Exhibit 7 – Topography, Geology, Climate, Surface Hydrology, and Groundwater Hydrology Description

Matanuska-Susitna Borough

Public Works Department

Solid Waste Division

350 East Dahlia Avenue - Palmer, Alaska 99645-6488

Phone: (907) 861-7604 Fax: (907) 861-7609

December 30, 2022

Alaska Department of Environmental Conservation (ADEC)
Division of Environmental Health
Solid Waste Program
555 Cordova Street
Anchorage, AK 99501

Attn: Annemieke Powers

RE: Matanuska-Susitna Borough RD&D Permit Renewal

Please find enclosed, a completed application for the Matanuska-Susitna Borough's Central Landfill Solid Waste RD&D Permit and evidence showing that the Matsu Central Landfill meets the requirements for the RD&D Permit. The Matsu Borough is seeking a variance to the liquids restriction regulation in 40 CFR 258.28(a) and 18AAC 60.360(a)(2) for cells 3 and 4.

Central Landfill Topography and Geology

Surface forms throughout the Central Landfill can be classified as ice disintegration features (kames, kettles, and eskers) composed of both ice contact stratified drift and pro-glacial pitted outwash deposits. Many of the features may also be defined as disintegration ridges or hummocky ablation drift. The active landfill area appears to be at the margin of two types of glacial drift deposits with kame and esker features being predominant to the south of the active landfill and hummocky topography to the north. Drill logs and inspection of large excavations on the property and adjacent properties confirm the surficial features and indicate that till deposits and a large glacial lake deposit are buried beneath the stratified drift and coarse pitted outwash deposits. Bedrock was logged in one well located immediately to the west of the landfill at an elevation of approximately 18 feet below sea level. Materials encountered in the drill holes located around the site is typical of the glacial drift deposits described. The stratigraphic sequences and gradations are extremely varied on a small scale but appear to show some general consistency over the entire depositional sequence.

Central Landfill Climate

Central Landfill is in a transitional climate zone where temperature variations, precipitation, cloudiness, humidity, and surface winds are milder than in maritime or mountainous zones. The mountains located to the south tend to bar the moist Pacific air, moderating the amount of precipitation. The mountains to the north and east protect the area from cold air from the Interior.

Mean annual temperature for the area is about 35° F, with a range of about -38° F to 87° F. Average annual precipitation is about 16 inches: 47 inches of snow and 10 inches of rain. September is typically the wettest month. March is typically the d1iest month, averaging only 0.5 inch. Maximum snow accumulation occurs in December, averaging nearly 12 inches.

Central Landfill Surface and Groundwater Hydrology

Hydrogeological studies (July 1993, by Steven R. Rowland, P.E.) concluded, "The existing Central Landfill is located in an area which is geologically and hydro geologically, relatively well suited for landfilling". Of the 620 acres, landfilling has occurred on an approximately 200-acre section of the property. Of primary significance is what appears to be a relatively consistent unit of lake type lacustrine sediment. This unit was encountered in all deep test borings and monitor wells located on the land fill property and in many of the domestic wells in the vicinity of the landfill. In the domestic wells nearest the north boundary of the landfill property, this deposit is logged as 120 to 150 feet thick. Test borings in the landfill area extended into the clay unit as much as 70 feet without penetrating the
sediment. Monitoring well CLF-16 located 2,000 feet south of the active land fill was over-bored to a depth of 278 feet (elevation 1.9 feet above sea level) and encountered a 45-foot thick unit of clayey sand and gravel which appears to be the southern extension of the clay unit. Grain size analysis of representative samples indicates that the sediments are predominately lean clay and silty clay with some fine silt and sand stratification. Penetration tests performed in the clay unit show that it is over consolidated. This is likely due to having been overridden during one or more glacial advances.

The Borough is aware of all applicable local ordinances and zoning requirements and have determined no other local permits or authorizations are required to operate the Central Landfill.

Should you have questions regarding this permit application please contact me at the number below. We appreciate your time in the review of this permit application and look forward to continuing to provide exceptional solid waste services to the residents of the Matanuska-Susitna Borough.

Respectfully,

Jeff Smith
Division Manager
MSB Solid Waste
Division (907) 861-7606

I Certify, under penalty of perjury, that all of the information and exhibits in this letter and application are true, accurate, and complete.	
Printed Name: Jeff Smith	Title: Solid Waste Division Manager
Signature:	Date: December 30, 2022

Exhibit 8 – Professional Engineer Certification for Permit Modification (SW1A007-26)

Certification

I, Fred Doran P.E., hereby certify, as a Professional Engineer in the state of Alaska, that the information in this document was assembled under my direct personal charge. This application and associated exhibits meet the requirements of 18 AAC 60.210(c).

Exhibit 9 – Wetland Determination

Matanuska Susitna Borough Central Landfill

Wetland Vicinity Map

Wetland Data Source: [Matsu Borough Wetland Mapper]

Exhibit 10 – HELP Model

Memorandum

BURNS McDONNELL

Date: May 20, 2020

To: Fred Doran, PE

From: Gina Tinio, EIT

Subject: HELP Model Analysis
Central Landfill
Project No. 120344

INTRODUCTION

This memorandum presents the results of the Hydrologic Evaluation of Landfill Performance (HELP) Model analysis for the Matanuska-Susitna Borough Central Landfill (Landfill). The analysis evaluated the leachate management system components, including leachate quantities at each stage of landfill development, maximum leachate recirculation rate, and leachate collection pipe sizing and material type.

METHODOLOGY

The following analyses were performed utilizing the HELP Model Version 3.07, which was developed by the United States Army Corps Engineers (USACE) for the United States Environmental Protection Agency (USEPA) Risk Reduction Engineering Laboratory in November of 1997. The HELP model is a hydrologic model of water movement across, into, through, and out of landfills. The model uses climatologic, soil, and design data in a daily sequential analysis that accounts for the effects of surface storage, runoff, infiltration, evapotranspiration, percolation, soil moisture storage, and lateral drainage.

The HELP Model was used to estimate amounts of leachate generation, leachate recirculation, and maximum daily head on the liner system that may be expected during various stages of landfill development for the Matanuska-Susitna Borough Central Landfill (Landfill). Three different landfill development design simulations were run which include the following:

1. Active Filling
2. Intermediate Cover; and

3. Final Cover.

The simulations were modeled on a per acre basis and results were then multiplied by the area of each phase in acres to quantify volumes associated with the leachate management system. The approximate area of each phase is shown in Table 1.

Table 1: Area of Landfill Phases

Phase	I	II	III
Area (Acres)	42	113	123

DESIGN CRITERIA

The HELP Model requires climatological, vegetative, soil, and design data specific to the landfill site. The following sections document the basis for data selection and the layer profiles used in the HELP Model analyses.

Weather Data

The required weather data for the HELP Model includes daily precipitation values, mean monthly temperatures, and solar radiation representative of the landfill site. These values may be entered by the user, synthetically generated by the program, or default data supplied with the program may be used. The HELP Model Version 3.07 does not include Palmer, Alaska, as a default location, so Bethel, Alaska, was selected as the default location for temperature and solar radiation data. Bethel, Alaska, is the closest location relative to the landfill site for solar and temperature data in the program. The model does not include any Alaska locations for synthetic precipitation data, so Medford, Oregon, was selected. Palmer, Alaska, precipitation data was then manually input into the HELP Model to simulate site specific weather conditions. Precipitation data was taken from monthly averages from 1981 to 2010. The average monthly values are presented in Table 2 and supporting documentation is included in Attachment 1.

Table 2: Precipitation Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average Annual
Inches	1.06	0.93	0.68	0.34	0.72	1.23	2.05	2.61	2.50	1.56	1.04	1.28	16.00

The peak daily precipitation was modified to be 2.69 inches for the initial and intermediate conditions, which corresponds to the upper bound of the 24-hour, 25-year storm event 90% confidence interval. For the final cover condition, the peak daily precipitation was modified to be 3.47 inches, which corresponds to the upper bound of the 24-hour, 100-year storm event 90% confidence interval.

Landfill Development

Three scenarios of landfill development design simulations were performed to calculate leachate generation rates for sizing the collection system. The three scenarios include:

1. Active Filling. The first stage of landfill development is after an initial 10-foot-thick lift of waste has been placed in a cell.
2. Intermediate cover. This stage of landfill development represents areas that have reached intermediate grades and intermediate cover soils have been placed over the waste. The intermediate waste thicknesses was modeled at 20 feet.
3. Final cover. The final stage of landfill development is when an area has reached final grade and receives its final cover. The final waste thicknesses was modeled at 192 feet, which reflects the maximum waste thickness measured from the top of the drainage layer to the top of final intermediate cover.

Landfill Liner Design Parameters

The landfill design for Landfill consists of the following layers from top to bottom:

- 6 inches of earthen material;

- 18 inches of granular drainage material;
- 40 mil LLDPE flexible membrane liner;
- 6 inches of leveling course;
- Waste and intermediate cover;
- 18 inches of granular drainage material;
- Geotextile fabric;
- 60 mil HDPE flexible membrane liner;
- Geosynthetic clay liner;
- 6 inches of sand leveling course; and
- Prepared subgrade.

Note that geotextiles are not modeled as a part of the HELP model analysis. Additionally, the sand leveling course and prepared subgrade below the geosynthetic clay liner are not included in the model, as the program does not allow multiple sequencing barrier layers.

Additional Design Assumptions

1. The program initialized soil moisture content by setting moisture content at field capacity and running the program from the first year of climatological data.
2. Evaporative zone depth was estimated to be:
    a. 6 inches for active filling. This depth is equal to the thickness of the daily cover soil layer.
    b. 12 inches for intermediate cover condition. This depth is equal to the thickness of the intermediate cover soil layer and includes the influence of plant roots extending into the intermediate cover soil layer; and
    c. 24 inches for final cover condition.
3. Percent of area where runoff is possible was assumed to be:
    a. 0 percent for active filling.
    b. 100 percent for intermediate and final cover conditions.

4. SCS runoff curve numbers were calculated by the HELP Model based on default soil data, vegetative cover, and user inputted surface slope.
    a. The soil texture used to compute the curve number was bare group B soil, consistent with the daily and intermediate cover in the active and intermediate scenarios.
    b. The soil textured used to compute the curve number for the final cover scenario was a good stand of grass.
    c. A conservative slope length of 1,500 ft was used. This reflects the maximum final cover slope length on the east side of the landfill.
    d. For the initial and intermediate condition scenarios, a surface slope of 2% was used. This is consistent with typical landfill construction surface slopes.
    e. For the final cover scenario, a surface slope of 4% was used.
5. The default growing period for Bethel, Alaska, was used for the landfill location.
6. The vegetative cover was modeled as:
    a. Bare ground for active filling and intermediate cover conditions
    b. Good stand of grass for final cover conditions
7. Maximum leaf area index of:
    a. Bare ground for active filling and intermediate cover conditions
    b. Good stand of grass for final cover conditions
8. The effective saturated hydraulic conductivity of the granular drainage material was set to 1.0×10^{-1} cm/s (minimum from Cell 4 design specification).
9. The effective saturated hydraulic conductivity of the geosynthetic clay liner was set to 5.0×10^{-9} cm/s in accordance with Geosynthetic Institute GRI-GCL3 Standard Specification.
10. Geomembrane placement was assumed to be good with one installation defect per acre and one pinhole per acre.

11. Active and intermediate conditions were modeled over a time span of five years of data generation, and the final cover condition was modeled over a time span of 30 years of data generation.

RESULTS

Hydraulic Head on Liner

The HELP Model was used to calculate the amount of percolation through the liner system and the maximum daily hydraulic head over the liner for each stage of landfill development. The model calculates the depth of the hydraulic head on the liner as a function of the drainage slope, slope length, permeability of the drainage material, and the amount of leachate reintroduced into the landfill.

Results demonstrate conformance with the Alaska Department of Environmental Conservation Solid Waste Management Rule 18 AAC 60.330, which requires less than 12 inches head of leachate over the liner. Detailed HELP modeling reports are included as Attachment 2. A summary of results is presented in Table 3.

Maximum Leachate Recirculation Rate

The HELP model allows for inclusion of leachate application rates as a percentage of leachate collected from the drainage layer and applied back into the landfill, also referred to as recirculation. During active filling (Scenario 1), a recirculation rate of 94 percent (approximately 516,000 cubic feet or 3,860,000 gallons per open acre of active landfill cell per year) was included in the model while still maintaining less than 12 inches of head on the liner (10.875 inches). During the intermediate cover condition, 100 percent of the volume of leachate collected from the drainage layer (approximately 374,000 cubic feet or 2,801,00 gallons per open acre of active landfill cell per year) was included in the model while maintaining less than 12

inches of head on the liner (7.628 inches). Table 3 provides a summary of head and the liner and leachate generation rates per acre for reach scenario.

Table 3: HELP Modeling Results

Scenario	Leachate Recirculation (%)	Max Head (in)	Average Head (in)	Average Annual Leachate Recirculated (gals/acre)	Average Annual Leachate Collected (gals/acre)
Active Filling	94	10.875	7.039	3,859,816	246,371
Intermediate Cover	100	7.628	4.675	2,800,972	-
Final Cover	0	9.939	6.337	-	0.02

Leachate Generation

The HELP Model calculated a peak daily volume and annual average volume of leachate collected from the drainage layer and volume recirculated over the modeled period. Scenarios 1 and 2 were modeled for 5 years since this represents a conservative time period for active filling conditions and intermediate slopes. Scenario 3 was modeled for 30 years to evaluate the post-closure period requirements.

Table 4 presents estimated annual and peak daily leachate generation assuming no leachate is recirculated back into the landfill. These values are useful for evaluating leachate storage and treatment options. The peak volume of leachate generated over a 24-hour period is 5,274 gallons per acre, assuming no leachate is recirculated.

Table 4: Per Acre Leachate Generation

Scenario	Average Annual Leachate Collected (cubic feet/acre)	Average Annual Leachate Collected (gals/acre)	Peak Daily Leachate Generated (cubic feet/acre)	Peak Daily Leachate Generated (gals/acre)
Active Filling	36,432	272,532	705	5,274
Intermediate Cover	16,438	122,965	450	3,366
Final Cover	0.020	0.150	0.002	0.015

Attachment 1 – Weather Data
Attachment 2 – HELP Modeling Reports

Climate Palmer - Alaska

	Jan (January)	Feb (February)	Mar (March)	Apr (April)	May (May)	Jun (June)
Average high in °F	23	28	37	48	60	66
Average low in °F	12	15	22	32	42	50
Av. precipitation in inch	1.06	0.93	0.68	0.34	0.72	1.23
Av. snowfall in inch	9	8	7	2	0	0

	Jul (July)	Aug (August)	Sep (September)	Oct (October)	Nov (November)	Dec (December)
Average high in °F	67	65	56	42	28	26
Average low in °F	53	51	44	30	17	15
Av. precipitation in inch	2.05	2.61	2.50	1.56	1.04	1.28
Av. snowfall in inch	0	0	0	6	10	12

Palmer weather averages

Annual high temperature	46°F
Annual low temperature	32°F
Average annual precip.	16 inch
Av. annual snowfall	54 inch

Station Data

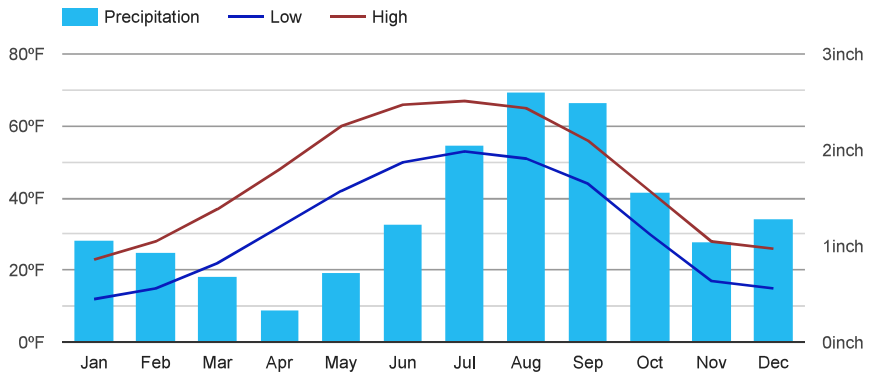
Monthly averages Palmer
Longitude: -149.113, Latitude: 61.5997
Average weather Palmer, AK - 99645

Monthly: 1981-2010 normals
History: 2007-2019

Abbreviations

Average precipitation in : Av. precipitation in
Jan (January): January, Feb (February): February, ...

Palmer Climate Graph - Alaska Climate Chart



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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\INITIAL.D4
TEMPERATURE DATA FILE:      C:\HELP3\INITIAL.D7
SOLAR RADIATION DATA FILE:  C:\HELP3\INITIAL.D13
EVAPOTRANSPIRATION DATA:    C:\HELP3\INITIAL.D11
SOIL AND DESIGN DATA FILE:  C:\HELP3\INIT160.D10
OUTPUT DATA FILE:           C:\HELP3\INIT160.OUT


TIME:  13: 2     DATE:   5/ 4/2020



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     TITLE:  MAT-SU LANDFILL ACTIVE FILLING CONDITION

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



                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   8
          THICKNESS                    =      6.00   INCHES
```

```
POROSITY                     =      0.4630 VOL/VOL
FIELD CAPACITY               =      0.2320 VOL/VOL
WILTING POINT                =      0.1160 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.1621 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.369999994000E-03 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

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THICKNESS                    =    120.00   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
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LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

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THICKNESS                    =     18.00   INCHES
POROSITY                     =      0.4170 VOL/VOL
FIELD CAPACITY               =      0.0450 VOL/VOL
WILTING POINT                =      0.0180 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0450 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000001000     CM/SEC
SLOPE                        =      4.00   PERCENT
DRAINAGE LENGTH              =    160.0    FEET
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LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

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

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.24 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.499999997000E-08 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM A USER-SPECIFIED CURVE NUMBER OF 86.0, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 1500. FEET.

SCS RUNOFF CURVE NUMBER	=	84.90	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	6.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.973	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	2.778	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.696	INCHES
INITIAL SNOW WATER	=	1.607	INCHES
INITIAL WATER IN LAYER MATERIALS	=	37.003	INCHES
TOTAL INITIAL WATER	=	38.610	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
BETHEL ALASKA

STATION LATITUDE	=	60.78 DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	184
END OF GROWING SEASON (JULIAN DATE)	=	225
EVAPORATIVE ZONE DEPTH	=	6.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	12.90 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	75.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	78.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	83.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	80.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MEDFORD OREGON

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.06	0.93	0.68	0.34	0.72	1.23
2.05	2.61	2.50	1.56	1.04	1.28

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BETHEL ALASKA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.90	5.70	10.70	23.40	40.30	50.60
54.70	52.80	45.00	29.70	17.50	4.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BETHEL ALASKA
AND STATION LATITUDE = 60.78 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.51	59931.316	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	7.669	27837.207	46.45
DRAINAGE COLLECTED FROM LAYER 3	8.8412	32093.447	53.55
PERC./LEAKAGE THROUGH LAYER 5	0.000016	0.058	0.00
AVG. HEAD ON TOP OF LAYER 4	0.1713		
CHANGE IN WATER STORAGE	0.000	0.582	0.00
SOIL WATER AT START OF YEAR	37.003	134319.969	
SOIL WATER AT END OF YEAR	37.003	134320.547	
SNOW WATER AT START OF YEAR	1.607	5833.651	9.73
SNOW WATER AT END OF YEAR	1.607	5833.651	9.73
ANNUAL WATER BUDGET BALANCE	0.0000	0.020	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.85	61165.508	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	6.814	24733.717	40.44
DRAINAGE COLLECTED FROM LAYER 3	9.4566	34327.543	56.12
PERC./LEAKAGE THROUGH LAYER 5	0.000017	0.062	0.00
AVG. HEAD ON TOP OF LAYER 4	0.1824		

CHANGE IN WATER STORAGE	0.580	2104.186	3.44
SOIL WATER AT START OF YEAR	37.003	134320.547	
SOIL WATER AT END OF YEAR	37.389	135720.969	
SNOW WATER AT START OF YEAR	1.607	5833.651	9.54
SNOW WATER AT END OF YEAR	1.801	6537.427	10.69
ANNUAL WATER BUDGET BALANCE	0.0000	0.002	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.57	63779.121	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	5.372	19499.645	30.57
DRAINAGE COLLECTED FROM LAYER 3	10.5497	38295.473	60.04
PERC./LEAKAGE THROUGH LAYER 5	0.000019	0.069	0.00
AVG. HEAD ON TOP OF LAYER 4	0.2026		
CHANGE IN WATER STORAGE	1.648	5983.897	9.38
SOIL WATER AT START OF YEAR	37.389	135720.969	
SOIL WATER AT END OF YEAR	38.301	139033.844	
SNOW WATER AT START OF YEAR	1.801	6537.427	10.25
SNOW WATER AT END OF YEAR	2.537	9208.442	14.44
ANNUAL WATER BUDGET BALANCE	0.0000	0.037	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	19.89	72200.687	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	8.235	29893.785	41.40
DRAINAGE COLLECTED FROM LAYER 3	13.3908	48608.777	67.32
PERC./LEAKAGE THROUGH LAYER 5	0.000024	0.087	0.00
AVG. HEAD ON TOP OF LAYER 4	0.2577		
CHANGE IN WATER STORAGE	-1.736	-6301.982	-8.73
SOIL WATER AT START OF YEAR	38.301	139033.844	
SOIL WATER AT END OF YEAR	38.023	138024.641	
SNOW WATER AT START OF YEAR	2.537	9208.442	12.75
SNOW WATER AT END OF YEAR	1.079	3915.669	5.42
ANNUAL WATER BUDGET BALANCE	0.0000	0.021	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.34	62944.215	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	7.475	27135.564	43.11
DRAINAGE COLLECTED FROM LAYER 3	7.9437	28835.756	45.81

PERC./LEAKAGE THROUGH LAYER 5	0.000014	0.052	0.00
AVG. HEAD ON TOP OF LAYER 4	0.1529		
CHANGE IN WATER STORAGE	1.921	6972.825	11.08
SOIL WATER AT START OF YEAR	38.023	138024.641	
SOIL WATER AT END OF YEAR	38.044	138100.422	
SNOW WATER AT START OF YEAR	1.079	3915.669	6.22
SNOW WATER AT END OF YEAR	2.979	10812.708	17.18
ANNUAL WATER BUDGET BALANCE	0.0000	0.018	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.89	1.06	0.58	0.33	0.82	1.05
	1.21	3.46	4.29	1.55	0.90	1.49
STD. DEVIATIONS	0.26	0.32	0.24	0.19	0.79	1.06
	1.57	1.26	1.59	0.91	0.31	0.31
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.312	0.326	0.351	0.382	0.048	1.335

	0.499	1.256	1.158	0.765	0.455	0.226
STD. DEVIATIONS	0.049	0.041	0.086	0.094	0.080	0.503
	0.458	0.524	0.478	0.119	0.187	0.051

LATERAL DRAINAGE COLLECTED FROM LAYER 3

TOTALS	0.0000	0.0000	0.0000	0.2111	2.1321	1.5201
	0.8368	0.6664	2.3848	2.1318	0.1533	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.1665	0.5428	0.2070
	0.6544	0.7388	0.8717	1.6901	0.3355	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 5

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0000	0.0000	0.0000	0.0497	0.4861	0.3581
	0.1908	0.1519	0.5618	0.4860	0.0361	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0392	0.1237	0.0488
	0.1492	0.1684	0.2054	0.3853	0.0790	0.0000

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	17.63	(1.328)	64004.2	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	7.113	(1.0978)	25819.98	40.341

LATERAL DRAINAGE COLLECTED FROM LAYER 3	10.03642	(2.10118)	36432.195	56.92160
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00002	(0.00000)	0.066	0.00010
AVERAGE HEAD ON TOP OF LAYER 4	0.193	(0.040)		
CHANGE IN WATER STORAGE	0.483	(1.4657)	1751.90	2.737

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	2.69	9764.700
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 3	0.19423	705.04028
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000000	0.00130
AVERAGE HEAD ON TOP OF LAYER 4	1.373	
MAXIMUM HEAD ON TOP OF LAYER 4	2.502	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	13.9 FEET	
SNOW WATER	3.82	13867.8398

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

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

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

ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	2.0142	0.3357
2	35.0399	0.2920
3	0.8100	0.0450
4	0.0000	0.0000
5	0.1800	0.7500
SNOW WATER	2.979	

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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\INITIAL.D4
TEMPERATURE DATA FILE:      C:\HELP3\INITIAL.D7
SOLAR RADIATION DATA FILE:  C:\HELP3\INITIAL.D13
EVAPOTRANSPIRATION DATA:    C:\HELP3\INITIAL.D11
SOIL AND DESIGN DATA FILE:  C:\HELP3\INIT160.D10
OUTPUT DATA FILE:           C:\HELP3\INIT160.OUT



TIME:  13:19     DATE:   5/ 4/2020



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     TITLE:  MAT-SU LANDFILL ACTIVE FILLING CONDITION

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



                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   8
          THICKNESS                    =      6.00   INCHES
```

```
  POROSITY                    =      0.4630 VOL/VOL
  FIELD CAPACITY              =      0.2320 VOL/VOL
  WILTING POINT               =      0.1160 VOL/VOL
  INITIAL SOIL WATER CONTENT  =      0.1621 VOL/VOL
  EFFECTIVE SAT. HYD. COND.   =  0.369999994000E-03 CM/SEC
```

LAYER 2

```
          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
  THICKNESS                   =    120.00   INCHES
  POROSITY                    =      0.6710 VOL/VOL
  FIELD CAPACITY              =      0.2920 VOL/VOL
  WILTING POINT               =      0.0770 VOL/VOL
  INITIAL SOIL WATER CONTENT  =      0.3326 VOL/VOL
  EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
NOTE:   94.00 PERCENT OF THE DRAINAGE COLLECTED FROM LAYER # 3
         IS RECIRCULATED INTO THIS LAYER.
```

LAYER 3

```
            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
  THICKNESS                   =     18.00   INCHES
  POROSITY                    =      0.4170 VOL/VOL
  FIELD CAPACITY              =      0.0450 VOL/VOL
  WILTING POINT               =      0.0180 VOL/VOL
  INITIAL SOIL WATER CONTENT  =      0.0707 VOL/VOL
  EFFECTIVE SAT. HYD. COND.   =  0.100000001000     CM/SEC
  SLOPE                       =      4.00   PERCENT
  DRAINAGE LENGTH             =    160.0    FEET
NOTE:   94.00 PERCENT OF THE DRAINAGE COLLECTED FROM THIS
         LAYER IS RECIRCULATED INTO LAYER #  2.
```

LAYER 4

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            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  35
```

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

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.24 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.499999997000E-08 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM A USER-SPECIFIED CURVE NUMBER OF 86.0, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 1500. FEET.

SCS RUNOFF CURVE NUMBER	=	84.90	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	6.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.973	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	2.778	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.696	INCHES
INITIAL SNOW WATER	=	1.607	INCHES
INITIAL WATER IN LAYER MATERIALS	=	42.333	INCHES
TOTAL INITIAL WATER	=	43.940	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
BETHEL ALASKA

STATION LATITUDE	= 60.78	DEGREES
MAXIMUM LEAF AREA INDEX	= 0.00	
START OF GROWING SEASON (JULIAN DATE)	= 184	
END OF GROWING SEASON (JULIAN DATE)	= 225	
EVAPORATIVE ZONE DEPTH	= 6.0	INCHES
AVERAGE ANNUAL WIND SPEED	= 12.90	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	= 75.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	= 78.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	= 83.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	= 80.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MEDFORD OREGON

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.06	0.93	0.68	0.34	0.72	1.23
2.05	2.61	2.50	1.56	1.04	1.28

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BETHEL ALASKA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.90	5.70	10.70	23.40	40.30	50.60
54.70	52.80	45.00	29.70	17.50	4.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BETHEL ALASKA
AND STATION LATITUDE = 60.78 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.51	59931.316	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	7.669	27837.207	46.45
RECIRCULATION INTO LAYER 2	90.169006	327313.500	546.15
DRAINAGE COLLECTED FROM LAYER 3	5.7555	20892.346	34.86
RECIRCULATION FROM LAYER 3	90.169006	327313.500	546.15
PERC./LEAKAGE THROUGH LAYER 5	0.000188	0.684	0.00
AVG. HEAD ON TOP OF LAYER 4	1.8537		
CHANGE IN WATER STORAGE	2.960	10744.728	17.93
SOIL WATER AT START OF YEAR	42.333	153668.531	
SOIL WATER AT END OF YEAR	45.293	164413.250	
SNOW WATER AT START OF YEAR	1.607	5833.651	9.73
SNOW WATER AT END OF YEAR	1.607	5833.651	9.73
ANNUAL WATER BUDGET BALANCE	0.1257	456.352	0.76

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.85	61165.508	100.00
RUNOFF	0.000	0.000	0.00

EVAPOTRANSPIRATION	6.814	24733.717	40.44
RECIRCULATION INTO LAYER 2	123.488007	448261.469	732.87
DRAINAGE COLLECTED FROM LAYER 3	7.8822	28612.430	46.78
RECIRCULATION FROM LAYER 3	123.488007	448261.469	732.87
PERC./LEAKAGE THROUGH LAYER 5	0.000271	0.983	0.00
AVG. HEAD ON TOP OF LAYER 4	2.5397		
CHANGE IN WATER STORAGE	2.068	7507.894	12.27
SOIL WATER AT START OF YEAR	45.293	164413.250	
SOIL WATER AT END OF YEAR	47.167	171217.375	
SNOW WATER AT START OF YEAR	1.607	5833.651	9.54
SNOW WATER AT END OF YEAR	1.801	6537.427	10.69
ANNUAL WATER BUDGET BALANCE	0.0855	310.486	0.51

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.57	63779.121	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	5.372	19499.645	30.57
RECIRCULATION INTO LAYER 2	144.080811	523013.344	820.04
DRAINAGE COLLECTED FROM LAYER 3	9.1966	33383.820	52.34
RECIRCULATION FROM LAYER 3	144.080811	523013.344	820.04
PERC./LEAKAGE THROUGH LAYER 5	0.000327	1.187	0.00
AVG. HEAD ON TOP OF LAYER 4	2.9635		

CHANGE IN WATER STORAGE	2.915	10582.174	16.59
SOIL WATER AT START OF YEAR	47.167	171217.375	
SOIL WATER AT END OF YEAR	49.347	179128.531	
SNOW WATER AT START OF YEAR	1.801	6537.427	10.25
SNOW WATER AT END OF YEAR	2.537	9208.442	14.44
ANNUAL WATER BUDGET BALANCE	0.0860	312.295	0.49

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	19.89	72200.687	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	8.235	29893.785	41.40
RECIRCULATION INTO LAYER 2	187.973648	682344.312	945.07
DRAINAGE COLLECTED FROM LAYER 3	11.9983	43553.914	60.32
RECIRCULATION FROM LAYER 3	187.973648	682344.312	945.07
PERC./LEAKAGE THROUGH LAYER 5	0.000461	1.674	0.00
AVG. HEAD ON TOP OF LAYER 4	3.8587		
CHANGE IN WATER STORAGE	-0.439	-1593.703	-2.21
SOIL WATER AT START OF YEAR	49.347	179128.531	
SOIL WATER AT END OF YEAR	50.366	182827.594	
SNOW WATER AT START OF YEAR	2.537	9208.442	12.75
SNOW WATER AT END OF YEAR	1.079	3915.669	5.42

ANNUAL WATER BUDGET BALANCE	0.0950	345.019	0.48

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.34	62944.215	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	7.475	27135.564	43.11
RECIRCULATION INTO LAYER 2	165.007996	598979.000	951.60
DRAINAGE COLLECTED FROM LAYER 3	10.5324	38232.691	60.74
RECIRCULATION FROM LAYER 3	165.007996	598979.000	951.60
PERC./LEAKAGE THROUGH LAYER 5	0.000383	1.389	0.00
AVG. HEAD ON TOP OF LAYER 4	3.3982		
CHANGE IN WATER STORAGE	-0.497	-1804.679	-2.87
SOIL WATER AT START OF YEAR	50.366	182827.594	
SOIL WATER AT END OF YEAR	47.969	174125.891	
SNOW WATER AT START OF YEAR	1.079	3915.669	6.22
SNOW WATER AT END OF YEAR	2.979	10812.708	17.18
ANNUAL WATER BUDGET BALANCE	-0.1710	-620.753	-0.99

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.89	1.06	0.58	0.33	0.82	1.05
	1.21	3.46	4.29	1.55	0.90	1.49
STD. DEVIATIONS	0.26	0.32	0.24	0.19	0.79	1.06
	1.57	1.26	1.59	0.91	0.31	0.31
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.312	0.326	0.351	0.382	0.048	1.335
	0.499	1.256	1.158	0.765	0.455	0.226
STD. DEVIATIONS	0.049	0.041	0.086	0.094	0.080	0.503
	0.458	0.524	0.478	0.119	0.187	0.051
LATERAL DRAINAGE RECIRCULATED INTO LAYER 2						
TOTALS	10.8182	8.8565	8.7921	7.6070	9.8987	10.9146
	12.0920	12.0476	14.7720	17.5624	15.1041	13.6785
STD. DEVIATIONS	4.2922	3.3643	3.1295	2.5717	2.9304	2.5372
	2.3954	3.4809	4.5544	5.1619	4.0473	3.4158
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.6905	0.5653	0.5612	0.4856	0.6318	0.6967
	0.7718	0.7690	0.9429	1.1210	0.9641	0.8731
STD. DEVIATIONS	0.2740	0.2147	0.1998	0.1641	0.1870	0.1619
	0.1529	0.2222	0.2907	0.3295	0.2583	0.2180
LATERAL DRAINAGE RECIRCULATED FROM LAYER 3						
TOTALS	10.8182	8.8565	8.7921	7.6070	9.8987	10.9146
	12.0920	12.0476	14.7720	17.5624	15.1041	13.6785

STD. DEVIATIONS	4.2922	3.3643	3.1295	2.5717	2.9304	2.5372
	2.3954	3.4809	4.5544	5.1619	4.0473	3.4158

PERCOLATION/LEAKAGE THROUGH LAYER 5

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	2.6236	2.3574	2.1322	1.9063	2.4006	2.7352
	2.9325	2.9218	3.7019	4.2592	3.7851	3.3173
STD. DEVIATIONS	1.0409	0.8869	0.7590	0.6445	0.7107	0.6358
	0.5809	0.8442	1.1413	1.2519	1.0143	0.8284

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	17.63	(1.328)	64004.2	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	7.113	(1.0978)	25819.98	40.341
DRAINAGE RECIRCULATED INTO LAYER 2	142.14389	(37.67066)	515982.312	806.16980
LATERAL DRAINAGE COLLECTED FROM LAYER 3	9.07301	(2.40451)	32935.043	51.45765
DRAINAGE RECIRCULATED FROM LAYER 3	142.14389	(37.67066)	515982.312	806.16980

PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00033	(0.00010)	1.183	0.00185
AVERAGE HEAD ON TOP OF LAYER 4	2.923	(0.774)		
CHANGE IN WATER STORAGE	1.401	(1.7434)	5087.28	7.948

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	2.69	9764.700
RUNOFF	0.000	0.0000
DRAINAGE RECIRCULATED INTO LAYER 2	0.93633	3398.86523
DRAINAGE COLLECTED FROM LAYER 3	0.05977	216.94884
DRAINAGE RECIRCULATED FROM LAYER 3	0.93633	3398.86523
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000003	0.00989
AVERAGE HEAD ON TOP OF LAYER 4	7.039	
MAXIMUM HEAD ON TOP OF LAYER 4	10.875	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	36.2 FEET	
SNOW WATER	3.82	13867.8398

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

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

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

ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	2.0142	0.3357
2	43.8878	0.3657
3	1.8865	0.1048
4	0.0000	0.0000
5	0.1800	0.7500
SNOW WATER	2.979	

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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\INTERMED.D4
TEMPERATURE DATA FILE:      C:\HELP3\INTERMED.D7
SOLAR RADIATION DATA FILE:  C:\HELP3\INTERMED.D13
EVAPOTRANSPIRATION DATA:    C:\HELP3\INTERMED.D11
SOIL AND DESIGN DATA FILE:  C:\HELP3\2INTE160.D10
OUTPUT DATA FILE:           C:\HELP3\2INTE160.OUT



TIME:  16:25     DATE:   5/20/2020



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     TITLE:  MAT-SU LANDFILL INTERMEDIATE COVER CONDITION

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



                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   8
          THICKNESS                    =     12.00   INCHES
```

```
POROSITY                     =      0.4630 VOL/VOL
FIELD CAPACITY               =      0.2320 VOL/VOL
WILTING POINT                =      0.1160 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.1974 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.369999994000E-03 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

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

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

```
THICKNESS                    =     18.00   INCHES
POROSITY                     =      0.4170 VOL/VOL
FIELD CAPACITY               =      0.0450 VOL/VOL
WILTING POINT                =      0.0180 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0450 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000001000     CM/SEC
SLOPE                        =      4.00   PERCENT
DRAINAGE LENGTH              =    160.0    FEET
```

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

```
THICKNESS                    =      0.06   INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
```

INITIAL SOIL WATER CONTENT	=	0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY	=	1.00 HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00 HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.24 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.499999997000E-08 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM A USER-SPECIFIED CURVE NUMBER OF 86.0, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 1500. FEET.

SCS RUNOFF CURVE NUMBER	=	84.90	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	2.369	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.556	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.392	INCHES
INITIAL SNOW WATER	=	1.607	INCHES
INITIAL WATER IN LAYER MATERIALS	=	73.439	INCHES
TOTAL INITIAL WATER	=	75.046	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
BETHEL ALASKA

STATION LATITUDE	=	60.78 DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	184
END OF GROWING SEASON (JULIAN DATE)	=	225
EVAPORATIVE ZONE DEPTH	=	12.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	12.90 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	75.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	78.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	83.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	80.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MEDFORD OREGON

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.06	0.93	0.68	0.34	0.72	1.23
2.05	2.61	2.50	1.56	1.04	1.28

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BETHEL ALASKA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.90	5.70	10.70	23.40	40.30	50.60
54.70	52.80	45.00	29.70	17.50	4.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BETHEL ALASKA
AND STATION LATITUDE = 60.78 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.51	59931.316	100.00
RUNOFF	3.383	12281.097	20.49
EVAPOTRANSPIRATION	8.669	31469.055	52.51
DRAINAGE COLLECTED FROM LAYER 3	4.4572	16179.498	27.00
PERC./LEAKAGE THROUGH LAYER 5	0.000008	0.030	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0862		
CHANGE IN WATER STORAGE	0.000	1.606	0.00
SOIL WATER AT START OF YEAR	73.439	266582.156	
SOIL WATER AT END OF YEAR	73.439	266583.781	
SNOW WATER AT START OF YEAR	1.607	5833.651	9.73
SNOW WATER AT END OF YEAR	1.607	5833.651	9.73
ANNUAL WATER BUDGET BALANCE	0.0000	0.030	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.85	61165.508	100.00
RUNOFF	4.380	15898.184	25.99
EVAPOTRANSPIRATION	8.643	31372.676	51.29
DRAINAGE COLLECTED FROM LAYER 3	3.1623	11479.095	18.77
PERC./LEAKAGE THROUGH LAYER 5	0.000006	0.022	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0608		

CHANGE IN WATER STORAGE	0.665	2415.530	3.95
SOIL WATER AT START OF YEAR	73.439	266583.781	
SOIL WATER AT END OF YEAR	73.911	268295.531	
SNOW WATER AT START OF YEAR	1.607	5833.651	9.54
SNOW WATER AT END OF YEAR	1.801	6537.427	10.69
ANNUAL WATER BUDGET BALANCE	0.0000	0.001	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.57	63779.121	100.00
RUNOFF	4.354	15804.095	24.78
EVAPOTRANSPIRATION	6.533	23716.424	37.19
DRAINAGE COLLECTED FROM LAYER 3	5.1685	18761.521	29.42
PERC./LEAKAGE THROUGH LAYER 5	0.000010	0.035	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0999		
CHANGE IN WATER STORAGE	1.514	5497.010	8.62
SOIL WATER AT START OF YEAR	73.911	268295.531	
SOIL WATER AT END OF YEAR	74.689	271121.531	
SNOW WATER AT START OF YEAR	1.801	6537.427	10.25
SNOW WATER AT END OF YEAR	2.537	9208.442	14.44
ANNUAL WATER BUDGET BALANCE	0.0000	0.035	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	19.89	72200.687	100.00
RUNOFF	4.824	17510.082	24.25
EVAPOTRANSPIRATION	10.287	37342.996	51.72
DRAINAGE COLLECTED FROM LAYER 3	6.6672	24201.891	33.52
PERC./LEAKAGE THROUGH LAYER 5	0.000012	0.043	0.00
AVG. HEAD ON TOP OF LAYER 4	0.1284		
CHANGE IN WATER STORAGE	-1.888	-6854.312	-9.49
SOIL WATER AT START OF YEAR	74.689	271121.531	
SOIL WATER AT END OF YEAR	74.259	269560.000	
SNOW WATER AT START OF YEAR	2.537	9208.442	12.75
SNOW WATER AT END OF YEAR	1.079	3915.669	5.42
ANNUAL WATER BUDGET BALANCE	0.0000	-0.011	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.34	62944.215	100.00
RUNOFF	2.998	10882.966	17.29
EVAPOTRANSPIRATION	9.155	33233.090	52.80
DRAINAGE COLLECTED FROM LAYER 3	3.1869	11568.364	18.38

PERC./LEAKAGE THROUGH LAYER 5	0.000006	0.022	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0618		
CHANGE IN WATER STORAGE	2.000	7259.728	11.53
SOIL WATER AT START OF YEAR	74.259	269560.000	
SOIL WATER AT END OF YEAR	74.359	269922.687	
SNOW WATER AT START OF YEAR	1.079	3915.669	6.22
SNOW WATER AT END OF YEAR	2.979	10812.708	17.18
ANNUAL WATER BUDGET BALANCE	0.0000	0.046	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.89	1.06	0.58	0.33	0.82	1.05
	1.21	3.46	4.29	1.55	0.90	1.49
STD. DEVIATIONS	0.26	0.32	0.24	0.19	0.79	1.06
	1.57	1.26	1.59	0.91	0.31	0.31
RUNOFF						
TOTALS	0.000	0.000	0.023	1.723	0.937	0.102
	0.160	0.391	0.506	0.000	0.145	0.000
STD. DEVIATIONS	0.000	0.000	0.052	0.922	0.782	0.216
	0.228	0.264	0.413	0.000	0.138	0.000
EVAPOTRANSPIRATION						
TOTALS	0.312	0.326	0.351	0.382	0.048	2.033

	0.982	1.286	1.451	0.803	0.456	0.226
STD. DEVIATIONS	0.049	0.041	0.086	0.094	0.080	0.398
	0.824	0.685	0.343	0.103	0.189	0.051

LATERAL DRAINAGE COLLECTED FROM LAYER 3

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.8144
	0.7259	0.1096	1.0950	1.5006	0.2828	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.3300
	0.5310	0.1387	0.5533	1.1209	0.5786	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 5

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.1919
	0.1655	0.0250	0.2579	0.3421	0.0666	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0777
	0.1211	0.0316	0.1303	0.2555	0.1363	0.0000

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	17.63	(1.328)	64004.2	100.00
RUNOFF	3.988	(0.7634)	14475.28	22.616
EVAPOTRANSPIRATION	8.658	(1.3616)	31426.85	49.101

LATERAL DRAINAGE COLLECTED FROM LAYER 3	4.52840 (	1.47098)	16438.074	25.68282
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00001 (	0.00000)	0.030	0.00005
AVERAGE HEAD ON TOP OF LAYER 4	0.087 (	0.028)		
CHANGE IN WATER STORAGE	0.458 (	1.5207)	1663.91	2.600

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	2.69	9764.700
RUNOFF	1.325	4810.1763
DRAINAGE COLLECTED FROM LAYER 3	0.12395	449.95428
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000000	0.00079
AVERAGE HEAD ON TOP OF LAYER 4	0.876	
MAXIMUM HEAD ON TOP OF LAYER 4	1.637	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	10.3 FEET	
SNOW WATER	3.82	13867.8398

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3679
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1160

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

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

ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	3.2889	0.2741
2	70.0799	0.2920
3	0.8100	0.0450
4	0.0000	0.0000
5	0.1800	0.7500
SNOW WATER	2.979	

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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\INTERMED.D4
TEMPERATURE DATA FILE:      C:\HELP3\INTERMED.D7
SOLAR RADIATION DATA FILE:  C:\HELP3\INTERMED.D13
EVAPOTRANSPIRATION DATA:    C:\HELP3\INTERMED.D11
SOIL AND DESIGN DATA FILE:  C:\HELP3\2INTE160.D10
OUTPUT DATA FILE:           C:\HELP3\2INTE160.OUT



TIME:  10:39     DATE:   5/ 4/2020



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     TITLE:  MAT-SU LANDFILL INTERMEDIATE COVER CONDITION

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



                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   8
          THICKNESS                    =     12.00   INCHES
```

```
  POROSITY                    =      0.4630 VOL/VOL
  FIELD CAPACITY              =      0.2320 VOL/VOL
  WILTING POINT               =      0.1160 VOL/VOL
  INITIAL SOIL WATER CONTENT  =      0.1974 VOL/VOL
  EFFECTIVE SAT. HYD. COND.   =  0.369999994000E-03 CM/SEC
```

LAYER 2

```
          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
  THICKNESS                   =    240.00   INCHES
  POROSITY                    =      0.6710 VOL/VOL
  FIELD CAPACITY              =      0.2920 VOL/VOL
  WILTING POINT               =      0.0770 VOL/VOL
  INITIAL SOIL WATER CONTENT  =      0.3101 VOL/VOL
  EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
NOTE:  100.00 PERCENT OF THE DRAINAGE COLLECTED FROM LAYER # 3
         IS RECIRCULATED INTO THIS LAYER.
```

LAYER 3

```
            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
  THICKNESS                   =     18.00   INCHES
  POROSITY                    =      0.4170 VOL/VOL
  FIELD CAPACITY              =      0.0450 VOL/VOL
  WILTING POINT               =      0.0180 VOL/VOL
  INITIAL SOIL WATER CONTENT  =      0.0574 VOL/VOL
  EFFECTIVE SAT. HYD. COND.   =  0.100000001000     CM/SEC
  SLOPE                       =      4.00   PERCENT
  DRAINAGE LENGTH             =    160.0    FEET
NOTE:  100.00 PERCENT OF THE DRAINAGE COLLECTED FROM THIS
         LAYER IS RECIRCULATED INTO LAYER #  2.
```

LAYER 4

```
            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  35
```

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

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.24 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.499999997000E-08 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM A USER-SPECIFIED CURVE NUMBER OF 86.0, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 1500. FEET.

SCS RUNOFF CURVE NUMBER	=	84.90	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	2.369	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.556	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.392	INCHES
INITIAL SNOW WATER	=	1.607	INCHES
INITIAL WATER IN LAYER MATERIALS	=	78.001	INCHES
TOTAL INITIAL WATER	=	79.608	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
BETHEL ALASKA

STATION LATITUDE	=	60.78 DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	184
END OF GROWING SEASON (JULIAN DATE)	=	225
EVAPORATIVE ZONE DEPTH	=	12.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	12.90 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	75.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	78.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	83.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	80.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MEDFORD OREGON

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.06	0.93	0.68	0.34	0.72	1.23
2.05	2.61	2.50	1.56	1.04	1.28

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BETHEL ALASKA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.90	5.70	10.70	23.40	40.30	50.60
54.70	52.80	45.00	29.70	17.50	4.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BETHEL ALASKA
AND STATION LATITUDE = 60.78 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.51	59931.316	100.00
RUNOFF	3.383	12281.097	20.49
EVAPOTRANSPIRATION	8.669	31469.055	52.51
RECIRCULATION INTO LAYER 2	37.283405	135338.766	225.82
DRAINAGE COLLECTED FROM LAYER 3	0.0000	0.000	0.00
RECIRCULATION FROM LAYER 3	37.283405	135338.766	225.82
PERC./LEAKAGE THROUGH LAYER 5	0.000065	0.237	0.00
AVG. HEAD ON TOP OF LAYER 4	0.7207		
CHANGE IN WATER STORAGE	4.406	15993.635	26.69
SOIL WATER AT START OF YEAR	78.001	283144.250	
SOIL WATER AT END OF YEAR	82.407	299137.906	
SNOW WATER AT START OF YEAR	1.607	5833.651	9.73
SNOW WATER AT END OF YEAR	1.607	5833.651	9.73
ANNUAL WATER BUDGET BALANCE	0.0516	187.292	0.31

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.85	61165.508	100.00
RUNOFF	4.380	15898.184	25.99

EVAPOTRANSPIRATION	8.643	31372.676	51.29
RECIRCULATION INTO LAYER 2	55.094719	199993.828	326.97
DRAINAGE COLLECTED FROM LAYER 3	0.0000	0.000	0.00
RECIRCULATION FROM LAYER 3	55.094719	199993.828	326.97
PERC./LEAKAGE THROUGH LAYER 5	0.000099	0.360	0.00
AVG. HEAD ON TOP OF LAYER 4	1.0661		
CHANGE IN WATER STORAGE	3.777	13711.146	22.42
SOIL WATER AT START OF YEAR	82.407	299137.906	
SOIL WATER AT END OF YEAR	85.990	312145.281	
SNOW WATER AT START OF YEAR	1.607	5833.651	9.54
SNOW WATER AT END OF YEAR	1.801	6537.427	10.69
ANNUAL WATER BUDGET BALANCE	0.0505	183.142	0.30

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.57	63779.121	100.00
RUNOFF	4.354	15804.095	24.78
EVAPOTRANSPIRATION	6.533	23716.424	37.19
RECIRCULATION INTO LAYER 2	79.268555	287744.844	451.16
DRAINAGE COLLECTED FROM LAYER 3	0.0000	0.000	0.00
RECIRCULATION FROM LAYER 3	79.268555	287744.844	451.16
PERC./LEAKAGE THROUGH LAYER 5	0.000149	0.541	0.00
AVG. HEAD ON TOP OF LAYER 4	1.5332		

CHANGE IN WATER STORAGE	6.569	23844.197	37.39
SOIL WATER AT START OF YEAR	85.990	312145.281	
SOIL WATER AT END OF YEAR	91.823	333318.437	
SNOW WATER AT START OF YEAR	1.801	6537.427	10.25
SNOW WATER AT END OF YEAR	2.537	9208.442	14.44
ANNUAL WATER BUDGET BALANCE	0.1140	413.864	0.65

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	19.89	72200.687	100.00
RUNOFF	4.824	17510.082	24.25
EVAPOTRANSPIRATION	10.287	37342.996	51.72
RECIRCULATION INTO LAYER 2	135.567825	492111.219	681.59
DRAINAGE COLLECTED FROM LAYER 3	0.0000	0.000	0.00
RECIRCULATION FROM LAYER 3	135.567825	492111.219	681.59
PERC./LEAKAGE THROUGH LAYER 5	0.000281	1.019	0.00
AVG. HEAD ON TOP OF LAYER 4	2.6159		
CHANGE IN WATER STORAGE	4.558	16546.576	22.92
SOIL WATER AT START OF YEAR	91.823	333318.437	
SOIL WATER AT END OF YEAR	97.840	355157.812	
SNOW WATER AT START OF YEAR	2.537	9208.442	12.75
SNOW WATER AT END OF YEAR	1.079	3915.669	5.42

ANNUAL WATER BUDGET BALANCE	0.2204	800.017	1.11

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.34	62944.215	100.00
RUNOFF	2.998	10882.966	17.29
EVAPOTRANSPIRATION	9.155	33233.090	52.80
RECIRCULATION INTO LAYER 2	208.536835	756988.687	1202.63
DRAINAGE COLLECTED FROM LAYER 3	0.0000	0.000	0.00
RECIRCULATION FROM LAYER 3	208.536835	756988.687	1202.63
PERC./LEAKAGE THROUGH LAYER 5	0.000475	1.724	0.00
AVG. HEAD ON TOP OF LAYER 4	4.0351		
CHANGE IN WATER STORAGE	5.046	18316.727	29.10
SOIL WATER AT START OF YEAR	97.840	355157.812	
SOIL WATER AT END OF YEAR	100.986	366577.500	
SNOW WATER AT START OF YEAR	1.079	3915.669	6.22
SNOW WATER AT END OF YEAR	2.979	10812.708	17.18
ANNUAL WATER BUDGET BALANCE	0.1404	509.709	0.81

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.89	1.06	0.58	0.33	0.82	1.05
	1.21	3.46	4.29	1.55	0.90	1.49
STD. DEVIATIONS	0.26	0.32	0.24	0.19	0.79	1.06
	1.57	1.26	1.59	0.91	0.31	0.31
RUNOFF						
TOTALS	0.000	0.000	0.023	1.723	0.937	0.102
	0.160	0.391	0.506	0.000	0.145	0.000
STD. DEVIATIONS	0.000	0.000	0.052	0.922	0.782	0.216
	0.228	0.264	0.413	0.000	0.138	0.000
EVAPOTRANSPIRATION						
TOTALS	0.312	0.326	0.351	0.382	0.048	2.033
	0.982	1.286	1.451	0.803	0.456	0.226
STD. DEVIATIONS	0.049	0.041	0.086	0.094	0.080	0.398
	0.824	0.685	0.343	0.103	0.189	0.051
LATERAL DRAINAGE RECIRCULATED INTO LAYER 2						
TOTALS	7.6167	6.9397	7.6167	7.3710	7.6167	7.3527
	8.4689	8.5754	8.8349	10.7382	10.8286	11.1907
STD. DEVIATIONS	5.3722	4.8778	5.3721	5.1988	5.3721	5.3700
	5.6981	5.9978	6.1455	7.0109	6.7135	6.9350
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE RECIRCULATED FROM LAYER 3						
TOTALS	7.6167	6.9397	7.6167	7.3710	7.6167	7.3527
	8.4689	8.5754	8.8349	10.7382	10.8286	11.1907

STD. DEVIATIONS	5.3722	4.8778	5.3721	5.1988	5.3721	5.3700
	5.6981	5.9978	6.1455	7.0109	6.7135	6.9350

PERCOLATION/LEAKAGE THROUGH LAYER 5

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	1.7364	1.7364	1.7364	1.7363	1.7363	1.7320
	1.9306	1.9549	2.0812	2.4480	2.5508	2.5511
STD. DEVIATIONS	1.2247	1.2247	1.2247	1.2247	1.2247	1.2650
	1.2990	1.3673	1.4477	1.5983	1.5815	1.5810

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	17.63	(1.328)	64004.2	100.00
RUNOFF	3.988	(0.7634)	14475.28	22.616
EVAPOTRANSPIRATION	8.658	(1.3616)	31426.85	49.101
DRAINAGE RECIRCULATED INTO LAYER 2	103.15027	(69.59768)	374435.469	585.01727
LATERAL DRAINAGE COLLECTED FROM LAYER 3	0.00000	(0.00000)	0.000	0.00000
DRAINAGE RECIRCULATED FROM LAYER 3	103.15027	(69.59768)	374435.469	585.01727

PERCOLATION/LEAKAGE THROUGH LAYER 5	0.00021 (	0.00017)	0.776	0.00121
AVERAGE HEAD ON TOP OF LAYER 4	1.994 (	1.346)		
CHANGE IN WATER STORAGE	4.871 (	1.0516)	17682.46	27.627

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	2.69	9764.700
RUNOFF	1.325	4810.1763
DRAINAGE RECIRCULATED INTO LAYER 2	0.66146	2401.09497
DRAINAGE COLLECTED FROM LAYER 3	0.00000	0.00000
DRAINAGE RECIRCULATED FROM LAYER 3	0.66146	2401.09497
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000002	0.00569
AVERAGE HEAD ON TOP OF LAYER 4	4.675	
MAXIMUM HEAD ON TOP OF LAYER 4	7.628	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	29.2 FEET	
SNOW WATER	3.82	13867.8398

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3679
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1160

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

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

ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	3.2889	0.2741
2	94.9689	0.3957
3	2.5477	0.1415
4	0.0000	0.0000
5	0.1800	0.7500
SNOW WATER	2.979	

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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\FINAL.D4
TEMPERATURE DATA FILE:      C:\HELP3\FINAL.D7
SOLAR RADIATION DATA FILE:  C:\HELP3\FINAL.D13
EVAPOTRANSPIRATION DATA:    C:\HELP3\FINAL.D11
SOIL AND DESIGN DATA FILE:  C:\HELP3\FINAL.D10
OUTPUT DATA FILE:           C:\HELP3\FINAL.OUT


TIME:  17:15     DATE:   5/ 4/2020



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     TITLE:  MAT-SU LANDFILL FINAL COVER CONDITION

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



                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   8
          THICKNESS                    =      6.00   INCHES
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POROSITY	=	0.4630 VOL/VOL
FIELD CAPACITY	=	0.2320 VOL/VOL
WILTING POINT	=	0.1160 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1905 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.369999994000E-03 CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.63
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	18.00 INCHES
POROSITY	=	0.4170 VOL/VOL
FIELD CAPACITY	=	0.0450 VOL/VOL
WILTING POINT	=	0.0180 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0488 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000 CM/SEC
SLOPE	=	4.00 PERCENT
DRAINAGE LENGTH	=	160.0 FEET

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.04 INCHES
POROSITY	=	0.0000 VOL/VOL
FIELD CAPACITY	=	0.0000 VOL/VOL
WILTING POINT	=	0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY	=	0.00 HOLES/ACRE
FML INSTALLATION DEFECTS	=	0.00 HOLES/ACRE
FML PLACEMENT QUALITY	=	4 - POOR

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 8

THICKNESS	=	6.00	INCHES
POROSITY	=	0.4630	VOL/VOL
FIELD CAPACITY	=	0.2320	VOL/VOL
WILTING POINT	=	0.1160	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2320	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.369999994000E-03	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 8

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4630	VOL/VOL
FIELD CAPACITY	=	0.2320	VOL/VOL
WILTING POINT	=	0.1160	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2320	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.369999994000E-03	CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 18

THICKNESS	=	2304.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2920	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 7

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	18.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL

INITIAL SOIL WATER CONTENT	=	0.0450	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000	CM/SEC
SLOPE	=	4.00	PERCENT
DRAINAGE LENGTH	=	160.0	FEET

LAYER 8

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

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

LAYER 9

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.24	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.499999997000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM A USER-SPECIFIED CURVE NUMBER OF 86.0, A SURFACE SLOPE OF 4.% AND A SLOPE LENGTH OF 1500. FEET.

SCS RUNOFF CURVE NUMBER	=	85.20

FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	2.021	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.284	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.020	INCHES
INITIAL SNOW WATER	=	1.607	INCHES
INITIAL WATER IN LAYER MATERIALS	=	679.955	INCHES
TOTAL INITIAL WATER	=	681.562	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
BETHEL ALASKA

STATION LATITUDE	=	60.78	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	184	
END OF GROWING SEASON (JULIAN DATE)	=	225	
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	12.90	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	75.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	78.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	83.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	80.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MEDFORD OREGON

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
1.06	0.93	0.68	0.34	0.72	1.23
2.05	2.61	2.50	1.56	1.04	1.28

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BETHEL ALASKA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.90	5.70	10.70	23.40	40.30	50.60
54.70	52.80	45.00	29.70	17.50	4.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BETHEL ALASKA
AND STATION LATITUDE = 60.78 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.15	62254.520	100.00
RUNOFF	3.256	11819.186	18.99
EVAPOTRANSPIRATION	8.313	30176.988	48.47
DRAINAGE COLLECTED FROM LAYER 2	5.7916	21023.621	33.77
PERC./LEAKAGE THROUGH LAYER 3	0.000007	0.027	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1128		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.023	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.211	-765.260	-1.23
SOIL WATER AT START OF YEAR	681.347	2473291.000	
SOIL WATER AT END OF YEAR	681.137	2472525.500	
SNOW WATER AT START OF YEAR	1.607	5833.651	9.37
SNOW WATER AT END OF YEAR	1.607	5833.651	9.37
ANNUAL WATER BUDGET BALANCE	0.0000	-0.043	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.85	61165.508	100.00
RUNOFF	3.412	12385.293	20.25
EVAPOTRANSPIRATION	7.552	27413.736	44.82
DRAINAGE COLLECTED FROM LAYER 2	5.1570	18719.791	30.61
PERC./LEAKAGE THROUGH LAYER 3	0.000007	0.024	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1002		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.020	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.729	2646.615	4.33
SOIL WATER AT START OF YEAR	681.137	2472525.500	
SOIL WATER AT END OF YEAR	681.672	2474468.500	
SNOW WATER AT START OF YEAR	1.607	5833.651	9.54
SNOW WATER AT END OF YEAR	1.801	6537.427	10.69
ANNUAL WATER BUDGET BALANCE	0.0000	0.050	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.57	63779.121	100.00
RUNOFF	3.279	11902.514	18.66
EVAPOTRANSPIRATION	5.963	21644.273	33.94
DRAINAGE COLLECTED FROM LAYER 2	6.8639	24916.098	39.07
PERC./LEAKAGE THROUGH LAYER 3	0.000009	0.032	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1333		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.028	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	1.465	5316.191	8.34
SOIL WATER AT START OF YEAR	681.672	2474468.500	
SOIL WATER AT END OF YEAR	682.400	2477113.750	
SNOW WATER AT START OF YEAR	1.801	6537.427	10.25
SNOW WATER AT END OF YEAR	2.537	9208.442	14.44
ANNUAL WATER BUDGET BALANCE	0.0000	0.011	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	19.89	72200.687	100.00
RUNOFF	3.892	14128.229	19.57
EVAPOTRANSPIRATION	9.472	34384.551	47.62
DRAINAGE COLLECTED FROM LAYER 2	8.3944	30471.543	42.20

PERC./LEAKAGE THROUGH LAYER 3	0.000011	0.039	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1629		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.034	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-1.869	-6783.635	-9.40
SOIL WATER AT START OF YEAR	682.400	2477113.750	
SOIL WATER AT END OF YEAR	681.990	2475622.750	
SNOW WATER AT START OF YEAR	2.537	9208.442	12.75
SNOW WATER AT END OF YEAR	1.079	3915.669	5.42
ANNUAL WATER BUDGET BALANCE	0.0000	-0.037	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.12	65775.625	100.00
RUNOFF	2.870	10416.285	15.84
EVAPOTRANSPIRATION	8.321	30203.686	45.92
DRAINAGE COLLECTED FROM LAYER 2	4.8925	17759.646	27.00
PERC./LEAKAGE THROUGH LAYER 3	0.000006	0.023	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0952		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.019	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00

AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	2.037	7395.986	11.24
SOIL WATER AT START OF YEAR	681.990	2475622.750	
SOIL WATER AT END OF YEAR	682.127	2476121.750	
SNOW WATER AT START OF YEAR	1.079	3915.669	5.95
SNOW WATER AT END OF YEAR	2.979	10812.708	16.44
ANNUAL WATER BUDGET BALANCE	0.0000	-0.004	0.00

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.20	37026.008	100.00
RUNOFF	4.110	14919.498	40.29
EVAPOTRANSPIRATION	3.754	13627.629	36.81
DRAINAGE COLLECTED FROM LAYER 2	2.7832	10103.009	27.29
PERC./LEAKAGE THROUGH LAYER 3	0.000004	0.014	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0546		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.012	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.002	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.447	-1624.078	-4.39
SOIL WATER AT START OF YEAR	682.127	2476121.750	
SOIL WATER AT END OF YEAR	681.529	2473949.750	
SNOW WATER AT START OF YEAR	2.979	10812.708	29.20

SNOW WATER AT END OF YEAR	3.130	11360.559	30.68
ANNUAL WATER BUDGET BALANCE	0.0000	-0.062	0.00

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	24.92	90459.617	100.00
RUNOFF	7.175	26045.891	28.79
EVAPOTRANSPIRATION	9.895	35920.520	39.71
DRAINAGE COLLECTED FROM LAYER 2	10.1934	37002.191	40.90
PERC./LEAKAGE THROUGH LAYER 3	0.000013	0.046	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1962		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.042	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-2.344	-8509.229	-9.41
SOIL WATER AT START OF YEAR	681.529	2473949.750	
SOIL WATER AT END OF YEAR	681.685	2474518.000	
SNOW WATER AT START OF YEAR	3.130	11360.559	12.56
SNOW WATER AT END OF YEAR	0.629	2283.034	2.52
ANNUAL WATER BUDGET BALANCE	0.0001	0.201	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.61	60294.309	100.00
RUNOFF	3.504	12718.188	21.09
EVAPOTRANSPIRATION	6.879	24969.205	41.41
DRAINAGE COLLECTED FROM LAYER 2	6.3496	23049.115	38.23
PERC./LEAKAGE THROUGH LAYER 3	0.000008	0.029	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1225		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.026	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.122	-442.227	-0.73
SOIL WATER AT START OF YEAR	681.685	2474518.000	
SOIL WATER AT END OF YEAR	681.562	2474069.000	
SNOW WATER AT START OF YEAR	0.629	2283.034	3.79
SNOW WATER AT END OF YEAR	0.631	2289.904	3.80
ANNUAL WATER BUDGET BALANCE	0.0000	-0.002	0.00

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.52	56337.605	100.00

RUNOFF	1.975	7168.051	12.72
EVAPOTRANSPIRATION	7.279	26422.861	46.90
DRAINAGE COLLECTED FROM LAYER 2	5.5855	20275.471	35.99
PERC./LEAKAGE THROUGH LAYER 3	0.000007	0.026	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1082		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.023	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.681	2471.336	4.39
SOIL WATER AT START OF YEAR	681.562	2474069.000	
SOIL WATER AT END OF YEAR	681.906	2475320.250	
SNOW WATER AT START OF YEAR	0.631	2289.904	4.06
SNOW WATER AT END OF YEAR	0.967	3509.883	6.23
ANNUAL WATER BUDGET BALANCE	0.0000	-0.140	0.00

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.70	60621.008	100.00
RUNOFF	2.294	8326.901	13.74
EVAPOTRANSPIRATION	7.786	28261.469	46.62
DRAINAGE COLLECTED FROM LAYER 2	4.2838	15550.221	25.65
PERC./LEAKAGE THROUGH LAYER 3	0.000006	0.021	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0829		

DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.017	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	2.337	8482.311	13.99
SOIL WATER AT START OF YEAR	681.906	2475320.250	
SOIL WATER AT END OF YEAR	681.923	2475380.250	
SNOW WATER AT START OF YEAR	0.967	3509.883	5.79
SNOW WATER AT END OF YEAR	3.287	11932.372	19.68
ANNUAL WATER BUDGET BALANCE	0.0000	0.088	0.00

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ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.56	56482.812	100.00
RUNOFF	6.246	22671.586	40.14
EVAPOTRANSPIRATION	6.445	23396.611	41.42
DRAINAGE COLLECTED FROM LAYER 2	4.1989	15242.148	26.99
PERC./LEAKAGE THROUGH LAYER 3	0.000005	0.020	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0818		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.017	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-1.330	-4827.645	-8.55

SOIL WATER AT START OF YEAR	681.923	2475380.250	
SOIL WATER AT END OF YEAR	682.784	2478507.000	
SNOW WATER AT START OF YEAR	3.287	11932.372	21.13
SNOW WATER AT END OF YEAR	1.096	3977.885	7.04
ANNUAL WATER BUDGET BALANCE	0.0000	0.092	0.00

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ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.10	47553.000	100.00
RUNOFF	3.255	11815.114	24.85
EVAPOTRANSPIRATION	7.557	27432.793	57.69
DRAINAGE COLLECTED FROM LAYER 2	3.0748	11161.594	23.47
PERC./LEAKAGE THROUGH LAYER 3	0.000004	0.016	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0598		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.012	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.787	-2856.515	-6.01
SOIL WATER AT START OF YEAR	682.784	2478507.000	
SOIL WATER AT END OF YEAR	682.368	2476996.000	
SNOW WATER AT START OF YEAR	1.096	3977.885	8.37
SNOW WATER AT END OF YEAR	0.725	2632.393	5.54
ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

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ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.67	53252.098	100.00
RUNOFF	2.523	9157.834	17.20
EVAPOTRANSPIRATION	6.963	25274.764	47.46
DRAINAGE COLLECTED FROM LAYER 2	5.3135	19287.846	36.22
PERC./LEAKAGE THROUGH LAYER 3	0.000007	0.025	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1027		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.021	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.129	-468.194	-0.88
SOIL WATER AT START OF YEAR	682.368	2476996.000	
SOIL WATER AT END OF YEAR	681.619	2474275.750	
SNOW WATER AT START OF YEAR	0.725	2632.393	4.94
SNOW WATER AT END OF YEAR	1.346	4884.483	9.17
ANNUAL WATER BUDGET BALANCE	0.0000	-0.177	0.00

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ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.69	38804.703	100.00
RUNOFF	1.843	6691.423	17.24
EVAPOTRANSPIRATION	4.918	17850.895	46.00
DRAINAGE COLLECTED FROM LAYER 2	3.6285	13171.343	33.94
PERC./LEAKAGE THROUGH LAYER 3	0.000005	0.017	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0711		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.015	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.301	1090.954	2.81
SOIL WATER AT START OF YEAR	681.619	2474275.750	
SOIL WATER AT END OF YEAR	680.711	2470980.750	
SNOW WATER AT START OF YEAR	1.346	4884.483	12.59
SNOW WATER AT END OF YEAR	2.554	9270.442	23.89
ANNUAL WATER BUDGET BALANCE	0.0000	0.070	0.00

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ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.68	53288.414	100.00
RUNOFF	2.676	9713.694	18.23
EVAPOTRANSPIRATION	7.434	26984.105	50.64

DRAINAGE COLLECTED FROM LAYER 2	4.4974	16325.490	30.64
PERC./LEAKAGE THROUGH LAYER 3	0.000006	0.021	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0880		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.018	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.073	265.137	0.50
SOIL WATER AT START OF YEAR	680.711	2470980.750	
SOIL WATER AT END OF YEAR	681.309	2473151.250	
SNOW WATER AT START OF YEAR	2.554	9270.442	17.40
SNOW WATER AT END OF YEAR	2.029	7364.979	13.82
ANNUAL WATER BUDGET BALANCE	0.0000	-0.033	0.00

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.70	67881.016	100.00
RUNOFF	4.898	17780.273	26.19
EVAPOTRANSPIRATION	7.389	26821.268	39.51
DRAINAGE COLLECTED FROM LAYER 2	6.0095	21814.375	32.14
PERC./LEAKAGE THROUGH LAYER 3	0.000008	0.028	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1164		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.024	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00

AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.404	1464.941	2.16
SOIL WATER AT START OF YEAR	681.309	2473151.250	
SOIL WATER AT END OF YEAR	682.807	2478588.000	
SNOW WATER AT START OF YEAR	2.029	7364.979	10.85
SNOW WATER AT END OF YEAR	0.935	3393.118	5.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.131	0.00

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ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	6.71	24357.297	100.00
RUNOFF	1.930	7006.661	28.77
EVAPOTRANSPIRATION	3.716	13487.886	55.38
DRAINAGE COLLECTED FROM LAYER 2	2.2498	8166.740	33.53
PERC./LEAKAGE THROUGH LAYER 3	0.000003	0.012	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0442		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.009	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-1.186	-4303.947	-17.67
SOIL WATER AT START OF YEAR	682.807	2478588.000	
SOIL WATER AT END OF YEAR	680.541	2470364.000	

SNOW WATER AT START OF YEAR	0.935	3393.118	13.93
SNOW WATER AT END OF YEAR	2.015	7313.168	30.02
ANNUAL WATER BUDGET BALANCE	0.0000	-0.056	0.00

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	9.58	34775.398	100.00
RUNOFF	2.045	7422.304	21.34
EVAPOTRANSPIRATION	5.473	19867.318	57.13
DRAINAGE COLLECTED FROM LAYER 2	2.0272	7358.789	21.16
PERC./LEAKAGE THROUGH LAYER 3	0.000003	0.011	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0397		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.008	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.035	126.942	0.37
SOIL WATER AT START OF YEAR	680.541	2470364.000	
SOIL WATER AT END OF YEAR	681.421	2473557.000	
SNOW WATER AT START OF YEAR	2.015	7313.168	21.03
SNOW WATER AT END OF YEAR	1.170	4247.243	12.21
ANNUAL WATER BUDGET BALANCE	0.0000	0.035	0.00

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ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.82	64686.621	100.00
RUNOFF	3.095	11233.452	17.37
EVAPOTRANSPIRATION	7.875	28584.586	44.19
DRAINAGE COLLECTED FROM LAYER 2	6.0785	22065.051	34.11
PERC./LEAKAGE THROUGH LAYER 3	0.000008	0.028	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1176		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.024	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.772	2803.564	4.33
SOIL WATER AT START OF YEAR	681.421	2473557.000	
SOIL WATER AT END OF YEAR	681.888	2475253.000	
SNOW WATER AT START OF YEAR	1.170	4247.243	6.57
SNOW WATER AT END OF YEAR	1.475	5354.783	8.28
ANNUAL WATER BUDGET BALANCE	0.0000	-0.063	0.00

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ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.73	64359.906	100.00

RUNOFF	2.791	10133.074	15.74
EVAPOTRANSPIRATION	10.440	37896.406	58.88
DRAINAGE COLLECTED FROM LAYER 2	3.6608	13288.829	20.65
PERC./LEAKAGE THROUGH LAYER 3	0.000005	0.018	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0702		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.013	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.005	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.838	3041.615	4.73
SOIL WATER AT START OF YEAR	681.888	2475253.000	
SOIL WATER AT END OF YEAR	682.365	2476985.500	
SNOW WATER AT START OF YEAR	1.475	5354.783	8.32
SNOW WATER AT END OF YEAR	1.836	6663.817	10.35
ANNUAL WATER BUDGET BALANCE	0.0000	-0.037	0.00

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ANNUAL TOTALS FOR YEAR 21

	INCHES	CU. FEET	PERCENT
PRECIPITATION	25.32	91911.625	100.00
RUNOFF	5.127	18611.855	20.25
EVAPOTRANSPIRATION	10.892	39536.898	43.02
DRAINAGE COLLECTED FROM LAYER 2	10.7789	39127.340	42.57
PERC./LEAKAGE THROUGH LAYER 3	0.000013	0.048	0.00

AVG. HEAD ON TOP OF LAYER 3	0.2081		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.044	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-1.478	-5364.717	-5.84
SOIL WATER AT START OF YEAR	682.365	2476985.500	
SOIL WATER AT END OF YEAR	681.863	2475164.250	
SNOW WATER AT START OF YEAR	1.836	6663.817	7.25
SNOW WATER AT END OF YEAR	0.860	3120.525	3.40
ANNUAL WATER BUDGET BALANCE	0.0001	0.203	0.00

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ANNUAL TOTALS FOR YEAR 22

	INCHES	CU. FEET	PERCENT
PRECIPITATION	21.17	76847.102	100.00
RUNOFF	3.138	11391.223	14.82
EVAPOTRANSPIRATION	11.160	40511.137	52.72
DRAINAGE COLLECTED FROM LAYER 2	5.3803	19530.611	25.41
PERC./LEAKAGE THROUGH LAYER 3	0.000007	0.025	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1047		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.021	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	1.492	5414.158	7.05

SOIL WATER AT START OF YEAR	681.863	2475164.250	
SOIL WATER AT END OF YEAR	682.044	2475819.000	
SNOW WATER AT START OF YEAR	0.860	3120.525	4.06
SNOW WATER AT END OF YEAR	2.171	7879.759	10.25
ANNUAL WATER BUDGET BALANCE	0.0000	-0.053	0.00

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ANNUAL TOTALS FOR YEAR 23

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.26	44503.801	100.00
RUNOFF	3.348	12152.770	27.31
EVAPOTRANSPIRATION	7.275	26407.336	59.34
DRAINAGE COLLECTED FROM LAYER 2	3.2078	11644.252	26.16
PERC./LEAKAGE THROUGH LAYER 3	0.000004	0.016	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0625		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.012	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-1.570	-5700.480	-12.81
SOIL WATER AT START OF YEAR	682.044	2475819.000	
SOIL WATER AT END OF YEAR	681.783	2474871.750	
SNOW WATER AT START OF YEAR	2.171	7879.759	17.71
SNOW WATER AT END OF YEAR	0.861	3126.659	7.03

ANNUAL WATER BUDGET BALANCE	0.0000	-0.093	0.00

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ANNUAL TOTALS FOR YEAR 24

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.29	62762.703	100.00
RUNOFF	3.035	11016.222	17.55
EVAPOTRANSPIRATION	8.470	30747.002	48.99
DRAINAGE COLLECTED FROM LAYER 2	5.2622	19101.684	30.43
PERC./LEAKAGE THROUGH LAYER 3	0.000007	0.025	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1012		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.021	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.523	1897.791	3.02
SOIL WATER AT START OF YEAR	681.783	2474871.750	
SOIL WATER AT END OF YEAR	682.369	2477001.000	
SNOW WATER AT START OF YEAR	0.861	3126.659	4.98
SNOW WATER AT END OF YEAR	0.798	2895.060	4.61
ANNUAL WATER BUDGET BALANCE	0.0000	-0.019	0.00

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ANNUAL TOTALS FOR YEAR 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.90	68607.008	100.00
RUNOFF	3.088	11209.370	16.34
EVAPOTRANSPIRATION	7.662	27812.826	40.54
DRAINAGE COLLECTED FROM LAYER 2	7.3422	26652.172	38.85
PERC./LEAKAGE THROUGH LAYER 3	0.000009	0.034	0.00
AVG. HEAD ON TOP OF LAYER 3	0.1416		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.030	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.808	2932.414	4.27
SOIL WATER AT START OF YEAR	682.369	2477001.000	
SOIL WATER AT END OF YEAR	682.477	2477390.750	
SNOW WATER AT START OF YEAR	0.798	2895.060	4.22
SNOW WATER AT END OF YEAR	1.498	5437.753	7.93
ANNUAL WATER BUDGET BALANCE	0.0001	0.190	0.00

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ANNUAL TOTALS FOR YEAR 26

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.42	48714.613	100.00
RUNOFF	4.962	18012.961	36.98
EVAPOTRANSPIRATION	4.997	18139.443	37.24

DRAINAGE COLLECTED FROM LAYER 2	4.4314	16086.002	33.02
PERC./LEAKAGE THROUGH LAYER 3	0.000006	0.021	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0866		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.018	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.971	-3523.790	-7.23
SOIL WATER AT START OF YEAR	682.477	2477390.750	
SOIL WATER AT END OF YEAR	681.910	2475332.000	
SNOW WATER AT START OF YEAR	1.498	5437.753	11.16
SNOW WATER AT END OF YEAR	1.094	3972.677	8.16
ANNUAL WATER BUDGET BALANCE	0.0000	-0.024	0.00

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ANNUAL TOTALS FOR YEAR 27

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.58	38405.406	100.00
RUNOFF	2.630	9545.321	24.85
EVAPOTRANSPIRATION	5.523	20050.154	52.21
DRAINAGE COLLECTED FROM LAYER 2	2.8546	10362.299	26.98
PERC./LEAKAGE THROUGH LAYER 3	0.000004	0.014	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0560		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.012	0.00

PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-0.428	-1552.336	-4.04
SOIL WATER AT START OF YEAR	681.910	2475332.000	
SOIL WATER AT END OF YEAR	681.451	2473668.750	
SNOW WATER AT START OF YEAR	1.094	3972.677	10.34
SNOW WATER AT END OF YEAR	1.125	4083.574	10.63
ANNUAL WATER BUDGET BALANCE	0.0000	-0.046	0.00

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ANNUAL TOTALS FOR YEAR 28

	INCHES	CU. FEET	PERCENT
PRECIPITATION	20.27	73580.133	100.00
RUNOFF	4.452	16160.196	21.96
EVAPOTRANSPIRATION	8.170	29657.270	40.31
DRAINAGE COLLECTED FROM LAYER 2	2.9136	10576.277	14.37
PERC./LEAKAGE THROUGH LAYER 3	0.000004	0.015	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0565		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.011	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.003	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	4.735	17186.283	23.36
SOIL WATER AT START OF YEAR	681.451	2473668.750	
SOIL WATER AT END OF YEAR	681.891	2475264.750	

SNOW WATER AT START OF YEAR	1.125	4083.574	5.55
SNOW WATER AT END OF YEAR	5.420	19673.979	26.74
ANNUAL WATER BUDGET BALANCE	0.0000	0.087	0.00

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ANNUAL TOTALS FOR YEAR 29

	INCHES	CU. FEET	PERCENT
PRECIPITATION	8.08	29330.410	100.00
RUNOFF	3.663	13298.250	45.34
EVAPOTRANSPIRATION	6.094	22121.936	75.42
DRAINAGE COLLECTED FROM LAYER 2	3.0184	10956.649	37.36
PERC./LEAKAGE THROUGH LAYER 3	0.000004	0.016	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0592		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.012	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	-4.696	-17046.385	-58.12
SOIL WATER AT START OF YEAR	681.891	2475264.750	
SOIL WATER AT END OF YEAR	680.891	2471633.000	
SNOW WATER AT START OF YEAR	5.420	19673.979	67.08
SNOW WATER AT END OF YEAR	1.724	6259.367	21.34
ANNUAL WATER BUDGET BALANCE	0.0000	-0.056	0.00

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ANNUAL TOTALS FOR YEAR 30

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.42	41454.598	100.00
RUNOFF	1.006	3653.490	8.81
EVAPOTRANSPIRATION	6.277	22784.221	54.96
DRAINAGE COLLECTED FROM LAYER 2	2.0535	7454.063	17.98
PERC./LEAKAGE THROUGH LAYER 3	0.000003	0.011	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0397		
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.007	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	2.083	7562.750	18.24
SOIL WATER AT START OF YEAR	680.891	2471633.000	
SOIL WATER AT END OF YEAR	681.584	2474149.250	
SNOW WATER AT START OF YEAR	1.724	6259.367	15.10
SNOW WATER AT END OF YEAR	3.115	11305.887	27.27
ANNUAL WATER BUDGET BALANCE	0.0000	0.062	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	1.05	1.03	0.61	0.33	0.73	0.87
	1.96	2.24	2.91	1.69	1.09	1.21
STD. DEVIATIONS	0.38	0.50	0.31	0.16	0.47	0.67
	2.57	2.38	1.75	0.98	0.40	0.60
RUNOFF						
TOTALS	0.000	0.030	0.114	1.309	0.784	0.119
	0.327	0.249	0.255	0.115	0.082	0.000
STD. DEVIATIONS	0.000	0.165	0.368	1.008	0.868	0.211
	0.605	0.428	0.393	0.298	0.170	0.001
EVAPOTRANSPIRATION						
TOTALS	0.314	0.295	0.393	0.405	0.119	1.388
	0.971	1.071	1.125	0.626	0.370	0.253
STD. DEVIATIONS	0.044	0.048	0.083	0.120	0.161	0.435
	0.971	0.829	0.549	0.248	0.115	0.053
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0679	2.1703
	0.5067	0.6805	0.9190	0.5546	0.0435	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.2896	0.6092
	1.0185	1.0731	0.9376	0.7895	0.1053	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LATERAL DRAINAGE COLLECTED FROM LAYER 7						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 9

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0155	0.5112
	0.1155	0.1551	0.2165	0.1264	0.0103	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0660	0.1435
	0.2322	0.2446	0.2209	0.1800	0.0248	0.0000

DAILY AVERAGE HEAD ON TOP OF LAYER 8

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

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

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.72 (4.522)	57049.1	100.00
RUNOFF	3.384 (1.3175)	12283.57	21.532
EVAPOTRANSPIRATION	7.331 (1.8785)	26612.99	46.649
LATERAL DRAINAGE COLLECTED FROM LAYER 2	4.94256 (2.20715)	17941.479	31.44919

PERCOLATION/LEAKAGE THROUGH LAYER 3	0.00001 (	0.00000)	0.023	0.00004
AVERAGE HEAD ON TOP OF LAYER 3	0.096 (	0.042)		
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.00001 (	0.00000)	0.020	0.00003
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000 (	0.00000)	0.004	0.00001
AVERAGE HEAD ON TOP OF LAYER 8	0.000 (	0.000)		
CHANGE IN WATER STORAGE	0.058 (	1.7120)	211.02	0.370

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	3.47	12596.101
RUNOFF	1.997	7250.1348
DRAINAGE COLLECTED FROM LAYER 2	0.89675	3255.20630
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.000001	0.00391
AVERAGE HEAD ON TOP OF LAYER 3	6.337	
MAXIMUM HEAD ON TOP OF LAYER 3	9.939	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	34.3 FEET	
DRAINAGE COLLECTED FROM LAYER 7	0.00000	0.00207
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000000	0.00002
AVERAGE HEAD ON TOP OF LAYER 8	0.000	
MAXIMUM HEAD ON TOP OF LAYER 8	0.009	

LOCATION OF MAXIMUM HEAD IN LAYER 7
(DISTANCE FROM DRAIN) 0.0 FEET

SNOW WATER 6.27 22769.7109

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.2351

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0456

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

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

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.1746	0.1958
2	1.0832	0.0602
3	0.0000	0.0000
4	1.3920	0.2320
5	2.7840	0.2320
6	672.7681	0.2920
7	0.8100	0.0450
8	0.0000	0.0000
9	0.1800	0.7500

SNOW WATER 3.115

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