
ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	59.12	32190.838	100.00
RUNOFF	0.265	144.482	0.45
EVAPOTRANSPIRATION	37.132	20218.289	62.81
DRAINAGE COLLECTED FROM LAYER 2	22.6689	12343.223	38.34
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0002		
CHANGE IN WATER STORAGE	-0.946	-515.151	-1.60
SOIL WATER AT START OF YEAR	8.647	4708.306	
SOIL WATER AT END OF YEAR	7.701	4193.155	
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

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	4.47 4.64	4.30 3.27	5.88 3.87	4.82 2.19	4.05 3.04	3.59 4.31
STD. DEVIATIONS	2.21 2.43	2.26 1.88	2.26 2.61	2.76 1.64	1.69 1.64	1.64 2.61
RUNOFF						
TOTALS	0.075 0.035	0.109 0.000	0.152 0.050	0.060 0.007	0.030 0.030	0.000 0.055

STD. DEVIATIONS	0.171 0.114	0.364 0.001	0.317 0.149	0.115 0.027	0.067 0.071	0.000 0.183
EVAPOTRANSPIRATION						
TOTALS	1.845 4.039	2.125 3.178	3.530 2.520	3.747 2.566	4.053 1.533	3.634 1.421
STD. DEVIATIONS	0.228 1.511	0.295 1.451	0.461 1.110	1.028 0.774	0.878 0.471	1.649 0.287
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	2.5453 0.2278	2.1561 0.0898	2.5273 0.5155	1.6274 0.6211	1.0225 0.2564	0.2012 1.8776
STD. DEVIATIONS	2.1573 0.7344	2.0707 0.3179	1.6404 1.1134	1.0007 0.9777	1.2148 0.7482	0.3905 2.2790
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 ACROSS LAYER 4

AVERAGES	0.0003 0.0000	0.0003 0.0000	0.0003 0.0001	0.0002 0.0001	0.0001 0.0000	0.0000 0.0002
STD. DEVIATIONS	0.0003 0.0001	0.0003 0.0000	0.0002 0.0001	0.0001 0.0001	0.0001 0.0001	0.0000 0.0003

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

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.44 (7.307)	26373.4	100.00
WNOFF	0.603 (0.5351)	328.09	1.244
EVAPOTRANSPIRATION	34.189 (2.9580)	18615.81	70.586
LATERAL DRAINAGE COLLECTED FROM LAYER 2	13.66817 (5.00030)	7442.320	28.21904

PERCOLATION/LEAKAGE THROUGH FROM LAYER 4	0.00000 (0.00000)	0.000	0.00000
VERAGE HEAD ACROSS TOP OF LAYER 4	0.000 (0.000)		
CHANGE IN WATER STORAGE	-0.024 (1.3818)	-12.82	-0.049

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	4.71	2564.595
RUNOFF	1.177	640.7753
DRAINAGE COLLECTED FROM LAYER 2	2.29515	1249.71118
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000000	0.00005
AVERAGE HEAD ACROSS LAYER 4	0.008	
SNOW WATER	4.62	2513.8826
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.3684
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0863

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	5.3288	0.2220
2	0.0027	0.0108
3	0.0000	0.0000
4	2.3694	0.3949
SNOW WATER	0.000	

HELP MODEL RUN A-3

Description: This model used the field-measured permeability inputs. The purpose of this model was to estimate leakage through the in-place closure cap using the updated HELP model.

Input: Composite liner with 60-mil HDPE liner and 3.6×10^{-5} cm/sec permeability for the clay component.

Results: Average annual percolation through the liner = .005 cubic feet.

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HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
 HELP MODEL VERSION 3.01 (14 OCTOBER 1994)
 DEVELOPED BY ENVIRONMENTAL LABORATORY
 USAE WATERWAYS EXPERIMENT STATION
 FOR USEPA RISK REDUCTION ENGINEERING LABORATORY

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PRECIPITATION DATA FILE: P:\HELP3\BONNELL.D4
TEMPERATURE DATA FILE: P:\HELP3\BONNELL.D7
SOLAR RADIATION DATA FILE: P:\HELP3\BONNELL.D13
EVAPOTRANSPIRATION DATA: P:\HELP3\BONNELL.D11
SOIL AND DESIGN DATA FILE: P:\HELP3\BONL-a3.D10
OUTPUT DATA FILE: P:\HELP3\BONL-a3.OUT

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TIME: 9:56 DATE: 9/12/1995

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TITLE: BONNELL-SHORT SIDESLOPE-RUN A3: 3.6E-5 LINER & 6" & 18" SOIL
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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
 COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1 -----

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      TYPE 1 - VERTICAL PERCOLATION LAYER
      MATERIAL TEXTURE NUMBER 0
THICKNESS           = 6.00 INCHES
POROSITY             = 0.4730 VOL/VOL
FIELD CAPACITY       = 0.2217 VOL/VOL
WILTING POINT        = 0.1043 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2014 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.156000000000E-02 CM/SEC

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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	18.00	INCHES
POROSITY	=	0.3949	VOL/VOL
FIELD CAPACITY	=	0.2797	VOL/VOL
WILTING POINT	=	0.1875	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3268	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.360000013000E-04	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.25	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	33.0000000000	CM/SEC
SLOPE	=	40.00	PERCENT
DRAINAGE LENGTH	=	11.0	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	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 5

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	6.00	INCHES
POROSITY	=	0.3949	VOL/VOL
FIELD CAPACITY	=	0.2797	VOL/VOL
WILTING POINT	=	0.1875	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3949	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.360000013000E-04	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.26	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	0.150	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	6.407	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.156	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.626	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	9.463	INCHES
TOTAL INITIAL WATER	=	9.463	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ATLANTA GEORGIA

MAXIMUM LEAF AREA INDEX	=	2.00
START OF GROWING SEASON (JULIAN DATE)	=	92
END OF GROWING SEASON (JULIAN DATE)	=	312
AVERAGE ANNUAL WIND SPEED	=	9.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	67.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	69.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.91	4.43	5.91	4.43	4.02	3.41
4.73	3.41	3.17	2.53	3.43	4.23

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
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41.90	44.90	52.50	61.80	69.30	75.80
78.60	78.20	73.00	62.20	52.00	44.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

STATION LATITUDE = 33.65 DEGREES

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.47	26936.418	100.00
RUNOFF	0.172	93.690	0.35
EVAPOTRANSPIRATION	37.778	20569.973	76.36
DRAINAGE COLLECTED FROM LAYER 3	11.5187	6271.958	23.28
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	0.001	0.798	0.00
SOIL WATER AT START OF YEAR	9.463	5152.780	
SOIL WATER AT END OF YEAR	9.465	5153.579	
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	0.000	0.00

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	63.92	34804.449	100.00
RUNOFF	2.353	1281.224	3.68
EVAPOTRANSPIRATION	36.997	20144.631	57.88

DRAINAGE COLLECTED FROM LAYER 3	23.7727	12944.260	37.19
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0016		
CHANGE IN WATER STORAGE	0.798	434.321	1.25
SOIL WATER AT START OF YEAR	9.465	5153.579	
SOIL WATER AT END OF YEAR	10.262	5587.899	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.013	0.00

ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	50.89	27709.605	100.00
RUNOFF	0.785	427.197	1.54
EVAPOTRANSPIRATION	36.408	19824.209	71.54
DRAINAGE COLLECTED FROM LAYER 3	13.1023	7134.219	25.75
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0009		
CHANGE IN WATER STORAGE	0.595	323.979	1.17
SOIL WATER AT START OF YEAR	10.262	5587.899	
SOIL WATER AT END OF YEAR	9.234	5027.807	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.624	884.071	3.19
ANNUAL WATER BUDGET BALANCE	0.0000	0.002	0.00

ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.49	24224.812	100.00
RUNOFF	0.191	104.189	0.43
EVAPOTRANSPIRATION	34.436	18750.416	77.40
DRAINAGE COLLECTED FROM LAYER 3	12.9689	7061.546	29.15
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0009		
CHANGE IN WATER STORAGE	-3.106	-1691.352	-6.98
SOIL WATER AT START OF YEAR	9.234	5027.807	
SOIL WATER AT END OF YEAR	7.751	4220.526	
SNOW WATER AT START OF YEAR	1.624	884.071	3.65
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.014	0.00

ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.24	26811.176	100.00
RUNOFF	0.372	202.319	0.75
EVAPOTRANSPIRATION	36.959	20124.254	75.06
DRAINAGE COLLECTED FROM LAYER 3	12.1347	6607.364	24.64
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0009		
CHANGE IN WATER STORAGE	-0.225	-122.756	-0.46
SOIL WATER AT START OF YEAR	7.751	4220.526	
SOIL WATER AT END OF YEAR	7.526	4097.771	
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

ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.50	25863.742	100.00
RUNOFF	0.039	21.179	0.08
EVAPOTRANSPIRATION	35.563	19364.229	74.87
DRAINAGE COLLECTED FROM LAYER 3	9.0084	4905.090	18.97
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0006		
CHANGE IN WATER STORAGE	2.889	1573.251	6.08
SOIL WATER AT START OF YEAR	7.526	4097.771	
SOIL WATER AT END OF YEAR	10.415	5671.022	
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	-0.007	0.00

ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	42.30	23032.354	100.00
RUNOFF	1.875	1021.072	4.43
VAPOTRANSPIRATION	28.910	15741.542	68.35
DRAINAGE COLLECTED FROM LAYER 3	11.7523	6399.131	27.78
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00

AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	-0.238	-129.391	-0.56
SOIL WATER AT START OF YEAR	10.415	5671.022	
SOIL WATER AT END OF YEAR	10.177	5541.631	
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	-0.002	0.00

ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.92	26092.439	100.00
RUNOFF	2.321	1263.975	4.84
EVAPOTRANSPIRATION	33.550	18267.873	70.01
DRAINAGE COLLECTED FROM LAYER 3	11.4680	6244.310	23.93
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	0.581	316.275	1.21
SOIL WATER AT START OF YEAR	10.177	5541.631	
SOIL WATER AT END OF YEAR	10.758	5857.906	
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	0.009	0.00

ANNUAL TOTALS FOR YEAR 9

INCHES	CU. FEET	PERCENT
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PRECIPITATION	56.49	30758.799	100.00
RUNOFF	0.592	322.530	1.05
EVAPOTRANSPIRATION	35.112	19118.502	62.16
DRAINAGE COLLECTED FROM LAYER 3	21.5568	11737.701	38.16
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0014		
CHANGE IN WATER STORAGE	-0.771	-419.922	-1.37
SOIL WATER AT START OF YEAR	10.758	5857.906	
SOIL WATER AT END OF YEAR	9.987	5437.984	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.013	0.00

ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	45.21	24616.844	100.00
RUNOFF	0.834	453.961	1.84
EVAPOTRANSPIRATION	34.585	18831.305	76.50
DRAINAGE COLLECTED FROM LAYER 3	11.2991	6152.375	24.99
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	-1.507	-820.789	-3.33
SOIL WATER AT START OF YEAR	9.987	5437.984	
SOIL WATER AT END OF YEAR	8.480	4617.195	
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

ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	37.37	20347.965	100.00
RUNOFF	0.041	22.561	0.11
EVAPOTRANSPIRATION	29.699	16170.880	79.47
DRAINAGE COLLECTED FROM LAYER 3	8.0295	4372.072	21.49
PERC./LEAKAGE THROUGH LAYER 5	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0006		
CHANGE IN WATER STORAGE	-0.400	-217.555	-1.07
SOIL WATER AT START OF YEAR	8.480	4617.195	
SOIL WATER AT END OF YEAR	8.080	4399.640	
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

ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	43.59	23734.758	100.00
RUNOFF	1.712	932.427	3.93
EVAPOTRANSPIRATION	29.823	16238.664	68.42
DRAINAGE COLLECTED FROM LAYER 3	11.4584	6239.091	26.29
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	0.596	324.582	1.37
SOIL WATER AT START OF YEAR	8.080	4399.640	

SOIL WATER AT END OF YEAR	8.676	4724.222	
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

ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.38	24164.912	100.00
RUNOFF	1.522	828.771	3.43
EVAPOTRANSPIRATION	26.900	14647.208	60.61
DRAINAGE COLLECTED FROM LAYER 3	15.2031	8278.065	34.26
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0010		
CHANGE IN WATER STORAGE	0.755	410.865	1.70
SOIL WATER AT START OF YEAR	8.676	4724.222	
SOIL WATER AT END OF YEAR	9.431	5135.087	
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	0.003	0.00

ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.41	26359.242	100.00
RUNOFF	1.884	1025.615	3.89
EVAPOTRANSPIRATION	34.862	18982.184	72.01

DRAINAGE COLLECTED FROM LAYER 3	12.3111	6703.421	25.43
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0009		
CHANGE IN WATER STORAGE	-0.646	-351.964	-1.34
SOIL WATER AT START OF YEAR	9.431	5135.087	
SOIL WATER AT END OF YEAR	8.784	4783.123	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.013	0.00

ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.37	27970.965	100.00
RUNOFF	1.166	634.740	2.27
EVAPOTRANSPIRATION	34.167	18603.754	66.51
DRAINAGE COLLECTED FROM LAYER 3	15.0858	8214.240	29.37
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0010		
CHANGE IN WATER STORAGE	0.952	518.238	1.85
SOIL WATER AT START OF YEAR	8.784	4783.123	
SOIL WATER AT END OF YEAR	9.736	5301.361	
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	-0.007	0.00

ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.66	17783.371	100.00
RUNOFF	0.018	9.740	0.05
EVAPOTRANSPIRATION	27.890	15186.047	85.39
DRAINAGE COLLECTED FROM LAYER 3	6.8159	3711.235	20.87
PERC./LEAKAGE THROUGH LAYER 5	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0005		
CHANGE IN WATER STORAGE	-2.064	-1123.652	-6.32
SOIL WATER AT START OF YEAR	9.736	5301.361	
SOIL WATER AT END OF YEAR	7.673	4177.710	
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	0.001	0.00

ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.73	24355.484	100.00
RUNOFF	2.245	1222.228	5.02
EVAPOTRANSPIRATION	31.820	17326.123	71.14
DRAINAGE COLLECTED FROM LAYER 3	9.0599	4933.127	20.25
PERC./LEAKAGE THROUGH LAYER 5	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0006		
CHANGE IN WATER STORAGE	1.605	874.010	3.59
SOIL WATER AT START OF YEAR	7.673	4177.710	
SOIL WATER AT END OF YEAR	9.278	5051.720	
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

ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	56.79	30922.146	100.00
RUNOFF	4.780	2602.919	8.42
EVAPOTRANSPIRATION	33.341	18154.016	58.71
DRAINAGE COLLECTED FROM LAYER 3	19.3048	10511.476	33.99
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0013		
CHANGE IN WATER STORAGE	-0.636	-346.249	-1.12
SOIL WATER AT START OF YEAR	9.278	5051.720	
SOIL WATER AT END OF YEAR	8.642	4705.471	
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	-0.015	0.00

ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	52.87	28787.713	100.00
RUNOFF	0.414	225.649	0.78
EVAPOTRANSPIRATION	35.063	19091.586	66.32
DRAINAGE COLLECTED FROM LAYER 3	16.1787	8809.289	30.60
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.000	0.00

AVG. HEAD ON TOP OF LAYER 5	0.0011		
CHANGE IN WATER STORAGE	1.214	661.201	2.30
SOIL WATER AT START OF YEAR	8.642	4705.471	
SOIL WATER AT END OF YEAR	9.856	5366.672	
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	-0.012	0.00

ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	59.12	32190.838	100.00
RUNOFF	0.555	302.395	0.94
EVAPOTRANSPIRATION	36.655	19958.387	62.00
DRAINAGE COLLECTED FROM LAYER 3	22.6543	12335.287	38.32
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0016		
CHANGE IN WATER STORAGE	-0.744	-405.224	-1.26
SOIL WATER AT START OF YEAR	9.856	5366.672	
SOIL WATER AT END OF YEAR	9.112	4961.448	
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	-0.006	0.00

 AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

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

PRECIPITATION						

TOTALS	4.47 4.64	4.30 3.27	5.88 3.87	4.82 2.19	4.05 3.04	3.59 4.31
STD. DEVIATIONS	2.21 2.43	2.26 1.88	2.26 2.61	2.76 1.64	1.69 1.64	1.64 2.61
RUNOFF						

TOTALS	0.159 0.042	0.254 0.001	0.288 0.088	0.150 0.008	0.043 0.032	0.000 0.129
STD. DEVIATIONS	0.375 0.139	0.923 0.002	0.609 0.265	0.334 0.028	0.088 0.071	0.001 0.405
EVAPOTRANSPIRATION						

TOTALS	1.674 4.062	2.006 3.153	3.333 2.448	3.649 2.598	4.210 1.489	3.598 1.308
STD. DEVIATIONS	0.285 1.496	0.321 1.426	0.386 1.032	0.943 0.755	0.867 0.490	1.701 0.277
LATERAL DRAINAGE COLLECTED FROM LAYER 3						

TOTALS	2.6201 0.2000	2.0966 0.0746	2.5401 0.5153	1.6065 0.6792	1.0744 0.2813	0.1405 1.9056
STD. DEVIATIONS	2.0532 0.6817	1.6948 0.2712	1.6043 1.0996	1.0636 0.9649	1.1734 0.7701	0.3083 2.1895
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 ACROSS LAYER 5

AVERAGES	0.0021 0.0002	0.0019 0.0001	0.0020 0.0004	0.0013 0.0005	0.0009 0.0002	0.0001 0.0015
STD. DEVIATIONS	0.0016 0.0006	0.0016 0.0002	0.0013 0.0009	0.0009 0.0008	0.0010 0.0007	0.0003 0.0017

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

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.44 (7.307)	26373.4	100.00
RUNOFF	1.194 (1.1775)	649.92	2.464
EVAPOTRANSPIRATION	33.526 (3.2562)	18254.79	69.217
LATERAL DRAINAGE COLLECTED FROM LAYER 3	13.73418 (4.80002)	7478.264	28.35533
PERCOLATION/LEAKAGE THROUGH FROM LAYER 5	0.00000 (0.00000)	0.000	0.00000
AVERAGE HEAD ACROSS TOP OF LAYER 5	0.001 (0.000)		
CHANGE IN WATER STORAGE	-0.018 (1.3371)	-9.57	-0.036

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	4.71	2564.595
RUNOFF	2.830	1541.1036
DRAINAGE COLLECTED FROM LAYER 3	1.22455	666.76605
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000000	0.00002
AVERAGE HEAD ACROSS LAYER 5	0.030	
SNOW WATER	4.62	2513.8826
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.4128
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.1518

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.0671	0.1778
2	5.6712	0.3151
3	0.0042	0.0169
4	0.0000	0.0000
5	2.3694	0.3949

SNOW WATER 0.000

HELP MODEL RUN B-1

Description: This model used the same input from the Closure Plan. The purpose of this model was to estimate leakage through the approved closure cap using the updated HELP model.

Input: Composite liner with 3.2×10^{-6} cm/sec permeability for the clay component and a 40-mil HDPE component.

Results: Average annual percolation through the liner = .001 cubic feet.

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HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 3.01 (14 OCTOBER 1994)
DEVELOPED BY ENVIRONMENTAL LABORATORY
USAE WATERWAYS EXPERIMENT STATION
FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
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PRECIPITATION DATA FILE: P:\HELP3\BONNELL.D4
TEMPERATURE DATA FILE: P:\HELP3\BONNELL.D7
SOLAR RADIATION DATA FILE: P:\HELP3\BONNELL.D13
EVAPOTRANSPIRATION DATA: P:\HELP3\BONNELL.D11
SOIL AND DESIGN DATA FILE: P:\HELP3\BONL-B1.D10
OUTPUT DATA FILE: P:\HELP3\BONL-B1.OUT

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TIME: 10:46 DATE: 9/12/1995

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TITLE: BONNELL - LONG SIDESLOPE - CLOSURE PLAN INPUT - RUN B1

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

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER MATERIAL TEXTURE NUMBER 0

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4730	VOL/VOL
FIELD CAPACITY	=	0.2217	VOL/VOL
WILTING POINT	=	0.1043	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2417	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.156000000000E-02	CM/SEC

LAYER 2

 TYPE 2 - LATERAL DRAINAGE LAYER
 MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.25	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	33.0000000000	CM/SEC
SLOPE	=	40.00	PERCENT
DRAINAGE LENGTH	=	42.0	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	=	3.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	3.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3	- GOOD

LAYER 4

TYPE 3 - BARRIER SOIL LINER
 MATERIAL TEXTURE NUMBER 0

THICKNESS	=	6.00	INCHES
POROSITY	=	0.3949	VOL/VOL
FIELD CAPACITY	=	0.2797	VOL/VOL
WILTING POINT	=	0.1875	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3949	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.320000004000E-05	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.26	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	0.320	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	5.251	INCHES

UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.406	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.295	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	8.172	INCHES
TOTAL INITIAL WATER	=	8.172	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ATLANTA GEORGIA

MAXIMUM LEAF AREA INDEX	=	2.00
START OF GROWING SEASON (JULIAN DATE)	=	92
END OF GROWING SEASON (JULIAN DATE)	=	312
AVERAGE ANNUAL WIND SPEED	=	9.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	67.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	69.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.91	4.43	5.91	4.43	4.02	3.41
4.73	3.41	3.17	2.53	3.43	4.23

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
41.90	44.90	52.50	61.80	69.30	75.80
78.60	78.20	73.00	62.20	52.00	44.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

STATION LATITUDE = 33.65 DEGREES

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.47	57464.355	100.00
RUNOFF	0.063	72.986	0.13
EVAPOTRANSPIRATION	37.940	44071.242	76.69
DRAINAGE COLLECTED FROM LAYER 2	11.4648	13317.455	23.18
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	0.002	2.676	0.00
SOIL WATER AT START OF YEAR	8.172	9492.324	
SOIL WATER AT END OF YEAR	8.174	9495.001	
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

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	63.92	74249.484	100.00
RUNOFF	1.120	1301.155	1.75
EVAPOTRANSPIRATION	37.480	43537.238	58.64
DRAINAGE COLLECTED FROM LAYER 2	24.4875	28444.654	38.31
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.002	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0002		
CHANGE IN WATER STORAGE	0.832	966.438	1.30
SOIL WATER AT START OF YEAR	8.174	9495.001	
SOIL WATER AT END OF YEAR	9.006	10461.438	
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	-0.003	0.00

ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	50.89	59113.820	100.00
RUNOFF	0.601	697.712	1.18
EVAPOTRANSPIRATION	36.686	42614.266	72.09
DRAINAGE COLLECTED FROM LAYER 2	13.4364	15607.716	26.40
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	0.167	194.135	0.33
SOIL WATER AT START OF YEAR	9.006	10461.438	
SOIL WATER AT END OF YEAR	7.550	8769.556	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.624	1886.018	3.19
ANNUAL WATER BUDGET BALANCE	0.0000	-0.009	0.00

ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.49	51679.598	100.00
RUNOFF	0.098	113.419	0.22
EVAPOTRANSPIRATION	35.023	40683.184	78.72
DRAINAGE COLLECTED FROM LAYER 2	12.3512	14347.101	27.76
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00

AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	-2.982	-3464.117	-6.70
SOIL WATER AT START OF YEAR	7.550	8769.556	
SOIL WATER AT END OF YEAR	6.191	7191.457	
SNOW WATER AT START OF YEAR	1.624	1886.018	3.65
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.010	0.00

ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.24	57197.172	100.00
RUNOFF	0.195	226.053	0.40
EVAPOTRANSPIRATION	36.781	42724.672	74.70
DRAINAGE COLLECTED FROM LAYER 2	12.3443	14339.087	25.07
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	-0.080	-92.635	-0.16
SOIL WATER AT START OF YEAR	6.191	7191.457	
SOIL WATER AT END OF YEAR	6.111	7098.822	
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

ANNUAL TOTALS FOR YEAR 6

INCHES	CU. FEET	PERCENT
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PRECIPITATION	47.50	55175.980	100.00
RUNOFF	0.024	27.888	0.05
EVAPOTRANSPIRATION	36.571	42480.547	76.99
DRAINAGE COLLECTED FROM LAYER 2	7.8442	9111.780	16.51
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	3.061	3555.773	6.44
SOIL WATER AT START OF YEAR	6.111	7098.822	
SOIL WATER AT END OF YEAR	9.172	10654.595	
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	-0.010	0.00

ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	42.30	49135.684	100.00
RUNOFF	1.004	1166.003	2.37
EVAPOTRANSPIRATION	29.931	34767.707	70.76
DRAINAGE COLLECTED FROM LAYER 2	11.7607	13661.223	27.80
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	-0.395	-459.253	-0.93
SOIL WATER AT START OF YEAR	9.172	10654.595	
SOIL WATER AT END OF YEAR	8.777	10195.342	
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	0.003	0.00

ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.92	55663.867	100.00
RUNOFF	0.957	1111.355	2.00
EVAPOTRANSPIRATION	34.063	39567.777	71.08
DRAINAGE COLLECTED FROM LAYER 2	12.2038	14175.937	25.47
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	0.696	808.799	1.45
SOIL WATER AT START OF YEAR	8.777	10195.342	
SOIL WATER AT END OF YEAR	9.473	11004.141	
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	-0.003	0.00

ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	56.49	65618.766	100.00
RUNOFF	0.291	337.653	0.51
EVAPOTRANSPIRATION	35.722	41494.949	63.24
DRAINAGE COLLECTED FROM LAYER 2	21.3615	24813.467	37.81
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0002		
CHANGE IN WATER STORAGE	-0.884	-1027.280	-1.57
SOIL WATER AT START OF YEAR	9.473	11004.141	

SOIL WATER AT END OF YEAR	8.589	9976.861	
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	-0.023	0.00

ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	45.21	52515.930	100.00
RUNOFF	0.570	661.642	1.26
EVAPOTRANSPIRATION	35.018	40676.926	77.46
DRAINAGE COLLECTED FROM LAYER 2	11.2864	13110.262	24.96
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	-1.664	-1932.883	-3.68
SOIL WATER AT START OF YEAR	8.589	9976.861	
SOIL WATER AT END OF YEAR	6.925	8043.978	
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	-0.020	0.00

ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	37.37	43408.988	100.00
RUNOFF	0.005	5.841	0.01
EVAPOTRANSPIRATION	30.799	35776.078	82.42

DRAINAGE COLLECTED FROM LAYER 2	6.9040	8019.641	18.47
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	-0.338	-392.561	-0.90
SOIL WATER AT START OF YEAR	6.925	8043.978	
SOIL WATER AT END OF YEAR	6.587	7651.417	
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	-0.011	0.00

ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	43.59	50634.148	100.00
RUNOFF	0.737	856.238	1.69
EVAPOTRANSPIRATION	30.893	35885.168	70.87
DRAINAGE COLLECTED FROM LAYER 2	11.1975	13007.049	25.69
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	0.762	885.689	1.75
SOIL WATER AT START OF YEAR	6.587	7651.417	
SOIL WATER AT END OF YEAR	7.349	8537.106	
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	0.000	0.00

ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.38	51551.809	100.00
RUNOFF	0.801	930.812	1.81
EVAPOTRANSPIRATION	28.875	33541.082	65.06
DRAINAGE COLLECTED FROM LAYER 2	14.0984	16376.651	31.77
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	0.605	703.264	1.36
SOIL WATER AT START OF YEAR	7.349	8537.106	
SOIL WATER AT END OF YEAR	7.955	9240.370	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.002	0.00

ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.41	56233.047	100.00
RUNOFF	0.858	996.392	1.77
EVAPOTRANSPIRATION	34.999	40655.137	72.30
DRAINAGE COLLECTED FROM LAYER 2	13.1386	15261.849	27.14
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	-0.586	-680.321	-1.21
SOIL WATER AT START OF YEAR	7.955	9240.370	
SOIL WATER AT END OF YEAR	7.369	8560.049	
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	-0.014	0.00

ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.37	59671.391	100.00
RUNOFF	0.885	1028.313	1.72
EVAPOTRANSPIRATION	34.524	40102.969	67.21
DRAINAGE COLLECTED FROM LAYER 2	15.0135	17439.699	29.23
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0002		
CHANGE IN WATER STORAGE	0.947	1100.435	1.84
SOIL WATER AT START OF YEAR	7.369	8560.049	
SOIL WATER AT END OF YEAR	8.317	9660.483	
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	-0.028	0.00

ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.66	37937.855	100.00
RUNOFF	0.016	18.771	0.05
EVAPOTRANSPIRATION	28.131	32676.459	86.13
DRAINAGE COLLECTED FROM LAYER 2	6.8479	7954.521	20.97
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00

AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	-2.335	-2711.892	-7.15
SOIL WATER AT START OF YEAR	8.317	9660.483	
SOIL WATER AT END OF YEAR	5.982	6948.592	
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	-0.007	0.00

ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.73	51958.363	100.00
RUNOFF	1.207	1401.922	2.70
EVAPOTRANSPIRATION	32.789	38087.512	73.30
DRAINAGE COLLECTED FROM LAYER 2	9.2486	10743.153	20.68
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0001		
CHANGE IN WATER STORAGE	1.486	1725.782	3.32
SOIL WATER AT START OF YEAR	5.982	6948.592	
SOIL WATER AT END OF YEAR	7.468	8674.374	
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	-0.009	0.00

ANNUAL TOTALS FOR YEAR 18

INCHES	CU. FEET	PERCENT
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PRECIPITATION	56.79	65967.242	100.00
RUNOFF	2.099	2437.636	3.70
EVAPOTRANSPIRATION	35.031	40692.016	61.69
DRAINAGE COLLECTED FROM LAYER 2	19.9532	23177.643	35.14
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0002		
CHANGE IN WATER STORAGE	-0.293	-340.035	-0.52
SOIL WATER AT START OF YEAR	7.468	8674.374	
SOIL WATER AT END OF YEAR	7.175	8334.339	
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

ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	52.87	61413.785	100.00
RUNOFF	0.257	298.546	0.49
EVAPOTRANSPIRATION	35.388	41107.266	66.93
DRAINAGE COLLECTED FROM LAYER 2	15.7524	18297.932	29.79
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0002		
CHANGE IN WATER STORAGE	1.472	1710.046	2.78
SOIL WATER AT START OF YEAR	7.175	8334.339	
SOIL WATER AT END OF YEAR	8.647	10044.385	
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	-0.007	0.00

ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	59.12	68673.781	100.00
RUNOFF	0.265	308.229	0.45
EVAPOTRANSPIRATION	37.132	43132.344	62.81
DRAINAGE COLLECTED FROM LAYER 2	22.6691	26332.441	38.34
PERC./LEAKAGE THROUGH LAYER 4	0.000001	0.002	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0002		
CHANGE IN WATER STORAGE	-0.946	-1099.218	-1.60
SOIL WATER AT START OF YEAR	8.647	10044.385	
SOIL WATER AT END OF YEAR	7.701	8945.167	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.013	0.00

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	4.47 4.64	4.30 3.27	5.88 3.87	4.82 2.19	4.05 3.04	3.59 4.31
STD. DEVIATIONS	2.21 2.43	2.26 1.88	2.26 2.61	2.76 1.64	1.69 1.64	1.64 2.61
RUNOFF						
TOTALS	0.075 0.035	0.109 0.000	0.152 0.050	0.060 0.007	0.030 0.030	0.000 0.055

STD. DEVIATIONS	0.171	0.364	0.317	0.115	0.067	0.000
	0.114	0.001	0.149	0.027	0.071	0.183

EVAPOTRANSPIRATION

TOTALS	1.845	2.125	3.530	3.747	4.053	3.634
	4.039	3.178	2.520	2.566	1.533	1.421

STD. DEVIATIONS	0.228	0.295	0.461	1.028	0.878	1.649
	1.511	1.451	1.110	0.774	0.471	0.287

LATERAL DRAINAGE COLLECTED FROM LAYER 2

TOTALS	2.5453	2.1561	2.5273	1.6274	1.0225	0.2012
	0.2278	0.0898	0.5155	0.6211	0.2564	1.8776

STD. DEVIATIONS	2.1573	2.0707	1.6403	1.0007	1.2148	0.3905
	0.7344	0.3179	1.1134	0.9777	0.7482	2.2790

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 ACROSS LAYER 4

AVERAGES	0.0003	0.0003	0.0003	0.0002	0.0001	0.0000
	0.0000	0.0000	0.0001	0.0001	0.0000	0.0002

STD. DEVIATIONS	0.0003	0.0003	0.0002	0.0001	0.0001	0.0000
	0.0001	0.0000	0.0001	0.0001	0.0001	0.0003

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

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.44 (7.307)	56263.3	100.00
UNOFF	0.603 (0.5351)	699.93	1.244
EVAPOTRANSPIRATION	34.189 (2.9580)	39713.73	70.586
LATERAL DRAINAGE COLLECTED FROM LAYER 2	13.66818 (5.00032)	15876.963	28.21906

PERCOLATION/LEAKAGE THROUGH FROM LAYER 4	0.00000 (0.00000)	0.001	0.00000
AVERAGE HEAD ACROSS TOP OF LAYER 4	0.000 (0.000)		
CHANGE IN WATER STORAGE	-0.024 (1.3818)	-27.36	-0.049

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	4.71	5471.136
RUNOFF	1.177	1366.9871
DRAINAGE COLLECTED FROM LAYER 2	2.29515	2666.05029
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000000	0.00009
AVERAGE HEAD ACROSS LAYER 4	0.008	
SNOW WATER	4.62	5362.9487
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.3684
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0863

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	5.3288	0.2220
2	0.0025	0.0100
3	0.0000	0.0000
4	2.3694	0.3949
SNOW WATER	0.000	

HELP MODEL RUN B-3

Description: This model used the field-measured permeability inputs. The purpose of this model was to estimate leakage through the in-place closure cap using the updated HELP model.

Input: Composite liner with 60-mil HDPE and 3.6×10^{-5} cm/sec permeability for the clay component.

Results: Average annual percolation through the liner = .003 cubic feet.


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**
**      HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
**      HELP MODEL VERSION 3.01   (14 OCTOBER 1994)
**      DEVELOPED BY ENVIRONMENTAL LABORATORY
**      USAE WATERWAYS EXPERIMENT STATION
**      FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
**
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PRECIPITATION DATA FILE:  P:\HELP3\BONNELL.D4
TEMPERATURE DATA FILE:   P:\HELP3\BONNELL.D7
SOLAR RADIATION DATA FILE: P:\HELP3\BONNELL.D13
EVAPOTRANSPIRATION DATA:  P:\HELP3\BONNELL.D11
SOIL AND DESIGN DATA FILE: P:\HELP3\BONL-B3.D10
OUTPUT DATA FILE:         P:\HELP3\BONL-B3.OUT

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TIME: 10:12 DATE: 9/12/1995

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*****
TITLE:  BONNELL-LONG SIDESLOPE-RUN B3: 3.6E-5 LINER & 6" & 18" SOIL
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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
 COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER		0
THICKNESS	=	6.00 INCHES
POROSITY	=	0.4730 VOL/VOL
FIELD CAPACITY	=	0.2217 VOL/VOL
WILTING POINT	=	0.1043 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2014 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.15600000000000E-02 CM/SEC

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	18.00	INCHES
POROSITY	=	0.3949	VOL/VOL
FIELD CAPACITY	=	0.2797	VOL/VOL
WILTING POINT	=	0.1875	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3268	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.360000013000E-04	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.25	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	33.0000000000	CM/SEC
SLOPE	=	40.00	PERCENT
DRAINAGE LENGTH	=	42.0	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	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 5

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	6.00	INCHES
POROSITY	=	0.3949	VOL/VOL
FIELD CAPACITY	=	0.2797	VOL/VOL
WILTING POINT	=	0.1875	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3949	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.360000013000E-04	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.26	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	0.320	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	6.407	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.156	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.626	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	9.463	INCHES
TOTAL INITIAL WATER	=	9.463	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ATLANTA GEORGIA

MAXIMUM LEAF AREA INDEX	=	2.00
START OF GROWING SEASON (JULIAN DATE)	=	92
END OF GROWING SEASON (JULIAN DATE)	=	312
AVERAGE ANNUAL WIND SPEED	=	9.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	67.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	69.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.91	4.43	5.91	4.43	4.02	3.41
4.73	3.41	3.17	2.53	3.43	4.23

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
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41.90	44.90	52.50	61.80	69.30	75.80
78.60	78.20	73.00	62.20	52.00	44.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

STATION LATITUDE = 33.65 DEGREES

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.47	57464.355	100.00
RUNOFF	0.172	199.871	0.35
EVAPOTRANSPIRATION	37.778	43882.602	76.36
DRAINAGE COLLECTED FROM LAYER 3	11.5187	13380.178	23.28
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.002	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	0.001	1.703	0.00
SOIL WATER AT START OF YEAR	9.463	10992.598	
SOIL WATER AT END OF YEAR	9.465	10994.300	
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	-0.002	0.00

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	63.92	74249.484	100.00
RUNOFF	2.353	2733.279	3.68
EVAPOTRANSPIRATION	36.997	42975.207	57.88

DRAINAGE COLLECTED FROM LAYER 3	23.7727	27614.418	37.19
PERC./LEAKAGE THROUGH LAYER 5	0.000004	0.004	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0016		
CHANGE IN WATER STORAGE	0.798	926.551	1.25
SOIL WATER AT START OF YEAR	9.465	10994.300	
SOIL WATER AT END OF YEAR	10.262	11920.851	
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	0.028	0.00

ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	50.89	59113.820	100.00
RUNOFF	0.785	911.353	1.54
EVAPOTRANSPIRATION	36.408	42291.641	71.54
DRAINAGE COLLECTED FROM LAYER 3	13.1023	15219.663	25.75
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.003	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0009		
CHANGE IN WATER STORAGE	0.595	691.155	1.17
SOIL WATER AT START OF YEAR	10.262	11920.851	
SOIL WATER AT END OF YEAR	9.234	10725.987	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.624	1886.018	3.19
ANNUAL WATER BUDGET BALANCE	0.0000	0.005	0.00

ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.49	51679.598	100.00
RUNOFF	0.191	222.270	0.43
EVAPOTRANSPIRATION	34.436	40000.883	77.40
DRAINAGE COLLECTED FROM LAYER 3	12.9689	15064.631	29.15
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.002	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0009		
CHANGE IN WATER STORAGE	-3.106	-3608.216	-6.98
SOIL WATER AT START OF YEAR	9.234	10725.987	
SOIL WATER AT END OF YEAR	7.751	9003.789	
SNOW WATER AT START OF YEAR	1.624	1886.018	3.65
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.027	0.00

ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.24	57197.172	100.00
RUNOFF	0.372	431.613	0.75
EVAPOTRANSPIRATION	36.959	42931.734	75.06
DRAINAGE COLLECTED FROM LAYER 3	12.1347	14095.706	24.64
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.002	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0009		
CHANGE IN WATER STORAGE	-0.225	-261.879	-0.46
SOIL WATER AT START OF YEAR	7.751	9003.789	
SOIL WATER AT END OF YEAR	7.526	8741.910	
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

ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.50	55175.980	100.00
RUNOFF	0.039	45.182	0.08
EVAPOTRANSPIRATION	35.563	41310.352	74.87
DRAINAGE COLLECTED FROM LAYER 3	9.0084	10464.191	18.97
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.002	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0006		
CHANGE IN WATER STORAGE	2.889	3356.269	6.08
SOIL WATER AT START OF YEAR	7.526	8741.910	
SOIL WATER AT END OF YEAR	10.415	12098.180	
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	-0.016	0.00

ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	42.30	49135.684	100.00
RUNOFF	1.875	2178.288	4.43
EVAPOTRANSPIRATION	28.910	33581.953	68.35
DRAINAGE COLLECTED FROM LAYER 3	11.7523	13651.479	27.78
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.002	0.00

AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	-0.238	-276.034	-0.56
SOIL WATER AT START OF YEAR	10.415	12098.180	
SOIL WATER AT END OF YEAR	10.177	11822.146	
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

ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.92	55663.867	100.00
RUNOFF	2.321	2696.479	4.84
EVAPOTRANSPIRATION	33.550	38971.457	70.01
DRAINAGE COLLECTED FROM LAYER 3	11.4680	13321.189	23.93
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.002	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	0.581	674.719	1.21
SOIL WATER AT START OF YEAR	10.177	11822.146	
SOIL WATER AT END OF YEAR	10.758	12496.865	
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	0.022	0.00

ANNUAL TOTALS FOR YEAR 9

INCHES	CU. FEET	PERCENT
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PRECIPITATION	56.49	65618.766	100.00
RUNOFF	0.592	688.065	1.05
EVAPOTRANSPIRATION	35.112	40786.133	62.16
DRAINAGE COLLECTED FROM LAYER 3	21.5568	25040.426	38.16
PERC./LEAKAGE THROUGH LAYER 5	0.000003	0.004	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0014		
CHANGE IN WATER STORAGE	-0.771	-895.834	-1.37
SOIL WATER AT START OF YEAR	10.758	12496.865	
SOIL WATER AT END OF YEAR	9.987	11601.031	
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	-0.027	0.00

ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	45.21	52515.930	100.00
RUNOFF	0.834	968.450	1.84
EVAPOTRANSPIRATION	34.585	40173.445	76.50
DRAINAGE COLLECTED FROM LAYER 3	11.2991	13125.064	24.99
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.002	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	-1.507	-1751.016	-3.33
SOIL WATER AT START OF YEAR	9.987	11601.031	
SOIL WATER AT END OF YEAR	8.480	9850.015	
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	-0.017	0.00

ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	37.37	43408.988	100.00
RUNOFF	0.041	48.129	0.11
EVAPOTRANSPIRATION	29.699	34497.871	79.47
DRAINAGE COLLECTED FROM LAYER 3	8.0295	9327.085	21.49
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.002	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0006		
CHANGE IN WATER STORAGE	-0.400	-464.117	-1.07
SOIL WATER AT START OF YEAR	8.480	9850.015	
SOIL WATER AT END OF YEAR	8.080	9385.898	
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	0.017	0.00

ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	43.59	50634.148	100.00
RUNOFF	1.712	1989.178	3.93
EVAPOTRANSPIRATION	29.823	34642.480	68.42
DRAINAGE COLLECTED FROM LAYER 3	11.4584	13310.058	26.29
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.002	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	0.596	692.441	1.37
SOIL WATER AT START OF YEAR	8.080	9385.898	

SOIL WATER AT END OF YEAR	8.676	10078.339	
NOW 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	-0.011	0.00

ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.38	51551.809	100.00
RUNOFF	1.522	1768.044	3.43
EVAPOTRANSPIRATION	26.900	31247.373	60.61
DRAINAGE COLLECTED FROM LAYER 3	15.2031	17659.869	34.26
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.003	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0010		
CHANGE IN WATER STORAGE	0.755	876.513	1.70
SOIL WATER AT START OF YEAR	8.676	10078.339	
SOIL WATER AT END OF YEAR	9.431	10954.852	
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	0.006	0.00

ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.41	56233.047	100.00
RUNOFF	1.884	2187.978	3.89
EVAPOTRANSPIRATION	34.862	40495.320	72.01

DRAINAGE COLLECTED FROM LAYER 3	12.3111	14300.629	25.43
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.002	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0009		
CHANGE IN WATER STORAGE	-0.646	-750.857	-1.34
SOIL WATER AT START OF YEAR	9.431	10954.852	
SOIL WATER AT END OF YEAR	8.784	10203.995	
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	-0.028	0.00

ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.37	59671.391	100.00
RUNOFF	1.166	1354.112	2.27
EVAPOTRANSPIRATION	34.167	39688.004	66.51
DRAINAGE COLLECTED FROM LAYER 3	15.0858	17523.707	29.37
PERC./LEAKAGE THROUGH LAYER 5	0.000003	0.003	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0010		
CHANGE IN WATER STORAGE	0.952	1105.575	1.85
SOIL WATER AT START OF YEAR	8.784	10203.995	
SOIL WATER AT END OF YEAR	9.736	11309.570	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.013	0.00

ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.66	37937.855	100.00
RUNOFF	0.018	20.779	0.05
EVAPOTRANSPIRATION	27.890	32396.895	85.39
DRAINAGE COLLECTED FROM LAYER 3	6.8159	7917.299	20.87
PERC./LEAKAGE THROUGH LAYER 5	0.000001	0.001	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0005		
CHANGE IN WATER STORAGE	-2.064	-2397.123	-6.32
SOIL WATER AT START OF YEAR	9.736	11309.570	
SOIL WATER AT END OF YEAR	7.673	8912.447	
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		

ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.73	51958.363	100.00
RUNOFF	2.245	2607.420	5.02
EVAPOTRANSPIRATION	31.820	36962.391	71.14
DRAINAGE COLLECTED FROM LAYER 3	9.0599	10524.002	20.25
PERC./LEAKAGE THROUGH LAYER 5	0.000002	0.002	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0006		
CHANGE IN WATER STORAGE	1.605	1864.554	3.59
SOIL WATER AT START OF YEAR	7.673	8912.447	
SOIL WATER AT END OF YEAR	9.278	10777.001	
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

ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	56.79	65967.242	100.00
RUNOFF	4.780	5552.894	8.42
EVAPOTRANSPIRATION	33.341	38728.562	58.71
DRAINAGE COLLECTED FROM LAYER 3	19.3048	22424.477	33.99
PERC./LEAKAGE THROUGH LAYER 5	0.000003	0.004	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0013		
CHANGE IN WATER STORAGE	-0.636	-738.664	-1.12
SOIL WATER AT START OF YEAR	9.278	10777.001	
SOIL WATER AT END OF YEAR	8.642	10038.337	
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	-0.032	0.00

ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	52.87	61413.785	100.00
RUNOFF	0.414	481.385	0.78
EVAPOTRANSPIRATION	35.063	40728.715	66.32
DRAINAGE COLLECTED FROM LAYER 3	16.1787	18793.146	30.60
PERC./LEAKAGE THROUGH LAYER 5	0.000003	0.003	0.00

AVG. HEAD ON TOP OF LAYER 5	0.0011		
CHANGE IN WATER STORAGE	1.214	1410.562	2.30
SOIL WATER AT START OF YEAR	8.642	10038.337	
SOIL WATER AT END OF YEAR	9.856	11448.898	
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	-0.026	0.00

ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	59.12	68673.781	100.00
RUNOFF	0.555	645.109	0.94
EVAPOTRANSPIRATION	36.655	42577.887	62.00
DRAINAGE COLLECTED FROM LAYER 3	22.6543	26315.273	38.32
PERC./LEAKAGE THROUGH LAYER 5	0.000004	0.004	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0016		
CHANGE IN WATER STORAGE	-0.744	-864.478	-1.26
SOIL WATER AT START OF YEAR	9.856	11448.898	
SOIL WATER AT--END OF YEAR	9.112	10584.421	
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	-0.010	0.00

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

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

TOTALS	4.47 4.64	4.30 3.27	5.88 3.87	4.82 2.19	4.05 3.04	3.59 4.31
STD. DEVIATIONS	2.21 2.43	2.26 1.88	2.26 2.61	2.76 1.64	1.69 1.64	1.64 2.61
RUNOFF						

TOTALS	0.159 0.042	0.254 0.001	0.288 0.088	0.150 0.008	0.043 0.032	0.000 0.129
STD. DEVIATIONS	0.375 0.139	0.923 0.002	0.609 0.265	0.334 0.028	0.088 0.071	0.001 0.405
EVAPOTRANSPIRATION						

TOTALS	1.674 4.062	2.006 3.153	3.333 2.448	3.649 2.598	4.210 1.489	3.598 1.308
STD. DEVIATIONS	0.285 1.496	0.321 1.426	0.386 1.032	0.943 0.755	0.867 0.490	1.701 0.277
LATERAL DRAINAGE COLLECTED FROM LAYER 3						

TOTALS	2.6201 0.2000	2.0966 0.0746	2.5401 0.5153	1.6065 0.6792	1.0744 0.2813	0.1405 1.9056
STD. DEVIATIONS	2.0532 0.6817	1.6948 0.2712	1.6043 1.0996	1.0636 0.9649	1.1734 0.7701	0.3084 2.1895
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 ACROSS LAYER 5

AVERAGES	0.0021 0.0002	0.0019 0.0001	0.0020 0.0004	0.0013 0.0005	0.0009 0.0002	0.0001 0.0015
STD. DEVIATIONS	0.0016 0.0006	0.0016 0.0002	0.0013 0.0009	0.0009 0.0008	0.0010 0.0007	0.0003 0.0017

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	48.44	(7.307)	56263.3	100.00
RUNOFF	1.194	(1.1775)	1386.49	2.464
EVAPOTRANSPIRATION	33.526	(3.2562)	38943.54	69.217
LATERAL DRAINAGE COLLECTED FROM LAYER 3	13.73418	(4.80002)	15953.625	28.35532
PERCOLATION/LEAKAGE THROUGH FROM LAYER 5	0.00000	(0.00000)	0.003	0.00000
AVERAGE HEAD ACROSS TOP OF LAYER 5	0.001	(0.000)		
CHANGE IN WATER STORAGE	-0.018	(1.3371)	-20.41	-0.036

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	4.71	5471.136
RUNOFF	2.830	3287.6873
DRAINAGE COLLECTED FROM LAYER 3	1.22455	1422.43384
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000000	0.00018
AVERAGE HEAD ACROSS LAYER 5	0.030	
SNOW WATER	4.62	5362.9487
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.4128
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.1518

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.0671	0.1778
2	5.6712	0.3151
3	0.0042	0.0169
4	0.0000	0.0000
5	2.3694	0.3949

SNOW WATER 0.000

HELP MODEL RUN C-1

Description: This model used the same input from the Closure Plan. The purpose of this model was to estimate leakage through the approved closure cap using the updated HELP model.

Input: Composite liner with 3.2×10^{-6} cm/sec permeability for the clay component and a 40-mil HDPE component.

Results: Average annual percolation through the liner = .144 cubic feet.

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HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 3.01 (14 OCTOBER 1994)
DEVELOPED BY ENVIRONMENTAL LABORATORY
USAE WATERWAYS EXPERIMENT STATION
FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
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PRECIPITATION DATA FILE: P:\HELP3\BONNELL.D4
TEMPERATURE DATA FILE: P:\HELP3\BONNELL.D7
SOLAR RADIATION DATA FILE: P:\HELP3\BONNELL.D13
EVAPOTRANSPIRATION DATA: P:\HELP3\BONNELL.D11
SOIL AND DESIGN DATA FILE: P:\HELP3\BONL-C1.D10
OUTPUT DATA FILE: P:\HELP3\BONL-C1.OUT

```

TIME: 11:35 DATE: 9/12/1995

TITLE: BONNELL-TOP AREA-RUN C1:

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

LAYER 1

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TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 0
THICKNESS = 24.00 INCHES
POROSITY = 0.4730 VOL/VOL
FIELD CAPACITY = 0.2217 VOL/VOL
WILTING POINT = 0.1043 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2417 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.156000000000E-02 CM/SEC

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LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.25	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0198	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	33.0000000000	CM/SEC
SLOPE	=	4.00	PERCENT
DRAINAGE LENGTH	=	220.0	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	=	3.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	3.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 4

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	6.00	INCHES
POROSITY	=	0.3949	VOL/VOL
FIELD CAPACITY	=	0.2797	VOL/VOL
WILTING POINT	=	0.1875	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3949	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.320000004000E-05	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.26	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.530	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	5.251	INCHES

UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.406	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.295	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	8.174	INCHES
TOTAL INITIAL WATER	=	8.174	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ATLANTA GEORGIA

MAXIMUM LEAF AREA INDEX	=	2.00
START OF GROWING SEASON (JULIAN DATE)	=	92
END OF GROWING SEASON (JULIAN DATE)	=	312
AVERAGE ANNUAL WIND SPEED	=	9.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	67.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	69.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.91	4.43	5.91	4.43	4.02	3.41
4.73	3.41	3.17	2.53	3.43	4.23

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
41.90	44.90	52.50	61.80	69.30	75.80
78.60	78.20	73.00	62.20	52.00	44.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

STATION LATITUDE = 33.65 DEGREES

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.47	274751.469	100.00
RUNOFF	0.063	348.965	0.13
EVAPOTRANSPIRATION	37.940	210715.625	76.69
DRAINAGE COLLECTED FROM LAYER 2	11.4653	63677.402	23.18
PERC./LEAKAGE THROUGH LAYER 4	0.000023	0.126	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0009		
CHANGE IN WATER STORAGE	0.002	9.380	0.00
SOIL WATER AT START OF YEAR	8.174	45398.762	
SOIL WATER AT END OF YEAR	8.176	45408.145	
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	-0.050	0.00

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	63.92	355005.344	100.00
RUNOFF	1.120	6221.147	1.75
EVAPOTRANSPIRATION	37.480	208162.422	58.64
DRAINAGE COLLECTED FROM LAYER 2	24.4847	135985.844	38.31
PERC./LEAKAGE THROUGH LAYER 4	0.000044	0.243	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0020		
CHANGE IN WATER STORAGE	0.835	4635.621	1.31
SOIL WATER AT START OF YEAR	8.176	45408.145	
SOIL WATER AT END OF YEAR	9.011	50043.766	
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	0.068	0.00

ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	50.89	282637.969	100.00
RUNOFF	0.601	3335.935	1.18
EVAPOTRANSPIRATION	36.686	203749.453	72.09
DRAINAGE COLLECTED FROM LAYER 2	13.4409	74649.242	26.41
PERC./LEAKAGE THROUGH LAYER 4	0.000026	0.146	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0011		
CHANGE IN WATER STORAGE	0.163	903.199	0.32
SOIL WATER AT START OF YEAR	9.011	50043.766	
SOIL WATER AT END OF YEAR	7.550	41929.437	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.624	9017.525	3.19
ANNUAL WATER BUDGET BALANCE	0.0000	-0.025	0.00

ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.49	247093.078	100.00
RUNOFF	0.098	542.285	0.22
VAPOTRANSPIRATION	35.023	194516.469	78.72
DRAINAGE COLLECTED FROM LAYER - 2	12.3510	68595.977	27.76
PERC./LEAKAGE THROUGH LAYER 4	0.000024	0.135	0.00

AVG. HEAD ON TOP OF LAYER . 4	0.0010		
CHANGE IN WATER STORAGE	-2.982	-16561.789	-6.70
SOIL WATER AT START OF YEAR	7.550	41929.437	
SOIL WATER AT END OF YEAR	6.191	34385.176	
SNOW WATER AT START OF YEAR	1.624	9017.525	3.65
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.001	0.00

ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.24	273473.969	100.00
RUNOFF	0.195	1080.817	0.40
EVAPOTRANSPIRATION	36.781	204277.344	74.70
DRAINAGE COLLECTED FROM LAYER 2	12.3444	68559.641	25.07
PERC./LEAKAGE THROUGH LAYER 4	0.000024	0.134	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0010		
CHANGE IN WATER STORAGE	-0.080	-443.933	-0.16
SOIL WATER AT START OF YEAR	6.191	34385.176	
SOIL WATER AT END OF YEAR	6.111	33941.242	
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	-0.032	0.00

ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
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PRECIPITATION	47.50	263810.156	100.00
RUNOFF	0.024	133.340	0.05
EVAPOTRANSPIRATION	36.571	203110.109	76.99
DRAINAGE COLLECTED FROM LAYER 2	7.8407	43546.578	16.51
PERC./LEAKAGE THROUGH LAYER 4	0.000016	0.089	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0006		
CHANGE IN WATER STORAGE	3.065	17020.061	6.45
SOIL WATER AT START OF YEAR	6.111	33941.242	
SOIL WATER AT END OF YEAR	9.176	50961.301	
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	-0.029	0.00

ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	42.30	234929.984	100.00
RUNOFF	1.004	5574.952	2.37
EVAPOTRANSPIRATION	29.931	166233.094	70.76
DRAINAGE COLLECTED FROM LAYER 2	11.7633	65331.988	27.81
PERC./LEAKAGE THROUGH LAYER 4	0.000023	0.128	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0009		
CHANGE IN WATER STORAGE	-0.398	-2210.239	-0.94
SOIL WATER AT START OF YEAR	9.176	50961.301	
SOIL WATER AT END OF YEAR	8.778	48751.062	
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	0.054	0.00

ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.92	266142.875	100.00
RUNOFF	0.957	5313.667	2.00
EVAPOTRANSPIRATION	34.063	189183.437	71.08
DRAINAGE COLLECTED FROM LAYER 2	12.2018	67767.469	25.46
PERC./LEAKAGE THROUGH LAYER 4	0.000023	0.127	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0010		
CHANGE IN WATER STORAGE	0.698	3878.179	1.46
SOIL WATER AT START OF YEAR	8.778	48751.062	
SOIL WATER AT END OF YEAR	9.476	52629.242	
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	-0.011	0.00

ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	56.49	313739.719	100.00
RUNOFF	0.291	1614.402	0.51
EVAPOTRANSPIRATION	35.722	198397.719	63.24
DRAINAGE COLLECTED FROM LAYER 2	21.3635	118650.945	37.82
PERC./LEAKAGE THROUGH LAYER 4	0.000039	0.214	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0017		
CHANGE IN WATER STORAGE	-0.886	-4923.444	-1.57
SOIL WATER AT START OF YEAR	9.476	52629.242	

SOIL WATER AT END OF YEAR	8.590	47705.797	
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	-0.113	0.00

ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	45.21	251091.781	100.00
RUNOFF	0.570	3163.476	1.26
EVAPOTRANSPIRATION	35.018	194486.547	77.46
DRAINAGE COLLECTED FROM LAYER 2	11.2871	62687.258	24.97
PERC./LEAKAGE THROUGH LAYER 4	0.000022	0.122	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0009		
CHANGE IN WATER STORAGE	-1.665	-9245.526	-3.68
SOIL WATER AT START OF YEAR	8.590	47705.797	
SOIL WATER AT END OF YEAR	6.925	38460.270	
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	-0.102	0.00

ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	37.37	207549.234	100.00
RUNOFF	0.005	27.929	0.01
EVAPOTRANSPIRATION	30.799	171054.375	82.42

DRAINAGE COLLECTED FROM LAYER 2	6.9039	38343.836	18.47
PERC./LEAKAGE THROUGH LAYER 4	0.000014	0.078	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0006		
CHANGE IN WATER STORAGE	-0.338	-1876.934	-0.90
SOIL WATER AT START OF YEAR	6.925	38460.270	
SOIL WATER AT END OF YEAR	6.587	36583.336	
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	-0.059	0.00

ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	43.59	242094.516	100.00
RUNOFF	0.737	4093.888	1.69
EVAPOTRANSPIRATION	30.893	171575.969	70.87
DRAINAGE COLLECTED FROM LAYER 2	11.1975	62189.859	25.69
PERC./LEAKAGE THROUGH LAYER 4	0.000021	0.119	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0009		
CHANGE IN WATER STORAGE	0.762	4234.702	1.75
SOIL WATER AT START OF YEAR	6.587	36583.336	
SOIL WATER AT END OF YEAR	7.349	40818.039	
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	-0.020	0.00

ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.38	246482.078	100.00
RUNOFF	0.801	4450.445	1.81
EVAPOTRANSPIRATION	28.875	160368.297	65.06
DRAINAGE COLLECTED FROM LAYER 2	14.0980	78298.945	31.77
PERC./LEAKAGE THROUGH LAYER 4	0.000026	0.144	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0011		
CHANGE IN WATER STORAGE	0.606	3364.254	1.36
SOIL WATER AT START OF YEAR	7.349	40818.039	
SOIL WATER AT END OF YEAR	7.955	44182.293	
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	-0.006	0.00

ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.41	268864.250	100.00
RUNOFF	0.858	4764.001	1.77
EVAPOTRANSPIRATION	34.999	194382.375	72.30
DRAINAGE COLLECTED FROM LAYER 2	13.1385	72969.797	27.14
PERC./LEAKAGE THROUGH LAYER 4	0.000025	0.139	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0011		
CHANGE IN WATER STORAGE	-0.586	-3251.998	-1.21
SOIL WATER AT START OF YEAR	7.955	44182.293	
SOIL WATER AT END OF YEAR	7.370	40930.297	
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

ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.37	285303.844	100.00
RUNOFF	0.885	4916.623	1.72
EVAPOTRANSPIRATION	34.524	191742.312	67.21
DRAINAGE COLLECTED FROM LAYER 2	15.0125	83377.883	29.22
PERC./LEAKAGE THROUGH LAYER 4	0.000030	0.165	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0012		
CHANGE IN WATER STORAGE	0.948	5266.990	1.85
SOIL WATER AT START OF YEAR	7.370	40930.297	
SOIL WATER AT END OF YEAR	8.318	46197.285	
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	-0.152	0.00

ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.66	181390.375	100.00
RUNOFF	0.016	89.750	0.05
EVAPOTRANSPIRATION	28.131	156234.312	86.13
DRAINAGE COLLECTED FROM LAYER 2	6.8493	38040.582	20.97
PERC./LEAKAGE THROUGH LAYER 4	0.000014	0.079	0.00

AVG. HEAD ON TOP OF LAYER 4	0.0006		
CHANGE IN WATER STORAGE	-2.336	-12974.331	-7.15
SOIL WATER AT START OF YEAR	8.318	46197.285	
SOIL WATER AT END OF YEAR	5.982	33222.953	
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	-0.036	0.00

ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.73	248425.922	100.00
RUNOFF	1.207	6702.938	2.70
EVAPOTRANSPIRATION	32.789	182105.922	73.30
DRAINAGE COLLECTED FROM LAYER 2	9.2486	51365.617	20.68
PERC./LEAKAGE THROUGH LAYER 4	0.000018	0.099	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0008		
CHANGE IN WATER STORAGE.	1.486	8251.397	3.32
SOIL WATER AT START OF YEAR	5.982	33222.953	
SOIL WATER AT END OF YEAR	7.468	41474.352	
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	-0.056	0.00

ANNUAL TOTALS FOR YEAR 18

INCHES	CU. FEET	PERCENT
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PRECIPITATION	56.79	315405.875	100.00
RUNOFF	2.099	11654.948	3.70
EVAPOTRANSPIRATION	35.031	194558.687	61.69
DRAINAGE COLLECTED FROM LAYER 2	19.9527	110815.445	35.13
PERC./LEAKAGE THROUGH LAYER 4	0.000036	0.200	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0017		
CHANGE IN WATER STORAGE	-0.292	-1623.364	-0.51
SOIL WATER AT START OF YEAR	7.468	41474.352	
SOIL WATER AT END OF YEAR	7.175	39850.988	
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	-0.055	0.00

ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	52.87	293634.656	100.00
RUNOFF	0.257	1427.424	0.49
EVAPOTRANSPIRATION	35.388	196544.125	66.93
DRAINAGE COLLECTED FROM LAYER 2	15.7496	87471.664	29.79
PERC./LEAKAGE THROUGH LAYER 4	0.000030	0.169	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0013		
CHANGE IN WATER STORAGE	1.475	8191.324	2.79
SOIL WATER AT START OF YEAR	7.175	39850.988	
SOIL WATER AT END OF YEAR	8.650	48042.312	
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	-0.047	0.00

ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	59.12	328346.531	100.00
RUNOFF	0.265	1473.719	0.45
EVAPOTRANSPIRATION	37.132	206226.516	62.81
DRAINAGE COLLECTED FROM LAYER 2	22.6715	125914.969	38.35
PERC./LEAKAGE THROUGH LAYER 4	0.000041	0.229	0.00
AVG. HEAD ON TOP OF LAYER 4	0.0018		
CHANGE IN WATER STORAGE	-0.949	-5268.841	-1.60
SOIL WATER AT START OF YEAR	8.650	48042.312	
SOIL WATER AT END OF YEAR	7.702	42773.473	
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	-0.065	0.00

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	4.47 4.64	4.30 3.27	5.88 3.87	4.82 2.19	4.05 3.04	3.59 4.31
STD. DEVIATIONS	2.21 2.43	2.26 1.88	2.26 2.61	2.76 1.64	1.69 1.64	1.64 2.61
RUNOFF						
TOTALS	0.075 0.035	0.109 0.000	0.152 0.050	0.060 0.007	0.030 0.030	0.000 0.055

STD. DEVIATIONS	0.171	0.364	0.317	0.115	0.067	0.000
	0.114	0.001	0.149	0.027	0.071	0.183

EVAPOTRANSPIRATION

TOTALS	1.845	2.125	3.530	3.747	4.053	3.634
	4.039	3.178	2.520	2.566	1.533	1.421

STD. DEVIATIONS	0.228	0.295	0.461	1.028	0.878	1.649
	1.511	1.451	1.110	0.774	0.471	0.287

LATERAL DRAINAGE COLLECTED FROM LAYER 2

TOTALS	2.5453	2.1565	2.5276	1.6267	1.0230	0.2018
	0.2278	0.0900	0.5150	0.6215	0.2563	1.8768

STD. DEVIATIONS	2.1575	2.0708	1.6399	1.0001	1.2152	0.3919
	0.7345	0.3183	1.1128	0.9773	0.7479	2.2786

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 ACROSS LAYER 4

AVERAGES	0.0024	0.0023	0.0024	0.0016	0.0010	0.0002
	0.0002	0.0001	0.0005	0.0006	0.0003	0.0018

STD. DEVIATIONS	0.0020	0.0022	0.0016	0.0010	0.0012	0.0004
	0.0007	0.0003	0.0011	0.0009	0.0007	0.0022

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

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.44 (7.307)	269008.7	100.00
UNOFF	0.603 (0.5351)	3346.53	1.244
EVAPOTRANSPIRATION	34.189 (2.9580)	189881.27	70.586
LATERAL DRAINAGE COLLECTED FROM LAYER 2	13.66824 (5.00034)	75912.047	28.21918

PERCOLATION/LEAKAGE THROUGH FROM LAYER 4	0.00003 (0.00001)	0.144	0.00005
AVERAGE HEAD ACROSS TOP OF LAYER 4	0.001 (0.000)		
CHANGE IN WATER STORAGE	-0.024 (1.3829)	-131.26	-0.049

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	4.71	26158.869
RUNOFF	1.177	6535.9067
DRAINAGE COLLECTED FROM LAYER 2	2.32203	12896.31640
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000003	0.01792
AVERAGE HEAD ACROSS LAYER 4	0.068	
SNOW WATER	4.62	25641.5977
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.3684
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0863

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	5.3288	0.2220
2	0.0033	0.0132
3	0.0000	0.0000
4	2.3694	0.3949
SNOW WATER	0.000	

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HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 3.01 (14 OCTOBER 1994)
DEVELOPED BY ENVIRONMENTAL LABORATORY
USAE WATERWAYS EXPERIMENT STATION
FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
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PRECIPITATION DATA FILE: C:\HELP3\BONNELL.D4
TEMPERATURE DATA FILE: C:\HELP3\BONNELL.D7
SOLAR RADIATION DATA FILE: C:\HELP3\BONNELL.D13
EVAPOTRANSPIRATION DATA: C:\HELP3\BONNELL.D11
SOIL AND DESIGN DATA FILE: C:\HELP3\BONL-C1.D10
OUTPUT DATA FILE: C:\HELP3\BONL-C1.OUT

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TIME: 21:17 DATE: 9/11/1995

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*****
TITLE: BONNELL-TOP AREA-RUN C1: 3.6E-5 LINER & 6" & 18" SOIL
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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 7

THICKNESS	=	6.00	INCHES
POROSITY	=	0.4730	VOL/VOL
FIELD CAPACITY	=	0.2220	VOL/VOL
WILTING POINT	=	0.1040	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2008	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.520000001000E-03	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 3.00
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	18.00	INCHES
POROSITY	=	0.4730	VOL/VOL
FIELD CAPACITY	=	0.2220	VOL/VOL
WILTING POINT	=	0.1040	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4224	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.939999973000E-05	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	0.22	INCHES
POROSITY	=	0.8200	VOL/VOL
FIELD CAPACITY	=	0.0500	VOL/VOL
WILTING POINT	=	0.0200	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2029	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	18.0000000000	CM/SEC
SLOPE	=	4.00	PERCENT
DRAINAGE LENGTH	=	220.0	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	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3	GOOD

LAYER 5

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	6.00	INCHES
POROSITY	=	0.3949	VOL/VOL
FIELD CAPACITY	=	0.2797	VOL/VOL
WILTING POINT	=	0.1875	VOL/VOL

INITIAL SOIL WATER CONTENT . = 0.3949 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.939999973000E-05 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.26	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.060	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	7.894	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.406	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.288	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	11.221	INCHES
TOTAL INITIAL WATER	=	11.221	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ATLANTA GEORGIA

MAXIMUM LEAF AREA INDEX	=	2.00
START OF GROWING SEASON (JULIAN DATE)	=	92
END OF GROWING SEASON (JULIAN DATE)	=	312
AVERAGE ANNUAL WIND SPEED	=	9.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	67.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	69.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.91	4.43	5.91	4.43	4.02	3.41
4.73	3.41	3.17	2.53	3.43	4.23

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
41.90	44.90	52.50	61.80	69.30	75.80
78.60	78.20	73.00	62.20	52.00	44.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

STATION LATITUDE = 33.65 DEGREES

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	4.47 4.64	4.30 3.27	5.88 3.87	4.82 2.19	4.05 3.04	3.59 4.31
STD. DEVIATIONS	2.21 2.43	2.26 1.88	2.26 2.61	2.76 1.64	1.69 1.64	1.64 2.61
RUNOFF						
TOTALS	0.297 0.056	0.368 0.001	0.375 0.167	0.252 0.030	0.100 0.055	0.000 0.289
STD. DEVIATIONS	0.720 0.202	1.168 0.002	0.751 0.435	0.491 0.089	0.232 0.140	0.000 0.803
EVAPOTRANSPIRATION						
TOTALS	1.767 3.978	2.058 3.139	3.421 2.391	3.671 2.827	4.381 1.564	4.392 1.337
STD. DEVIATIONS	0.230 1.491	0.308 1.382	0.442 1.016	0.952 0.810	0.755 0.436	1.661 0.249
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	1.9279 0.2201	1.5501 0.1492	2.0747 0.2483	1.3003 0.5394	1.3218 0.2415	1.0879 0.9749
STD. DEVIATIONS	1.6758 0.3390	1.3413 0.2230	1.2763 0.4585	0.8399 0.6652	1.0861 0.2686	0.5643 1.3960
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 ACROSS LAYER 5

AVERAGES	0.0050	0.0045	0.0054	0.0035	0.0035	0.0029
	0.0006	0.0004	0.0007	0.0014	0.0007	0.0025
STD. DEVIATIONS	0.0043	0.0038	0.0033	0.0023	0.0028	0.0015
	0.0009	0.0006	0.0012	0.0018	0.0007	0.0036

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	48.44	(7.307)	186372.0	100.00
RUNOFF	1.990	(1.8635)	7658.15	4.109
EVAPOTRANSPIRATION	34.926	(3.1355)	134387.97	72.107
LATERAL DRAINAGE COLLECTED FROM LAYER 3	11.63617	(4.34889)	44773.645	24.02380
PERCOLATION/LEAKAGE THROUGH FROM LAYER 5	0.00005	(0.00002)	0.202	0.00011
AVERAGE HEAD ACROSS TOP OF LAYER 5	0.003	(0.001)		
CHANGE IN WATER STORAGE	-0.116	(2.1663)	-447.93	-0.240

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	4.71	18123.137
RUNOFF	2.859	11000.4961
DRAINAGE COLLECTED FROM LAYER 3	0.33023	1270.66882
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000001	0.00518
AVERAGE HEAD ACROSS LAYER 5	0.026	
SNOW WATER	4.62	17764.7676
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.4688
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0945

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.1385	0.1898
2	5.3743	0.2986
3	0.0110	0.0500
4	0.0000	0.0000
5	2.3694	0.3949
SNOW WATER	0.000	

HELP MODEL RUN C-2

Description: This model used the field-measured permeability inputs. The purpose of this model was to estimate leakage through the in-place closure cap using the updated HELP model.

Input: Composite liner with 60-mil HDPE and 9.4×10^{-6} cm/sec permeability for the clay component.

Results: Average annual percolation through the liner = .163 cubic feet.

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**
**      HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
**      HELP MODEL VERSION 3.01      (14 OCTOBER 1994)
**      DEVELOPED BY ENVIRONMENTAL LABORATORY
**      USAE WATERWAYS EXPERIMENT STATION
**      FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
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PRECIPITATION DATA FILE:  P:\HELP3\BONNELL.D4
TEMPERATURE DATA FILE:   P:\HELP3\BONNELL.D7
SOLAR RADIATION DATA FILE: P:\HELP3\BONNELL.D13
EVAPOTRANSPIRATION DATA:  P:\HELP3\BONNELL.D11
SOIL AND DESIGN DATA FILE: P:\HELP3\BONL-C2.D10
OUTPUT DATA FILE:         P:\HELP3\BONL-C2.OUT

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TIME: 11:27 DATE: 9/12/1995

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*****
TITLE:  BONNELL-TOP AREA-RUN C2:
*****

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

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER MATERIAL TEXTURE NUMBER 0

THICKNESS	=	6.00	INCHES
POROSITY	=	0.4730	VOL/VOL
FIELD CAPACITY	=	0.2217	VOL/VOL
WILTING POINT	=	0.1043	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2080	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.156000000000E-02	CM/SEC

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	18.00	INCHES
POROSITY	=	0.3949	VOL/VOL
FIELD CAPACITY	=	0.2797	VOL/VOL
WILTING POINT	=	0.1875	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3581	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.939999973000E-05	CM/SEC

LAYER 3

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 34

THICKNESS	=	0.25	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0840	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	33.0000000000	CM/SEC
SLOPE	=	4.00	PERCENT
DRAINAGE LENGTH	=	220.0	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	=	2.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	2.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 5

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	6.00	INCHES
POROSITY	=	0.3949	VOL/VOL
FIELD CAPACITY	=	0.2797	VOL/VOL
WILTING POINT	=	0.1875	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3949	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.939999973000E-05	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.26	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.530	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	6.945	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.156	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.626	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	10.085	INCHES
TOTAL INITIAL WATER	=	10.085	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ATLANTA GEORGIA

MAXIMUM LEAF AREA INDEX	=	2.00
START OF GROWING SEASON (JULIAN DATE)	=	92
END OF GROWING SEASON (JULIAN DATE)	=	312
AVERAGE ANNUAL WIND SPEED	=	9.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	67.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	69.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.91	4.43	5.91	4.43	4.02	3.41
4.73	3.41	3.17	2.53	3.43	4.23

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
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41.90	44.90	52.50	61.80	69.30	75.80
78.60	78.20	73.00	62.20	52.00	44.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

STATION LATITUDE = 33.65 DEGREES

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.47	274751.469	100.00
RUNOFF	0.797	4428.761	1.61
EVAPOTRANSPIRATION	37.914	210571.500	76.64
DRAINAGE COLLECTED FROM LAYER 3	10.7542	59727.812	21.74
PERC./LEAKAGE THROUGH LAYER 5	0.000026	0.146	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0022		
CHANGE IN WATER STORAGE	0.004	23.146	0.01
SOIL WATER AT START OF YEAR	10.085	56008.871	
SOIL WATER AT END OF YEAR	10.089	56032.020	
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	0.088	0.00

ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	63.92	355005.344	100.00
RUNOFF	7.611	42269.984	11.91
EVAPOTRANSPIRATION	37.424	207847.094	58.55

DRAINAGE COLLECTED FROM LAYER 3	18.0618	100313.305	28.26
PERC./LEAKAGE THROUGH LAYER 5	0.000043	0.237	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0037		
CHANGE IN WATER STORAGE	0.824	4574.646	1.29
SOIL WATER AT START OF YEAR	10.089	56032.020	
SOIL WATER AT END OF YEAR	10.912	60606.664	
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	0.092	0.00

ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	50.89	282637.969	100.00
RUNOFF	1.439	7993.235	2.83
EVAPOTRANSPIRATION	36.956	205249.187	72.62
DRAINAGE COLLECTED FROM LAYER 3	12.4903	69369.937	24.54
PERC./LEAKAGE THROUGH LAYER 5	0.000030	0.169	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0026		
CHANGE IN WATER STORAGE	0.005	25.579	0.01
SOIL WATER AT START OF YEAR	10.912	60606.664	
SOIL WATER AT END OF YEAR	9.293	51614.719	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.624	9017.525	3.19
ANNUAL WATER BUDGET BALANCE	0.0000	-0.146	0.00

ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.49	247093.078	100.00
RUNOFF	0.478	2654.850	1.07
EVAPOTRANSPIRATION	34.168	189767.375	76.80
DRAINAGE COLLECTED FROM LAYER 3	12.6116	70043.656	28.35
PERC./LEAKAGE THROUGH LAYER 5	0.000030	0.167	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0026		
CHANGE IN WATER STORAGE	-2.768	-15373.084	-6.22
SOIL WATER AT START OF YEAR	9.293	51614.719	
SOIL WATER AT END OF YEAR	8.149	45259.160	
SNOW WATER AT START OF YEAR	1.624	9017.525	3.65
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.103	0.00

ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.24	273473.969	100.00
RUNOFF	0.877	4872.363	1.78
EVAPOTRANSPIRATION	36.927	205086.281	74.99
DRAINAGE COLLECTED FROM LAYER 3	11.8315	65710.727	24.03
PERC./LEAKAGE THROUGH LAYER 5	0.000028	0.156	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0025		
CHANGE IN WATER STORAGE	-0.395	-2195.528	-0.80
OIL WATER AT START OF YEAR	8.149	45259.160	
SOIL WATER AT END OF YEAR	7.754	43063.633	
SNOW WATER AT START OF YEAR	0.0	0.000	0.00

SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.026	0.00

ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.50	263810.156	100.00
RUNOFF	0.167	927.345	0.35
EVAPOTRANSPIRATION	36.331	201778.625	76.49
DRAINAGE COLLECTED FROM LAYER 3	7.7109	42825.727	16.23
PERC./LEAKAGE THROUGH LAYER 5	0.000019	0.106	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0016		
CHANGE IN WATER STORAGE	3.291	18278.477	6.93
OIL WATER AT START OF YEAR	7.754	43063.633	
SOIL WATER AT END OF YEAR	11.045	61342.109	
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	-0.133	0.00

ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	42.30	234929.984	100.00
RUNOFF	3.056	16972.238	7.22
VAPOTRANSPIRATION	28.876	160372.344	68.26
DRAINAGE COLLECTED FROM LAYER 3	10.8583	60306.160	25.67
PERC./LEAKAGE THROUGH LAYER 5	0.000026	0.146	0.00

AVG. HEAD ON TOP OF LAYER 5	0.0022		
CHANGE IN WATER STORAGE	-0.490	-2720.912	-1.16
SOIL WATER AT START OF YEAR	11.045	61342.109	
SOIL WATER AT END OF YEAR	10.555	58621.199	
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	-0.007	0.00

ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.92	266142.875	100.00
RUNOFF	5.158	28647.928	10.76
EVAPOTRANSPIRATION	33.872	188120.234	70.68
DRAINAGE COLLECTED FROM LAYER 3	8.3166	46189.750	17.36
PERC./LEAKAGE THROUGH LAYER 5	0.000021	0.115	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0017		
CHANGE IN WATER STORAGE	0.573	3184.773	1.20
SOIL WATER AT START OF YEAR	10.555	58621.199	
SOIL WATER AT END OF YEAR	11.128	61805.973	
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	0.062	0.00

ANNUAL TOTALS FOR YEAR 9

INCHES	CU. FEET	PERCENT
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PRECIPITATION	56.49	313739.719	100.00
RUNOFF	1.494	8296.674	2.64
EVAPOTRANSPIRATION	35.721	198393.547	63.24
DRAINAGE COLLECTED FROM LAYER 3	20.0555	111386.516	35.50
PERC./LEAKAGE THROUGH LAYER 5	0.000046	0.256	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0040		
CHANGE IN WATER STORAGE	-0.781	-4337.120	-1.38
SOIL WATER AT START OF YEAR	11.128	61805.973	
SOIL WATER AT END OF YEAR	10.347	57468.852	
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	-0.148	0.00

ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	45.21	251091.781	100.00
RUNOFF	2.693	14955.495	5.96
EVAPOTRANSPIRATION	34.929	193992.969	77.26
DRAINAGE COLLECTED FROM LAYER 3	-9.5079	-52805.883	21.03
PERC./LEAKAGE THROUGH LAYER 5	0.000024	0.131	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0019		
CHANGE IN WATER STORAGE	-1.920	-10662.757	-4.25
SOIL WATER AT START OF YEAR	10.347	57468.852	
SOIL WATER AT END OF YEAR	8.428	46806.094	
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	0.056	0.00

ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	37.37	207549.234	100.00
RUNOFF	0.081	448.212	0.22
EVAPOTRANSPIRATION	29.981	166510.922	80.23
DRAINAGE COLLECTED FROM LAYER 3	7.6354	42406.406	20.43
PERC./LEAKAGE THROUGH LAYER 5	0.000019	0.103	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0016		
CHANGE IN WATER STORAGE	-0.327	-1816.340	-0.88
SOIL WATER AT START OF YEAR	8.428	46806.094	
SOIL WATER AT END OF YEAR	8.101	44989.754	
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	-0.074	0.00

ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	43.59	242094.516	100.00
RUNOFF	2.966	16470.879	6.80
EVAPOTRANSPIRATION	29.893	166024.000	68.58
DRAINAGE COLLECTED FROM LAYER 3	10.0358	55737.574	23.02
PERC./LEAKAGE THROUGH LAYER 5	0.000024	0.133	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0021		
CHANGE IN WATER STORAGE	0.695	3861.881	1.60
SOIL WATER AT START OF YEAR	8.101	44989.754	

SOIL WATER AT END OF YEAR	8.796	48851.633	
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

ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.38	246482.078	100.00
RUNOFF	3.192	17728.549	7.19
EVAPOTRANSPIRATION	27.366	151989.297	61.66
DRAINAGE COLLECTED FROM LAYER 3	12.8049	71117.187	28.85
PERC./LEAKAGE THROUGH LAYER 5	0.000030	0.169	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0026		
CHANGE IN WATER STORAGE	1.017	5646.876	2.29
SOIL WATER AT START OF YEAR	8.796	48851.633	
SOIL WATER AT END OF YEAR	9.813	54498.512	
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	0.001	0.00

ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.41	268864.250	100.00
RUNOFF	4.029	22379.354	8.32
EVAPOTRANSPIRATION	34.973	194235.937	72.24

DRAINAGE COLLECTED FROM LAYER 3	10.0183	55640.652	20.69
PERC./LEAKAGE THROUGH LAYER 5	0.000025	0.137	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0020		
CHANGE IN WATER STORAGE	-0.611	-3391.839	-1.26
SOIL WATER AT START OF YEAR	9.813	54498.512	
SOIL WATER AT END OF YEAR	9.202	51106.672	
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	0.001	0.00

ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.37	285303.844	100.00
RUNOFF	3.124	17350.625	6.08
EVAPOTRANSPIRATION	34.324	190631.484	66.82
DRAINAGE COLLECTED FROM LAYER 3	12.9270	71795.219	25.16
PERC./LEAKAGE THROUGH LAYER 5	0.000032	0.177	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0027		
CHANGE IN WATER STORAGE	0.995	5526.320	1.94
SOIL WATER AT START OF YEAR	9.202	51106.672	
SOIL WATER AT END OF YEAR	10.197	56632.992	
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	-0.003	0.00

ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.66	181390.375	100.00
RUNOFF	0.022	121.879	0.07
EVAPOTRANSPIRATION	27.985	155424.344	85.69
DRAINAGE COLLECTED FROM LAYER 3	7.1287	39592.117	21.83
PERC./LEAKAGE THROUGH LAYER 5	0.000018	0.100	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0015		
CHANGE IN WATER STORAGE	-2.475	-13748.142	-7.58
SOIL WATER AT START OF YEAR	10.197	56632.992	
SOIL WATER AT END OF YEAR	7.722	42884.852	
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

ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.73	248425.922	100.00
RUNOFF	3.133	17398.584	7.00
EVAPOTRANSPIRATION	31.625	175641.078	70.70
DRAINAGE COLLECTED FROM LAYER 3	8.3649	46457.621	18.70
PERC./LEAKAGE THROUGH LAYER 5	0.000020	0.113	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0017		
CHANGE IN WATER STORAGE	1.608	8928.564	3.59
SOIL WATER AT START OF YEAR	7.722	42884.852	
SOIL WATER AT END OF YEAR	9.329	51813.414	
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

ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	56.79	315405.875	100.00
RUNOFF	7.093	39394.727	12.49
EVAPOTRANSPIRATION	32.975	183138.141	58.06
DRAINAGE COLLECTED FROM LAYER 3	16.9999	94415.648	29.93
PERC./LEAKAGE THROUGH LAYER 5	0.000040	0.220	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0035		
CHANGE IN WATER STORAGE	-0.278	-1542.797	-0.49
SOIL WATER AT START OF YEAR	9.329	51813.414	
SOIL WATER AT END OF YEAR	9.051	50270.617	
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	-0.075	0.00

ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	52.87	293634.656	100.00
RUNOFF	0.983	5461.817	1.86
VAPOTRANSPIRATION	35.213	195570.672	66.60
DRAINAGE COLLECTED FROM LAYER 3	15.0020	83319.672	28.38
PERC./LEAKAGE THROUGH LAYER 5	0.000035	0.197	0.00

AVG. HEAD ON TOP OF LAYER 5	0.0031		
CHANGE IN WATER STORAGE	1.671	9282.264	3.16
SOIL WATER AT START OF YEAR	9.051	50270.617	
SOIL WATER AT END OF YEAR	10.723	59552.883	
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	0.037	0.00

ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	59.12	328346.531	100.00
RUNOFF	1.920	10666.045	3.25
EVAPOTRANSPIRATION	36.996	205472.984	62.58
DRAINAGE COLLECTED FROM LAYER 3	21.4497	119129.328	36.28
PERC./LEAKAGE THROUGH LAYER 5	0.000049	0.274	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0044		
CHANGE IN WATER STORAGE	-1.246	-6922.025	-2.11
SOIL WATER AT START OF YEAR	10.723	59552.883	
SOIL WATER AT END OF YEAR	9.476	52630.855	
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	-0.066	0.00

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

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

TOTALS	4.47 4.64	4.30 3.27	5.88 3.87	4.82 2.19	4.05 3.04	3.59 4.31
STD. DEVIATIONS	2.21 2.43	2.26 1.88	2.26 2.61	2.76 1.64	1.69 1.64	1.64 2.61

RUNOFF

TOTALS	0.364 0.069	0.421 0.001	0.454 0.247	0.346 0.040	0.114 0.082	0.000 0.379
STD. DEVIATIONS	0.828 0.253	1.207 0.002	0.867 0.660	0.626 0.121	0.253 0.198	0.001 0.968

EVAPOTRANSPIRATION

TOTALS	1.656 4.079	2.004 3.151	3.322 2.425	3.662 2.661	4.248 1.488	3.730 1.297
STD. DEVIATIONS	0.290 1.526	0.345 1.424	0.390 1.010	0.939 0.769	0.845 0.481	1.705 0.282

LATERAL DRAINAGE COLLECTED FROM LAYER 3

TOTALS	2.3613 0.1386	1.9028 0.0945	2.4092 0.3110	1.3877 0.5377	1.1106 0.2407	0.2777 1.4566
STD. DEVIATIONS	1.8500 0.5235	1.4059 0.3821	1.4799 0.6035	0.8109 0.6335	1.0641 0.7160	0.4879 1.7373

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 ACROSS LAYER 5

AVERAGES	0.0056 0.0003	0.0050 0.0002	0.0058 0.0008	0.0035 0.0013	0.0027 0.0006	0.0007 0.0035
STD. DEVIATIONS	0.0044 0.0012	0.0037 0.0009	0.0035 0.0015	0.0020 0.0015	0.0026 0.0018	0.0012 0.0042

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	48.44	(7.307)	269008.7	100.00
RUNOFF	2.516	(2.1798)	13971.98	5.194
EVAPOTRANSPIRATION	33.722	(3.3227)	187290.91	69.623
LATERAL DRAINAGE COLLECTED FROM LAYER 3	12.22826	(4.17297)	67914.539	25.24623
PERCOLATION/LEAKAGE THROUGH FROM LAYER 5	0.00003	(0.00001)	0.163	0.00006
AVERAGE HEAD ACROSS TOP OF LAYER 5	0.002	(0.001)		
CHANGE IN WATER STORAGE	-0.030	(1.4563)	-168.90	-0.063

PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	4.71	26158.869
RUNOFF	3.058	16986.2773
DRAINAGE COLLECTED FROM LAYER 3	0.32000	1777.26758
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.000001	0.00381
AVERAGE HEAD ACROSS LAYER 5	0.024	
SNOW WATER	4.62	25641.5977
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.4131
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.1511

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	1.0650	0.1775
2	6.0342	0.3352
3	0.0078	0.0314
4	0.0000	0.0000
5	2.3694	0.3949
SNOW WATER	0.000	

**HELP MODEL RUN
ENTITLED EPA STANDARD RCRA CAP**

Description: This model simulated a standard RCRA cap. The purpose of this model was to compare the leakage of this cap to the one used for the Surface Impoundment at the William L. Bonnell site.

Input: Composite liner with 3 feet of 1×10^{-7} clay, a 20-mil liner, a 1-foot sand lateral drainage layer and soil percolation layer. Only the 1.53-acre top of the landfill was used in the model, corresponding to Area C in the other HELP model run printouts.

Results: Average annual percolation through the liner = 66.2 cubic feet.

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4370	VOL/VOL
FIELD CAPACITY	=	0.1050	VOL/VOL
WILTING POINT	=	0.0470	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1975	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.170000002000E-02	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 3.00
FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER MATERIAL TEXTURE NUMBER 1

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4170	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999978000E-02	CM/SEC
SLOPE	=	4.00	PERCENT
DRAINAGE LENGTH	=	220.0	FEET

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.02	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	=	4.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	4.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 4

TYPE 3 - BARRIER SOIL LINER MATERIAL TEXTURE NUMBER 16

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.26	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.530	ACRES
EVAPORATIVE ZONE DEPTH	=	22.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.865	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	9.614	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.034	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	19.991	INCHES
TOTAL INITIAL WATER	=	19.991	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ATLANTA GEORGIA

MAXIMUM LEAF AREA INDEX	=	2.00
START OF GROWING SEASON (JULIAN DATE)	=	92
END OF GROWING SEASON (JULIAN DATE)	=	312
AVERAGE ANNUAL WIND SPEED	=	9.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	65.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	67.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	69.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
4.91	4.43	5.91	4.43	4.02	3.41
4.73	3.41	3.17	2.53	3.43	4.23

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
41.90	44.90	52.50	61.80	69.30	75.80
78.60	78.20	73.00	62.20	52.00	44.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ATLANTA GEORGIA

STATION LATITUDE = 33.65 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.47	274751.469	100.00
RUNOFF	0.066	369.225	0.13
EVAPOTRANSPIRATION	35.625	197858.687	72.01
DRAINAGE COLLECTED FROM LAYER 2	13.6647	75892.102	27.62
PERC./LEAKAGE THROUGH LAYER 4	0.009411	52.267	0.02
AVG. HEAD ON TOP OF LAYER 4	7.5620		
CHANGE IN WATER STORAGE	0.104	579.174	0.21
SOIL WATER AT START OF YEAR	19.991	111029.992	
SOIL WATER AT END OF YEAR	20.096	111609.164	
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	-0.014	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	63.92	355005.344	100.00
RUNOFF	2.580	14328.919	4.04
EVAPOTRANSPIRATION	37.020	205607.641	57.92
DRAINAGE COLLECTED FROM LAYER 2	22.4601	124741.109	35.14
PERC./LEAKAGE THROUGH LAYER 4	0.019823	110.094	0.03
AVG. HEAD ON TOP OF LAYER 4	16.5855		

CHANGE IN WATER STORAGE	1.840	10217.577	2.88
SOIL WATER AT START OF YEAR	20.096	111609.164	
SOIL WATER AT END OF YEAR	21.935	121826.742	
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	0.016	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	50.89	282637.969	100.00
RUNOFF	0.665	3690.686	1.31
EVAPOTRANSPIRATION	34.641	192393.266	68.07
DRAINAGE COLLECTED FROM LAYER 2	19.9833	110985.422	39.27
PERC./LEAKAGE THROUGH LAYER 4	0.016905	93.891	0.03
AVG. HEAD ON TOP OF LAYER 4	14.0891		
CHANGE IN WATER STORAGE	-4.416	-24525.248	-8.68
SOIL WATER AT START OF YEAR	21.935	121826.742	
SOIL WATER AT END OF YEAR	15.896	88283.969	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.624	9017.525	3.19
ANNUAL WATER BUDGET BALANCE	0.0000	-0.065	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.49	247093.078	100.00
RUNOFF	0.103	569.724	0.23
EVAPOTRANSPIRATION	33.702	187175.031	75.75
DRAINAGE COLLECTED FROM LAYER 2	14.3750	79837.172	32.31
PERC./LEAKAGE THROUGH LAYER 4	0.010721	59.544	0.02
AVG. HEAD ON TOP OF LAYER 4	8.7348		
CHANGE IN WATER STORAGE	-3.700	-20548.445	-8.32
SOIL WATER AT START OF YEAR	15.896	88283.969	
SOIL WATER AT END OF YEAR	13.820	76753.047	
SNOW WATER AT START OF YEAR	1.624	9017.525	3.65
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.056	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.24	273473.969	100.00
RUNOFF	0.249	1385.439	0.51
EVAPOTRANSPIRATION	35.137	195145.859	71.36
DRAINAGE COLLECTED FROM LAYER 2	13.3516	74153.414	27.12
PERC./LEAKAGE THROUGH LAYER 4	0.009835	54.620	0.02
AVG. HEAD ON TOP OF LAYER 4	7.9486		
CHANGE IN WATER STORAGE	0.492	2734.773	1.00
SOIL WATER AT START OF YEAR	13.820	76753.047	
SOIL WATER AT END OF YEAR	14.312	79487.820	
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	-0.133	0.00

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.50	263810.156	100.00
RUNOFF	0.030	167.334	0.06
EVAPOTRANSPIRATION	34.093	189348.234	71.77
DRAINAGE COLLECTED FROM LAYER 2	10.7121	59493.832	22.55
PERC./LEAKAGE THROUGH LAYER 4	0.006901	38.326	0.01
AVG. HEAD ON TOP OF LAYER 4	5.4517		
CHANGE IN WATER STORAGE	2.658	14762.504	5.60
SOIL WATER AT START OF YEAR	14.312	79487.820	
SOIL WATER AT END OF YEAR	16.970	94250.320	
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	-0.066	0.00

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	42.30	234929.984	100.00
RUNOFF	1.089	6049.817	2.58

EVAPOTRANSPIRATION	27.275	151480.187	64.48
DRAINAGE COLLECTED FROM LAYER 2	12.0488	66918.047	28.48
PERC./LEAKAGE THROUGH LAYER 4	0.008185	45.458	0.02
AVG. HEAD ON TOP OF LAYER 4	6.5138		
CHANGE IN WATER STORAGE	1.879	10436.443	4.44
SOIL WATER AT START OF YEAR	16.970	94250.320	
SOIL WATER AT END OF YEAR	18.849	104686.766	
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	0.029	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.92	266142.875	100.00
RUNOFF	0.818	4543.960	1.71
EVAPOTRANSPIRATION	31.699	176055.156	66.15
DRAINAGE COLLECTED FROM LAYER 2	16.9049	93887.984	35.28
PERC./LEAKAGE THROUGH LAYER 4	0.014501	80.539	0.03
AVG. HEAD ON TOP OF LAYER 4	12.0016		
CHANGE IN WATER STORAGE	-1.517	-8424.705	-3.17
SOIL WATER AT START OF YEAR	18.849	104686.766	
SOIL WATER AT END OF YEAR	17.332	96262.062	
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	-0.059	0.00

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	56.49	313739.719	100.00
RUNOFF	0.271	1507.133	0.48
EVAPOTRANSPIRATION	33.950	188557.047	60.10
DRAINAGE COLLECTED FROM LAYER 2	19.4906	108249.086	34.50
PERC./LEAKAGE THROUGH LAYER 4	0.016870	93.694	0.03
AVG. HEAD ON TOP OF LAYER 4	14.0704		
CHANGE IN WATER STORAGE	2.761	15333.023	4.89
SOIL WATER AT START OF YEAR	17.332	96262.062	
SOIL WATER AT END OF YEAR	20.093	111595.086	
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	-0.255	0.00

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	45.21	251091.781	100.00
RUNOFF	0.599	3327.460	1.33
EVAPOTRANSPIRATION	32.569	180882.266	72.04
DRAINAGE COLLECTED FROM LAYER 2	16.3364	90730.461	36.13
PERC./LEAKAGE THROUGH LAYER 4	0.012111	67.262	0.03
AVG. HEAD ON TOP OF LAYER 4	9.9050		

CHANGE IN WATER STORAGE	-4.306	-23915.609	-9.52
SOIL WATER AT START OF YEAR	20.093	111595.086	
SOIL WATER AT END OF YEAR	15.787	87679.477	
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	-0.060	0.00

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ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	37.37	207549.234	100.00
RUNOFF	0.010	53.214	0.03
EVAPOTRANSPIRATION	29.152	161907.312	78.01
DRAINAGE COLLECTED FROM LAYER 2	10.3307	57375.801	27.64
PERC./LEAKAGE THROUGH LAYER 4	0.006770	37.598	0.02
AVG. HEAD ON TOP OF LAYER 4	5.4038		
CHANGE IN WATER STORAGE	-2.129	-11824.706	-5.70
SOIL WATER AT START OF YEAR	15.787	87679.477	
SOIL WATER AT END OF YEAR	13.658	75854.766	
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	0.015	0.00

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ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	43.59	242094.516	100.00
RUNOFF	0.773	4291.696	1.77
EVAPOTRANSPIRATION	28.700	159397.391	65.84
DRAINAGE COLLECTED FROM LAYER 2	13.1733	73163.312	30.22
PERC./LEAKAGE THROUGH LAYER 4	0.009148	50.808	0.02
AVG. HEAD ON TOP OF LAYER 4	7.3951		
CHANGE IN WATER STORAGE	0.935	5191.283	2.14
SOIL WATER AT START OF YEAR	13.658	75854.766	
SOIL WATER AT END OF YEAR	14.593	81046.047	
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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ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.38	246482.078	100.00
RUNOFF	0.820	4555.304	1.85
EVAPOTRANSPIRATION	26.921	149518.203	60.66
DRAINAGE COLLECTED FROM LAYER 2	12.9409	71872.727	29.16
PERC./LEAKAGE THROUGH LAYER 4	0.008970	49.818	0.02
AVG. HEAD ON TOP OF LAYER 4	7.1903		
CHANGE IN WATER STORAGE	3.689	20486.076	8.31
SOIL WATER AT START OF YEAR	14.593	81046.047	
SOIL WATER AT END OF YEAR	18.281	101532.125	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00

SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.042	0.00

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ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	48.41	268864.250	100.00
RUNOFF	0.787	4370.353	1.63
EVAPOTRANSPIRATION	32.045	177976.953	66.20
DRAINAGE COLLECTED FROM LAYER 2	13.4051	74450.680	27.69
PERC./LEAKAGE THROUGH LAYER 4	0.009437	52.413	0.02
AVG. HEAD ON TOP OF LAYER 4	7.5690		
CHANGE IN WATER STORAGE	2.163	12013.880	4.47
SOIL WATER AT START OF YEAR	18.281	101532.125	
SOIL WATER AT END OF YEAR	20.444	113546.008	
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	-0.032	0.00

*

ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.37	285303.844	100.00
RUNOFF	1.067	5926.707	2.08

EVAPOTRANSPIRATION	32.135	178475.094	62.56
DRAINAGE COLLECTED FROM LAYER 2	19.3156	107277.031	37.60
PERC./LEAKAGE THROUGH LAYER 4	0.014890	82.698	0.03
AVG. HEAD ON TOP OF LAYER 4	12.2671		
CHANGE IN WATER STORAGE	-1.163	-6457.661	-2.26
SOIL WATER AT START OF YEAR	20.444	113546.008	
SOIL WATER AT END OF YEAR	19.282	107088.344	
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	-0.039	0.00

*

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.66	181390.375	100.00
RUNOFF	0.030	165.319	0.09
EVAPOTRANSPIRATION	26.510	147231.875	81.17
DRAINAGE COLLECTED FROM LAYER 2	12.0438	66889.852	36.88
PERC./LEAKAGE THROUGH LAYER 4	0.008287	46.023	0.03
AVG. HEAD ON TOP OF LAYER 4	6.6850		
CHANGE IN WATER STORAGE	-5.931	-32942.687	-18.16
SOIL WATER AT START OF YEAR	19.282	107088.344	
SOIL WATER AT END OF YEAR	13.350	74145.656	
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	-0.007	0.00

*

ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.73	248425.922	100.00
RUNOFF	1.295	7193.367	2.90
EVAPOTRANSPIRATION	30.744	170750.141	68.73
DRAINAGE COLLECTED FROM LAYER 2	11.3703	63149.266	25.42
PERC./LEAKAGE THROUGH LAYER 4	0.008056	44.745	0.02
AVG. HEAD ON TOP OF LAYER 4	6.4802		
CHANGE IN WATER STORAGE	1.312	7288.413	2.93
SOIL WATER AT START OF YEAR	13.350	74145.656	
SOIL WATER AT END OF YEAR	14.663	81434.070	
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	-0.017	0.00

*

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	56.79	315405.875	100.00
RUNOFF	2.661	14776.761	4.68
EVAPOTRANSPIRATION	34.122	189512.766	60.09
DRAINAGE COLLECTED FROM LAYER 2	18.0452	100221.148	31.78
PERC./LEAKAGE THROUGH LAYER 4	0.016213	90.045	0.03
AVG. HEAD ON TOP OF LAYER 4	13.5226		

CHANGE IN WATER STORAGE	1.946	10805.257	3.43
SOIL WATER AT START OF YEAR	14.663	81434.070	
SOIL WATER AT END OF YEAR	16.608	92239.328	
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	-0.108	0.00

*

*

ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	52.87	293634.656	100.00
RUNOFF	0.334	1856.167	0.63
EVAPOTRANSPIRATION	32.250	179111.172	61.00
DRAINAGE COLLECTED FROM LAYER 2	13.7469	76348.836	26.00
PERC./LEAKAGE THROUGH LAYER 4	0.009716	53.960	0.02
AVG. HEAD ON TOP OF LAYER 4	7.8197		
CHANGE IN WATER STORAGE	6.530	36264.480	12.35
SOIL WATER AT START OF YEAR	16.608	92239.328	
SOIL WATER AT END OF YEAR	23.138	128503.805	
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	0.044	0.00

*

*

ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	59.12	328346.531	100.00
RUNOFF	7.183	39893.094	12.15
EVAPOTRANSPIRATION	35.063	194736.000	59.31
DRAINAGE COLLECTED FROM LAYER 2	23.4994	130513.320	39.75
PERC./LEAKAGE THROUGH LAYER 4	0.021692	120.477	0.04
AVG. HEAD ON TOP OF LAYER 4	18.2269		
CHANGE IN WATER STORAGE	-6.647	-36916.238	-11.24
SOIL WATER AT START OF YEAR	23.138	128503.805	
SOIL WATER AT END OF YEAR	16.491	91587.570	
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	-0.130	0.00

*

*

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	4.47 4.64	4.30 3.27	5.88 3.87	4.82 2.19	4.05 3.04	3.59 4.31
STD. DEVIATIONS	2.21 2.43	2.26 1.88	2.26 2.61	2.76 1.64	1.69 1.64	1.64 2.61
RUNOFF						
TOTALS	0.083 0.036	0.286 0.001	0.238 0.051	0.171 0.006	0.120 0.031	0.001 0.048
STD. DEVIATIONS	0.169 0.118	0.882 0.002	0.445 0.152	0.368 0.024	0.329 0.073	0.005 0.163

EVAPOTRANSPIRATION

TOTALS	1.747 4.053	1.888 2.933	2.916 2.174	2.978 2.529	3.829 1.457	4.289 1.376
STD. DEVIATIONS	0.272 1.494	0.405 1.221	0.593 0.857	0.803 0.694	0.654 0.455	1.660 0.253

LATERAL DRAINAGE COLLECTED FROM LAYER 2

TOTALS	1.3796	1.4220	1.9042	1.8881	1.8642
1.5404	1.2251	0.9381	0.7690	0.8431	0.7216
0.8645					
STD. DEVIATIONS	0.7918	0.6040	0.4948	0.4203	0.4832
0.3901	0.3309	0.3348	0.3621	0.4585	0.3447
0.5592					

PERCOLATION/LEAKAGE THROUGH LAYER 4

TOTALS	0.0011	0.0012	0.0017	0.0016	0.0016
0.0012	0.0009	0.0006	0.0005	0.0005	0.0005
0.0006					
STD. DEVIATIONS	0.0009	0.0007	0.0007	0.0006	0.0007
0.0005	0.0003	0.0003	0.0003	0.0004	0.0003
0.0005					

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ACROSS LAYER 4

AVERAGES	10.6804	12.6783	16.3087	16.5319	15.6463
11.9104	8.0878	5.7559	4.6357	4.9712	4.2899
5.7569					
STD. DEVIATIONS	8.5121	7.8464	7.0562	6.8459	7.5216
5.2763	2.9005	2.5640	2.8212	3.5267	2.6394
4.9315					

*

*

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	48.44	(7.307)	269008.7	100.00
RUNOFF	1.072	(1.6221)	5951.08	2.212
EVAPOTRANSPIRATION	32.168	(3.0686)	178656.00	66.413
LATERAL DRAINAGE COLLECTED FROM LAYER 2	15.35993	(3.91358)	85307.531	31.71181
PERCOLATION/LEAKAGE THROUGH 0.02461 FROM LAYER 4	0.01192	(0.00444)	66.214	
AVERAGE HEAD ACROSS TOP OF LAYER 4	9.771	(3.834)		
CHANGE IN WATER STORAGE	-0.175	(3.4628)	-972.12	-0.361

*

PEAK DAILY VALUES FOR YEARS	1 THROUGH	20
	(INCHES)	(CU. FT.)
PRECIPITATION	4.71	26158.869
RUNOFF	1.358	7539.5942
DRAINAGE COLLECTED FROM LAYER 2	0.11301	627.67236
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000115	0.63985
AVERAGE HEAD ACROSS LAYER 4	35.926	
SNOW WATER	4.62	25641.5977
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.4370
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0364

FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	3.8736	0.1614
2	2.3691	0.1974
3	0.0000	0.0000
4	10.2480	0.4270
SNOW WATER	0.000	



APPENDIX K

SERROT SUBGRADE ACCEPTANCE FORM

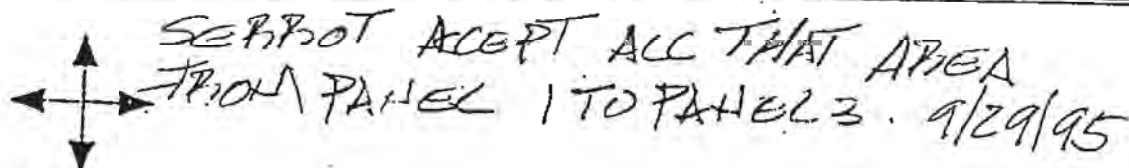
SERROT CORPORATION
SUBGRADE ACCEPTANCE FORM

Page 2 of 2

Date: 10/10/95

Project Name: BOWELL COUSE Project Number: 5303Superintendent: IGNACIO LEON Project Manager: JULY DAVIS

Location and size of area to be accepted. Describe and sketch below. (Indicate North on Arrow)



SERROT ACCEPT ALL THAT AREA
FROM PANEL 1 TO PANEL 3. 9/29/95

SERROT ACCEPT ALL THAT AREA
FROM PANEL 34 TO PANEL 51 9/30/95

SERROT ACCEPT ALL THAT AREA
FROM PANEL 59 TO PANEL 81. 10/2/95

SERROT ACCEPT ALL THAT AREA
FROM PANEL 82 TO PANEL 88 10/9/95.

I the undersigned, an authorized representative of SERROT CORPORATION, accept the above described subgrade area as suitable to be lined.

DAROLD WIGGINS [Signature] Env. Signat 10/10/95

Name (Print)

Signature

Title

Date

JEFF HANSON[Signature]

Resident CQA MGR

10-10-95

I the undersigned, an authorized representative of W.L. BONNETT CO.

the Inspecting Engineers, approve of the subgrade as being constructed to the specifications.



APPENDIX L

HDPE/GEOCOMPOSITE MATERIAL INVENTORY



1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

MATERIAL INVENTORY

PROJECT NAME: Bonne/ Surface Impoundment Closure
PROJECT NO.: 72040.009.092
DATE: 9-18-95
REVIEWED BY: JH
DATE REVIEWED: _____

ROLL NUMBER	LENGTH (FT)	WIDTH (FT)	AREA (SF)	THICKNESS (MIL)	MATERIAL TYPE	COMMENTS
84045603				60mil	HDT	Parkersburg W.V.
84045606				60mil	HDT	Parkersburg W.V.
83125809				60mil	HDT	Parkersburg W.V.
84045613				60mil	HDT	Parkersburg W.V.
83125905				60mil	HDT	Parkersburg W.V.
83105913				60mil	HDT	UWI
84045616				60mil	HDT	Parkersburg W.V./
83115806				60mil	HDT	UWI
83125620				60mil	HDT	UWI/Conf. test
83125740				60mil	HDT	UWI
83124411				60mil	HDT	UWI
83125714				60mil	HDT	UWI
83115803				60mil	HDT	UWI
122850						
6 Rolls delivered on 10-2-95						
84075013	420	22.5	9450	60mil	HDT	
84075014	420	22.5	9450	60mil	HDT	
84075015	420	22.5	9450	60mil	HDT	
84075016	420	22.5	9450	60mil	HDT	
84075017	420	22.5	9450	60mil	HDT	
84075018	420	22.5	9450	60mil	HDT	
84075018	420	22.5	9450	60mil	HDT	

✓ → Denotes Factory & Cuts deployment logs for square footage.
Note: Rolls #01 - #013 did not have factory straps on. Use



APPENDIX M

HDPE MANUFACTURERS QUALITY CONTROL CERTIFICATIONS



PHILLIPS CHEMICAL COMPANY

A DIVISION OF PHILLIPS PETROLEUM COMPANY

BOX 792 • PHONE 713 475-3666
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

November 14, 1994

JHV# 16844-94

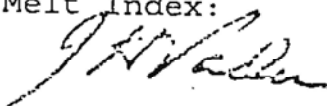
FAX: 011-865-220-2668

Steel Dragon
10F 11.87, Chung Hsag E Rd.
Sec 4 Taipet, Taiwan R.O.C.

ATTN: Kevin Wu

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-400G
Lot Numbers:	7140509, 7140753, 7140754, 7140755, 7140760, 7140761
Ref. Number:	TX-72250
Date Shipped:	11/22/94
Quantity:	917020 LBS.
HLMI:	12.0 G/10 MIN
Density:	.937 G/CC
Melt Index:	.070 G/10 (7140509)


J. H. Vaden
Quality Assurance Manager

JHV:PSN:sr

* Reg. U.S. Pat. Off.

cc: QA-File-RC
Export



PHILLIPS CHEMICAL COMPANY

A DIVISION OF PHILLIPS PETROLEUM COMPANY

BOX 792 • PHONE 713 475-3666
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

August 22, 1994

JHV# 12133-94

FAX: 011-852-810-0125

Steel Dragon
Taiwan

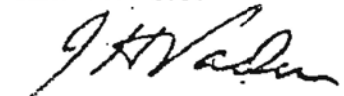
UPDATED COPY

(Melt Index)

ATTN: Alfred Ng / Danny Kong

This letter will certify that the Marlex* resin shown below,
as supplied by Phillips Chemical Company, conforms to our
manufacturing specification.

Type:	HHM TR-400G
Lot Number:	7140409
Date Shipped:	06/18/94
HLMI:	10.6 G/10 MIN
Density:	.937 G/CC
Melt Index:	.07 G/10 MIN


J. H. Vaden
Quality Assurance Manager
PHILLIPS CHEMICAL COMPANY

JHV:PSN:sr

* Reg. U.S. Pat. Off.

cc: QA-File-RC
Export File

Daelim Industrial Co., Ltd.

대림 폴리머 시험 성적서
DAELIM POLY TENDER REPORT

GRADE : TR-400

LOT NO : 503132B

검사일
INSPECTED DATE : 1995 . 03 . 13

발행일자
ISSUED DATE : 1995 . 03 . 21

항목 (ITEM)	단위 (UNIT)	결과 (RESULT)	비고 (REMARK)
용융 지수 (MELT INDEX)	g / 10 MIN	0.20	0.13 - 0.22
HLMI (21.6 kg)	g / 10 MIN	—	
밀도 (DENSITY)	g / cm ³	0.938	0.936 - 0.940
색상 (COLOR)	—	300	150 MIN
입도 수 (PELLET COUNTS)	PELLETS / g	42	35 - 65
불질혼입수 (SPECK COUNTS)	EA / kg	NIL	30 MAX
휘발 물질 (VOLATILE MATERIALS)	wt %	0.033	0.04MAX
회분 (ASH)	wt %	0.014	0.05MAX

COMMENTS

위의 시험결과가 불림이 없음을 증명함.
CERTIFY THE ABOVE STATEMENT OF QUALITY TO BE TRUE AND CORRECT.

자
CHECKED BY :

승인자
APPROVED BY : K. S. SONG

POLYMER Q.C SEC. MANAGER

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 83125620 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 7140760 SALES ORDER #: 5303
MANUFAC. DATE: 12/26/94

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	63.4	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	159.3	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	181.6	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.3	ASTM D638
Elongation at Break:	25,000 SqFt	100%	377.3	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	97.7	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	50.1	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.54	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.944	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.100	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.250	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	> -60	ASTM D746

CERTIFIED BY:

Ian Su

Ian Su
QUALITY CONTROL MANAGER

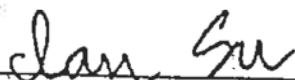
Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 83124411 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 7140509 SALES ORDER #: 5303
MANUFAC. DATE: 12/24/94

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.2	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	159.7	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	168.6	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	14.6	ASTM D638
Elongation at Break:	25,000 SqFt	100%	253.5	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	77.8	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	57.3	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.55	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.944	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.100	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.298	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	> -60	ASTM D746

CERTIFIED BY:


Dan Su
QUALITY CONTROL MANAGER

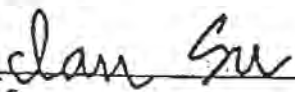
Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 83125714 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 7140760 SALES ORDER #: 5303
MANUFAC. DATE: 12/27/94

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	62.6	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 psi	157.3	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 psi	188.5	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	17.0	ASTM D638
Elongation at Break:	25,000 SqFt	100%	398.3	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	98.8	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	49.6	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.45	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.944	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.200	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.050	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	>1500	ASTM D1693
Low Temperature Impact	Certified	-60 C	>-60	ASTM D746

CERTIFIED BY:


in Su
QUALITY CONTROL MANAGER

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 83125704 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 7140760 SALES ORDER #: 5303
MANUFAC. DATE: 12/27/94

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	62	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	152.8	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	191.9	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.9	ASTM D638
Elongation at Break:	25,000 SqFt	100%	423.6	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	94.8	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	50.2	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.54	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.945	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.100	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.250	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	> -60	ASTM D746

CERTIFIED BY:

Jan Su
an Su
QUALITY CONTROL MANAGER

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 83115806 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 7140509 SALES ORDER #: 5303
MANUFAC. DATE: 11/28/94

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.3	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	166.9	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	176.2	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.3	ASTM D638
Elongation at Break:	25,000 SqFt	100%	327.1	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	109.5	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	54.3	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.70	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.946	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.100	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.110	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	>-60	ASTM D746

CERTIFIED BY:

Alan Su

an Su
QUALITY CONTROL MANAGER.

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 83115803 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 7140509 SALES ORDER #: 5303
MANUFAC. DATE: 11/28/94

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60. mils	65.1	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	167.7	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	178.3	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.5	ASTM D638
Elongation at Break:	25,000 SqFt	100%	312.9	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	109.5	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	51.9	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.54	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.944	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.150	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.200	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	> -60	ASTM D746

CERTIFIED BY:

Chan Su
Chan Su
QUALITY CONTROL MANAGER

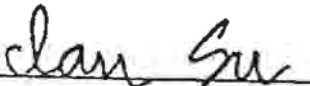
Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 83105913 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 7140409 SALES ORDER #: 5303
MANUFAC. DATE: 10/29/94

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.1	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	153.4	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	178.4	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.1	ASTM D638
Elongation at Break:	25,000 SqFt	100%	325.3	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	90.0	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	49.2	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.06	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.943	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.200	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.248	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	> -60	ASTM D746

CERTIFIED BY:


Ian Su
QUALITY CONTROL MANA

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 84045616 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 503132B SALES ORDER #: 5303
MANUFAC. DATE: 4/26/95

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.6	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 psi	149.5	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 psi	154.7	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.1	ASTM D638
Elongation at Break:	25,000 SqFt	100%	278.3	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	99.2	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	50.2	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.33	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.944	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.200	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.180	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	>1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	>-60	ASTM D746

CERTIFIED BY:

Ian Su

Ian Su
QUALITY CONTROL MANAGER

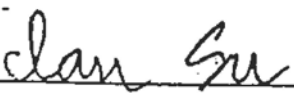
Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 84045613 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 503132B SALES ORDER #: 5303
MANUFAC. DATE: 4/26/95

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.3	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	151.6	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	157.2	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.1	ASTM D638
Elongation at Break:	25,000 SqFt	100%	305.8	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	101.4	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	51.6	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.41	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.944	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.200	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.180	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	> -60	ASTM D746

CERTIFIED BY:


Ian Su
QUALITY CONTROL MANAGER

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 84045606 **PROJECT NAME:** Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL **LOCATION:** Newman, GA
LOT/BLEND: 503132B **SALES ORDER #:** 5303
MANUFAC. DATE: 4/26/95

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	61.1	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	149.2	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	155.8	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.1	ASTM D638
Elongation at Break:	25,000 SqFt	100%	221.9	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	99.0	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	51.1	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.26	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.944	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.200	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.290	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	> -60	ASTM D746

CERTIFIED BY:

Chan Su

Chan Su

QUALITY CONTROL MANAGER

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 84045603 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 503132B SALES ORDER #: 5303
MANUFAC. DATE: 4/26/95

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.6	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	138.6	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	139.2	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.1	ASTM D638
Elongation at Break:	25,000 SqFt	100%	451.7	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	95.2	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	63.9	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.63	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.944	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.154	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.290	ASTM D1204
Environ. Stress Crack	Certified	1500' hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	> -60	ASTM D746

CERTIFIED BY:

lan Su

lan Su
QUALITY CONTROL MANAGER

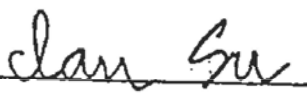
Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 83125905 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 7140760 SALES ORDER #: 5303
MANUFAC. DATE: 1/31/95

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.8	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	144.9	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	172.3	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	15.9	ASTM D638
Elongation at Break:	25,000 SqFt	100%	417.0	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	92.0	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	48.0	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.17	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.945	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.150	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.280	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	> -60	ASTM D746

CERTIFIED BY:


Ian Su
QUALITY CONTROL MANAGER

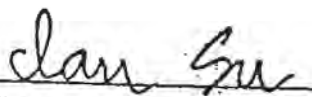
Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#: 83125809 PROJECT NAME: Bonnell Closure
MATERIAL: HDPE TEXTURED 60 MIL LOCATION: Newman, GA
LOT/BLEND: 7140760 SALES ORDER #: 5303
MANUFAC. DATE: 1/31/95

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	63.1	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	125.2	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	144.3	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	14.8	ASTM D638
Elongation at Break:	25,000 SqFt	100%	340.1	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	79.8	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	41.3	ASTM D1004
Carbon Black Content (min.):	100,000 SqFt	2-3%	2.40	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.945	ASTM D792
Melt Flow Index:	100,000 SqFt	<0.5 g/10 minutes	0.150	ASTM D1238
Dimensional Stability:	100,000 SqF	+/-2.0% max	-0.280	ASTM D1204
Environ. Stress Crack	Certified	1500 hours	> 1500	ASTM D1693
Low Temperature Impac	Certified	-60 C	>-60	ASTM D746

CERTIFIED BY:


Alan Su
QUALITY CONTROL MANAGER

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#:	84075013	PROJECT NAME:	Bonnell Closure
MATERIAL:	HDPE TEXTURED 60 MIL	LOCATION:	Newman, GA
LOT/BLEND:	LF2008	SALES ORDER #:	5303
MANUFAC. DATE:	7/20/95		

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.1	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	161.1	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	115.8	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.2	ASTM D638
Elongation at Break*: * (2.5" gauge length)	25,000 SqFt	100%	398.0	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	88.6	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	70.8	ASTM D1004
Carbon Black Content :	100,000 SqFt	2-3%	2.5	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.946	ASTM D792
Melt Flow Index:	100,000 SqFt	>0.5g/10 min	0.12	ASTM D123
Dimensional Stability:	100,000 SqFt	+/- 2.0% max	-0.23	ASTM D1204
Environ. Stress Crack:	Certified	1500 hrs	>1500	ASTM D1204
Low Temp. Brittleness:	Certified	-60 C	>-60 C	ASTM D746

CERTIFIED BY:

Ian Su

Ian Su

QUALITY CONTROL MANAGER

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#:	84075014	PROJECT NAME:	Bonnell Closure
MATERIAL:	HDPE TEXTURED 60 MIL	LOCATION:	Newman, GA
LOT/BLEND:	LF2008	SALES ORDER #:	5303
MANUFAC. DATE:	7/20/95		

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.1	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 psi	161.1	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 psi	115.8	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.2	ASTM D638
Elongation at Break*: * (2.5" gauge length)	25,000 SqFt	100%	398.0	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	88.6	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	70.8	ASTM D1004
Carbon Black Content :	100,000 SqFt	2-3%	2.5	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.946	ASTM D792
Melt Flow Index:	100,000 SqFt	>0.5g/10 min	0.12	ASTM D123
Dimensional Stability:	100,000 SqFt	+/- 2.0% max	-0.23	ASTM D1204
Environ. Stress Crack:	Certified	1500 hrs	>1500	ASTM D1204
Low Temp. Brittleness:	Certified	-60 C	>-60 C	ASTM D746

CERTIFIED BY:

Ian Su

Ian Su
QUALITY CONTROL MANAGER

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#:	84075015	PROJECT NAME:	Bonnell Closure
MATERIAL:	HDPE TEXTURED 60 MIL	LOCATION:	Newman, GA
LOT/BLEND:	LF2008	SALES ORDER #:	5303
MANUFAC. DATE:	7/20/95		

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.1	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	161.1	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	107.2	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.2	ASTM D638
Elongation at Break*: * (2.5" gauge length)	25,000 SqFt	100%	398.0	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	88.6	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	70.8	ASTM D1004
Carbon Black Content :	100,000 SqFt	2-3%	2.5	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.946	ASTM D792
Melt Flow Index:	100,000 SqFt	>0.5g/10 min	0.12	ASTM D123
Dimensional Stability:	100,000 SqFt	+/- 2.0% max	-0.23	ASTM D1204
Environ. Stress Crack:	Certified	1500 hrs	>1500	ASTM D1204
Low Temp. Brittleness:	Certified	-60 C	>-60 C	ASTM D746

CERTIFIED BY:

Jan Su

Jan Su

QUALITY CONTROL MANAGER

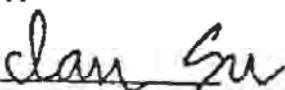
Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#:	84075016	PROJECT NAME:	Bonnell Closure
MATERIAL:	HDPE TEXTURED 60 MIL	LOCATION:	Newman, GA
LOT/BLEND:	LF2008	SALES ORDER #:	5303
MANUFAC. DATE:	7/20/95		

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.1	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	161.1	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	107.2	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.2	ASTM D638
Elongation at Break*: * (2.5" gauge length)	25,000 SqFt	100%	398.0	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	88.6	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	70.8	ASTM D1004
Carbon Black Content :	100,000 SqFt	2-3%	2.5	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.946	ASTM D792
Melt Flow Index:	100,000 SqFt	>0.5g/10 min	0.12	ASTM D123
Dimensional Stability:	100,000 SqFt	+/- 2.0% max	-0.23	ASTM D1204
Environ. Stress Crack:	Certified	1500 hrs	>1500	ASTM D1204
Low Temp. Brittleness:	Certified	-60 C	>-60 C	ASTM D746

CERTIFIED BY:



Ian Su

QUALITY CONTROL MANAGER

S. I. Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#:	84075017	PROJECT NAME:	Bonnell Closure
MATERIAL:	HDPE TEXTURED 60 MIL	LOCATION:	Newman, GA
LOT/BLEND:	LF2008	SALES ORDER #:	5303
MANUFAC. DATE:	7/20/95		

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.1	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 ppi	161.1	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 ppi	95.5	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.2	ASTM D638
Elongation at Break*: (2.5" gauge length)	25,000 SqFt	100%	398.0	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	88.6	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	70.8	ASTM D1004
Carbon Black Content :	100,000 SqFt	2-3%	2.5	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.946	ASTM D792
Melt Flow Index:	100,000 SqFt	>0.5g/10 min	0.12	ASTM D123
Dimensional Stability:	100,000 SqFt	+/- 2.0% max	-0.23	ASTM D1204
Environ. Stress Crack:	Certified	1500 hrs	>1500	ASTM D1204
Low Temp. Brittleness:	Certified	-60 C	>-60 C	ASTM D746

CERTIFIED BY:

clan Su
n Su
UA *CONTROL MANAGER

Steel Dragon Enterprise Co., Ltd.

CERTIFICATE OF QUALITY ASSURANCE

ROLL#:	84075018	PROJECT NAME:	Bonnell Closure
MATERIAL:	HDPE TEXTURED 60 MIL	LOCATION:	Newman, GA
LOT/BLEND:	LF2008	SALES ORDER #:	5303
MANUFAC. DATE:	7/20/95		

<u>TEST</u>	<u>FREQUENCY</u>	<u>SPECIFICATIONS</u>	<u>TEST RESULTS</u>	<u>TEST METHOD</u>
Average Thickness:	Every Roll	60 mils	60.1	ASTM D751
Tensile Strength at Yield:	25,000 SqFt	126 psi	161.1	ASTM D638
Tensile Strength at Break:	25,000 SqFt	75 psi	95.5	ASTM D638
Elongation at Yield:	25,000 SqFt	12%	16.2	ASTM D638
Elongation at Break*: * (2.5" gauge length)	25,000 SqFt	100%	398.0	ASTM D638
Puncture Resistance:	50,000 SqFt	72 lbs	88.6	FTMS 101, (2065)
Tear Resistance:	50,000 SqFt	39 lbs	70.8	ASTM D1004
Carbon Black Content :	100,000 SqFt	2-3%	2.5	ASTM D1603
Carbon Dispersion:	100,000 SqFt	A1, A2 or B1	A1	ASTM D3015
Density (min):	100,000 SqFt	0.940 g/cm ³	0.946	ASTM D792
Melt Flow Index:	100,000 SqFt	>0.5g/10 min	0.12	ASTM D123
Dimensional Stability:	100,000 SqFt	+/- 2.0% max	-0.23	ASTM D1204
Environ. Stress Crack:	Certified	1500 hrs	>1500	ASTM D1204
Low Temp. Brittleness:	Certified	-60 C	>-60 C	ASTM D746

CERTIFIED BY:

Ian Su

QUALITY CONTROL MANAGER

Geocomposite Mfg.

QC Certs



ENTERPRISES, INC.

Engineered Solutions To Drainage Problems

September 22, 1995

Sold to: Serrot
125 Cassia Way
Henderson, NV. 89014
Purchase Order: 19752

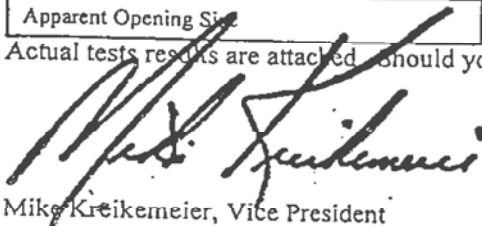
Reference: JDR's work order: J00001348
Bill of Lading #: 04830, 04831
Date of Shipment: 09-21-95
of Rolls/Square feet: 132/138600 sq/ft
Project: William J. Bonnell Co. Inc. - Bonnell Closure
25 Bonnell Street
Newnan, Ga. 30284

This letter is to certify J-DRain 200 FNF manufactured by JDR Enterprises, Inc., meets the following properties per the attached documentation

J-DRain 200 FNF

Properties	Test Method	Value
Thickness	ASTM D-1777	.2 in.
Density of Polymer	ASTM D-1505	.940 (g/cm ³)
Roll Width	-----	7 (feet)
Roll Length	-----	150 (feet)
Square Feet per Roll	-----	1050
Carbon Black	ASTM D-1603	2-3%
*Transmissivity at 15,000 psf (m ² /s)	ASTM D-4716	1 x 10 ⁻³
Peel Strength	ASTM D-413	2 lb per inch
Tensile Strength	ASTM D-1682	50 lbs per inch
Mass per Unit Area	ASTM D-3776	.18 lbs per foot
*The transmissivity is measured by placing the geonet only between two steel plates and a gradient of one.		
AMOCO 4506		
Fabric Weight	ASTM D-3776	6.0 oz/yd ²
Thickness	ASTM D-1777	65 mils
Grab Tensile	ASTM D-4632	150 lbs
Grab Elongation	ASTM D-4632	50%
Trapezoid Tear	ASTM D-4533	65 lbs
Puncture Resistance	ASTM D-4833	90 lbs
Mullen Burst	ASTM D-3786	350 lbs
Permittivity	ASTM D-4491	90 gal/min/ft ²¹
Apparent Opening Size	ASTM D-4751	70 US Std Sieve

Actual tests results are attached. Should you need additional information, please do not hesitate to contact our office.


Mike Kreikemeier, Vice President

QUALITY CONTROL DATA SHEET

APPROVED BY

TEST SAMPLE INFORMATION

LOT NUMBER

J00001348-HH

ROLL NUMBER

1348-38

DATA ON RAW MATERIAL USED DURING MANUFACTURING

TOP FABRIC TYPE

Amoco 6 oz. - 101877006

BOTTOM FABRIC

Amoco 6 oz. - 101820207

RESIN RAIL #

CCBX58376

BLACK COLOR CONCENTRATE

LOT #

08951689

CARBON BLACK TEST

TEST METHOD

ASTM D-1603

CARBON BLACK CONTENT YIELDS

2.45%

MASS PER UNIT AREA

TEST METHOD

ASTM D-3776

.182 lb/ft

TENSILE STRENGTH TEST

TEST METHOD

ASTM D-1682
(5 TESTS ARE PERFORMED ON EACH SAMPLE ROLL)

MEAN VALUE

MD-63.9 lb/in CM-20.53 lb/in

PEEL STRENGTH TEST

TEST METHOD

ASTM D-413
(5 TESTS ARE PERFORMED ON EACH SAMPLE ROLL)

TOP FABRIC

2.28575 lb/in

BOTTOM FABRIC

3.00225 lb/in

DENSITY OF GEONET TEST

TEST METHOD

ASTM D-792/
D-1505

.958 g/cm

MANAGER APPROVAL

JDR Enterprises, Inc.
725 Branch Drive
Alpharetta, Georgia 30201
(404) 442-1461 or (800) 943-7569
fax: (404) 664-7951

QUALITY CONTROL DATA SHEET

APPROVED BY

Danny Chacon

TEST SAMPLE INFORMATION

LOT NUMBER J00001348-HH

ROLL NUMBER 1348-76

DATA ON RAW MATERIAL USED DURING MANUFACTURING

TOP FABRIC TYPE Amoco 6 oz. - 101421357

BOTTOM FABRIC Amoco 6 oz. - 101455992

RESIN RAIL # CCBX58376

BLACK COLOR CONCENTRATE LOT # 09950945

CARBON BLACK TEST

TEST METHOD ASTM D-1603

CARBON BLACK CONTENT YIELDS 2.72%

MASS PER UNIT AREA

TEST METHOD ASTM D-3776 .174 lb/ft

TENSILE STRENGTH TEST

TEST METHOD ASTM D-1682
(5 TESTS ARE PERFORMED ON EACH SAMPLE ROLL)

MEAN VALUE MD-71.65 lb/in CM-20.12 lb/in

PEEL STRENGTH TEST

TEST METHOD ASTM D-413
(5 TESTS ARE PERFORMED ON EACH SAMPLE ROLL)

TOP FABRIC 3.229 lb/in

BOTTOM FABRIC 3.01 lb/in

DENSITY OF GEONET TEST

TEST METHOD ASTM D-792/
D-1505 .958 g/cm

MANAGER APPROVAL

[Signature]

JDR Enterprises, Inc.
725 Branch Drive
Alpharetta, Georgia 30201
(404) 442-1461 or (800) 943-7569
fax: (404) 664-7951

STRAIGHT BILL OF LADING— SHORT FORM

ORIGINAL—NOT NEGOTIABLE

Shipper's No. 04830

Carrier's Name:

TruamTL #1

Carrier's No.

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of lading.

at Alpharetta GA (Date) 9/21 1995 FROM QPR Enterprises

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as shown below, which said company (the word company being throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its own railroad, water line, highway, or route, or within the territory of its highway operations, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or a part of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Bill of Lading set forth (1) in the Uniform Freight Classification in effect on the date hereof, if this is a rail or rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consigned TO William G. Bonnell Co Inc (Mail or street address for purposes of notification only.)

On Collect on Delivery Shipments, the letters "C.O.D." must appear before consignee's name or as otherwise provided in Item 430, Sec. 1.

Destination Bonnell Close Street 25 Bonnell Street City County Newnan State GA Zip 30284Route Attn: Terry Snell Delivery Address Delivering Carrier Call for delivery appointment (A To be filled in only when shipper desires and governing tariffs provide for delivery thereat.)Collect on Delivery \$ 404-254-7690 And Remit to Street City State No. Packages K.M. Kind of Package, Description of Articles, Special Marks, and Exceptions Weight (Subject to Correction) Class or Rate Check Column 95 Rolls Plastic Article 27000⁺ TL 3 QPR 200 FNF 6oz Amoco Bag, tri

Subject to Section 7 of conditions, if ment is to be delivered to the consignee recourse on the consignee, the consignee shall not make delivery shipment without payment of freight other lawful charges.

(Signature of consignee.)

C. O. D. Charges to be

Paid by ☐ Shipper ☐ Consignee

If charges are to be prepaid, stamp here, "To be Prepaid."

TO BE PFReceived \$ in prepayment of the charges on property described hereon.

Agent or Cashier

Per (The signature here acknowledges only the amount prepaid.)

Charges Advanced:

\$

1 The fibre containers used for this shipment conform to the specifications set forth box maker's certificate thereon, and are requirements of Rule 41 of the Uniform Classification and Rule 5 of the National Freight Classification.

2 Shipper's Imprint in lieu of stamp; not of bill of lading approved by the Interstate Commerce Commission.

*If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is carrier's or shipper's weight.
NOTE — Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding

per

QPR Enterprises Shipper, Per G. HeavenEPW

Permanent post-office address of shipper,

725 Branch A Alpharetta GAPer TRISM 9-21-95

1

04830

FROM:

gpr
Sarnot

TL#

SOLD TO <i>Servot</i>	
ADDRESS	
SHIP TO <i>William J Bonnell Co Inc</i>	
ADDRESS <i>Bonnell Closure 25 Bonnell St Newnan</i>	
CUSTOMER'S NO. <i>19752</i>	SHIPPER'S NO.
SALESMAN	DATE <i>GA 9-21-95</i>
QUANTITY	DESCRIPTION
<i>95</i>	<i>Drain 200 TNF 602 Amoco</i>
<i>3</i>	<i>Bags, two</i>
PACKED BY	CHECKED BY
CARTON-PKGS	TOTAL WEIGHT
SHIP VIA	<i>27000⁺L</i>
<i>TRISM</i>	

T5082

PLEASE NOTIFY US IMMEDIATELY
IF ERROR IS FOUND IN SHIPMENT

STRAIGHT BILL OF LADING— SHORT FORM

ORIGINAL—NOT NEGOTIABLE

Shipper's No. 04831

Carrier's Name:

Landstey RanchTL #2

Carrier's No.

RECEIVED subject to the classifications and tariffs in effect on the date of the issue of this Bill of lading.

at Alpharetta, MA (Date) 9/21 1995 FROM JDR Enterprises

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and described as shown below, which said company (the word company being used throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its own railroad, water line, highway or routes, or within the territory of its highway operations, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Bill of Lading set forth (1) in the Uniform Freight Classification in effect on the date hereof, if this is a rail or rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this shipment and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consigned TO William J. Bonnell Co Inc Bonnell Closure

On Collect on Delivery Shipments, the letters "C.O.D." must appear before consignee's name or as otherwise provided in Item 430, Sec. 1.

Destination 25 Bonnell St. Street Newnan GA 30284 City

County _____ State _____ Zip _____

Route Attn: Terry Snell Delivery Address *

(*To be filled in only when shipper desires and governing tariffs provide for delivery thereat.)

Delivering Carrier CALL FOR Delivery appt! Car or Vehicle Initials and No. _____Collect on Delivery \$ 404-254-71090 And Remit to _____

Street _____ City _____ State _____

No. Packages	H.M.	Kind of Package, Description of Articles, Special Marks, and Exceptions	Weight (Subject to Correction)	Class or Rate	Check Column
37		Rolls Plastic Artelin	15000 ⁺ L	TL	
6		JDRain 200 FNF Looz Amoco			
		Bag, tur			

*If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is carrier's or shipper's weight.
NOTE — Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding

JDR Enterprises Shipper, Per J. HeaverPermanent post-office address of shipper, 725 Branch B Alpharetta GA

Per

Subject to Section 7 of conditions, if the shipment is to be delivered to the consignee, recourse on the consignee, the consignee signs the following statement:
The carrier shall not make delivery of shipment without payment of freight or other lawful charges.

(Signature of consignor.)

C. O. D. Charges to be

Paid by

☐ Shipper ☐ Consignee

If charges are to be prepaid, write stamp here, "To be Prepaid."

TO BE PP.Received \$ _____ to
in prepayment of the charges on
property described herein.

Agent or Cashier

Per _____
(The signature here acknowledges only
the amount prepaid.)

Charges Advanced:

* The fibre container used for this shipment conform to the specifications set forth in box maker's certificate thereon, and all requirements of Rule 41 of the Uniform Freight Classification and Rule 5 of the National Freight Classification.
† Shipper's imprint in lieu of stamp; not of bill of lading approved by the Inter Commerce Commission.

1

04831

FROM:

Opp Interview TL #2

SOLD TO		William G. Bonnell Co Inc	
ADDRESS		(Secret)	
SHIP TO		William G. Bonnell Co Inc Bonnell	
ADDRESS		Clausen 25 Bonnell St Newnan GA	
CUSTOMER'S NO.	SHIPPER'S NO.	SALESMAN	DATE
19752			9-21-95
QUANTITY	DESCRIPTION		
37	GDRUM 200 TNF 60Z Amold		
6	Eng. tw		
PACKED BY	CHECKED BY	CARTON-PKGS	TOTAL WEIGHT
			15000'1-
SHIP VIA		Ranger	

TS082

PLEASE NOTIFY US IMMEDIATELY
IF ERROR IS FOUND IN SHIPMENT

STANDRIDGE COLOR CORP.

JDR ENTERPRISES INC.

SEP-95

Q.C. DATA

Page 1

DL = DELTA L / LIGHT * DARK
 DA = DELTA A / RED * GREEN AXIS
 DB = DELTA B / YELLOW * BLUE AXIS
 DC = DELTA C / DELTA CHROMATICITY

DE = DELTA E / DELTA ENTIRITY
 STR = STRENGTH
 ASH = ASH CONTENT

SCC	LOT	DL	DA	DB	DC	DE	STR	ASH
1501	04950964	.74	-.01	-.03	.04	.75	95	49
1501	04951257	-.29	.03	.18	.19	.35	101	51
1501	04951784	.49	-.01	.09	.09	.5	96	48
1501	05950529	.54	.01	-.01	.02	.54	96	49
1501	05951840	.56	.07	.24	.25	.62	98	49
1501	05951070	0	.03	.28	.28	.28	100	49
1501	05951855	.35	0	.31	.31	.47	97	49
1501	06950128	-.26	0	.35	.35	.44	101	52
1501	06951942	.39	-.03	.17	.17	.43	97	50
1501	07951013	-.15	0	.13	.14	.21	101	49
1501	07951335	.3	.06	.51	.51	.6	96	49
1501	06950907	.51	.01	.23	.23	.56	96	51
1501	07951403	.26	.04	.5	.5	.57	96	49
1501	08950370	-.15	.2	.26	.27	.31	100	49
1501	07951690	-.68	.01	.53	.53	.86	103	49
1501	08950171	-.06	.03	.26	.27	.27	101	50
1501	08951270	.48	.1	.04	.11	.5	97	52
1501	08951325	.25	-.04	.11	.11	.27	98	51
1501	08951689	-.29	.13	.59	.61	.68	100	51
1501	09950945	.38	-.05	-.04	.06	.39	97	48

P. SE NOTE *** THE LAST LOT # IS THE CURRENT LOT
 PLEASE NOTE *** NO DATA INDICATES STANDARD LOT

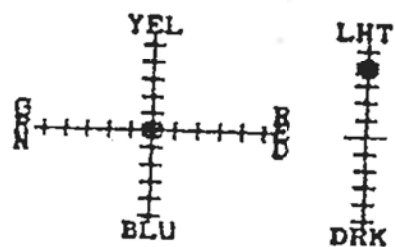
STANDRIDGE COLOR CORPORATION

9-15-95 Large Area Included 10° Obs.
SCC-1501

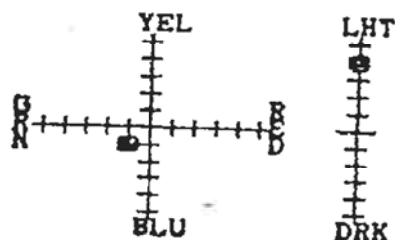
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		SAMPLE	STANDARD	DELTA
D65	L*	41.49	41.11	0.38
	a*	-1.00	-0.95	-0.05
	b*	-3.86	-3.82	-0.04
	DC			0.06
	DE			0.39
A	L*	41.08	40.71	0.37
	a*	-2.11	-2.05	-0.06
	b*	-4.32	-4.26	-0.06
	DC			0.08
	DE			0.39
F2	L*	41.24	40.86	0.38
	a*	-0.66	-0.65	-0.01
	b*	-4.48	-4.41	-0.07
	DC			0.07
	DE			0.39

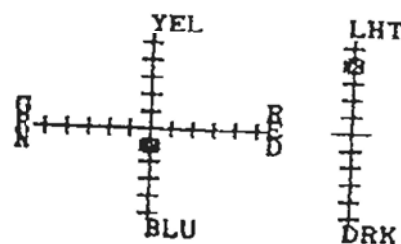
CIELab I11 D65
0.10 Units/Div

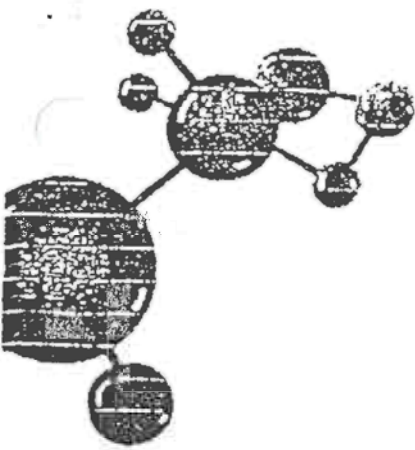


CIELab I11 A
0.10 Units/Div



CIELab I11 F2
0.10 Units/Div



**SPI****Southern Polymer, Inc.**

8151 Powers Ferry Road, N.W. - Suite 590 - Atlanta, GA 30339 • (404) 816-0607 • FAX (404) 916-0608

**MEDIUM & HIGH DENSITY POLYETHYLENE
MATERIAL ANALYSIS REPORT****DELIVERED TO:**
JDR ENTERPRISES, INC.
ALPHARETTA, GA**SOLD TO: SAME**
CUSTOMER P.O. #: 20675-1
SPI INVOICE # 01346401
SHIP DATE : 09-11-95**SPI TYPE CODE : SP 0203**
SPI LOT NUMBER : P07611
RAIL CAR NUMBER : CCBX 58376

PROPERTY	VALUE
DENSITY	0.950 g/cm ³
MELT INDEX	0.26 g per 10 min
COLOR	NATURAL

Note: The information provided is based upon values represented to us by the manufacturer and is correct to the best of our knowledge. Southern Polymer, Inc. makes no warranty or representation as to the suitability of the product as specified herein for any particular application. The determination of the suitability of the above specification for any particular use is solely the responsibility of the user.



Amoco Fabrics and Fibers Company

Quality Control Department
P. O. Box 836
Hazlehurst, Georgia 31539-0451

September 15, 1995

J D.R Enterprises
725 Branch Drive
Alpharetta, GA 30201

SEP 18 1995

Re: Purchase Order # 20783
Amoco Shipping # Q1199, dated September 14, 1995

Amoco Style 4506 is a 100% polypropylene nonwoven needlepunched fabric. This engineered geotextile is stabilized to resist degradation due to ultraviolet exposure. It is resistant to commonly encountered soil chemicals, mildew, and insects, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13 making it one of the most stable polymers available for geotextiles today. The Amoco 4506 conforms to the physical property values listed below:

<u>Property</u>	<u>Unit</u>	<u>Test Method</u>	<u>Typical Value</u>	<u>Minimum Average Roll Value</u>
Weight	oz/yd ²	ASTM-D-3776	6.74	6.0
Thickness	Mils	ASTM-D-1777	71	65
Grab Tensile (CMD/MD)	lbs.	ASTM-D-4632	210/182	150
Grab Tensile Elongation % (CMD/MD)	%	ASTM-D-4632	60/64	50
Mullen Burst	psi	ASTM-D-3786	383	350
Puncture Resistance	lbs.	ASTM-D-4833	116	90
Trapezoid Tear (CMD/MD)	lbs.	ASTM-D-4533	85/72	65
Permittivity	Gal/Min/Ft ²	ASTM-D-4491	110	90
Apparent Opening Size (% Retained)	Sieve Size	ASTM-D-4751	140	70
Permittivity	Sec ⁻¹	ASTM-D-4491	2.0	1.7
UV Resistance (Strength Retained)	* %	ASTM-D-4355	80	70

* % strength retention after 500 hours of conditioning
CMD - Cross Machine Direction
MD - Machine Direction

Bennie J. Boutwell

Bennie J. Boutwell
Quality Assurance Manager
Amoco Fabrics and Fibers Company

mom

WORK ORDER NUMBER J00001348-HH
TRUCK LOAD #1

TRUCK LOAD #1											
ROLL #	SIZE	THICKNESS	WEIGHT	FABRIC	FABRIC VENDOR		RESIN	COLOR	DATE	SHIFT	
					TOP	BOTTOM					
1348	4	7X150	0.203	322	6 OZ AMO	101876378	101876770	CCBX58376	08951689	09-19-95	B
1348	6	7X150	0.2	330	6 OZ AMO	101876605	101876770	CCBX58376	08951689	09-19-95	B
1348	14	7X150	0.203	331	6 OZ AMO	101876700	101877086	CCBX58376	08951689	09-19-95	B
1348	17	7X150	0.202	329	6 OZ AMO	101876633	101876650	CCBX58376	08951689	09-19-95	B
1348	18	7X150	0.202	332	6 OZ AMO	101876633	101876650	CCBX58376	08951689	09-19-95	B
1348	19	7X150	0.2	331	6 OZ AMO	101876633	101876650	CCBX58376	08951689	09-19-95	B
1348	21	7X150	0.203	332	6 OZ AMO	101876633	101876650	CCBX58376	08951689	09-19-95	B
1348	22	7X150	0.203	327	6 OZ AMO	101876633	101876649	CCBX58376	08951689	09-19-95	B
1348	26	7X150	0.204	321	6 OZ AMO	101876633	101876649	CCBX58376	08951689	09-19-95	B
1348	27	7X150	0.201	323	6 OZ AMO	101876567	101876649	CCBX58376	08951689	09-19-95	B
1348	28	7X150	0.203	330	6 OZ AMO	101876567	101876649	CCBX58376	08951689	09-19-95	B
1348	29	7X150	0.205	331	6 OZ AMO	101876567	101409648	CCBX58376	08951689	09-19-95	B
1348	30	7X150	0.203	342	6 OZ AMO	101876564	101409648	CCBX58376	08951689	09-19-95	B
1348	31	7X150	0.203	340	6 OZ AMO	101876564	101409648	CCBX58376	08951689	09-19-95	B
1348	32	7X150	0.202	340	6 OZ AMO	101876564	101409648	CCBX58376	08951689	09-19-95	B
1348	33	7X150	0.202	340	6 OZ AMO	101876564	101409648	CCBX58376	08951689	09-19-95	B
1348	34	7X150	0.2	343	6 OZ AMO	101876564	101409648	CCBX58376	08951689	09-19-95	B
1348	35	7X150	0.203	346	6 OZ AMO	101876564	101820207	CCBX58376	08951689	09-19-95	B
1348	36	7X150	0.204	350	6 OZ AMO	101876564	101820207	CCBX58376	08951689	09-19-95	B
1348	37	7X150	0.202	350	6 OZ AMO	101877006	101820207	CCBX58376	08951689	09-19-95	B
1348	38	7X150	0.203	342	6 OZ AMO	101877006	101820207	CCBX58376	08951689	09-19-95	B
1348	39	7X150	0.201	338	6 OZ AMO	101877006	101820207	CCBX58376	08951689	09-19-95	B
1348	40	7X150	0.203	340	6 OZ AMO	101877006	101444426	CCBX58376	08951689	09-19-95	B
1348	41	7X150	0.203	347	6 OZ AMO	101877006	101444426	CCBX58376	08951689	09-19-95	B
1348	42	7X150	0.201	321	6 OZ AMO	101876630	101444426	CCBX58376	08951689	09-19-95	B
1348	43	7X150	0.202	329	6 OZ AMO	101876630	101444426	CCBX58376	08951689	09-19-95	B
1348	44	7X150	0.202	332	6 OZ AMO	101876630	101444426	CCBX58376	08951689	09-19-95	B
1348	45	7X150	0.202	329	6 OZ AMO	101876630	101444426	CCBX58376	08951689	09-19-95	B
1348	46	7X150	0.202	338	6 OZ AMO	101876630	101820312	CCBX58376	08951689	09-19-95	B
1348	47	7X150	0.203	339	6 OZ AMO	101876630	101820312	CCBX58376	08951689	09-19-95	B
1348	48	7X150	0.203	340	6 OZ AMO	101876630	101820312	CCBX58376	08951689	09-19-95	B
1348	49	7X150	0.202	338	6 OZ AMO	101876348	101820312	CCBX58376	08951689	09-19-95	B
1348	50	7X150	0.202	337	6 OZ AMO	101876348	101820312	CCBX58376	08951689	09-19-95	B
1348	51	7X150	0.203	343	6 OZ AMO	101876348	101422140	CCBX58376	08951689	09-19-95	B

CERTIFICATION FOR:

Sever

DATE: 9-22-95

BY: J. J. J. J. J.

WORK ORDER NUMBER J00001348-HH
TRUCK LOAD #1

HUCK LOAD #1											
ROLL #	SIZE	THICKNESS	WEIGHT	FABRIC	FABRIC VENDOR		RESIN	COLOR	DATE	SHIFT	
					TOP	BOTTOM					
1348	52	7X150	0.202	335	6 OZ AMO	101876348	101422140	CCBX58376	08951689	09-19-95	
1348	53	7X150	0.203	340	6 OZ AMO	101876348	101422140	CCBX58376	08951689	09-19-95	B
1348	54	7X150	0.202	338	6 OZ AMO	101876685	101422140	CCBX58376	08951689	09-19-95	B
1348	55	7X150	0.203	342	6 OZ AMO	101876685	101422140	CCBX58376	08951689	09-19-95	B
1348	56	7X150	0.203	339	6 OZ AMO	101876685	101422140	CCBX58376	08951689	09-19-95	B
1348	57	7X150	0.202	330	6 OZ AMO	101876685	101422140	CCBX58376	08951689	09-19-95	B
1348	58	7X150	0.204	336	6 OZ AMO	101876685	101443927	CCBX58376	08951689	09-19-95	B
1348	59	7X150	0.202	330	6 OZ AMO	101876685	101443927	CCBX58376	08951689	09-19-95	B
1348	60	7X150	0.202	337	6 OZ AMO	101876685	101443927	CCBX58376	08951689	09-19-95	B
1348	61	7X150	0.203	339	6 OZ AMO	101876685	101443927	CCBX58376	08951689	09-19-95	B
1348	62	7X150	0.204	336	6 OZ AMO	101876685	101443927	CCBX58376	08951689	09-19-95	B
1348	63	7X150	0.202	335	6 OZ AMO	101876685	101443927	CCBX58376	08951689	09-19-95	B
1348	64	7X150	0.202	333	6 OZ AMO	101876685	101456211	CCBX58376	08951689	09-19-95	B
1348	65	7X150	0.203	338	6 OZ AMO	101876685	101456211	CCBX58376	08951689	09-19-95	B
1348	66	7X150	0.202	330	6 OZ AMO	101876685	101456211	CCBX58376	08951689	09-19-95	B
1348	67	7X150	0.203	335	6 OZ AMO	101876685	101456211	CCBX58376	08951689	09-19-95	B
1348	68	7X150	0.202	334	6 OZ AMO	101876685	101456211	CCBX58376	08951689	09-19-95	B
1348	69	7X150	0.202	330	6 OZ AMO	101876685	101456211	CCBX58376	08951689	09-19-95	B
1348	70	7X150	0.202	329	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	71	7X150	0.201	320	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	72	7X150	0.202	335	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	73	7X150	0.202	332	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	74	7X150	0.201	327	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	75	7X150	0.202	330	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	76	7X150	0.202	331	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	77	7X150	0.202	329	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	78	7X150	0.201	325	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	79	7X150	0.2	320	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	80	7X150	0.201	322	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	81	7X150	0.201	325	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	82	7X150	0.202	318	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	83	7X150	0.203	330	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	84	7X150	0.203	333	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D
1348	85	7X150	0.202	330	6 OZ AMO	101876685	101820053	CCBX58376	08951689	09-20-95	D

WORK ORDER NUMBER J00001348-HH
TRUCK LOAD #1

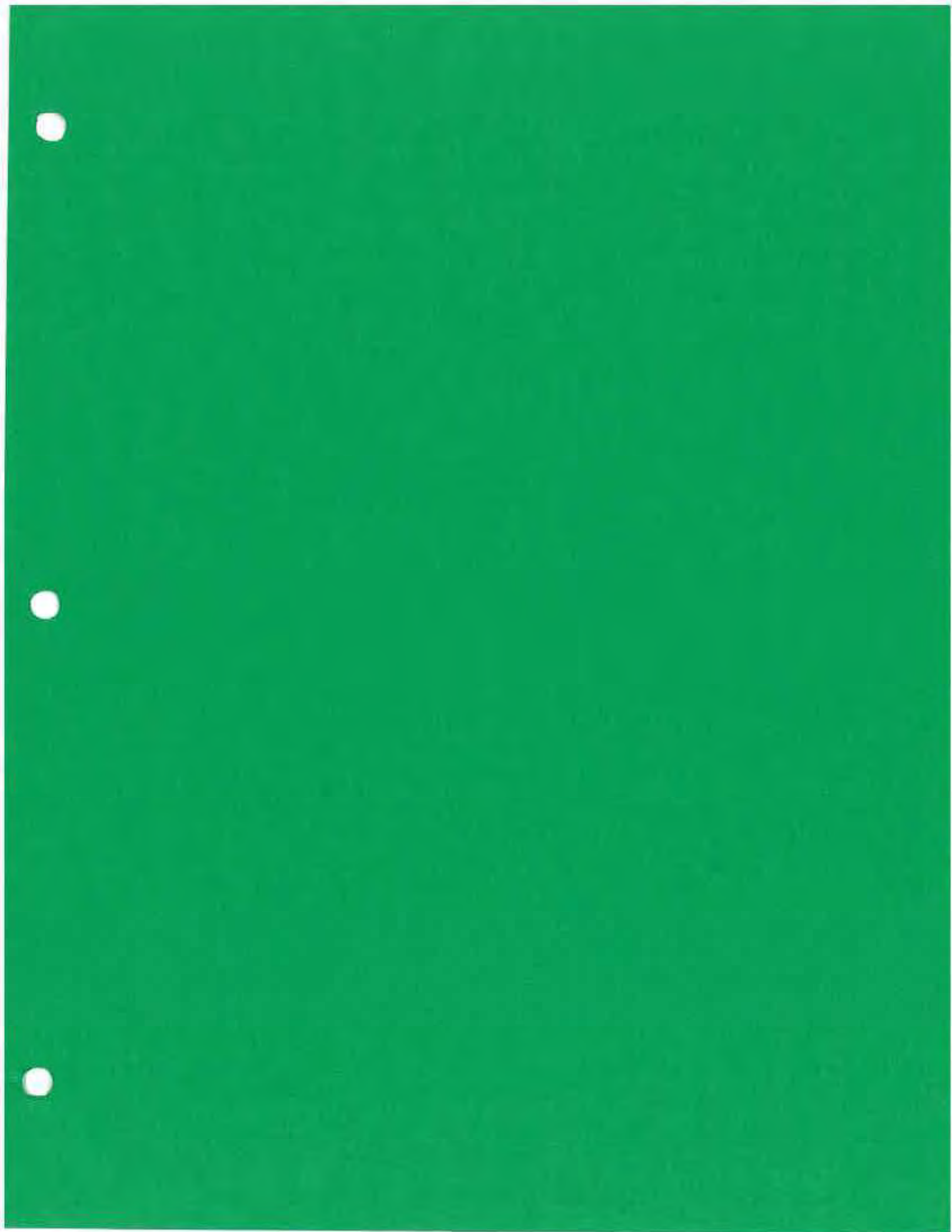
	ROLL #	SIZE	THICKNESS	WEIGHT	FABRIC	FABRIC VENDOR		RESIN	COLOR	DATE	SHIFT
						TOP	BOTTOM				
1348	86	7X150	0.203	336	6 OZ AMO	101375776	101422239	CCBX58376	09950945	09-20-95	D
1348	87	7X150	0.205	340	6 OZ AMO	101375776	101421574	CCBX58376	09950945	09-20-95	D
1348	88	7X150	0.202	335	6 OZ AMO	101375776	101421574	CCBX58376	09950945	09-20-95	D
1348	89	7X150	0.203	340	6 OZ AMO	101421573	101421574	CCBX58376	09950945	09-20-95	D
1348	90	7X150	0.203	345	6 OZ AMO	101421573	101421574	CCBX58376	09950945	09-20-95	A
1348	91	7X150	0.203	340	6 OZ AMO	101421573	101421574	CCBX58376	09950945	09-20-95	A
1348	92	7X150	0.203	349	6 OZ AMO	101421573	101421574	CCBX58376	09950945	09-20-95	A
1348	93	7X150	0.203	340	6 OZ AMO	101421573	101409832	CCBX58376	09950945	09-20-95	A
1348	94	7X150	0.203	342	6 OZ AMO	101455767	101409832	CCBX58376	09950945	09-20-95	A
1348	95	7X150	0.203	341	6 OZ AMO	101455767	101409832	CCBX58376	09950945	09-20-95	A
1348	96	7X150	0.203	350	6 OZ AMO	101455767	101409832	CCBX58376	09950945	09-20-95	A
1348	97	7X150	0.202	330	6 OZ AMO	101455767	101409832	CCBX58376	09950945	09-20-95	A
1348	98	7X150	0.202	370	6 OZ AMO	101455767	101409832	CCBX58376	09950945	09-20-95	A
1348	99	7X150	0.201	325	6 OZ AMO	101455767	101456446	CCBX58376	09950945	09-20-95	A
1348	100	7X150	0.202	346	6 OZ AMO	101444400	101456446	CCBX58376	09950945	09-20-95	A
1348	101	7X150	0.202	349	6 OZ AMO	101444400	101456446	CCBX58376	09950945	09-20-95	A
1348	102	7X150	0.201	320	6 OZ AMO	101444400	101456446	CCBX58376	09950945	09-20-95	A
1348	103	7X150	0.202	332	6 OZ AMO	101444400	101444562	CCBX58376	09950945	09-20-95	A
1348	104	7X150	0.202	335	6 OZ AMO	101444400	101444562	CCBX58376	09950945	09-20-95	A
1348	105	7X150	0.203	344	6 OZ AMO	101444400	101444562	CCBX58376	09950945	09-20-95	A
1348	106	7X150	0.203	324	6 OZ AMO	101444400	101444562	CCBX58376	09950945	09-20-95	A
1348	107	7X150	0.202	329	6 OZ AMO	101444430	101444562	CCBX58376	09950945	09-20-95	A
1348	108	7X150	0.202	330	6 OZ AMO	101444430	101444562	CCBX58376	09950945	09-20-95	A
1348	109	7X150	0.202	330	6 OZ AMO	101444430	101444562	CCBX58376	09950945	09-20-95	A
1348	110	7X150	0.202	332	6 OZ AMO	101444430	109508488	CCBX58376	09950945	09-20-95	A
1348	111	7X150	0.202	333	6 OZ AMO	101444430	109508488	CCBX58376	09950945	09-20-95	A
1348	112	7X150	0.202	329	6 OZ AMO	101422413	109508488	CCBX58376	09950945	09-20-95	A

WORK ORDER NUMBER J00001348-HH
TRUCK LOAD #2

ROLL #	SIZE	THICKNESS	WEIGHT	FABRIC	FABRIC VENDOR	RESIN	COLOR	DATE	SHIFT
1348	1	7X150	0.202	323 6 OZ AMO	101876378 101876703	CCBX58376	08951689	09-19-95	B
1348	2	7X150	0.202	333 6 OZ AMO	101876378 101876703	CCBX58376	08951689	09-19-95	B
1348	3	7X150	0.202	331 6 OZ AMO	101876378 101876703	CCBX58376	08951689	09-19-95	B
1348	5	7X150	0.203	332 6 OZ AMO	101876378 101876703	CCBX58376	08951689	09-19-95	B
1348	7	7X150	0.202	324 6 OZ AMO	101876378 101876703	CCBX58376	08951689	09-19-95	B
1348	8	7X150	0.202	334 6 OZ AMO	101876605 101876770	CCBX58376	08951689	09-19-95	B
1348	9	7X150	0.202	360 6 OZ AMO	101876605 101876770	CCBX58376	08951689	09-19-95	B
1348	10	7X150	0.2	342 6 OZ AMO	101876605 101876770	CCBX58376	08951689	09-19-95	B
1348	11	7X150	0.201	323 6 OZ AMO	101876605 101877086	CCBX58376	08951689	09-19-95	B
1348	12	7X150	0.202	332 6 OZ AMO	101876605 101877086	CCBX58376	08951689	09-19-95	B
1348	13	7X150	0.202	339 6 OZ AMO	101876700 101877086	CCBX58376	08951689	09-19-95	B
1348	15	7X150	0.204	340 6 OZ AMO	101876700 101877086	CCBX58376	08951689	09-19-95	B
1348	16	7X150	0.203	344 6 OZ AMO	101876700 101877086	CCBX58376	08951689	09-19-95	B
1348	20	7X150	0.202	345 6 OZ AMO	101876633 101876650	CCBX58376	08951689	09-19-95	B
1348	23	7X150	0.202	335 6 OZ AMO	101876633 101876650	CCBX58376	08951689	09-19-95	B
1348	24	7X150	0.202	319 6 OZ AMO	101876567 101876649	CCBX58376	08951689	09-19-95	B
1348	25	7X150	0.204	325 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	113	7X150	0.202	318 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	114	7X150	0.203	346 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	115	7X150	0.201	323 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	116	7X150	0.209	355 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	117	7X150	0.204	350 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	118	7X150	0.204	340 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	119	7X150	0.203	352 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	120	7X150	0.204	329 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	121	7X150	0.202	351 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	122	7X150	0.204	329 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	123	7X150	0.204	351 6 OZ AMO	101422413 109508488	CCBX58376	08951689	09-19-95	B
1348	124	7X150	0.205	336 6 OZ AMO	101265563 101409985	CCBX58376	08950945	09-20-95	A
1348	125	7X150	0.204	335 6 OZ AMO	101265563 101409985	CCBX58376	08950945	09-20-95	A
1348	126	7X150	0.204	350 6 OZ AMO	101265563 101409985	CCBX58376	08950945	09-20-95	A
1348	127	7X150	0.203	345 6 OZ AMO	101265563 101409985	CCBX58376	08950945	09-20-95	A
1348	128	7X150	0.203	343 6 OZ AMO	101265563 101409985	CCBX58376	08950945	09-20-95	A
1348	129	7X150	0.206	352 6 OZ AMO	101444634 101456593	CCBX58376	08950945	09-20-95	A

WORK ORDER NUMBER J00001348-HH
TRUCK LOAD #2

	ROLL #	SIZE	THICKNESS	WEIGHT	FABRIC	FABRIC VENDOR		RESIN	COLOR	DATE	SHIFT
1348	130	7X150	0.206	330	6 OZ AMO	TOP	BOTTOM				
1348	131	7X150	0.201	312	6 OZ AMO	101444634	101456593	CCBX58376	09950945	09-20-95	A
1348	132	7X150	0.202	318	6 OZ AMO	101444634	101456593	CCBX58376	09950945	09-20-95	A
						101444634	101456593	CCBX58376	09950945	09-20-95	A



APPENDIX N

EMCON GEOMEMBRANE CONFORMANCE TEST RESULTS

AUG 31 '95 11:33 FR TRI ENVIRONMENTAL INC512 263 2558 TO 14046334496

P.03/03



TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS
Paul Valladares
Project Name: BFI-UWL, Area 3

Material: 60 mil textured HDPE geomembrane
Roll #: 83126280
5620

TRI Log #: E2033-06-04

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD	PROJECT SPEC.
Thickness (ASTM D 761, NSF 64)	1	2	3	4	5	6	7	8	9	10			
Thickness (mils)	60	63	63	64	63	63	65	62	60	60	63	2	N/A
	64	60	62	63	62	66	61	64	63	64	60	min.	N/A
	60	62	62	62	63								
Carbon Black Content (ASTM D 1603)													
% carbon black (%)	2.30	2.32									2.30	0.02	N/A
Density (ASTM D 1505)													
Density (g/cm ³)	0.948	0.946	0.946								0.946	0.000	N/A
Tensile Properties (ASTM D 882/NSF 64)													
MD Yield Strength (psi)	167	167	180	146	166						161	8	N/A
TD Yield Strength (psi)	172	163	180	181	168						167	8	N/A
MD Break Strength (psi)	240	226	262	178	217						229	26	N/A
TD Break Strength (psi)	218	182	186	210	186						196	14	N/A
MD Yield Elongation (%)	17	22	30	20	19						20	2	N/A
TD Yield Elongation (%)	21	18	17	16	17						18	2	N/A
MD Break Elongation (%)	487	436	515	388	430						447	80	N/A
TD Break Elongation (%)	444	381	377	413	390						401	28	N/A
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	54	57	55	53	58	58	51	51	55	54	54	3	N/A
TD Tear Strength (lbs)	54	53	54	56	51	54	55	51	55	58	54	1	N/A

MD - Machine Direction
TD - Transverse Direction
N/A - Not Available

The testing herein is based upon accepted industry practice as well as the test method listed.
TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material.

HDN 08-29-95
Quality Review/Data

Duplicate

EMCON

Project: BONNEL
 Client: EMCON NORCROSS
 Sample: ROLL#84045603
 Material: 60 ML TEXTURED HDPE

Proj. No. 72040.009.092

Date: 9-12-95

Test	Readings						Average
Thickness (mils)	59.20	60.90	61.15	60.50	60.95	61.30	60.80
ASTM D751	60.40	61.55	61.50	60.55	60.30	61.30	
	61.25	60.80	60.40	60.00	60.40	61.30	
	61.60	61.05	60.40				

Tear Resist.		52.75	54.62	57.25	56.31	54.56	Average
ASTM	Direction A	54.18	54.62	55.25	59.43	55.31	55.43
D1004		53.68	54.81	55.18	53.12	55.18	
(lbs.)	Direction B	54.93	54.37	52.93	56.00	55.06	54.53

Tensile Properties: ASTM D638		Specimen 1	Specimen 2	Specimen 3	Specimen 4	Specimen 5	Average
Tensile Strength							
Yield	Direction A	169.7	180.2	176.2	178.2	169.2	174.7
(ppi)	Direction B	169.5	171.0	175.2	169.0	163.7	169.7
Break	Direction A	153.2	183.5	139.2	147.5	137.7	152.2
(ppi)	Direction B	136.5	136.5	133.5	139.7	124.0	134.0
Elongation							
Yield %	Direction A	27.7	28.5	28.5	29.2	28.5	28.5
	Direction B	26.2	30.0	29.2	26.2	26.2	27.6
Break %	Direction A	392.0	404.0	228.0	260.0	220.0	300.8
	Direction B	356.0	232.0	240.0	220.0	152.0	240.0

	Specimen 1	Specimen 2	Specimen 3	Average
Carbon Black, % ASTM D1603	2.0837	2.1799	2.0293	2.0976

Remarks:

Thickness: Tested with Mitutoyo Model No. 326-711 Digital Micrometer.
 Readings taken at 1 foot intervals along length of roll.

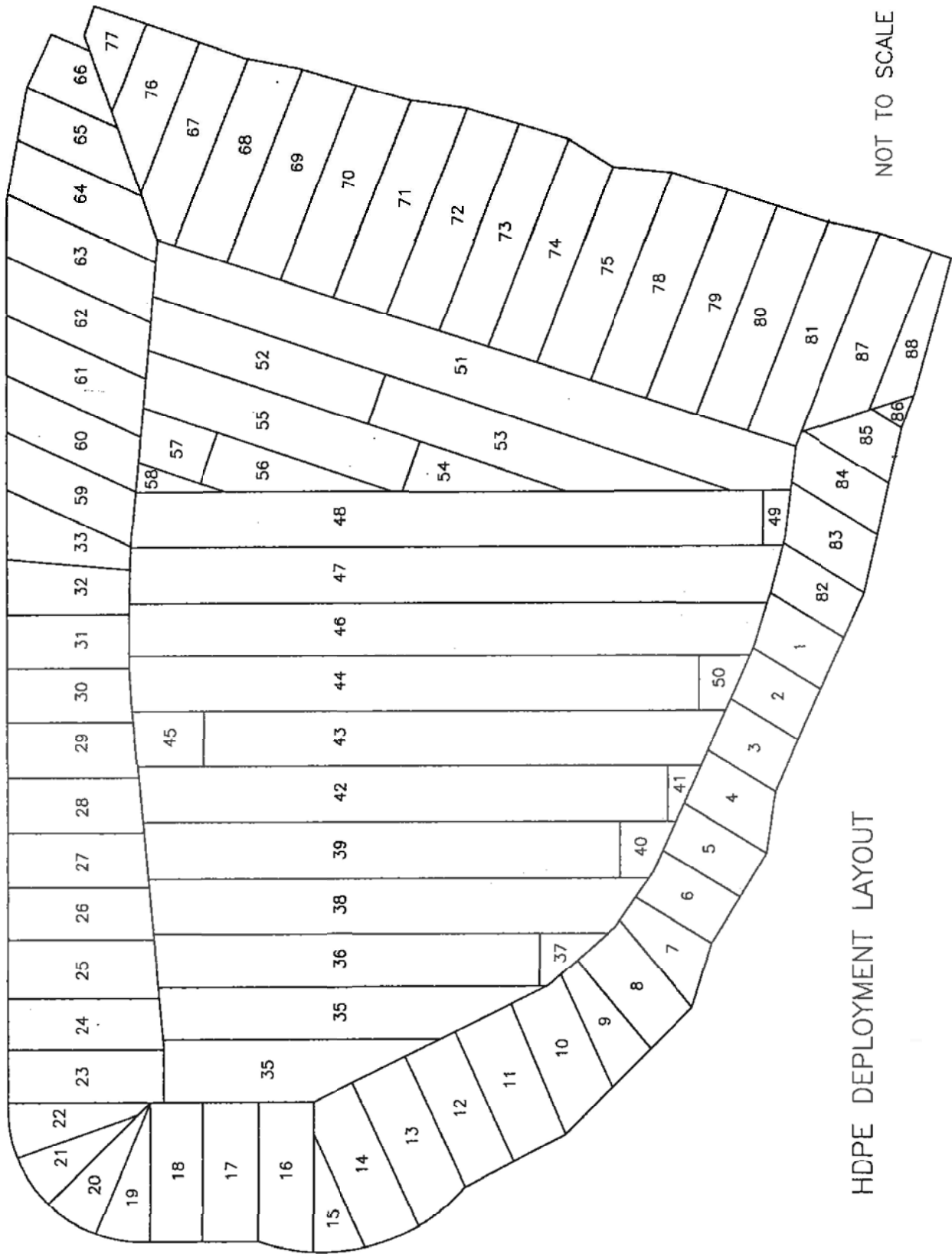
Tensile Properties:

1. Grip separation 2.5".
2. Assumed gauge length 1.3" and 2.5" for yield and break elongations, respectively (as modified by NSF).
3. Direction A = Machine Direction
 Direction B = Cross-Machine Direction



APPENDIX O

GEOMEMBRANE PANEL LAYOUT AND HDPE DEPLOYMENT LOGS



HDPE DEPLOYMENT LAYOUT

NOT TO SCALE

1560 OAKBROOK DR. SUITE 100 NORCROSS, GA 30093 PHONE: 404/447-4665 FAX: 404/447-9079	DEPLOYMENT SUMMARY	
	PROJECT NAME:	<u>Bonne 1</u>
	PROJECT NO.:	<u>72040.009.092</u>
	DATE:	<u>10-9-95</u>
	REVIEWED BY:	<u>JH</u>
	DATE REVIEWED:	<u>10-21-95</u>

10-21-95

[illegible]

1560 OAKBROOK DR. SUITE 100 NORCROSS, GA 30093 PHONE: 404/447-4665 FAX: 404/447-9079	DEPLOYMENT SUMMARY	
	PROJECT NAME:	<u>Bonne /</u>
	PROJECT NO.:	<u>72040.009.092</u>
	DATE:	<u>10-2-95</u>
	REVIEWED BY:	<u>JY</u>
	DATE REVIEWED:	<u>10-20-95</u>

10-20-95

[illegible]

DEPLOYMENT SUMMARY

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME:

Bonne /

PROJECT NO.:

72040.009.092

DATE:

10-2-95 (Mon)

REVIEWED BY:

JH

DATE REVIEWED:

10-20-95

PANEL NUMBER	ROLL NUMBER	LENGTH (FT)	WIDTH (FT)	AREA (SF)	QA INITIALS	COMMENTS
59	84075015	54	22	1188 1188	JH	
60	84075015	56	22	1232 2420	JH	
61	84075015	57	22	1254 3674	JH	
62	84075015	60	22	1320 4994	JH	
63	84075015	64	22	1408 6402	JH	
64	84075015	62	22	1364 7766	JH	
65	84075015	61	22	1342 9108	JH	
66	84075015	—	—	—	JH	Sec. off of P65 5th corner
67	84075016	81	22	1782 10890	JH	
68	84075016	78	22	1716 12606	JH	
69	84075016	82	22	1804 14410	JH	
70	84075016	80	22	1760 16120	JH	
71	84075016	82	22	1804 17984	JH	
72	84075013	81	22	1782 19764	JH	
73	84075013	82	22	1804 21568	JH	
74	84075013	80	22	1760 23328	JH	
75	840750	81	22	1782 25110	JH	
76	840750	80	22	1760 26870	JA	
77	840750	—	—	—	—	Sec. off of P77
78	84075014	85	22	1870 28740	JA	
79	840750	85	22	1870 30610	JA	
80	840750	85	22	1870 32480	JA	

1560 OAKBROOK DR. SUITE 100 NORCROSS, GA 30093 PHONE: 404/447-4665 FAX: 404/447-9079	DEPLOYMENT SUMMARY		SUMMARY
	PROJECT NAME:	PROJECT NAME:	
	PROJECT NO.:	PROJECT NO.:	
	DATE:	DATE:	
	REVIEWED BY:	REVIEWED BY:	
	DATE REVIEWED:	DATE REVIEWED:	

[illegible]

DEPLOYMENT SUMMARY

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: Bonne /
PROJECT NO.: 72040.009.092
DATE: 9-30-95 (Sat)
REVIEWED BY: JH
DATE REVIEWED: 10-20-95

Page 2 pg 03 of

PANEL NUMBER	ROLL NUMBER	LENGTH (FT)	WIDTH (FT)	AREA (SF)	QA INITIALS	COMMENTS
P34	84045616	112	22	2464 2464	JH	
P35	84045616	147	22	3234 5698	JH	
P36	84045616	—	—		JH	Diagonal section cut from P35. S.F. included in P35
P37	84045616	153	22	3366 9064	JH	E.O.R. (End of roll)
P38	84045603	203	22	4466 13530	JH	
P39	84045603	187	22	4114 17644	JH	
P40	84045613	—	—		JH	Diagonal section cut from P38
P41	84045603	—	—		JH	Diagonal section cut from
P42	83105913	209	22	4598 22242	JH	
P43	83105913	211	22	4642 26884	JH	E.O.R.
P44	83125714	221	22	4862 31746	JH	
P45	83125714	30	22	660 32406	JH	
P46	83124411	253	22	5566 37972	JH	
P47	83125704	262	22	5764 43736	JH	
P48	83115800	252	22	5544 49280	JH	→ 83721 S.F. (Cumulative)
P49	83125704	—	—		JH	
P50	8345905	20	22	440 49720	JH	
P51	83115803	266	22	5852 55572	JH	
P52	83125704	90	22	1980 57552	JH	
P53	83115803	144	22	3168 60720	JH	
P54	83115803	63	22		JH	Sec of P53
P55	83115800	112	22	2464 63184	JH	

DEPLOYMENT SUMMARY

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME:

Bonne /

PROJECT NO.:

72040.009.092

DATE:

9-29-95

REVIEWED BY:

574

DATE REVIEWED:

10-20-95

21769

pg 2

[illegible]

DEPLOYMENT SUMMARY

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME:

Bonne /

PROJECT NO.:

72040.009 092

DATE:

(Fri) 9-29-95

REVIEWED BY:

JH

DATE REVIEWED:

10-20-95

- Original -

PANEL NUMBER	ROLL NUMBER	LENGTH (FT)	WIDTH (FT)	AREA (SF)	QA INITIALS	COMMENTS
P-01	83125809	38'	22'	836	JH	N. Slope
P-02	83125809	39'	22'	858/1694	JH	N. Slope
P-03	83125809	39'	22'	858/2552	JH	N. Slope
P-04	83125809	38'	22'	836/3388	JH	N. Slope
P-05	083125809	40'	22'	880/4268	JH	N. Slope
P-06	083125809	40'	22'	880/5148	JH	N. Slope
P-07	083125809	40'	22'	880/6028	JH	NE Slope
P-08	083125809	51'	22'	1122/7150	JH	NE Slope partial roll left (50')
P-09	08315905	64'	22'	1408/8558	JH	NE Slope
P-10	08315905	60'	22'	1320/9878	JH	E. Slope
P-11	08315905	55'	22'	1210/11088	JH	E. Slope
P-12	08315905	59'	22'	1298/12386	JH	E. Slope
P-13	08315905	59'	22'	1298/13684	JH	E. Slope
P-14	08315905	64'	22'	1408/15092	JH	E. Slope
P-15	08315905	59'	22'	1298/16390	JH	E. Slope Partial roll left
P-16	03125809	50'	22'	550/16940	JH	E. Slope 50' 22' 16940 (50')
P-17	84045613	57'	22'	1254/18194	JH	
P-18	84045613	53'	22'	1166/19360	JH	
P-19	84045613	54'	22'	594/19954	JH	54' 22'
P-20	84045613	54'	22'	594/20540	JH	54' 22'
P-21	84045613	56'	22'	1232616/21164/21700	JH	56' 22'
P-22	84045613	55'	22'	605/21769	JH	55' 22'

21769 SF



APPENDIX P

**GEOMEMBRANE SEAM SHEAR TEST REPORTS,
GEOMEMBRANE SEAM PEEL TEST REPORTS,
AIR PRESSURE TEST LOGS, AND
VACUUM TEST LOGS**

EMCON

GEOMEMBRANE SEAM SHEAR TEST REPORT

Assigned by: B.D.
 Tested by: K.H.
 Checked by: R.S.A.
 Date Tested: 10-4-95

Project No.: 72040.009.092
 Client: EMCON NORCROSS
 Project: BONNEL

LABORATORY TEST RESULTS

Sample No.: DS-1
 Seam No.: 1/2
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	167.43	STRETCHING IN BOTTOM SHEET
2		167.68	STRETCHING IN BOTTOM SHEET
3		168.56	STRETCHING IN BOTTOM SHEET
4		168.31	STRETCHING IN BOTTOM SHEET
5		165.18	STRETCHING IN BOTTOM SHEET

Average Load (Pounds) 167.43

Sample No.: DS-2
 Seam No.: P5/6
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	158.12	STRETCHING IN BOTTOM SHEET
2		158.56	STRETCHING IN BOTTOM SHEET
3		157.56	STRETCHING IN BOTTOM SHEET
4		158.18	STRETCHING IN BOTTOM SHEET
5		157.31	STRETCHING IN BOTTOM SHEET

Average Load (Pounds) 157.95

EMCON

GEOMEMBRANE SEAM SHEAR TEST REPORT

Assigned by: B.D.
 Tested by: K.H.
 Checked by: R.S.A.
 Date Tested: 10-4-95

Project No.: 72040.009.092
 Client: EMCON NORCROSS
 Project: BONNEL

LABORATORY TEST RESULTS

Sample No.: DS-3
 Seam No.: 20/21
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	167.81	STRETCHING IN BOTTOM SHEET
2		167.18	STRETCHING IN BOTTOM SHEET
3		167.12	STRETCHING IN BOTTOM SHEET
4		168.31	STRETCHING IN TOP SHEET
5		170.06	STRETCHING IN BOTTOM SHEET

Average Load (Pounds) 168.10

Sample No.: DS-4
 Seam No.: 21/22
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	170.75	STRETCHING IN TOP SHEET
2		171.31	STRETCHING IN TOP SHEET
3		172.56	STRETCHING IN TOP SHEET
4		170.43	STRETCHING IN TOP SHEET
5		167.81	STRETCHING IN BOTTOM SHEET

Average Load (Pounds) 170.57

EMCON

GEOMEMBRANE SEAM SHEAR TEST REPORT

Assigned by: B.D.
 Tested by: K.H.
 Checked by: R.S.A.
 Date Tested: 10-4-95

Project No.: 72040.009.092
 Client: EMCON NORCROSS
 Project: BONNEL

LABORATORY TEST RESULTS

Sample No.: DS-5
 Seam No.: 34/35
 Seamed by:
 Date Seamed:

Sample Size: 1' X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	167.12	STRETCHING IN BOTTOM SHEET
2		164.93	STRETCHING IN BOTTOM SHEET
3		167.31	STRETCHING IN BOTTOM SHEET
4		167.31	STRETCHING IN BOTTOM SHEET
5		165.93	STRETCHING IN BOTTOM SHEET

Average Load (Pounds) 166.52

Sample No.: DS-6
 Seam No.: 36/38
 Seamed by:
 Date Seamed:

Sample Size: 1' X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	163.37	STRETCHING IN TOP SHEET
2		163.50	STRETCHING IN TOP SHEET
3		162.00	STRETCHING IN TOP SHEET
4		163.50	STRETCHING IN TOP SHEET
5		161.06	STRETCHING IN TOP SHEET

Average Load (Pounds) 162.69

EMCON

GEOMEMBRANE SEAM SHEAR TEST REPORT

Assigned by: B.D.
 Tested by: K.H.
 Checked by: R.S.A.
 Date Tested: 10-4-95

Project No.: 72040.009.092
 Client: EMCON NORCROSS
 Project: BONNEL

LABORATORY TEST RESULTS

Sample No.: DS-7
 Seam No.: 42/43
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	179.93	STRETCHING IN BOTTOM SHEET
2		179.18	STRETCHING IN BOTTOM SHEET
3		179.31	STRETCHING IN BOTTOM SHEET
4		176.25	STRETCHING IN BOTTOM SHEET
5		174.68	STRETCHING IN BOTTOM SHEET

Average Load (Pounds) 177.87

Sample No.: DS-8
 Seam No.: 47/46
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	169.00	STRETCHING IN BOTTOM SHEET
2		168.37	STRETCHING IN TOP SHEET
3		168.31	STRETCHING IN BOTTOM SHEET
4		166.50	STRETCHING IN TOP SHEET
5		169.75	STRETCHING IN TOP SHEET

Average Load (Pounds) 168.39

EMCON

GEOMEMBRANE SEAM SHEAR TEST REPORT

Assigned by: B.D.
 Tested by: K.H.
 Checked by: R.S.A.
 Date Tested: 10-4-95

Project No.: 72040.009.092
 Client: EMCON NORCROSS
 Project: BONNEL

LABORATORY TEST RESULTS

Sample No.: DS-9
 Seam No.: 47/48
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	173.50	STRETCHING IN TOP SHEET
2		173.18	STRETCHING IN TOP SHEET
3		172.00	STRETCHING IN TOP SHEET
4		173.62	STRETCHING IN TOP SHEET
5		173.50	STRETCHING IN TOP SHEET

Average Load (Pounds) 173.16

Sample No.: DS-10
 Seam No.: 53/51
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	179.37	STRETCHING IN TOP SHEET
2		182.62	STRETCHING IN TOP SHEET
3		182.50	STRETCHING IN BOTTOM SHEET
4		180.43	STRETCHING IN BOTTOM SHEET
5		178.93	STRETCHING IN TOP SHEET

Average Load (Pounds) 180.77

EMCON

GEOMEMBRANE SEAM SHEAR TEST REPORT

Assigned by: B.D.
 Tested by: K.H.
 Checked by: R.S.A.
 Date Tested: 10-4-95

Project No.: 72040.009.092
 Client: EMCON NORCROSS
 Project: BONNEL

LABORATORY TEST RESULTS

Sample No.: DS-11
 Seam No.: 54/53
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	180.56	STRETCHING IN BOTTOM SHEET
2		182.31	STRETCHING IN BOTTOM SHEET
3		179.00	STRETCHING IN BOTTOM SHEET
4		182.50	STRETCHING IN BOTTOM SHEET
5		180.87	STRETCHING IN BOTTOM SHEET

Average Load (Pounds) 181.05

Sample No.: DS-12
 Seam No.: 59/60
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	173.75	STRETCHING IN BOTTOM SHEET
2		172.93	STRETCHING IN BOTTOM SHEET
3		174.12	STRETCHING IN BOTTOM SHEET
4		172.18	STRETCHING IN BOTTOM SHEET
5		171.25	STRETCHING IN BOTTOM SHEET

Average Load (Pounds) 172.85

EMCON

GEOMEMBRANE SEAM SHEAR TEST REPORT

Assigned by: B.D.
 Tested by: K.H.
 Checked by: R.S.A.
 Date Tested: 10-4-95

Project No.: 72040.009.092
 Client: EMCON NORCROSS
 Project: BONNEL

LABORATORY TEST RESULTS

Sample No.: DS-13
 Seam No.: 68/69
 Seamed by:
 Date Seamed:

Sample Size: 1' X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	171.12	STRETCHING IN BOTTOM SHEET
2		173.25	STRETCHING IN BOTTOM SHEET
3		170.25	STRETCHING IN BOTTOM SHEET
4		173.56	STRETCHING IN BOTTOM SHEET
5		172.93	STRETCHING IN BOTTOM SHEET

Average Load (Pounds) 172.22

Sample No.: DS-14
 Seam No.: 80/81
 Seamed by:
 Date Seamed:

Sample Size: 1' X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	181.68	STRETCHING IN BOTTOM SHEET
2		182.06	STRETCHING IN BOTTOM SHEET
3		180.81	STRETCHING IN BOTTOM SHEET
4		182.00	STRETCHING IN BOTTOM SHEET
5		178.56	STRETCHING IN BOTTOM SHEET

Average Load (Pounds) 181.02

EMCON GEOMEMBRANE SEAM SHEAR TEST REPORT

Assigned by: B.D.
 Tested by: K.H.
 Checked by: R.S.A.
 Date Tested: 10-12-95

Project No.: 72040.009.092
 Client: EMCON NORCROSS
 Project: BONNEL

LABORATORY TEST RESULTS

Sample No.: DS-15
 Seam No.:
 Seamed by:
 Date Seamed:

Sample Size: 1" X 8"
 Material: TEXT HDPE
 Weld Type: HOT WEDGE
 Strain Rate: 2 in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1	60 ML NOMINAL	179.50	STRETCHING IN TOP SHEET
2		181.75	STRETCHING IN BOTTOM SHEET
3		184.43	STRETCHING IN TOP SHEET
4		183.56	STRETCHING IN BOTTOM SHEET
5		183.93	STRETCHING IN TOP SHEET

Average Load (Pounds) = 182.63

Sample No.:
 Seam No.:
 Seamed by:
 Date Seamed:

Sample Size:
 Material:
 Weld Type:
 Strain Rate: in./min.

Specimen No.	Thickness (inches)	Maximum Load (pounds)	Remarks
1			
2			
3			
4			
5			

Average Load (Pounds) 0.00



APPENDIX Q

FIELD TRIAL SEAM TEST LOGS

PROJECT NAME:
PROJECT NO.:
DATE:

FIELD TRIAL SEAM LOG

Bonne /

72040.009.092

117-91-95

REVIEWED BY:

REVIEW DATE:

10-21-95

REVIEW DATE:

[illegible]

PROJECT NAME:
PROJECT NO.:
DATE:

FIELD TRIAL SEAM LOG
Beane /

REVIEWED BY:

REVIEW DATE:

SAMPLE NUMBER	TIME	AMBIENT TEMP (°)	TECH INT.	MACHINE NUMBER	TEMP SET (°)	SPEED PERHAT	PEEL TESTS			PEEL TESTS			SHAR TESTS			PASS OR FAIL	Q.A. INITIALS
							1	2	3	1	2	3	1	2	3		
TSF-1	0740	62°	TA	138	440/5	5	116	107	119	121	114	126	144			P	TA
TSF-2	0734	63°	1F	97	430/4	4	121	113	116	129	134	109	155			P	TA
TSF-3	1235	79°	TA	138	440/5	5	124	111	109	132	121	119	141			P	TA
TSF-4	1242	79°	1F	97	450/4	4	108	101	112	120	106	109	159			P	TA
TSX-1	0830	68°	ET	048	240	6	109	103	111				126			P	TA
TSX-2	0846	68°	EH	012	240	5	112	101	99				134			P	TA
TSX-3	1300	80°	ET	048	240	6	101	101	99				150			P	TA
TSX-4	1304	80°	EH	012	240	6	113	112	106				141			P	TA
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PROJECT NAME:
PROJECT NO.:
DATE:

FIELD TRIAL SEAM LOG

Bonne /

772440.009.092

10-1-95

RI

REVIEWED BY:
REVIEW DATE:

74
10-20-75

[illegible]

TSF	Trial/Seam fusion
TSX	Trial/seam extension

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NO.:

DATE:

FIELD TRIAL SEAM LOG

Bonne /

72040.009.092

9-30-95

REVIEWED BY:

REVIEW DATE:

10-20-95

[illegible]

TSF - Trial/Seam fusion
TSX - Trial/Seam extension

10-20-95

Bonne 11

72040.009.092

9-29-95

10-20-95

* Mach #107 pulled off production

PROJECT NAME:
PROJECT NO.:
DATE:

FIELD TRIAL SEAM LOG

REVIEWED BY:
REVIEW DATE:[illegible]

TSF Trial/Seam fusion
TSX → Trial/Seam extrusion

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: Bermel
PROJECT NO.: 72040.009.092
DATE: 10-9-95

REVIEWED
BY: JH
REVIEW
DATE: 10-20

SEAMING LOG

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (°F) SPEED	TRCH INITIALS	LENGTH	Q.A. INITIALS	TEST DATE	COMMENTS
01/82	138	SEOS	NEOS	450/5	LF	33'	JH	10-9	
02/83	138	SEOS	NEOS	450/5	LF	37'	JH	10-9	
03/84	138	SEOS	NEOS	450/5	LF	39'	JH	10-9	
04/85	138	SEOS	NEOS	450/5	LF	40'	JH	10-9	
05/86	138	SEOS	NEOS	450/5	LF	17'	JH	10-9	
01/87	138	SEOS	NEOS	450/5	LF	85'	JH	10-9	
07/88	138	SEOS	NEOS	450/5	LF	65'	JH	10-9	
47/82	138	SEOS	NEOS	450/5	LF	25'	JH	N/A	Seamed covered by 6N
49/83	138	SEOS	NEOS	450/5	LF	21'	JH	N/A	Covered by 6N
51/84	138	SEOS	NEOS	45/60	LF	18'	JH	10-9	
81/84	138	SEOS	NEOS	450/5	LF	10'	JH	N/A	Covered by 6N
85/87	138	SEOS	NEOS	450/5	LF	29'	JH	10-9	
86/88	138	SEOS	NEOS	450/5	LF	17'	JH	10-9	

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

SEAMING LOG

PROJECT NAME: Bernel
PROJECT NO.: 7240.009.092
DATE: 10-2-95

REVIEWED
BY: TH
REVIEW
DATE: 12-20

[illegible]

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

SEAMING LOG

PROJECT NAME: Bennet
PROJECT NO.: 72040.009.092
DATE: 10-2-95

REVIEWED BY: STY
REVIEW DATE: 10-20

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (F) SPEED	TECH INITIALS	LENGTH	QA INITIALS	TEST DATE	COMMENTS
P62/P55	097	E605	W605	450/4.0	LF	6.0'	JA	N/A	Covered by 54
P62/P52	097	"	"	"	"	20.0'	JA	10-2	
P63/P52	"	"	"	"	"	54.0'	JA	10-2	
P63/P51	"	"	"	"	"	20.0'	JA	10-2	
P64/P51	"	"	"	"	"	6.0'	JA	10-2	
P64/P51	"	SE05	NE05	"	"	1.0'	JA	10-2	Duplicate
P67/P51	"	"	"	"	"	9.0'	JA	10-2	
P68/P51	"	"	"	"	"	22.0'	JA	10-2	
P69/P51	"	"	"	"	"	22.0'	JA	10-2	
P70/P51	"	"	"	"	"	22.0'	JA	10-2	
P71/P51	"	"	"	"	"	22.0'	JA	10-2	
P72/P51	"	"	"	"	"	22.0'	JA	10-2	
P73/P51	"	"	"	"	"	22.0'	JA	10-2	
P74/P51	"	"	"	"	"	22.0'	JA	10-2	
P75/P51	"	"	"	"	"	22.0'	JA	10-2	

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: Bennel
PROJECT NO.: 72040.009.092
DATE: 10-2-95

SEAMING LOG

REVIEWED BY: TH
REVIEW DATE: 10-20

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (°F) SPEED	TECH INITIALS	LENGTH	QA INITIALS	TEST DATE	COMMENTS
P73/P74	138	EEOS	WEOS	440/5.0	JGB	83'	JTA	10-2	
P74/P75	138	EEOS	WEOS	440/5.0	JGB	83'	JTA	10-2	
P74/P76	097	EEOS	WEOS	450/4.0	LF	32'	JTA	10-2	
P75/P78	138	EEOS	WEOS	440/5.0	RP	83'	JTA	10-2	
P78/P79	138	EEOS	WEOS	440/5.0	JGB	85'	JTA	10-2	
P79/P80	138	EEOS	WEOS	440/5.0	JGB	86'	JTA	10-2	
P80/P81	138	EEOS	WEOS	440/5.0	JGB	87'	JTA	10-2	
P84/P77	097	EEOS	WEOS	450/4.0	LF	20'	JTA	10-2	
P76/P65	097	"	"	"	"	15'	JTA	10-2	
P67/P64	097	"	"	"	"	15'	JTA	10-2	
P59/P48	097	EEOS	WEOS	450/4.0	LF	61'	JTA	10-2	
P59/P58	"	"	"	"	"	12'	JTA	10-2	
P57/P60	"	"	"	"	"	21'	JTA	10-2	
P61/P57	"	"	"	"	"	5'	JTA	10-2	
P61/P55	"	"	"	"	"	92'	JTA	10-2	

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

SEAMING LOG

PROJECT NAME: Bennet
PROJECT NO.: 72040.009.092
DATE: 10-2-95

REVIEWED BY: JH
REVIEW DATE: 10-20-95

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (F) SPEED	TECH INITIALS	LENGTH	QA INITIALS	TEST DATE	COMMENTS
P338/P59	097	NEOS	SEOS	450/4.0	LF	52'	JA	10-2	234-97
P59/P60	138	NEOS	SEOS	440/5.0	JTB	59'	JA	10-2	424-138 DS-12 end of run
P60/P61	097	NEOS	SEOS	450/4.0	LF	61'	JA	10-2	24-97
P61/P62	138	NEOS	SEOS	440/5.0	JGB	62'	JA	10-2	62'-138
P62/P63	097	NEOS	SEOS	450/4.0	LF	62'	JA	10-2	38-97
P63/P64	138	NEOS	SEOS	440/5.0	JGB	63'	JA	10-2	125-138
P64/P65	097	NEOS	SEOS	450/4.0	LF	51'	JA	10-2	409-97
P65/P66	097	NEOS	SEOS	450/4.0	LF	32'	JA	10-2	491-97
P66/P67	097	NEOS	SEOS	440/4.0	JTB	66'	JA	10-2	
P67/P68	138	NEOS	SEOS	440/5.0	JGB	77'	JA	10-2	
P68/P69	097	NEOS	SEOS	450/4.0	LF	79'	JA	10-2	DS-13 mid
P69/P70	097	NEOS	SEOS	450/4.0	LF	82'	JA	10-2	
P70/P71	138	NEOS	SEOS	440/5.0	JGB	82'	JA	10-2	
P71/P72	138	NEOS	SEOS	440/5.0	JGB	85'	JA	10-2	
P72/P73	138	NEOS	SEOS	440/5.0	JGB	85'	JA	10-2	

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

SEAMING LOG

PROJECT NAME: Barnet
PROJECT NO.: 72040.009.092
DATE: 9-30-95
REVIEWED BY: JF
REVIEW DATE: 10-20-95

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (F) SPEED	TECH INITIALS	LENGTH	QA INITIALS	TEST DATE	COMMENTS
23/34	097	EEOS	WEOs	450/4	LF	22'	JF	10-1	1457 Duplicate
24/35	097	EEOS	WEOs	450/4	LF	22'	JF	10-1	Duplicate
25/36	097	EEOS	WEOs	450/4	LF	22'	JF	10-1	Duplicate
28/45	097	EEOS	WEOs	450/4	LF	22'	JF	10-1	Duplicate
30/44	097	EEOS	WEOs	450/4	LF	22'	JF	10-1	
31/46	097	EEOS	WEOs	450/4	LF	22'	JF	10-1	
31/44	097	EEOS	WEOs	450/4	LF	22'	JF	10-1	
32/46	097	EEOS	WEOs	450/4	LF	1'	JF	10-1	
32/47	097	EEOS	WEOs	450/4	LF	15'	JF	10-1	
33/47	097	EEOS	WEOs	450/4	LF	7'	JF	10-1	
33/48	097	EEOS	WEOs	450/4	LF	5'	JF	10-1	
18/34	097	EEOS	WEOs	450/4	LF	22'	JF	10-1	
17/34	097	EEOS	WEOs	450/4	LF	22'	JF	10-1	
16/34	097	EEOS	WEOs	450/4	LF	22'	JF	10-1	
14/34	097	EEOS	WEOs	450/4	LF	19'	JF	10-1	

SEAMING LOG

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: Bemmel
PROJECT NO.: 72040.009.092
DATE: 9-30-95

REVIEWED BY: JH
REVIEW DATE: 10-20-95

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (F) SPEED	TECH INITIALS	LENGTH	QA INITIALS	TEST DATE	COMMENTS
26/38	097	SBOS (3F)	NBOS (1F)	450/4	LF	22	JH	10-1	
27/39	097	EBOS (1F)	NBOS (1F)	450/4	LF	22	JH	10-1	
28/42	097	EBOS	NBOS	450/4	LF	22	JH	10-1	
13/34	097	SBOS	NBOS	450/4	LF	22	SDC	10-1	
12/34	097	SBOS	NBOS	450/4	LF	9	SDC	10-1	
12/35	097	SBOS	NBOS	450/4	LF	13	SDC	10-1	
11/35	097	SBOS	NBOS	450/4	LF	22	SDC	10-1	
10/35	097	SBOS	NBOS	450/4	LF	9	SDC	10-1	
10/36	097	SBOS	NBOS	450/4	LF	7	SDC	10-1	
10/37	097	SBOS	NBOS	450/4	LF	7	SDC	10-1	
9/37	097	SBOS	NBOS	450/4	LF	8	SDC	10-1	
8/37	097	SBOS	NBOS	450/4	LF	22	SDC	10-1	
8/38	097	SBOS	NBOS	450/4	LF	2	SDC	10-1	
7/38	097	SBOS	NBOS	450/4	LF	14	SDC	10-1	
0/38	097	SBOS	NBOS	450/4	LF	13	SDC	10-1	

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

SEAMING LOG

PROJECT NAME: Barnet
PROJECT NO.: 72040.009.092
DATE: 9-30

REVIEWED BY: JH
REVIEW DATE: 10-20-95

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (°F) SPEED	TECH INITIALS	LENGTH	Q.A. INITIALS	TEST DATE	COMMENTS
C / 40	097	EBOS	SBOS	450/4.0	LF	9	SOCL	10-1	72-97
5 / 40	097	EBOS	SBOS	450/4.0	LF	18	SOCL	10-1	90-97
5 / 41	097	EBOS	WBOS	450/4.0	LF	9	SOCL	10-1	49-97
4 / 41	097	EBOS	WBOS	450/4.0	LF	19	SOCL	10-1	118-97
4 / 43	097	EBOS	WBOS	450/4.0	LF	6	SOCL	10-1	124-97
3 / 43	097	EBOS	WBOS	450/4.0	LF	22	SOCL	10-1	146-97
3 / 50	097	EBOS	WBOS	450/4.0	LF	2	SOCL	10-1	142-97
2 / 50	097	EBOS	WBOS	450/4.0	LF	25	SOCL	10-1	173-97
1 / 46	097	EBOS	WBOS	450/4.0	LF	22	SOCL	10-1	154-97
40 / 41	097	NBOS	SBOS	450/4.0	LF	6	JMH	10-1	
41 / 43	097	NBOS	SBOS	450/4.0	LF	16	JH	10	
24 / 34	097	EBOS	SBOS	450/4.0	LF	3	JH	10-1	

Day 2

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: Reemel

PROJECT NO.: 72040.009.092

DATE: 9-30-95

REVIEWED BY: JH

REVIEW DATE: 10-20-95

SEAMING LOG

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (°) / SPEED	TECH INITIALS	LENGTH	QA INITIALS	TEST DATE	COMMENTS
31) P55/P54	138	EEOS	WEOS	440/5.0	JGB	20'	JA	10-24	70-138
32) P55/P54	097	SEOS	NEOS	450/4.0	LF	111'	JA	10-24	404-097
33) P55/P53	097	SEOS	NEOS	450/4.0	LF	21'	JA	10-24	425-097
34) P54/P53	097	SEOS	NEOS	450/4.0	LF	57	JA	10-24	442-097 DS-11
35) P48/P58	138	SEOS	NEOS	440/5.0	JGB	43'	JA	10-24	132-138
36) P48/P54	138	SEOS	NEOS	440/5.0	JGB	65'	JA	10-24	138-138
37) P48/P55	138	SEOS	NEOS	440/5.0	JGB	4'	JA	10-24	202-138
38) P48/P54	138	SEOS	NEOS	440/5.0	JGB	60'	JA	10-24	264-138
39) P48/P53	138	SEOS	NEOS	440/5.0	JGB	65'	JA	10-24	331-138
40) P48/P51	138	SEOS	NEOS	440/5.0	JGB	16'	JA	10-24	347-138
41) P49/P51	138	SEOS	NEOS	440/5.0	JGB	18'	JA	10-24	365-138
42) P34/P33	097	EEOS	WEOS	450/4.0	LF	20'	JA	10-24	21-097
43) P35/P24	"	"	"	"	"	21'	JA	10-24	42-097
44) P36/P5	"	"	"	"	"	21'	JA	10-24	63-097
45) P39/P42	097	NEOS	SEOS	450/4.0	LF	195'	JA	10-24	

1560 OAKBROOK DR
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

SEAMING LOG

PROJECT NAME: Bornel
PROJECT NO.: 72040.009.092
DATE: 9-30-95
REVIEWED BY: JH
REVIEW DATE: 10-20-95

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (°F)	TECH INITIALS	LENGTH	QA INITIALS	TEST DATE	COMMENTS
16 P50/P44	097	EE05	NE05	450/4.0	LF	21'	JH	9-30-95	252-097
17 P43/P50	138	SE05	NE05	440/5.0	JGB	12'	JH	9-30-95	272-138
18 P46/P50	097	SE05	NE05	450/4.0	LF	17'	JH	9-30-95	249-097
19 P46/P47	138	SE05	NE05	440/5.0	JGB	257'	JH	10-1-95	529-138 DS-2. Conly in run
20 P47/P48	097	SE05	NE05	450/4.0	LF	252'	JH	10-1-95	521Q End. DS-270E Midway 097 +125
21 P49/P48	138	EE05	WE05	440/5.0	JGB	22'	JH	10-1-95	270-138
22 P47/P49	097	SE05	NE05	450/4.0	LF	6'	JH	10-1-95	131-097
23 P52/P56	097	EE05	WE05	450/4.0	LF	28'	JH	10-1-95	153-097
24 P51/P59	138	SE05	NE05	440/5.0	JGB	90'	JH	10-1-95	320-138
25 P53/P59	138	EE05	WE05	440/5.0	JGB	22'	JH	10-1-95	342-138
26 P58/P59	097	SE05	NE05	450/4.0	LF	23'	JH	10-1-95	172-097
27 P58/P56	097	SE05	NE05	450/4.0	LF	15'	JH	10-1-95	191-097
28 P51/P53	138	SE05	NE05	440/5.0	JGB	141'	JH	10-1-95	BS-100(MW) 170 Midway 138
29 P57/P55	097	SE05	NE05	450/4.0	LF	25'	JH	10-1-95	212-097
30 P55/P56	097	SE05	NE05	450/4.0	LF	79'	JH	10-1-95	293-097

1560 OAKBROOK DR
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: Bernel
PROJECT NO.: 72040.009.092
DATE: 9-30-95

REVIEWED BY: 74
REVIEW DATE: 10-20-95
97 - 304' /
138 - 304'

SEAMING LOG

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (F) SPEED	TECH INITIALS	LENGTH	QA INITIALS	TEST DATE	COMMENTS
② P34/P35	097	NEOS	SEOS	450/4.0	LF	111'	JA	9-30	475 * 05-5
① P35/P36	138	NEOS	SEOS	440/5.0	JGB	150'	JA	9-30	208 - 138
③ P36/P37	138	EEOs	WEOS	440/5.0	JGB	208'	JA	9-30	208 - 138
④ P37/P38	138	NEOS	SEOS	440/5.0	JGB	322'	JA	9-30	310 - 138
⑤ P38/P39	138	NEOS	SEOS	440/5.0	JGB	156'	JA	9-30	496 * 05-4 138
⑥ P39/P40	097	EEOs	WEOS	450/4.0	LF	822'	JA	9-30	22 - 097
⑦ P40/P38	097	NEOS	SEOS	450/4.0	LF	171'	JA	9-30	21 - 097
⑧ P38/P39	097	NEOS	SEOS	450/4.0	LF	192'	JA	9-30	211 - 097
⑨ P41/42	138	EEOs	WEOS	440/5.0	JGB	221'	JA	9-30	22 - 138
⑩ P43/45	097	EEOs	WEOS	450/4.0	LF	251'	JA	9-30	250 - 097
⑪ P42/45	097	SEOS	NEOS	450/4.0	LF	281'	JA	9-30	281 - 097
⑫ P42/P43	097	SEOS	NEOS	450/4.0	LF	186'	JA	9-30	470 * 05-7 097
⑬ P44/P45	138	SEOS	NEOS	440/5.0	JGB	281'	JA	9-30	50 - 138
⑭ P44/P43	138	SEOS	NEOS	440/5.0	JGB	210'	JA	9-30	200 - 138
⑮ P44/P46	097	SEOS	NEOS	450/4.0	LF	231'	JA	9-30	231 - 097

REVIEWED
BY: SH
REVIEW
DATE: 10-18-95

SEAMING LOG

[illegible]

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: Bennet
PROJECT NO.: 72040.009.092
DATE: 9.29-95

REVIEWED BY: [Signature]
REVIEW DATE: 10-20-95

SEAMING LOG

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (F) SPEED	TECH INITIALS	LENGTH	QA INITIALS	TEST DATE	COMMENTS
P16/P17	D97	WEOS	EEO5	4.0	LF	54'	JA	9-24	F5 304'/047
P17/P18	138	WEOS	EEO5	4.5	JGB	55'	JA	9-29	F5 310'/0130
P18/P19	D97	WEOS	EEO5	4.0	LF	54'	JA	9-29	F5 430'/007
P19/P20	138	WEOS	EEO5	4.5	JGB	54'	JA	9-30	F5 452'/0138
P20/P21	D97	NEOS	SEOS	4.0	LF	54'	JA	9-28	F5 DS-8
P21/P22	138	NEOS	SEOS	4.5	JGB	55'	JA	9-28	F5 DS-4
P22/P23	D97	NEOS	SEOS	4.0	LF	57'	JA	9-29	F5 571'/097
P23/P24	D97	NEOS	SEOS	4.0	LF	58'	JA	9-29	F5 115'/097
P24/P25	138	NEOS	SEOS	4.5	JGB	56'	JA	9-29	F5 54'/118
P25/P26	D97	NEOS	SEOS	4.0	EA	53'	JA	9-29	F5 160'/097
P26/P27	138	NEOS	SEOS	4.5	JGB	50'	JA	9-29	F5 100'/138
P27/P28	D97	NEOS	SEOS	4.0	EA	47'	JA	9-29	F5 215'/097
P28/P29	D97	NEOS	SEOS	4.0	EA	47'	JA	9-29	F5 262'/097
P29/P30	D97	NEOS	SEOS	4.0	EA	50'	JA	9-29	F5 312'/097
P30/P31	138	NEOS	SEOS	4.5	JGB	51'	JA	9-29	F5 157'/118

10/2- 097 NEOS SEOS 4.0 10' JA 10-1

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1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

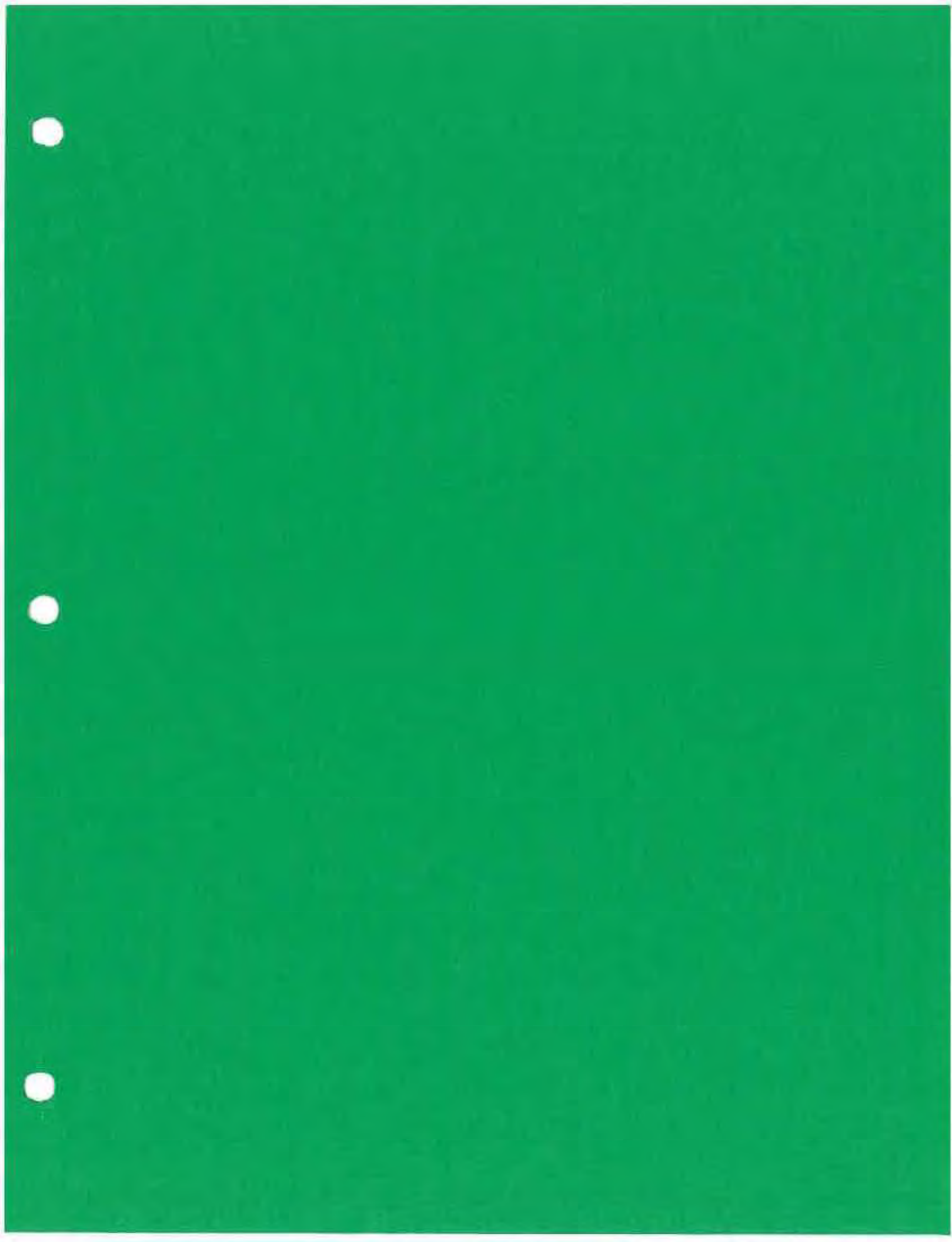
SEAMING LOG

PROJECT NAME: Bennet
PROJECT NO.: 72046.009.092
DATE: 9-29-95

REVIEWED BY: JH
REVIEW DATE: 10-20-95

SEAM NUMBER	MACHINE NUMBER	FROM	TO	TEMP (°) SPEED	TECH INITIALS	LENGTH	Q.A. INITIALS	TEST DATE	COMMENTS
① P1/P2	138	SEOS	NEOS	4.5	JGB	38'	JA	9-30 9-29	F5 DS-01
② P2/P3	138	SEOS	NEOS	4.5	JGB	38'	JA	9-30 9-29	F5
③ P3/P4	138	SEOS	NEOS	4.5	JGB	38'	JA	9-30 9-29	F5 76' / #138
④ P4/P5	138	SEOS	NEOS	4.5	JGB	39'	JA	9-30 9-29	F5 117' / #138
⑤ P5/P6	097	SEOS	NEOS	4.0	LF	40'	JA	9-30 9-29	F5 DS-02
⑥ P6/P7	097	SEOS	NEOS	4.0	LF	42'	JA	9-30 9-29	F5 42' / #97
⑦ P7/P8	138	SEOS	NEOS	4.5	JGB	47'	JA	9-30 9-29	F5 144' / #138
⑧ P8/P9	097	SEOS	NEOS	4.0	LF	51'	JA	9-30 9-29	F5 93' / #97
⑨ P9/P10	138	SEOS	NEOS	4.5	JGB	54'	JA	9-30 9-29	F5 221' / #138
⑩ P10/P11	097	WEOS	EEOS	4.0	LF	57'	JA	9-30 9-29	F5 150' / #97
⑪ P11/P12	097	WEOS	EEOS	4.0	LF	57'	JA	9-30 9-29	F5 207' / #97
⑫ P12/P13	138	WEOS	EEOS	4.5	JGB	57'	JA	9-30 9-29	F5 270' / #138
⑬ P13/P14	097	WEOS	EEOS	4.0	LF	59'	JA	9-30 9-29	F5 266' / #97
⑭ P14/P15	097	WEOS	EEOS	4.0	LF	64'	JA	9-30 9-29	F5 330' / #97
⑮ P15/P16	138	WEOS	EEOS	4.5	JGB	55'	JA	9-30 9-29	F5 343' / #138

P14 138 W205 EEOS 4.5 J 10' JA 10-1



APPENDIX R

DEFECT LOGS AND REPAIR LOGS

1560 OAKBROOK DR. SUITE 100 NORCROSS, GA 30093 PHONE: 404/447-4665 FAX: 404/447-9079	DEFECT LOG # <u>1</u> PROJECT NAME: <u>Barnes</u> PROJECT NO.: <u>77040.009.092</u> DATE: <u>9-29</u> DATE REVIEWED: <u>10-19</u> BY: <u>JH</u>
--	--

DEFECT #	DEFECT LOCATION	DEFECT TYPE	LOG DATE	QA INIT.	REPAIR DATE	TEST DATE	COMMENTS
A	P-06; 5' W of 6/7 @ Crest of slope (Cos)	ID	9-29	JH	10-2	10-2	
B	01/02; 20' N of SEOS	DS-1	9-30	JH	10-1	10-2	DS-1 W138
C	05/06; 10' N of SEOS	DS-2	9-30	JH	10-2	10-2	W097
D	20/21; 10' NW of Tce of slope (Tos)	DS-3	9-30	JH	10-2	10-2	W097
E	21/22; 15' SE of Crest of slope (Cos)	DS-4	9-30	JH	10-2	10-2	W138
F	34/39	T	9-30	JH	10-2	10-2	
G	34/35; 20' N of SEOS	DS-5	10-1	JH	10-2	10-2	W097
H	36/38; 50' N of SEOS	DS-6	10-1	JH	10-2	10-2	W138
I	42/43; 20' S of NEOS	DS-7	10-1	JH	10-1	10-2	W097
J	739; 65' S of N.E.O.P. 10' W of 38/39	FD	10-1	JH	10-1	10-2 REWORK	
K	01/02/46/50	T	10-1	JH	10-1	10-2	
M	02/03/43/50	T	10-1	JH	10-1	10-2	
N	03/04/41/42	T 4 panel	10-1	JH	10-1	10-2	intersection of same 04/43
P	06/038/040	T	10-1	JH	10-1	10-2	extends 5' E:W of 05/06/04-038/040 (25' - 106/07/38)
Q	03/04/41/42	T	10-1	JH	10-1	10-2	
R	04/05/41	T	10-1	JH	10-1	10-2	
S	04/05 04/05; 35' N of SEOS	ID	10-1	JH	10-1	10-2	Burnout
T	07/08/037/038	T	10-1	JH	10-2	10-2	
U	08/09/10/37	T	10-1	JH	10-1	10-2	all of same 09/037 4P inks
W	06/07 @ N.E.O.S in A.T.	ID	10-1	JH	10-1	10-2	
X	08/09; @ N.E.O.S.	ID	10-1	JH	10-1	10-2	
Y	10/35/36/37	T	10-1	JH	10-1	10-2	Covers A/36
Z	10/11/35	T	10-1	JH	10-1	10-2	

ID=INSTALLATION DAMAGE FD=FACTORY DAMAGE T=THREE PANEL INTERSECTION SD=SUBGRADE DAMAGE

Note: 2 WOK. no damage Note: 27 covers 05/039/041/042

DEFECT LOG # 2

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: Bonnel
PROJECT NO.: 77240.009.092
DATE: 10-9-30
DATE REVIEWED: 10-19 BY: JH

DEFECT #	DEFECT LOCATION	DEFECT TYPE	LOG DATE	QA. INIT.	REPAIR DATE	TEST DATE	COMMENTS
A	01/02	ID	9-29	JA	10-1	10-2	WELDER BURNOUT
B	10' S of 03/04 South end of panel P3	ID	9-29	JA	10-1	10-2	Installation crease
C	05/06	ID	9-29	JA	10-1	10-2	CREASE ON SEAM
D	8' S of 10/17 EAST END OF PANEL P17	ID	9-29	JA	10-2	10-2	CREASE
E	11' S of 10/17 EAST END OF PANEL P17	ID	9-29	JA	10-2	10-2	CREASE
F	15/16	ID	9-29	JA	10-1	10-2	WELDER BURNOUT
G	15/16	ID	9-29	JA	10-1	10-2	WELDER BURNOUT
H	14/15/16	T	9-29	JA	10-2	10-2	Three PANEL INT.
I	18/19/20/21/22/23	T	9-29	JA	10-1	10-2	T PANEL INT.
J	22/23	ID	9-29	JA	10-2	10-2	BURNOUT
K	38/37/34	T	9-30	JA	10-2	10-2	T PANEL
M	40/39/38	T	9-30	JA	10-1	10-2	T PANEL
N	45' S of NW 42/39	FD	9-30	JA	10-1	10-2	FACTORY DAMAGE LINER LOOK THIN
P	42/43/45	T	9-30	JA	10-2	10-2	T PANEL
Q	32' N of SOUTH END 43/44	ID	9-30	JA	10-2	10-2	WELDER BURNOUT
R	43/44/45	T	9-30	JA	10-2	10-2	T PANEL
S	40/42/39	T	9-30	JA	10-1	10-2	T PANEL
T	41/40/42	T	9-30	JA	10-1	10-2	T PANEL
U	43/41/42	T	9-30	JA	10-1	10-2	T PANEL
W	20' South of North end P43	ID	9-30	JA	10-1	10-2	CREASE IN PLASTIC
X	43/44/50	T	9-30	JA	10-1	10-2	T-PANEL
Y	46/44/50	T	9-30	JA	10-1	10-2	T-PANEL
Z	47/48/49	T	9-30	JA	10-2	10-2	T-PANEL

ID=INSTALLATION DAMAGE FD=FACTORY DAMAGE T=THREE PANEL INTERSECTION SD=SUBGRADE DAMAGE

1560 OAKBROOK DR. SUITE 100 NORCROSS, GA 30093 PHONE: 404/447-4665 FAX: 404/447-9079	DEFECT LOG # <u>3</u> PROJECT NAME: <u>Bonnel</u> PROJECT NO.: <u>72040.009.092</u> DATE: <u>9-29</u> DATE REVIEWED: <u>10-19</u> BY: <u>JH</u>
--	--

DEFECT #	DEFECT LOCATION	DEFECT TYPE	LOG DATE	QA INIT.	REPAIR DATE	TEST DATE	COMMENTS
A	51/53/53	T	9-29	JA	10-2	10-2	T-PANEL
B	53/53	ID	9-29	JA	10-2	10-2	WELDER BURNOUT
C	57/56/58	T	9-29	JA	10-2	10-2	T-PANEL
D	56/57/55	T	9-29	JA	10-2	10-2	T-PANEL
E	53/59/55	T	9-29	JA	10-1	10-2	T-PANEL
F	54/55/53	T	9-29	JA	10-2	10-2	T-PANEL
G	48/58/56	T	9-29	JA	10-2	10-2	T-PANEL
H	55/56/48	T	9-29	JA	10-2	10-2	T-PANEL
I	54/55/48	T	9-29	JA	10-1	10-2	T-PANEL
J	53/54/48	T	9-29	JA	10-2	10-2	T-PANEL
K	51/53/48	T	9-29	JA	10-2	10-2	T-PANEL
M	48/51/49	T	9-29	JA	10-2	10-2	T-PANEL
N	34/23/18	T	9-29	JA	10-1	10-2	T-PANEL
P	34/35/23/24	T	9-29	JA	10-2	10-2	"
Q	35/36/24/25	T	9-29	JA	10-2	10-2	"
R	36/25/26/58	T	9-29	JA	10-2	10-2	"
S	011/012/035	T	10-1	FT	10-2	10-2	
T	247; 15' N of Timber Section 33/47/48	FD	10-1	JH	10-2	10-2	
U	031/046, 8' E of WEOS	ID	10-1	JH	10-1	10-2	
W	012/034/035	T	10-1	JH	10-2	10-2	
X	012/013/034	T	10-1	JH	10-2	10-2	
Y	013/014/034	T	10-1	JH	10-2	10-2	
Z	014/016/034	T	10-1	JH	10-2	10-2	

ID=INSTALLATION DAMAGE FD=FACTORY DAMAGE T=THREE PANEL INTERSECTION SD=SUBGRADE DAMAGE

1340-95

DEFECT LOG # 4

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: BonnelPROJECT NO.: 72040.009.092DATE: 10-1DATE REVIEWED: 10-19BY: JH

DEFECT #	DEFECT LOCATION	DEFECT TYPE	LOG DATE	QA. INIT.	REPAIR DATE	TEST DATE	COMMENTS
A	032/047; 10' E. of WEOS	ID	10-1	JH	10-2	10-2	
B	016/017/034	T	10-1	JH	10-2	10-2	
C	017/018/034	T	10-1	JH	10-2	10-2	
D	018/023/034	T	10-1	JH	10-2	10-2	
E	018/019; C EEOs	ID	10-1	JH	10-2	10-2	
F	08/09/020/021/022/023	6 Panel Inter	10-1	JH	10-2	10-2	Note 018/023 between 42' & 47' has been extended
G	028/029/042/045	4 Panel Inter	10-1	JH	10-2	10-2	
H	029/030/044/045	4 Panel Inter	10-1	JH	10-2	10-2	
I	030/031/044/046	4 Panel Inter	10-1	JH	10-2	10-2	
J	P59 30' North of South section	ID	10-2	JA	10-2	10-2	
K	P78/P75 55' West of East end	ID	10-2	JA	10-2	10-2	WELDER BURNOUT
M	P48 60' South of North end	ID	10-2	JA	10-2	10-2	* Repaired *
N	P48/P51 25' South of North end	ID	10-2	JA	10-2	10-2	WELDER BURNOUT * Repaired *
P	P78 15' West of East end	ID	10-2	JA	10-2	10-2	HOLE IN UNDER ON SLOPE
Q	P80/P81 10' W of East end	ID	10-2	JA	10-2	10-2	WELDER BURNOUT
R	64/65/76/67	4-Panel	10-2	JA	10-2	10-2	4 PANEL INTERSECT
S	65/76/66	T	10-2	JA	10-2	10-2	T PANEL
T	77/76/66	T	10-2	JA	10-2	10-2	T-PANEL
U	59/60;	DS-12	10-2	JH	10-2	10-2	
W	68/69;	DS-13	10-2	JH	10-2	10-2	
X	53/54; 20' N of SEOS	DS-11	10-2	JH	10-2	10-2	
Y	51/53; 75' S of NEOS	DS-10	10-2	JH	10-2	10-2	
Z	47/48; 100' S of NEOS	DS-9	10-2	JH	10-2	10-2	

ID=INSTALLATION DAMAGE FD=FACTORY DAMAGE T=THREE PANEL INTERSECTION SD=SUBGRADE DAMAGE

Note ID extends to end of beam @ Bottom

DEFECT LOG # 5

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: Bonne 1
PROJECT NO.: 72040.009.092
DATE: 10-2-95
DATE REVIEWED: 10-19 BY: JH

DEFECT #	DEFECT LOCATION	DEFECT TYPE	LOG DATE	QA. INIT.	REPAIR DATE	TEST DATE	COMMENTS
A	59/33/48	T	10-2	JA	10-2	10-2	
B	59/48/58	T	10-2	JA	10-2	10-2	
C	60/59/58	T	10-2	JA	10-2	10-2	
D	60/58/57	T	10-2	JA	10-2	10-2	
E	61/60/57	T	10-2	JA	10-2	10-2	
F	61/57/55	T	10-2	JA	10-2	10-2	
G	55/61/62	T	10-2	JA	10-2	10-2	
H	52/55/61	T	10-2	JA	10-2	10-2	
I	62/52/63	T	10-2	JA	10-2	10-2	
J	52/51/63	T	10-2	JA	10-2	10-2	
K	64/63/51	T	10-2	JA	10-2	10-2	
M	64/51/67	T	10-2	JA	10-2	10-2	
N	51/67/68	T	10-2	JA	10-2	10-2	
P	68/69/51	T	10-2	JA	10-2	10-2	
Q	69/70/51	T	10-2	JA	10-2	10-2	
R	46/47 ^{55' South of NEOS}	DS-B	10-2	JH	10-2	10-2	
S	70/71/51	T	10-2	JA	10-2	10-2	
T	71/72/51	T	10-2	JA	10-2	10-2	
U	72/73/51	T	10-2	JA	10-2	10-2	
W	73/74/51	T	10-2	JA	10-2	10-2	
X	74/75/51	T	10-2	JA	10-2	10-2	
Y	75/78/51	T	10-1	JA	10-2	10-2	
Z	78/79/51	T	10-2	JA	10-2	10-2	

ID=INSTALLATION DAMAGE FD=FACTORY DAMAGE T=THREE PANEL INTERSECTION SD=SUBGRADE DAMAGE

DEFECT LOG # 6

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME: Bonnet
PROJECT NO.: 72040.009.092
DATE: 10-2
DATE REVIEWED: 10-19 BY: JH

DEFECT #	DEFECT LOCATION	DEFECT TYPE	LOG DATE	QA. INIT.	REPAIR DATE	TEST DATE	COMMENTS
A	79/80/51	T	10-2	JA	10-2	10-2	
B	80/81/51	T	10-2	JA	10-2	10-2	
C	80/81 SEOS	DSH	10-2	JH	10-2	10-2	
D	52 35' from SEOS	ID	10-2	JA	10-2	10-2	
E	P47 8' from SEOPanel	FD	10-2	JA	10-2	10-2	
F	P47 8' from SEOPanel	FD	10-2	JA	10-2	10-2	
G	P58 2' from SEOPanel	FD	10-2	JA	10-2	10-2	
H	01/46/47/82	T	10-9	JH	10-2	10-9	
I	47/49/82/83	T	10-9	JH	10-2	10-9	
J	49/51/83/84	T	10-9	JH	10-2	10-9	
K	51/81/84/85/87	5 Panel Inter	10-9	JH	10-2	10-9	
M	01/82; 25' N of SEOS	DS-15	10-9	JH	10-2	10-9	
N	01/046/007/002 thru 23/34/81	ID	10-9	JH	10-9	10-9	Insufficient over lap existing capped
P							
Q							
R							
S							
T							
U							
W							
X							
Y							
Z							

ID=INSTALLATION DAMAGE FD=FACTORY DAMAGE T=THREE PANEL INTERSECTION SD=SUBGRADE DAMAGE

1560 OAKBROOK DR. SUITE 100 NORCROSS, GA 30093 PHONE: 404/447-4665 FAX: 404/447-9079	DEFECT LOG # <u>7</u> PROJECT NAME: <u>Bonnel</u> PROJECT NO.: <u>72040.009.092</u> DATE: _____ DATE REVIEWED: _____ BY: _____
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DEFECT #	DEFECT LOCATION	DEFECT TYPE	LOG DATE	QA INIT.	REPAIR DATE	TEST DATE	COMMENTS
A							
B							
C							
D							
E							
F							
G							
H							
I							
J							
K							
M							
N							
P							
Q							
R							
S							
T							
U							
W							
X							
Y							
Z							

ID=INSTALLATION DAMAGE FD=FACTORY DAMAGE T=THREE PANEL INTERSECTION SD=SUBGRADE DAMAGE

1560 OAKBROOK DR. SUITE 100 NORCROSS, GA 30093 PHONE: 404/447-4665 FAX: 404/447-9079	DEFECT LOG # <u>8</u> PROJECT NAME: <u>Bonnell</u> PROJECT NO.: <u>72040.009.092</u> DATE: _____ DATE REVIEWED: _____ BY: _____
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DEFECT #	DEFECT LOCATION	DEFECT TYPE	LOG DATE	QA INIT.	REPAIR DATE	TEST DATE	COMMENTS
A							
B							
C							
D							
E							
F							
G							
H							
I							
J							
K							
M							
N							
P							
Q							
R							
S							
T							
U							
W							
X							
Y							
Z							

ID=INSTALLATION DAMAGE FD=FACTORY DAMAGE T=THREE PANEL INTERSECTION SD=SUBGRADE DAMAGE

1560 OAKBROOK DR. SUITE 100 NORCROSS, GA 30093 PHONE: 404/447-4665 FAX: 404/447-9079	DEFECT LOG # <u>9</u> PROJECT NAME: <u>Bonnel</u> PROJECT NO.: <u>72040.009.092</u> DATE: _____ DATE REVIEWED: _____ BY: _____
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DEFECT #	DEFECT LOCATION	DEFECT TYPE	LOG DATE	Q.A. INIT.	REPAIR DATE	TEST DATE	COMMENTS
A							
B							
C							
D							
E							
F							
G							
H							
I							
J							
K							
M							
N							
P							
Q							
R							
S							
T							
U							
W							
X							
Y							
Z							

ID=INSTALLATION DAMAGE
 FD=FACTORY DAMAGE
 T=THREE PANEL INTERSECTION
 SD=SUBGRADE DAMAGE

DEFECT LOG # 10

1560 OAKBROOK DR.
SUITE 100
NORCROSS, GA 30093
PHONE: 404/447-4665
FAX: 404/447-9079

PROJECT NAME:

Bonne /

PROJECT NO.:

72040.009.092

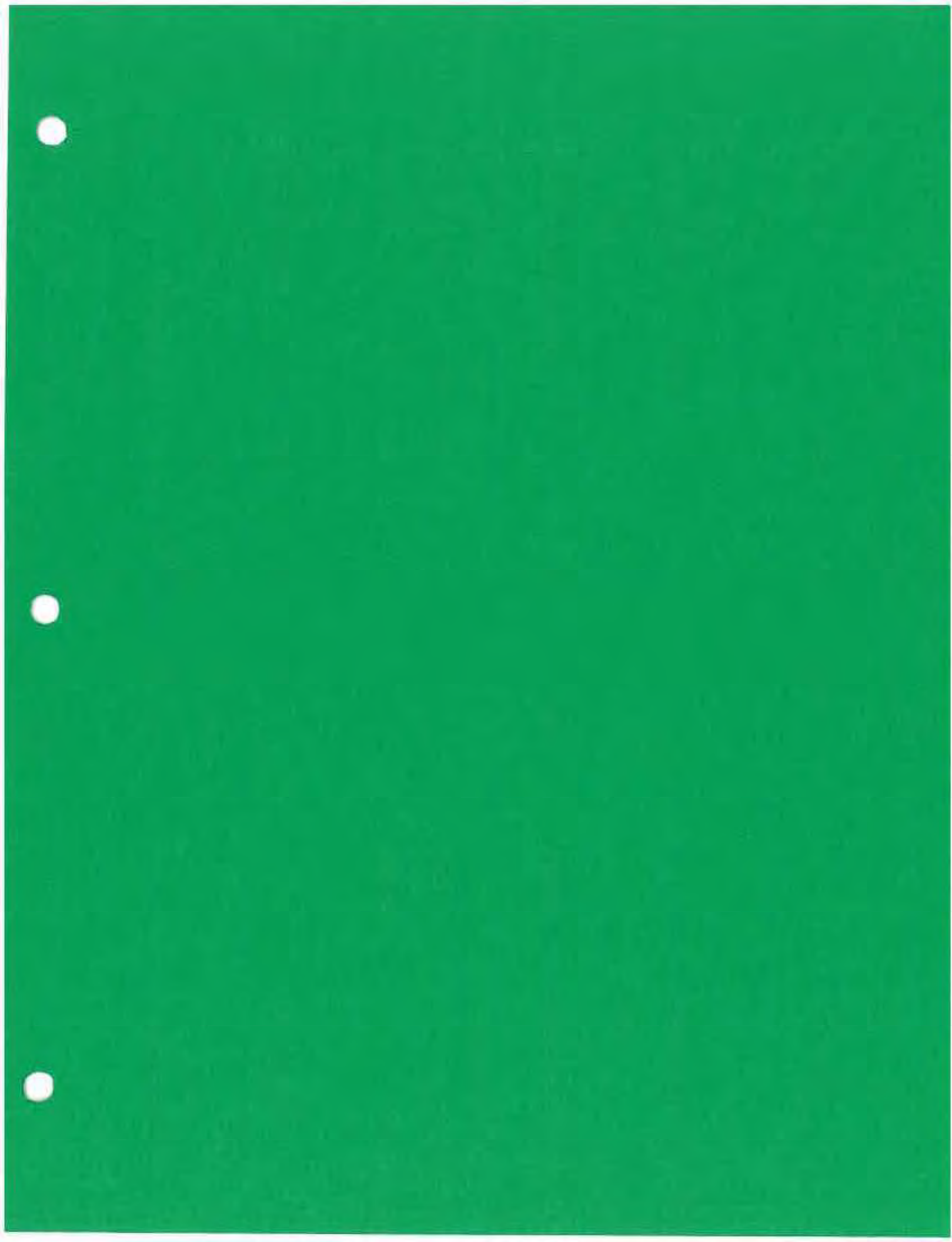
DATE:

DATE REVIEWED:

BY:

DEFECT #	DEFECT LOCATION	DEFECT TYPE	LOG DATE	QA INIT.	REPAIR DATE	TEST DATE	COMMENTS
A							
B							
C							
D							
E							
F							
G							
H							
I							
J							
K							
M							
N							
P							
Q							
R							
S							
T							
U							
W							
X							
Y							
Z							

ID=INSTALLATION DAMAGE FD=FACTORY DAMAGE T=THREE PANEL INTERSECTION SD=SUBGRADE DAMAGE



APPENDIX S

EMCON GEOCOMPOSITE TEST RESULTS

EMCON

Project: BONNEL

Proj. No. 72040.009.092

Client: EMCON NORCROSS

Date: 10-6-95

Sample: GEOCOMPOSITE REC'D 9-30-95 Roll#1348-95

GEOTEXTILE COMPONENT

PUNCTURE RESISTANCE ASTM D4833

Puncture Resist. (lbs.)	Specimen 1	Specimen 2	Specimen 3	Specimen 4	Specimen 5	Average
	199.81	198.31	198.25	157.06	165.68	183.82

GRAB BREAKING LOAD AND ELONGATION ASTM D4632

Specimen	Machine Direction		Cross Machine Direction	
	Breaking Load #'s	Apparent Elongation	Breaking Load #'s	Apparent Elongation
1	188.25	120.0	220.06	116.7
2	200.81	116.7	227.87	120.0
3	195.68	110.0	240.12	110.0
4	188.81	106.7	206.93	110.0
5	195.56	103.3	196.81	116.7
Average	189.42	111.3	218.36	114.7

Remarks: Apparent Elongation: The observed elongation, calculated as a percentage of the initial nominal gauge length of the specimen. Measured at Break.
Test Condition: As received

PERMITTIVITY (Constant Head Method) ASTM D4491

Average Permittivity, $s-1$ (QRt/hAt):	1.919
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Remarks: Soaked in closed container of deaired water at room temp. for a period of 2 hrs. (approx).
Four (4) specimens tested.

APPARENT OPENING SIZE ASTM D4751

Average:	60
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Remarks: Average of three specimens

TRAPEZOIDAL TEARING STRENGTH ASTM D4533

Specimen	Machine Direction Tearing Force #'s	Cross-Machine Direction Tearing Force #'s
1	90.50	121.75
2	105.31	141.56
3	95.43	150.06
4	126.75	131.93
5	98.75	93.56
Average	103.35	127.77

Tested By:

K.H./D.L.

Entered By:

K.H.

Checked By:

R.S.A.

EMCON

Project: BONNEL

Proj. No. 72040.009.092

Client: EMCON NORCROSS

Date: 10-6-95

Sample: GEOCOMPOSITE REC'D 9-30-95 Roll#1348-95

GEONET COMPONENT

	Specimen 1	Specimen 2	Specimen 3	Average
Carbon Black, % ASTM D1603	2.4676	2.3893	2.4617	2.4395

	Specimen 1	Specimen 2	Specimen 3	Average
Density ASTM D792	0.9581	0.9588	0.9580	0.9583

EMCON
HYDRAULIC TRANSMISSIVITY TEST
 CONSTANT HEAD TEST METHOD
 ASTM D4716

Project: BONNEL

Project No.: 72040.009.092

Client: EMCON NORCROSS

Date: 10-6-95

GEONET FROM GEOCOMPOSITE REC'D 9-30-95
 Roll#1348-95

	Compressive Normal Stress PSF	H	Q cc/sec.	Q m3/sec.	Lm	Wm	Temp. Corr.	Hydraulic Transmissivity $O = (QL/WH)m^2/sec.$ at 20°C
Trial 1	500	.1 .03048 m	3300/30	.000011	0.3048	0.3048	19°/1.025	3.699×10^{-3}
Trial 2	500	.1 .03048 m	3300/30	.000011	0.3048	0.3048	19°/1.025	3.699×10^{-3}
Trial 3	500	.1 .03048 m	3300/30	.000011	0.3048	0.3048	19°/1.025	3.699×10^{-3}

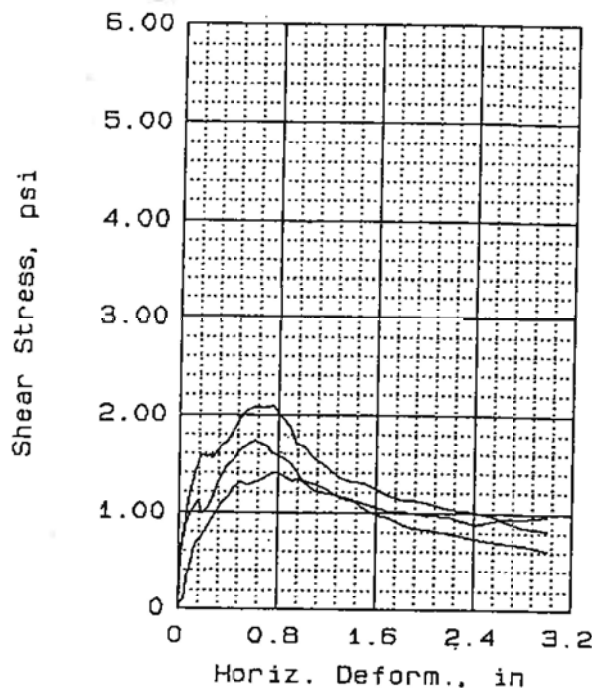
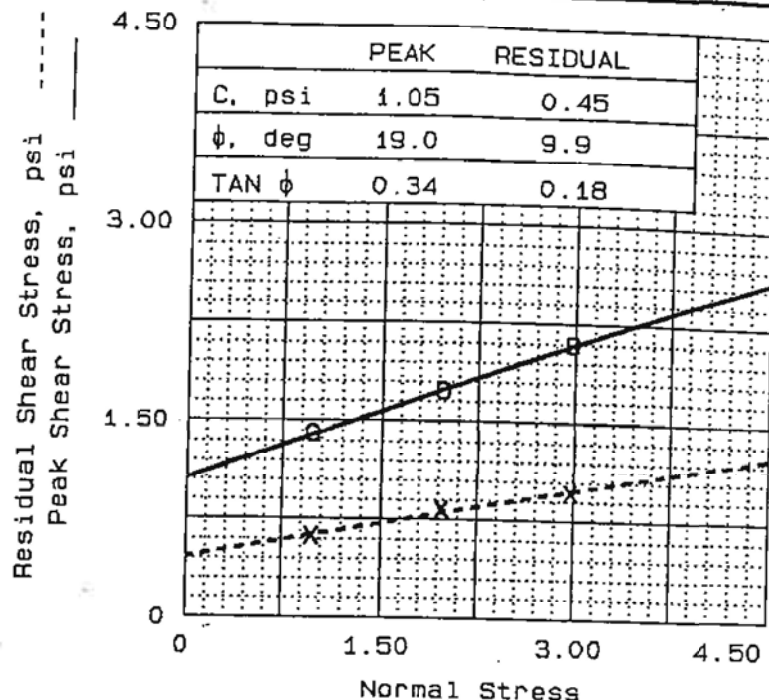
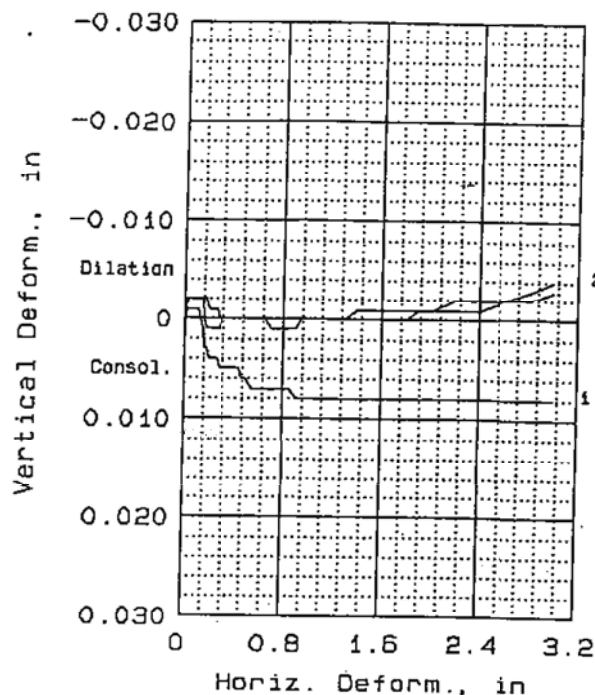
Remarks:

1. Tested with tap water.
2. Flow of water during the test, and water in two reservoirs for the duration of test setup.
3. Sample size: 14" x 12"
4. Duration of test: 1 hr. (10:00 to 11:00)
5. Test setup:

 Rigid steel plate

 0.20" GEONET
 (approx.)

 Rigid steel plate



SAMPLE NO.		1	2	3
INITIAL	SIDE LENGTH, in	11.82	11.82	11.82
	HEIGHT, in	0.25	0.25	0.25
AT TEST	SIDE LENGTH, in	11.82	11.82	11.82
	HEIGHT, in	0.20	0.20	0.20
NORMAL STRESS, psi		1.00	2.00	3.00
MAXIMUM SHEAR, psi		1.40	1.73	2.09
RESIDUAL SHEAR, psi		0.62	0.82	0.97
Strain rate, in/min		0.200	0.200	0.200

SAMPLE DATA
 SAMPLE TYPE: ASTM D5321
 DESCRIPTION: GEOCOMP. SOAKED 40
 MIN. BEFORE TESTING

REMARKS: GEOCOMP. CLAMPED TO
 BOTTOM METAL PLATE, TEXT HDPE
 GLUED TO PLYWOOD TOP BOX. NO
 WATER IN BOX DURING TEST.

FIG. NO:

CLIENT: EMCON NORCROSS

PROJECT: BONNEL

SAMPLE LOCATION: GEOCOMPOSITE (9-30-95)
 ROLL#1348-95 & 60 ML TEXTURED HDPE

PROJ. NO.: 72040.009 DATE: 10-6-95

DIRECT SHEAR TEST REPORT

EMCON

DIRECT SHEAR TEST

10-24-1995

Project Data

Project No.: 72040.009 Date: 10-6-95 Data file: BNL-GCTX
 Client: EMCON NORCROSS
 Project: BONNEL
 Sample location: GEOCOMPOSITE (9-30-95) ROLL#1348-95 & 60 ML TEXTURED HDPE
 Sample description: GEOCOMP. SOAKED 40 MIN. BEFORE TESTING
 Remarks: GEOCOMP. CLAMPED TO BOTTOM METAL PLATE, TEXT HDPE
 GLUED TO PLYWOOD TOP BOX. NO WATER IN BOX DURING TEST. Fig No.

Sample No. 1 Data

Type of sample: ASTM D5321

Specific Gravity= LL= PL= PI=

Sample Parameters	Before Test	At Testing
Side length, in	11.82	
Height, in	0.25	0.20

Test Data

Deformation dial constant= 1 in per input unit
 Primary load ring constant= 1 lbs. per input unit
 Secondary load ring constant= 0 lbs. per input unit
 Zero reading for secondary load ring= 0 input units
 Strain rate, in/min = 0.200
 Normal Stress= 1 psi

No.	HORIZONTAL		Load Dial Units	Load lbs.	Shear Stress psi	VERTICAL	
	Dial Reading	Def. in				Dial Reading	Def. in
0	0.0000	0.000	-8.00	0.0	0.00	0.0000	0.0000
1	0.0200	0.020	2.00	10.0	0.07	0.0010	-0.0010
2	0.0400	0.040	5.00	13.0	0.09	0.0010	-0.0010
3	0.0600	0.060	35.00	43.0	0.31	0.0010	-0.0010
4	0.0800	0.080	53.00	61.0	0.44	0.0010	-0.0010
5	0.1000	0.100	68.00	76.0	0.54	0.0010	-0.0010
6	0.1200	0.120	85.00	93.0	0.67	0.0000	0.0000
7	0.1400	0.140	90.00	98.0	0.70	-0.0010	0.0010
8	0.1600	0.160	90.00	98.0	0.70	-0.0030	0.0030
9	0.1800	0.180	97.00	105.0	0.75	-0.0030	0.0030
10	0.2000	0.200	103.00	111.0	0.79	-0.0040	0.0040
11	0.2200	0.220	109.00	117.0	0.84	-0.0040	0.0040
12	0.2400	0.240	115.00	123.0	0.88	-0.0040	0.0040
13	0.2600	0.260	122.00	130.0	0.93	-0.0040	0.0040
14	0.2800	0.280	128.00	136.0	0.97	-0.0050	0.0050
15	0.3000	0.300	133.00	141.0	1.01	-0.0050	0.0050
16	0.3200	0.320	137.00	145.0	1.04	-0.0050	0.0050
17	0.3400	0.340	144.00	152.0	1.09	-0.0050	0.0050
18	0.3600	0.360	148.00	156.0	1.12	-0.0050	0.0050

No.	HORIZONTAL		Load Dial Units	Load lbs.	Shear Stress psi	VERTICAL	
	Dial Reading	Def. in				Dial Reading	Def. in
	0.3800	0.380	151.00	159.0	1.14	-0.0050	0.0050
	0.4000	0.400	156.00	164.0	1.17	-0.0050	0.0050
21	0.4200	0.420	164.00	172.0	1.23	-0.0050	0.0050
22	0.4400	0.440	168.00	176.0	1.26	-0.0050	0.0050
23	0.4600	0.460	170.00	178.0	1.27	-0.0060	0.0060
24	0.4800	0.480	172.00	180.0	1.29	-0.0060	0.0060
25	0.5000	0.500	175.00	183.0	1.31	-0.0060	0.0060
26	0.5500	0.550	170.00	178.0	1.27	-0.0070	0.0070
27	0.6000	0.600	176.00	184.0	1.32	-0.0070	0.0070
28	0.6500	0.650	178.00	186.0	1.33	-0.0070	0.0070
29	0.7000	0.700	183.00	191.0	1.37	-0.0070	0.0070
30	0.7500	0.750	188.00	196.0	1.40	-0.0070	0.0070
31	0.8000	0.800	188.00	196.0	1.40	-0.0070	0.0070
32	0.8500	0.850	182.00	190.0	1.36	-0.0070	0.0070
33	0.9000	0.900	178.00	186.0	1.33	-0.0080	0.0080
34	0.9500	0.950	179.00	187.0	1.34	-0.0080	0.0080
35	1.0000	1.000	177.00	185.0	1.32	-0.0080	0.0080
36	1.1000	1.100	171.00	179.0	1.28	-0.0080	0.0080
37	1.2000	1.200	164.00	172.0	1.23	-0.0080	0.0080
38	1.3000	1.300	151.00	159.0	1.14	-0.0080	0.0080
39	1.4000	1.400	149.00	157.0	1.12	-0.0080	0.0080
40	1.5000	1.500	136.00	144.0	1.03	-0.0080	0.0080
41	1.6000	1.600	127.00	135.0	0.97	-0.0080	0.0080
42	1.7000	1.700	124.00	132.0	0.94	-0.0080	0.0080
43	1.8000	1.800	114.00	122.0	0.87	-0.0080	0.0080
	1.9000	1.900	110.00	118.0	0.84	-0.0080	0.0080
	2.0000	2.000	107.00	115.0	0.82	-0.0080	0.0080
46	2.2000	2.200	101.00	109.0	0.78	-0.0080	0.0080
47	2.4000	2.400	94.00	102.0	0.73	-0.0080	0.0080
48	2.6000	2.600	89.00	97.0	0.69	-0.0080	0.0080
49	2.8000	2.800	85.00	93.0	0.67	-0.0080	0.0080
50	3.0000	3.000	78.00	86.0	0.62	-0.0080	0.0080

DIRECT SHEAR TEST

10-24-1995

Project Data

Project No.: 72040.009 Date: 10-6-95 Data file: BNL-GCTX
 Client: EMCON NORCROSS
 Project: BONNEL
 Sample location: GEOCOMPOSITE (9-30-95) ROLL#1348-95 & 60 ML TEXTURED HDPE
 Sample description: GEOCOMP. SOAKED 40 MIN. BEFORE TESTING
 Remarks: GEOCOMP. CLAMPED TO BOTTOM METAL PLATE, TEXT HDPE
 GLUED TO PLYWOOD TOP BOX. NO WATER IN BOX DURING TEST. Fig No.

Sample No. 2 Data

Type of sample: ASTM D5321
 Specific Gravity= LL= PL= PI=
 Sample Parameters Before Test At Testing
 Side length, in 11.82
 Height, in 0.25 0.20

Test Data

Deformation dial constant= 1 in per input unit
 Primary load ring constant= 1 lbs. per input unit
 Secondary load ring constant= 0 lbs. per input unit
 Crossover reading for secondary load ring= 0 input units
 Strain rate, in/min = 0.200
 Normal Stress= 2 psi

No.	HORIZONTAL		Load Dial Units	Load lbs.	Shear Stress psi	VERTICAL	
	Dial Reading	Def. in				Dial Reading	Def. in
0	0.0000	0.000	-15.00	0.0	0.00	0.0000	0.0000
1	0.0200	0.020	67.00	82.0	0.59	0.0020	-0.0020
2	0.0400	0.040	95.00	110.0	0.79	0.0020	-0.0020
3	0.0600	0.060	110.00	125.0	0.89	0.0020	-0.0020
4	0.0800	0.080	120.00	135.0	0.97	0.0020	-0.0020
5	0.1000	0.100	128.00	143.0	1.02	0.0020	-0.0020
6	0.1200	0.120	134.00	149.0	1.07	0.0020	-0.0020
7	0.1400	0.140	141.00	156.0	1.12	0.0020	-0.0020
8	0.1600	0.160	137.00	152.0	1.09	0.0000	0.0000
9	0.1800	0.180	122.00	137.0	0.98	-0.0010	0.0010
10	0.2000	0.200	126.00	141.0	1.01	-0.0010	0.0010
11	0.2200	0.220	130.00	145.0	1.04	-0.0010	0.0010
12	0.2400	0.240	136.00	151.0	1.08	-0.0010	0.0010
13	0.2600	0.260	142.00	157.0	1.12	-0.0010	0.0010
14	0.2800	0.280	153.00	168.0	1.20	-0.0010	0.0010
15	0.3000	0.300	164.00	179.0	1.28	0.0000	0.0000
16	0.3200	0.320	171.00	186.0	1.33	0.0000	0.0000
17	0.3400	0.340	176.00	191.0	1.37	0.0000	0.0000
18	0.3600	0.360	183.00	198.0	1.42	0.0000	0.0000

No.	HORIZONTAL		Load Dial Units	Load lbs.	Shear Stress psi	VERTICAL	
	Dial Reading	Def. in				Dial Reading	Def. in
	0.3800	0.380	190.00	205.0	1.47	0.0000	0.0000
20	0.4000	0.400	194.00	209.0	1.50	0.0000	0.0000
21	0.4200	0.420	197.00	212.0	1.52	0.0000	0.0000
22	0.4400	0.440	201.00	216.0	1.55	0.0000	0.0000
23	0.4600	0.460	207.00	222.0	1.59	0.0000	0.0000
24	0.4800	0.480	210.00	225.0	1.61	0.0000	0.0000
25	0.5000	0.500	215.00	230.0	1.65	0.0000	0.0000
26	0.5500	0.550	222.00	237.0	1.70	0.0000	0.0000
27	0.6000	0.600	227.00	242.0	1.73	0.0000	0.0000
28	0.6500	0.650	224.00	239.0	1.71	0.0000	0.0000
29	0.7000	0.700	220.00	235.0	1.68	-0.0010	0.0010
30	0.7500	0.750	209.00	224.0	1.60	-0.0010	0.0010
31	0.8000	0.800	205.00	220.0	1.57	-0.0010	0.0010
32	0.8500	0.850	201.00	216.0	1.55	-0.0010	0.0010
33	0.9000	0.900	194.00	209.0	1.50	-0.0010	0.0010
34	0.9500	0.950	183.00	198.0	1.42	0.0000	0.0000
35	1.0000	1.000	169.00	184.0	1.32	0.0000	0.0000
36	1.1000	1.100	156.00	171.0	1.22	0.0000	0.0000
37	1.2000	1.200	152.00	167.0	1.20	0.0000	0.0000
38	1.3000	1.300	149.00	164.0	1.17	0.0000	0.0000
39	1.4000	1.400	142.00	157.0	1.12	0.0000	0.0000
40	1.5000	1.500	137.00	152.0	1.09	0.0000	0.0000
41	1.6000	1.600	132.00	147.0	1.05	0.0000	0.0000
42	1.7000	1.700	126.00	141.0	1.01	0.0000	0.0000
43	1.8000	1.800	126.00	141.0	1.01	0.0000	0.0000
	1.9000	1.900	124.00	139.0	0.99	0.0010	-0.0010
	2.0000	2.000	120.00	135.0	0.97	0.0010	-0.0010
46	2.2000	2.200	118.00	133.0	0.95	0.0010	-0.0010
47	2.4000	2.400	108.00	123.0	0.88	0.0010	-0.0010
48	2.6000	2.600	114.00	129.0	0.92	0.0020	-0.0020
49	2.8000	2.800	104.00	119.0	0.85	0.0030	-0.0030
50	3.0000	3.000	100.00	115.0	0.82	0.0040	-0.0040

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10-24-1995

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 GLUED TO PLYWOOD TOP BOX. NO WATER IN BOX DURING TEST. Fig No.

Sample No. 3 Data

Type of sample: ASTM D5321
 Specific Gravity= LL= PL= PI=
 Sample Parameters
 Side length, in Before Test At Testing
 Height, in 11.82 0.25 0.20

Test Data

Deformation dial constant= 1 in per input unit
 Primary load ring constant= 1 lbs. per input unit
 Secondary load ring constant= 0 lbs. per input unit
 Zero reading for secondary load ring= 0 input units
 Strain rate, in/min = 0.200
 Normal Stress= 3 psi

No.	HORIZONTAL		Load		Shear Stress psi	VERTICAL	
	Dial Reading	Def. in	Dial Units	lbs.		Dial Reading	Def. in
0	0.0000	0.000	-3.00	0.0	0.00	0.0000	0.0000
1	0.0200	0.020	83.00	86.0	0.62	0.0020	-0.0020
2	0.0400	0.040	113.00	116.0	0.83	0.0020	-0.0020
3	0.0600	0.060	139.00	142.0	1.02	0.0020	-0.0020
4	0.0800	0.080	163.00	166.0	1.19	0.0020	-0.0020
5	0.1000	0.100	176.00	179.0	1.28	0.0020	-0.0020
6	0.1200	0.120	194.00	197.0	1.41	0.0020	-0.0020
7	0.1400	0.140	205.00	208.0	1.49	0.0020	-0.0020
8	0.1600	0.160	213.00	216.0	1.55	0.0020	-0.0020
9	0.1800	0.180	218.00	221.0	1.58	0.0020	-0.0020
10	0.2000	0.200	217.00	220.0	1.57	0.0010	-0.0010
11	0.2200	0.220	216.00	219.0	1.57	0.0010	-0.0010
12	0.2400	0.240	219.00	222.0	1.59	0.0010	-0.0010
13	0.2600	0.260	214.00	217.0	1.55	0.0010	-0.0010
14	0.2800	0.280	219.00	222.0	1.59	0.0000	0.0000
15	0.3000	0.300	224.00	227.0	1.62	0.0000	0.0000
16	0.3200	0.320	225.00	228.0	1.63	0.0000	0.0000
17	0.3400	0.340	232.00	235.0	1.68	0.0000	0.0000
18	0.3600	0.360	235.00	238.0	1.70	0.0000	0.0000

No.	HORIZONTAL		Load Dial Units	Load lbs.	Shear Stress psi	VERTICAL	
	Dial Reading	Def. in				Dial Reading	Def. in
	0.3800	0.380	238.00	241.0	1.72	0.0000	0.0000
21	0.4000	0.400	243.00	246.0	1.76	0.0000	0.0000
22	0.4200	0.420	249.00	252.0	1.80	0.0000	0.0000
23	0.4400	0.440	255.00	258.0	1.85	0.0000	0.0000
24	0.4600	0.460	261.00	264.0	1.89	0.0000	0.0000
25	0.4800	0.480	267.00	270.0	1.93	0.0000	0.0000
26	0.5000	0.500	272.00	275.0	1.97	0.0000	0.0000
27	0.5500	0.550	284.00	287.0	2.05	0.0000	0.0000
28	0.6000	0.600	287.00	290.0	2.08	0.0000	0.0000
29	0.6500	0.650	286.00	289.0	2.07	0.0000	0.0000
30	0.7000	0.700	286.00	289.0	2.07	0.0000	0.0000
31	0.7500	0.750	289.00	292.0	2.09	0.0000	0.0000
32	0.8000	0.800	277.00	280.0	2.00	0.0000	0.0000
33	0.8500	0.850	268.00	271.0	1.94	0.0000	0.0000
34	0.9000	0.900	256.00	259.0	1.85	0.0000	0.0000
35	0.9500	0.950	234.00	237.0	1.70	0.0000	0.0000
36	1.0000	1.000	232.00	235.0	1.68	0.0000	0.0000
37	1.1000	1.100	214.00	217.0	1.55	0.0000	0.0000
38	1.2000	1.200	200.00	203.0	1.45	0.0000	0.0000
39	1.3000	1.300	186.00	189.0	1.35	0.0000	0.0000
40	1.4000	1.400	181.00	184.0	1.32	0.0010	-0.0010
41	1.5000	1.500	178.00	181.0	1.30	0.0010	-0.0010
42	1.6000	1.600	169.00	172.0	1.23	0.0010	-0.0010
43	1.7000	1.700	161.00	164.0	1.17	0.0010	-0.0010
	1.8000	1.800	155.00	158.0	1.13	0.0010	-0.0010
	1.9000	1.900	154.00	157.0	1.12	0.0010	-0.0010
	2.0000	2.000	150.00	153.0	1.10	0.0010	-0.0010
46	2.2000	2.200	142.00	145.0	1.04	0.0020	-0.0020
47	2.4000	2.400	138.00	141.0	1.01	0.0020	-0.0020
48	2.6000	2.600	129.00	132.0	0.94	0.0020	-0.0020
49	2.8000	2.800	128.00	131.0	0.94	0.0020	-0.0020
50	3.0000	3.000	132.00	135.0	0.97	0.0030	-0.0030



APPENDIX T

SERROT PROJECT COMPLETION FORM.

SERROT CORPORATION

PROJECT COMPLETION REPORT

To: WILLIAM L. BONNELL CO. INC Project Name BONNELL CLOSURE

25 BONNELL STREET Project Number 5303
NEWNAN GA. 30264 Date Complete 10/10/95

FINAL QUANTITIES			
ITEM	DESCRIPTION	QUANTITY	NOTES
	60 MIL HDT COVER.	138,359 SF	ALL QCQA IS
	GEO COMPOSITE COVER.	135,525 SF	DONE 100%

SERROT MATERIALS LEFT ON SITE		
DESCRIPTION	QUANTITY	NOTES
Full Roll #84075018	9,450 SF	
1 PARTIAL Roll #83125620	4,590 SF	→ BEST.
1 PARTIAL Roll #84075017	3,172.5 SF	

LIST ALL ROLL NUMBERS SEPERATELY AND ATTACH LIST TO THIS REPORT

otes:

The Project has been left in a clean orderly fashion acceptable to the customer.

HT (INITIALS)

DATE 10-10-95

THE WORK IS COMPLETE, SATISFACTORY, QUANTITIES AGREED TO AND ACCEPTED BY:

SERROT SUPERINTENDENT SIGNATURE

10/10/95

DATE

AUTHORIZED SIGNATURE

Environmental Super

TITLE

W. L. Bonnell

COMPANY NAME

10 Oct 95

DATE

fax message

fax message

fax message

BB&T INSURANCE SERVICES

TO: EPS

FAX #: 4043158509

DATE: 6/5/2014 4:18:10 PM

MESSAGE:

If you would prefer to receive your certificates via email, please contact the agency shown on the certificate to provide your email address for a faster delivery. Thank you!

Please contact your local BB&T Insurance Services office with any corrections, questions, or concerns.

This is a 3 page document (including cover sheet)

NOTE:

THE INFORMATION CONTAINED IN THIS FACSIMILE MESSAGE IS PRIVILEGED AND CONFIDENTIAL INFORMATION INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY NAMED ABOVE. IF THE READER OF THIS MESSAGE IS NOT THE INTENDED RECIPIENT, YOU ARE HEREBY NOTIFIED THAT ANY DISSEMINATION, DISTRIBUTION OR COPY OF THIS COMMUNICATION IS STRICTLY PROHIBITED. IF YOU HAVE RECEIVED THIS COMMUNICATION IN ERROR, PLEASE NOTIFY US IMMEDIATELY BY TELEPHONE AND RETURN THE ORIGINAL MESSAGE TO US. THANK YOU.

fax message

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fax message

Client#: 727890

67HUFFPIP

ACORD™

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

6/05/2014

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER BB&T - Barnes Insurance 417 East First Avenue PO Box 1327 Easley, SC 29641	CONTACT NAME: Barbara Garrett	
	PHONE (A/C, No, Ext): 864 442-4030 E-MAIL: bgarrett@bbandt.com ADDRESS:	FAX (A/C, No): 888 751-3016
INSURED Huff Piping Inc P O Box 14003 Greenville, SC 29610	INSURER(S) AFFORDING COVERAGE	
	INSURER A: Selective Insurance Company of	NAIC # 19259
	INSURER B: Bridgefield Casualty Insurance	10335
	INSURER C:	
	INSURER D:	
	INSURER E:	
INSURER F:		

COVERAGES

CERTIFICATE NUMBER:

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL SUBR INSR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	GENERAL LIABILITY ☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☒ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC		\$1619182	06/19/2014	06/19/2015	EACH OCCURRENCE \$1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$100,000 MED EXP (Any one person) \$10,000 PERSONAL & ADV INJURY \$1,000,000 GENERAL AGGREGATE \$3,000,000 PRODUCTS - COMP/OP AGG \$3,000,000
A	AUTOMOBILE LIABILITY ☒ ANY AUTO ☐ ALL OWNED AUTOS ☒ HIRED AUTOS ☒ SCHEDULED AUTOS ☐ NON-OWNED AUTOS		\$1619182	06/19/2014	06/19/2015	COMBINED SINGLE LIMIT (Ea accident) \$1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
A	☒ UMBRELLA LIAB ☒ OCCUR ☐ EXCESS LIAB ☐ CLAIMS-MADE DED ☒ RETENTION \$0		\$1619182	06/19/2014	06/19/2015	EACH OCCURRENCE \$2,000,000 AGGREGATE \$2,000,000
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N N N/A	19634707	06/19/2014	06/19/2015	☒ WC STATUTORY LIMITS ☐ OTH-ER E.L. EACH ACCIDENT \$500,000 E.L. DISEASE - EA EMPLOYEE \$500,000 E.L. DISEASE - POLICY LIMIT \$500,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CERTIFICATE HOLDER

CANCELLATION

EPS
Attn: Justin Vickery
1050 Crown Pointe Pkwy, Ste 550
Atlanta, GA 30338

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

William C. Kump

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