CDM Camp Dresser & McKee Inc.

consulting
engineering
construction
operations

Westshore Center
1715 North Westshore Boulevard, Suite 875
Tampa, Florida 33607
Tel: 813 281-2900 Fax: 813 288-8787

February 19, 2001

Mr. Kim Ford, P.E.
Solid Waste Section
Division of Waste Management
Department of Environmental Protection
Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Subject: West Pasco County Landfill Cells SW-2 and A-3, Responses to DEP Comments dated February 14, 2001

Dear Mr. Ford:

This letter transmits a comprehensive Water Quality Monitoring Plan for the West Pasco County Class I landfill. This Plan supplements our responses provided to the Department on January 16, 2001. The Plan specifically addressees all of the comments contained in the January 8, 2001 memorandum from Mr. John Morris, and Item Number 1 of your letter dated February 14, 2001. This Plan also replaces Items 6 and 7 contained in our original submittal to the Department dated December 2000.

The remainder of this letter responds to the other comments contained in your February 14, 2001 letter. Your comments are in bold type, and our responses follow.

Sheet G-3 - The top of the clay elevation for boring c-13+35

We checked the clay elevation shown in this boring. It is correct as shown. The department's previous comment in this regard was in error. See Exhibit 1.

Sheet C-1 - Note 5 is unclear regarding the location of transition from smooth to textured liner.

To save our client money, we have decided to use textured liner throughout the project. Therefore, no transition now exists. A copy of the geocomposit drainage net requirements, general specifications, and HELP Model results are shown in Exhibit 2.

Sheet C-4 - Ball valves not shown. Cross-section details are needed for the 8" pipe penetration through the inter cell separation berm.

To save our client money we have eliminated the ball valves at these locations and have replaced them with inflatable plugs. The detail for these plugs and the requested detail are shown on drawing CD-1 in Exhibit 3.

Sheets C-6, CD-1, and CD-2 - The inter cell separation berm appears to be drawn incorrectly and lacks detail for welding at ends. Detail K on Sheet CD-2 does not show pipe penetrations through the inter cell separation berm. Detail B on Sheet CD-1 appears to conflict with specifications on Page 2623-5, Section 2.03A for perforation locations.

The inter cell separation berm has been modified and penetration details have been added. Detail B on Drawing CD-2 is correct. The specifications have been modified accordingly (2 rows of ½-inch perorations). See drawings in Exhibit 3.

Sheet C-7 – Cross-sections for liner system tie-in to existing liner do not include sufficient detail. Assurance that ADS pipes will not intercept leachate is requested.

The ADS pipes have been eliminated from the design. A liner flap which rests on the filter sand will serves as a stormwater conveyance. (See Drawing C-1 Detail A, CD-2). Once the waste in the cell reaches the elevation of the flap, it will be cut and removed from the cell to prevent it from being a leachate conveyance. The contour and location of this stormwater conveyance allows operation of the cell in concert with the inter cell separation berms.

Condition of Certification XIV Operational Plans and Drawings are needed prior to operation of the new disposal units. The current Department-approved Operations Plan should be revised to describe the fill sequences, operation of the inter cell separation berms, leachate system operation and maintenance, testing and cleaning of leachate pipes, record keeping for leachate leakage and removal, and any other aspects of the plan that may have changed. Drawings are needed to show grades for proper drainage, cross-section of lifts and special drainage devices.

As indicated in our previous correspondence with the Department, Pasco County will provide an updated Operations Plan to the Department prior to operation of the new cells. The updated Operation Plan will address the sequence of filling, operation of the inter cell berms and leachate collection system as well as the stormwater control system features designed for each new cell.

If you have any questions in this regard, do not hesitate contacting me.

Very truly yours,

CAMP DRESSER & McKEE INC.

Daniel E. Strobridge, QEP
Vice President

Abdul Mulla-Saleh, P.E.
Associate

A R. Mulla Saleh
2/19/01

Enclosures

c: V. Mannella
A. Mulla Saleh
D. Rojas
B. Butera
J. Morris

Exhibit 1

Boring C-13+35

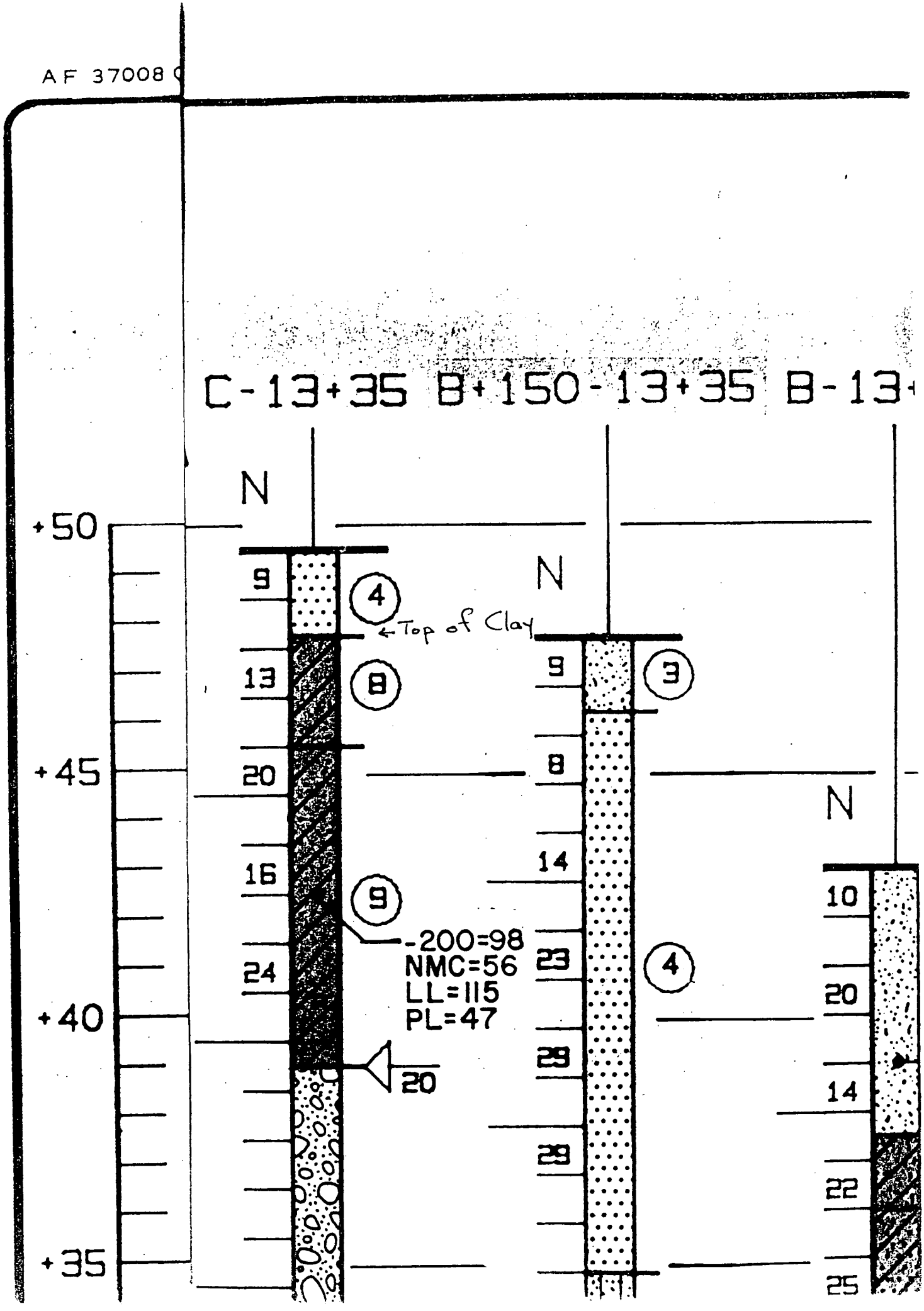
AF 37008
C-13+35
B+150-13+35
B-13
N
N
N
+50
+45
+40
+35
9
13
20
16
24
4
8
9
20
Top of Clay
-200=98
NMC=56
LL=115
PL=47
9
8
14
23
29
29
3
4
10
20
14
22
25

Exhibit 2

Composite Drainage Net and HELP Products

TENAX Corporation
1635 Jamestown Place
Pittsburgh, PA 15235
Phone: 412-371-2973
Fax: 412-371-2974

TO:	Abdul Mulla Saleh, P.E.	**COMPANY:**	Camp Dresser & McKee Inc.
FAX #:	813-288-8787	**DATE:**	2 / 1 / 01
FROM:	J. P. Kline Regional Engineer	**RE:**	Pasco County

I am transmitting 3 pages including this cover sheet. If there is any problems in receiving this transmission, please contact me at 412-371-2973.

Abdul,

The Tendrain 770-2 double-sided drainage geocomposite has an ultimate hydraulic transmissivity of 1.8×10^{-3} m^3/sec-m tested between sand (on top) and membrane at a normal load of 15000 psf, a hydraulic gradient of 0.1 and a 100 hour seating period. This results in an ultimate permeability of 35.43 cm/sec at a thickness of 0.2 inches (beginning thickness of .310 inches with minimum 65% retained $\simeq$ 0.2 inches).

Based on the parameters Darwish provided me:

1. 150 ft waste height @1700 lb/cy = 9445 psf
2. Slope 150 ft horizontal: 3 ft vertical = 2% or I = 0.02; use gradient of 0.1 for more reliable data.
3. Assumption: 50% of permeability (10 cm/sec) is lost at design height compared to permeability (20 cm/sec) without any load.
4. Thickness at design load is 0.2 inches (representative of the Tendrain product).

This ultimate permeability can be reduced to a required transmissivity to be compared to your design requirement.

My assumptions are as follows:

1. Design normal load of 15000 psf (1.5 times the maximum anticipated load)
2. Reduction factors for creep and intrusion are accounted for due to the assumption of 50% permeability (factor of 2) and the 100-hour seating period in-situ transmissivty test.
3. Average reduction factors for biological (1.75) and chemical (1.75) clogging.
4. Universal factor of safety of 2.0
5. Hydraulic gradient of 0.1 which provides a conservative value compared to values tested at 0.02.

Thus, the required permeability for design purposes is:

$$K_{req} = (35.43 \text{ cm/sec}) / (2 * 1.75 * 1.75) = 5.78 \text{ cm/sec}$$

The Tendrain 770-2 double-sided drainage geocomposite will meet your required design permeability of 5 cm/sec. The ultimate transmissivity of 1.8×10^{-3} m^3/sec-m used in the above calculation is a minimum transmissivity value from our standard specification. Tenax incorporates an industrial factor of safety into our published minimum values to guarantee that all products shipped to the site will perform greater than the specified transmissivity value. Please note that these calculations are based on the performance of the Tendrain Tri-planar product. Any consideration of other products would have to be analyzed based on that product's performance characteristics.

The assumption to negate the reduction factors for intrusion and creep in calculating the required permeability are representative of the tri-planar product. An in-soil transmissivity test will capture the majority of the expected intrusion due to the extended seating period of 100 hours. Also, the Tendrain geonet core, based on long term (10,000 hour) compressive creep testing, demonstrated a loss of less than 10% of its thickness from hour 100 to 10,000 of the compressive creep test at 25,000psf. The actual reduction factor for creep of the Tendrain product, based on the creep testing and the use of a 100 hour transmissivity test, would be 1.1. Thus, the reduction factors for creep and intrusion are accounted for in the assumption Darwish gave me of 50% reduction of permeability (factor of 2) at full cell height.

Included is a specification sheet for the Tendrain 770-2 product. I can forward an electronic copy of this specification at your request. Please contact me at 412 –371-2973 if you have any questions or need further assistance.

TENAX® Corp.
4800 East Monument Street
Baltimore, MD 21205
1-800-356-8495

TENDRAIN 770-2

DOUBLE-SIDED GEOCOMPOSITE

Drainage geocomposite is comprised of a tri-planar geonet structure consisting of thick supporting ribs with diagonally placed top and bottom ribs and with a thermally bonded, non-woven geotextile on both sides. The product is capable of providing high Transmissivity in a soil environment under high normal loads and will have properties conforming with the values and test methods listed below:

PROPERTIES	TEST METHOD	UNIT	VALUE	QUALIFIER
GEONET CORE				
Tensile Strength - MD	ASTM D4595	lb/ft (kN/m)	1000 (14.6)	c, Note 1, 4
Compressive Behavior (% Retained thickness)				
@50,000 psf (short term)	ASTM D1621	%	50	a, Note 2, 4
@25,000 psf (10,000 hours)		%	65	a, Note 4
Density	ASTM D1505	g/cm^3	0.94	c, Note 4
Melt Flow Index	ASTM D1238	g/10 min.	1.0	d, note 4
Carbon Black Content	ASTM D4218	%	2.0	c, Note 4
Thickness	ASTM D5199	mils (mm)	300 (7.6)	a, Note 3, 4
GEOTEXTILE				
Apparent Opening Size (AOS)	ASTM D4751	US Sieve (mm)	70 (0.21)	b, Note 4
Weight	ASTM D3776	oz/yd^2 (g/m^2)	6 (203)	b, Note 4
Water Flow Rate	ASTM D4491	gal/min/ft^2 (lpm/m^2)	110 (4483)	b, Note 4
Permeability	ASTM D4491	cm/sec	0.2	b, Note 4
Permittivity	ASTM D4491	sec^{-1}	1.3	b, Note 4
Puncture Strength	ASTM D4833	lbs (N)	90 (400)	b, Note 4
Trapezoid Tear	ASTM D4533	lbs (N)	65 (290)	b, Note 4
Grab Tensile Strength	ASTM D4632	lbs (N)	160 (712)	b, Note 4
Grab Elongation	ASTM D4632	%	50	b, Note 4
Mullen Burst	ASTM D3786	psi (kPa)	325 (2241)	b, Note 4
UV Resistance @500 Hours	ASTM D4355	%	70	b, Note 4
GEOCOMPOSITE				
Roll Width		ft (m)	6.7 (2.0)	a, Note 5
Roll Length		ft (m)	200 (61)	a, Note 5
Ply Adhesion	ASTM F904 (modified)	lb/in (N/m)	1.0 (175)	c, Note 6
HYDRAULIC BEHAVIOR OF GEOCOMPOSITE				
Transmissivity - MD, ASTM D 4716-99 (m^2/sec)				c, Notes 7
Gradient/Load:	15,000 psf (720 kPa)		25,000 psf (1200 kPa)	
0.1	1.8×10^{-3}		1.0×10^{-3}	

Qualifiers: a = Typical Value b = Minimum Average Roll Value (MARV)
c = Minimum Value d = Maximum Value

NOTES:

1. Tensile properties tested by manufacturer every 40,000 square feet of product per ASTM D4595 with a specimen width of 8.0 in. and cross-head speed of 0.04 in/min
2. Short term compressive behavior tested by manufacturer every 40,000 square feet of product per ASTM D1621 with a 2 in. x 2 in. specimen and a constant rate of strain of 0.04 in./min.
3. Thickness measured by manufacturer every 40,000 square feet of product per ASTM D5199 with a 2.22 in. diameter presser foot and 2.9 psi pressure.
4. Geotextile and geonet properties listed are prior to lamination.
5. Roll dimensions are measured at the time of manufacture.
6. Ply Adhesion is tested by the manufacturer every 100,000 sf of production per modified ASTM F904, with a 2 inch wide (5 longitudinal ribs) by 10 inch long strip. The geotextile bonded to either side of the geonet is pulled apart at a peeling rate of 12 in/min., for at least 4 inches of peeling distance. The reported value for each laminated side is the average of the "peak" values from 5 tested samples. The 5 samples are cut evenly distributed along the roll width with a 1 foot margin from both edges of the roll.
7. Geocomposite transmissivity measured by manufacturer every 200,000 square feet of product as per ASTM D4716-99 with testing boundary conditions as follows: steel plate / uniform sand / geocomposite / 60 mil HDPE geomembrane / steel plate, and seating period of 100 hours.

GA04HT

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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:     O:\HELP3\DATA4PO.D4
TEMPERATURE DATA FILE:       O:\HELP3\DATA7PO.D7
SOLAR RADIATION DATA FILE:   O:\HELP3\DATA13PO.D13
EVAPOTRANSPIRATION DATA:     O:\HELP3\DATA11PO.D11
SOIL AND DESIGN DATA FILE:   O:\HELP3\PASCO5NA.D10
OUTPUT DATA FILE:            O:\HELP3\PASCO5NA.OUT


TIME:  13:55     DATE:   1/30/2001


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     TITLE:  PASCO COUNTY LANDFILL, CELL 3 WITH 5 FEET OF ASH

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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  31
          THICKNESS                     =     60.00   INCHES
          POROSITY                      =      0.5780 VOL/VOL
          FIELD CAPACITY                =      0.0760 VOL/VOL
          WILTING POINT                 =      0.0250 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.1569 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.410000002000E-02 CM/SEC


                                LAYER  2
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TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2105	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 52

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0275	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	5.00000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	130.0	FEET

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.20	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	=	1 - PERFECT	

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #31 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 150. FEET.

SCS RUNOFF CURVE NUMBER	=	96.90	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT

AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.680	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.780	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.250	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	14.474	INCHES
TOTAL INITIAL WATER	=	14.474	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	26.90	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	9.50	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	71.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	77.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	74.00	%

NOTE: PRECIPITATION DATA FOR TAMPA FLORIDA
WAS ENTERED FROM THE DEFAULT DATA FILE.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

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

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 27.58 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1974

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.17	0.89	2.35	0.38	1.11	13.75
	3.43	4.67	4.00	0.23	0.12	2.80
RUNOFF	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	0.396	0.142	1.365	0.500	1.042	4.725
	2.785	3.955	2.541	0.359	0.247	1.411
LATERAL DRAINAGE COLLECTED FROM LAYER 3	0.4756	0.2886	0.6150	0.5212	0.2008	1.7490
	5.5864	1.2392	0.7071	1.6260	0.8641	0.5624
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 4	0.004	0.002	0.005	0.004	0.001	0.319
	0.146	0.009	0.005	0.012	0.007	0.004
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 4	0.001	0.002	0.001	0.001	0.001	1.349
	0.610	0.002	0.003	0.002	0.001	0.001

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ANNUAL TOTALS FOR YEAR 1974

	INCHES	CU. FEET	PERCENT
PRECIPITATION	33.90	123056.992	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	19.467	70665.070	57.42
DRAINAGE COLLECTED FROM LAYER 3	14.4354	52400.348	42.58
PERC./LEAKAGE THROUGH LAYER 4	0.000003	0.010	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0432		
CHANGE IN WATER STORAGE	-0.002	-8.398	-0.01
SOIL WATER AT START OF YEAR	14.476	52546.066	
SOIL WATER AT END OF YEAR	14.473	52537.668	

SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.035	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1975

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.91	1.56	1.09	0.91	2.07	8.73
	6.65	4.24	11.25	4.94	0.22	0.87
RUNOFF	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	0.860	1.286	1.004	1.186	1.371	4.644
	3.361	4.023	5.703	3.308	0.851	0.305
LATERAL DRAINAGE COLLECTED FROM LAYER 3	0.4755	0.2911	0.6169	0.4512	0.3402	0.2597
	1.6703	2.1408	2.1512	4.2348	1.5941	1.2830
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 4	0.004	0.002	0.005	0.003	0.003	0.002
	0.012	0.016	0.016	0.031	0.012	0.009
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 4	0.001	0.002	0.000	0.000	0.000	0.001
	0.010	0.006	0.011	0.015	0.005	0.002

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ANNUAL TOTALS FOR YEAR 1975

	INCHES	CU. FEET	PERCENT
PRECIPITATION	43.44	157687.156	100.00

RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	27.902	101282.711	64.23
DRAINAGE COLLECTED FROM LAYER 3	15.5089	56297.148	35.70
PERC./LEAKAGE THROUGH LAYER 4	0.000002	0.009	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0097		
CHANGE IN WATER STORAGE	0.030	107.355	0.07
SOIL WATER AT START OF YEAR	14.473	52537.668	
SOIL WATER AT END OF YEAR	14.503	52645.023	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.071	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1976

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.40	0.49	1.64	1.83	8.13	7.22
	4.58	7.02	6.04	1.30	1.59	1.49
RUNOFF	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	0.859	0.299	1.570	1.616	4.132	3.457
	3.207	3.863	3.730	2.231	1.341	1.394
LATERAL DRAINAGE COLLECTED FROM LAYER 3	0.7188	0.4783	0.3968	0.3108	0.2469	1.2572
	3.4123	2.5836	2.6147	0.9207	1.0867	0.7603
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.005	0.004	0.003	0.002	0.002	0.010

TOP OF LAYER 4	0.025	0.019	0.020	0.007	0.008	0.006
STD. DEVIATION OF DAILY	0.001	0.000	0.000	0.000	0.001	0.010
HEAD ON TOP OF LAYER 4	0.011	0.013	0.008	0.003	0.001	0.001

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ANNUAL TOTALS FOR YEAR 1976

	INCHES	CU. FEET	PERCENT
PRECIPITATION	41.73	151479.906	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	27.699	100548.742	66.38
DRAINAGE COLLECTED FROM LAYER 3	14.7872	53677.531	35.44
PERC./LEAKAGE THROUGH LAYER 4	0.000002	0.009	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0092		
CHANGE IN WATER STORAGE	-0.757	-2746.335	-1.81
SOIL WATER AT START OF YEAR	14.503	52645.023	
SOIL WATER AT END OF YEAR	13.746	49898.687	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.040	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	2.99	2.72	0.74	0.86	0.72	2.57
	5.46	5.96	4.30	0.42	1.87	3.42
RUNOFF	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	2.169	2.017	1.303	1.045	0.792	1.581
	4.641	4.268	3.159	0.669	0.951	3.143
LATERAL DRAINAGE COLLECTED	0.4085	0.4143	0.2502	0.2502	0.3577	0.3241
FROM LAYER 3	0.2752	0.2911	0.1653	1.2544	1.0000	0.6500
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.003	0.003	0.002	0.002	0.003	0.002
TOP OF LAYER 4	0.002	0.002	0.001	0.009	0.008	0.005
STD. DEVIATION OF DAILY	0.001	0.001	0.001	0.000	0.000	0.000
HEAD ON TOP OF LAYER 4	0.000	0.001	0.001	0.003	0.001	0.001

ANNUAL TOTALS FOR YEAR 1977

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.03	116268.922	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	25.737	93426.789	80.35
DRAINAGE COLLECTED FROM LAYER 3	5.6410	20476.973	17.61
PERC./LEAKAGE THROUGH LAYER 4	0.000002	0.009	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0035		
CHANGE IN WATER STORAGE	0.652	2365.155	2.03
SOIL WATER AT START OF YEAR	13.746	49898.687	
SOIL WATER AT END OF YEAR	14.398	52263.844	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.004	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	2.82	5.16	2.45	0.94	5.00	1.73
	6.06	5.80	3.32	3.44	0.01	3.12
RUNOFF	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	2.464	2.415	2.153	0.452	3.306	1.717
	4.491	4.529	3.154	1.469	1.193	1.026
LATERAL DRAINAGE COLLECTED FROM LAYER 3	0.5104	0.2421	1.5241	1.2129	0.8834	0.5348
	0.7633	0.7852	0.8158	0.7971	0.7718	1.2032
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 4	0.004	0.002	0.011	0.009	0.007	0.004
	0.006	0.006	0.006	0.006	0.006	0.009
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 4	0.001	0.001	0.008	0.001	0.002	0.002
	0.003	0.002	0.004	0.002	0.003	0.001

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ANNUAL TOTALS FOR YEAR 1978

	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.85	144655.484	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	28.367	102972.555	71.18
DRAINAGE COLLECTED FROM LAYER 3	10.0442	36460.457	25.21
PERC./LEAKAGE THROUGH LAYER 4	0.000002	0.009	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0063		
CHANGE IN WATER STORAGE	1.439	5222.497	3.61

SOIL WATER AT START OF YEAR	14.398	52263.844	
SOIL WATER AT END OF YEAR	15.836	57486.340	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.033	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1974 THROUGH 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.46	2.16	1.65	0.98	3.41	6.80
	5.24	5.54	5.78	2.07	0.76	2.34
STD. DEVIATIONS	1.35	1.88	0.75	0.53	3.13	4.89
	1.27	1.10	3.22	2.05	0.89	1.10
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	1.350	1.232	1.479	0.960	2.128	3.225
	3.697	4.128	3.657	1.607	0.916	1.456
STD. DEVIATIONS	0.909	1.009	0.428	0.489	1.495	1.524
	0.823	0.270	1.218	1.198	0.421	1.044
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.5178	0.3429	0.6806	0.5493	0.4058	0.8250
	2.3415	1.4080	1.2908	1.7666	1.0633	0.8918
STD. DEVIATIONS	0.1183	0.0990	0.4964	0.3864	0.2748	0.6510
	2.1730	0.9464	1.0400	1.4168	0.3205	0.3295
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0038	0.0028	0.0050	0.0042	0.0030	0.0674
	0.0383	0.0104	0.0099	0.0131	0.0081	0.0066
STD. DEVIATIONS	0.0009	0.0008	0.0037	0.0030	0.0020	0.1407
	0.0609	0.0070	0.0080	0.0105	0.0025	0.0024

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1974 THROUGH 1978

	INCHES		CU. FEET	PERCENT
ECIPITATION	38.19	(4.980)	138629.7	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	25.834	(3.6986)	93779.18	67.647
LATERAL DRAINAGE COLLECTED FROM LAYER 3	12.08333	(4.19041)	43862.492	31.64004
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00000	(0.00000)	0.009	0.00001
AVERAGE HEAD ON TOP OF LAYER 4	0.014	(0.016)		
CHANGE IN WATER STORAGE	0.272	(0.8212)	988.05	0.713

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PEAK DAILY VALUES FOR YEARS 1974 THROUGH 1978

	(INCHES)	(CU. FT.)
PRECIPITATION	5.47	19856.100
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 3	0.87971	3193.33252
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000000	0.00087
AVERAGE HEAD ON TOP OF LAYER 4	7.075	
MAXIMUM HEAD ON TOP OF LAYER 4	9.330	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	44.4 FEET	
SNOW WATER	0.00	0.0000

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3944
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0250

*** 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 1978

LAYER	(INCHES)	(VOL/VOL)
1	10.4629	0.1744
2	5.3634	0.2235
3	0.0082	0.0410
4	0.0000	0.0000
SNOW WATER	0.000	

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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:     O:\HELP3\DATA4PO.D4
TEMPERATURE DATA FILE:       O:\HELP3\DATA7PO.D7
SOLAR RADIATION DATA FILE:   O:\HELP3\DATA13PO.D13
EVAPOTRANSPIRATION DATA:     O:\HELP3\DATA11PO.D11
SOIL AND DESIGN DATA FILE:   O:\HELP3\PASCO5NW.D10
OUTPUT DATA FILE:            O:\HELP3\PASCO5NW.OUT

TIME:  15:47     DATE:   1/30/2001

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     TITLE:  PASCO COUNTY LANDFILL, CELL 2A WITH 5 FEET OF MSW

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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  18
          THICKNESS                     =     60.00   INCHES
          POROSITY                      =      0.6710 VOL/VOL
          FIELD CAPACITY                =      0.2920 VOL/VOL
          WILTING POINT                 =      0.0770 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.2659 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.100000005000E-02 CM/SEC


                                LAYER  2
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TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1906	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 52

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	5.00000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	130.0	FEET

LAYER 4

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.20	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	=	1 - PERFECT	

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #18 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 150. FEET.

SCS RUNOFF CURVE NUMBER	=	80.60	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT

AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	1.355	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	6.710	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.770	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	20.531	INCHES
TOTAL INITIAL WATER	=	20.531	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
TAMPA FLORIDA

STATION LATITUDE	=	26.90	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	9.50	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	71.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	77.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	74.00	%

NOTE: PRECIPITATION DATA FOR TAMPA FLORIDA
WAS ENTERED FROM THE DEFAULT DATA FILE.

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

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

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

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR TAMPA FLORIDA
AND STATION LATITUDE = 27.58 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1974

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.17	0.89	2.35	0.38	1.11	13.75
	3.43	4.67	4.00	0.23	0.12	2.80
RUNOFF	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	0.748	0.220	1.938	0.909	0.467	5.701
	3.902	4.440	3.322	0.584	0.383	2.025
LATERAL DRAINAGE COLLECTED FROM LAYER 3	0.1453	0.1692	0.1434	0.0679	0.1228	0.4401
	6.4636	0.4722	0.2391	0.5890	0.2607	0.1539
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 4	0.001	0.001	0.001	0.001	0.001	0.041
	0.262	0.003	0.002	0.004	0.002	0.001
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 4	0.001	0.000	0.000	0.000	0.000	0.220
	1.219	0.001	0.001	0.001	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1974

	INCHES	CU. FEET	PERCENT
PRECIPITATION	33.90	123056.992	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	24.638	89437.156	72.68
DRAINAGE COLLECTED FROM LAYER 3	9.2673	33640.383	27.34
PERC./LEAKAGE THROUGH LAYER 4	0.000003	0.009	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0267		
CHANGE IN WATER STORAGE	-0.006	-20.494	-0.02
SOIL WATER AT START OF YEAR	20.533	74533.039	
SOIL WATER AT END OF YEAR	20.527	74512.547	

SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.061	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1975

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.91	1.56	1.09	0.91	2.07	8.73
	6.65	4.24	11.25	4.94	0.22	0.87
RUNOFF	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	0.824	1.352	1.347	0.701	1.609	6.104
	4.903	4.962	6.002	4.328	1.780	0.298
LATERAL DRAINAGE COLLECTED FROM LAYER 3	0.1441	0.1782	0.1429	0.1024	0.0829	0.0703
	1.7004	0.9317	1.0755	4.0386	0.6661	0.2615
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 4	0.001	0.001	0.001	0.001	0.001	0.001
	0.013	0.007	0.008	0.030	0.005	0.002
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 4	0.001	0.000	0.000	0.000	0.000	0.000
	0.012	0.003	0.013	0.014	0.002	0.000

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ANNUAL TOTALS FOR YEAR 1975

	INCHES	CU. FEET	PERCENT
PRECIPITATION	43.44	157687.156	100.00

RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	34.209	124178.492	78.75
DRAINAGE COLLECTED FROM LAYER 3	9.3944	34101.820	21.63
PERC./LEAKAGE THROUGH LAYER 4	0.000002	0.009	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0058		
CHANGE IN WATER STORAGE	-0.163	-593.158	-0.38
SOIL WATER AT START OF YEAR	20.527	74512.547	
SOIL WATER AT END OF YEAR	20.363	73919.391	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.005	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1976

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.40	0.49	1.64	1.83	8.13	7.22
	4.58	7.02	6.04	1.30	1.59	1.49
RUNOFF	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	0.333	0.409	2.006	1.826	4.443	4.300
	4.658	4.780	4.612	2.849	1.516	1.107
LATERAL DRAINAGE COLLECTED FROM LAYER 3	0.1597	0.1064	0.0878	0.0686	0.2349	1.8971
	2.5667	0.9117	2.2319	0.3660	0.1889	0.1310
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.001	0.001	0.001	0.001	0.002	0.015

TOP OF LAYER 4	0.019	0.007	0.017	0.003	0.001	0.001
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.006	0.013
HEAD ON TOP OF LAYER 4	0.015	0.012	0.015	0.001	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1976

	INCHES	CU. FEET	PERCENT
PRECIPITATION	41.73	151479.906	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	32.838	119203.125	78.69
DRAINAGE COLLECTED FROM LAYER 3	8.9506	32490.697	21.45
PERC./LEAKAGE THROUGH LAYER 4	0.000002	0.009	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0056		
CHANGE IN WATER STORAGE	-0.059	-213.858	-0.14
SOIL WATER AT START OF YEAR	20.363	73919.391	
SOIL WATER AT END OF YEAR	20.305	73705.531	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.057	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	2.99	2.72	0.74	0.86	0.72	2.57
	5.46	5.96	4.30	0.42	1.87	3.42
RUNOFF	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	2.906	2.162	1.456	0.666	0.654	2.343
	5.548	4.916	4.753	0.866	1.037	3.118
L^TERAL DRAINAGE COLLECTED	0.0862	0.0659	0.0793	0.0697	0.0611	0.0527
ROM LAYER 3	0.0522	0.0317	0.1358	0.2402	0.1603	0.1189
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.001	0.001	0.001	0.001	0.000	0.000
TOP OF LAYER 4	0.000	0.000	0.001	0.002	0.001	0.001
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 4	0.000	0.000	0.001	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1977

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.03	116268.922	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	30.425	110444.055	94.99
DRAINAGE COLLECTED FROM LAYER 3	1.1539	4188.624	3.60
PERC./LEAKAGE THROUGH LAYER 4	0.000002	0.008	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0007		
CHANGE IN WATER STORAGE	0.451	1636.217	1.41
SOIL WATER AT START OF YEAR	20.305	73705.531	
SOIL WATER AT END OF YEAR	20.755	75341.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.019	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	2.82	5.16	2.45	0.94	5.00	1.73
	6.06	5.80	3.32	3.44	0.01	3.12
RUNOFF	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	3.254	2.858	3.439	0.326	4.373	2.117
	5.149	5.305	3.995	2.088	2.107	0.808
LATERAL DRAINAGE COLLECTED FROM LAYER 3	0.0862	0.0596	1.1704	0.4075	0.2059	0.1262
	0.1053	0.0634	0.2212	0.1751	0.0977	0.1392
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 4	0.001	0.000	0.009	0.003	0.002	0.001
	0.001	0.000	0.002	0.001	0.001	0.001
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 4	0.000	0.000	0.008	0.001	0.000	0.000
	0.000	0.001	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1978

	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.85	144655.484	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	35.820	130025.937	89.89
DRAINAGE COLLECTED FROM LAYER 3	2.8578	10373.763	7.17
PERC./LEAKAGE THROUGH LAYER 4	0.000002	0.009	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0018		
CHANGE IN WATER STORAGE	1.172	4255.783	2.94

SOIL WATER AT START OF YEAR	20.755	75341.750	
SOIL WATER AT END OF YEAR	21.928	79597.531	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.008	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1974 THROUGH 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.46	2.16	1.65	0.98	3.41	6.80
	5.24	5.54	5.78	2.07	0.76	2.34
STD. DEVIATIONS	1.35	1.88	0.75	0.53	3.13	4.89
	1.27	1.10	3.22	2.05	0.89	1.10
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	1.613	1.400	2.037	0.886	2.309	4.113
	4.832	4.881	4.537	2.143	1.365	1.471
STD. DEVIATIONS	1.358	1.127	0.835	0.566	1.964	1.847
	0.615	0.313	0.996	1.528	0.674	1.114
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.1243	0.1159	0.3248	0.1432	0.1415	0.5173
	2.1776	0.4821	0.7807	1.0818	0.2747	0.1609
STD. DEVIATIONS	0.0353	0.0558	0.4737	0.1485	0.0760	0.7872
	2.6249	0.4373	0.8965	1.6604	0.2265	0.0577
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4

AVERAGES	0.0009	0.0009	0.0024	0.0011	0.0010	0.0114
	0.0589	0.0036	0.0060	0.0080	0.0021	0.0012
STD. DEVIATIONS	0.0003	0.0005	0.0035	0.0011	0.0006	0.0174
	0.1136	0.0032	0.0069	0.0123	0.0017	0.0004

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1974 THROUGH 1978

	INCHES		CU. FEET	PERCENT
ECIPITATION	38.19	(4.980)	138629.7	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	31.586	(4.3586)	114657.75	82.708
LATERAL DRAINAGE COLLECTED FROM LAYER 3	6.32481	(3.99169)	22959.057	16.56143
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00000	(0.00000)	0.009	0.00001
AVERAGE HEAD ON TOP OF LAYER 4	0.008	(0.011)		
CHANGE IN WATER STORAGE	0.279	(0.5519)	1012.90	0.731

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PEAK DAILY VALUES FOR YEARS 1974 THROUGH 1978

	(INCHES)	(CU. FT.)
PRECIPITATION	5.47	19856.100
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 3	0.87860	3189.30103
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000000	0.00084
AVERAGE HEAD ON TOP OF LAYER 4	6.828	
MAXIMUM HEAD ON TOP OF LAYER 4	9.063	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	43.8 FEET	
SNOW WATER	0.00	0.0000

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.6475
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0770

*** 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 1978

LAYER	(INCHES)	(VOL/VOL)
1	17.7102	0.2952
2	4.2123	0.1755
3	0.0032	0.0160
4	0.0000	0.0000
SNOW WATER	0.000	

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Exhibit 3

Drawings