

PRILOG 4

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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:\WHI\VHELP22\data\P3728.VHP\_weather1.dat
TEMPERATURE DATA FILE:    C:\WHI\VHELP22\data\P3728.VHP\_weather2.dat
SOLAR RADIATION DATA FILE: C:\WHI\VHELP22\data\P3728.VHP\_weather3.dat
EVAPOTRANSPIRATION DATA:  C:\WHI\VHELP22\data\P3728.VHP\_weather4.dat
SOIL AND DESIGN DATA FILE: C:\WHI\VHELP22\data\P3728.VHP\I_388608.inp
OUTPUT DATA FILE:         C:\WHI\VHELP22\data\P3728.VHP\O_388608.prt
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TIME: 11:58 DATE: 2/10/2006

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TITLE: 1 : 3

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER
WERE SPECIFIED BY THE USER.

LAYER 1 -----

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 6

THICKNESS	=	100.00	CM
POROSITY	=	0.4530	VOL/VOL
FIELD CAPACITY	=	0.1900	VOL/VOL
WILTING POINT	=	0.0850	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.720000000000E-03	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 5.00
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

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LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.60	CM
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	33.0000000000	CM/SEC
SLOPE	=	33.00	PERCENT
DRAINAGE LENGTH	=	30.0	METERS

LAYER 3

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 17

THICKNESS	=	2.00	CM
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.	=	0.300000000000E-08	CM/SEC

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TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 18

THICKNESS	=	3800.00	CM
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000224000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

SCS RUNOFF CURVE NUMBER	=	73.72	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.0000	HECTARES
EVAPORATIVE ZONE DEPTH	=	25.0	CM
INITIAL WATER IN EVAPORATIVE ZONE	=	4.750	CM
UPPER LIMIT OF EVAPORATIVE STORAGE	=	11.325	CM
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.125	CM
INITIAL SNOW WATER	=	0.000	CM
INITIAL WATER IN LAYER MATERIALS	=	1198.506	CM
TOTAL INITIAL WATER	=	1198.506	CM
TOTAL SUBSURFACE INFLOW	=	0.00	MM/YR

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EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
SPLIT/KASTEL FORM

STATION LATITUDE	=	43.53 DEGREES
MAXIMUM LEAF AREA INDEX	=	5.00
START OF GROWING SEASON (JULIAN DATE)	=	74
END OF GROWING SEASON (JULIAN DATE)	=	319
EVAPORATIVE ZONE DEPTH	=	25.0 CM
AVERAGE ANNUAL WIND SPEED	=	11.26 KPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	61.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR SPLIT/KASTEL FORM

NORMAL MEAN MONTHLY PRECIPITATION (MM)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
82.1	80.0	94.8	70.1	79.0	50.5
20.0	50.2	52.5	79.1	89.0	99.8

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR SPLIT/KASTEL FORM

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES CELSIUS)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
7.3	7.9	10.2	13.1	17.6	21.3
24.3	24.2	20.8	16.8	11.7	8.9

HEAD #1: AVERAGE HEAD ON TOP OF LAYER 3
DRAIN #1: LATERAL DRAINAGE FROM LAYER 2 (RECIRCULATION AND COLLECTION)
LEAK #1: PERCOLATION OR LEAKAGE THROUGH LAYER 3
LEAK #2: PERCOLATION OR LEAKAGE THROUGH LAYER 4

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AVERAGE MONTHLY VALUES (MM) FOR YEARS 1 THROUGH 20

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

PRECIPITATION						

TOTALS	91.94 21.86	75.85 43.90	102.40 50.22	67.88 70.36	67.34 79.52	49.46 87.70
STD. DEVIATIONS	45.26 19.47	32.70 39.46	53.08 32.08	45.18 37.11	43.66 37.14	25.03 54.96
RUNOFF						

TOTALS	0.192 0.000	0.073 0.075	0.113 0.147	0.116 0.107	0.082 0.243	0.007 0.354
STD. DEVIATIONS	0.564 0.000	0.327 0.289	0.418 0.435	0.520 0.404	0.255 0.619	0.030 0.788
EVAPOTRANSPIRATION						

TOTALS	27.499 23.335	38.315 32.866	59.996 35.382	61.324 33.999	51.326 21.681	44.328 19.072
STD. DEVIATIONS	2.897 16.101	3.388 26.077	11.682 20.458	25.184 17.587	24.375 4.438	17.939 3.133
LATERAL DRAINAGE COLLECTED FROM LAYER 2						

TOTALS	61.2248 8.3443	50.6514 7.1945	46.2660 7.1582	31.4974 11.3528	17.6320 39.2064	14.7236 61.7703
STD. DEVIATIONS	41.9978 2.6553	28.2376 3.4010	35.0344 4.5387	20.4545 7.8702	10.5777 26.7290	12.0130 44.3485
PERCOLATION/LEAKAGE THROUGH LAYER 3						

TOTALS	0.0174 0.0202	0.0166 0.0183	0.0183 0.0179	0.0189 0.0163	0.0188 0.0169	0.0190 0.0184
STD. DEVIATIONS	0.0044 0.0008	0.0025 0.0022	0.0022 0.0028	0.0016 0.0038	0.0018 0.0019	0.0015 0.0023
PERCOLATION/LEAKAGE THROUGH LAYER 4						

TOTALS	5.3524 4.0149	5.0167 1.4918	5.1656 0.0000	4.7189 0.0304	4.5040 0.0000	4.1233 0.0000
STD. DEVIATIONS	23.7938 17.8125	22.4352 6.6716	23.1013 0.0000	20.8177 0.1361	20.1424 0.0000	18.2970 0.0000

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AVERAGES OF MONTHLY AVERAGED DAILY HEADS (CM)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.0007	0.0006	0.0005	0.0004	0.0002	0.0002
	0.0001	0.0001	0.0001	0.0001	0.0005	0.0007
STD. DEVIATIONS	0.0005	0.0003	0.0004	0.0002	0.0001	0.0001
	0.0000	0.0000	0.0001	0.0001	0.0003	0.0005

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 20

	MM		CU. METERS	PERCENT
PRECIPITATION	808.41	(155.888)	8084.1	100.00
RUNOFF	1.509	(1.6545)	15.09	0.187
EVAPOTRANSPIRATION	449.122	(63.2598)	4491.22	55.557
LATERAL DRAINAGE COLLECTED FROM LAYER 2	357.02183	(100.27452)	3570.218	44.16373
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.21690	(0.00994)	2.169	0.02683
AVERAGE HEAD ON TOP OF LAYER 3	0.003	(0.001)		
PERCOLATION/LEAKAGE THROUGH LAYER 4	34.41794	(153.06230)	344.179	4.25751
CHANGE IN WATER STORAGE	-33.665	(5.9345)	-336.65	-4.164

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20		
	(MM)	(CU. METERS)
PRECIPITATION	66.60	666.00000
RUNOFF	2.617	26.17147
DRAINAGE COLLECTED FROM LAYER 2	35.04398	350.43982
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.001734	0.01734
AVERAGE HEAD ON TOP OF LAYER 3	0.121	
MAXIMUM HEAD ON TOP OF LAYER 3	0.124	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	0.0 METERS	
PERCOLATION/LEAKAGE THROUGH LAYER 4	3.891376	38.91376
SNOW WATER	23.17	231.6890
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.3335
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0850

FINAL WATER STORAGE AT END OF YEAR 20		
LAYER	(CM)	(VOL/VOL)
1	20.0712	0.2007
2	0.0060	0.0100
3	1.5000	0.7500
4	1109.5979	0.2920
SNOW WATER	0.000	
