 27.0, 31.0, 215.0, 7.0, 0.62, 0.04,	
39.0, 42.4, 27.2, 31.0, 215.0, 7.0, 0.62, 0.04,	
40.0, 42.7, 27.3, 31.0, 215.0, 7.0, 0.62, 0.03,	
41.0, 43.0, 27.4, 31.0, 215.0, 7.0, 0.62, 0.04,	
42.0, 43.3, 27.6, 31.0, 215.0, 7.0, 0.62, 0.04,	
43.0, 43.7, 27.7, 31.0, 215.0, 7.0, 0.62, 0.04,	
44.0, 44.0, 27.9, 31.0, 215.0, 7.0, 0.62, 0.00,	
45.0, 44.3, 28.0, 31.0, 215.0, 7.0, 0.62, 0.04,	
46.0, 44.7, 28.2, 31.0, 215.0, 7.0, 0.62, 0.04,	
47.0, 45.1, 28.4, 31.0, 215.0, 7.0, 0.62, 0.04,	
48.0, 45.4, 28.5, 31.0, 215.0, 7.0, 0.62, 0.04,	
49.0, 45.8, 28.7, 31.0, 215.0, 7.0, 0.62, 0.04,	
50.0, 46.2, 28.9, 31.0, 215.0, 7.0, 0.62, 0.04,	

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51.0, 46.5, 29.1, 31.0, 215.0, 7.0, 0.62, 0.04,  
 52.0, 46.9, 29.3, 31.0, 215.0, 7.0, 0.62, 0.04,  
 53.0, 47.3, 29.5, 31.0, 215.0, 7.0, 0.62, 0.00,  
 54.0, 47.7, 29.7, 31.0, 215.0, 7.0, 0.62, 0.04,  
 55.0, 48.0, 30.0, 31.0, 215.0, 7.0, 0.62, 0.04,  
 56.0, 48.4, 30.2, 31.0, 215.0, 7.0, 0.62, 0.04,  
 57.0, 48.8, 30.4, 31.0, 215.0, 7.0, 0.62, 0.04,  
 58.0, 49.2, 30.7, 31.0, 215.0, 7.0, 0.62, 0.03,  
 59.0, 49.6, 30.9, 31.0, 215.0, 7.0, 0.62, 0.04,  
 60.0, 49.7, 31.0, 31.0, 215.0, 7.0, 0.62, 0.00,  
 61.0, 49.9, 31.1, 30.0, 326.7, 7.0, 0.58, 0.04,  
 62.0, 50.3, 31.4, 30.0, 326.7, 7.0, 0.58, 0.04,  
 63.0, 50.7, 31.6, 30.0, 326.7, 7.0, 0.58, 0.04,  
 64.0, 51.0, 31.8, 30.0, 326.7, 7.0, 0.58, 0.04,  
 65.0, 51.4, 32.1, 30.0, 326.7, 7.0, 0.58, 0.04,  
 66.0, 51.7, 32.3, 30.0, 326.7, 7.0, 0.58, 0.04,  
 67.0, 52.1, 32.6, 30.0, 326.7, 7.0, 0.58, 0.04,  
 68.0, 52.4, 32.8, 30.0, 326.7, 7.0, 0.58, 0.07,  
 69.0, 52.7, 33.0, 30.0, 326.7, 7.0, 0.58, 0.04,  
 70.0, 53.1, 33.3, 30.0, 326.7, 7.0, 0.58, 0.04,  
 71.0, 53.4, 33.5, 30.0, 326.7, 7.0, 0.58, 0.04,  
 72.0, 53.7, 33.7, 30.0, 326.7, 7.0, 0.58, 0.04,  
 73.0, 54.0, 34.0, 30.0, 326.7, 7.0, 0.58, 0.04,  
 74.0, 54.3, 34.2, 30.0, 326.7, 7.0, 0.58, 0.04,  
 75.0, 54.6, 34.4, 30.0, 326.7, 7.0, 0.58, 0.04,  
 76.0, 54.9, 34.6, 30.0, 326.7, 7.0, 0.58, 0.08,  
 77.0, 55.1, 34.8, 30.0, 326.7, 7.0, 0.58, 0.04,  
 78.0, 55.4, 35.0, 30.0, 326.7, 7.0, 0.58, 0.04,  
 79.0, 55.7, 35.2, 30.0, 326.7, 7.0, 0.58, 0.04,  
 80.0, 55.9, 35.4, 30.0, 326.7, 7.0, 0.58, 0.04,  
 81.0, 56.2, 35.5, 30.0, 326.7, 7.0, 0.58, 0.04,  
 82.0, 56.4, 35.7, 30.0, 326.7, 7.0, 0.58, 0.07,  
 83.0, 56.6, 35.9, 30.0, 326.7, 7.0, 0.58, 0.04,  
 84.0, 56.9, 36.0, 30.0, 326.7, 7.0, 0.58, 0.04,  
 85.0, 57.1, 36.2, 30.0, 326.7, 7.0, 0.58, 0.04,  
 86.0, 57.3, 36.3, 30.0, 326.7, 7.0, 0.58, 0.04,  
 87.0, 57.6, 36.5, 30.0, 326.7, 7.0, 0.58, 0.08,  
 88.0, 57.8, 36.6, 30.0, 326.7, 7.0, 0.58, 0.04,  
 89.0, 58.0, 36.8, 30.0, 326.7, 7.0, 0.58, 0.04,  
 90.0, 58.2, 36.9, 30.0, 326.7, 7.0, 0.58, 0.04,  
 91.0, 58.4, 37.0, 30.0, 326.7, 7.0, 0.58, 0.04,  
 92.0, 58.6, 37.1, 28.0, 455.7, 8.0, 0.50, 0.04,  
 93.0, 58.9, 37.3, 28.0, 455.7, 8.0, 0.50, 0.04,  
 94.0, 59.1, 37.4, 28.0, 455.7, 8.0, 0.50, 0.04,  
 95.0, 59.3, 37.5, 28.0, 455.7, 8.0, 0.50, 0.04,  
 96.0, 59.5, 37.6, 28.0, 455.7, 8.0, 0.50, 0.04,  
 97.0, 59.8, 37.8, 28.0, 455.7, 8.0, 0.50, 0.04,  
 98.0, 60.0, 37.9, 28.0, 455.7, 8.0, 0.50, 0.04,  
 99.0, 60.2, 38.0, 28.0, 455.7, 8.0, 0.50, 0.03,  
 100.0, 60.5, 38.1, 28.0, 455.7, 8.0, 0.50, 0.04,  
 101.0, 60.7, 38.3, 28.0, 455.7, 8.0, 0.50, 0.04,  
 102.0, 60.9, 38.4, 28.0, 455.7, 8.0, 0.50, 0.04,  
 103.0, 61.2, 38.6, 28.0, 455.7, 8.0, 0.50, 0.04,  
 104.0, 61.5, 38.7, 28.0, 455.7, 8.0, 0.50, 0.04,  
 105.0, 61.7, 38.8, 28.0, 455.7, 8.0, 0.50, 0.04,  
 106.0, 62.0, 39.0, 28.0, 455.7, 8.0, 0.50, 0.04,  
 107.0, 62.3, 39.2, 28.0, 455.7, 8.0, 0.50, 0.04,  
 108.0, 62.5, 39.3, 28.0, 455.7, 8.0, 0.50, 0.04,  
 109.0, 62.8, 39.5, 28.0, 455.7, 8.0, 0.50, 0.04,  
 110.0, 63.1, 39.7, 28.0, 455.7, 8.0, 0.50, 0.08,  
 111.0, 63.4, 39.9, 28.0, 455.7, 8.0, 0.50, 0.04,  
 112.0, 63.7, 40.1, 28.0, 455.7, 8.0, 0.50, 0.04,  
 113.0, 64.0, 40.3, 28.0, 455.7, 8.0, 0.50, 0.04,

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114.0, 64.3, 40.5, 28.0, 455.7, 8.0, 0.50, 0.03,  
 115.0, 64.6, 40.7, 28.0, 455.7, 8.0, 0.50, 0.04,  
 116.0, 64.9, 40.9, 28.0, 455.7, 8.0, 0.50, 0.04,  
 117.0, 65.2, 41.2, 28.0, 455.7, 8.0, 0.50, 0.04,  
 118.0, 65.6, 41.4, 28.0, 455.7, 8.0, 0.50, 0.04,  
 119.0, 65.9, 41.7, 28.0, 455.7, 8.0, 0.50, 0.04,  
 120.0, 66.2, 41.9, 28.0, 455.7, 8.0, 0.50, 0.04,  
 121.0, 66.5, 42.2, 28.0, 455.7, 8.0, 0.50, 0.04,  
 122.0, 66.9, 42.4, 41.0, 558.9, 7.0, 0.42, 0.04,  
 123.0, 67.2, 42.7, 41.0, 558.9, 7.0, 0.42, 0.04,  
 124.0, 67.5, 43.0, 41.0, 558.9, 7.0, 0.42, 0.08,  
 125.0, 67.9, 43.2, 41.0, 558.9, 7.0, 0.42, 0.04,  
 126.0, 68.2, 43.5, 41.0, 558.9, 7.0, 0.42, 0.04,  
 127.0, 68.5, 43.8, 41.0, 558.9, 7.0, 0.42, 0.04,  
 128.0, 68.8, 44.1, 41.0, 558.9, 7.0, 0.42, 0.03,  
 129.0, 69.2, 44.4, 41.0, 558.9, 7.0, 0.42, 0.04,  
 130.0, 69.5, 44.6, 41.0, 558.9, 7.0, 0.42, 0.04,  
 131.0, 69.8, 44.9, 41.0, 558.9, 7.0, 0.42, 0.08,  
 132.0, 70.1, 45.2, 41.0, 558.9, 7.0, 0.42, 0.04,  
 133.0, 70.4, 45.5, 41.0, 558.9, 7.0, 0.42, 0.04,  
 134.0, 70.8, 45.8, 41.0, 558.9, 7.0, 0.42, 0.04,  
 135.0, 71.1, 46.0, 41.0, 558.9, 7.0, 0.42, 0.04,  
 136.0, 71.4, 46.3, 41.0, 558.9, 7.0, 0.42, 0.08,  
 137.0, 71.7, 46.6, 41.0, 558.9, 7.0, 0.42, 0.04,  
 138.0, 72.0, 46.9, 41.0, 558.9, 7.0, 0.42, 0.04,  
 139.0, 72.3, 47.1, 41.0, 558.9, 7.0, 0.42, 0.04,  
 140.0, 72.6, 47.4, 41.0, 558.9, 7.0, 0.42, 0.04,  
 141.0, 72.9, 47.7, 41.0, 558.9, 7.0, 0.42, 0.04,  
 142.0, 73.2, 47.9, 41.0, 558.9, 7.0, 0.42, 0.03,  
 143.0, 73.5, 48.2, 41.0, 558.9, 7.0, 0.42, 0.04,  
 144.0, 73.8, 48.4, 41.0, 558.9, 7.0, 0.42, 0.08,  
 145.0, 74.1, 48.7, 41.0, 558.9, 7.0, 0.42, 0.04,  
 146.0, 74.3, 48.9, 41.0, 558.9, 7.0, 0.42, 0.04,  
 147.0, 74.6, 49.1, 41.0, 558.9, 7.0, 0.42, 0.04,  
 148.0, 74.9, 49.4, 41.0, 558.9, 7.0, 0.42, 0.04,  
 149.0, 75.2, 49.6, 41.0, 558.9, 7.0, 0.42, 0.04,  
 150.0, 75.5, 49.8, 41.0, 558.9, 7.0, 0.42, 0.04,  
 151.0, 75.8, 50.1, 41.0, 558.9, 7.0, 0.42, 0.04,  
 152.0, 76.1, 50.3, 41.0, 558.9, 7.0, 0.42, 0.04,  
 153.0, 76.4, 50.5, 43.0, 619.1, 7.0, 0.27, 0.04,  
 154.0, 76.7, 50.7, 43.0, 619.1, 7.0, 0.27, 0.04,  
 155.0, 77.0, 50.9, 43.0, 619.1, 7.0, 0.27, 0.04,  
 156.0, 77.3, 51.1, 43.0, 619.1, 7.0, 0.27, 0.04,  
 157.0, 77.6, 51.3, 43.0, 619.1, 7.0, 0.27, 0.00,  
 158.0, 77.9, 51.6, 43.0, 619.1, 7.0, 0.27, 0.04,  
 159.0, 78.2, 51.8, 43.0, 619.1, 7.0, 0.27, 0.04,  
 160.0, 78.6, 52.0, 43.0, 619.1, 7.0, 0.27, 0.04,  
 161.0, 78.9, 52.2, 43.0, 619.1, 7.0, 0.27, 0.00,  
 162.0, 79.2, 52.4, 43.0, 619.1, 7.0, 0.27, 0.03,  
 163.0, 79.5, 52.6, 43.0, 619.1, 7.0, 0.27, 0.04,  
 164.0, 79.9, 52.8, 43.0, 619.1, 7.0, 0.27, 0.00,  
 165.0, 80.2, 53.1, 43.0, 619.1, 7.0, 0.27, 0.04,  
 166.0, 80.6, 53.3, 43.0, 619.1, 7.0, 0.27, 0.00,  
 167.0, 81.0, 53.5, 43.0, 619.1, 7.0, 0.27, 0.04,  
 168.0, 81.3, 53.7, 43.0, 619.1, 7.0, 0.27, 0.00,  
 169.0, 81.7, 54.0, 43.0, 619.1, 7.0, 0.27, 0.04,  
 170.0, 82.1, 54.2, 43.0, 619.1, 7.0, 0.27, 0.00,  
 171.0, 82.4, 54.4, 43.0, 619.1, 7.0, 0.27, 0.04,  
 172.0, 82.8, 54.7, 43.0, 619.1, 7.0, 0.27, 0.00,  
 173.0, 83.2, 54.9, 43.0, 619.1, 7.0, 0.27, 0.04,  
 174.0, 83.6, 55.1, 43.0, 619.1, 7.0, 0.27, 0.00,  
 175.0, 84.0, 55.4, 43.0, 619.1, 7.0, 0.27, 0.04,  
 176.0, 84.4, 55.6, 43.0, 619.1, 7.0, 0.27, 0.00,

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177.0,	84.8,	55.9,	43.0,	619.1,	7.0,	0.27,	0.04,
178.0,	85.2,	56.1,	43.0,	619.1,	7.0,	0.27,	0.00,
179.0,	85.6,	56.4,	43.0,	619.1,	7.0,	0.27,	0.04,
180.0,	86.0,	56.7,	43.0,	619.1,	7.0,	0.27,	0.00,
181.0,	86.3,	56.9,	43.0,	619.1,	7.0,	0.27,	0.00,
182.0,	86.7,	57.2,	43.0,	619.1,	7.0,	0.27,	0.04,
183.0,	87.1,	57.4,	46.0,	653.5,	7.0,	0.13,	0.00,
184.0,	87.5,	57.7,	46.0,	653.5,	7.0,	0.13,	0.04,
185.0,	87.9,	57.9,	46.0,	653.5,	7.0,	0.13,	0.00,
186.0,	88.2,	58.2,	46.0,	653.5,	7.0,	0.13,	0.00,
187.0,	88.6,	58.4,	46.0,	653.5,	7.0,	0.13,	0.04,
188.0,	89.0,	58.7,	46.0,	653.5,	7.0,	0.13,	0.00,
189.0,	89.3,	58.9,	46.0,	653.5,	7.0,	0.13,	0.00,
190.0,	89.6,	59.2,	46.0,	653.5,	7.0,	0.13,	0.04,
191.0,	90.0,	59.4,	46.0,	653.5,	7.0,	0.13,	0.00,
192.0,	90.3,	59.6,	46.0,	653.5,	7.0,	0.13,	0.00,
193.0,	90.6,	59.9,	46.0,	653.5,	7.0,	0.13,	0.04,
194.0,	90.8,	60.1,	46.0,	653.5,	7.0,	0.13,	0.00,
195.0,	91.1,	60.3,	46.0,	653.5,	7.0,	0.13,	0.00,
196.0,	91.4,	60.5,	46.0,	653.5,	7.0,	0.13,	0.00,
197.0,	91.6,	60.6,	46.0,	653.5,	7.0,	0.13,	0.04,
198.0,	91.8,	60.8,	46.0,	653.5,	7.0,	0.13,	0.00,
199.0,	92.0,	61.0,	46.0,	653.5,	7.0,	0.13,	0.00,
200.0,	92.2,	61.1,	46.0,	653.5,	7.0,	0.13,	0.00,
201.0,	92.4,	61.3,	46.0,	653.5,	7.0,	0.13,	0.04,
202.0,	92.6,	61.4,	46.0,	653.5,	7.0,	0.13,	0.00,
203.0,	92.7,	61.5,	46.0,	653.5,	7.0,	0.13,	0.00,
204.0,	92.8,	61.6,	46.0,	653.5,	7.0,	0.13,	0.00,
205.0,	92.9,	61.7,	46.0,	653.5,	7.0,	0.13,	0.04,
206.0,	93.0,	61.8,	46.0,	653.5,	7.0,	0.13,	0.00,
207.0,	93.1,	61.8,	46.0,	653.5,	7.0,	0.13,	0.00,
208.0,	93.1,	61.9,	46.0,	653.5,	7.0,	0.13,	0.00,
209.0,	93.1,	61.9,	46.0,	653.5,	7.0,	0.13,	0.00,
210.0,	93.1,	61.9,	46.0,	653.5,	7.0,	0.13,	0.03,
211.0,	93.1,	61.9,	46.0,	653.5,	7.0,	0.13,	0.00,
212.0,	93.1,	61.9,	46.0,	653.5,	7.0,	0.13,	0.00,
213.0,	93.0,	61.9,	46.0,	653.5,	7.0,	0.13,	0.00,
214.0,	93.0,	61.9,	41.0,	567.5,	7.0,	0.13,	0.00,
215.0,	92.9,	61.8,	41.0,	567.5,	7.0,	0.13,	0.04,
216.0,	92.8,	61.8,	41.0,	567.5,	7.0,	0.13,	0.00,
217.0,	92.7,	61.7,	41.0,	567.5,	7.0,	0.13,	0.00,
218.0,	92.5,	61.6,	41.0,	567.5,	7.0,	0.13,	0.00,
219.0,	92.4,	61.5,	41.0,	567.5,	7.0,	0.13,	0.00,
220.0,	92.2,	61.4,	41.0,	567.5,	7.0,	0.13,	0.00,
221.0,	92.0,	61.3,	41.0,	567.5,	7.0,	0.13,	0.04,
222.0,	91.8,	61.1,	41.0,	567.5,	7.0,	0.13,	0.00,
223.0,	91.6,	61.0,	41.0,	567.5,	7.0,	0.13,	0.00,
224.0,	91.4,	60.8,	41.0,	567.5,	7.0,	0.13,	0.00,
225.0,	91.1,	60.7,	41.0,	567.5,	7.0,	0.13,	0.00,
226.0,	90.9,	60.5,	41.0,	567.5,	7.0,	0.13,	0.04,
227.0,	90.6,	60.3,	41.0,	567.5,	7.0,	0.13,	0.00,
228.0,	90.4,	60.1,	41.0,	567.5,	7.0,	0.13,	0.00,
229.0,	90.1,	59.9,	41.0,	567.5,	7.0,	0.13,	0.00,
230.0,	89.8,	59.7,	41.0,	567.5,	7.0,	0.13,	0.00,
231.0,	89.5,	59.5,	41.0,	567.5,	7.0,	0.13,	0.00,
232.0,	89.2,	59.3,	41.0,	567.5,	7.0,	0.13,	0.04,
233.0,	88.9,	59.0,	41.0,	567.5,	7.0,	0.13,	0.00,
234.0,	88.6,	58.8,	41.0,	567.5,	7.0,	0.13,	0.00,
235.0,	88.2,	58.6,	41.0,	567.5,	7.0,	0.13,	0.00,
236.0,	87.9,	58.3,	41.0,	567.5,	7.0,	0.13,	0.00,
237.0,	87.5,	58.1,	41.0,	567.5,	7.0,	0.13,	0.00,
238.0,	87.2,	57.8,	41.0,	567.5,	7.0,	0.13,	0.04,
239.0,	86.8,	57.5,	41.0,	567.5,	7.0,	0.13,	0.00,

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240.0	86.5	57.3	41.0	567.5	7.0	0.13	0.00
241.0	86.1	57.0	41.0	567.5	7.0	0.13	0.00
242.0	85.8	56.7	41.0	567.5	7.0	0.13	0.04
243.0	85.4	56.4	41.0	567.5	7.0	0.13	0.00
244.0	85.0	56.1	41.0	567.5	7.0	0.13	0.00
245.0	84.6	55.8	38.0	438.5	5.0	0.20	0.00
246.0	84.2	55.5	38.0	438.5	5.0	0.20	0.04
247.0	83.9	55.2	38.0	438.5	5.0	0.20	0.00
248.0	83.5	54.9	38.0	438.5	5.0	0.20	0.00
249.0	83.1	54.6	38.0	438.5	5.0	0.20	0.04
250.0	82.7	54.3	38.0	438.5	5.0	0.20	0.00
251.0	82.3	53.9	38.0	438.5	5.0	0.20	0.04
252.0	81.9	53.6	38.0	438.5	5.0	0.20	0.00
253.0	81.5	53.3	38.0	438.5	5.0	0.20	0.00
254.0	81.1	53.0	38.0	438.5	5.0	0.20	0.04
255.0	80.7	52.6	38.0	438.5	5.0	0.20	0.00
256.0	80.3	52.3	38.0	438.5	5.0	0.20	0.04
257.0	79.9	51.9	38.0	438.5	5.0	0.20	0.00
258.0	79.5	51.6	38.0	438.5	5.0	0.20	0.04
259.0	79.1	51.3	38.0	438.5	5.0	0.20	0.00
260.0	78.7	50.9	38.0	438.5	5.0	0.20	0.04
261.0	78.3	50.6	38.0	438.5	5.0	0.20	0.00
262.0	77.8	50.2	38.0	438.5	5.0	0.20	0.03
263.0	77.4	49.8	38.0	438.5	5.0	0.20	0.00
264.0	77.0	49.5	38.0	438.5	5.0	0.20	0.04
265.0	76.6	49.1	38.0	438.5	5.0	0.20	0.04
266.0	76.2	48.8	38.0	438.5	5.0	0.20	0.00
267.0	75.7	48.4	38.0	438.5	5.0	0.20	0.04
268.0	75.3	48.1	38.0	438.5	5.0	0.20	0.00
269.0	74.9	47.7	38.0	438.5	5.0	0.20	0.04
270.0	74.4	47.3	38.0	438.5	5.0	0.20	0.00
271.0	74.0	47.0	38.0	438.5	5.0	0.20	0.04
272.0	73.6	46.6	38.0	438.5	5.0	0.20	0.00
273.0	73.1	46.3	38.0	438.5	5.0	0.20	0.04
274.0	72.7	45.9	38.0	438.5	5.0	0.20	0.04
275.0	72.2	45.6	40.0	292.3	6.0	0.35	0.04
276.0	71.8	45.2	40.0	292.3	6.0	0.35	0.00
277.0	71.3	44.9	40.0	292.3	6.0	0.35	0.04
278.0	70.8	44.5	40.0	292.3	6.0	0.35	0.00
279.0	70.4	44.2	40.0	292.3	6.0	0.35	0.04
280.0	69.9	43.9	40.0	292.3	6.0	0.35	0.00
281.0	69.4	43.5	40.0	292.3	6.0	0.35	0.04
282.0	68.9	43.2	40.0	292.3	6.0	0.35	0.00
283.0	68.5	42.9	40.0	292.3	6.0	0.35	0.04
284.0	68.0	42.6	40.0	292.3	6.0	0.35	0.00
285.0	67.5	42.3	40.0	292.3	6.0	0.35	0.04
286.0	67.0	42.0	40.0	292.3	6.0	0.35	0.00
287.0	66.5	41.7	40.0	292.3	6.0	0.35	0.04
288.0	66.0	41.4	40.0	292.3	6.0	0.35	0.00
289.0	65.5	41.1	40.0	292.3	6.0	0.35	0.03
290.0	65.0	40.8	40.0	292.3	6.0	0.35	0.04
291.0	64.5	40.5	40.0	292.3	6.0	0.35	0.00
292.0	63.9	40.2	40.0	292.3	6.0	0.35	0.04
293.0	63.4	39.9	40.0	292.3	6.0	0.35	0.00
294.0	62.9	39.6	40.0	292.3	6.0	0.35	0.04
295.0	62.3	39.4	40.0	292.3	6.0	0.35	0.04
296.0	61.8	39.1	40.0	292.3	6.0	0.35	0.00
297.0	61.3	38.8	40.0	292.3	6.0	0.35	0.04
298.0	60.7	38.5	40.0	292.3	6.0	0.35	0.04
299.0	60.2	38.3	40.0	292.3	6.0	0.35	0.00
300.0	59.6	38.0	40.0	292.3	6.0	0.35	0.04
301.0	59.0	37.7	40.0	292.3	6.0	0.35	0.04
302.0	58.5	37.5	40.0	292.3	6.0	0.35	0.04

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303.0, 57.9, 37.2, 40.0, 292.3, 6.0, 0.35, 0.00,  
 304.0, 57.4, 36.9, 40.0, 292.3, 6.0, 0.35, 0.04,  
 305.0, 56.8, 36.6, 40.0, 292.3, 6.0, 0.35, 0.04,  
 306.0, 56.2, 36.4, 27.0, 163.4, 7.0, 0.60, 0.04,  
 307.0, 55.6, 36.1, 27.0, 163.4, 7.0, 0.60, 0.04,  
 308.0, 55.1, 35.8, 27.0, 163.4, 7.0, 0.60, 0.04,  
 309.0, 54.5, 35.5, 27.0, 163.4, 7.0, 0.60, 0.04,  
 310.0, 53.9, 35.2, 27.0, 163.4, 7.0, 0.60, 0.04,  
 311.0, 53.3, 35.0, 27.0, 163.4, 7.0, 0.60, 0.04,  
 312.0, 52.8, 34.7, 27.0, 163.4, 7.0, 0.60, 0.04,  
 313.0, 52.2, 34.4, 27.0, 163.4, 7.0, 0.60, 0.03,  
 314.0, 51.6, 34.1, 27.0, 163.4, 7.0, 0.60, 0.04,  
 315.0, 51.0, 33.8, 27.0, 163.4, 7.0, 0.60, 0.04,  
 316.0, 50.5, 33.4, 27.0, 163.4, 7.0, 0.60, 0.04,  
 317.0, 49.9, 33.1, 27.0, 163.4, 7.0, 0.60, 0.04,  
 318.0, 49.3, 32.8, 27.0, 163.4, 7.0, 0.60, 0.04,  
 319.0, 48.8, 32.5, 27.0, 163.4, 7.0, 0.60, 0.08,  
 320.0, 48.2, 32.2, 27.0, 163.4, 7.0, 0.60, 0.04,  
 321.0, 47.7, 31.8, 27.0, 163.4, 7.0, 0.60, 0.04,  
 322.0, 47.1, 31.5, 27.0, 163.4, 7.0, 0.60, 0.04,  
 323.0, 46.6, 31.2, 27.0, 163.4, 7.0, 0.60, 0.08,  
 324.0, 46.1, 30.8, 27.0, 163.4, 7.0, 0.60, 0.04,  
 325.0, 45.6, 30.5, 27.0, 163.4, 7.0, 0.60, 0.04,  
 326.0, 45.1, 30.1, 27.0, 163.4, 7.0, 0.60, 0.04,  
 327.0, 44.6, 29.8, 27.0, 163.4, 7.0, 0.60, 0.03,  
 328.0, 44.1, 29.5, 27.0, 163.4, 7.0, 0.60, 0.08,  
 329.0, 43.6, 29.1, 27.0, 163.4, 7.0, 0.60, 0.04,  
 330.0, 43.2, 28.8, 27.0, 163.4, 7.0, 0.60, 0.04,  
 331.0, 42.7, 28.5, 27.0, 163.4, 7.0, 0.60, 0.04,  
 332.0, 42.3, 28.1, 27.0, 163.4, 7.0, 0.60, 0.04,  
 333.0, 41.9, 27.8, 27.0, 163.4, 7.0, 0.60, 0.08,  
 334.0, 41.5, 27.5, 27.0, 163.4, 7.0, 0.60, 0.04,  
 335.0, 41.1, 27.2, 27.0, 163.4, 7.0, 0.60, 0.04,  
 336.0, 40.7, 26.8, 26.0, 120.4, 9.0, 0.65, 0.04,  
 337.0, 40.3, 26.5, 26.0, 120.4, 9.0, 0.65, 0.08,  
 338.0, 40.0, 26.2, 26.0, 120.4, 9.0, 0.65, 0.04,  
 339.0, 39.7, 26.0, 26.0, 120.4, 9.0, 0.65, 0.04,  
 340.0, 39.3, 25.7, 26.0, 120.4, 9.0, 0.65, 0.04,  
 341.0, 39.1, 25.4, 26.0, 120.4, 9.0, 0.65, 0.07,  
 342.0, 38.8, 25.2, 26.0, 120.4, 9.0, 0.65, 0.04,  
 343.0, 38.5, 24.9, 26.0, 120.4, 9.0, 0.65, 0.04,  
 344.0, 38.3, 24.7, 26.0, 120.4, 9.0, 0.65, 0.04,  
 345.0, 38.0, 24.5, 26.0, 120.4, 9.0, 0.65, 0.08,  
 346.0, 37.8, 24.3, 26.0, 120.4, 9.0, 0.65, 0.04,  
 347.0, 37.6, 24.1, 26.0, 120.4, 9.0, 0.65, 0.04,  
 348.0, 37.4, 23.9, 26.0, 120.4, 9.0, 0.65, 0.04,  
 349.0, 37.2, 23.7, 26.0, 120.4, 9.0, 0.65, 0.08,  
 350.0, 37.1, 23.6, 26.0, 120.4, 9.0, 0.65, 0.04,  
 351.0, 36.9, 23.4, 26.0, 120.4, 9.0, 0.65, 0.04,  
 352.0, 36.8, 23.3, 26.0, 120.4, 9.0, 0.65, 0.04,  
 353.0, 36.7, 23.2, 26.0, 120.4, 9.0, 0.65, 0.08,  
 354.0, 36.6, 23.1, 26.0, 120.4, 9.0, 0.65, 0.03,  
 355.0, 36.5, 23.1, 26.0, 120.4, 9.0, 0.65, 0.04,  
 356.0, 36.4, 23.0, 26.0, 120.4, 9.0, 0.65, 0.08,  
 357.0, 36.4, 22.9, 26.0, 120.4, 9.0, 0.65, 0.04,  
 358.0, 36.3, 22.9, 26.0, 120.4, 9.0, 0.65, 0.04,  
 359.0, 36.3, 22.9, 26.0, 120.4, 9.0, 0.65, 0.04,  
 360.0, 36.3, 22.9, 26.0, 120.4, 9.0, 0.65, 0.08,  
 361.0, 36.2, 22.9, 26.0, 120.4, 9.0, 0.65, 0.04,  
 362.0, 36.2, 22.9, 26.0, 120.4, 9.0, 0.65, 0.08,  
 363.0, 36.2, 22.9, 26.0, 120.4, 9.0, 0.65, 0.04,  
 364.0, 36.2, 23.0, 26.0, 120.4, 9.0, 0.65, 0.04,  
 365.0, 36.3, 23.0, 26.0, 120.4, 9.0, 0.65, 0.04,

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366.0, 36.3, 23.1, 26.0, 120.4, 9.0, 0.65, 0.04,  
0, NDAY

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UNSAT-H Version 3.01  
INITIAL CONDITIONS

Input File: C:\Unsat\_V30\Pickles\_Butte\monocover\_101216.inp  
Results File: C:\Unsat\_V30\Pickles\_Butte\monocover\_101216.res  
Date of Run: 12 Oct 2016  
Time of Run: 13:54:11.99  
Title:  
Monolithihic Cover with vegetation and vertical infiltration

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	0.000E+00	1.540E+04	0.0502	288.46	2	2.500E-01	1.540E+04	0.0502	288.46
3	7.500E-01	1.540E+04	0.0502	288.46	4	1.500E+00	1.540E+04	0.0502	288.46
5	2.500E+00	1.540E+04	0.0502	288.46	6	4.000E+00	1.540E+04	0.0502	288.46
7	6.000E+00	1.540E+04	0.0502	288.46	8	8.500E+00	1.540E+04	0.0502	288.46
9	1.100E+01	1.540E+04	0.0502	288.46	10	1.350E+01	1.540E+04	0.0502	288.46
11	1.600E+01	1.540E+04	0.0502	288.46	12	1.850E+01	1.540E+04	0.0502	288.46
13	2.100E+01	1.540E+04	0.0502	288.46	14	2.350E+01	1.540E+04	0.0502	288.46
15	2.600E+01	1.540E+04	0.0502	288.46	16	2.850E+01	1.540E+04	0.0502	288.46
17	3.100E+01	1.540E+04	0.0502	288.46	18	3.350E+01	1.540E+04	0.0502	288.46
19	3.600E+01	1.540E+04	0.0502	288.46	20	3.850E+01	1.540E+04	0.0502	288.46
21	4.100E+01	1.540E+04	0.0502	288.46	22	4.350E+01	1.540E+04	0.0502	288.46
23	4.600E+01	1.540E+04	0.0502	288.46	24	4.850E+01	1.540E+04	0.0502	288.46
25	5.100E+01	1.540E+04	0.0502	288.46	26	5.350E+01	1.540E+04	0.0502	288.46
27	5.600E+01	1.540E+04	0.0502	288.46	28	5.850E+01	1.540E+04	0.0502	288.46
29	6.100E+01	1.540E+04	0.0502	288.46	30	6.350E+01	1.540E+04	0.0502	288.46
31	6.600E+01	1.540E+04	0.0502	288.46	32	6.850E+01	1.540E+04	0.0502	288.46
33	7.100E+01	1.540E+04	0.0502	288.46	34	7.350E+01	1.540E+04	0.0502	288.46
35	7.600E+01	1.540E+04	0.0502	288.46	36	7.850E+01	1.540E+04	0.0502	288.46
37	8.100E+01	1.540E+04	0.0502	288.46	38	8.350E+01	1.540E+04	0.0502	288.46
39	8.600E+01	1.540E+04	0.0502	288.46	40	8.800E+01	1.540E+04	0.0502	288.46
41	8.950E+01	1.540E+04	0.0502	288.46	42	9.050E+01	1.540E+04	0.0502	288.46
43	9.125E+01	1.540E+04	0.0502	288.46	44	9.150E+01	1.540E+04	0.0502	288.46
45	9.175E+01	1.540E+04	0.0609	288.46	46	9.225E+01	1.540E+04	0.0609	288.46
47	9.300E+01	1.540E+04	0.0609	288.46	48	9.400E+01	1.540E+04	0.0609	288.46
49	9.550E+01	1.540E+04	0.0609	288.46	50	9.750E+01	1.540E+04	0.0609	288.46
51	1.000E+02	1.540E+04	0.0609	288.46	52	1.025E+02	1.540E+04	0.0609	288.46
53	1.050E+02	1.540E+04	0.0609	288.46	54	1.075E+02	1.540E+04	0.0609	288.46
55	1.100E+02	1.540E+04	0.0609	288.46	56	1.125E+02	1.540E+04	0.0609	288.46
57	1.150E+02	1.540E+04	0.0609	288.46	58	1.175E+02	1.540E+04	0.0609	288.46
59	1.195E+02	1.540E+04	0.0609	288.46	60	1.205E+02	1.540E+04	0.0609	288.46
61	1.212E+02	1.540E+04	0.0609	288.46	62	1.217E+02	1.540E+04	0.0609	288.46
63	1.220E+02	1.540E+04	0.0609	288.46					

Initial Water Storage = 6.4501 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number	=	37	38	53
Depth (cm)	=	81.00000	83.50000	105.00000
Water (cm <sup>3</sup> /cm <sup>3</sup> )	=	0.05023	0.05023	0.06087
Head (cm)	=	1.53937E+04	1.53926E+04	1.53959E+04



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LiqWater Flow (cm)= 2.58277E-04 2.19678E-04 4.43060E-05  
 IsoVapor Flow (cm)=-6.25266E-09-8.05177E-09 1.45633E-09  
 Plant Sink (cm) = 0.00000E+00 0.00000E+00 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAP0	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
6.4501+	0.1016+	0.0000	- 0.0000-	0.0000-	0.0000 =	6.5517 vs.	6.5515

Mass Balance = 2.1365E-04 cm; Time step attempts = 47 and successes = 47  
 Evaporation: Potential = 0.0000 cm, Actual = 0.0000 cm  
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm  
 RHMEAN = 89.8 %; TMEAN = 271.9 K; HDRY = 1.5000E+04 cm; DAYUBC = 0

DAILY SUMMARY: Day = 366, Simulated Time = 24.0000 hr

Node Number	=	37	38	53
Depth (cm)	=	81.00000	83.50000	105.00000
Water (cm3/cm3)	=	0.09450	0.09445	0.07199
Head (cm)	=	5.44761E+03	5.45243E+03	5.46935E+03
LiqWater Flow (cm)	=	4.31823E-02	4.14720E-02	3.25681E-02
IsoVapor Flow (cm)	=	2.76711E-08	2.62087E-08	9.80999E-10
Plant Sink (cm)	=	0.00000E+00	0.00000E+00	0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAP0	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
10.8300+	0.1016+	0.0000	- 0.0046-	0.0000-	0.0280 =	10.8989 vs.	10.8989

Mass Balance = 8.5643E-06 cm; Time step attempts = 47 and successes = 47  
 Evaporation: Potential = 0.0047 cm, Actual = 0.0046 cm  
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm  
 RHMEAN = 86.5 %; TMEAN = 271.9 K; HDRY = 1.5000E+04 cm; DAYUBC = 0

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# UNSAT-H Version 3.01 SIMULATION SUMMARY

Title:  
 Monolithihic Cover with vegetation and vertical infiltration

Transpiration Scheme is:	=	1	
Potential Evapotranspiration	=	1.2029E+02	[cm]
Potential Transpiration	=	6.1362E+01	[cm]
Actual Transpiration	=	1.2820E+00	[cm]
Potential Evaporation	=	5.8923E+01	[cm]
Actual Evaporation	=	2.3149E+01	[cm]
Evaporation during Growth	=	7.9566E+00	[cm]
Total Runoff	=	0.0000E+00	[cm]
Total Infiltration	=	2.9616E+01	[cm]
Total Basal Liquid Flux (drainage)	=	7.0856E-01	[cm]
Total Basal Vapor Flux (temp-grad)	=	0.0000E+00	[cm]
Total Applied Water	=	2.9616E+01	[cm]
Actual Rainfall	=	2.9616E+01	[cm]
Actual Irrigation	=	0.0000E+00	[cm]
Total Final Moisture Storage	=	1.0899E+01	[cm]
Mass Balance Error	=	2.7870E-02	[cm]
Total Successful Time Steps	=	15063	
Total Attempted Time Steps	=	15063	
Total Time Step Reductions (DHMAX)	=	0	

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Total Changes in Surface Boundary = 3658  
 Total Time Actually Simulated = 3.6600E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6600E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.000	6.4673E+00	0.125	6.4775E+00	0.500	6.4417E+00
1.125	6.3670E+00	2.000	6.2432E+00	3.250	6.0606E+00
5.000	5.8272E+00	7.250	5.5685E+00	9.750	5.3211E+00
12.250	5.1047E+00	14.750	4.9132E+00	17.250	4.7409E+00
19.750	4.5831E+00	22.250	4.4359E+00	24.750	4.2965E+00
27.250	4.1627E+00	29.750	4.0329E+00	32.250	3.9060E+00
34.750	3.7812E+00	37.250	3.6579E+00	39.750	3.5357E+00
42.250	3.4144E+00	44.750	3.2937E+00	47.250	3.1734E+00
49.750	3.0536E+00	52.250	2.9340E+00	54.750	2.8147E+00
57.250	2.6956E+00	59.750	2.5766E+00	62.250	2.4579E+00
64.750	2.3393E+00	67.250	2.2208E+00	69.750	2.1025E+00
72.250	1.9843E+00	74.750	1.8662E+00	77.250	1.7483E+00
79.750	1.6305E+00	82.250	1.5127E+00	84.750	1.3951E+00
87.000	1.2894E+00	88.750	1.2072E+00	90.000	1.1485E+00
90.875	1.1074E+00	91.375	1.0839E+00	91.625	1.0722E+00
92.000	1.0677E+00	92.625	1.0602E+00	93.500	1.0497E+00
94.750	1.0348E+00	96.500	1.0138E+00	98.750	9.8684E-01
101.250	9.5690E-01	103.750	9.2697E-01	106.250	8.9704E-01
108.750	8.6711E-01	111.250	8.3719E-01	113.750	8.0727E-01
116.250	7.7736E-01	118.500	7.5044E-01	120.000	7.3249E-01
120.875	7.2202E-01	121.500	7.1454E-01	121.875	7.1005E-01
122.000	7.0856E-01				

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.000	0.0000E+00	0.250	3.1413E-02	0.750	5.2447E-02
1.500	7.3918E-02	2.500	1.0336E-01	4.000	1.3466E-01
6.000	1.4989E-01	8.500	1.3267E-01	11.000	1.0256E-01
13.500	7.7991E-02	16.000	5.8898E-02	18.500	4.4523E-02
21.000	3.3930E-02	23.500	2.6237E-02	26.000	2.0701E-02
28.500	1.6739E-02	31.000	1.3910E-02	33.500	1.1892E-02
36.000	1.0452E-02	38.500	9.4253E-03	41.000	8.6934E-03
43.500	8.1725E-03	46.000	7.8028E-03	48.500	7.5413E-03
51.000	7.3576E-03	53.500	7.2295E-03	56.000	7.1413E-03
58.500	7.0817E-03	61.000	7.0426E-03	63.500	7.0181E-03
66.000	7.0041E-03	68.500	6.9976E-03	71.000	6.9963E-03
73.500	6.9988E-03	76.000	7.0039E-03	78.500	7.0107E-03
81.000	7.0186E-03	83.500	7.0272E-03	86.000	6.3325E-03
88.000	4.9304E-03	89.500	3.5244E-03	90.500	2.4683E-03
91.250	1.4110E-03	91.500	7.0558E-04	91.750	3.2087E-04
92.250	5.3467E-04	93.000	7.4829E-04	94.000	1.0686E-03
95.500	1.4952E-03	97.500	1.9212E-03	100.000	2.1332E-03
102.500	2.1320E-03	105.000	2.1310E-03	107.500	2.1302E-03
110.000	2.1295E-03	112.500	2.1289E-03	115.000	2.1285E-03
117.500	1.9153E-03	119.500	1.2768E-03	120.500	7.4478E-04
121.250	5.3198E-04	121.750	3.1919E-04	122.000	1.0640E-04

**APPENDIX E**  
**DRAFT FINAL GRADING PLAN**



This topographic map illustrates a site with various waste management and stormwater features. The map includes contour lines indicating elevation, with labels such as 2700, 2725, 2750, 2775, 2800, 2825, 2850, 2875, 2900, 2925, 2950, 2975, and 3000. Key features and labels include:

- PHASE 2 WASTE LIMITS:** Indicated by a dashed line in the upper left quadrant.
- PHASE 3 WASTE LIMITS:** Indicated by a dashed line in the lower left quadrant.
- EXISTING STORMWATER POND:** Located in the upper left quadrant.
- PERIMETER FENCE:** Represented by a line with 'X' marks along the top and right edges.
- STORMWATER BENCH (TYP.):** Located near the top center.
- EXISTING WASTE LIMITS:** Indicated by a dashed line in the upper right quadrant.
- SITE CERTIFICATION BOUNDARY:** Represented by a dashed line on the right side.
- PROPERTY LINE:** Represented by a dashed line on the right side.
- DOWN SLOPE DRAINAGE PIPE:** Located near the bottom right.
- OPERATIONS AREA STORMWATER POND:** Located in the bottom right corner.
- SLOPE INDICATORS:** Several areas are marked with slope indicators such as 5.0:1 and 5.00%.

The map also includes a north arrow in the top right corner and a scale bar in the bottom right corner, ranging from 0 to 300 feet.

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